

706-732-800
86 91 118

U. S. NAVY
PORTABLE
RADIO WAVEMETER

TYPE SE 392

RANGE 150-2400M. VAR. COND. MAX. .0032 MFD.

REQ. 640 - CONTRACT 481 - DATE 1917

SERIAL No. **179-Y**

MADE FOR
BUREAU OF STEAM ENGINEERING
BY
WIRELESS IMPROVEMENT COMPANY
47 WEST STREET, NEW YORK.

~~Accurate~~

Oil #3 1630 λ - 184 keys

7 1/3 Rad 8.7 amps.

DESCRIPTION AND DIRECTIONS

FOR USE OF

U. S. NAVY PORTABLE RADIO WAVEMETER

TYPE SE 392

SERIAL NO. **179-Y**

RANGE: 150 to 2400 METERS.

WIRELESS IMPROVEMENT COMPANY
47 West St. New York.

DESCRIPTION AND DIRECTIONS
for use of
PORTABLE RADIO WAVEMETER
Type SE-392
RANGE, 150 - 2400 METERS
Drawing RW-74F-271

This instrument is designed for the measurement of wave-lengths and decrements.

At the left side of the panel is a crystal detector; just in front of it are two binding posts marked "TELEPHONES". To the right of the detector is the handle of a rotary variable condenser, carrying a circular metal plate on which four scales are engraved. One scale is divided into degrees for indicating the relative positions of the fixed and movable plates. On the three other scales wave-lengths are indicated.

At the upper left hand corner of the panel is a socket for plugging in the wavemeter coils. The binding post marked "GROUND" is to be connected to the ground when the wavemeter is used for decrement measurements. At the upper right hand corner of the panel is a current squared meter, (deflections proportional to the square of the current through it.)

Zero error may be corrected by the slotted screw marked "ZERO ADJ'R".

On the rear of the panel, between the two binding posts marked "CONDENSER", a small safety gap, set for five mils, is connected. The condenser may be used separately by connecting to these posts and removing the wavemeter coil from the coil socket. The calibration curve is given on sheet 8 of these instructions. At the right hand side of the panel, there is a small jack switch marked "OFF" and "BUZZER ON", for closing the buzzer circuit when using the instrument as a "driver". Two silver chloride cells are already connected to the buzzer circuit. Outside batteries, (1 - 3 volts), may be connected to the terminals marked "BUZZER BATTERY" if the internal battery runs down. When this is to be done, first remove the wavemeter from its case after removing the six screws in the panel, and cut the leads joining the chloride cells to the rest of the circuit directly at the cell terminals.

-SPECIAL FEATURES:-

- CONDENSER:** The variable condenser is of the balanced plate type. The fixed and movable plate systems are in two sections, arranged 180° from each other to balance the movable plate system mechanically. The maximum capacity of this condenser is 0.003 mfd., - the minimum obtainable capacity is 0.0001 mfd.
- COILS:** The wavemeter coils are wound with 3 x 16 x 38 Litz. wire so as to have a low radio frequency resistance. In order to allow quick insertion of the coils, they are provided with plugs. All contacts are silver faced.
- CURRENT SQUARED METER:** The current squared meter is provided with a shunt resistance of 2.4 ohms, so as to reduce the decrement of the wavemeter at short wave lengths.
- BUZZER SYSTEM:** When the wavemeter is used as a driver, the only additional conductor added to the oscillating circuit is the buzzer point, and the lead from this to the buzzer switch. This arrangement gives the same calibration for driver as for receiver.
- DETECTOR CIRCUIT:** The detector and telephones are in unilateral connection with the oscillatory circuit. This arrangement gives the same calibration for receiving, using either the current squared meter or the detector and telephones.

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The wavemeter, complete, weighs 16.25 lbs. Its over-all dimensions are 11.8" x 10.8" x 8.9".

