

TB SIG E28

WAR DEPARTMENT TECHNICAL BULLETIN

JAPANESE RADIO SET

Mobile Wireless Set B

WAR DEPARTMENT

12 MAY 1945

~~RESTRICTED~~

WAR DEPARTMENT,
WASHINGTON 25, D. C., 12 May 1945.

TB SIG E28, Japanese Radio Set Mobile Wireless Set B, is published for the information and guidance of all concerned.

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(For explanation of symbols see FM 21-6.)

SECTION I. DESCRIPTION

1. THE SET.

The Mobile Wireless Set B, referred to as "the set" or "set B," is a medium-frequency mobile transmitter and receiver unit. It is designed for use in vehicles and small naval craft as a coordinating or command set. It is used also for ground to air communication. It can be used in nets with like sets for ground communication purposes. To distinguish between its uses, it will be referred to either as a command set or as a net set. As a command set, it is installed with the Mobile Wireless Set C Mark I, both sets being controlled by the remote control box of the latter set (set "C"). For further information concerning Mobile Wireless Set C refer to TB SIG E 21. For transportation and temporary installation, the set is carried in two iron-bound wooden carrying boxes, the No. 1 Box and the No. 2 Box. The following table gives the size and weight of the boxes and the weight and dimensions of the major components of the set.

Box No.	Component	Dimensions (in.)			Weight (lbs)
		Height	Width	Depth	
1		20.0	28.5	10.0	40.0
	Model No. 147 Transmitter	8.6	9.0	8.0	19.75
	Antenna tuner	5.6	6.5	4.5	3.5
	Model No. 147 Receiver	8.75	11.12	8.12	24.75
	Model No. 147 Dynamotor	8.5	10.6	7.0	24.75
2		20.0	28.5	10.0	40.0
	Receiver coil box	7.25	5.6	5.12	5.25

If desired, control of the transmitter output can be obtained over the entire frequency range of the set.

(1) *Oscillator.* The oscillator stage can be operated as a self-excited or a crystal-locking Hartley circuit. Two channels of operation, referred to as channel A and channel B, are available on either

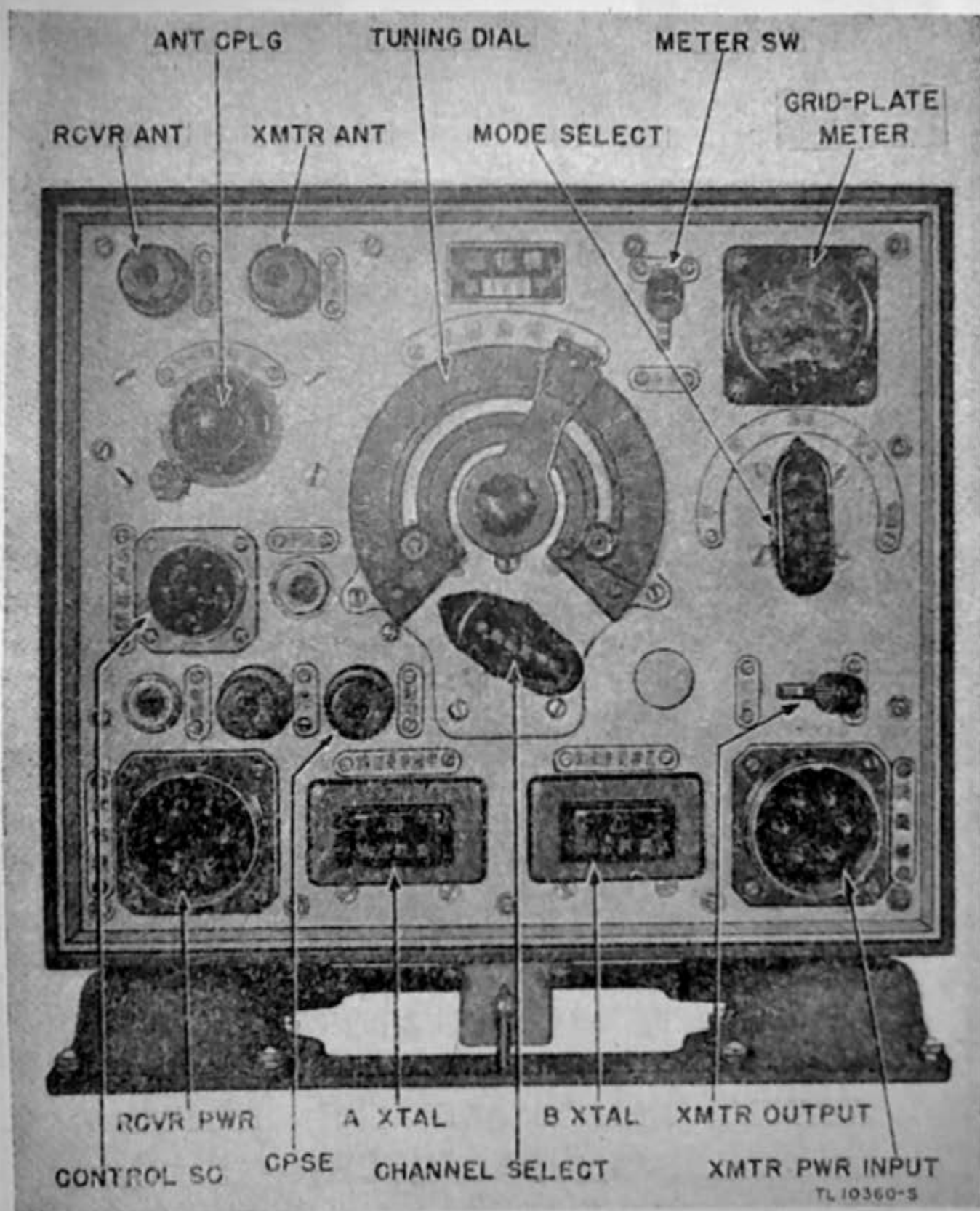


Figure 10. Model 147 Transmitter, view of control panel.

self-excited or crystal operation. On inserting the proper crystal in either of the two crystal compartments on the front panel, the oscillator circuit changes automatically from self-excited to crystal operation. Change-over from channel A to channel B is accom-

plished by turning the channel selector switch to the proper channel marking. Two-channel operation can be obtained on self-excited operation by adjusting the two preset locks on the tuning dial to the desired frequencies. As in crystal operation, channel change-over is accomplished by turning the frequency selector-switch to

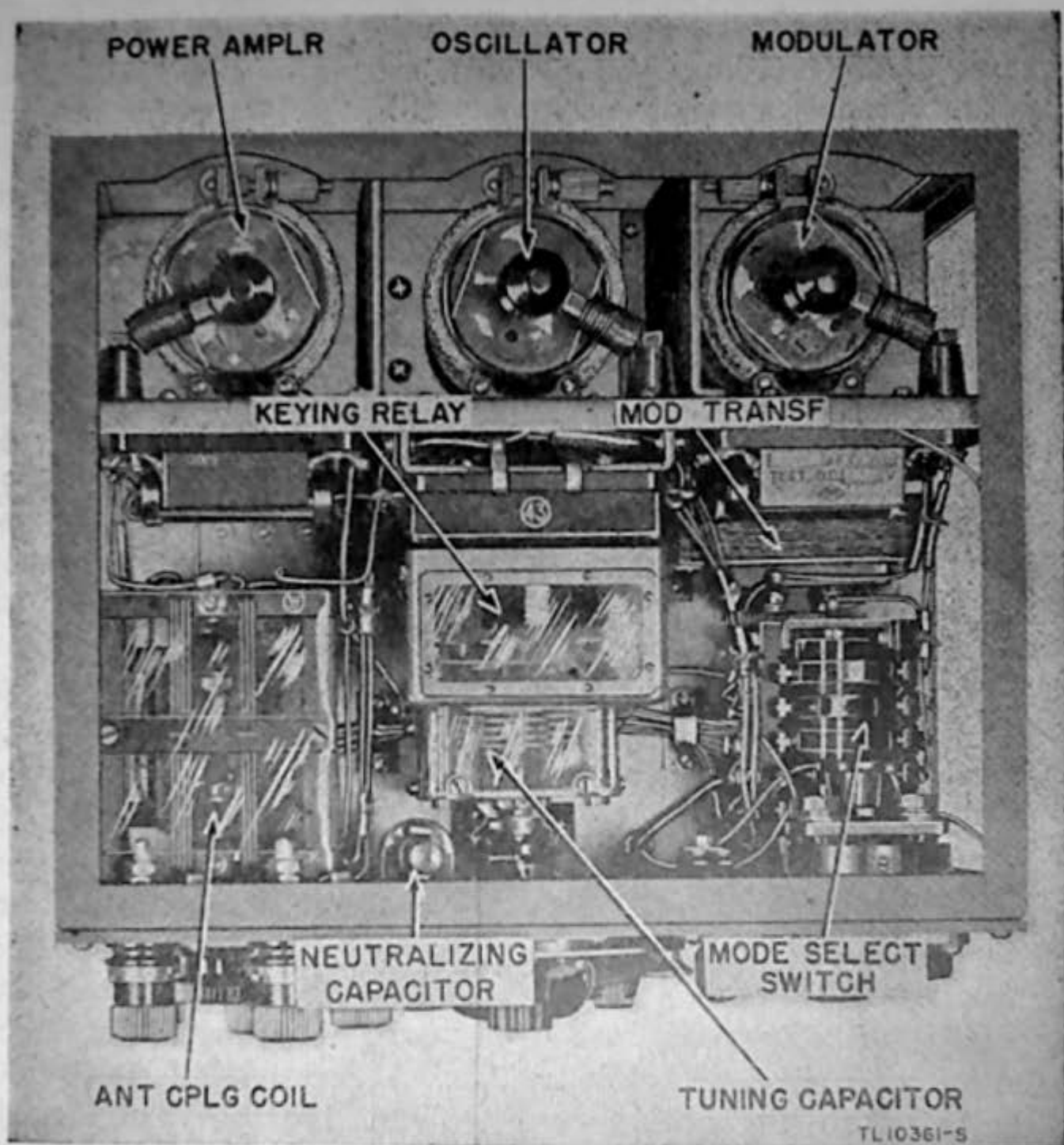


Figure 11. Model 147 Transmitter, top view of chassis, panel removed.

the proper channel marking. The test key on the panel of the transmitter allows screen and plate voltage to be applied only to the oscillator stage, thus enabling the operator to neutralize the power amplifier, or to calibrate the receiver, without dismantling the set.

(2) *Power Amplifier.* The power amplifier is of the conventional tuned-plate type. A high-power, low-power switch places a resistor in series with the screen grid and reduces the total power

output approximately 4 watts. Variable coupling to the antenna provides a complete control on the power output. The keying relay (fig. 11) provides antenna change-over from receiver to transmitter during transmitter operation. Tuning of the power amplifier is ganged with the oscillator.

(3) *Modulator*. A single UY 807A pentode tube functions as a plate modulator for both tone and voice operation. Sidetone is supplied to the receiver headset. On c-w operation, the modulator tube functions as an audio oscillator and is keyed with the oscillator and power amplifier. The proper value of audio voltage for sidetone is applied to the receiver headset through a suitable resistor and capacitor combination. The proper microphone voltage for voice operation is secured by utilizing the voltage drop across the filament of the oscillator tube. For voice modulation, the mode selector switch is turned to the voice position. Pressing the press-to-talk switch in the microphone and headset connecting cord actuates the keying relay, and talking into the microphone modulates the transmitter. By installing the microphone unit in the proper assembly, it will serve as either a hand or throat microphone.

5. MODEL NO. 147 RECEIVER.

a. *Physical*. The nameplate of the Model No. 147 Receiver, referred to as "the receiver," and its American equivalent are shown in figure 12. Figure 13 is a view of the receiver front panel with all parts and controls clearly labeled. Chassis parts are symmetrically laid out on an aluminum floor plate held in a highly polished, spot-welded, steel-angle frame. The entire chassis fits into an aluminum cabinet and is held in place by two snap latches which engage the steel frame at the rear of the cabinet. For transport, the cabinet fits into an iron open-work frame which is shock-mounted by four feet set in rubber. A rectangular sheet-metal frame bolted to the shock mounting forms the base plate for the entire unit. A latch at the lower front of the protecting framework holds the receiver cabinet in place. The exterior of the receiver unit is painted the regulation Japanese army brown. In transport, the panel of the receiver is protected by a steel cover (fig. 3) with openings to allow access to the operating controls. The tube shields are of the screw-in type with a slotted cap for the pentode control grid lead. The i-f (intermediate-frequency) trimmer capacitor adjusting screws, accessible from the top of the chassis, are number-coded, as are all parts of the set. All wiring is short and all parts are securely mounted. The receiver is not moistureproofed.

b. Electrical. The receiver is a six-tube, superheterodyne type, tuning from 1,500 to 5,500 kc using 3 sets of plug-in coils. One set of coils is always kept in the set, while the other two sets are kept in the receiver coil box in the No. 2 Box. The frequency coverage of each coil is plainly marked in Arabic numerals. Six UT 6F7 tubes used in the circuit give equivalent operation of 12 tubes. Figure 14 is a block diagram of the receiver. The circuit from antenna to headset is as follows:

(1) *R-f Amplifier.* Two separate r-f (radio-frequency) channels are used, each channel having an r-f amplifier, a mixer and an h-f (high-frequency) oscillator tube. The tuning controls for each channel, A and B, are brought out on opposite sides of the panel and labeled with the corresponding channel symbol. The h-f oscillator sections of both channels operate as either self-excited or crystal-locking Hartley circuits, change-over being accomplished by oscillator selector switches which short the crystal in each of the oscillator grid circuits. The output of either or both channels can be fed to the i-f amplifier (400 kc) by means of the channel selector switch at the center of the panel. The a-v-c (automatic-volume-control) voltage is applied to either channel according to the position of the channel selector switch, and is removed from both circuits when both amplifiers are used. A d-c (direct-current) bias is applied to both r-f amplifier grids at all times. By means of separate r-f amplifier and mixer grid trimmer adjusting screws accessible from the front panel, the receiver can be aligned on channels A and B without removing the chassis from the cabinet.

(2) *I-f Amplifier.* A single stage of i-f amplification employing the pentode section of a UT 6F7 is used. Sensitivity of this stage is controlled by the gain control potentiometer which varies the d-c grid bias. The i-f input transformer (fig. 15) to this stage has two tuned primary windings, one for the plate circuit of each mixer tube.

(3) *Detector and Avc.* The triode section of one of the UT 6F7 tubes functions as a combined detector and a-v-c tube. The grid and cathode elements of the tube are arranged in a conventional diode detector circuit. The i-f signal is applied to the triode plate through a capacitor and the rectified direct current is filtered and applied to the grids of the r-f amplifier and mixer tubes as a-v-c voltage.

(4) *Beat-frequency Oscillator.* The bfo (beat-frequency oscillator) stage uses the triode section of one of the UT 6F7 tubes as a Hartley oscillator. The output is inductively coupled to the detector stage by a separate winding on the detector i-f transformer. A switch on the front panel accomplishes the change from c-w to voice reception by removing the bfo tube plate voltage. The bfo

乙 機 線 無 輻 車

第 [REDACTED] 号

機 信 受 型 号 七 四 一

第 186 号

製 月 二 年 一 八 和 昭

東  京

社 會 式 株 機 電 線 無 京 東

(M 6 型 196 号)

MOBILE WIRELESS SET B

SERIAL NO.

MODEL NO. 147 RECEIVER

SERIAL NO.

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

(MODEL M6 NO. 196)

TL10362-5

Figure 12. Model 147 Receiver nameplate and nameplate translation.

