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TME11-227A

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

SIGNAL COMMUNICATION
EQUIPMENT DIRECTORY

JAPANESE RADIO COMMUNICATION EQUIPMENT

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Washington 25, D. C., 30 December 1944

TM E11-227A, Signal Communication Equipment Directory — Japanese Radio Communication Equipment, is published for the information and guidance of all concerned.

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For explanation of symbols, see FM 21-6.

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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!

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DESTRUCTION NOTICE

Destroy this equipment 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 equipment 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 into 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

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SAFETY NOTICE

Voltages as high as 3,200 volts are used in the Japanese equipment described in this directory. These voltages are dangerous to life.

Do not change tubes or make adjustments inside the equipment with the high-voltage supply ON.

If service checks must be made inside the set with the high voltage on, always have present another person capable of rendering aid. Keep one hand in your pocket while making high-voltage measurements. This precaution will prevent touching the electrical circuit with more than one part of the body at one time.

High radio-frequency voltages may develop on the antennas of some of these equipments. Do not touch the antenna while the transmitter is turned on.

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INTRODUCTION

The radio equipments described in this directory have been named in accordance with a system of nomenclature rapidly being adopted by the Army, Navy, and British forces. A wide variety of translations in the past, led to a great deal of confusion in identifying equipment, particularly when the Japanese introduced slight changes in the original model.

Characters have been translated as shown in the accompanying figure, and every attempt is being made to have these translations used by all parties dealing with captured equipment and documents.

式	SHIKI	(MODEL)
號	GŌ	(MARK)
改	KAI	(IMPROVEMENT)
型	GATA	(TYPE)

SAMPLE TRANSLATION

92	MODEL	3	TYPE	IMP.	1
九	二	式	三	型	改

TL16396

Approved translation of Japanese characters.

Up to the present time, the Japanese Army has used nomenclature for communication equipment based on one of the Japanese year systems. This system began in 660 B.C. when the Japanese empire was founded. The calendar year 1940 is the Japanese year 2600 (1940 plus 660). For model numbers on communication equipment the Japanese customarily use the last two digits of the Japanese calendar year in which the model was introduced. When the last two digits are from 01 to 09, the last digit only is sometimes used. The nomenclature Model 92 would indicate the set was introduced in 1932, and the nomenclature Model 2 would indicate the set was introduced in 1942.

Information in this manual is incomplete. When more information is available for publication, it will be added by means of additional loose-leaf pages.

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MODEL 92 MARK 3 IMPROVEMENT 1
(Long-wave xmtr)

FREQUENCY RANGE: Approx. 0.1 to 1.0 mc. Frequency varied by plate and grid taps on large plate coil, and by capacitors selected by six-position switch on front panel.

POWER OUTPUT: 1 to 2 kw.

TYPE OF SIGNAL: Cw.

USE: Army administrative and command set.

POWER SOURCE: Motor-driven converter operating from 220-v, 3-phase, 50- to 60-cps supply. Output: 3,000 v at 0.7 amp; 1,500 v at 0.05 amp; 16 v fil at 30 amp from selenium rect; 6-v relay pri.

ANTENNA:

TRANSPORTATION: Fixed station.

TUBES: SN146 dual triode osc.

TUNING: Mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	29½	46	22	300
Pwr unit	27½	43½	21½	800

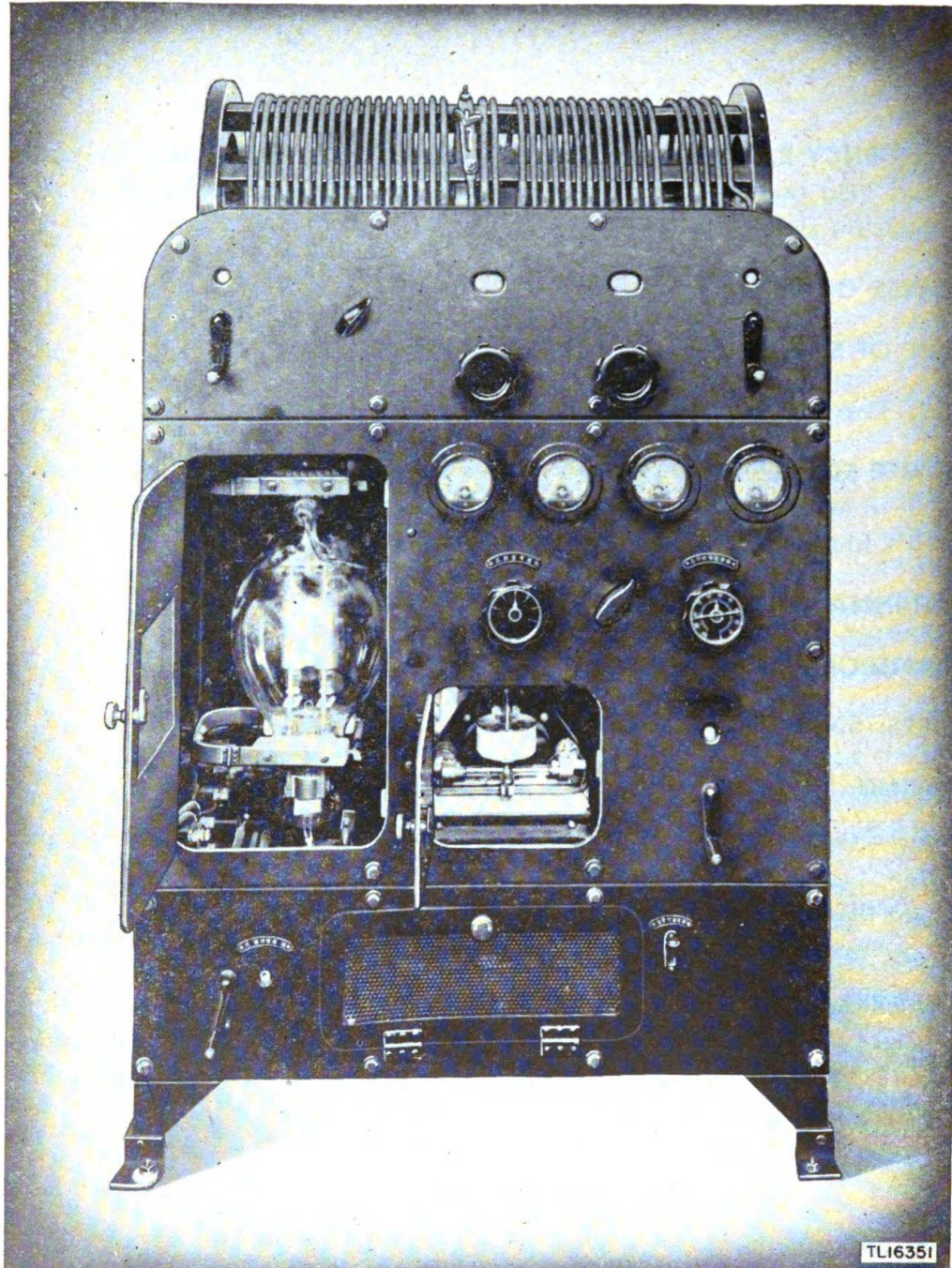
REMARKS: Equipment was manufactured by East Ocean Communication Mfg. Co. It is believed to be a one-stage, self-excited xmtr. Osc circuit is of conventional Hartley design. Set is grid keyed with vacuum relay which is magnetically controlled.

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MODEL 92 MARK 3 IMPROVEMENT 1
(Long-wave xmtr)



Model 92 Mark 3 Improvement 1 transmitter.

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MODEL 94 MARK 1 WIRELESS SET (Xmtr)

FREQUENCY RANGE: Design and construction indicate frequencies between 0.14 and 15.0 mc.

POWER OUTPUT: 275 w max on cw. Pwr output of UY511B tubes with 1,250 v on plates is 100 w; with 1,000 v, 70 w — enough to drive pwr amplr.

TYPE OF SIGNAL: Cw, mcw, voice.

USE: Land-based xmtr.

POWER SOURCE: D-c gen, motor-driven.

ANTENNA: Separate low-frequency and high-frequency antennas, believed supported by same mast.

TRANSPORTATION: Equipment, except motor-gen, can be carried in five cases with handles.

TUBES: UY511B osc; two UV812 parallel r-f pwr amplr. UY511B (8½" x 2½") has five-pin base for fil, control grid, screen grid, and suppressor grid connections; UV812 (12½" x 8½").

Tubes operate at reduced pwr; optimum performance on frequencies between 4 and 12 mc.

TUNING: Xtal, mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	30	21½	15¾	150
Distribution panel	19¾	29½	10	85
Motor	12	15½	10½	133
Gen	13½	19	17½	190

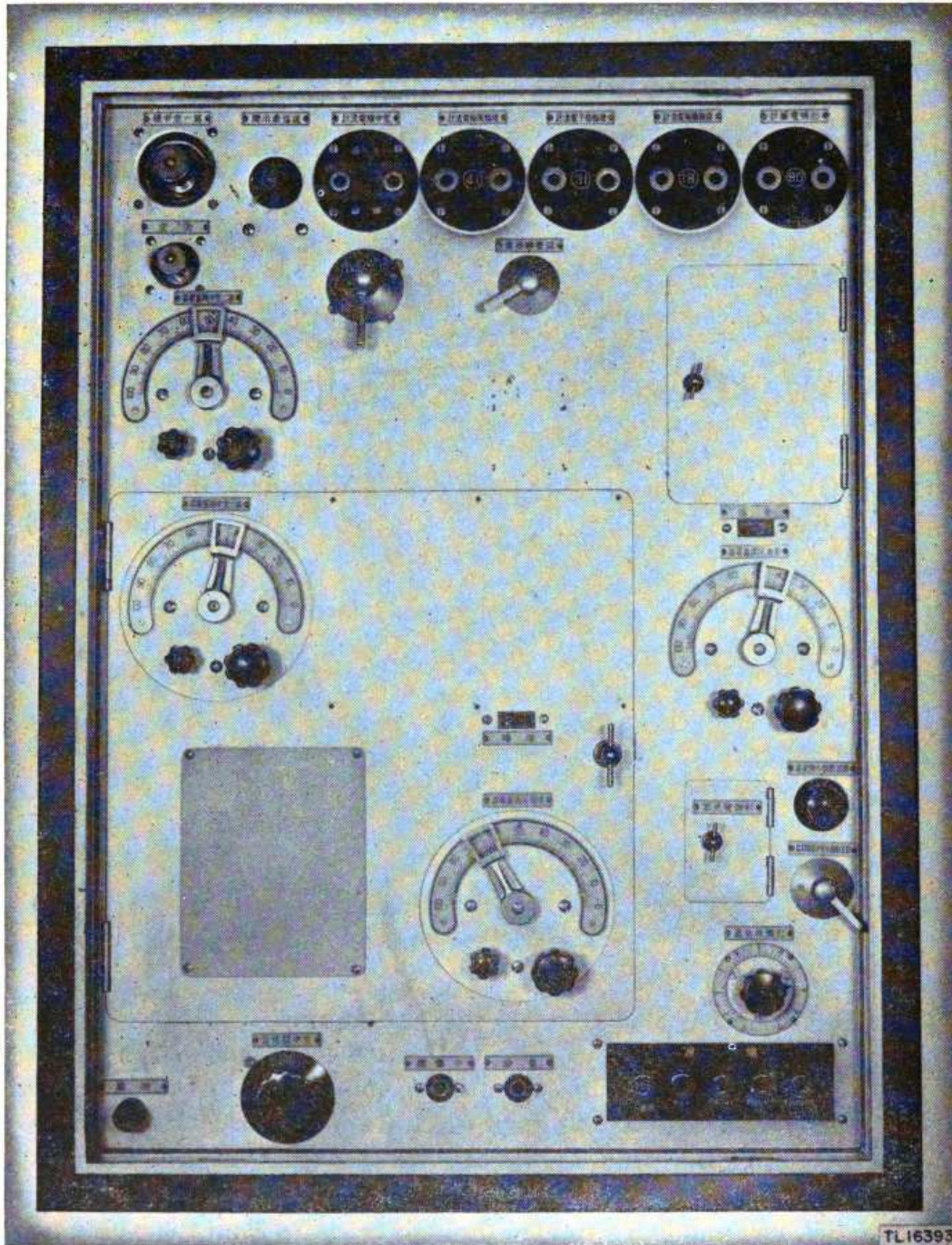
REMARKS: External mod connects to xmtr through binding posts near bottom of xmtr case, and provides for low-level modulation during m-c-w and voice operation. Circuits are conventional. Xtal-controlled pentode osc is series-fed through r-f choke from 1,000-v supply; feedback is through capacitive coupling between control grid and plate. Osc is capacitively coupled to r-f pwr-amplr screen-grid tubes in parallel. Pwr amplr is series-fed through r-f choke from 2,000-v supply. Bias during c-w operation is obtained from tapped resistor connected

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MODEL 94 MARK 1 – Continued

across 400-v supply. For m-c-w or voice operation, a knife switch connects mod output to grid circuit of pwr-amplr tubes. For c-w or m-c-w operation, the screen-grid voltage of pwr-amplr tubes is keyed and osc operates continuously. Meters plug into front panel sockets. Equipment is not protected against moisture or fungi; it has no interlock relays or other protective devices.



Model 94 Mark 1 Wireless Set, transmitter.

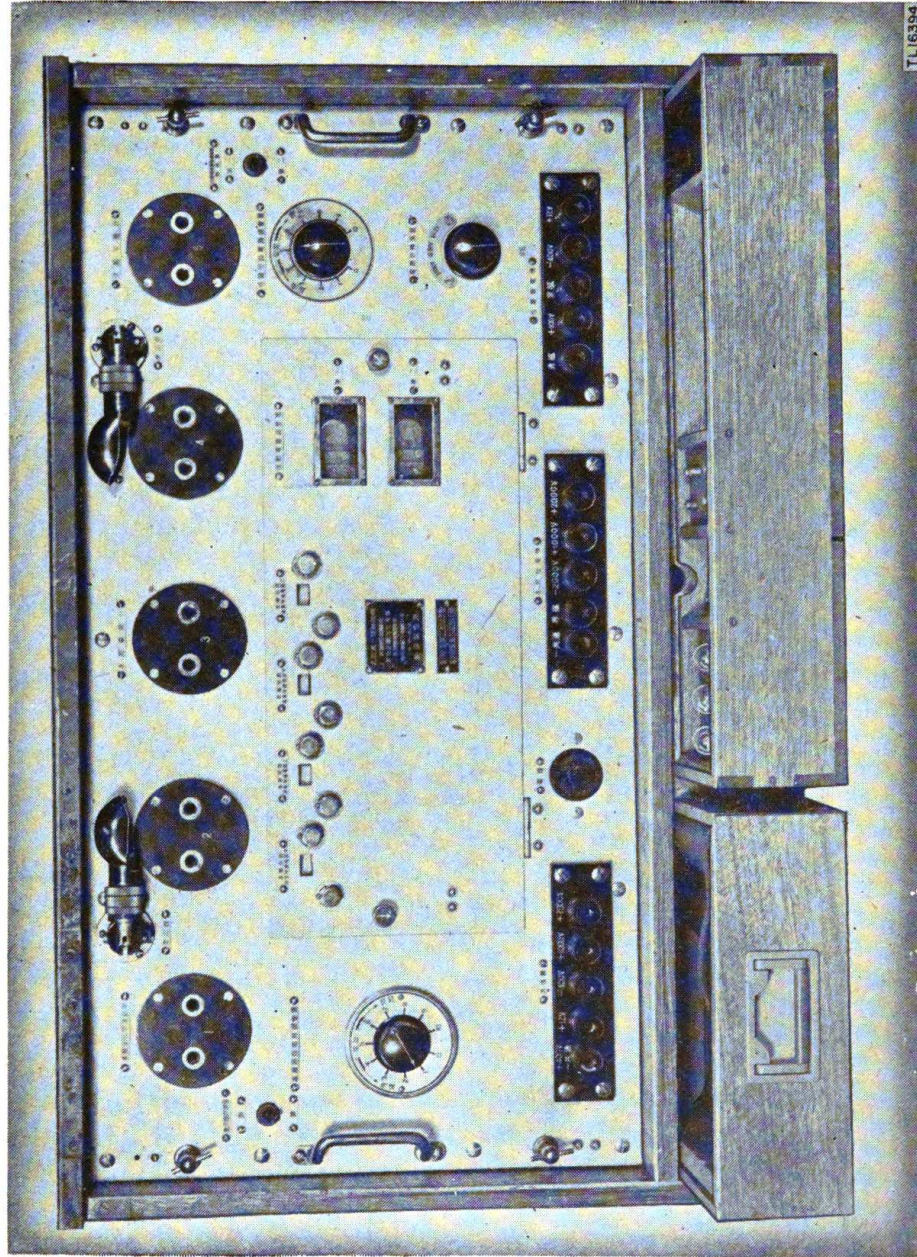
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MODEL 94 MARK 1 WIRELESS SET
(Xmtr)



Mark 40 Type C Distribution Panel used with Model 94 Mark 1 Wireless Set.

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MODEL 95
(Short-wave 1-kw xmtr)

FREQUENCY RANGE: 3.7 to 8.0 mc. Four xtal-controlled frequencies selected by switch on front panel.

POWER OUTPUT: 1 kw.

TYPE OF SIGNAL: Cw.

USE: Army administrative and command set.

POWER SOURCE: Converter operating from 220-v, 3-phase, 50 to 60-cps supply. Output: 2,100 w, 900 w, 75 w; 3,000 v, 2,000 v, 500 v, and -300 v bias. Selenium rect units supply 16 v fil. Relay pri voltages also supplied.

ANTENNA:

TRANSPORTATION: Fixed station.

TUBES: Xmtr: 202A osc, D865 tetrode r-f amplr, UV814 tetrode r-f amplr, 6XN146 dual triode r-f amplr. Rect: Nine H830, six X968.

TUNING: Xtal, mo.

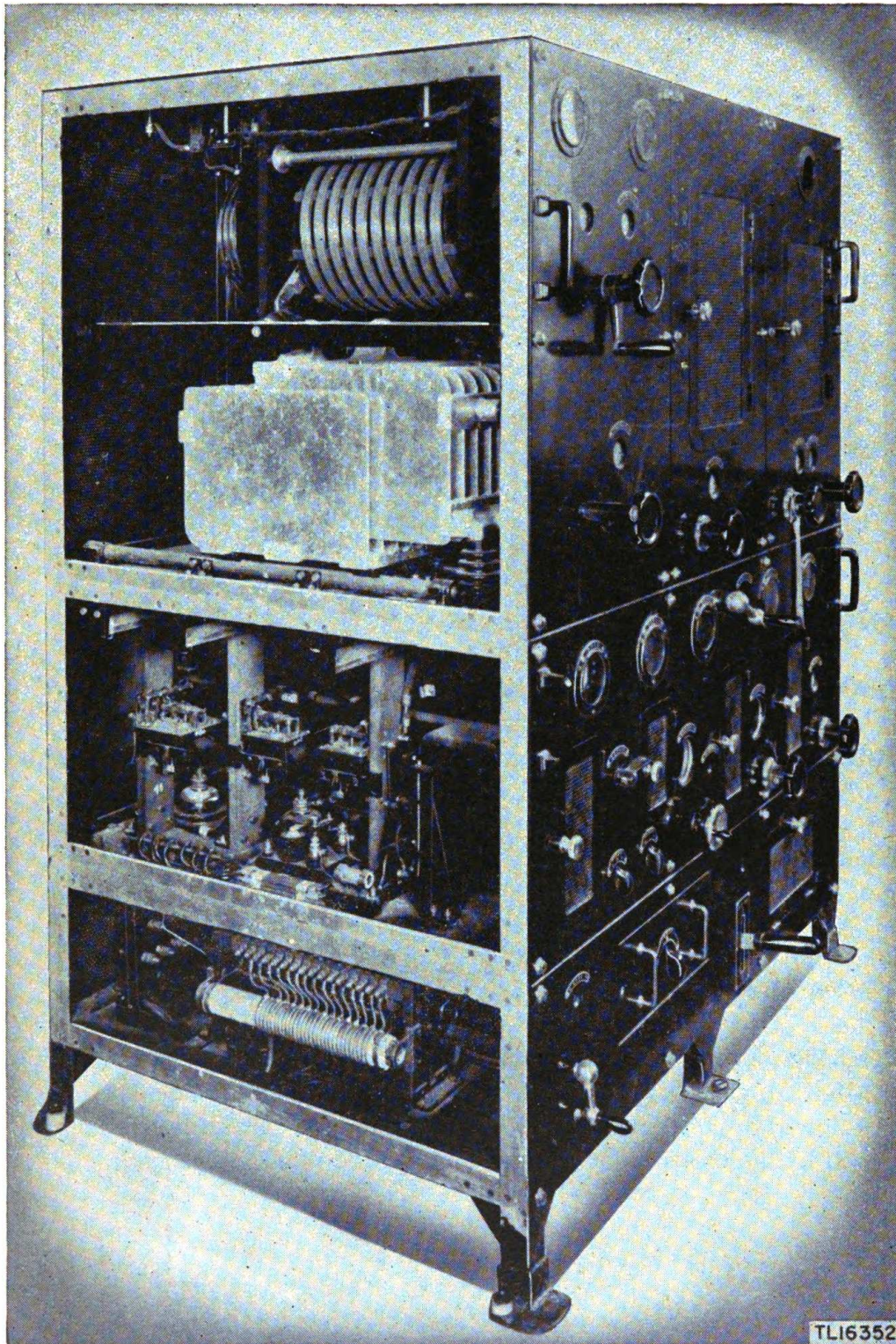
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	41½	53½	28¾	1000
Pwr supply	31½	55½	21½	1200

REMARKS: Equipment was manufactured by East Ocean Communication Mfg. Co. It appears to be well constructed. Small triode xtal osc is followed by conventional tetrode r-f amplr stages. Pwr amplr is neutralized by large capacitor. First r-f amplr is believed grid keyed.

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MODEL 95
(Short-wave 1-kw xmtr)



Model 95 transmitter.

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MODEL 95 MARK 4 IMPROVEMENT 1
 (Short-wave 500-watt xmtr)

FREQUENCY RANGE (mc): 3.44 to 19.9 in 7 bands; No. 1, 12.92 to 19.0; No. 2, 12.92 to 19.9; No. 3, 9.7 to 16.48; No. 4, 9.7 to 16.48; No. 5, 6.42 to 10.9; No. 6, 4.84 to 8.22; No. 7, 3.44 to 5.86.

POWER OUTPUT: 500 w.

TYPE OF SIGNAL: Cw, voice.

USE: Army administrative and command set.

POWER SOURCE: Power supply unit operating from 220-v, 3-phase, 50- or 60-cps supply. Output: plate, 3,200 v at 300-350 ma, 1,500 v at 110 ma, 550 v at 60 ma; grid bias, 200 v at 100 ma; fil, 11 v at 20 amp. Relay pri voltages also supplied.

ANTENNA: Long wire tuned to multiples of $\frac{1}{4}$ wave, or tuned zepp.

TRANSPORTATION: Fixed station.

TUBES: Xmtr: UX202A triode osc, D865 r-f amplr, UV814 r-f dblr-amplr, D860 r-f amplr, UV861 r-f pwr amplr. Rect: Nine H830, six X968.

TUNING: Xtal, mo.