- TO MEASURE TRANSMITTER WAVE-LENGTHS -

- (1) Place jack switch on "OFF".
- (2) Plug in a wavemeter coil.
- (3) Couple the wavemeter, loosely, to the antenna.
- (4) Tune to resonance, (maximum deflection on current squared meter).

Read wave-length on the scale under the movable pointer.

If no deflection is obtained by varying the capacity of the wavemeter circuit:

- (1) Increase the coupling to the antenna, either by rotating the coil, or by bringing the wavemeter closer to the transmitter; or
- (2) Change the wavemeter coil.

If a maximum deflection is obtained at more than one point on the same condenser scale, it indicates that the transmitter is radiating more than one wave.

If it is not possible to couple the wavemeter to the transmitter closely enough to obtain a readable deflection in the C.S. meter, use the telephones and crystal detector as an indicator.

It is generally desirable to check the quality of the transmitter note by listening in with the wavemeter loosely coupled and tuned to resonance.

- TO CALIBRATE A RECEIVING SET -

- (1) Place jack switch on "BUZZER ON".
- (2) Plug in a wavemeter coil.
- (3) Adjust buzzer so that it emits a steady, high pitched, musical note.
- (4) Couple the wavemeter coil, loosely to the antenna circuit of the receiving set. Couple the secondary circuit of the receiving set to the antenna circuit, and listen in on the receiving phones, using the loosest coupling giving an audible signal. When both circuits of the receiver are tuned to the wavemeter, the wave-length of the receiver at this adjustment is the wave-length indicated by the pointer of the wavemeter.

- TO MEASURE THE DECREMENT OF A TRANSMITTING SET -

- (1) Connect binding post marked "GROUND" to ground.
- (2) Place jack switch on "OFF".
- (3) Insert in the socket the wavemeter coil which was used in measuring the wave-length of the transmitter.
- (4) Set the transmitter in operation.
- (5) Couple the wavemeter coil to the antenna circuit.
- (6) Vary the capacity in the wavemeter circuit until a maximum indication is obtained in the C.S. meter.
- (7) Increase the coupling between the wavemeter coil and the antenna circuit of the transmitter until a full scale deflection is obtained in the C.S. meter. Denote the wave-length indicated on the wavemeter at this adjustment by λ_R .
- (8) Keeping the coupling constant, increase the wave-length of the wavemeter circuit until the deflection of the C.S. meter drops to one-half of its original full scale reading. Denote the wave-length of the wavemeter at that setting by λ_1 .
- (9) Keeping the coupling to the transmitter constant, decrease the wave-length of the wavemeter circuit, until the deflection in the C.S. meter drops to one-half its original full scale deflection. Denote the wave-length of the wavemeter at that setting by λ_2 .

Then, the decrement of the transmitter, at the wave-length λ_2 is given by the formula