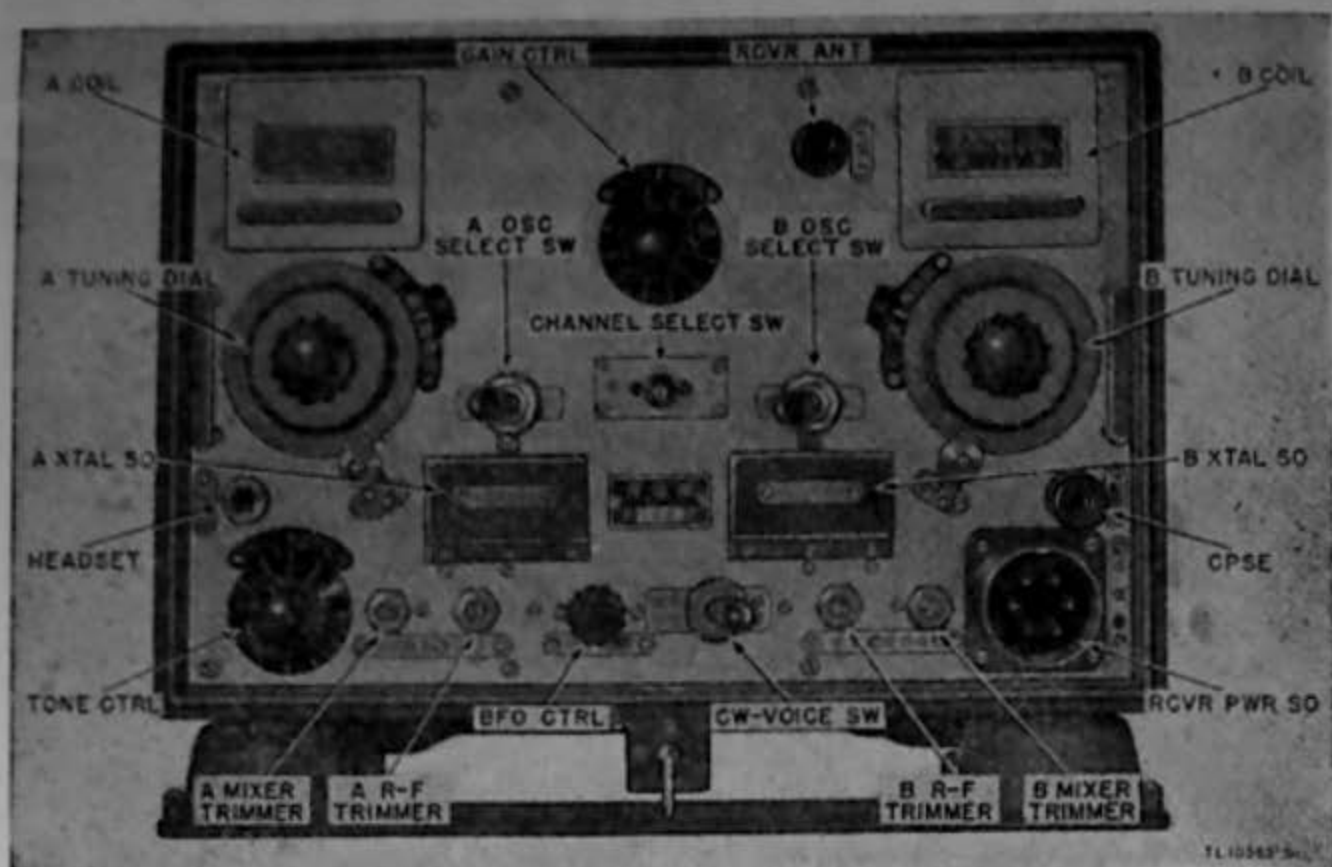


Figure 13. Model 147 Receiver, view of control panel.

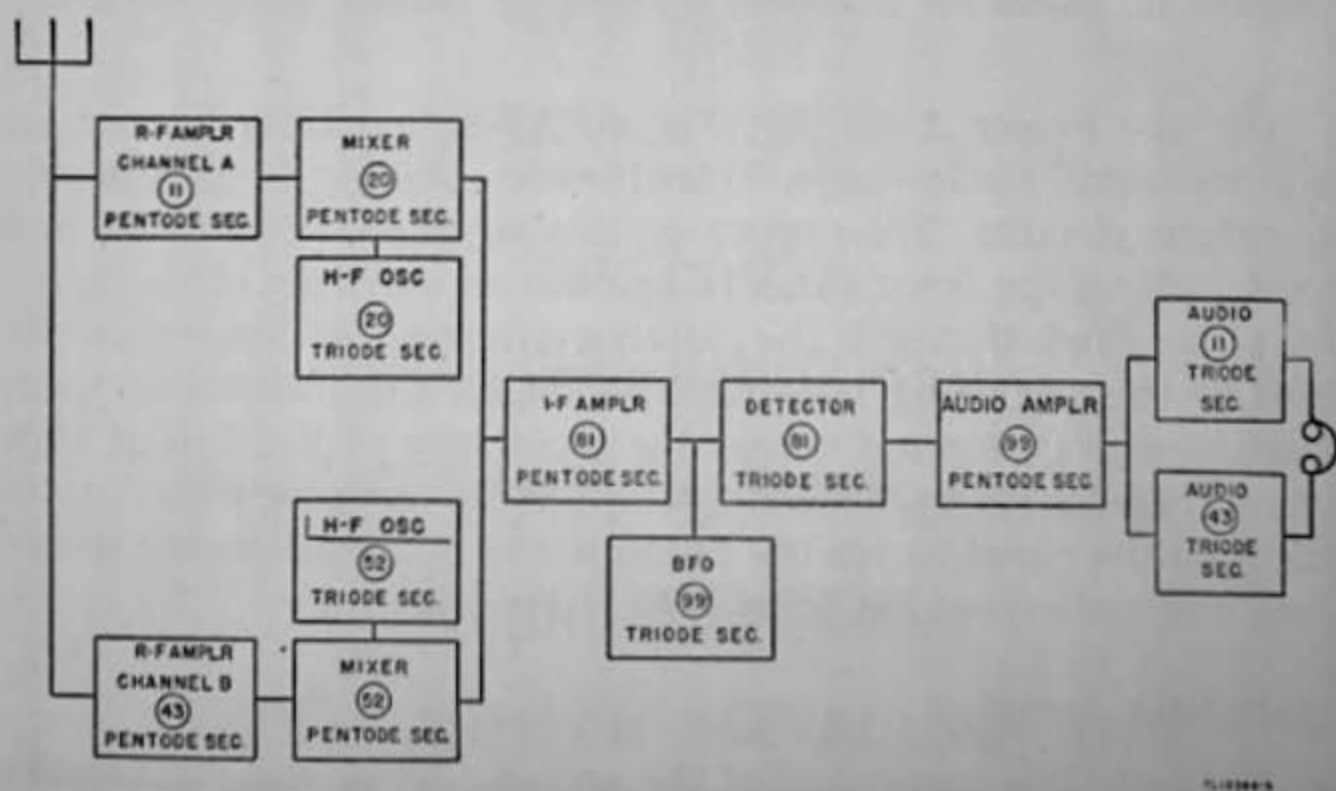


Figure 14. Model 147 Receiver, block diagram.

control varies the bfo grid trimmer capacitor to provide a pitch control of the audio signal when receiving c-w signals.

(5) *A-f Voltage Amplifier.* The a-f (audio-frequency) voltage amplifier uses the pentode section of one of the UT 6F7 tubes in a conventional circuit. The detector is resistance-coupled to the voltage amplifier. The output of the voltage amplifier is transformer-coupled to the push-pull audio stage.

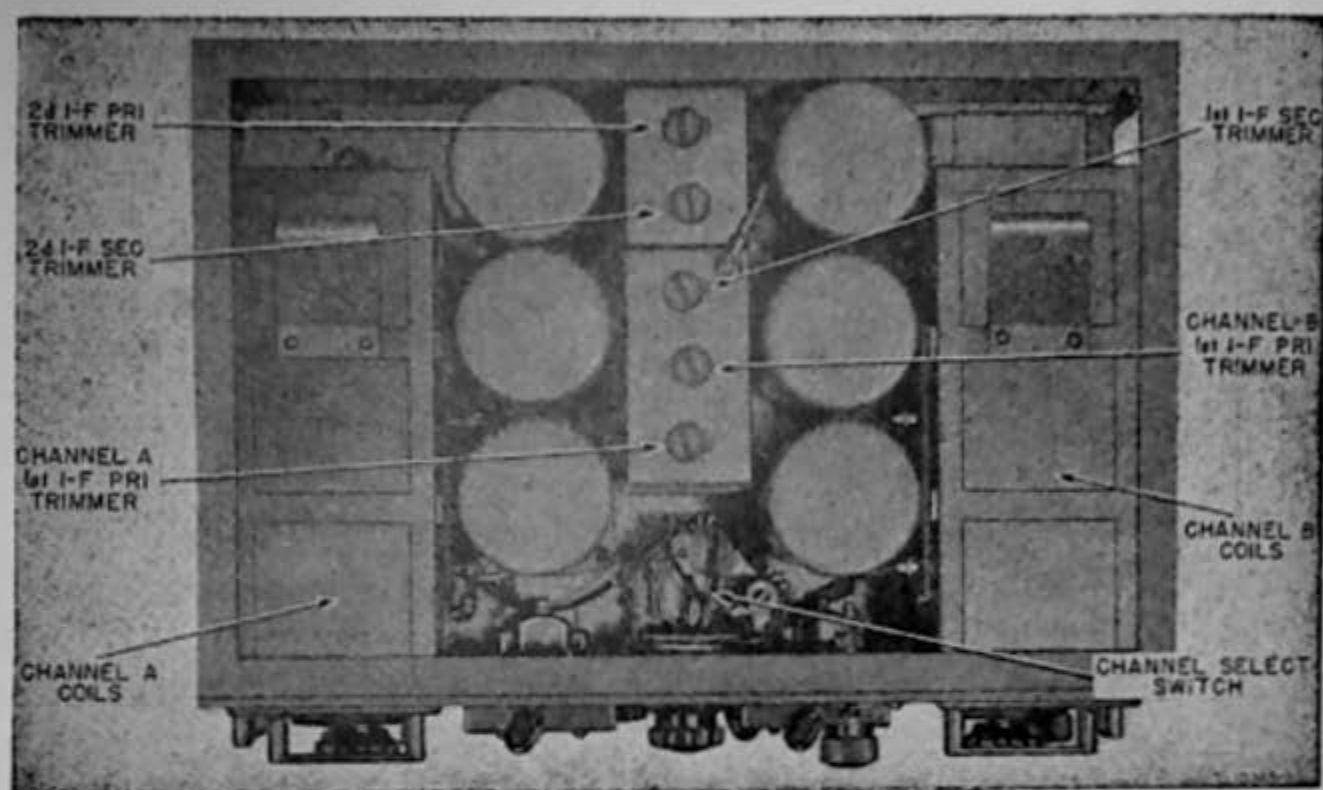
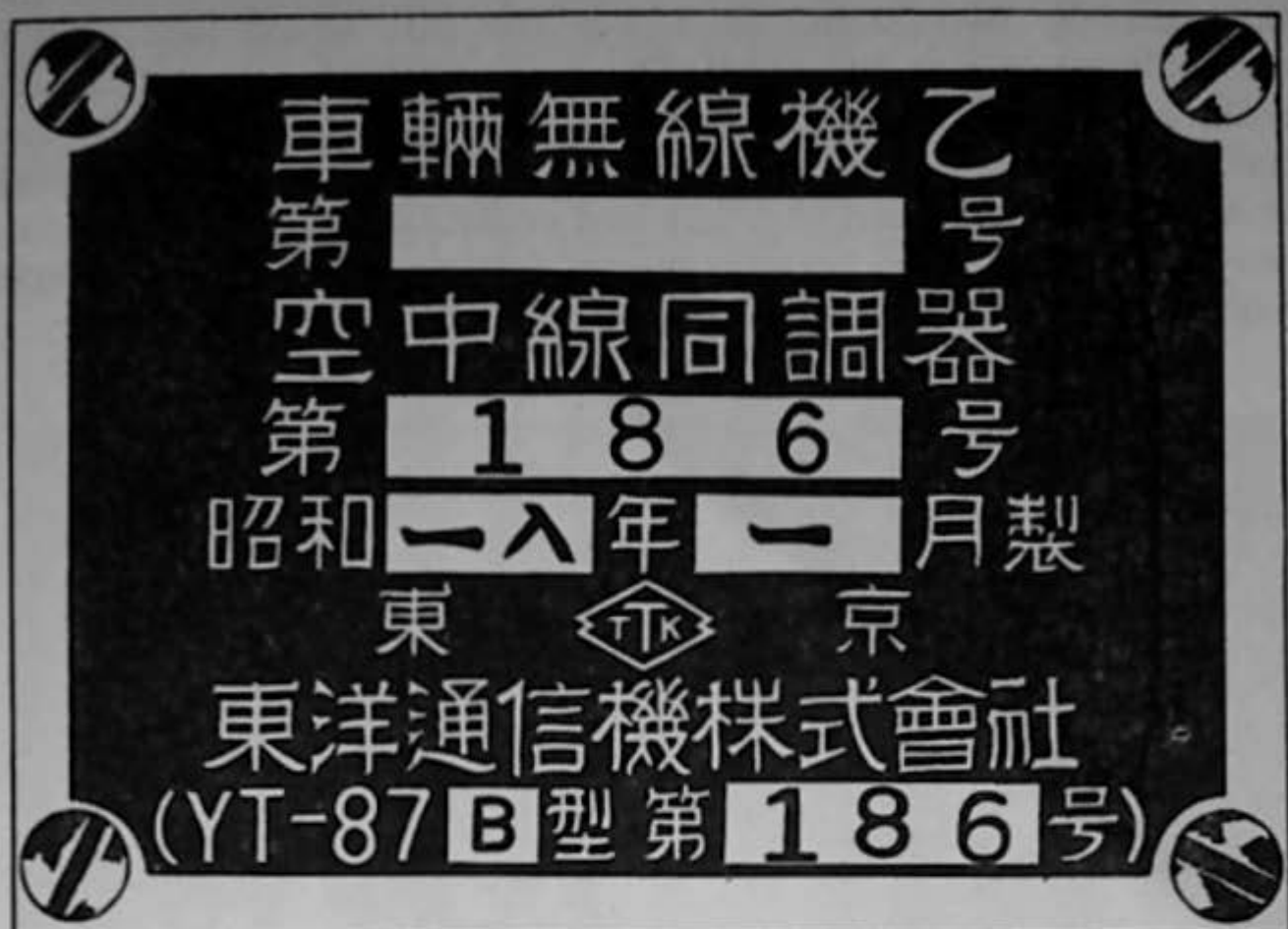


Figure 15. Model 147 Receiver, top view of chassis, panel removed.

(6) *A-f Power Amplifier.* The a-f power amplifier is a conventional push-pull audio stage. Transformer coupling is used in input and output circuits. The output of this stage is wired to an open-circuit jack on the front panel to operate an extra set of earphones; it is also wired through the receiver-transmitter interconnecting cables to the microphone-headset socket on the transmitter panel. A capacitor is connected across the secondary of the output transformer to peak the audio voltage output for c-w operation. A tone control on the panel varies the resistance of a potentiometer shunted across the audio-peaking capacitor.

6. ANTENNA TUNER.

a. *Physical.* The nameplate of the antenna tuner and its American equivalent are shown in figure 16. Figure 17 is a view of the antenna tuner front panel with all parts and controls clearly labeled. All the components of the antenna tuner are mounted on a bakelite panel fitted into a brown, wooden case. The panel is secured in the



MOBILE WIRELESS SET B

SERIAL NO.

ANTENNA TUNER

SERIAL NO.