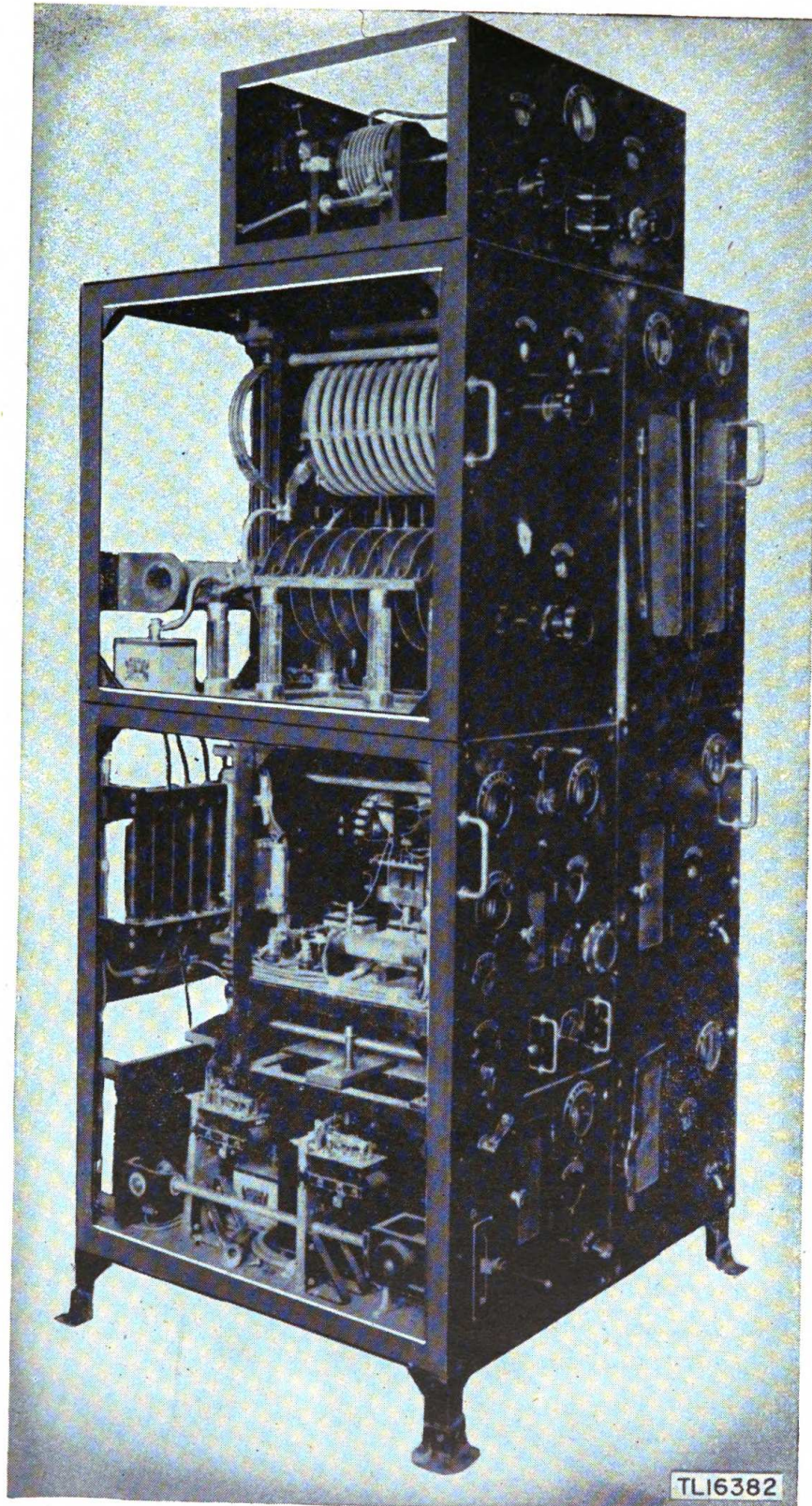
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	29 $\frac{3}{4}$	58 $\frac{1}{2}$	25 $\frac{3}{4}$	800
Antenna loading box	15 $\frac{3}{4}$	21 $\frac{1}{2}$	10 $\frac{1}{4}$	

REMARKS: Equipment was manufactured by East Ocean Communication Mfg. Co. Automatic voltage control is used in pwr supply. UV861 has large plate tank circuit. Keying is in oscillator or buffer, or both. Antenna loading circuit is housed on top of xmtr; it is composed of variable inductor and variable capacitor with switch for series or parallel tuning. Thirteen meters are used. Terminals are provided for connecting an external grid modulator.

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MODEL 95 MARK 4 IMPROVEMENT 1
(Short-wave 500-watt xmtr)



Model 95 Mark 4 Improvement 1 transmitter.

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MODEL 2 SHORT-WAVE MOBILE TRANSMITTER

FREQUENCY RANGE (mc): 3.38-14.0 (except 10.4-12.2) in four steps; No. 1, 3.38 to 5.836; No. 2, 5.503 to 7.878; No. 3, 5.092 to 10.4; No. 4, 12.2 to 14.0.

POWER OUTPUT: 50 w in low-power position; 240 w in high-power position.

TYPE OF SIGNAL: Cw.

USE:

POWER SOURCE: Rect and pwr transf operating from 50-, 60-, or 190-cycle power lines or alternator. Output: plate, 1,000 v and 2,000 v; also grid bias voltages. Batteries and battery charger also used.

ANTENNA: Two antenna coils cover entire frequency range; one is part of xmtr, other is in separate box. Coupling adjustable from xmtr panel.

TRANSPORTATION: Equipment designed for fixed-station use, but can be carried on poles thrust through straps.

TUBES: Xmtr: C202A, UV814, UV812. Rect: Four HX966 half-wave mercury rect tubes.

TUNING: Mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	25½	20		146
Xmtr carrying case	32	23½	20	78
Rect unit	14½	14½	10	62
Rect unit carrying case	18½	17½	13	26
Accessories box	35	22½	19½	80
Accessories				70

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MODEL 2 – Continued

REMARKS: Equipment is simple and well designed. Xmtr consists of osc, intermediate pwr amplr, and pwr amplr without frequency multiplication. A three-contact keying relay controls voltages applied to screen and control grids of intermediate pwr amplr and control grid of pwr amplr. Xmtr can be operated while it is in carrying case. On low power, 1,000 v is supplied plates of all stages; on high power, plate voltage of pwr amplr is 2,000 v. Full-wave bridge rectification is used for 2,000 v; half-wave rectification, utilizing only one rect tube, is used for 1,000 v. Separate filters for high voltage and low voltage are housed in one cast aluminum case. A push button is connected to discharge filter capacitors. Carrying cases are gray, of Japanese oak, with leather-bound rope handles anchored by aluminum fastenings, and with rotary locking clips. Cables are of good quality; high-grade rubber insulation is used between separate cotton-covered wires. All cables end in plugs which are fitted with screw type locking rings. High-voltage cables are red with leather spacers sewed between wires. Each lead has a distinctive fitting; leads cannot be interchanged. All cable sockets are fitted with dust covers. Wiring is very rigid.

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MARK 32 TYPE F TRANSMITTER (Part of Model 94 Mark 5 Wireless Set)

FREQUENCY RANGE: 0.8 to 5.0 mc.

POWER OUTPUT: Less than 1 w.

TYPE OF SIGNAL: Cw, voice.

USE: Short-distance, two-way communication.

POWER SOURCE: Batteries or hand-driven gen.

ANTENNA: 50 meters of braided wire.

TRANSPORTATION: Man pack.

TUBES: UZ12C twin triode. Amplification factor approx 8, plate resistance 4,000 ohms, transconductance 2,500 microohms.

TUNING: Xtal.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	6½	8	5	8.25

REMARKS: Xmtr is so compact that repair is difficult. It is not weather-proof. Luminous paint facilitates night operation, but there are no panel lamps. Circuit and controls are simple. For c-w operation, xmtr uses parallel-operated twin triode as xtal-controlled osc. Feedback is through tube interelectrode capacitances. Keying is in plate voltage lead. As voice xmtr, the same circuit is used except that half of the twin triode is an osc, the other half is a Heising mod. Only 35 percent modulation possible. Carbon microphone is used with 20:1 ratio transf, audio choke, and 6-v battery. Operation of send-receive switch has little effect on frequency.

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MODEL 92 SPECIAL RECEIVER IMPROVEMENT 3

FREQUENCY RANGE: 0.02 to 20.0 mc using 2 plug-in coil sets, one having three coils and the other two coils. Each coil has five tuning ranges.

POWER OUTPUT:

TYPE OF SIGNAL:

USE: Fixed or semifixed station.

POWER SOURCE: Plate, 110 v or 220 v; fil, 6.3 v, 12 v, or 110 v.

ANTENNA:

TRANSPORTATION:

TUBES: Two UZ78 r-f amplr, UT6A7 converter, two UZ78 i-f amplr, UZ77 regen detecr, UY238 a-f output.

TUNING:

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Rcvr	26 $\frac{1}{4}$	13 $\frac{1}{4}$	10	102

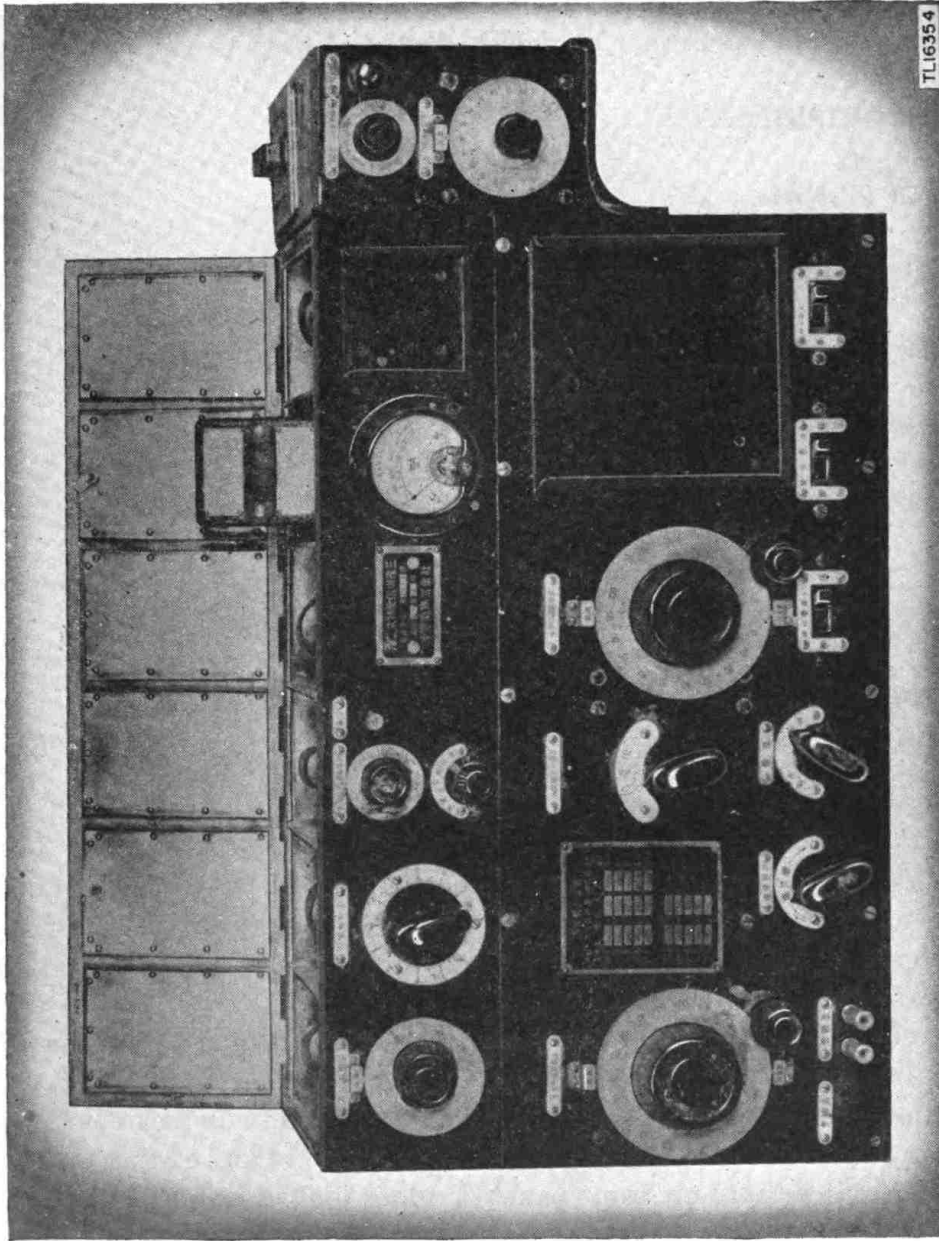
REMARKS: Equipment is 7-tube superheterodyne rcvr from 1500 kc to 20 mc; and tuned r-f rcvr from 20 to 1500 kc, with r-f amplr and converter stages disconnected, and i-f amplr used as tuned r-f rcvr with regen detecr. Rcvr is built in two sections. Top section houses coil sockets and tube sockets; bottom section houses tuning capacitors, i-f amplr tuning section, and superheterodyne section. In the rear are audio transf, chokes, and bypass capacitor blocks. Compartments are interconnected with two terminal strips. All controls except certain power switches are on front panel. Tuning dials are similar to U. S. types. Sensitivity of rcvr is fairly good. Selectivity is sharp near peak, as is typical in regenerative sets. Absence of avc permits it to overload readily. Rcvr is cumbersome and difficult to tune.

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MODEL 92 SPECIAL RECEIVER IMPROVEMENT 3



Model 92 Special Receiver Improvement 3.

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MODEL 92 SPECIAL RECEIVER IMPROVEMENT 4

FREQUENCY RANGE: 0.02 to 20.0 mc in 10 bands, using seven plug-in coils.

POWER OUTPUT:

TYPE OF SIGNAL:

USE: Army administrative and command set.

POWER SOURCE: Plate, 220 v; fil, 6 v.

ANTENNA:

TRANSPORTATION:

TUBES: All tubes of U. S. design.

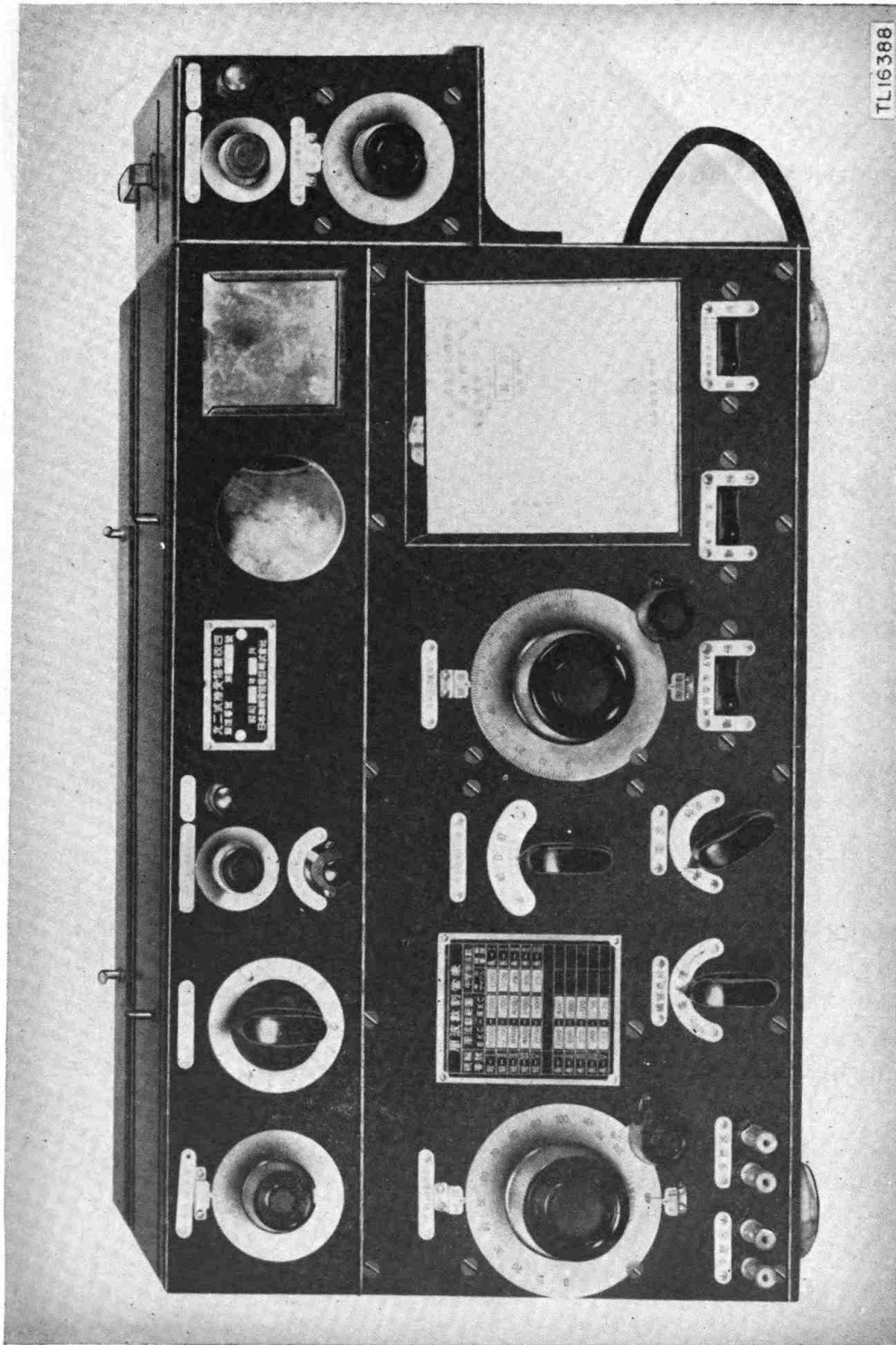
TUNING:

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Rcvr	14	26	10 $\frac{1}{4}$	80

REMARKS: Rcvr operates as three-stage tuned r-f rcvr in range from 20 to 1500 kc and as superheterodyne in range from 1.5 to 20 mc. Plug-in coils are used in superheterodyne for antenna tuning, r-f amplr, h-f osc, mixer, and 3 i-f amplr circuits. The i-f circuits can be pretuned for superheterodyne use. Antenna and r-f circuits are tuned separately.

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MODEL 92 SPECIAL RECEIVER IMPROVEMENT 4



Model 92 Special Receiver Improvement 4.

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**MODEL 93 SHORT-DISTANCE SHORT-WAVE DIRECTION
FINDER IMPROVEMENT 1**

FREQUENCY RANGE (mc): 2.5 to 20.0 in 3 bands; No. 1, 2.5 to 5.0;
No. 2, 5.0 to 10.0; No. 3, 10.0 to 20.0.

POWER OUTPUT:

TYPE OF SIGNAL:

USE: Direction finding and interception.

POWER SOURCE: Batteries located under operator's table. Battery charger is in small frame shack on ground 25' below rcvr. Power for charging is supplied through three-wire underground cable from pwr plant. Fil, 6 v at 3 amps; plate 150 v at 100 ma.

ANTENNA: Elevated H Adcock collector consisting of 2 towers half mi apart. Rcvr housed in center of room 20' square and 25' high built into each tower 25' above ground. Doublet antenna leads connect rcvr to 20' vertical dipole in each corner of room. Single 10' vertical antenna rises directly above rcvr.

TRANSPORTATION: Fixed installation.

TUBES: Five UY39, two UY36.

TUNING:

PRINCIPAL COMPONENTS:

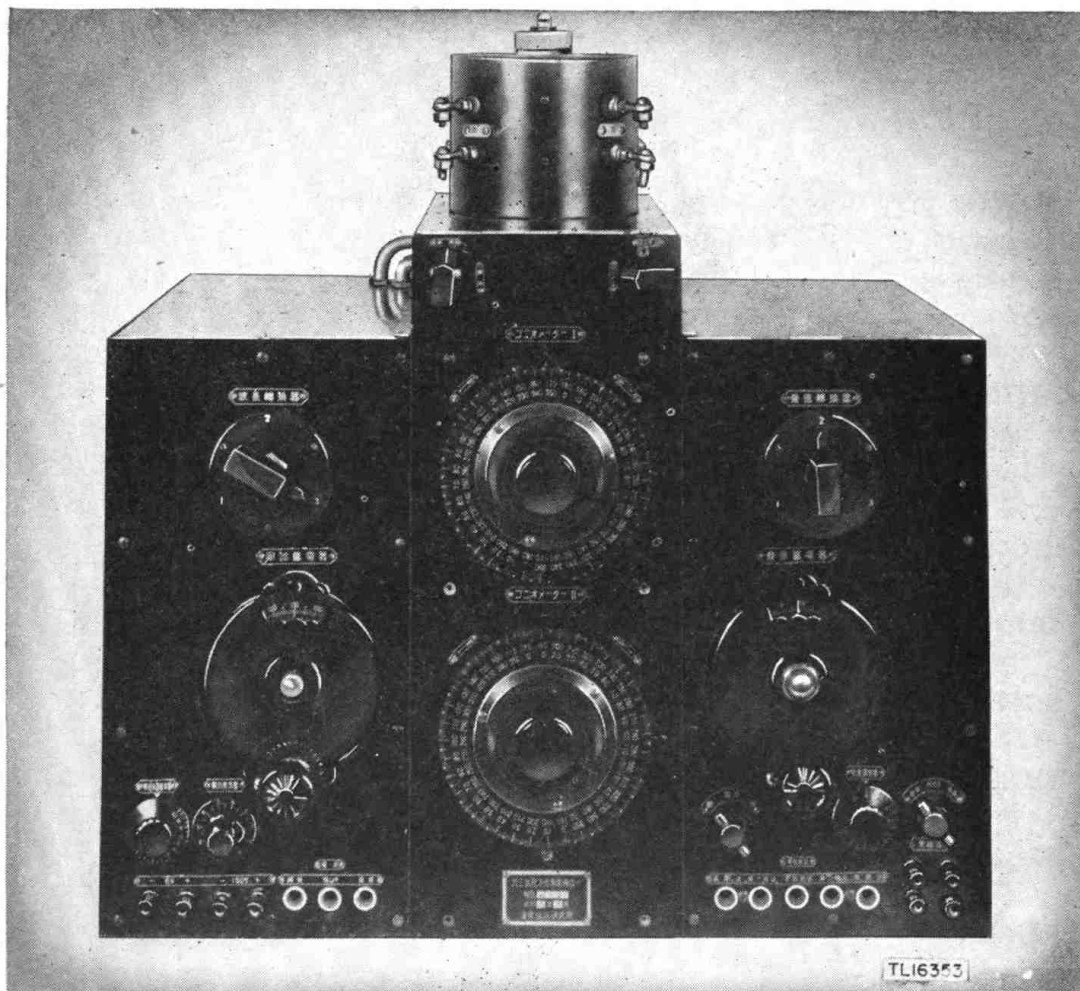
REMARKS: The four-antenna, elevated H, aural null type direction finder is designed to operate with a goniometer and a superheterodyne rcvr. All components appear to be of commercial design without conformity to military standards. Tuning controls are calibrated and used with charts. Mixer and h-f osc are separately tuned. Rcvr sensitivity is about 40 μ v; selectivity is comparable to that of average superheterodyne.

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MODEL 93 SHORT-DISTANCE SHORT-WAVE DIRECTION
FINDER IMPROVEMENT 1



Model 93 Short-Distance Short-Wave Direction Finder Improvement 1.

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MODEL 94 MARK 1 (Direction finder and intercept rcvr)

FREQUENCY RANGE (mc): 0.1 to 2.0 in 5 bands; No. 1, 0.1 to 0.22; No. 2, 0.21 to 0.46; No. 3, 0.45 to 0.97; No. 4, 0.96 to 1.6; No. 5, 1.5 to 2.0.

POWER OUTPUT:

TYPE OF SIGNAL:

USE: Direction finding and intercept.

POWER SOURCE: Six series-connected 22½-v dry batteries for B supply; single 1½-v dry cell for fil supply; single 4½-v dry battery for bias supply. Batteries in single compartment in rcvr.

ANTENNA: Direction finding loop assembly consists of T-shaped mast and crossarm supporting a six-turn unshielded diamond-shaped loop about 4' square. For intercept purposes, two vertical masts probably are used.

TRANSPORTATION: Components can be packed in four wooden boxes and one canvas bag. Equipment is bulky and not carried easily.

TUBES: Three 134A r-f amplr, 109A regen detecr, 109A 1st a-f amplr, 133A 2d a-f amplr.

TUNING:

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Entire set				350

REMARKS: Equipment consists of rcvr, loop mast assembly, loop wire, shelter, connecting sections for two vertical mast antennas, miscellaneous spare parts and chests for carrying components. Antenna loop is wound in two sections of three turns each with separate taps from the end of each section to permit either series or parallel connection. Bottom of loop mast is supported by sleeve type bearing mounted on top of shelter. Mast extension is coupled to a handwheel for rotating loop and to a graduated azimuth scale which can be rotated independently of the loop. Loop can be locked in fixed position when not in operation. Loop is directly coupled to rcvr by flexible cable. Highest average sensitivity for both cw and mcw is on band 4; lowest on band 1. Selectivity is very sharp, being best in bands 1 and 5. Accuracy is fairly good when average of direct and reciprocal bearings is taken. Accuracy is very poor when direct bearing is taken alone.