$$d = 1.57 \frac{\lambda_1 - \lambda_2}{\lambda_R} - d_R$$

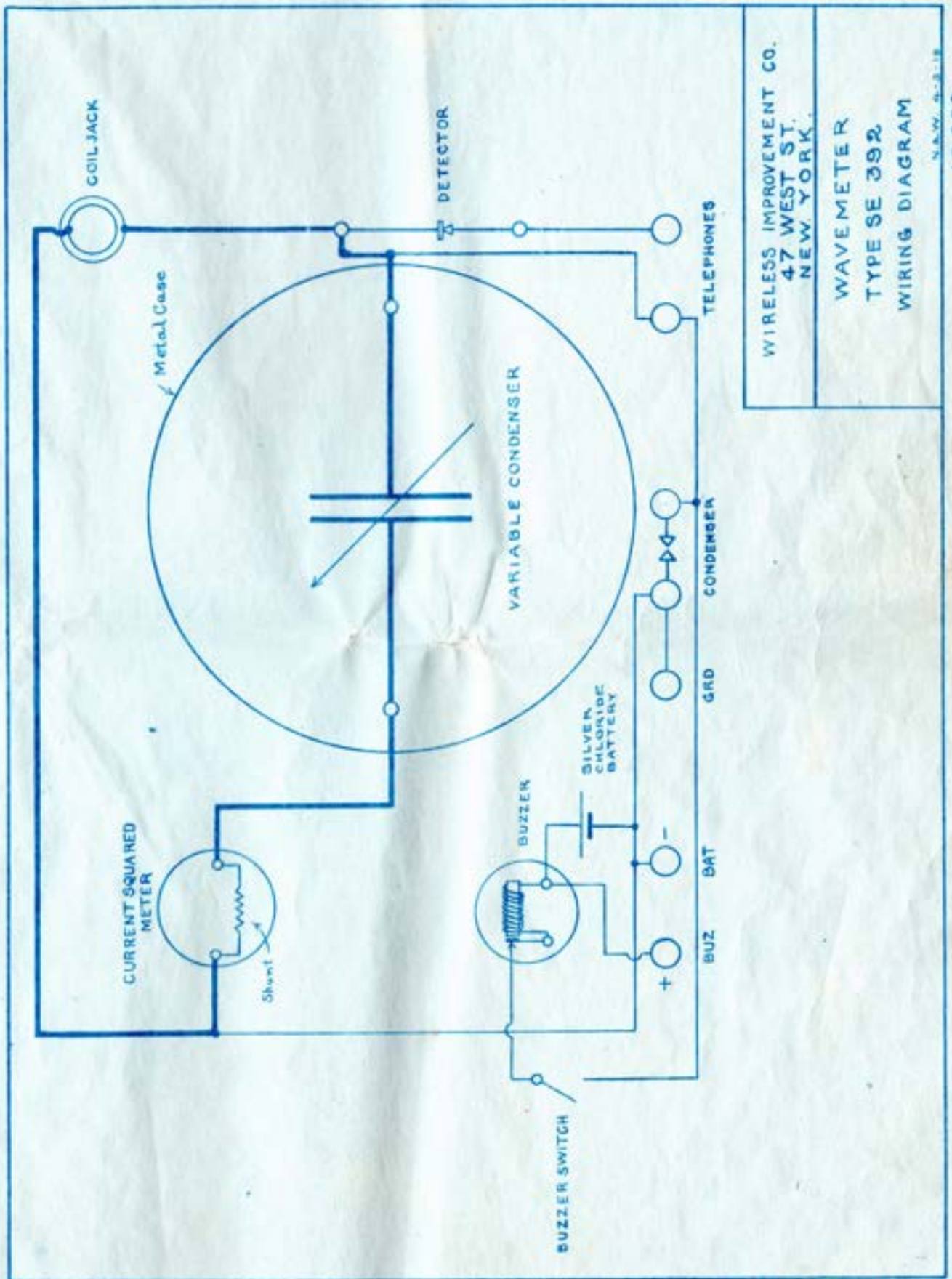
in which $\lambda_1, \lambda_2, \lambda_R$ are expressed in meters, and d_R is the decrement of the wavemeter at the wave-length λ_R . This value of d_R is to be taken for the coil in use, from the calibration curve, sheet 9, 10 or 11.

If the transmitter is one of high power, the coupling between the antenna circuit of the transmitter and the wavemeter coil should be great enough to make the deflection at resonance a full scale reading.

If the transmitter is 1/4 K.W. or less, the deflection at resonance should be about one-half the full scale reading. In this case, the deflections at λ_1 and λ_2 are about one-quarter of the full scale.

In measuring the decrement of a high decrement transmitter, for example, the primary of a quenched spark transmitter, sparking may occur at the safety gap for less than a full scale deflection on the current squared meter. This may be overcome by using the next smaller wavemeter coil that covers the range, so as to obtain a high ratio of capacity to inductance for that wave-length.

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WIRELESS IMPROVEMENT CO.
 47 WEST ST.
 NEW YORK.

