TM 11-5046

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

HOMING BEACON AN/CRN-12( )

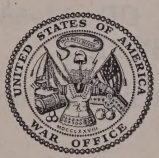
DEPARTMENT OF THE ARMY • *APRIL 1951*

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HOMING BEACON AN/CRN-12( )



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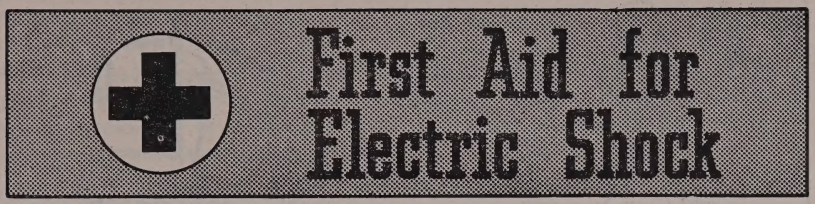
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WARNING

HIGH VOLTAGE
is used in the operation
of this equipment.

DEATH ON CONTACT
may result if operating personnel fail
to observe safety precautions.

When working with the equipment, be extremely careful not to come in contact with points inside the transmitter that are at a high potential. Do not come in contact with the antenna mast when the transmitter is turned on.



RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

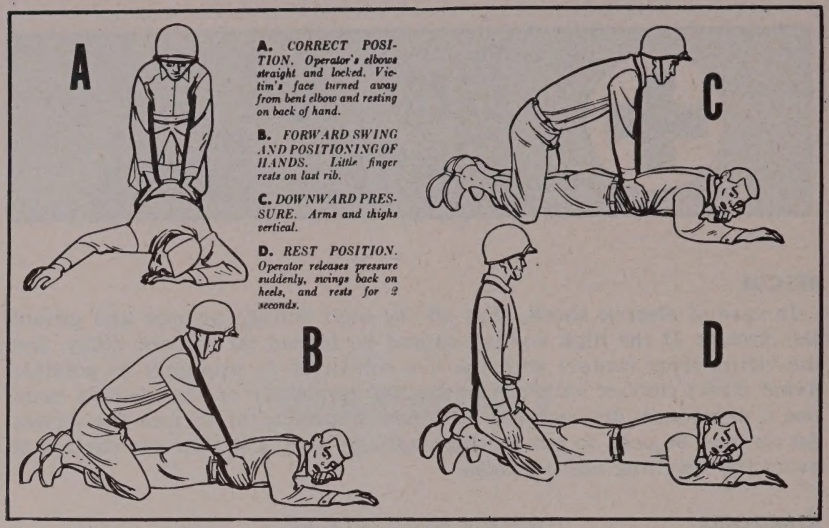
TREATMENT.

a. Start artificial respiration immediately At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open,

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with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(*1*) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(*2*) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib:

(*3*) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim:

(*4*) the operator's elbows are straight and locked.

f. The resuscitation procedure is as follows:

(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit on the heels.

(*3*) After 2 seconds, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4 seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence

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of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing ½ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*