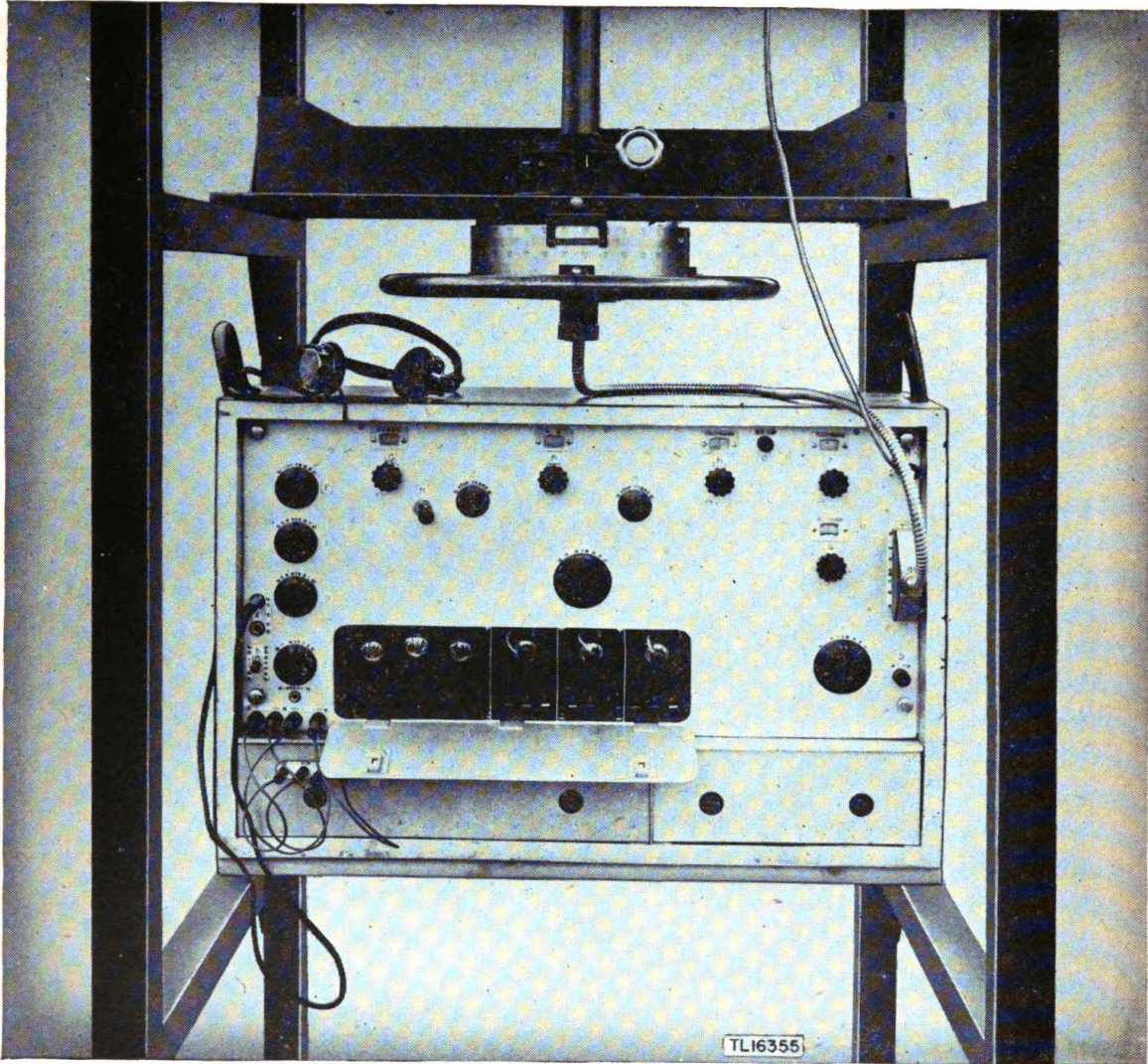
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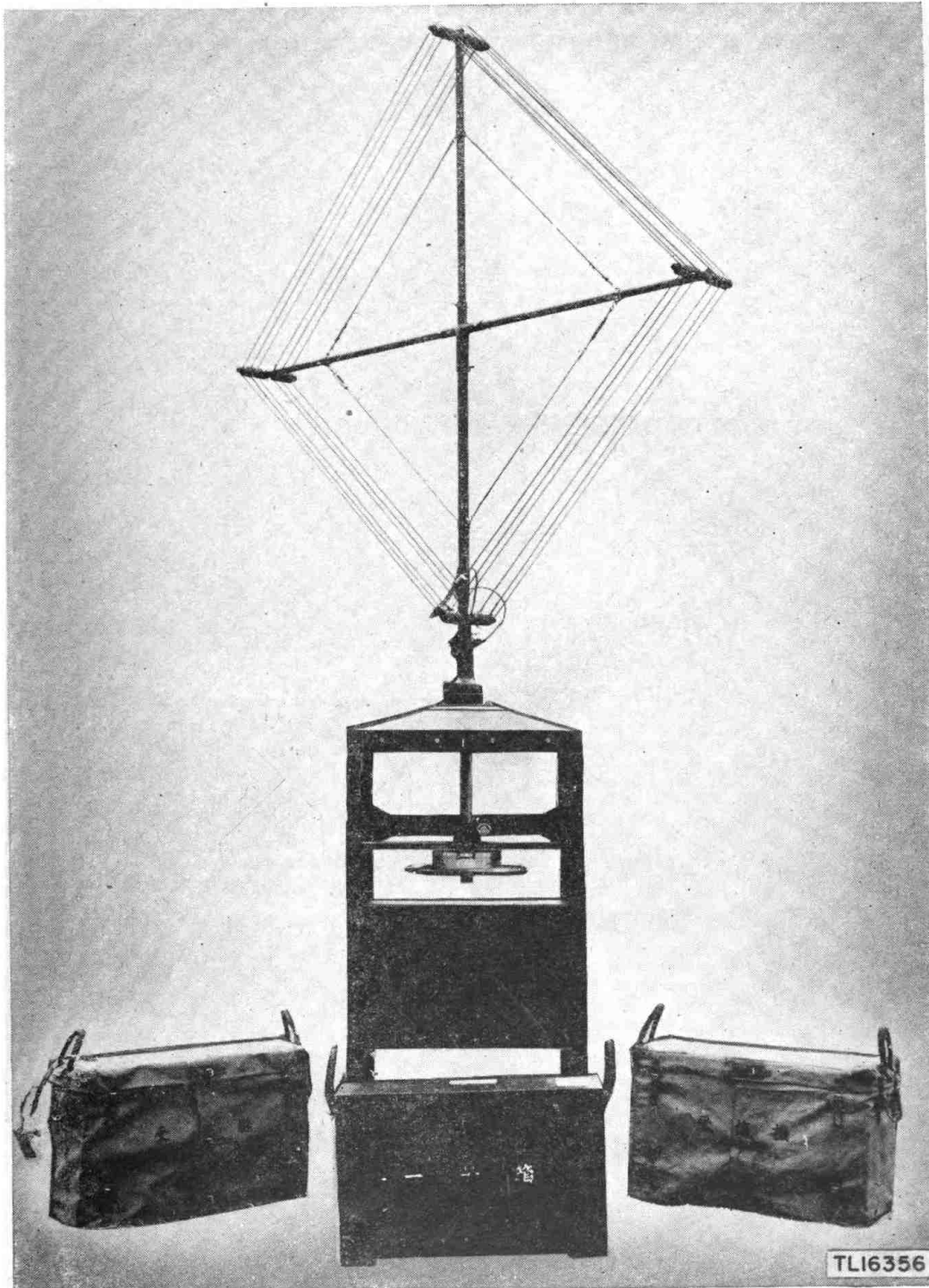
MODEL 94 MARK 1
(Direction finder and intercept rcvr)



Model 94 Mark 1 direction finder and intercept receiver.

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MODEL 94 MARK 1
(Direction finder and intercept rcvr)



Loop antenna used with Model 94 Mark 1 direction finder and intercept receiver.

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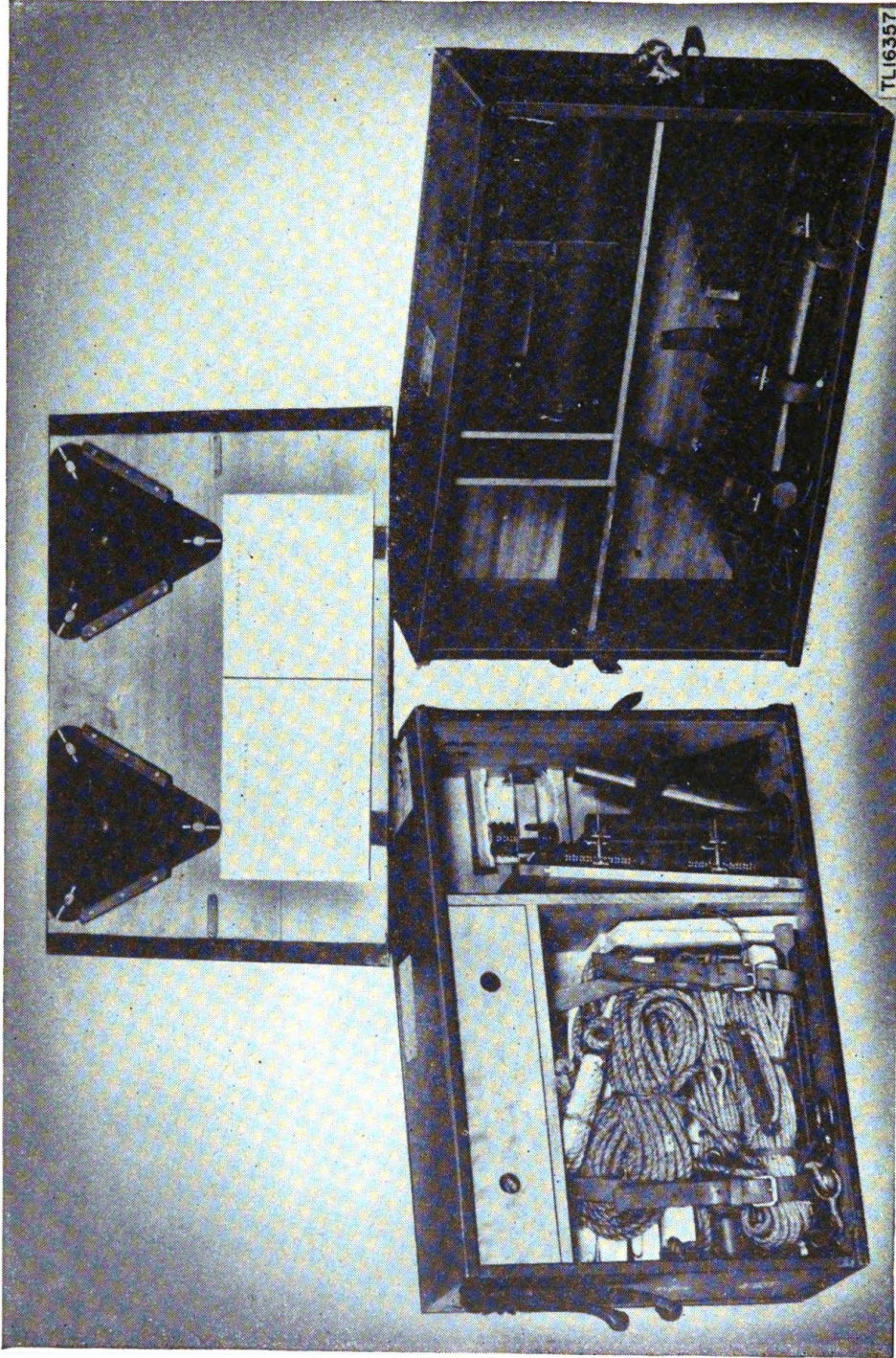
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MODEL 94 MARK 1

(Direction finder and intercept rcvr)



Equipment cases used with Model 94 Mark 1 direction finder and intercept receiver.

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MARK 53 TYPE C RECEIVER

(Part of Model 94 Mark 3A Wireless Set)

FREQUENCY RANGE (mc): 0.4 to 5.75 using five sets of plug-in coils; No. 1, 0.4 to 0.73; No. 2, 0.73 to 1.33; No. 3, 1.33 to 2.3; No. 4, 2.3 to 4.3; No. 5, 4.3 to 5.75.

POWER OUTPUT:

TYPE OF SIGNAL: Cw, mcw, voice.

USE: Field set, exceedingly compact and designed to give portability with reasonable effectiveness.

POWER SOURCE: Dry batteries: 22½-v plates, 1½-v fl. Operation not critical during voltage changes. Gen (No. 29 Model E) can be connected through a special switch.

ANTENNA: 12' of flexible rubber-covered wire attached to special plug which fits antenna jack of rcvr. Short wire used as counterpoise connects to ground binding post.

TRANSPORTATION: Man pack.

TUBES: Miniature tubes: UY14M pentode r-f amplr; UY11M tetrode regen detecr; two UY11M tetrode a-f amplr. Tubes have five-pin black bakelite bases and are similar to U. S. hearing-aid types.

TUNING:

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Rcvr container	8½	14¼	6¾	5
Rcvr unit with batteries	6¾	8¾	2¾	6

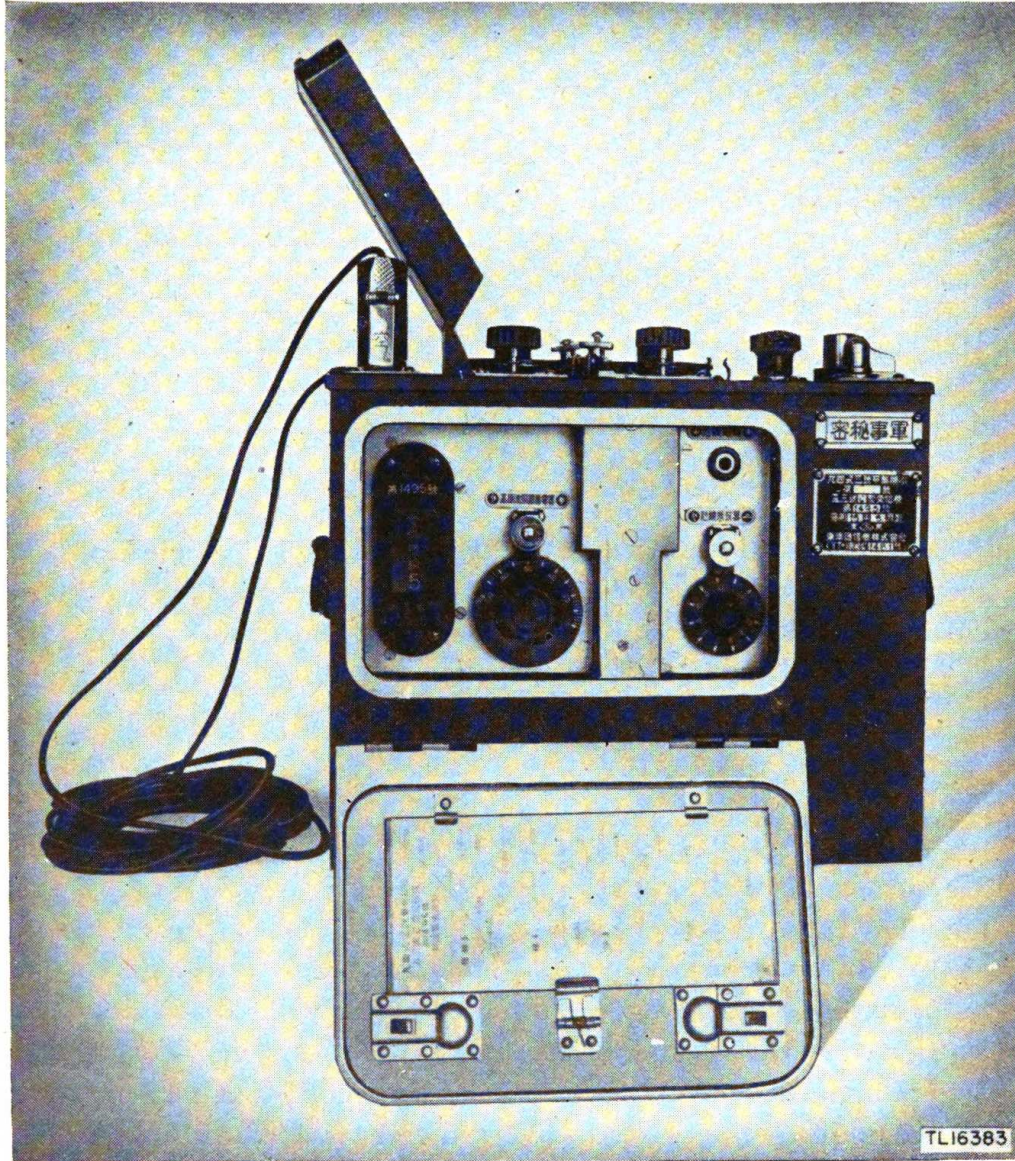
REMARKS: Equipment was manufactured by Tokyo Instrument Co. It is an extremely compact regen rcvr housed with accessories in a wooden container which has shoulder straps for carrying. Set is rugged and components are fairly accessible. Luminous dial markings are used and all controls are provided with dial locks which clamp to the outer edge of the dial. Flexible wire insulated with black or brown spaghetti is used throughout. There is no color coding and no protection against moisture. All tubes appear to operate satisfactorily at reduced voltages. Operation of rcvr is considered difficult. R-f and detecr controls are not ganged. Control adjustments are critical, and fringe howl occurs at the threshold of regeneration. Sensitivity is as good as can be expected in a regen rcvr. Selectivity is fair.

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MARK 53 TYPE C RECEIVER

(Part of Model 94 Mark 3A Wireless Set)



Mark 53 Type C Receiver.

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MODEL 94 MARK 5 WIRELESS SET: MARK 32 TYPE TRANSMITTER, MARK 32 TYPE RECEIVER

FREQUENCY RANGE (mc): Xmtr: 0.850 to 5.1 in 3 bands; No. 1, 0.850 to 1.62; No. 2, 1.55 to 3.05; No. 3, 2.8 to 5.1. Rcvr: 0.396 to 7.6 in 4 bands; No. 1, 0.369 to 0.874; No. 2, 0.761 to 1.95; No. 3, 1.4 to 3.9; No. 4, 2.5 to 7.6.

POWER OUTPUT: Cw, 1.6 w; voice, 0.57 w.

TYPE OF SIGNAL: Xmtr: cw, voice. Rcvr: cw, mcw, voice.

USE: Communication between infantry units.

POWER SOURCE: Xmtr: Type 19 hand gen. Output: cw, 150-v plate at 44-ma; voice, 41-ma; 6 v at 500-ma fil. Rcvr: batteries housed in bottom of rcvr case; plate, 90 v at 10 ma; fil, 1.5 v at 180 ma.

ANTENNA: Two 50' lengths of flexible wire for antenna and counterpoise. When packed, wire is wound on flat, wooden strips. Single wire antenna from 53' to 88' will load xmtr throughout frequency range.

TRANSPORTATION: Two-man pack. Equipment may be operated while in transit.

TUBES: Xmtr: UZ12C twin triode; sections in parallel for cw, one becomes plate mod for voice. Rcvr: UF134 r-f amplr, UF109A regen detecr, UZ133D a-f amplr.

TUNING: Xtal, mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr (out of case)	4 $\frac{5}{8}$	7 $\frac{3}{4}$	5 $\frac{5}{8}$	5.25
Rcvr (out of case)	5 $\frac{5}{8}$	8 $\frac{3}{8}$	8 $\frac{5}{8}$	6.75
Gen				15.00

REMARKS: Equipment includes xmtr, rcvr, hand gen, antenna equipment, headset, throat microphone, key, connecting cables, carrying cases and accessories. Xmtr uses Hartley osc which is coupled to antenna. Miniature type carbon throat microphone has connecting wires cabled into headset cord. Microphone hangs from elastic band worn around neck. Xmtr and rcvr have aluminum cases with canvas or leather covers. Tuning graphs and circuit diagrams are mounted inside covers under celluloid. Rcvr batteries are carried in lower compartment of rcvr. The 2,000-ohm headset is small and light; external screw collars provide for adjustment of the diaphragms. Wiring is stranded tinned copper wire with varnished cambric tubing. Joints are well soldered. Set is difficult to service and has no protection against moisture or fungi.

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**MODEL 94 MARK 5 WIRELESS SET:
MARK 32 TYPE TRANSMITTER, MARK 32 TYPE RECEIVER**

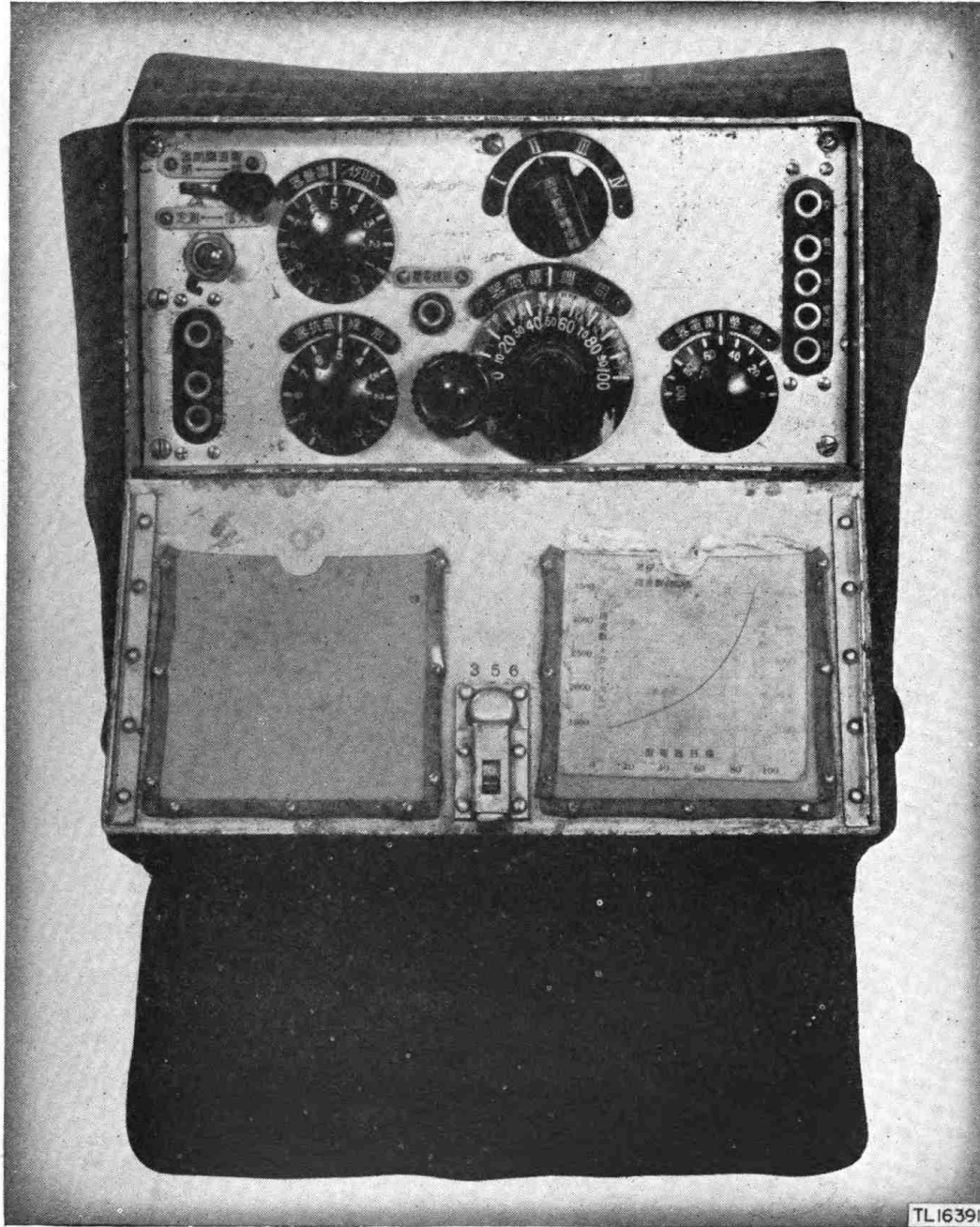


Mark 32 Type Transmitter.