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

(MODEL YT-87B SERIAL NO. 186)

TL10366-S

Figure 16. Antenna Tuner nameplate and nameplate translation.

case by two spring clips on the side of the case which snap over the panel, and by two latches on top of the case which lock around two binding posts on the panel. The antenna tuner can be mounted on the receiver protecting frame (fig. 34) and held in place by two studs. The antenna-loading variometer and antenna-loading capacitor are geared together (fig. 18) and controlled by a common dial. Two preset locks provide the means of setting the dial at the proper frequency for operation on either A or B transmitter channels.

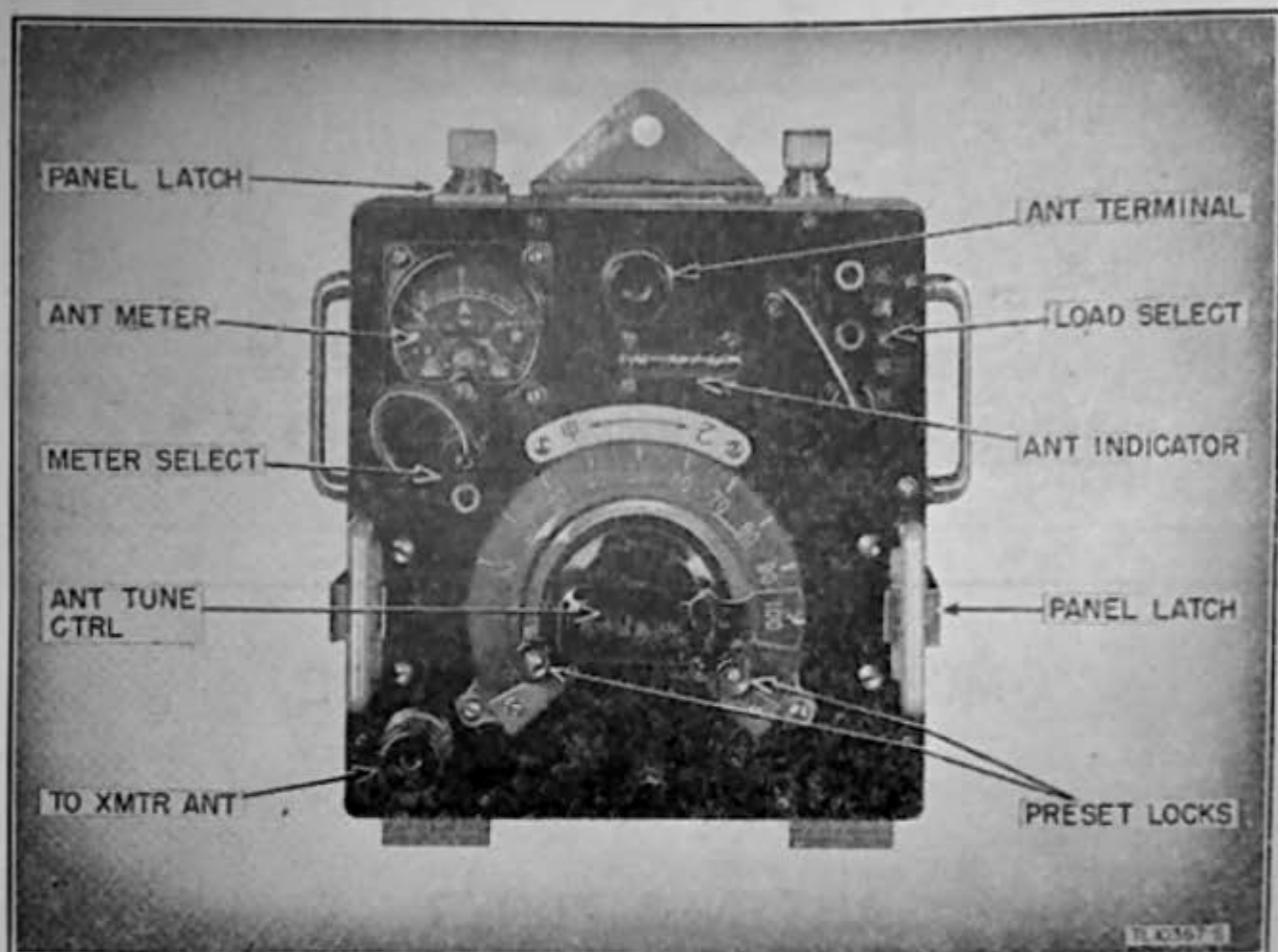


Figure 17. Antenna Tuner, view of control panel.

b. Electrical. Various lengths of antenna can be matched to the transmitter when the antenna tuner is used. Electrically, the antenna tuner provides a means of shortening or lengthening an antenna, so that its effective length matches the output frequency or some harmonic of the transmitter frequency. Basically, the antenna tuner is composed of an r-f meter, a capacitor, and a variometer, all connected in series. On the panel of the antenna tuner are two jumpers and a number of pin jacks. By placing the jumpers in the associated pin jacks the electrical changes noted below can be made:

(1) *Antenna Meter.* Below the antenna meter are two pin jacks, labeled 1.5 and 3A. The 1.5 or 3-ampere meter range is selected by placing the jumper pin in the appropriate jack.

(2) *Antenna-loading Selector Jacks.* On the upper right of the panel are three pin jacks labeled 1, 2, and 3.

(a) *Pin 1.* When the jumper is in pin jack 1, the antenna-loading capacitor is shorted.

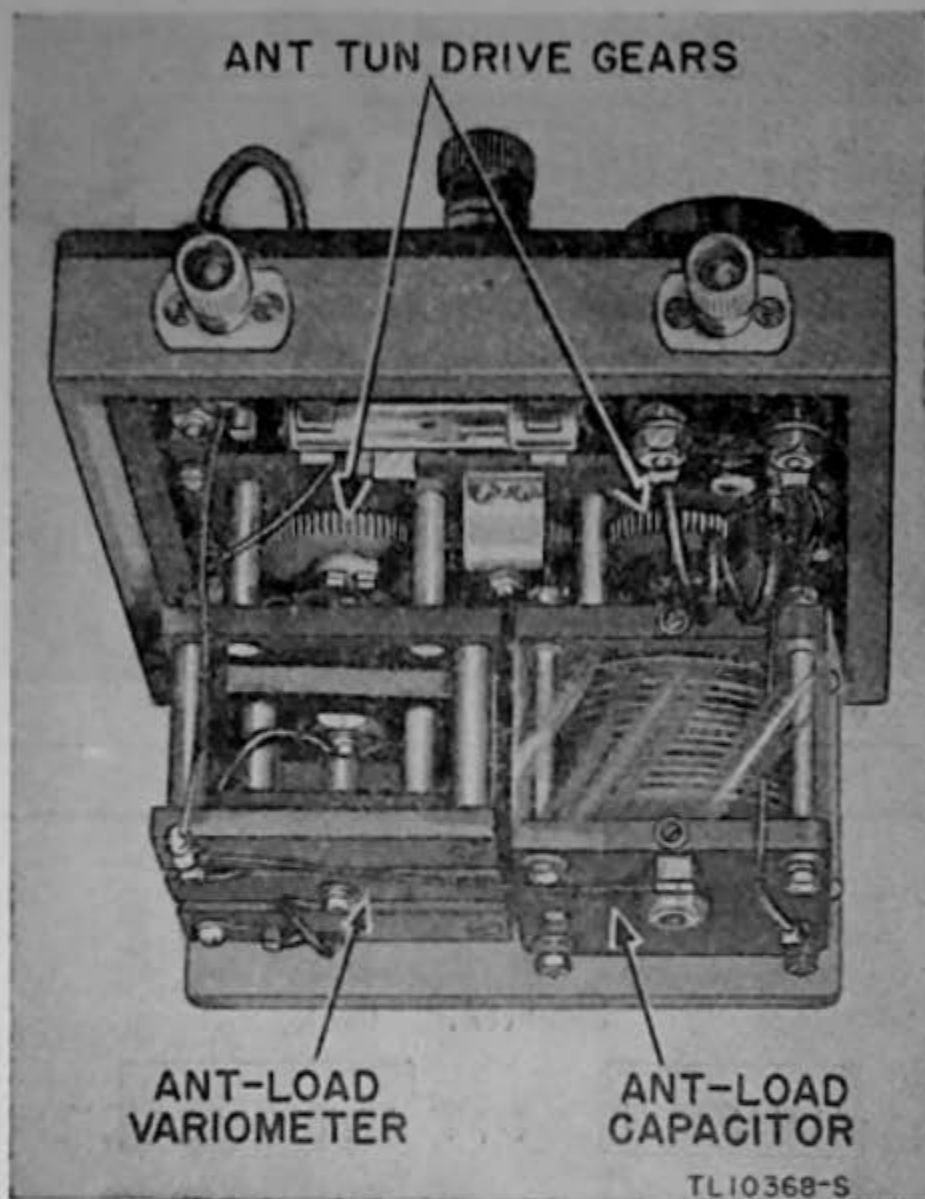


Figure 18. Antenna Tuner, removed from cabinet, top rear view.

(b) *Pin 2.* When the jumper is in pin jack 2, the antenna-loading capacitor and the antenna-loading variometer both are in series with the antenna.

(c) *Pin 3.* When the jumper is in pin jack 3, the antenna-loading variometer is shorted.

7. DYNAMOTOR.

a. *Physical.* The nameplate of the Model No. 147 Dynamotor, referred to as "the dynamotor," and its American equivalent are shown in figure 19. Figure 20 is a view of the dynamotor panel with all parts and controls clearly labeled. The chassis floor divides the interior of the dynamotor cabinet into two sections. Castle nuts and

乙機無線車輛

第 [] 号

一 号 箱

昭和 [] 年 [] 月製

東  京

東洋通信機株式會社

(YT-87 [] B 型第 [] 186 [] 号)

MOBILE WIRELESS SET B

SERIAL NO.

NO. 1 BOX

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

(MODEL YT-87B SERIAL NO. 186)

TL10351-S

Figure 1. No. 1 Box, nameplate and nameplate translation.

乙 機 線 無 輻 車

第 [] 號

機 壓 變 流 直 機 通 信 型 號 七 四 一

第 [] 號

製 月 六 年 一 八 和 昭

東 京

社 會 式 株 氣 電 洋 山

(製 品 番 號 22150)

MOBILE WIRELESS SET B

SERIAL NO.

MODEL NO. 147 DYNAMOTOR

SERIAL NO.

(DATE MANUFACTURED)

TOKYO

(MANUFACTURER)

(PRODUCT NO. 22150)

TL10369-S

Figure 19. Dynamotor nameplate and nameplate translation.

bolts through the four mounting feet hold the dynamotor in place. Removable panels held by snap latches allow access to the top and sides of the dynamotor. Ventilation is provided in the front and rear panels by sliding doors with screened vents behind the door openings (fig. 20). Access to the circuit components in the lower half of the cabinet is obtained by releasing the two snap latches which hold the bottom panel in place. The cabinet is of steel construction and is shock-mounted by four feet set in rubber. A rectangular iron plate bolted to the shock-mounting forms the base plate for the cabinet. The entire unit is painted the regulation Japanese army brown.

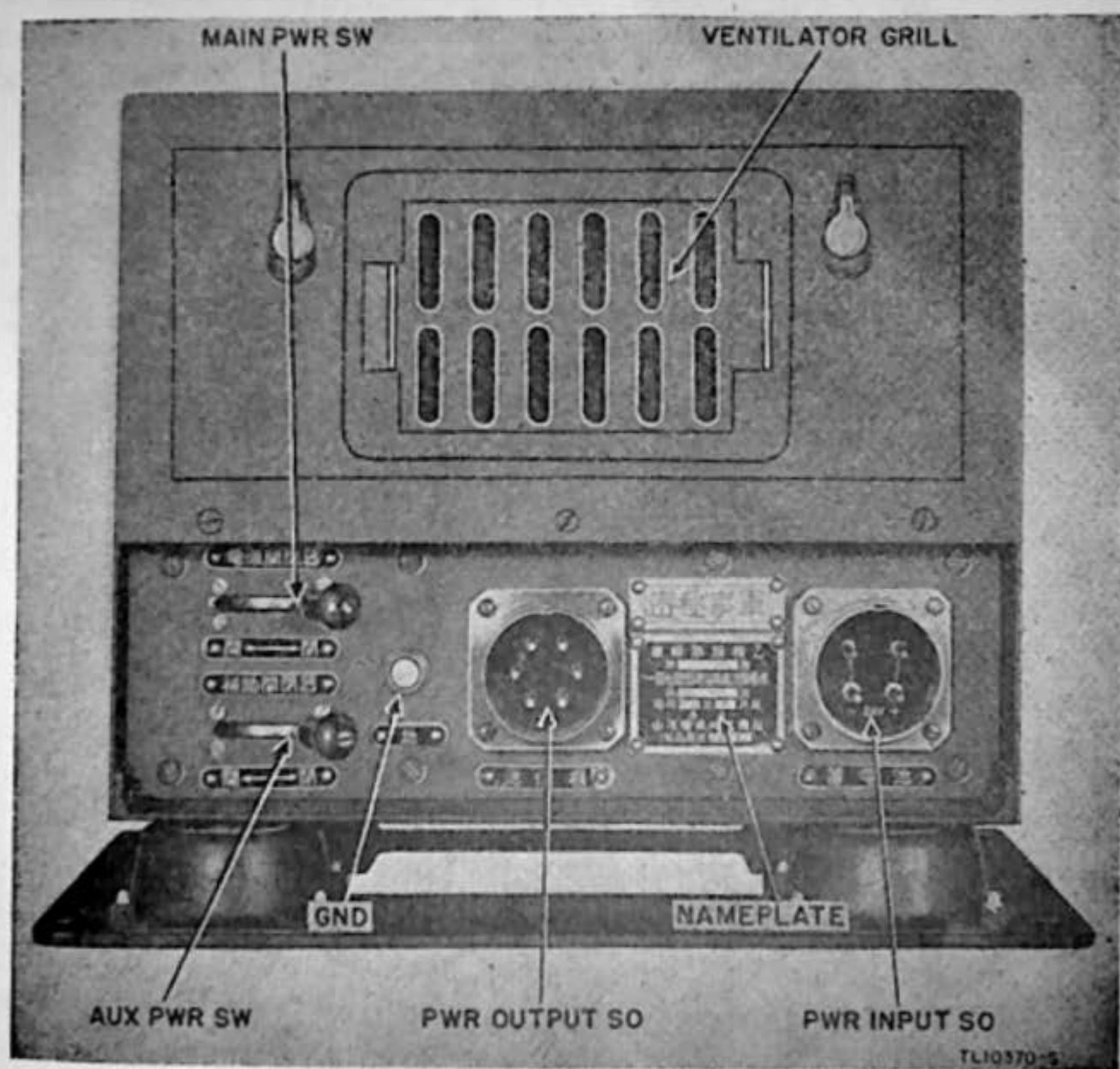


Figure 20. Model 147 Dynamotor, view of control panel.

b. **Electrical.** The dynamotor provides the plate voltage for the transmitter and receiver, the source of power being a 24-volt battery which runs the dynamotor and also directly heats the transmitter and receiver tube filaments. The unit contains a filter system for the output voltage, a main power switch, an auxiliary power

switch for controlling the dynamotor directly, and a relay for controlling the dynamotor from the transmitter. The input and output circuits are fused. There is no data available on the rating of the dynamotor except for the cable markings, which indicate an output of 400 volts. The voltage regulation and efficiency appear excellent. The dynamotor heats up slightly under a normal load.