WAVE METER
 TYPE SE 392
 WIRING DIAGRAM

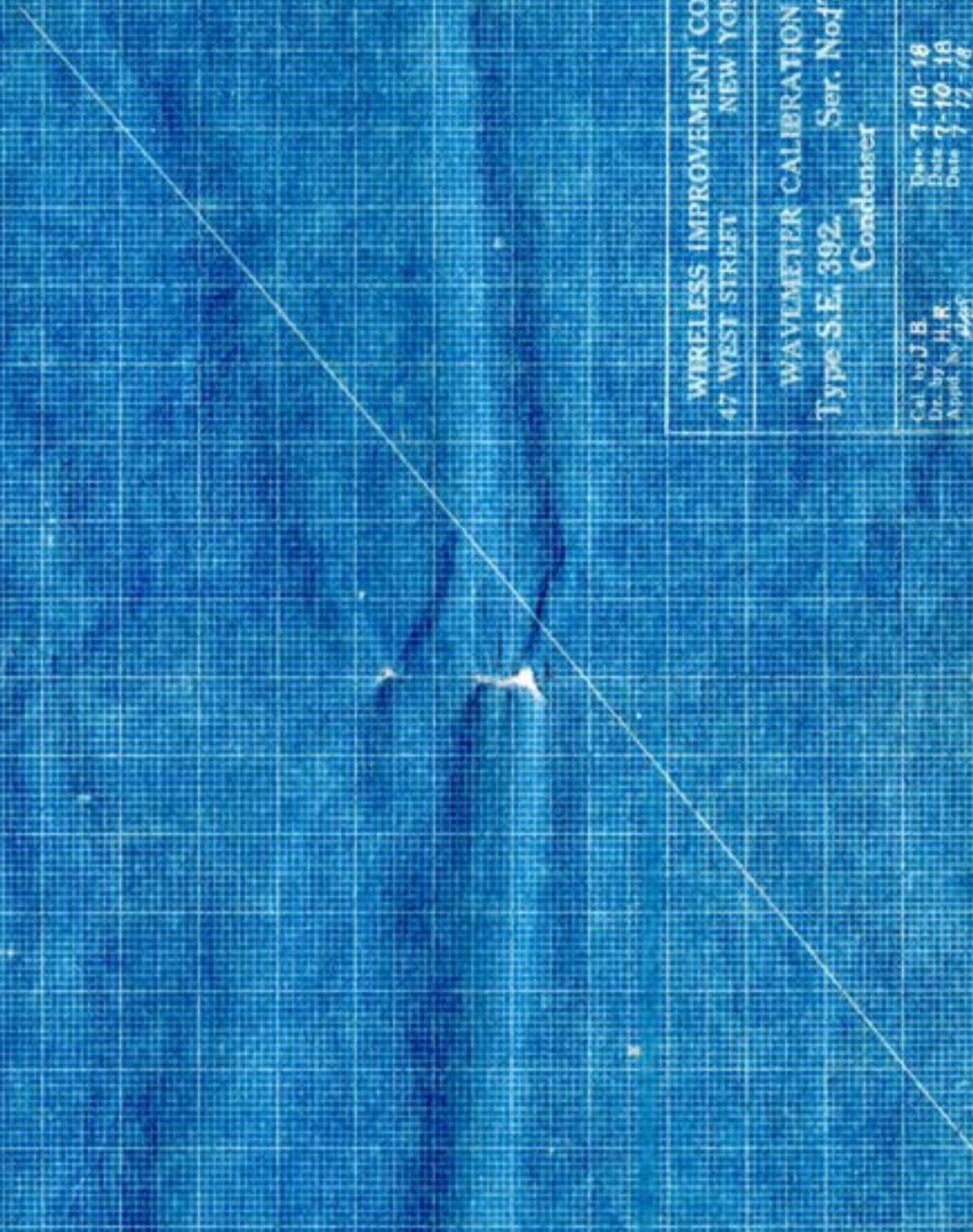
N.W. 5-2-18
 10663

TYPE M 10950 IN. 10.5 X 14.5 IN. 10.5 X 14.5 IN.