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MODEL 94 MARK 5 WIRELESS SET:
MARK 32 TYPE TRANSMITTER, MARK 32 TYPE RECEIVER



Mark 32 Type Receiver.

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MODEL 94 GROUND-AIR MARK 2 WIRELESS SET (TYPE 2)

FREQUENCY RANGE (mc): Xmtr: 0.8 to 10.0. Rcvr: 0.14 to 15.0 using 8 plug-in coil boxes; No. 1, 0.14 to 0.27; No. 2, 0.25 to 0.45; No. 3, 0.45 to 0.85; No. 4, 0.8 to 1.5; No. 5, 1.5 to 2.8; No. 6, 2.5 to 4.5; No. 7, 4.5 to 8.5; No. 8, 8.0 to 15.0. Two plug-in coil assemblies are provided, one for coil boxes No. 1 through No. 4, the other for coil boxes No. 5 through No. 8.

POWER OUTPUT: 200 w voice.

TYPE OF SIGNAL: Cw, voice.

USE: Ground-to-air communication.

POWER SOURCE: Motor-gen and 12-v storage battery. Gen output: 2,200 v and 12 v.

ANTENNA: Single mast 80' or double mast 40' high supports stranded copper wire; at 20' intervals are ball insulators and jumpers. Mast is formed by 12 aluminum tubular sections $2\frac{3}{8}$ " diam and 12 sections $1\frac{7}{8}$ " diam telescoped to form either one or two poles.

TRANSPORTATION: Fixed station. Equipment is sufficiently rugged for semi-mobile field operation.

TUBES: Xmtr: UF210B, three UX860. Rcvr: two UY37, two UY78, UT617G, UT6B7, UZ41. Mod: four UX12A, UF210B, UV849.

TUNING: Mo, xtal. Removing xtal connects mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	25	29½	19½	184
Rcvr	13	14	7½	40
Mod	25	29½	14	192
Motor-gen	30	46	20½	425
Pwr panel	20	29½	10	95
Storage battery	14	15¾	11	100
5 loaded spare parts boxes (ea)	20	29½	10	50
Antenna masts				64
Connecting cables				45

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MODEL 94 MARK 2 TYPE 2 — Continued

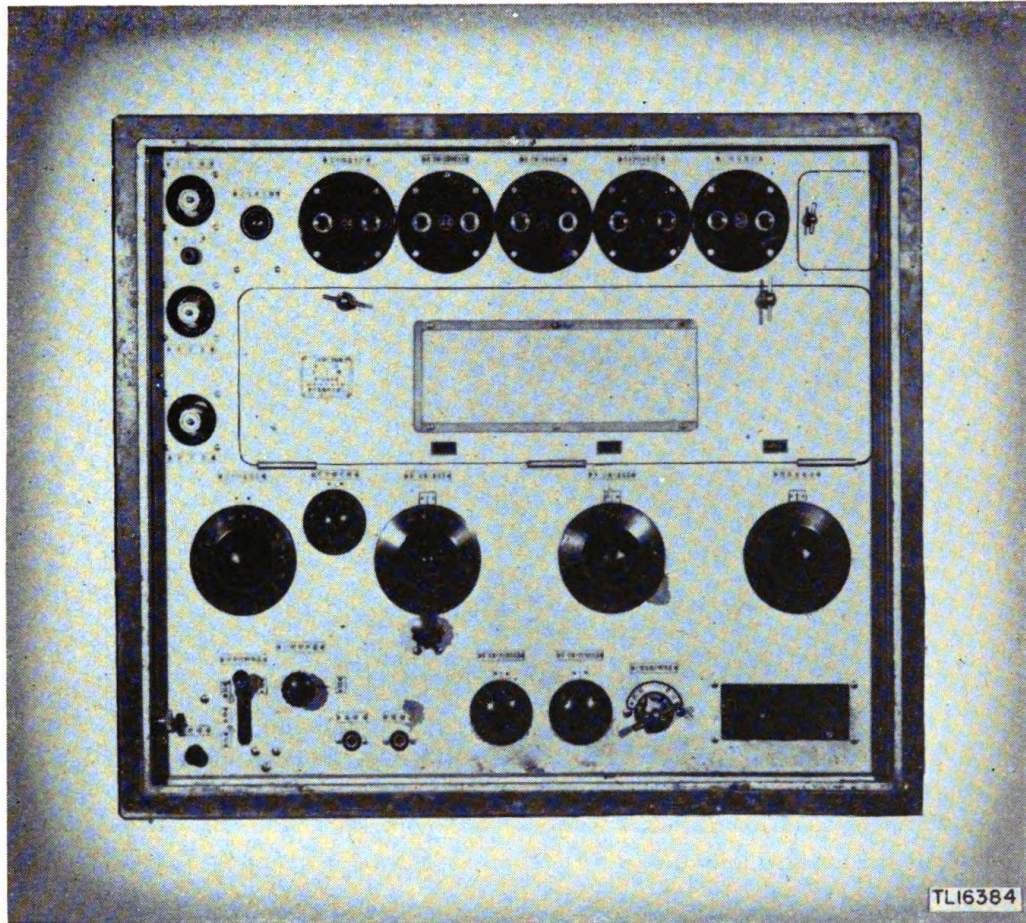
REMARKS: Equipment captured in Burma 3 Jun 1944 was found in two dugouts connected by 20' tunnel. Front dugout housed xmtr and rcvr; rear dugout housed motor-gen equipment. Xmtr is mounted in welded aluminum angle frame to which shields and components are riveted to form seven compartments housing: No. 1, osc tube, tank coil, xtal; No. 2, osc tank tuning capacitor, intermediate-pwr-amplr grid r-f choke; No. 3, intermediate-pwr-amplr tube, tank coil, keying relay; No. 4, intermediate-pwr-amplr tank tuning capacitor, pwr-amplr grid r-f choke; No. 5, high-voltage and bias bleeder; No. 6, pwr-amplr tubes and tank coil, antenna coupling and loading coils, receive-transmit switch; No. 7, pwr-amplr tank tuning capacitor, fil switch, cw-voice switch. Rcvr is mounted on welded aluminum angle frame and panel. It is a seven-tube superheterodyne consisting of r-f amplr, mixer, h-f osc, 1st and 2d i-f amplr stages, diode detecr, a-f amplr, and BFO. Three volume controls are located on front panel. Connecting cables are carried in a leather-bound canvas bag. All leads are color coded. Remote control box allows operation of xmtr from remote rcvr location. Provision is made for telephone communication between xmtr and remote location over same wire used for keying. Five reels of light field wire and a chest reel are supplied for connecting remote control box to the remote key and telephone. Set uses two types of xtals; one xtal-holder is a bakelite box in which xtal is placed between two metal blocks tied together with silk ribbon. Equipment is not protected against moisture or fungi.

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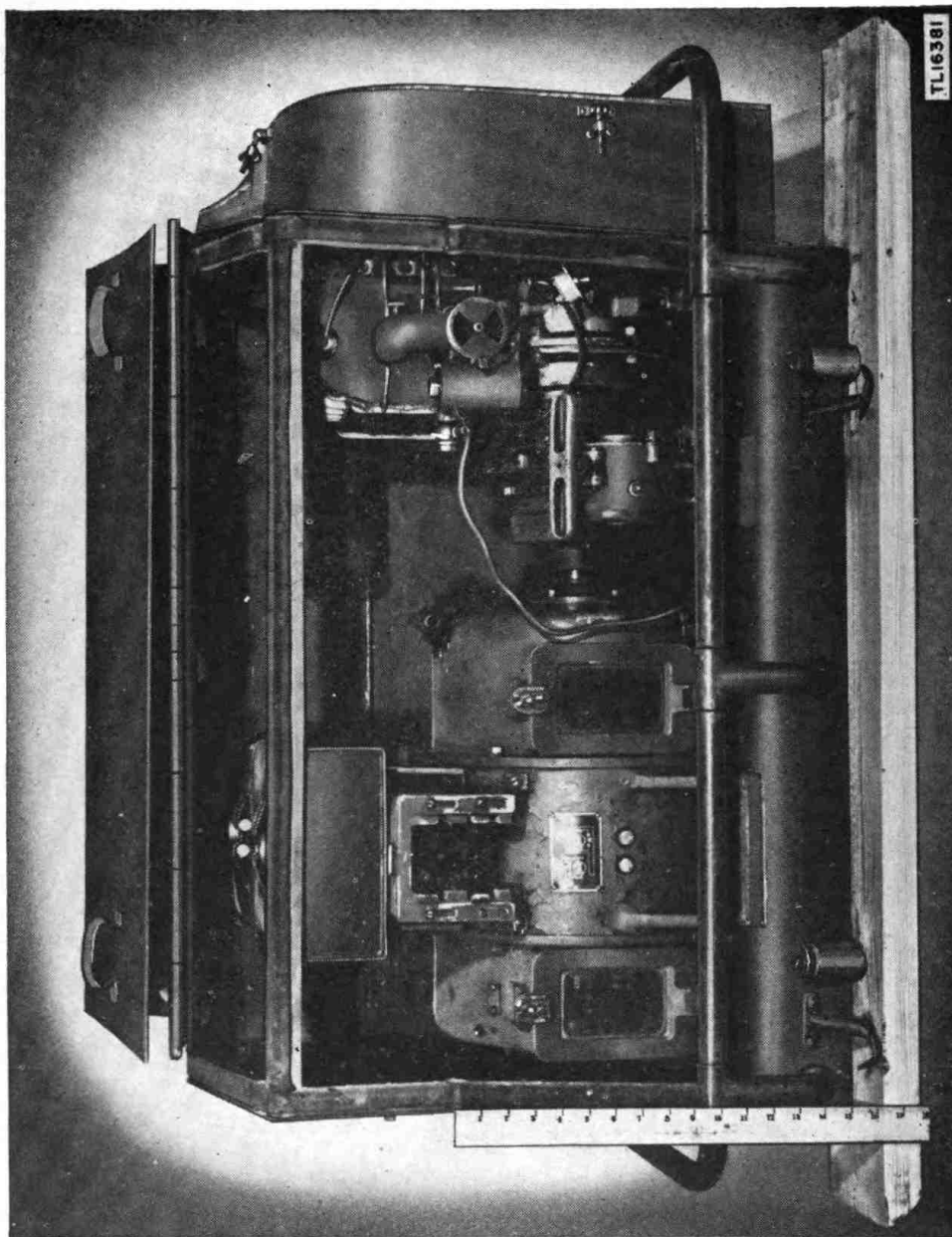
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MODEL 94 GROUND-AIR MARK 2 WIRELESS SET (TYPE 2)



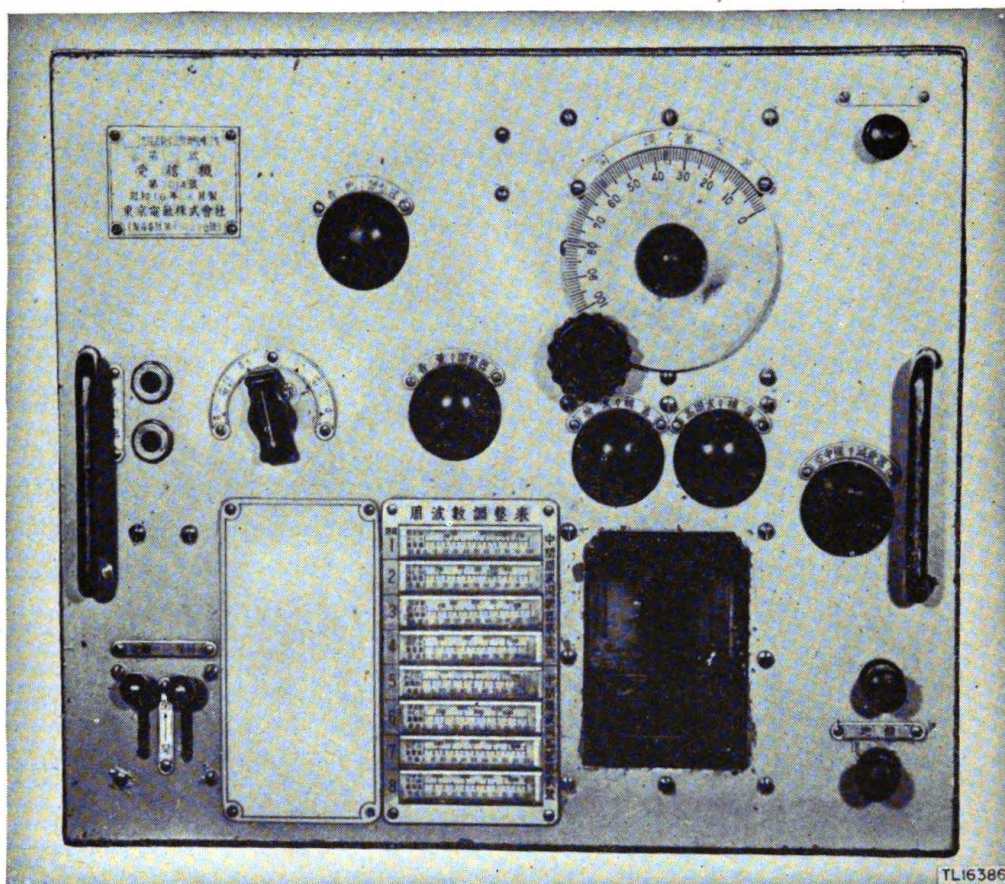
Transmitter used with Model 94 Ground-air Mark 2 Wireless Set (Type 2).

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MODEL 94 GROUND-AIR MARK 2 WIRELESS SET (TYPE 2)



Motor-generator used with Model 94 Ground-air Mark 2 Wireless Set (Type 2).

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MODEL 94 GROUND-AIR MARK 2 WIRELESS SET (TYPE 2)



Receiver used with Model 94 Ground-air Mark 2 Wireless Set (Type 2).

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MODEL 94 MARK 2B WIRELESS SET: MARK 55 TYPE D TRANSMITTER, MARK 27 RECEIVER

FREQUENCY RANGE (mc): Xmtr: 0.95 to 6.675 using 3 plug-in coil sets; No. 1, 0.95 to 1.8; No. 2, 1.75 to 3.2; No. 3, 3.1 to 6.675. Rcvr: 0.14 to 15.0 using plug-in coils; No. 1, 0.14 to 0.275; No. 2, 0.275 to 0.54; No. 3, 0.54 to 1.05; No. 4, 1.05 to 2.04; No. 5, 2.04 to 3.96; No. 6, 3.95 to 7.7; No. 7, 7.7 to 15.0. I.f. is 100 kc on first 3 coils; 400 kc on last 4 coils.

POWER OUTPUT: 76 w.

TYPE OF SIGNAL: Xmtr: cw. Rcvr: cw, voice.

USE: Used by corps, division.

POWER SOURCE: Xmtr: gasoline-driven gen. Output: 1300 v, at 225 ma, 12 v, at 3.9 amp. Rcvr: battery pack carried in rcvr. Output: plate, 135 v at 17.5 ma, fil, 1.5 v at 440 ma; bias, 4.5 v and 3 v.

ANTENNA: Length 15' from 1.3 to 6.675 mc; 75' below 1.3 mc. Length critical on low-frequency bands. Antenna coupling controlled by five-position switch; coarse tuning by three-position switch; fine tuning by vernier control.

TRANSPORTATION: Mobile.

TUBES: Xmtr: UX47C pentode mo, UV814 tetrode pwr amplr. Rcvr: UF134 r-f amplr, UZ135 autodyne converter, UF134 i-f amplr, UF111A detecr, UF109A 1st a-f amplr, UY133A 2d a-f amplr.

TUNING: Xtal, mo. When xtal is used, osc capacitor is tuned to resonance, indicated by glow of neon lamp in plate circuit of osc stage. Switch just below xtal socket shifts xtal frequency 130 cps in position I, 155 cps in position II, 180 cps in position III, using 1,000 kc xtal. Two sets of xtals include 8 xtals per set. Jack is provided on front panel for operating xtal.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	18 $\frac{1}{4}$	15 $\frac{3}{4}$	6	35
Carrying cases for xmtr and rcvr	20	26 $\frac{1}{2}$	8	

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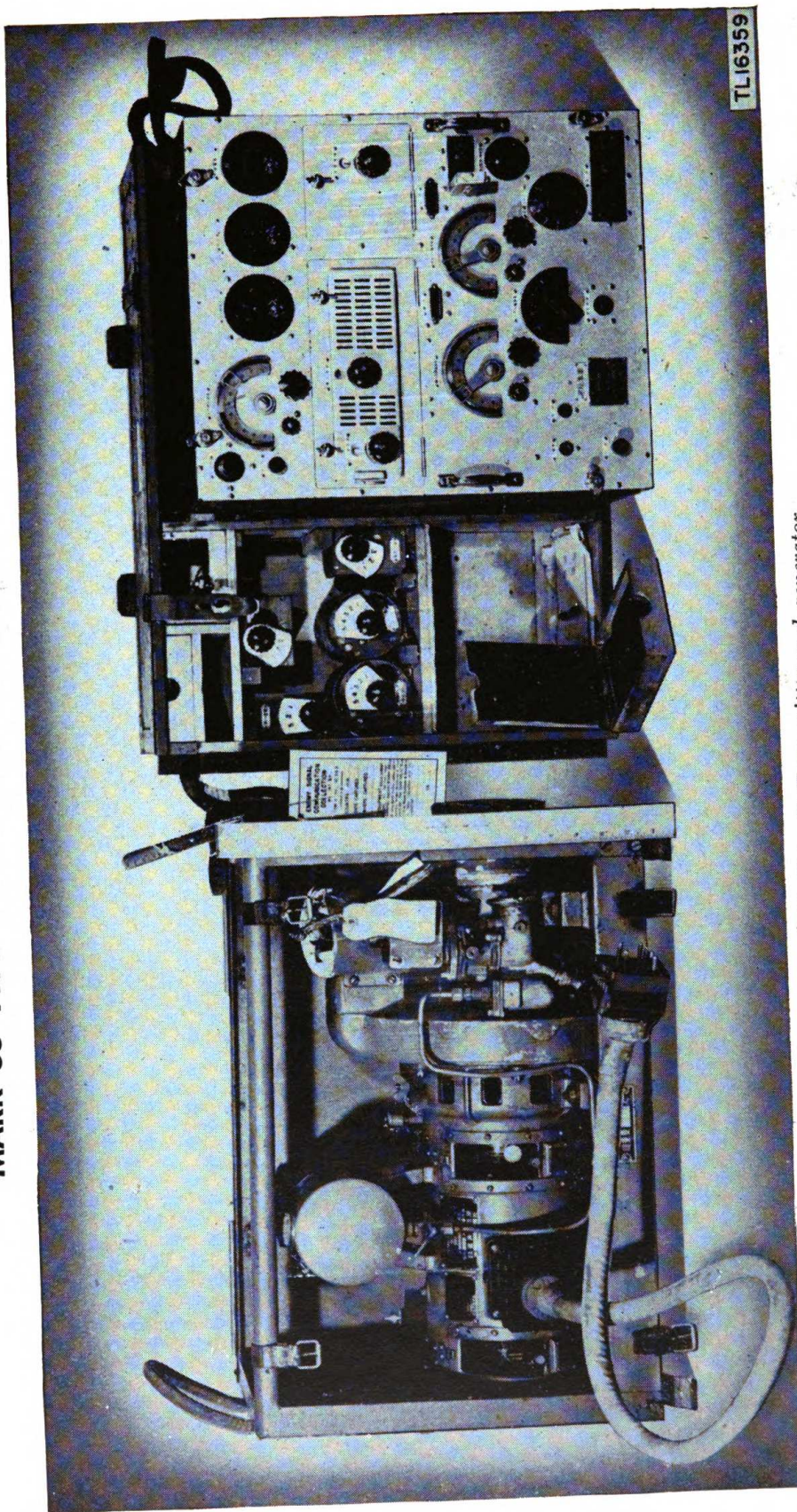
MODEL 94 MARK 2B WIRELESS SET — Continued

REMARKS: Equipment combines adequate performance with small dimensions, light weight, ruggedness, stability, and ease of repair. Mechanical construction is rigid; shielding is complete; air-trimmed circuits are used extensively. Xmtr housing is of airplane type construction, using aluminum alloy and copper rivets. Top, bottom, and back of xmtr are removable panels with hinged doors on each side. Tuning coils are inserted through hinged doors on front panel. Rcvr is superheterodyne, and is carried in iron-bound wooden box which also houses rcvr battery box, spare coils, accessories, and spare parts. Leather handles facilitate carrying, and hooks are used for mounting in a vehicle. Front panel controls are main tuning dial, on-off switch, fil rheostat, heterodyne adjustment, volume controls A and B, r-f grid trimmer, and ground switch. Front panel connections are power supply terminal strip, antenna connector terminal, headset jacks, and fil voltage test jacks.

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**MODEL 94 MARK 2B WIRELESS SET:
MARK 55 TYPE D TRANSMITTER, MARK 27 RECEIVER**

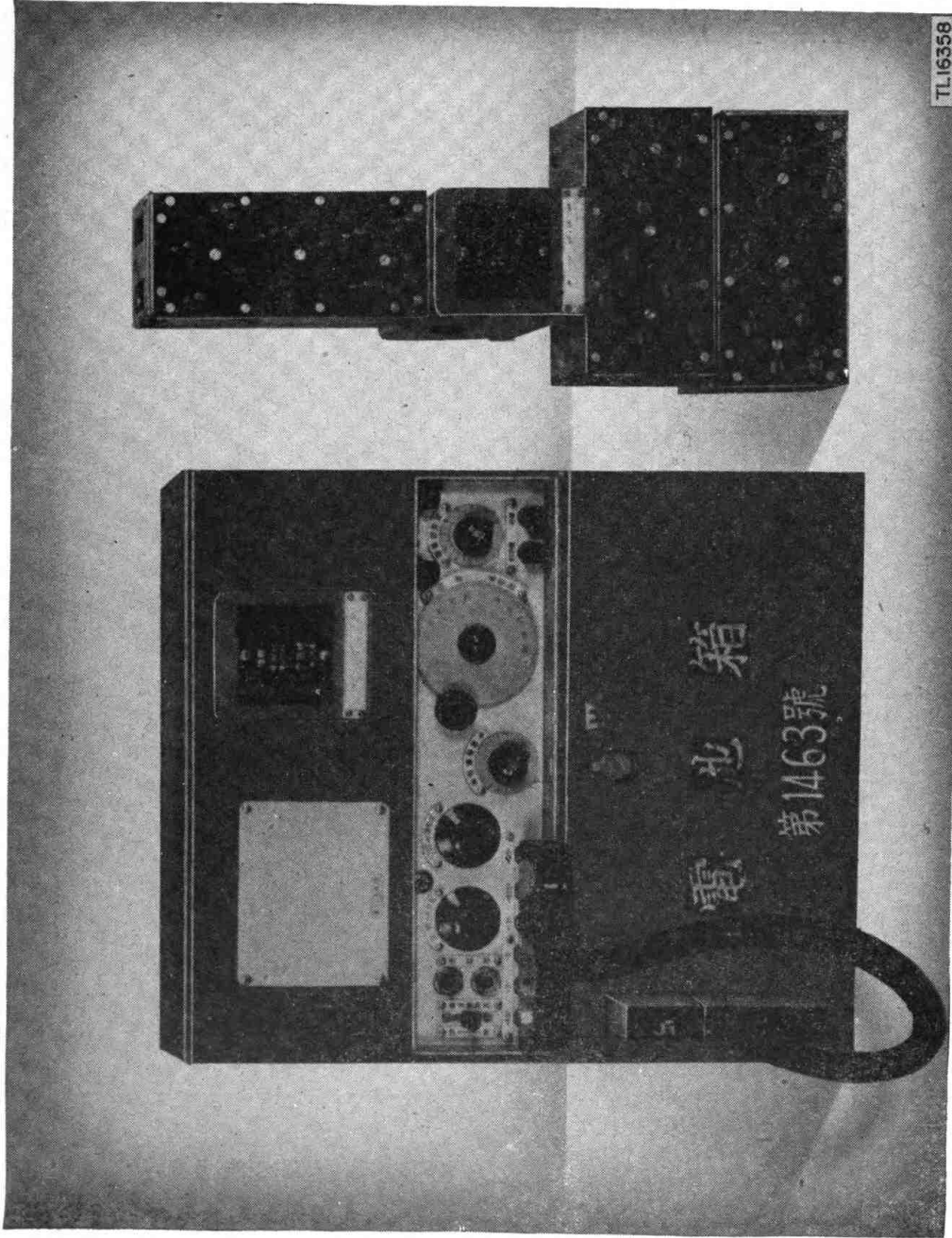


Mark 55 Type D Transmitter and generator.