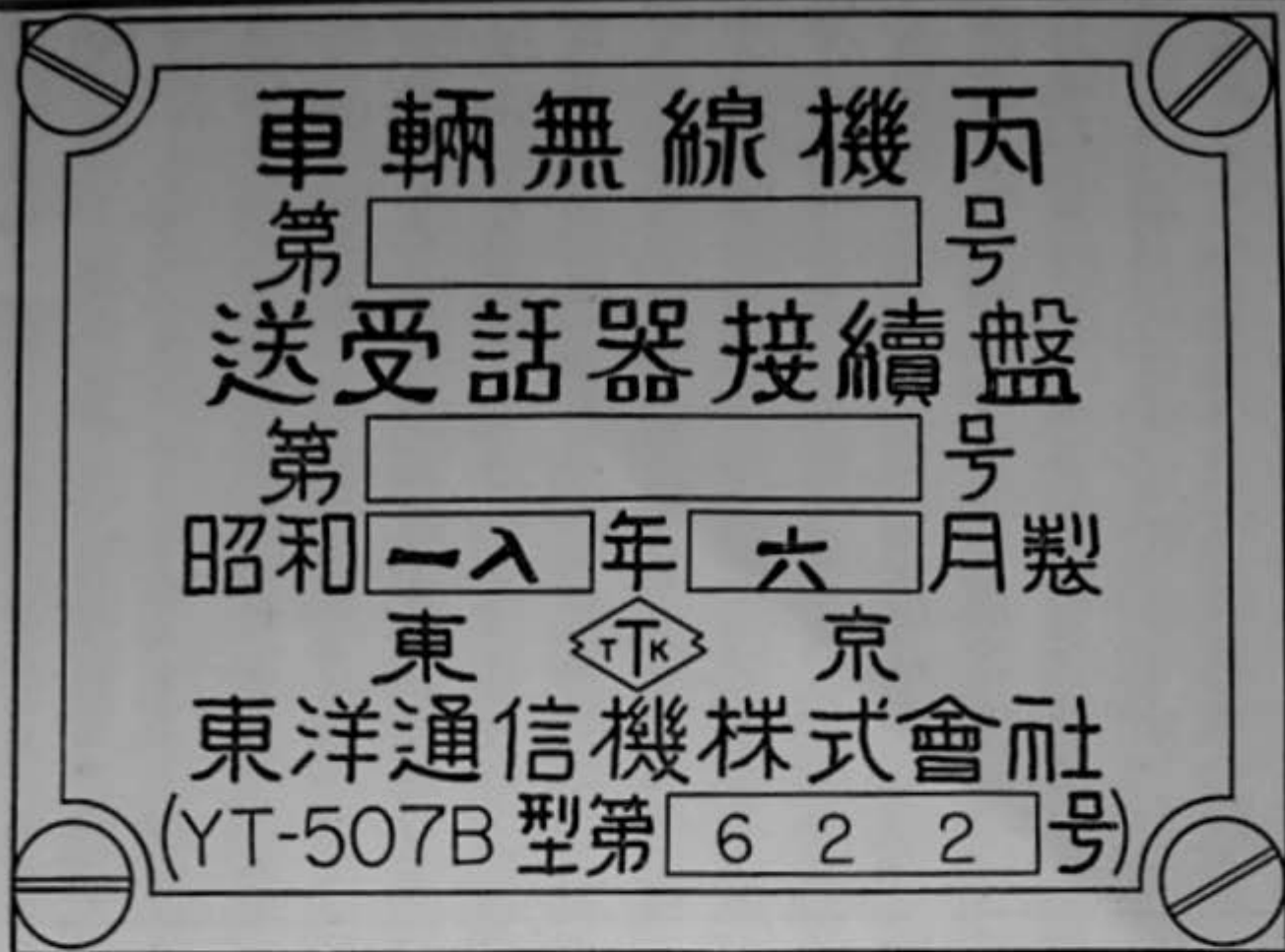
8. MOBILE WIRELESS SET C MARK I.

a. **General.** The Mobile Wireless Set C Mark I, referred to as "Set C," is an h-f mobile transmitter and receiver unit designed for use in vehicles or small naval craft. When used in a unit commander's vehicle or craft, it is installed with set B for purposes of ground-air coordination. A remote control box mounted on the front panel of the dynamotor cabinet of set C provides control of both set B and set C. Figure 21 shows set C with the remote control box.



Figure 21. Mobile Wireless Set C Mark I with remote control box.

b. **Remote Control Box.** Figures 22 and 23 show the remote control box nameplate and its American equivalent. On the front panel (fig. 24) are two microphone-headset sockets, the left socket for the set C operator, the right socket for the set B operator. Directly above the microphone-headset sockets are the receiver-selector switches for each operator, each switch having two positions: the set C receiving position on the left, the set B receiving position on the right. By means of this control box, each operator can control his own transmitter and have sidetone at all positions, or talk to all interphone positions without throwing the transmitter on the air. On the left side (fig. 25) of the control box are two sockets, one for an interphone operator's microphone-headset, the other for connecting the auxiliary connecting cable (fig. 36) to set C. On



TL 16954

Figure 22. Remote Control Box nameplate.



TL 16955

Figure 23. Remote Control Box nameplate translation.

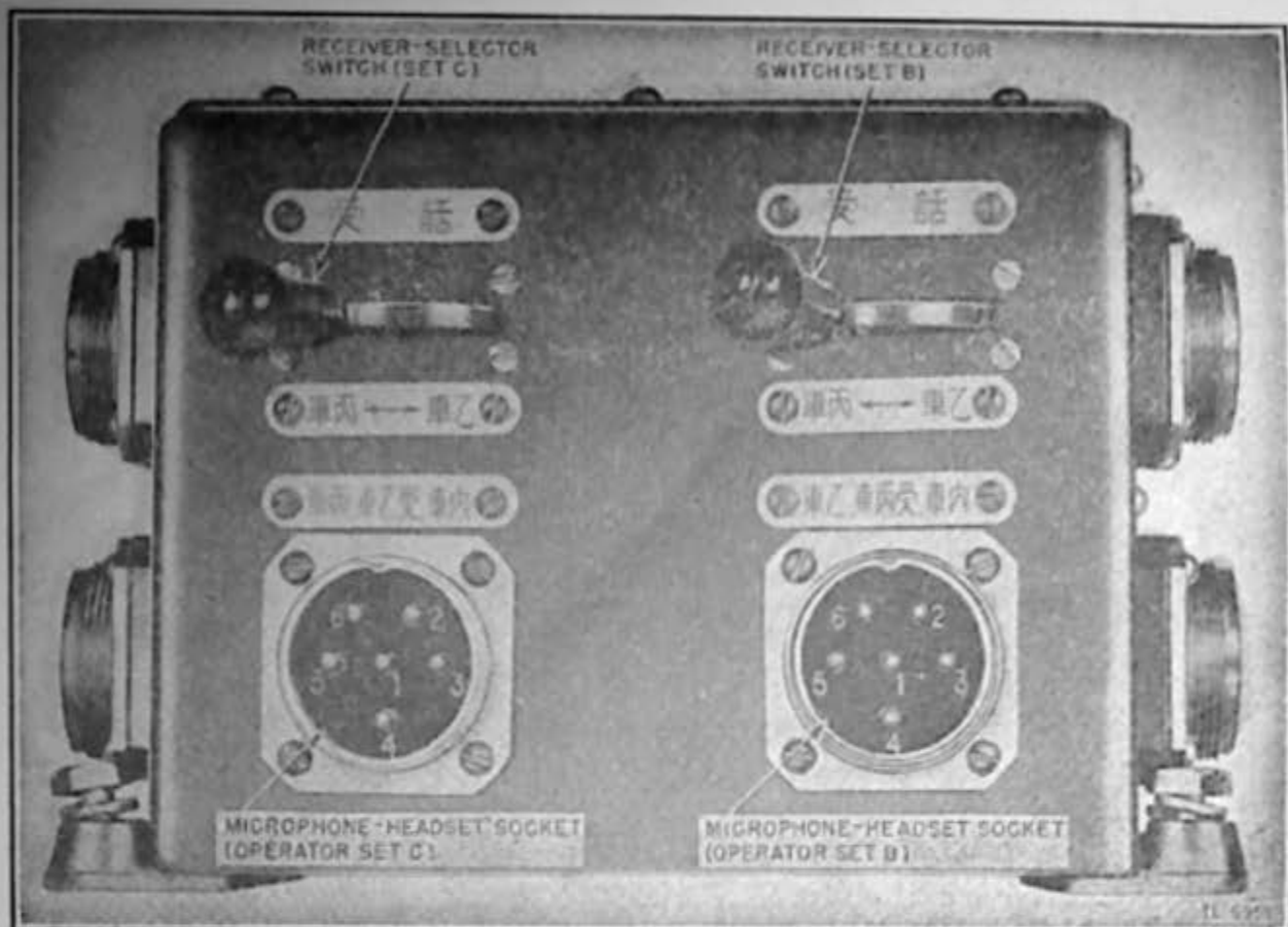


Figure 24. Remote Control Box, view of control panel.

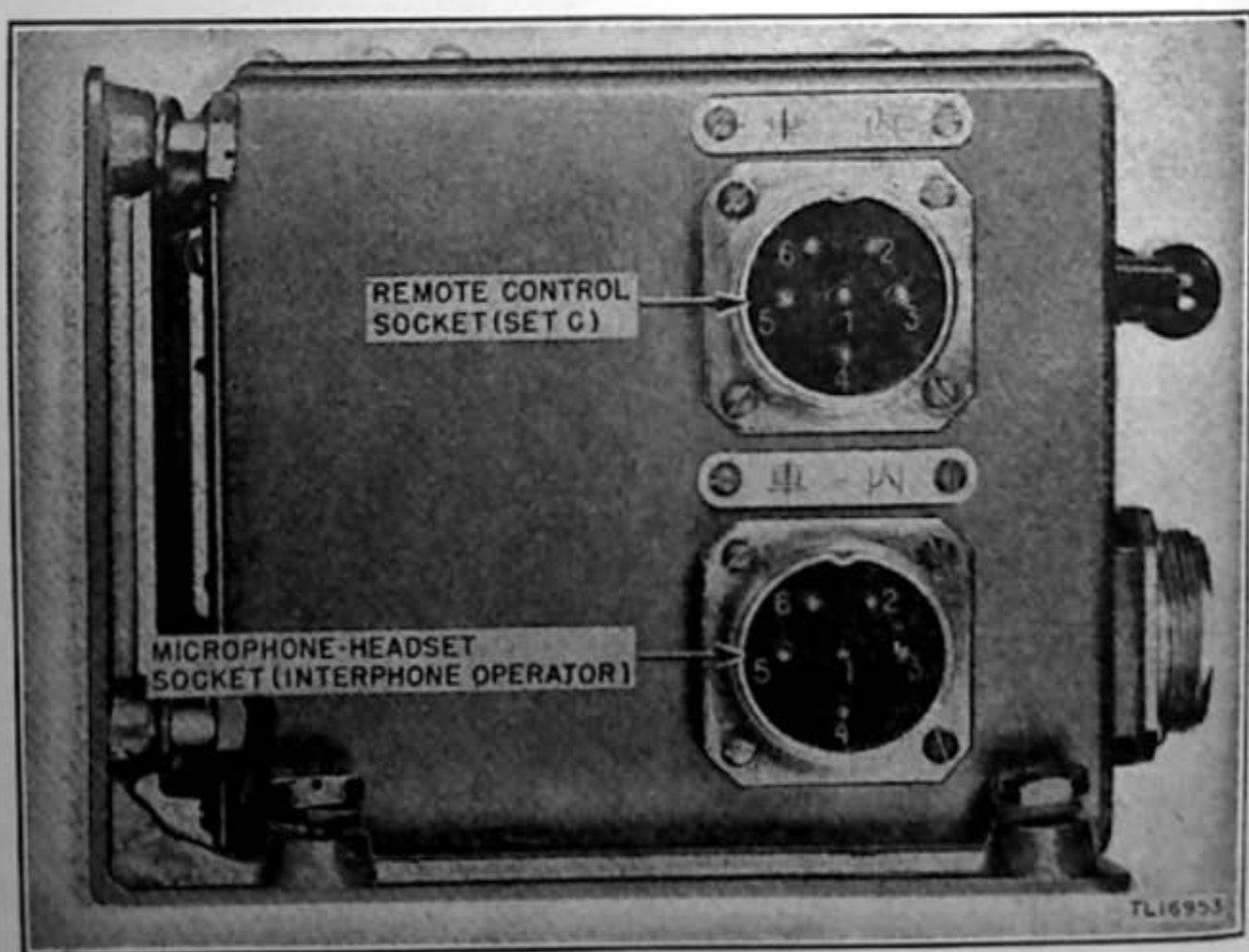


Figure 25. Remote Control Box, left side view.

the right side of the control box (fig. 26) are also two sockets, one for a second interphone operator's microphone-headset, the other for connecting the auxiliary connecting cable (fig. 36) to set B. Both interphone operators can speak over the interphone system, but cannot control the transmitter.

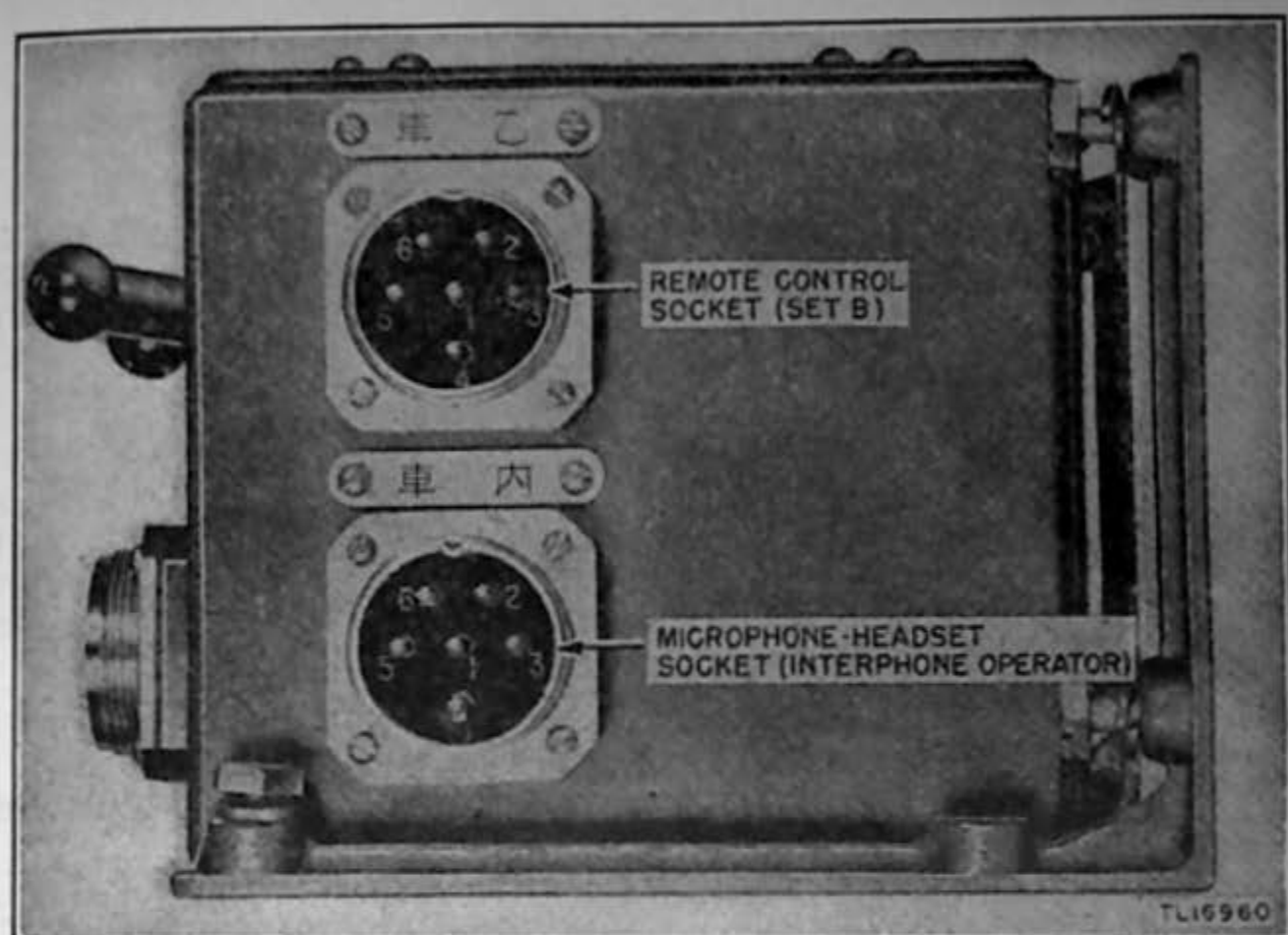


Figure 26. Remote Control Box, right side view.