CAPACITY - MFDs
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

CONDENSER DEGREES



WIRELESS IMPROVEMENT CO.
47 WEST STREET
NEW YORK

WAVEMETER CALIBRATION
Type S.E. 392. Ser. No. 79
Condenser

Cal. by J. B.
Dr. by H. R.
Appt. by M. G.

Dev. 7-10-18
Des. 7-10-18
Date 7-17-18

INSTRUMENT DECREMENT

085

WAVE LENGTH—METERS

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

CONDENSER DEGREES

WIRELESS IMPROVEMENT CO.
47 WEST STREET
NEW YORK

WAVEMETER CALIBRATION
Type S.E. 392. Ser. No. 779
Coil 1

Cal. by J.B. Date 7-10-18
Dec. by H.R. Date 7-10-18
Approved by *phg* Date 7-17-18



INSTRUMENT DECREMENT

.04

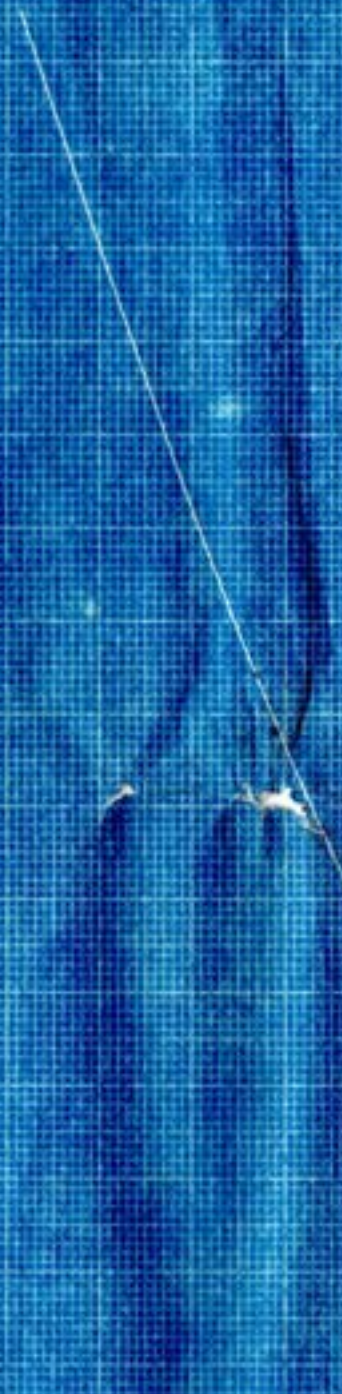
WAVE LENGTH—METERS

1200
1100
1000
900
800
700
600
500
400
300
200
100
0

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

CONDENSER DEGREES

WIRELESS IMPROVEMENT CO. 47 WEST STREET NEW YORK	
WAVELENGTH CALIBRATION Type S.E. 392. Ser. No. 179 Coil 2	
Cal. by J.B.	Date 7-10-18
Chk. by H.R.	Date 7-10-18
Approved by <i>W.P.P.</i>	Date 7-17-18



INSTRUMENT DECREMENT

.02

WAVE LENGTH - METERS

2500
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200

0

20

40

60

80

100

120

140

160

180

200

220

240

260

280

300

320

WIRELESS IMPROVEMENT CO.
47 WEST STREET NEW YORK

WAVEMETER CALIBRATION
Type S.E. 392 Ser. No. 179

Coil 3

Cal. by J. B.
Dir. by H. A.
Approved by [Signature]

Date 7-10-18
Date 7-10-18
Date 7-17-18

CONDENSER DEGREES

10 Aug - 1958

1700
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(91)

454-660-76°
171-1754-85°

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