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**MODEL 94 MARK 2B WIRELESS SET:
MARK 55 TYPE D TRANSMITTER, MARK 27 RECEIVER**



Mark 27 Receiver.

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MODEL 94 MARK 2B WIRELESS SET: MARK 55 TYPE TRANSMITTER, MARK 27 RECEIVER

FREQUENCY RANGE (mc): Xmtr: 0.95 to 6.675 using three plug-in coils; No. 1, 0.95 to 1.75; No. 2, 1.75 to 3.2; No. 3, 3.2 to 6.675. Rcvr: 0.14 to 15.0 using seven plug-in coils; No. 1, 0.14 to 0.275; No. 2, 0.275 to 0.54; No. 3, 0.54 to 1.05; No. 4, 1.05 to 2.04; No. 5, 2.04 to 3.96; No. 6, 3.95 to 7.7; No. 7, 7.7 to 15.0. I.f. is 100 kc on first 3 coils, 400 kc on last 4 coils.

POWER OUTPUT: Approx 85 w.

TYPE OF SIGNAL: Xmtr: cw. Rcvr: cw, voice.

USE: Used by corps, division.

POWER SOURCE: Xmtr: gasoline-driven motor-gen. Power output: plate, 1,300 v at 175 ma; fil, 12 v at 5 amp. Rcvr: built-in batteries; plate 135 v at 17.5 ma, fil 1.5 v at 440 ma, bias 4.5 v and 3 v.

ANTENNA: 70' braided wire.

TRANSPORTATION: Mobile.

TUBES: Xmtr: UX47C pentode osc, UV814 tetrode amplr. Rcvr: UF134 r-f amplr, UZ135 autodyne converter, UF134 i-f amplr, UF111A detecr, UF109A 1st a-f amplr, UY133A 2d a-f amplr.

TUNING: Xtal, mo. All coils provided with turn-shortening tap switch for rough frequency adjustment.

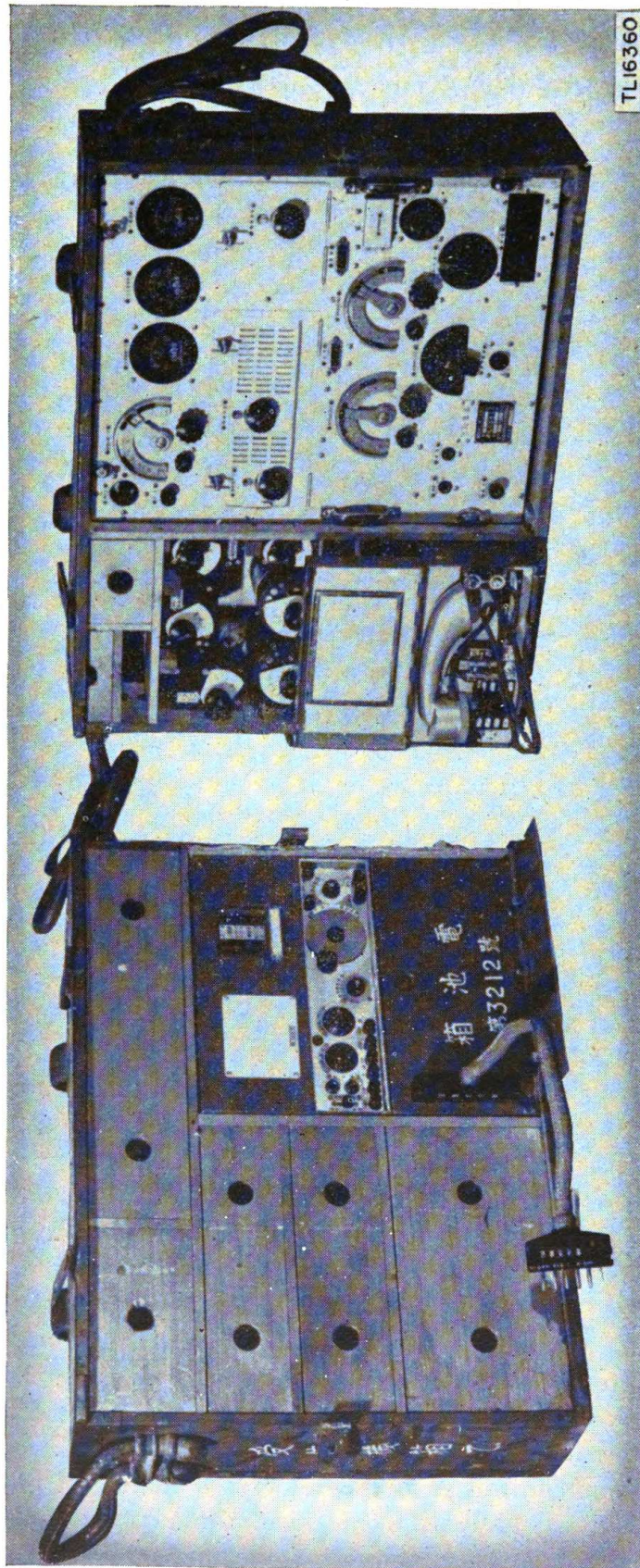
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Carrying case	20	26½	8	

REMARKS: Xmtr is similar to Mark 55 Type D and rcvr is same as used with Mark 55 Type D. Equipment is a well-constructed, portable, transmitting and receiving station. It is housed in two iron-bound wooden carrying cases with leather handles. Basic xmtr components are osc, either xtal-controlled pentode osc or modified Colpitts mo; amplr, tetrode amplr or frequency dblr which is impedance-coupled to osc; and antenna tuning network, with antenna resonated through a tapped coil in series with a variometer-capacitor arrangement. Almost any wire can be resonated with this circuit. Xmtr front panel controls are: antenna tuning, amplr tuning capacitor, osc tuning capacitor, antenna coil tap switch, amplr coil tap switch, osc coil tap switch, transmit-receive switch, fil rheostat, and xtal frequency tap switch. Connections on front panel are: xmtr antenna, rcvr antenna, keying jack, pwr supply connections, ground, relay jack, keyer jack, and xtal holder socket. The superheterodyne receiver has the following controls: main tuning dial, on-off switch, fil rheostat, heterodyne adjustment, volume controls A and B, r-f grid trimmer, r-f plate trimmer, and ground switch. Rcvr front panel connections are: pwr supply terminal strip, antenna connector terminal, phone jacks, and fil voltage test jacks.

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**MODEL 94 MARK 28 WIRELESS SET:
MARK 55 TYPE TRANSMITTER, MARK 27 RECEIVER**



Mark 27 Receiver, left; Mark 55 Type Transmitter, right.

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MODEL 94 MARK 3A WIRELESS SET: MARK 36 TRANSMITTER, MARK 36 RECEIVER

FREQUENCY RANGE (mc): Xmtr: 0.4 to 5.7 in five bands; No. 1, 0.4 to 0.5; No. 2, 0.5 to 1.0; No. 3, 1.0 to 2.0; No. 4, 2.0 to 3.0; No. 5, 3.0 to 5.7. Rcvr: 0.35 to 6.0 in five bands; No. 1, 0.35 to 0.625; No. 2, 0.625 to 1.1; No. 3, 1.1 to 1.95; No. 4, 1.95 to 3.45; No. 5, 3.45 to 6.0.

POWER OUTPUT: Approx 15 w.

TYPE OF SIGNAL: Cw.

USE: Suited to guerilla warfare, since it can be used for months without replacements or battery charging. Chromium plated surfaces make it suitable for use in tropics. Used between divisions and regimental headquarters.

POWER SOURCE: Xmtr: hand-driven gen coupled by four-wire cable which plugs into jack on front panel. Rcvr: dry batteries housed in drawer under rcvr; plate, 90 v at 10 ma; fil, 1.5 v at 0.4 amp; grid bias, 3 v.

ANTENNA: Stranded wire 65½' long suspended horizontally between 2 masts, each in seven sections from 3' to 3½' long with overlap of 6". Lead-in wire 26' 9" long.

TRANSPORTATION: Animal pack. Equipment housed in two wooden cases with hooks for attaching to pack saddle.

TUBES: Xmtr: UY510B pentode osc. Rcvr: two UF134 pentodes, UF109A triode, UZ135 heptode, UZ133D triode-pentode.

TUNING: Xtal, mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Antenna equipment				52

REMARKS: Equipment is a well-designed, light, efficient xmtr-rcvr combination in which great attention has been paid to details such as luminous panel markings, chromium-plated surfaces, celluloid casings on tuning capacitors, and extension leads for quick testing. Set consists of xmtr, rcvr, hand-driven xmtr gen, rcvr dry batteries, and accessories including antenna gear, headset, key, tools, calibration curves, and spare parts. Xmtr and rcvr are mounted together in a wooden case. Xmtr is inductively coupled to a complex antenna circuit which is tuned by a combination of plugs and sockets, switches, capacitor,

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MODEL 94 MARK 3A WIRELESS SET — Continued

and variometer. This permits using any length antenna on any frequency. Tuning aids are a neon oscillation indicator coupled to the plate, antenna ammeter, and plate current meter. Keying is in high-voltage negative lead in three ways: by a key with folding arm flush with the panel, local key fitted with flexible lead and jack, or remote control and relay. Rcvr is six-stage superheterodyne. R-f circuits are trimmed by adjusting circuit inductance and capacitance. Inductances can be reached from top of set when set is removed from case, but the r-f amplr tube must be removed before capacitors can be adjusted. R-f coupling circuit uses an autotransformer giving voltage step-up to mixer grid. Small band-spread capacitor on front panel permits fine tuning. I-f circuits are conventional. Detecr has Rheinartz type regeneration, controlled from front panel. Output of 2d detecr is coupled to triode section of last tube through step-up transf. Triode output is coupled to pentode section through identical transf. Pentode output is transformer-coupled to parallel phone jacks on front panel. Both high-voltage and low-voltage switches are located on front panel; case cannot be closed if low-voltage switch is on. Over-all gain of set is unusually high, but is somewhat offset by heavy background noise.

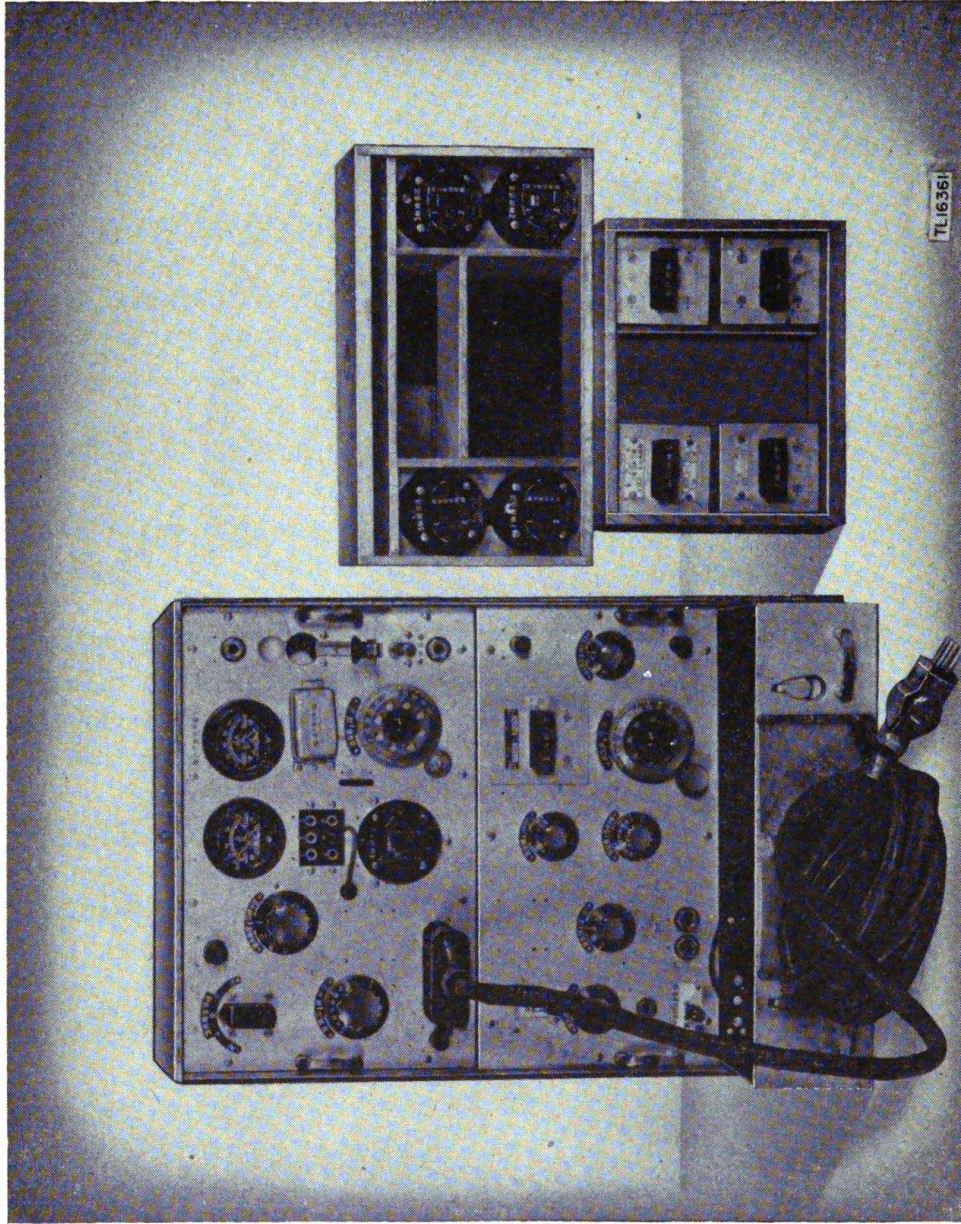
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**MODEL 94 MARK 3A WIRELESS SET:
MARK 36 TRANSMITTER, MARK 36 RECEIVER**



Model 94 Mark 3A Wireless Set: Mark 36 Transmitter, Mark 36 Receiver.

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MODEL 94 MARK 3A WIRELESS SET:
MARK 36 TYPE D TRANSMITTER, MARK 36 TYPE D RECEIVER

FREQUENCY RANGE: Xmtr: 0.4 to 5.7 mc. Rcvr: 0.35 to 6.0 mc.

POWER OUTPUT: 10 to 15 w.

TYPE OF SIGNAL: Cw, voice.

USE: Medium range communication.

POWER SOURCE: Xmtr: hand gen; output 5,000 plate, 7 v fil. Rcvr: dry batteries housed in compartment below rcvr; four Mark 18 B cells, one Mark 3 square model dry cell, one Mark 129 C cell.

ANTENNA: Flexible, single-strand wire, 66' long, light yellow in color, suspended between two jointed poles of alloy pipe 23' high. Poles are held by guy wires braced at one point. Two ground wires: brown wire 66' long, black wire 33' long,

TRANSPORTATION: Animal pack. Equipment is loaded on two pack horses; it can be transported on class C transport wagon. Equipment necessary for immediate signalling can be carried by one pack horse or by several unmounted men.

TUBES: Xmtr: UY510B osc. Rcvr: two UF134, UZ135, UF109A, UZ133D.

TUNING: Xtal, mo. Removing xtal connects mo.

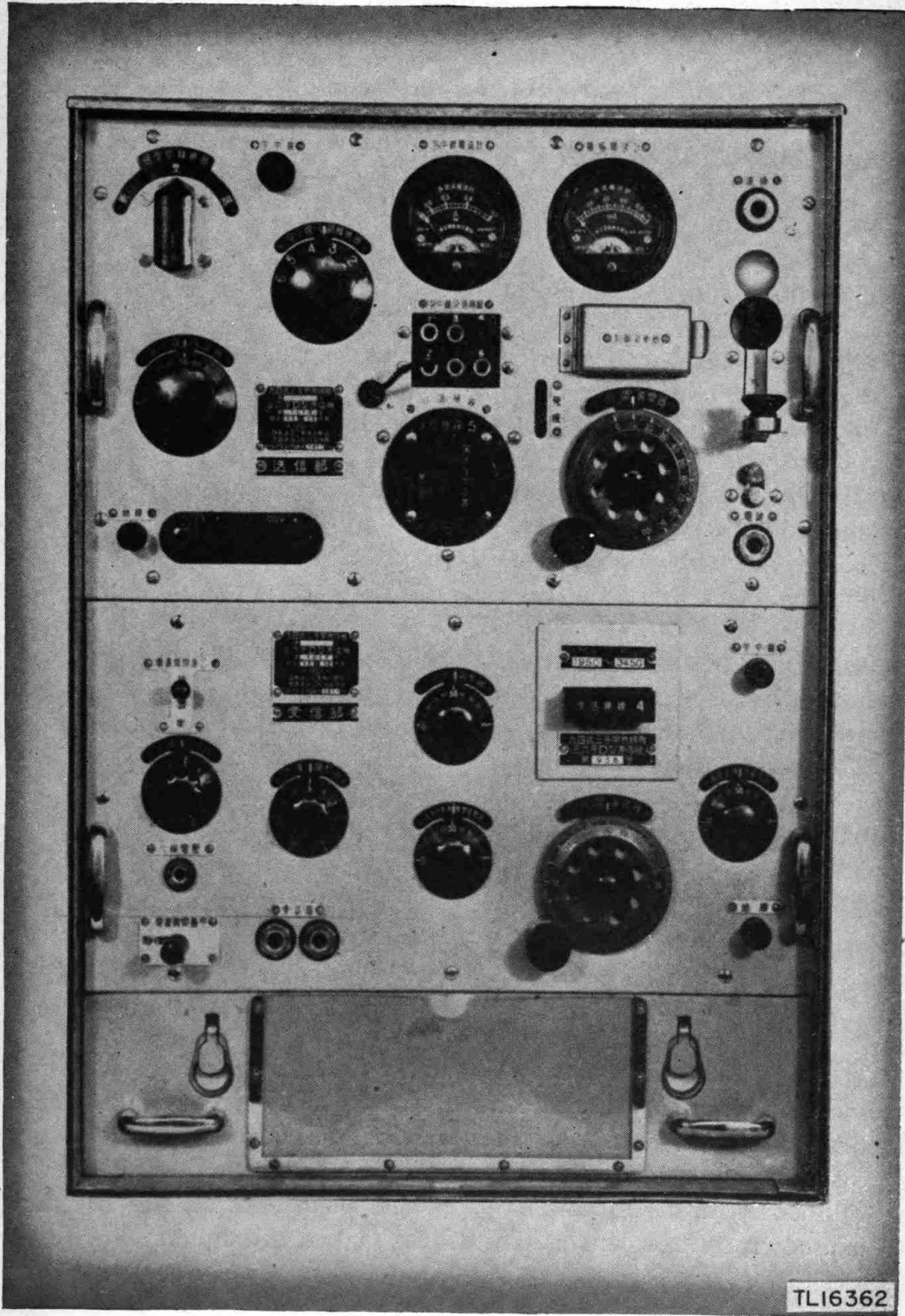
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Wireless set	18½	9½	6¾	37.4

REMARKS: Xmtr and rcvr units in same cabinet, front surface of which forms control panel. Cabinet has attachments for carrying straps, and a protective front cover. Sheathing device inside cabinet holds wiring diagram, xmtr and rcvr frequency charts. Units are removed from cabinet by raising locking strips on rear of cabinet. Luminous paint is used on control panel. Color coding is used throughout.

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**MODEL 94 MARK 3A WIRELESS SET:
MARK 36 TYPE D TRANSMITTER, MARK 36 TYPE D RECEIVER**



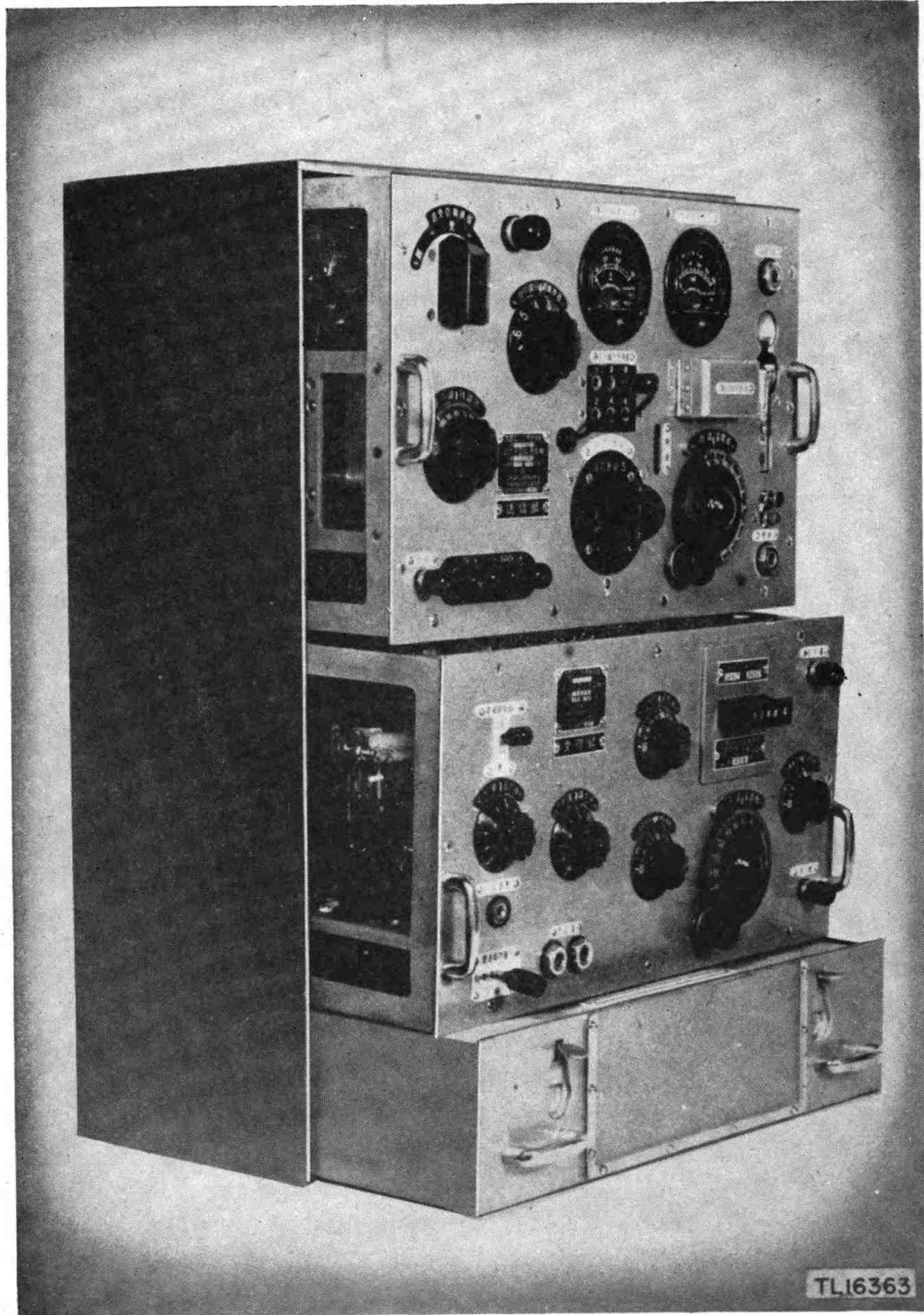
*Model 94 Mark 3A Wireless Set: Mark 36 Type D
Transmitter, Mark 36 Type D Receiver.*

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MODEL 94 MARK 3A WIRELESS SET:
MARK 36 TYPE D TRANSMITTER, MARK 36 TYPE D RECEIVER



*Model 94 Mark 3A Wireless Set: Mark 36 Type D
Transmitter, Mark 36 Type D Receiver.*

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MODEL 94 MARK 3C WIRELESS SET: MARK 33 TYPE D TRANSMITTER, MARK 41 TYPE D RECEIVER

FREQUENCY RANGE (mc): Xmtr: 0.4 to 5.7 using four sets of plug-in coils; No. 1, 0.4 to 0.75; No. 2, 0.75 to 1.5; No. 3, 1.5 to 2.9; No. 4, 2.9 to 5.7. Rcvr: 0.3 to 6.0 using five sets of plug-in-coils; No. 1, 0.3 to 0.55; No. 2, 0.55 to 0.85; No. 3, 0.85 to 1.6; No. 4, 1.6 to 3.1; No. 5, 3.1 to 6.0 approx.