SECTION II. PERFORMANCE DATA

9. TRANSMITTER.

Frequency range	approx 3 to 6 mc (megacycles)
Can be used in nets with:	
American sets	Radio Sets AN/VRC-1, AN/TRC-2, SCR-177-(), SCR-188-(), SCR-193-(), SCR-284-(), SCR-299-(), SCR-399-(), SCR-499-(), SCR-506-(), SCR-511-(), SCR-536-(), SCR-694-()
Japanese sets	Model 94 Ground-Air Mark 2 Wireless Set (Type 2), Model 94 Mark 2B Wireless Set, Model 94 Mark 4, Short Wave Transmitter Improvement 1
Types of signals emitted	c-w, tone, and voice
Type of modulation	amplitude
Method of modulation	plate
Preset frequencies	2; preset dial stops permit choice of 2 frequencies. Optional crystal control on 2 channels
Sidetone in set	available on c-w, tone, and voice
Zero-beat transmitter to receiver	yes; receiver can be set to oscillator frequency
Transmitter type	Mopa (master oscillator-power amplifier) with either self-excited or crystal-locking Hartley oscillator
Tuning dial graduations	0 to 100, in equal divisions
Method of calibration	a suitable frequency meter such as Frequency Meter Set SCR-211-()
Antenna type	rod 16 feet long for vehicular installations or a long wire antenna 65 feet long and elevated approximately 25 feet above the ground
Distance range:	
C-w	30 miles
Tone	25 miles
Voice	20 miles

Number of tubes 3

<u>Type of tube</u>	<u>Function</u>	<u>Part No.</u>
UY 807A	oscillator	8
UY 807A	power amplifier	25
UY 807A	modulator	66

Power output:

C-w	16 to 18 watts
Tone	20 watts
Voice	15 watts (unmodulated)

Power supply dynamotor and 24-volt storage battery

Power requirements:

Plate	400 v at 128.5 ma
Filament	24 v at 1 amp
Keying relay	22 v at 75 ma

10. RECEIVER.

Frequency range	1,500 to 5,500 kc (in three bands)
Band I	1,500 to 2,400 kc
Band II	2,400 to 3,500 kc
Band III	3,500 to 5,500 kc

Receiver type superheterodyne

Method of band change 3 sets of r-f plug-in coils

Intermediate frequency 400 kc

Types of signals which can be received c-w, tone, voice

Preset frequencies 2; plug-in crystals fix the receiver h-f oscillator stages for operation on 2 channels. Preset dial stops provide 2-channel operation when crystals are not used

Antenna type rod 16 feet long (uses the transmitting antenna through the transmitter keying relay and connecting wire)

Tuning dial graduations 0 to 100, in equal divisions

Zero-beat receiver with transmitter yes

Number of tubes 6

<u>Type of tube</u>	<u>Tube section</u>	<u>Function</u>	<u>Part No.</u>
UT 6F7	pentode	channel A r-f amplifier	11
	triode	one-half of power amplifier	11

<u>Type of tube</u>	<u>Tube section</u>	<u>Function</u>	<u>Part No.</u>
UT 6F7	pentode	channel A mixer	20
	triode	channel A h-f oscillator	20
UT 6F7	pentode	channel B r-f amplifier	43
	triode	one-half of power amplifier	43
UT 6F7	pentode	channel B mixer	52
	triode	channel B h-f oscillator	52
UT 6F7	pentode	first i-f amplifier	81
	triode	detector and avc	81
UT 6F7	pentode	first a-f voltage amplifier	99
	triode	beat-frequency oscillator	99
Power supply		dynamotor and 24-volt storage battery	

Power requirements:

Plate and screen grid	*400 v at 33.7 ma
Filament	24 v at 0.6 amp

*400 volts measured at RCVR PWR INPUT socket.

11. SET C.

a. Transmitter.

Frequency	20 to 30 mc
Can communicate with	Radio Set SCR-194
Types of signals emitted	tone, voice
Type of modulation	amplitude
Method of modulation	plate
Preset frequencies	none
Sidetone in set	available on tone and voice
Zero-beat transmitter to receiver	no
Antenna type	rod, 13-1/2 to 15 feet long, coaxially fed
Distance range:	
Tone	25 miles
Voice	10 miles
Tuning dial graduations	20 to 30 mc; and 0 to 100 equal dial divisions
Type of transmitter	mopa
Method of calibration	crystal-check oscillator
Number of tubes	4: two UT 6F7, two UY 807A

Power output:
Tone 11 watts
Voice 6 watts
Power supply dynamotor and 24-volt storage
battery

b. Receiver.

Frequency range 20 to 30 mc
Types of signals which can be received tone, voice
Preset frequencies none
Antenna type rod, 13-1/2 to 15 feet long
Type of receiver superregenerative
Method of calibration crystal-check oscillator in transmit-
ter
Number of tubes 3: all UT 6F7 tubes
Power supply dynamotor and 24-volt storage
battery

NOTE: For further information concerning Mobile Wireless Set C, refer to TB SIG E 21.



Figure 2. No. 1 Box, transport covers in place.

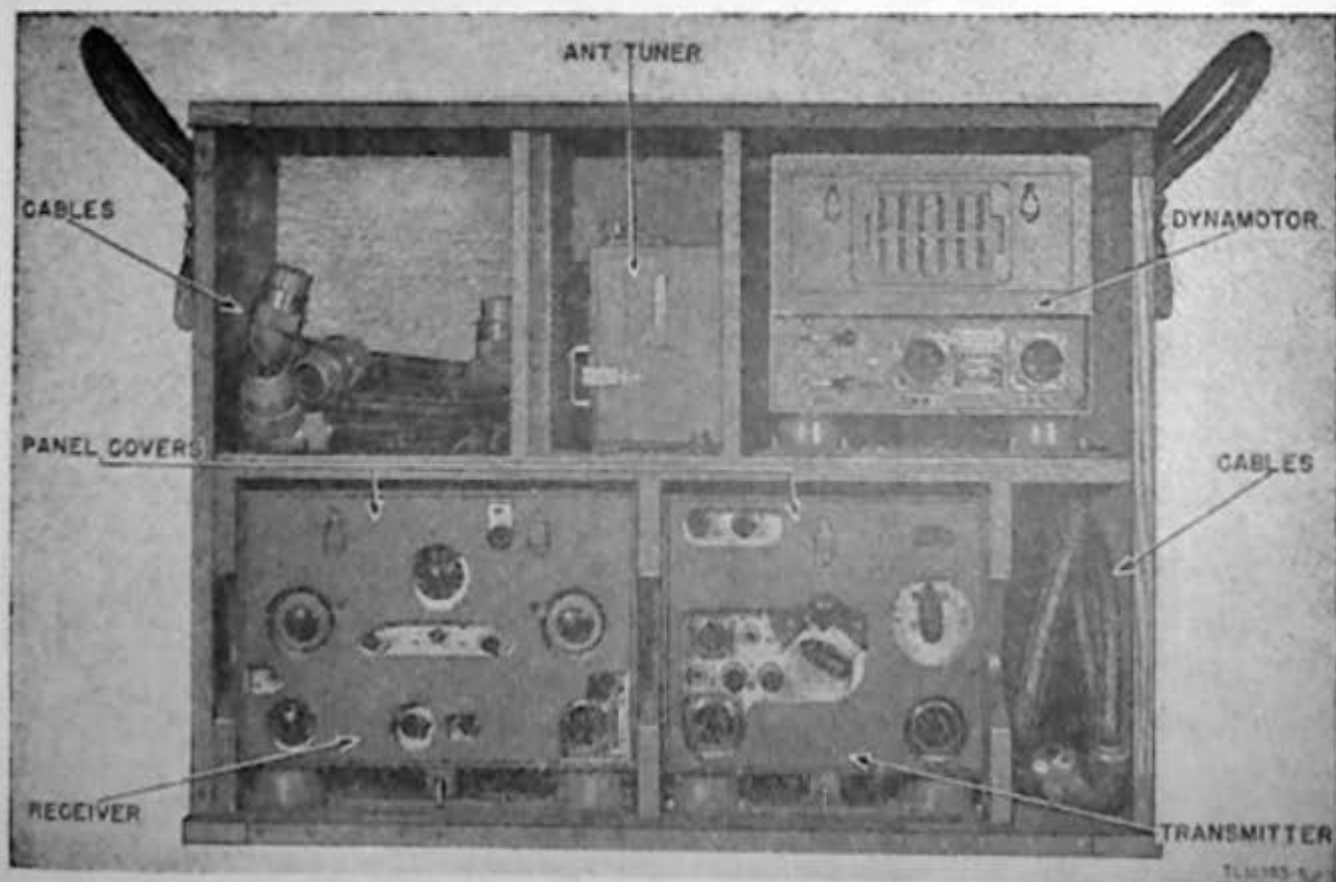


Figure 3. No. 1 Box, transport covers removed.

SECTION III. CONTROLS AND THEIR FUNCTIONS

12. GENERAL.

As a means of identifying the various controls, terminals, jacks, and components of the set, two groups of identification name tabs and nameplates are provided in the back of this bulletin to cut out and affix to a Japanese set used. This should be done before installation of the set is attempted. The name tabs and nameplates are shown in figures 62a through 65.

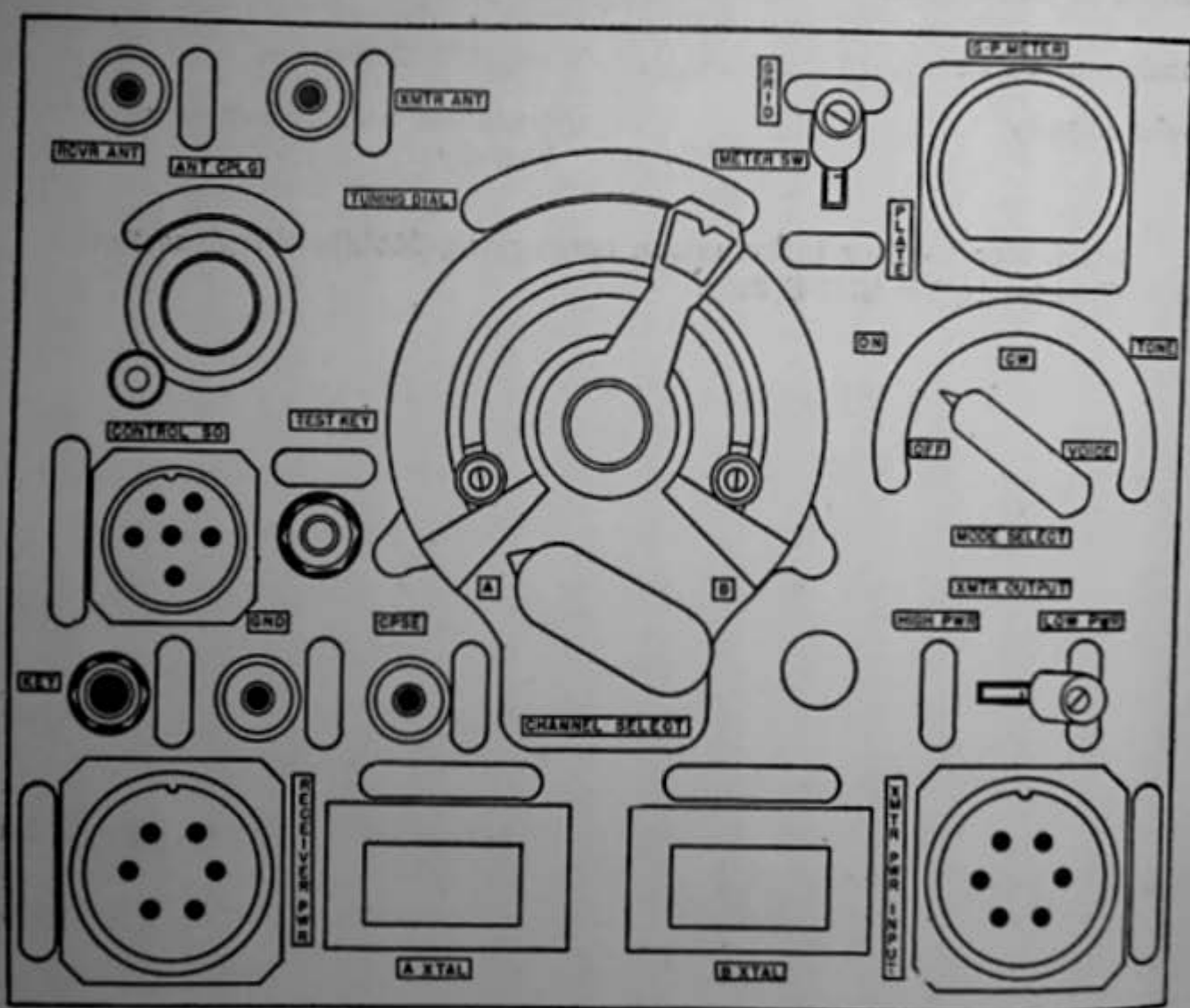


Figure 27. Transmitter panel, name tabs affixed.

13. TRANSMITTER.

Figure 27 shows the transmitter panel with name tabs affixed. Part numbers indicated in parentheses in this paragraph are shown with the parts in the schematic diagram (fig. 50). The following are the control, terminal, and jack names, and their functions.

a. The XMTR ANT terminal provides a means of connecting the transmitter to the XMTR ANT terminal of the antenna tuner.

b. The RCVR ANT terminal provides for the use of a common antenna for both transmitter and receiver. The keying relay connects the antenna to either the transmitter or the receiver. When the key is open, the antenna is connected to the receiver; when the key is closed, the antenna is connected to the transmitter.

c. The ANT CPLG control provides a control of the transmitter power output by varying the amount of coupling to the antenna. Turning the control in a counterclockwise direction increases the coupling, and consequently the amount of r-f power fed to the antenna is also increased.

d. The CONTROL SO is the receptacle for the microphone-headset assembly plug. Audio signal for the headset is obtained from the receiver through the interconnecting receiver power cable and the internal wiring in the transmitter.

e. The TEST KEY button controls a single-pole, single-throw, push-type switch. When this switch is closed, screen and plate voltage are applied to the oscillator, allowing the power amplifier to be neutralized without applying plate voltage to that stage.

f. The KEY jack provides a means of connecting a key to the set for c-w and tone type transmission. When the key is closed, plate voltage and the antenna are disconnected from the receiver and connected to the transmitter.

g. The RECEIVER PWR socket is the receptacle for the receiver power cable plug.

h. The GND terminal provides a means of connecting an external ground to the transmitter chassis.

i. The CPSE terminal provides a means of connecting a counterpoise or ground to the set. This terminal is common to both receiver and dynamotor through the power sockets and the connecting power cables.

j. The A XTAL compartment houses the crystal jack for the channel A crystal.

k. The B XTAL compartment houses the crystal jack for the channel B crystal.

l. The TUNING DIAL control changes the frequency of the transmitter. Ganged oscillator tuning capacitor (17) and power-amplifier tuning capacitor (36) are varied by turning the control.

m. The CHANNEL SELECT switch places the TUNING DIAL at either the channel A frequency or the channel B frequency:

(1) The left or channel A position turns the TUNING DIAL to the channel A frequency.