POWER OUTPUT:

TYPE OF SIGNAL: Cw, voice.

USE: Portable field set.

POWER SOURCE: Xmtr: hand-driven gen with two cranks; requires two men. Power output: 62 w; plate, 400 v; fil, 8 v. Rcvr: batteries in rcvr case; plate, 135 v; screen, 90 v; fil, 1.5 v; bias, 3 v.

ANTENNA:

TRANSPORTATION: Man pack; three men transport complete set.

TUBES: Xmtr: UY47B speech amplr, UY47B osc, UY202A pwr amplr, UY202A mod. Rcvr: UF134 tetrode r-f amplr, UZ135 converter, UF134 tetrode i-f amplr, UF111A tetrode detecr, UF109A tetrode a-f amplr, UY133A pentode a-f output.

TUNING: Xtal, mo. Removing xtal connects mo.

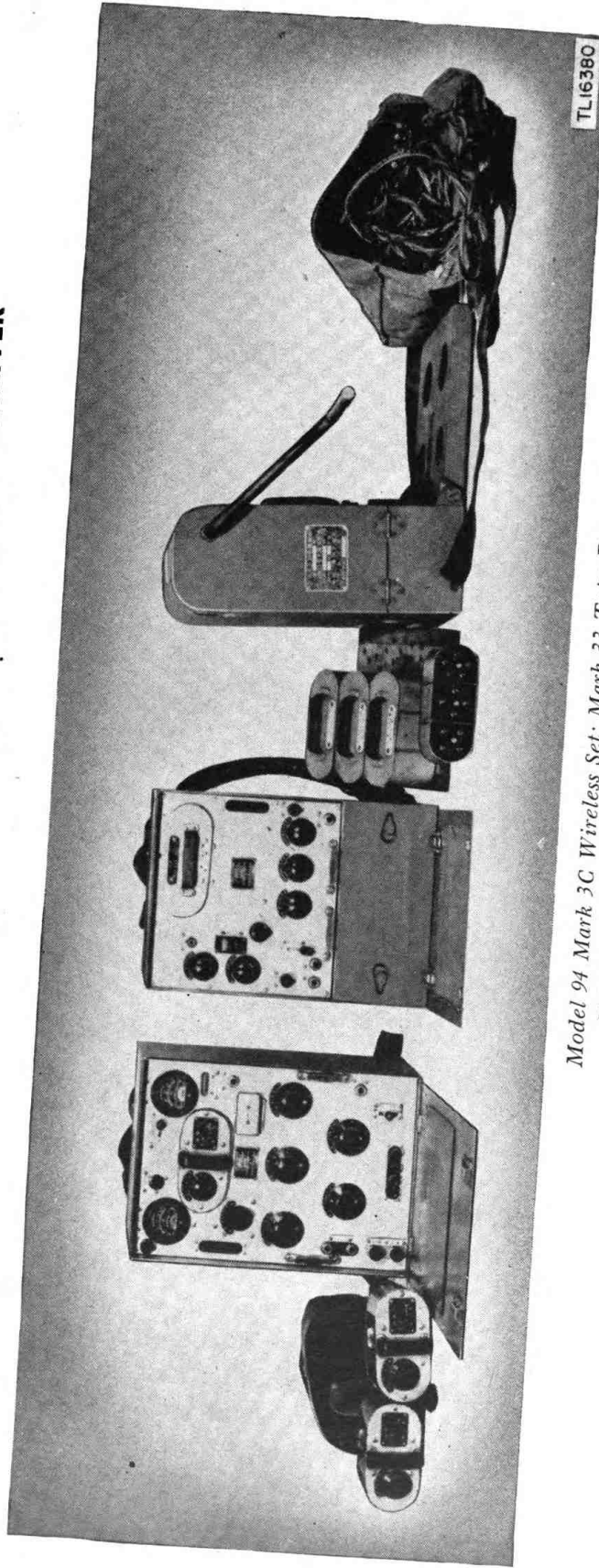
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	13½	10	6½	
Rcvr	13½	10	6½	
Gen	13½	9½	6½	

REMARKS: This medium-size, portable field set consists of xmtr, hand-driven gen, rcvr and accessories, headset, connecting cords and plugs, and coils. Wiring diagrams of xmtr and rcvr are mounted in cases. Xmtr and rcvr may be operated together or separately. Send-receive switch on xmtr panel quiets rcvr during transmissions. Patch cord permits use of one antenna and counterpoise for both xmtr and rcvr. Xmtr includes xtal-controlled osc or mo, pwr amplr, plate mod and one-stage speech amplr. Rcvr uses standard superheterodyne circuit with regen detecr for c-w reception. Five controls must be used to tune in one station. Set is poorly wired; there is no protection against moisture or fungi; set is difficult to repair.

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**MODEL 94 MARK 3C WIRELESS SET:
MARK 33 TYPE D TRANSMITTER, MARK 41 TYPE D RECEIVER**



Model 94 Mark 3C Wireless Set: Mark 33 Type D Transmitter, Mark 41 Type D Receiver.

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MODEL 94 MARK 5 WIRELESS SET: MARK 32 TYPE D TRANSMITTER, MARK 32 TYPE D RECEIVER

FREQUENCY RANGE (mc): Xmtr: two bands approx 0.86 to 2.06 and 4.0 to 5.0. Rcvr: two bands, 0.84 to 2.1 and 3.84 to 5.0.

POWER OUTPUT:

TYPE OF SIGNAL: Cw, voice.

USE: Field set.

POWER SOURCE: Xmtr: hand-driven gen. Output: 150. v, 6 v. Low-voltage meter on generator. Rcvr: batteries in compartment built into rcvr.

ANTENNA:

TRANSPORTATION: Man pack; three men carry complete set.

TUBES: Xmtr: UZ12C twin triode. Two triodes in parallel as osc for c-w operation; one triode is osc, the other mod for voice operation. Rcvr: UF134 tetrode tuned r-f amplr, UF109A triode regen detecr, UZ133D pentode a-f amplr.

TUNING: Xtal, mo. Removing xtal connects mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	8	4 $\frac{3}{4}$	5 $\frac{3}{4}$	
Rcvr	8 $\frac{5}{8}$	8 $\frac{3}{4}$	5 $\frac{5}{8}$	
Gen	7 $\frac{1}{4}$	5	8 $\frac{1}{2}$	

REMARKS: Equipment is completely self-contained and consists of xmtr, hand-driven gen, rcvr and accessories including headset, cords, plugs, and accessories case. Each large unit is fitted with shoulder straps. All cases are metal, constituting a shield for each unit. Rcvr uses regen detecr, but r-f amplr prevents radiation when detecr oscillates. Xmtr and rcvr may be operated separately or connected by a small patch cord. When xmtr and rcvr are connected, transmit-receive switch on xmtr panel silences rcvr during transmission. Tuning graphs and wiring diagrams are mounted inside xmtr and rcvr covers. Set is poorly constructed and many parts are inaccessible. Equipment has no protection against moisture. Xmtr and rcvr are in same series as Type F xmtr and rcvr, Mark 32 rcvr, and Mark 32 Type F xmtr, although of slightly different frequency and design.

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**MODEL 94 MARK 5 WIRELESS SET:
MARK 32 TYPE D TRANSMITTER, MARK 32 TYPE D RECEIVER**



Mark 32 Type D Receiver, left, Mark 32 Type D Transmitter, and hand generator, right, used with Model 94 Mark 5 Wireless Set.

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MODEL TM SHORT-WAVE MOBILE WIRELESS SET IMPROVEMENT 3

FREQUENCY RANGE (mc): Xmtr: 3.5 to 17.0 using three coils; No. 1, 9.0 to 17.0; No. 2, 5.5 to 11.0; No. 3, 3.5 to 7.0. Tapped coils switched from front panel. Antenna coupling coils changed to cover frequency spectrum. Rcvr: 3.75 to 15.0 using three coils: No. 1, 15.0 to 9.5; No. 2, 9.5 to 6.0; No. 3, 6.0 to 3.75.

POWER OUTPUT: Approx 400 w.

TYPE OF SIGNAL: Xmtr: cw. Rcvr: cw, mcw, voice.

USE: In aircraft, on land, and ships for medium and long-distance communication.

POWER SOURCE: Xmtr: a-c source of 75, 100, or 200 v, and 50, 60, or 190 cps. For portable operation, 1-kva a-c generator is driven by a 2-hp gasoline engine. Rcvr: batteries, 150 v plate, 6 v fil.

ANTENNA: Two black bakelite antenna reels, on aluminum mounting secured to top of xmtr case by four wingnuts, contain antenna and counterpoise. Antenna is reeled out to a tree or high pole and insulated with stand-off insulator.

TRANSPORTATION: Mobile.

TUBES: Xmtr: UX202 triode osc, UV814 pentode intermediate pwr amplr, UV812 tetrode r-f amplr. Rect: four HX966. Rcvr: UZ77 r-f amplr, UZ77 regen detecr, UZ41 and two UY37 transformer-coupled a-f amplr stages.

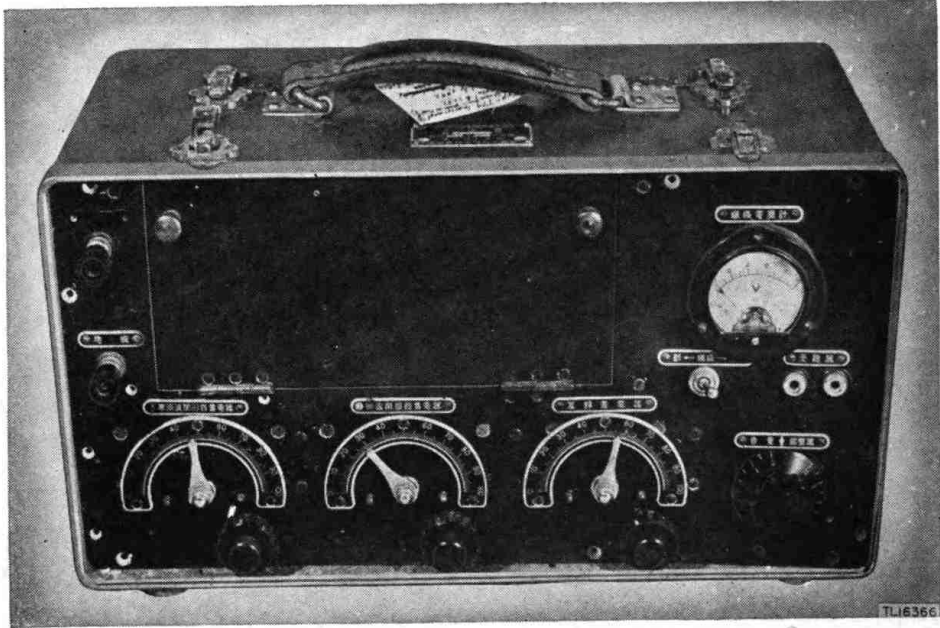
TUNING: Xtal, mo. Front panel switch selects xtal or mo. Osc is mo when equipment is land-based, xtal-controlled when used on ships.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	19	25 $\frac{1}{4}$	15	130
xmtr box	23 $\frac{1}{2}$	29	19	35
Rcvr	8 $\frac{3}{4}$	16 $\frac{1}{2}$	8	20
Rect	9 $\frac{7}{8}$	14 $\frac{1}{4}$	12 $\frac{3}{4}$	62
Rect box	12 $\frac{3}{4}$	17	16 $\frac{3}{4}$	21
Voltage control	14 $\frac{1}{4}$	14 $\frac{1}{4}$	12 $\frac{3}{4}$	77
Voltage control box	17	17	16 $\frac{7}{8}$	24
Line filter	6 $\frac{7}{8}$	8 $\frac{1}{4}$	7 $\frac{1}{2}$	14
Gas gen	24	27 $\frac{3}{4}$	18 $\frac{1}{4}$	252
Fil battery box	13	17 $\frac{1}{2}$	9	20
Plate battery box	13	19 $\frac{1}{2}$	12	60
Battery charger	12	14	9 $\frac{1}{2}$	30
Cables and box	12 $\frac{1}{4}$	18 $\frac{1}{2}$	10	35
Reel unit base	9 $\frac{1}{2}$	7 $\frac{1}{2}$		
Antenna reels	diam 10			

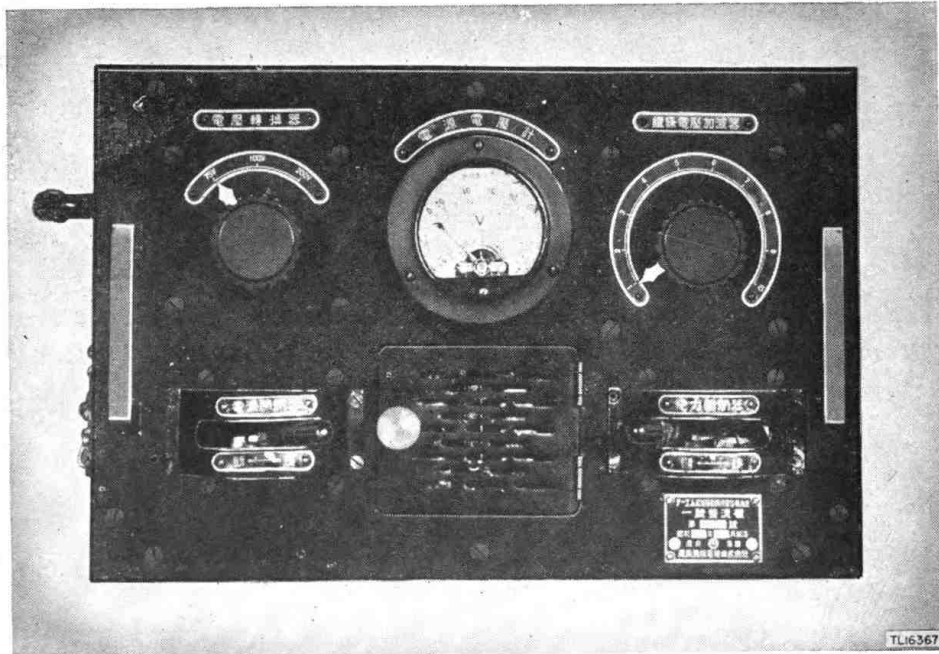
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**MODEL TM SHORT-WAVE
MOBILE WIRELESS SET IMPROVEMENT 3**



Receiver used with Model TM Short-wave Wireless Set Improvement 3.



*Mark 1 Rectifier and voltage control used with Model
TM Short-wave Wireless Set Improvement 3.*

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**MODEL TM SHORT-WAVE
MOBILE WIRELESS SET IMPROVEMENT 3**



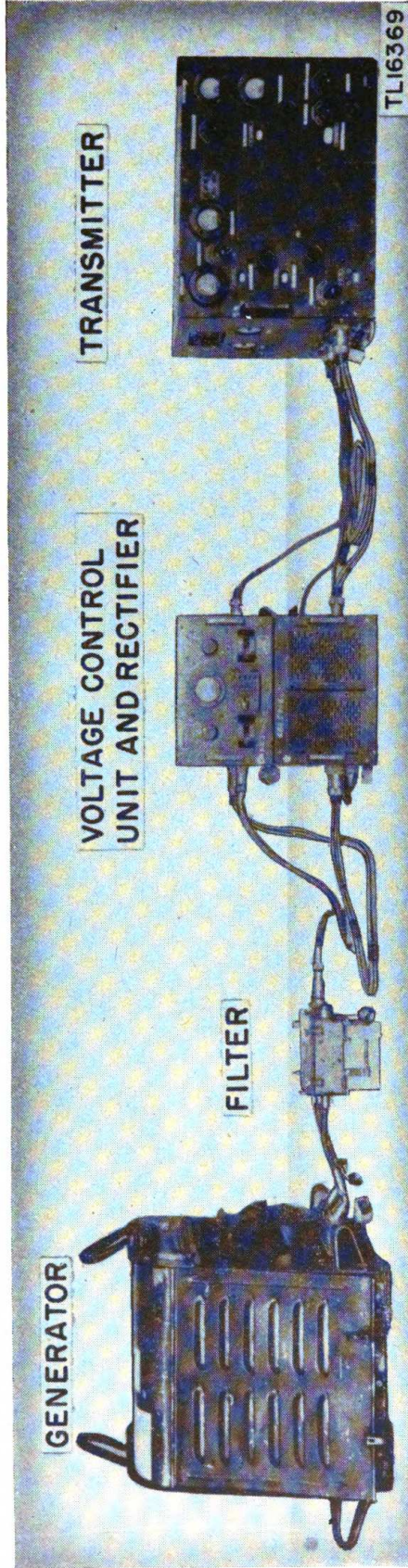
Transmitter used with Model TM Short-wave Wireless Set Improvement 3.

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MODEL TM SHORT-WAVE MOBILE WIRELESS SET IMPROVEMENT 3



Model TM Short-wave Wireless Set Improvement 3, units interconnected.

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MARK 39 TYPE C TRANSMITTER AND MARK 45 TYPE C RECEIVER

(Intelligence wireless set)

FREQUENCY RANGE (mc): Xmtr: 0.4 to 5.7 using five coils; No. 1, 0.4 to 0.75; No. 2, 0.75 to 1.4; No. 3, 1.4 to 2.5; No. 4, 2.5 to 4.0; No. 5, 4.0 to 5.7. Rcvr: 0.14 to 15.0 using 7 coils; No. 1, 0.14 to 0.27; No. 2, 0.27 to 0.55; No. 3, 0.55 to 1.1; No. 4, 1.1 to 2.25; No. 5, 2.25 to 4.6; No. 6, 4.6 to 8.0; No. 7, 8.0 to 15.

POWER OUTPUT: 10 w.

TYPE OF SIGNAL: Xmtr: cw. Rcvr: cw, voice.

USE: Ground communication; perhaps communication with the WT set in an airplane.

POWER SOURCE: Xmtr: hand gen, plate 500 v at 70 ma, fil 7 v at 1.5 amp. Rcvr: dry batteries, plate 90 v, fil 1.5 v, bias 4.5 v.

ANTENNA: Two jointed poles adjustable to 23' secured in ground by guy wires in three directions. Inverted type L antenna with horizontal portions 60.5' and 29.7' long; flexible ground wires 60.6' and 30' long. Poles of light alloy construction with base plates. Selection of length determined by frequency desired.

TRANSPORTATION: Mobile by means of vehicle or horse pack; load can be divided and carried short distances by man pack.

TUBES: Xmtr: UY510B osc. Rcvr: UZ134 r-f amplr, UZ135 converter, UF134 i-f amplr, UF111A detecr, UZ133D a-f amplr.

TUNING: Xtal, mo. Removing xtal connects mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	7.87	9.84	6.69	11.24
Rcvr	13.38	10.43	6.69	30.86
Mark 1 box, contents	19.68	26.57	7.87	97.0
Mark 2 box, contents	19.68	26.57	7.87	97.0

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MARK 39 TYPE C XMTR AND MARK 45 TYPE C RCVR

— Continued

REMARKS: Equipment consists of xmtr, rcvr, hand gen, antenna equipment, accessories, and spare parts. Mark 1 box contains xmtr, rcvr, coils, accessories, spare parts: Mark 2 box contains gen, antenna equipment, tubes, and spare parts. Contents of each box are listed inside cover. Xmtr is usually xtal-controlled. Transmit-receive switch changes antenna from xmtr to rcvr and controls high- and low-voltage xmtr circuits. Superheterodyne rcvr is connected by cables to xmtr and battery box. Xmtr and rcvr cabinets are of light alloy painted brown, sprayed inside with aluminum dust, and finished with colorless lacquer. Xmtr and rcvr can be removed from cases. Wiring diagrams and data charts are under celluloid on each door. Color coding and luminous markings are used throughout.

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MOBILE WIRELESS SET C MARK 1: MARK 305 TYPE TRANSMITTER

FREQUENCY RANGE: 20 to 30 mc.

POWER OUTPUT: 6 w.

TYPE OF SIGNAL: Mcw, voice.

USE: Probably tank set.

POWER SOURCE: Dynamotor. Output: 400 v.

ANTENNA: 14' vertical whip.

TRANSPORTATION: Probably in tank.

TUBES: Xmtr: UY807A r-f, UY807A mod, UT6F7 interphone, UT6F7 xtal calibration osc. Rcvr: UT6F7 r-f amplr, UT6F7 superregen detecr and quench osc, UT6F7 a-f amplr.

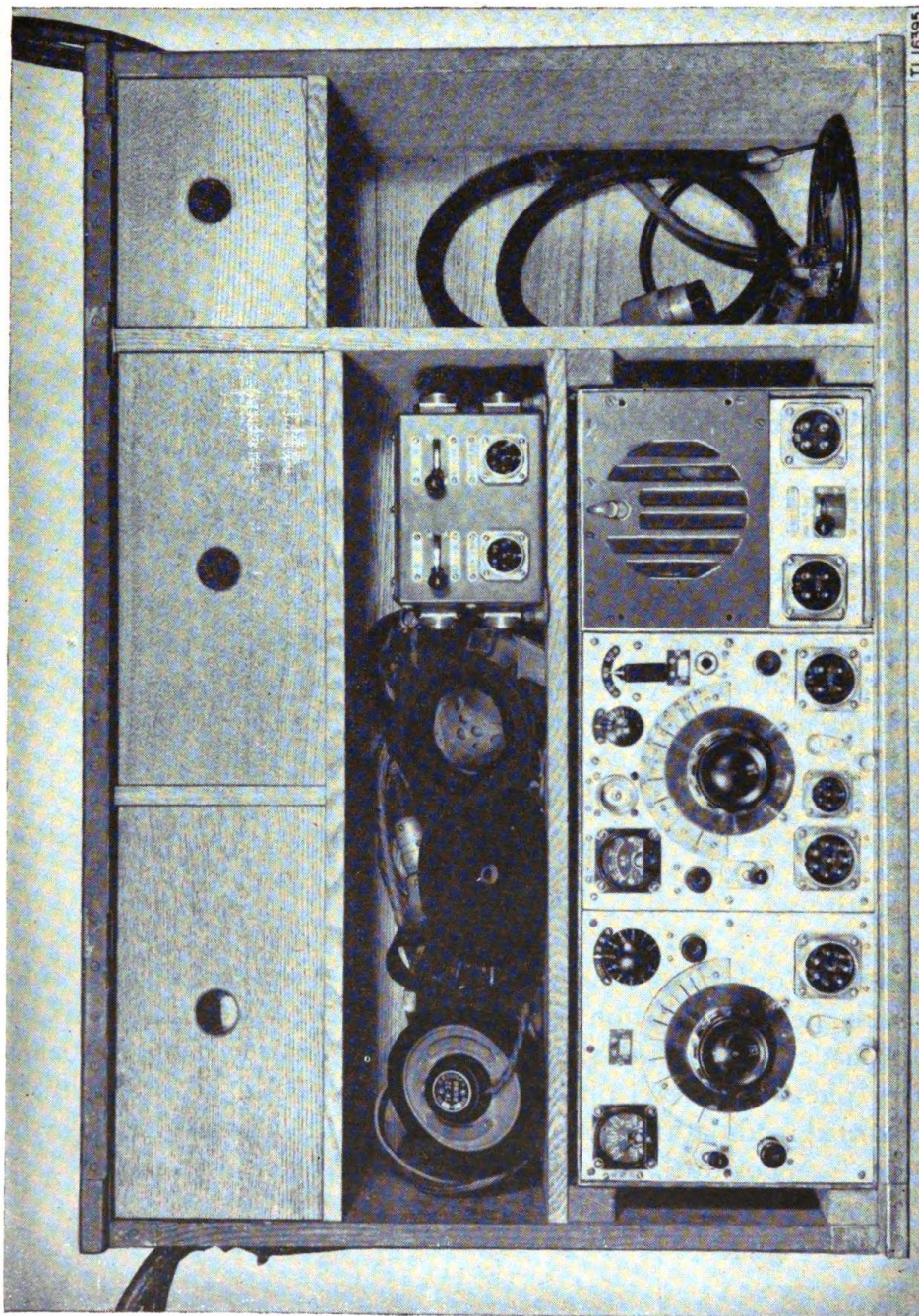
TUNING: Mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Entire set	19 $\frac{3}{4}$	31	10	

REMARKS: Equipment consists of xmtr, rcvr, carrying case, key, microphone, headset, junction box, and dynamotor. Case and chassis parts are made of aluminum, coil forms and insulators of brown bakelite type phenolic. Nickel plating is used throughout. Xmtr has low undistorted modulation capability, no satisfactory antenna tuning system. Rcvr has poor tracking in osc and amplr tuning.

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MOBILE WIRELESS SET C MARK 1: MARK 305 TYPE TRANSMITTER



Mobile Wireless Set C Mark 1: Mark 305 Type Transmitter.

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TTK MODEL 147 MOBILE WIRELESS SET B

FREQUENCY RANGE: 1.5 to 5.5 mc.

POWER OUTPUT: 30 w high pwr; 5 w low pwr.

TYPE OF SIGNAL: Cw, mcw, voice.

USE: Communications between mechanized units.

POWER SOURCE: Dynamotor.

ANTENNA: Whip type.

TRANSPORTATION: Vehicular.

TUBES: Xmtr: 807 xtal osc, 807 pwr amplr, 807 tone gen. Rcvr: Six 6F7.

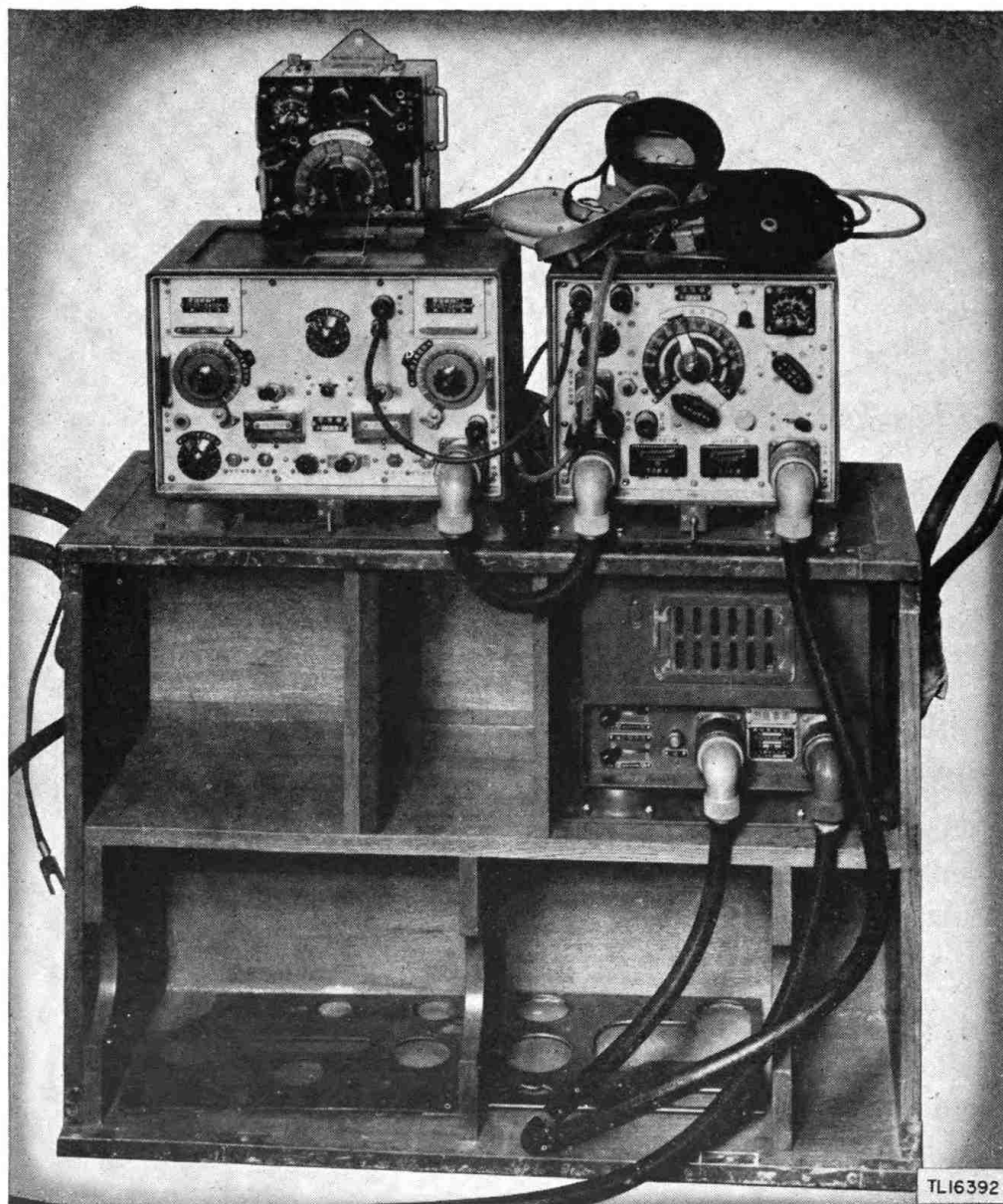
TUNING: Xtal.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr	9	8½	8	
Rcvr	11½	8½	8	
Dynamotor	9	8½	8	
Total weight				65.0

REMARKS: Rcvr is superheterodyne with two r-f channels selected by switch on front panel. It uses three plug-in coils. Xmtr has two xtal-controlled frequencies selected by switch on front panel.

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TTK MODEL 147 MOBILE WIRELESS SET B



TTK Model 147 Mobile Wireless Set B.

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MARK 66 TYPE WIRELESS SET: TYPE A TRANSMITTER (Walkie-talkie)

FREQUENCY RANGE: 2.5 to 4.5 mc.

POWER OUTPUT:

TYPE OF SIGNAL: Cw, voice.

USE: Walkie-talkie.

POWER SOURCE: Batteries in box with leather case, attached to operator's neck by two leather straps. Plate, 135 v; fil, 1.5 v. A three-conductor cable connects battery box and transceiver.

ANTENNA: Whip.

TRANSPORTATION: One-man pack.

TUBES: Three UZ109C double triodes.

TUNING: Xtal, mo. Removing xtal connects mo.

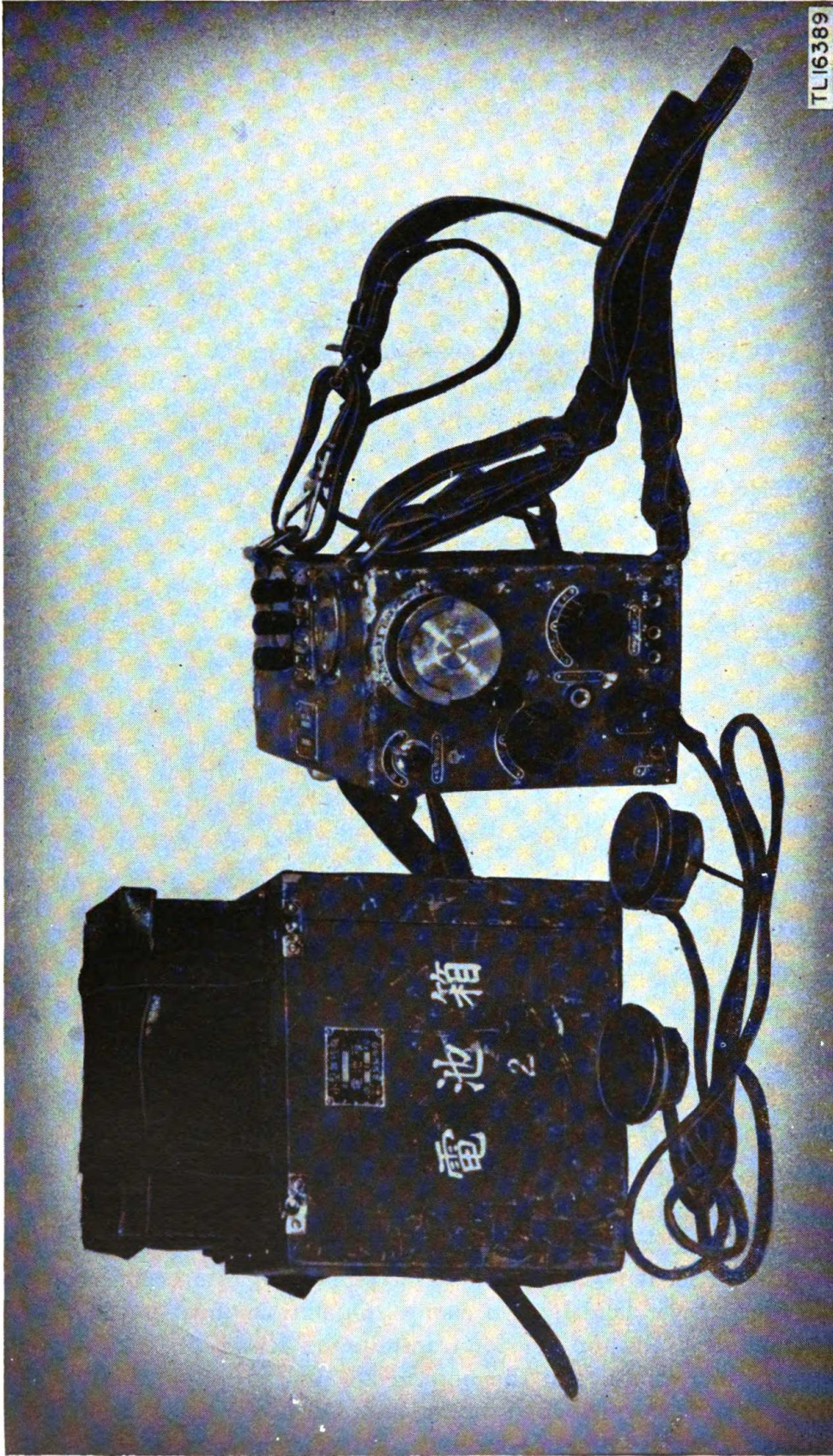
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Transceiver	7½	4½	11	8.1
Battery box	10	8	5	2.1
Key	1⅝	1⅞	4	0.6
Complete set				15.0

REMARKS: Equipment is compactly built. Efforts have been made to waterproof it, but none to safeguard it against tropic conditions. Controls do not lock. Tuning dials are graduated 0-100, making reference charts necessary in tuning. Xmtr-rcvr in metal container painted brown is attached to operator's chest with two leather straps. Two jacks provide for connecting short or long antenna. Set is not of chassis construction; component parts are mounted on sides, top, and internal bracket. Set is accessible from back or bottom by removing panels held in place by machine screws and sealed to case by rubber gaskets. Set is normally repaired by reaching components through a hinged cover held by two clamps. Operation of set is controlled by three keys, the top key for transmit, the center key for receive and frequency check, and the bottom key for telegraph and telephone. Jacks are provided for ground, receiver, power connection and filament test. Two meters measure plate current and antenna current.

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MARK 66 TYPE WIRELESS SET: TYPE A TRANSMITTER



Mark 66 Type Wireless Set: Type A Transmitter.

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MODEL 94 MARK 6 WIRELESS SET: MARK 23 TYPE H TRANSMITTER (Walkie-talkie)

FREQUENCY RANGE (mc): 24.0 to 47.0 in three bands; No. 1, 24.0 to 31.0; No. 2, 28.0 to 37.0; No. 3, 34.0 to 47.0.

POWER OUTPUT: Approx 0.2 w.

TYPE OF SIGNAL: Mcw, voice.

USE: Walkie-talkie for short-distance, two-way communication. Designed for regimental headquarters; used in lower echelons.

POWER SOURCE: Batteries; plate, 135 v at 40 ma; fil 3 v at 250 ma (max). Connection to battery supply by rubber-covered wire. Power cable receptacle provides for use of hand-gen for xmtr.

ANTENNA: Folding rod antenna 55" long; counterpoise 26" long.

TRANSPORTATION: Man pack.

TUBES: UZ30MC double triode. Operates as ultra-audion osc in xmtr, as superregen detecr and a-f amplr in rcvr.

TUNING: Mo.

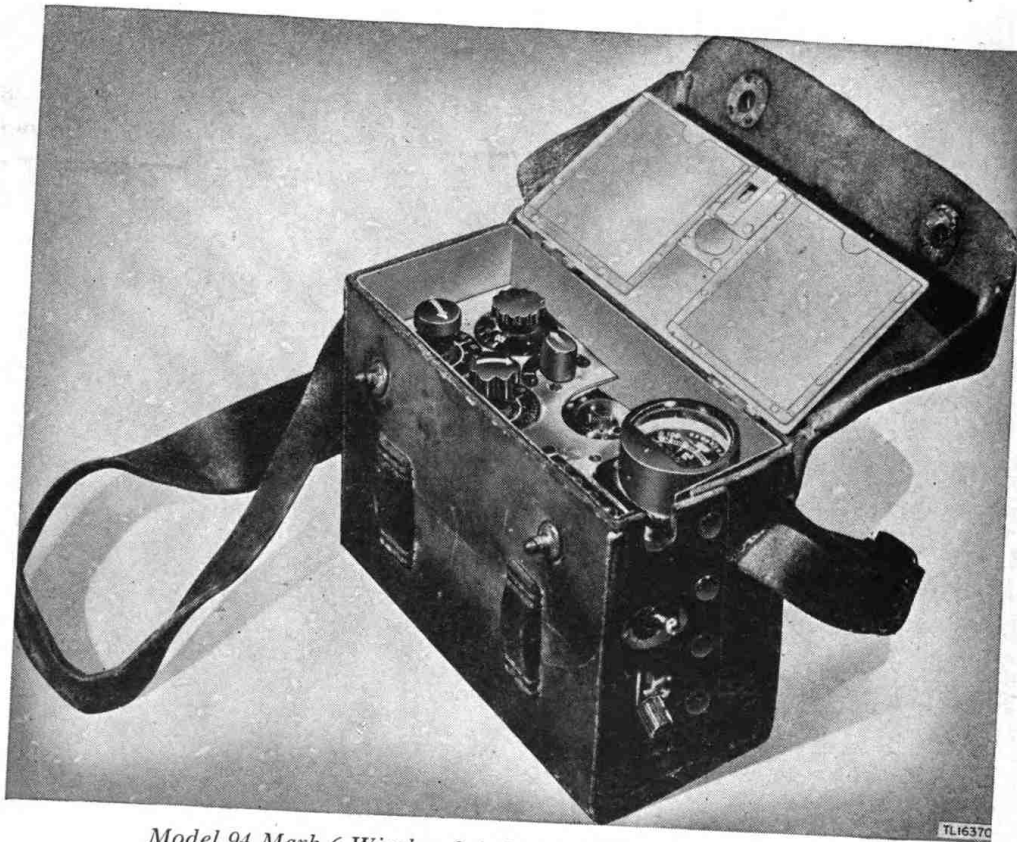
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Transceiver carrying case	7 $\frac{3}{8}$	5 $\frac{3}{8}$	3 $\frac{3}{8}$	6.25

REMARKS: Equipment consists of two units, transceiver and antenna system, and separate battery case. Transceiver can be operated in transit. Equipment is neither waterproof nor weatherproof. Lacquer covers chassis and olive drab paint is used on case. Luminous paint makes night operation possible. Grid circuit of osc is capacitance-coupled to antenna and plate circuit of osc is capacitance-coupled to counterpoise. No provision is made for tuning antenna circuit; design apparently provides for electrical quarter wave at mid-frequency. During m-c-w operation, the audio circuit is an a-f osc which plate modulates the r-f osc. Plate modulation also is used in voice operation.

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**MODEL 94 MARK 6 WIRELESS SET:
MARK 23 TYPE H TRANSMITTER**
(Walkie-talkie)



Model 94 Mark 6 Wireless Set: Mark 23 Type H Transmitter.

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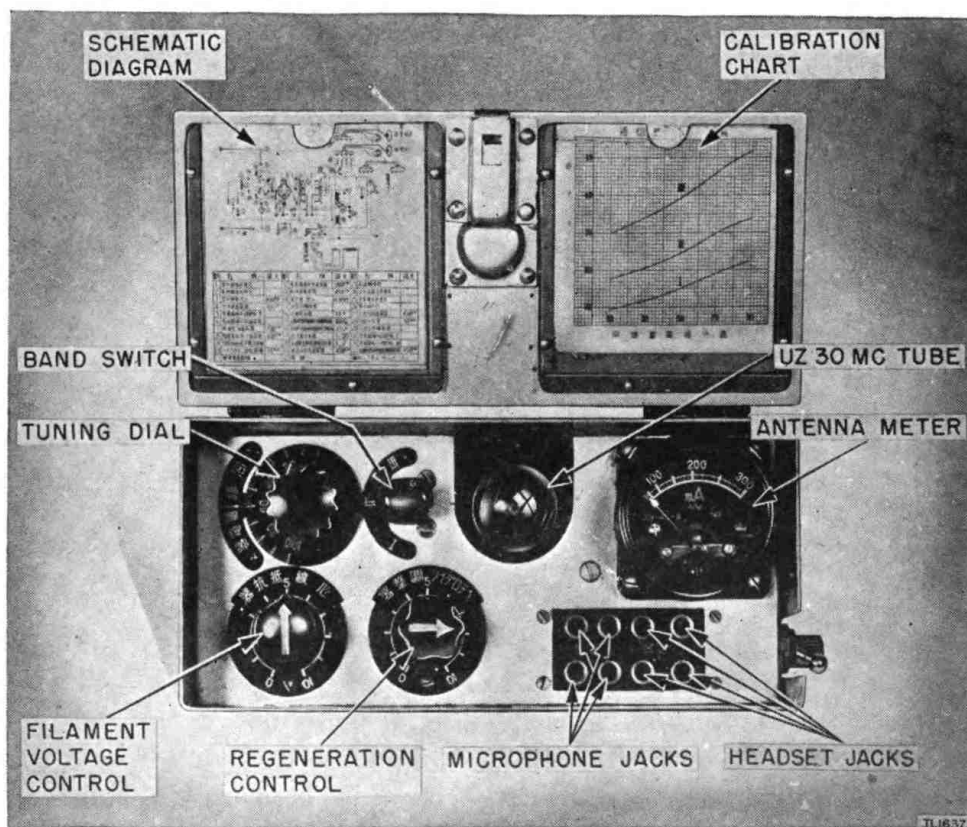
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**MODEL 94 MARK 6 WIRELESS SET:
MARK 23 TYPE H TRANSMITTER**
(Walkie-talkie)



Model 94 Mark 6 Wireless Set: Mark 23 Type H Transmitter.

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MODEL 97 LIGHT WIRELESS SET

(Walkie-talkie)

FREQUENCY RANGE: 23.0 to 31.0 mc.

POWER OUTPUT: 0.3 to 0.5 w.

TYPE OF SIGNAL: Mcw, voice.

USE: Walkie-talkie for short-distance, two-way communication.

POWER SOURCE: Batteries or small hand-driven gen, connected to transceiver by rubber-covered cable. Gen supplies plate and fil pwr; has internal filter system; uses carbon brushes for high v, copper brushes for low v.

ANTENNA: Antenna 51" long; counterpoise 24" long.

TRANSPORTATION: Man pack.

TUBES: UZ31MC double triode; one section is superregen detect, other is a-f amplr when used as rcvr; one section is osc, other is mod when used as xmtr.

TUNING: Mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Transceiver	5	7	2 $\frac{3}{4}$	7.25

REMARKS: Equipment is similar to Model 94 Mark 16 Wireless Set: Mark 23 Type H Transmitter, but is of different manufacture and later date. Set is contained in case of cast aluminum alloy $\frac{1}{4}$ " thick with hinged panels back and front, and with three glass windows on top. Outside is covered with dark green olive paint; inside is aluminum. Set is carried by strap placed around operator's neck and fitted to top of case. Luminous dial markings provide for night operation. All control knobs and switch handles are on the left side, leaving the right hand free for keying. All wires are stranded; high-voltage, d-c, and r-f wires are insulated with red spaghetti; low-voltage leads are of black cotton-covered wire. Headset is crudely constructed and uncomfortable. Larynx microphone is of single-button type, using only one element which may fit on either side of operator's throat. Telegraph key is built into case and is protected by rubber diaphragm. Equipment is moistureproof, easy to repair, and more stable than Model 94 Mark 6.

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MODEL 97 LIGHT WIRELESS SET
(Walkie-talkie)



Model 97 Light Wireless Set, end view.

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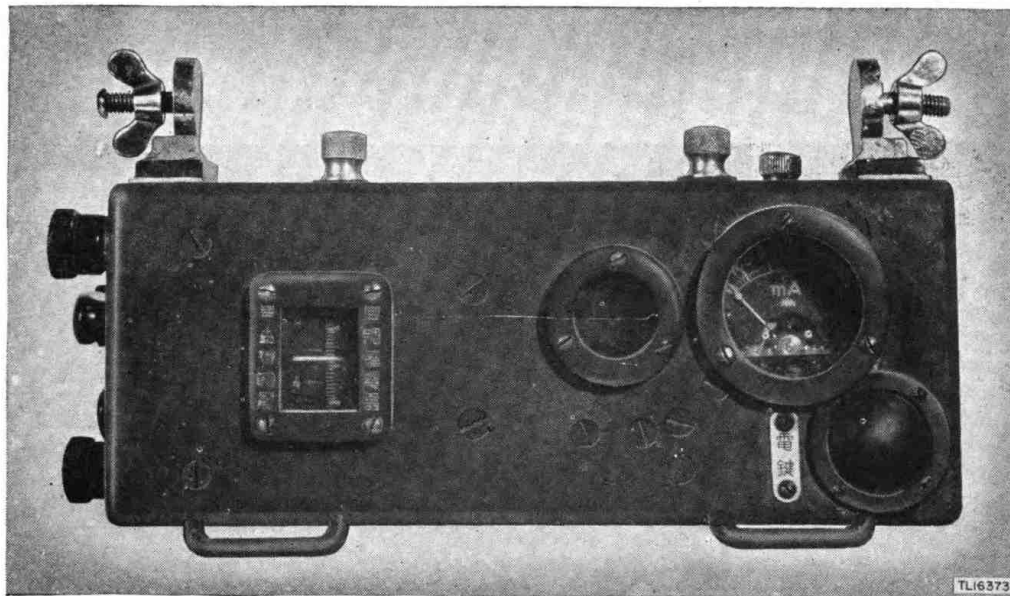
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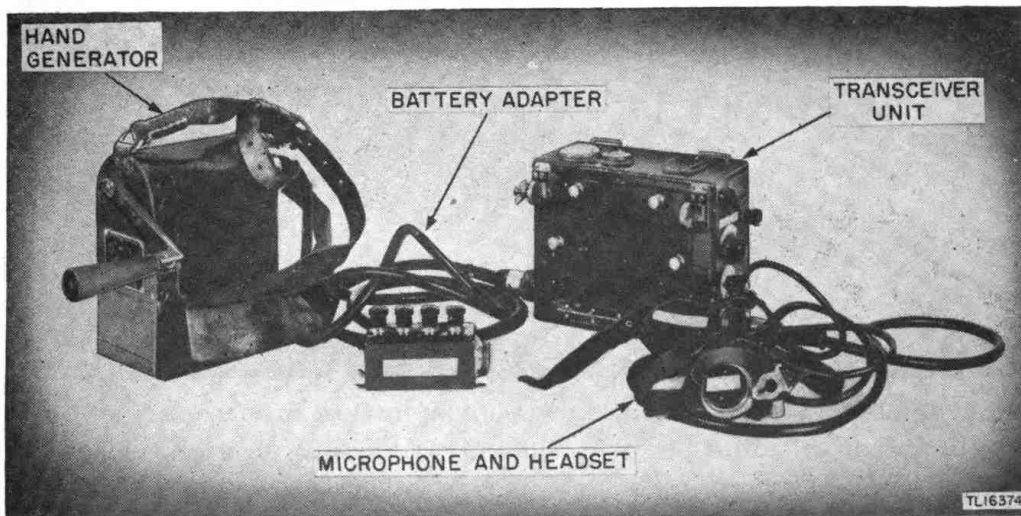
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MODEL 97 LIGHT WIRELESS SET

(Walkie-talkie)



Model 97 Light Wireless Set, top view.