(2) The right or channel B position turns the TUNING DIAL to the channel B frequency.

n. The XMTR PWR INPUT socket is for plugging in the transmitter power cable from the XMTR PWR socket of the dynamotor.

o. The XMTR OUTPUT switch (33) has two positions:

(1) In the left or HIGH PWR position the switch is closed, and higher screen voltage is applied to the p-a (power-amplifier) tube, increasing the power output of the p-a tube.

(2) In the right or LOW PWR position the switch is opened, placing resistor (32) in series with the p-a screen grid, and lowering the screen voltage and the power output of the p-a tube.

p. The MODE SELECT switch (50) has five positions: OFF, ON, CW, TONE, and VOICE, in clockwise order.

(1) In the OFF position all voltages to the transmitter and receiver are disconnected.

(2) In the ON position, filament voltage is applied to the transmitter and receiver tubes.

(3) In the CW position both plate and filament voltage are applied to the receiver, but only filament voltage to the transmitter. When the key is pressed, the keying relay transfers the plate voltage and antenna from the receiver to the transmitter. Sidetone is applied to the receiver headset by the modulator circuit, which acts as an audio oscillator.

(4) In the TONE position both plate and filament voltage are applied to the receiver, but only filament voltage to the transmitter. When the key is pressed, the keying relay transfers the plate voltage and antenna from the receiver to the transmitter. The modulator tube functions as an audio oscillator and plate-modulates the p-a tube. Sidetone is provided to the receiver headset.

(5) In the VOICE position both plate and filament voltage are applied to the receiver, but only filament voltage to the transmitter. When the press-to-talk switch in the microphone-headset connecting cord (fig. 37) is closed, the keying relay contacts are closed, transferring plate voltage and antenna from the receiver to the transmitter. The transmitter is modulated by speaking into

the microphone. Sidetone from the modulator tube is applied to the receiver headset.

q. The G-P METER can be used either as a grid-current meter for the p-a tube or as a plate-current meter for transmitter or receiver, depending upon which is being used. The function of the meter is changed by the METER SW.

r. The METER SW has two positions for selecting the desired G-P METER operation:

(1) In the up or GRID position, the switch (53) is open and only the p-a tube grid current flows through the meter. The METER SW should be in the GRID position when neutralizing the p-a stage.

(2) In the down or PLATE position, the switch (53) is closed and the meter measures the plate current of the transmitter or receiver, whichever is operating.

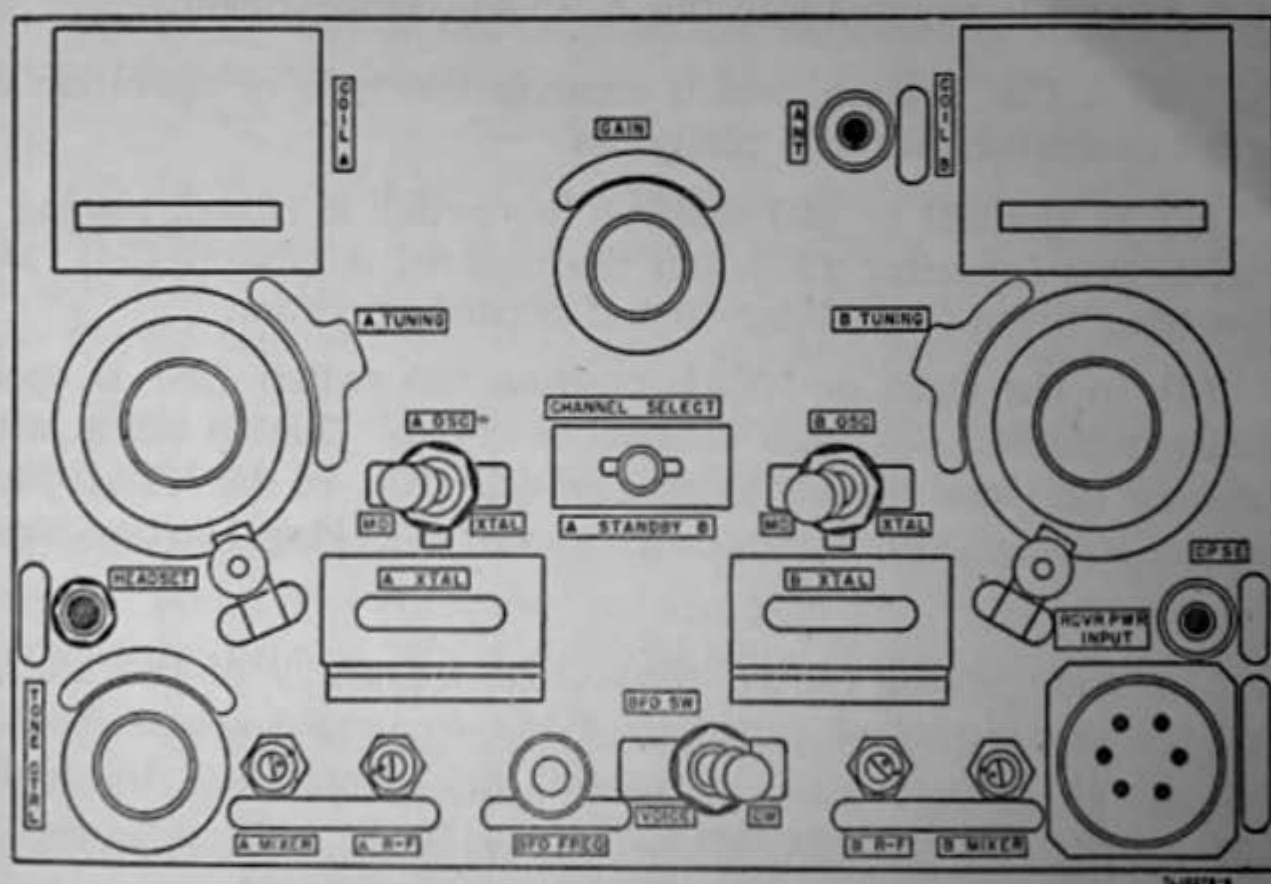


Figure 28. Receiver panel, name tabs affixed.

14. RECEIVER.

Figure 28 shows the receiver panel with name tabs affixed. Part numbers in parentheses in this paragraph are shown with the parts in the schematic diagram (fig. 60a).

a. COIL A is the compartment into which the channel A coils are plugged.

b. The A TUNING dial is the frequency control for the r-f amplifier, mixer, and h-f oscillator ganged tuning capacitors for channel A.

c. The jack marked HEADSET is an outlet for an additional headset.

d. The TONE CTRL provides a means of controlling the tone of the audio output of the receiver.

e. The A MIXER adjusting screw is used to align the channel A mixer stage. The channel A mixer grid trimmer capacitor is varied by turning the A MIXER adjusting screw.

f. The A R-F adjusting screw is used to align the channel A r-f amplifier stage. The channel A r-f amplifier grid trimmer capacitor is varied by turning the A R-F adjusting screw.

g. When the receiver is operated with crystal control, the channel A crystal is plugged into the A XTAL compartment.

h. The A OSC switch, which controls the type of operation of the h-f oscillator, has two positions:

(1) In the left or MO position the switch is closed, placing a short across capacitor (23) and the channel A crystal (24), and converting the h-f oscillator to self-excited operation.

(2) In the right or XTAL position the switch (25) is open, placing capacitor (23) and channel A crystal (24) in series with capacitor (22) and the oscillator grid coil (26). In the XTAL position the h-f oscillator operates as a crystal-locking Hartley oscillator.

i. The BFO FREQ control varies the frequency of the bfo by changing the setting of capacitor (131) connected across the bfo tank circuit. This provides a variable pitch control of the audio signal when receiving c-w signals.

j. The BFO SW controls the operation of the beat-frequency oscillator. The switch has two positions:

(1) In the left or VOICE position the b-f-o tube is inoperative. When the BFO SW is in the VOICE position, the switch (108) is open, removing the plate voltage from the b-f-o tube.

(2) The right or CW position closes the b-f-o tube plate circuit and allows the tube to oscillate, providing a beat note for the received signal.

k. The CHANNEL SELECT switch has three positions, to select the output of either the channel A or channel B amplifier, or of both:

(1) In the left or A position, the output of the channel A amplifier is fed to the i-f amplifier. The a-v-c voltage is applied to the channel A amplifier but not to the channel B amplifier.

(2) In the right or B position, the output of the channel B amplifier is fed to the i-f amplifier. The a-v-c voltage is applied to the channel B amplifier but not to the channel A amplifier.

(3) In the middle or STANDBY position, the output of both channel A and B amplifiers is fed to the i-f amplifier. The a-v-c voltage is removed from both amplifiers, leaving only the d-c grid bias on these tubes.

l. The B OSC switch, which controls the type of operation of the channel B h-f oscillator, has two positions:

(1) In the left or MO position the switch (57) is closed, placing a short across capacitor (55) and the channel B crystal (56), and converting the h-f oscillator to self-excited operation.

(2) In the right or XTAL position the switch (57) is open, placing capacitor (55) and the channel B crystal (56) in series with capacitor (54) and the oscillator grid coil (58). In the XTAL position the h-f oscillator operates as a crystal-locking Hartley circuit.

m. When the receiver is crystal-controlled, the channel B crystal is plugged into the B XTAL compartment.

n. The B R-F adjusting screw is used to align the channel B r-f amplifier stage. The channel B r-f amplifier grid trimmer capacitor is varied by turning the B R-F adjusting screw.

o. The B MIXER adjusting screw is used to align the channel B mixer stage. The channel B mixer grid trimmer capacitor is varied by turning the B MIXER adjusting screw.

p. The RCVR PWR INPUT is the power receptacle for the receiver. The connecting plug of the receiver power cable is plugged into this socket.

q. The CPSE terminal provides a means of connecting a counterpoise to the receiver.

r. The B TUNING dial is the frequency control for the r-f amplifier, mixer, and h-f oscillator ganged tuning capacitors for channel B.

s. COIL B is the compartment into which the channel B receiver coil is plugged.

t. The ANT terminal provides a means of connecting the antenna to the receiver. In mobile operation this terminal is connected to the RCVR ANT terminal of the transmitter.

u. The GAIN control varies the resistance of potentiometer (116) controlling the i-f amplifier d-c grid voltage. Turning this control counterclockwise increases the gain of the receiver.

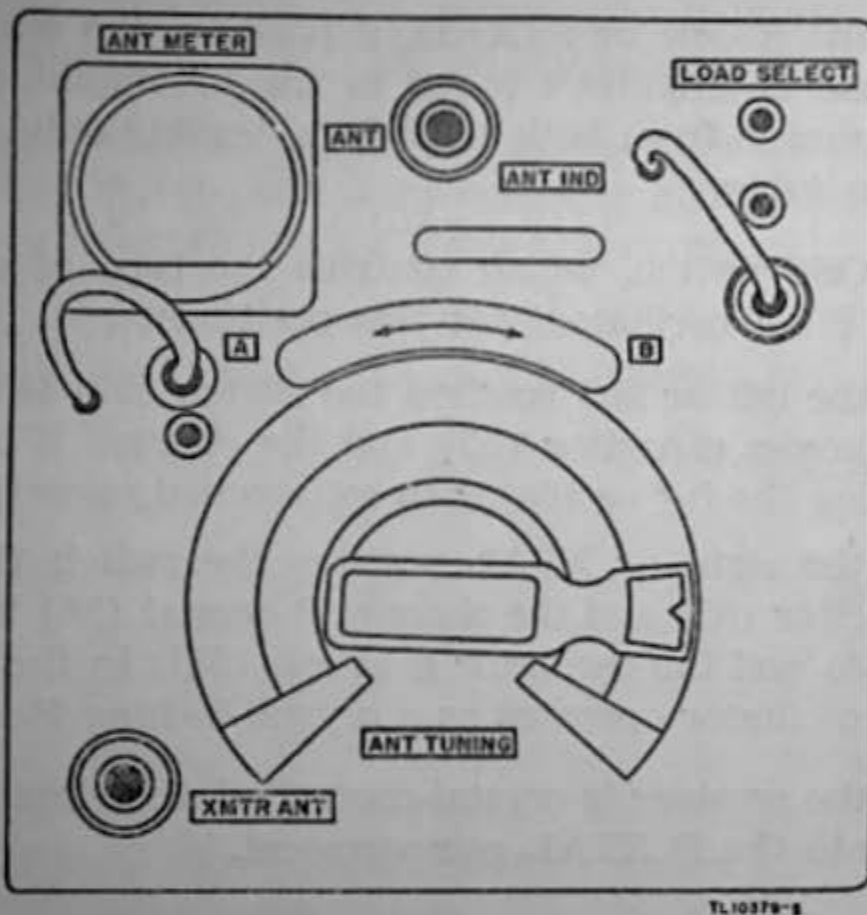


Figure 29. Antenna Tuner panel, name tabs affixed.

15. ANTENNA TUNER.

Figure 29 shows the antenna tuner panel with name tabs affixed. Part numbers in parentheses in this paragraph are shown with the parts in the schematic diagram (fig. 55).

a. The XMTR ANT terminal provides a means of connecting the transmitter to the antenna tuner.

b. The ANT TUNING control provides simultaneous adjustment of the antenna-loading variometer (2) and the antenna-loading capacitor (4).

c. The LOAD SELECT pin jacks provide for matching various lengths of antenna to the antenna tuner. The pins and their functions are as follows:

(1) When the jumper pin is placed in pin jack 1, the antenna-loading capacitor (4) is shorted. This leaves only an inductance, antenna-loading variometer (2), in series with the antenna. This makes the antenna tuner of suitable impedance for use with a short antenna, as added inductance increases the effective electrical length of a wire.

(2) When the jumper pin is placed in pin jack 2, both the antenna-loading capacitor and antenna-loading variometer are in series with the antenna for fine tuning.

(3) When the jumper pin is placed in pin jack 3, the antenna-loading variometer is shorted, leaving only the antenna-loading capacitor in series with the antenna, thereby shortening the electrical length of the antenna. This connection should be used with a long wire antenna.

d. The ANT terminal provides a means of connecting either a rod or long wire antenna to the antenna tuner.

e. The ANT METER measures the antenna current of the transmitter.

f. The ANT IND is the antenna resonance indicator for the antenna tuner. When the antenna is properly tuned to the frequency of the transmitter, the neon tube (7) behind the panel opening should glow.

16. DYNAMOTOR.

Figure 30 shows the dynamotor panel with name tabs affixed. Part numbers in parentheses in this paragraph are shown with the parts in the schematic diagram (fig. 43).

a. The PWR ON-OFF SW is the main power switch (2) for the set. This switch has two positions:

(1) In the left or OFF position, the switch is open and the dynamotor will not run.

(2) In the right or ON position, the switch (2) is closed, and the positive voltage is applied to the high side of the starting relay field (4) and to the positive 24-volt pin of the XMTR PWR socket. With the switch (2) in the ON position, voltage will be applied to the components of the set under the two following conditions:

(a) When the MODE SELECT switch of the transmitter is in the ON position, filament voltage is applied to the transmitter and receiver filaments.

(b) When the MODE SELECT switch is at the CW, TONE, or VOICE positions, the dynamotor is turned on and filament

voltage is applied to transmitter and receiver filaments. Plate voltage is applied to the receiver when the key or microphone-headset switches are open; when these switches are closed, plate voltage is applied to the transmitter and not to the receiver.