Model 97 Light Wireless Set, equipment interconnected.

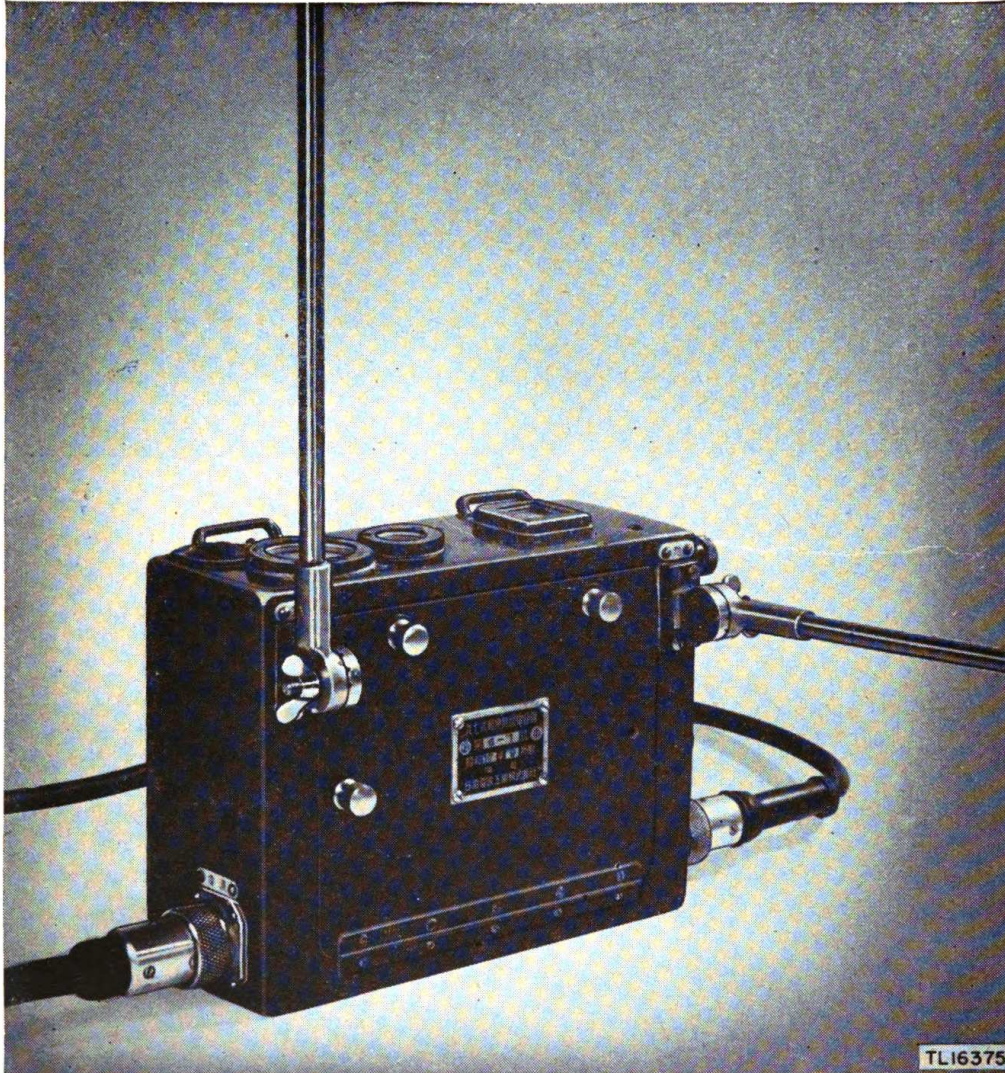
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MODEL 97 LIGHT WIRELESS SET
(Walkie-talkie)



Model 97 Light Wireless Set, showing antenna and counterpoise.

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TM HANDY WIRELESS SET IMPROVEMENT 2

(Portable transceiver)

FREQUENCY RANGE: Xmtr and rcvr: 4.0 to 12.0 mc. Range from 4.0 to 6.0 mc is believed most useful for short-range communication.

POWER OUTPUT: 1 w max.

TYPE OF SIGNAL: Cw, mcw. (Cw somewhat frequency-modulated).

USE: Two-way c-w communication between land stations.

POWER SOURCE: Batteries or rect in case connected to transceiver by six-wire cable. Two high-voltage outputs, 180 v and 150 v.

ANTENNA: Single wire, Marconi type. Reel of wire in each end of case, one containing 67' of single wire, the other 120' of twisted cord tied to end of antenna. When both reels are operated, antenna length may be varied to tune antenna circuit.

TRANSPORTATION: One-man pack for short distances; no shoulder straps or slings provided.

TUBES: Two UX112A triodes in parallel Hartley osc circuit. As rcvr, one tube operates as single-triode regen detecr and other as a-f amplr.

TUNING: Mo.

<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Xmtr-rcvr case	11	20½	8	
Pwr supply in case	8	13½	8	
Total weight				58.5

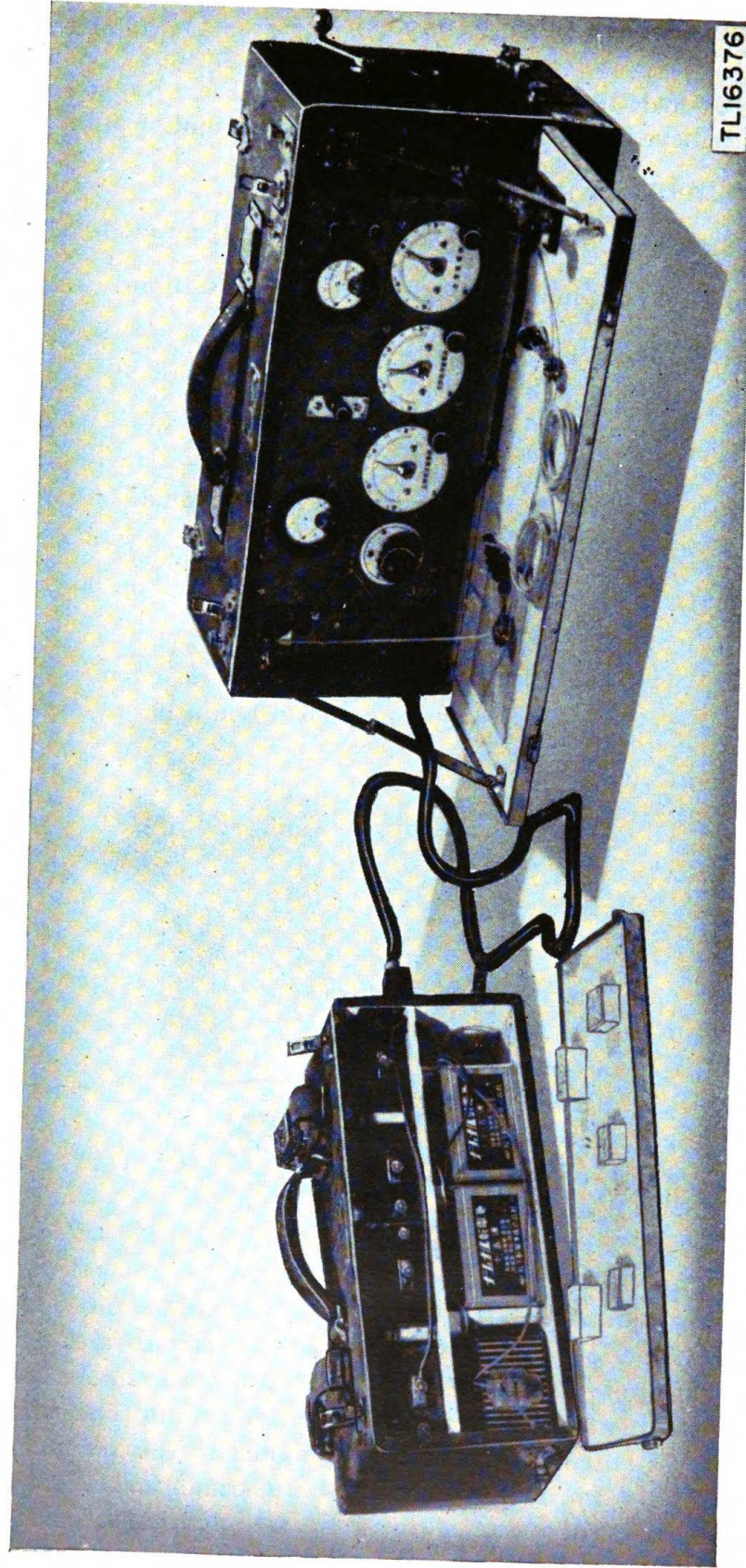
REMARKS: Transceiver is constructed of canvas-covered plywood painted olive drab and has leather handle on top. Nickel-plated metal is used for bolts. Front cover opens down to form desk. Wiring is poor; soldered joints are brittle; there is no protection against weather or fungi. Set has no panel light and is awkward to carry. Complete apparatus consists of xmtr-rcvr unit, pwr supply, pwr cable, on key with cord and jack, and one earphone with cord and jack. Front panel controls are fil voltmeter, fil rheostat, send-receive switch, antenna current meter, rcvr tuning capacitor control, regen control, and xmtr tuning capacitor control. Component parts are mounted on plywood board on back of control panel, both of which are covered with copper. Two banks of switches permit use of same tubes in both xmtr and rcvr. Antenna current meter has removable shunt. Osc is inductively coupled to antenna. Japanese type phones in this set measure 1,275 ohms. Audio transformer is believed of German make. Simple circuits permit set to be operated by untrained personnel. Selectivity and sensitivity very poor; rcvr is microphonic.

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RADIOSONDE

FREQUENCY RANGE: Variable in medium frequency range.

POWER OUTPUT:

TYPE OF SIGNAL:

USE: Vertical soundings of lower atmospheric strata, 20,000 to 25,000 feet above sea level. Radiosonde originally intended for temperature and humidity recordings only; later a barometer was added. Equipment records fairly wide ranges of temperature, humidity and air pressure.

POWER SOURCE: Zinc-lead storage battery of 2.5 v with vibrator pwr supply.

ANTENNA: Two antennas, one formed of wire 36' long suspending apparatus from a balloon or kite, the other a trailing wire 48' long hanging from the apparatus. Antenna outlet of humidity xmtr is built overhead, that of temperature xmtr is below.

TRANSPORTATION: Attached to balloon or kite.

TUBES: Two 30M triodes. Tubes are $\frac{3}{4}$ " diam, $2\frac{1}{4}$ " long, without bases, leads projecting from end are held by clips. Each fil draws 60 ma at 2 v.

TUNING:

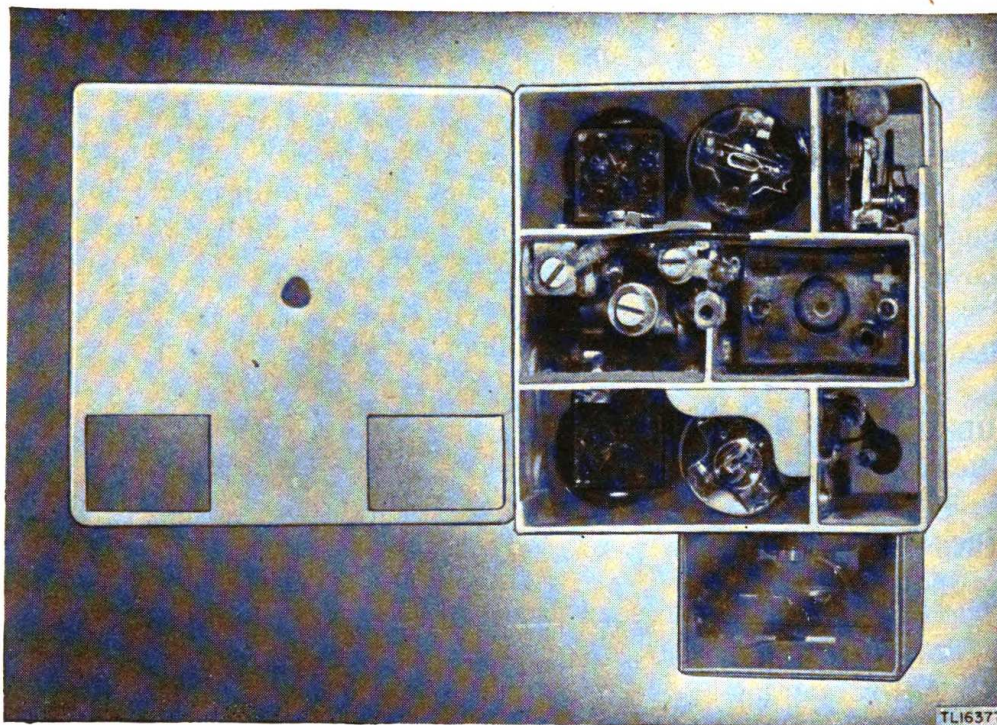
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Main box	$3\frac{1}{2}$	3	3	
Box containing barometer	$1\frac{3}{4}$	$1\frac{1}{2}$	$\frac{7}{8}$	

REMARKS: Radiosonde consists of two xmtrs, thermometer, barometer, storage battery, transf, vibrator, and antennas. All components except antennas are contained in two celluloid boxes, one small transparent box holding the barometer. This is attached to a larger, white opaque box which is divided into compartments for the other equipment. When the box is closed, the hygrometer and barometer compartments remain open to the weather. A change in temperature recorded by the thallium amalgum thermometer alters the transmissions from one xmtr; a hair humidity element in the hygrometer alters the radio frequency of the second xmtr; changes in a pressure device stop the operation of the temperature-controlled xmtr.

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RADIOSONDE



TL16371

Radiosonde, top view.

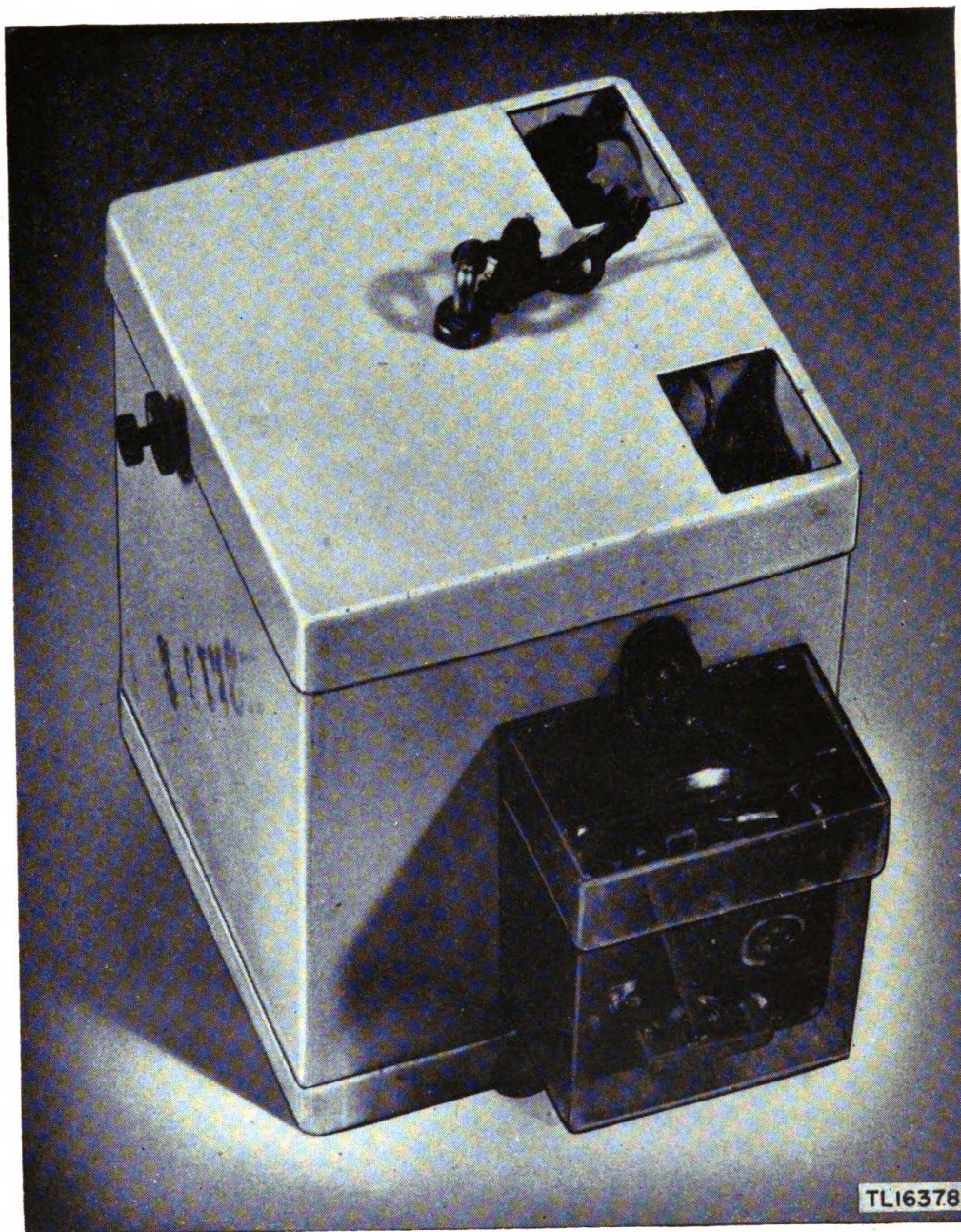
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RADIOSONDE



Radiosonde, showing barometer.

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WEATHER WARNING RECEIVER

FREQUENCY RANGE (mc): 0.0375 to 0.15 and 0.545 to 15.0 using 6 plug-in coils; No. 1, 0.0375 to 0.078; No. 2, 0.078 to 0.15; No. 3, 0.545 to 1.33; No. 4, 1.33 to 3.41; No. 5, 3.41 to 7.35; No. 6, 7.35 to 15.0.

POWER OUTPUT: Adequate for headset use.

TYPE OF SIGNAL:

USE: Weather warning.

POWER SOURCE: External battery pack. Output: plate, 90 v at 12 ma; fil, 1.5 v at 325 ma; bias, 4.5 v.

ANTENNA:

TRANSPORTATION:

TUBES: UF134 r-f amplr, UF134 detectr, UY133A 1st a-f amplr, UF109A 2d a-f amplr.

TUNING:

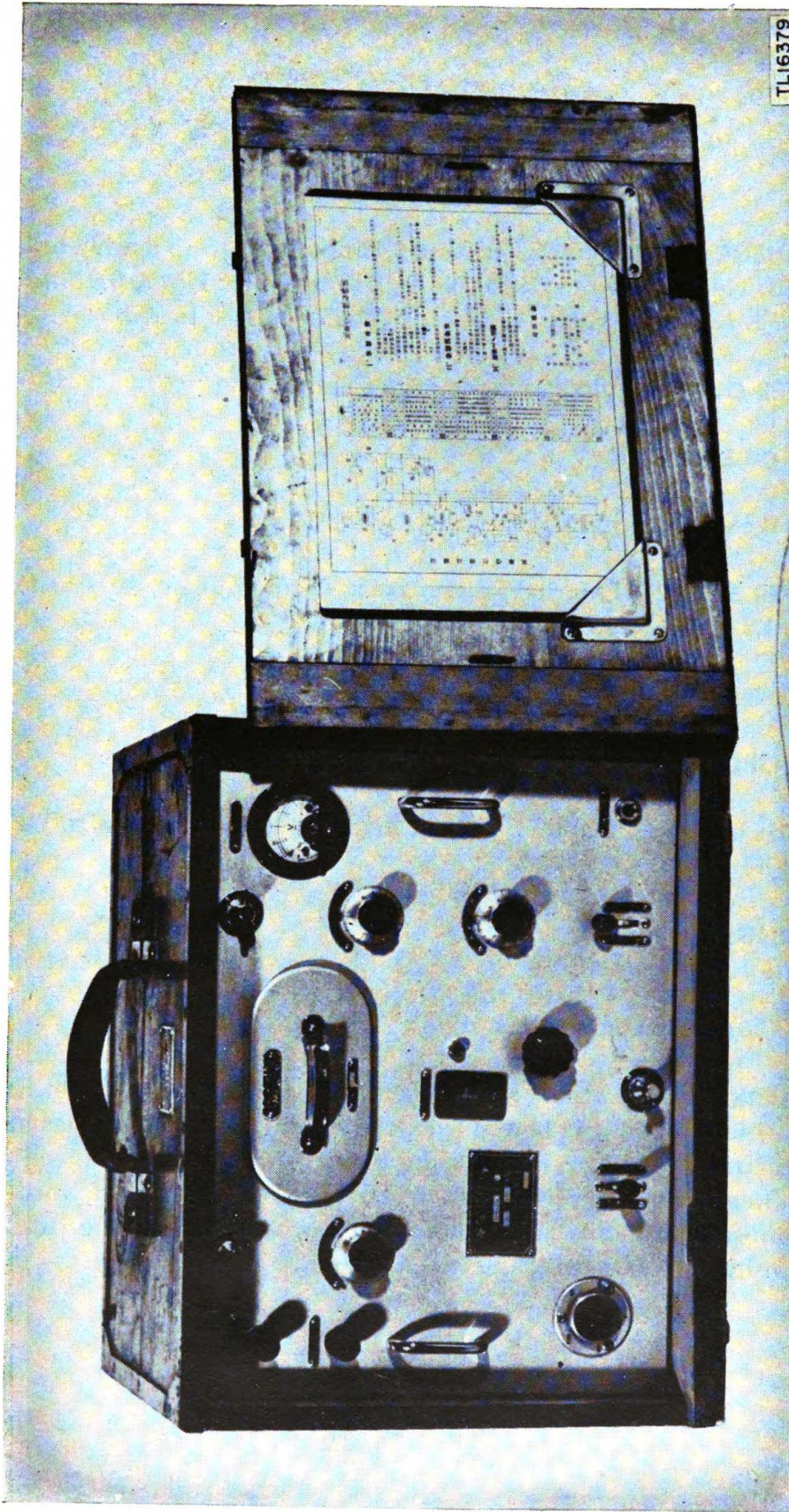
<i>Principal components</i>	<i>Dimensions (in.)</i>			<i>Weight (lb.)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Carrying case	12	15 $\frac{3}{4}$	10	

REMARKS: This portable regen rcvr with spare plug-in coils and headset is housed in an iron-bound wooden carrying case with leather handle. On front panel are main tuning dial, vernier tuning control, on-off power switch, meter switch, regen control, fil rheostat, pwr cable connector, antenna and ground binding posts, and phone jack. Rcvr sensitivity is rather high, selectivity poor.

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WEATHER WARNING RECEIVER



Weather Warning Receiver.

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LIST OF ABBREVIATIONS

<i>Abbrev</i>	<i>Word</i>	<i>Abbrev</i>	<i>Word</i>
amp	ampere	kw	kilowatt
amplr	amplifier	l-f	low-frequency
approx	approximately	mfg	manufacturing
a-f	audio-frequency	mo	master oscillator
BFO	beat-frequency oscillator	max	maximum
Co	company	mc	megacycle
cw	continuous wave	m-c-w	modulated continuous wave
xtal	crystal	μ v	microvolt
cps	cycles per second	mw	milliwatts
detecr	detector	mod	modulator
diam	diameter	osc	oscillator
dc	direct current	lb	pound
dbl	doubler	pwr	power
fil	filament	pri	primary
1st	first	rf	radio frequency
gen	generator	r-f	radio-frequency
h-f	high-frequency	rcvr	receiver
hp	horsepower	rect	rectifier
in.	inch	regen	regenerative
i.f.	intermediate frequency	2d	second
i-f	intermediate- frequency	superregen	superregenerative
kc	kilocycle	transf	transformer
kva	kilovolt-ampere	xmtr	transmitter
		v	volts
		w	watt

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