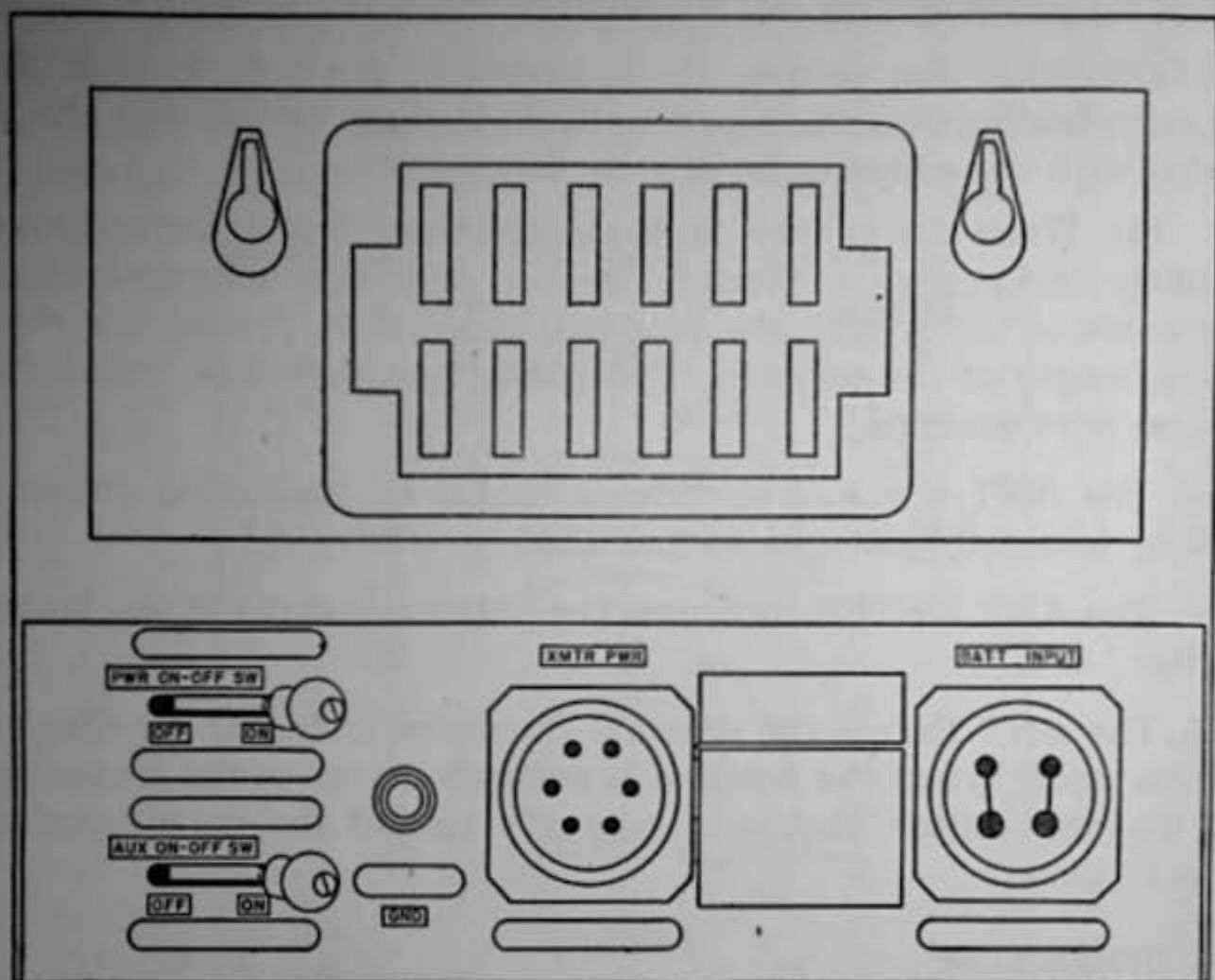


Figure 30. Dynamotor panel, name tabs affixed.

b. The AUX ON-OFF SW is the auxiliary power switch (5) for the set. This switch has two positions:

(1) In the left or OFF position, the switch (5) is open.

(2) In the right or ON position, the switch (5) is closed. When the PWR ON-OFF SW is in the ON position, the dynamotor can be operated independently of the MODE SELECT switch of the transmitter by placing the AUX ON-OFF SW in the ON position.

17. REMOTE CONTROL BOX.

Figures 31, 32, and 33 show the remote control box panels with name tabs affixed. Figure 61 shows a modified schematic diagram of the remote control box. The following are the sockets, controls and their functions:

a. The microphone-headset of set C is plugged into the MICROPHONE-HEADSET SO (OPERATOR SET C) socket.

b. The microphone-headset of set B is plugged into the MICROPHONE-HEADSET SO (OPERATOR SET B) socket.

c. The RCVR-SELECTOR SW (SET B) has two positions:

(1) In the left or RECEIVE C position, the output of the set C receiver can be heard over the interphone system.

(2) In the right or RECEIVE B position, the output of the set B receiver can be heard over the interphone system.

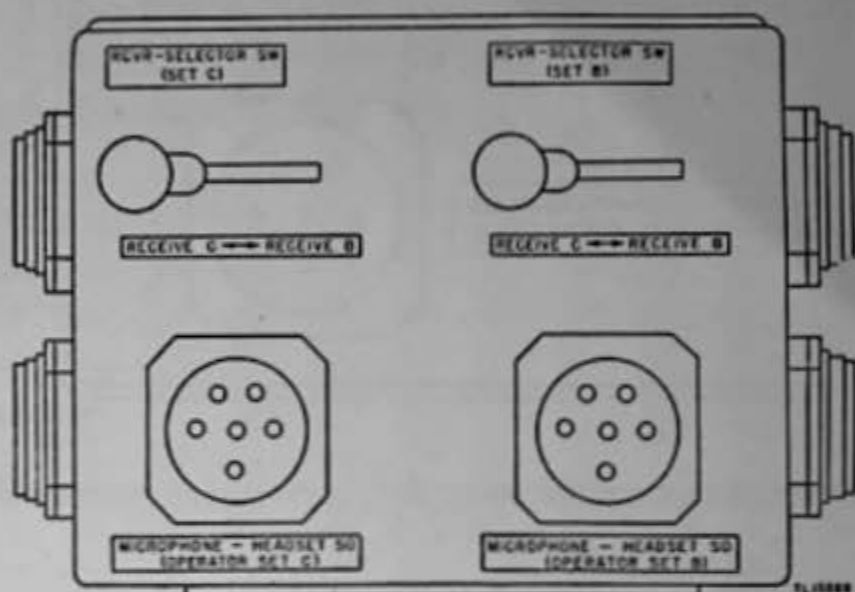


Figure 31. Remote Control Box, front panel, name tabs affixed.

d. The RCVR-SELECTOR SW (SET C) has two positions:

(1) In the left or RECEIVE C position, the output of the set C receiver can be heard over the interphone system.

(2) In the right or RECEIVE B position, the output of the set B receiver can be heard over the interphone system.

e. The auxiliary connecting cable (fig. 36) is plugged into the REMOTE CONTROL SO (SET C) and into the microphone-headset socket of set C. This connection provides a means of controlling set C from the remote control box.

f. The auxiliary connecting cable (fig. 36) is plugged into the REMOTE CONTROL SO (SET B) into the CTRL SO receptacle of transmitter B. This connection provides a means of controlling set B from the remote control box.

g. The MICROPHONE-HEADSET SO (INTERPHONE OPERATOR) socket is an outlet for an additional interphone operator's



MOBILE WIRELESS SET B

SERIAL NO.

NO. 2 BOX

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

(MODEL YT-87B SERIAL NO. 186)

TL10354-S

Figure 4. No. 2 Box, nameplate and nameplate translation.

microphone-headset connecting cord plug. There are two of these sockets, one on the left side of the remote control box, the other on the right side.

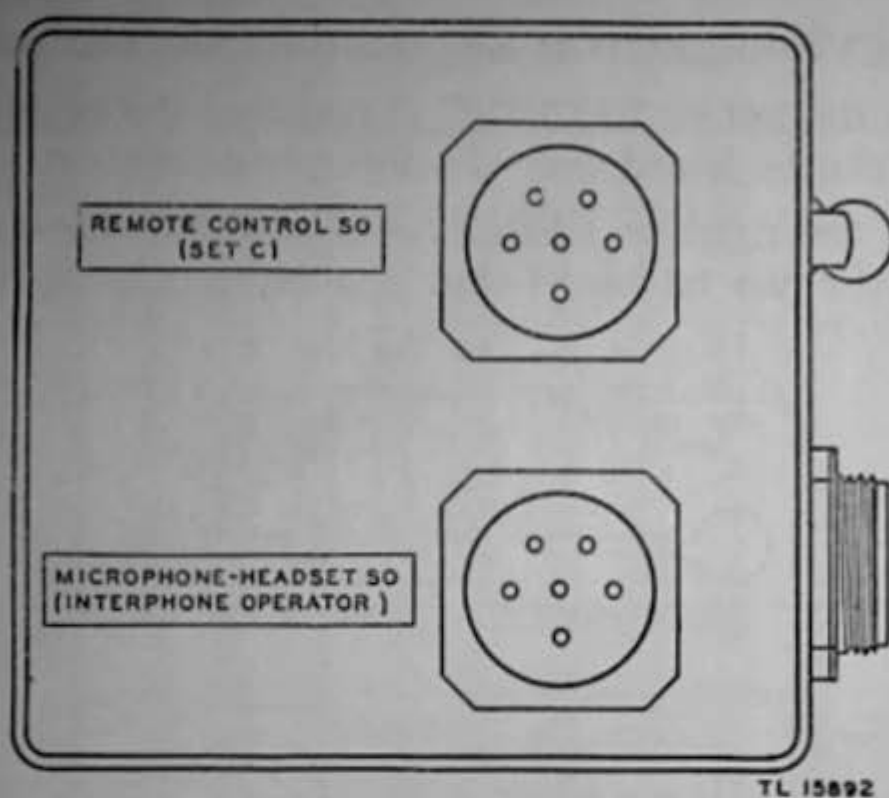


Figure 32. Remote Control Box, left side panel, name tabs affixed.

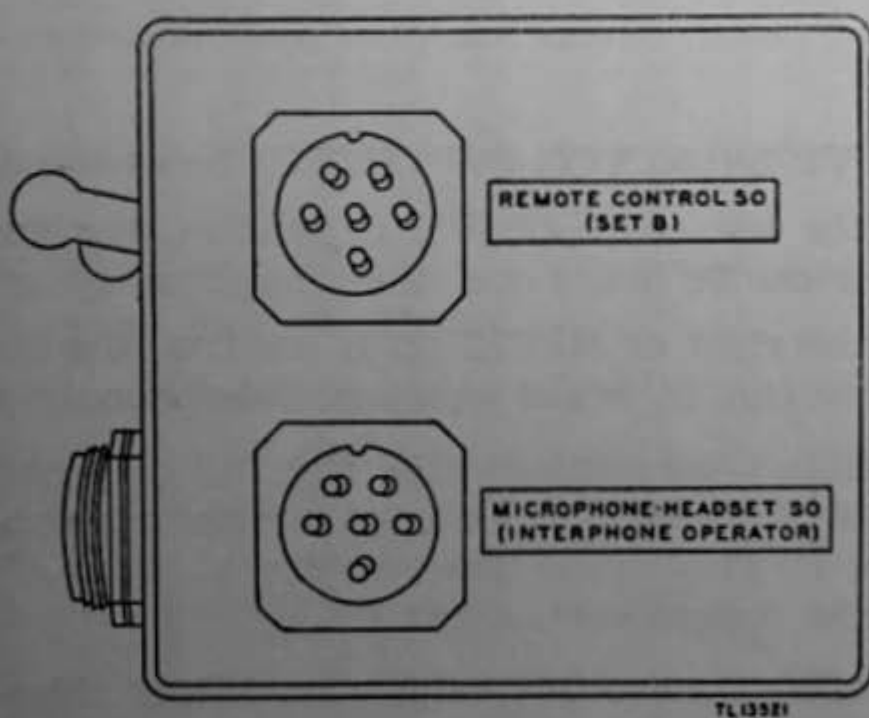


Figure 33. Remote Control Box, right side panel, name tabs affixed.

SECTION IV. INSTALLATION

18. GENERAL.

The Model 147 Mobile Wireless Set B can be used separately in nets with like sets, or as a coordinating or command set. As a command set, it is installed in a vehicle with a Mobile Wireless Set C Mark 1, both sets being controlled by the Remote Control Box of set C (fig. 21), as mentioned in paragraph 1. Figure 34 shows a block diagram of the set.

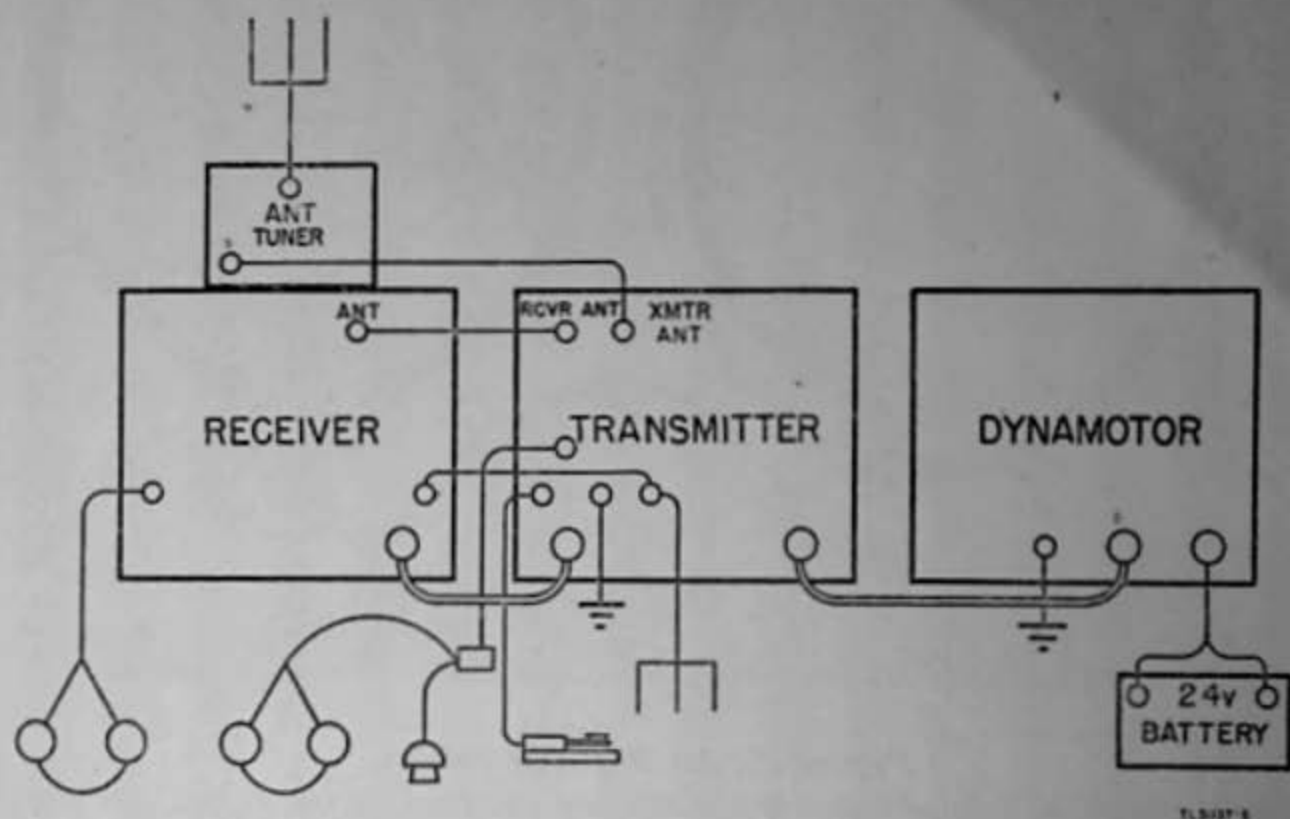


Figure 34. Block diagram of Set B installation.

19. NET SET.

The set can remain in its transport case when used in a ground installation. In mobile operation it should be removed from its case and installed in a vehicle.

a. **Ground Installation.** Remove the transport cover from the No. 1 Box (fig. 2) by releasing the two snap latches at the front of the case. Remove the cables and connecting cords from the upper left and lower right compartments of the case. Take the antenna

2. NO. 1 BOX.

The nameplate and nameplate translation of the No. 1 Box are shown in figure 1. The No. 1 Box (fig. 2) contains the power cables and connecting cords and the four major components of the set: Model No. 147 Transmitter, Model No. 147 Receiver, Antenna Tuner, and Model No. 147 Dynamotor. Figure 3 shows the No. 1 Box with transport covers removed and the units of the set in their respective compartments. The following is a list of the various cables and connecting cords found in the No. 1 Box:

- 1 transmitter power cable
- 1 battery connecting cord (for connecting two 12-volt storage batteries in series)
- 1 battery power cable
- 1 transmitter-receiver power cable
- 1 microphone-headset connecting cord
- 1 transmitter-antenna tuner connecting cord
- 1 transmitter-receiver antenna connecting cord
- 1 microphone-headset spare connecting cord A
- 1 microphone-headset spare connecting cord B

Figures 62a and 62b contain two sets of nameplate translations to be cut out and affixed to a set used.

3. NO. 2. BOX.

The nameplate and nameplate translation of the No. 2 Box are shown in figure 4. The No. 2 Box (fig. 5) contains the accessories and spare parts box for the set. Figure 6 shows the No. 2 Box with transport covers removed. Figures 62a and 62b contain two sets of nameplate translations to be cut out and affixed to a set used. Figure 7 shows the nameplate and nameplate translation of the receiver coil box. Figure 8 is a view of the receiver coil box which is carried in the No. 2 Box.

4. MODEL NO. 147 TRANSMITTER.

a. **Physical.** The nameplate of the Model No. 147 Transmitter, referred to as "the transmitter," and its American equivalent are shown in figure 9. Figure 10 is a view of the transmitter panel with all parts and controls clearly marked. The transmitter is a compact, well-constructed unit built in a spot-welded steel-angle frame, having sheet aluminum for the chassis floor and shield compartment sections. The chassis slides into a close-fitting aluminum cabinet and is held in place by a snap latch at the rear of the cabinet.



Figure 5. No. 2 Box, transport covers in place.

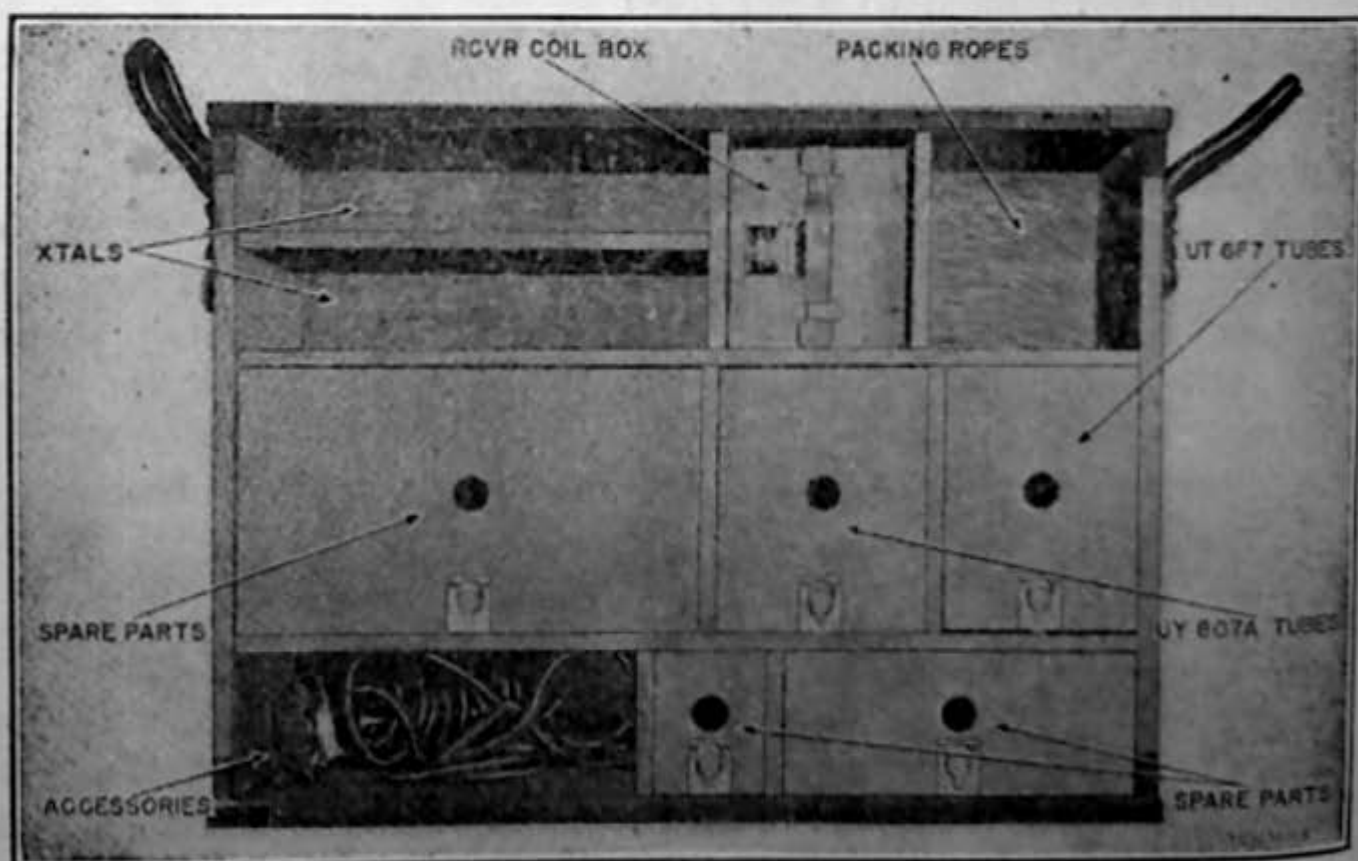


Figure 6. No. 2 Box, transport covers removed.



MOBILE WIRELESS SET B

SERIAL NO.

RECEIVER COIL BOX

SERIAL NO.

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

TL10356-S

Figure 7. Receiver Coil Box, nameplate and nameplate translation.

The cabinet fits into an iron open-work frame, shock-mounted by four feet set in rubber. A rectangular iron plate bolted to the shock-mounting forms the base plate for the entire unit. The cabinet is held in the frame by a latch at the lower front of the frame. The protecting cabinet is painted the regulation Japanese army brown. The tubes are held in place by felt-covered steel clamps (fig. 11) which encircle the glass envelope of the tube. There is no evidence of moistureproofing; however, the ganged tuning capacitor, keying relay, and antenna-coupling coil are inclosed by protective, transparent, plastic covers (fig. 11). The wiring is short and all parts are securely mounted. When the set is mounted in a vehicle the panel is protected by a steel cover (fig. 3) with openings to allow access to the operating controls.

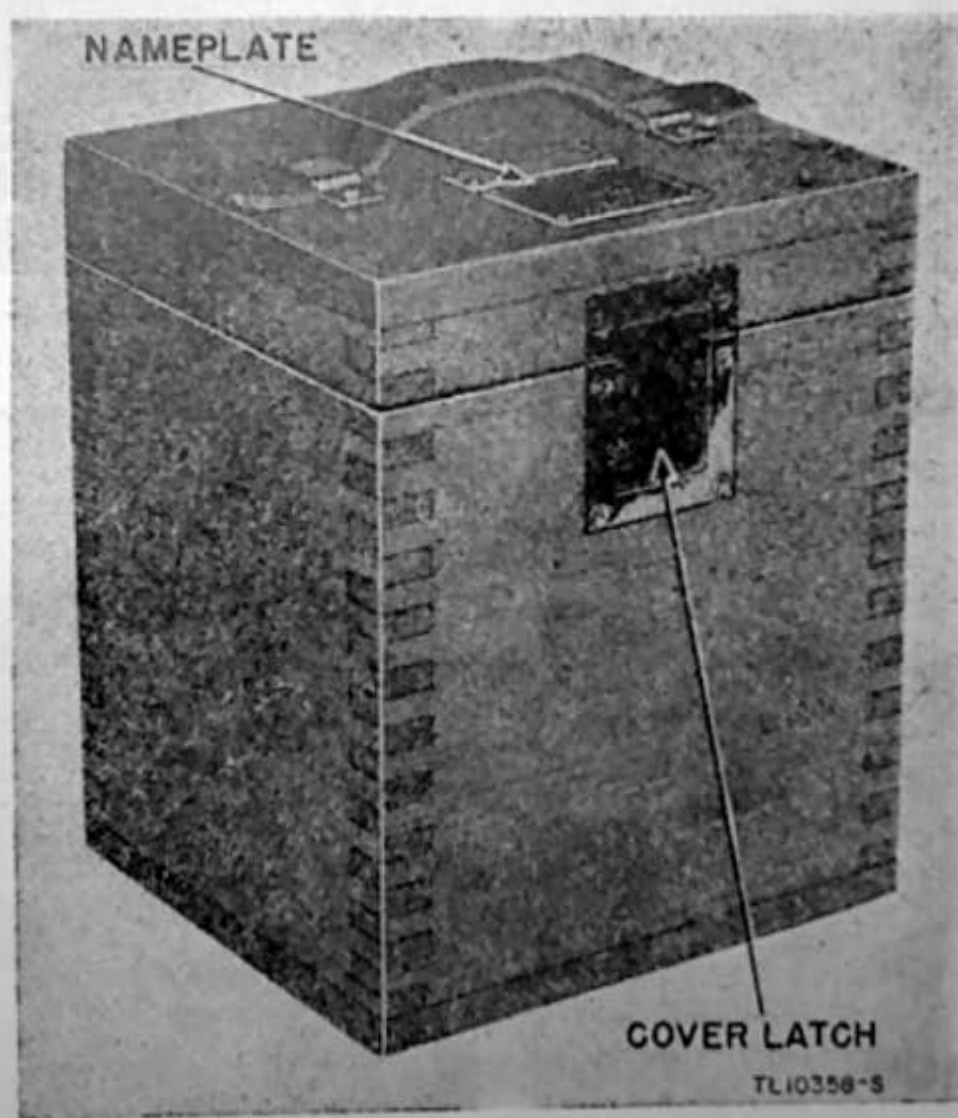


Figure 8. Receiver Coil Box, cover closed.

b. Electrical. The transmitter uses three UY 807A tubes as an oscillator, a power amplifier, and a modulator. The frequency range, approximately 3,000 to 6,000 kc (kilocycles), is covered by a single set of coils wired in the set. Output is available on c-w (continuous-wave), tone, and voice. The transmitter has two preset channels, A and B, on either crystal or self-excited operation of the oscillator.

乙機無線車輛

第 [] 号

機送信型 147 号

第 186 号

製 1 月 1 年 昭和

東  京

東洋通信機株式會社
(YT-87B 型 第 186 号)

MOBILE WIRELESS SET B

SERIAL NO.

MODEL NO. 147 TRANSMITTER

SERIAL NO.

(DATE MANUFACTURED)

(MANUFACTURERS TRADE MARK)

(MANUFACTURER)

(MODEL YT-87B SERIAL NO. 186)

TL10359-5

Figure 9. Model 147 Transmitter, nameplate and nameplate translation.

WARNING!

THE JAPS OFTEN CONNECT BOOBY TRAPS TO ABANDONED RADIOS. TURNING A DIAL OR SWITCH MAY DETONATE THE EXPLOSIVE. DO NOT HANDLE OR EXAMINE THEIR EQUIPMENT UNTIL IT HAS BEEN CLEARED BY DESIGNATED PERSONNEL!

LOOK OUT!

~~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 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.

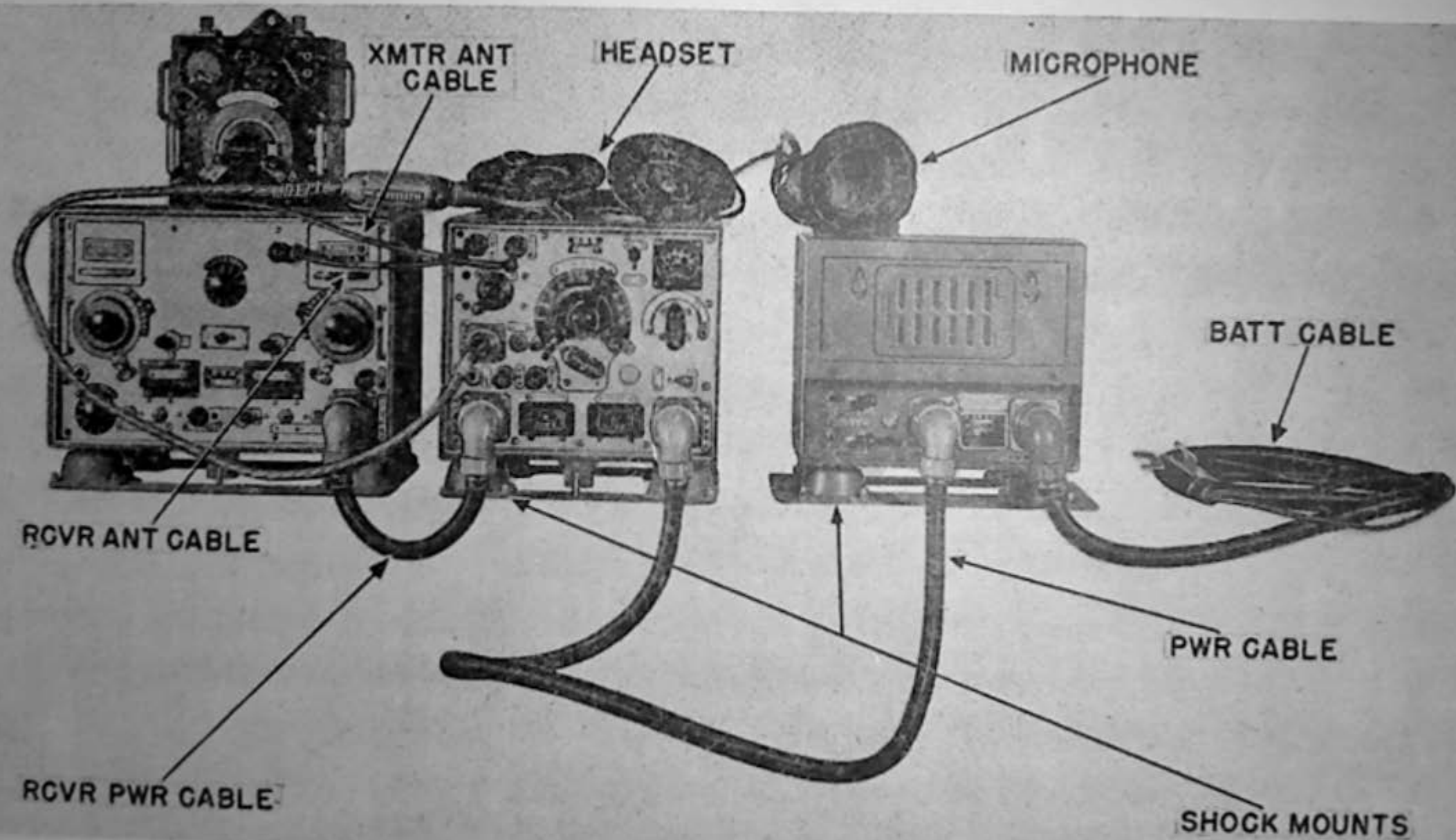
USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- 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 of equipment after destroying them.

DESTROY EVERYTHING!

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Frontispiece. Japanese Radio Set Mobile Wireless Set B.