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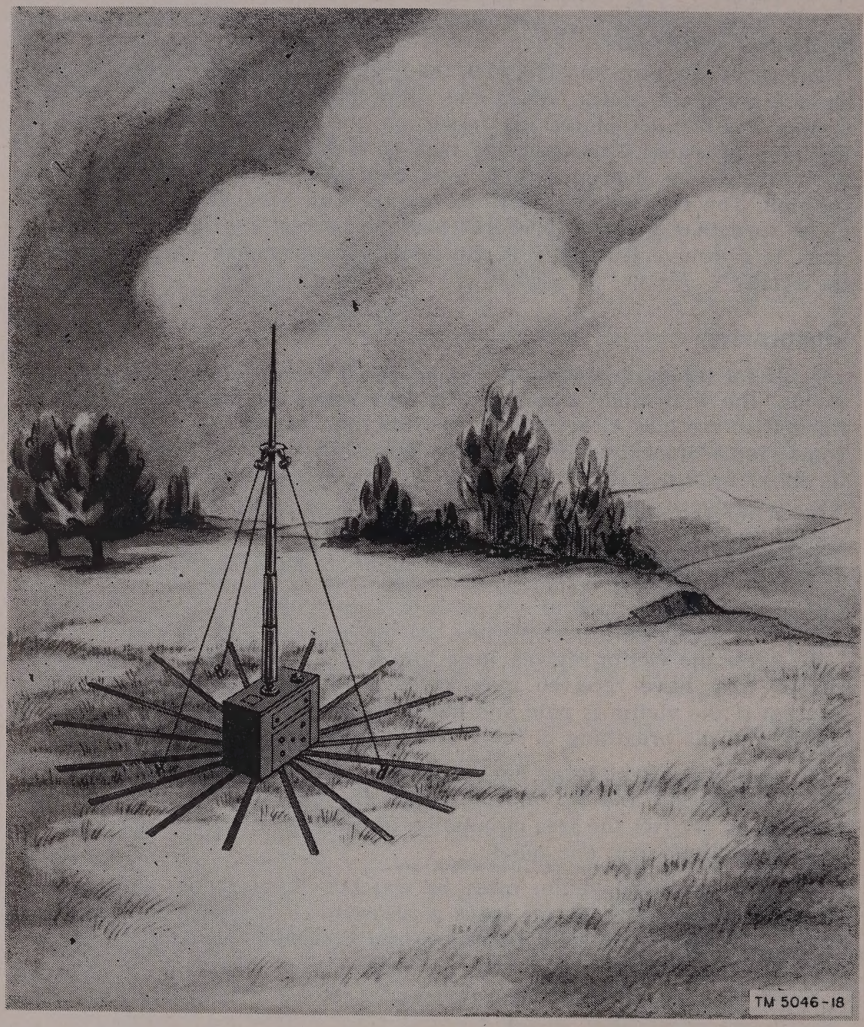


Figure 1. Homing Beacon AN/CRN–12.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

This technical manual contains instructions for the installation, operation, maintenance, and repair of Homing Beacon AN/CRN–12. In addition to these instructions, there are two appendixes covering a list of references and an identification table of parts.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army matériel and equipment.

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745–45–5 (Army), NAV DEPT SERIAL 85P00 (Navy), and AFR 71–4 (Air Force).

b. DA AGO Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700–45–5.

c. USAF Form 54, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700–45–5 and AFR 65–26.

d. DA AGO Form 419, Preventive Maintenance Checklist for Signal Corps Equipment, will be prepared in accordance with instructions on the back of the form.

e. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Homing Beacon AN/CRN–12 (fig. 1) is essentially a radio beacon, sometimes called a marker transmitter. It radiates a coded signal which may be used to guide personnel to the location of the transmitter by homing on the signal. The receiving equipment, which may be Radio Set SCR–536 that has been modified for use with Homing Beacon AN/CRN–12 by means of Homing Modification Kit MC–619 (TM 11–235), is not a part of this equipment.

The homing beacon is intended for either manual or automatic transmission of a nondirectional signal.

b. The equipment is capable of transmitting on any frequency from 3.5 to 6 mc (megacycles). Automatic operation may be obtained on four prearranged crystal frequencies, provided the difference between the highest and lowest crystal frequencies is not more than 140 kc (kilocycles), the maximum bandwidth the antenna circuit will pass. By means of the BAND SWITCH, the antenna is tuned throughout the range in five steps designated A, B, C, D, and E; fine tuning is provided by an ANT. TUNING control. Normally, the signals may be received at least 8 miles from the point of transmission.

4. Application of Equipment

a. Homing Beacon AN/CRN–12 performs several types of operation. They are as follows:

(1) Automatic transmission of a predetermined code letter and automatic selection of each of four crystal-controlled frequencies. Each frequency is used for a 2-minute period before the next frequency is selected automatically. These frequencies are so chosen that the end frequencies of the group are not more than 140 kc apart.

(2) Automatic transmission of a predetermined code letter on any one of four preselected crystal-controlled frequencies.

(3) Manual keying of a desired signal on any one of four preselected crystal-controlled frequencies.

b. The automatic signals that may be transmitted consist of the repetition every minute of eight 1-second dashes, one 19-second dash, and eight 1-second dashes, followed by the preselected code letter.

5. Technical Characteristics

Frequency:	
Range	3.5 to 6 mc.
Crystal channels	4.
Transmitter type	Crystal oscillator power amplifier.
Type of signal transmitted	Tone modulated (amplitude modulation).
Distance range	8 miles (approx).
Modulation frequency	180 cycles.
Number of tubes	2.
Power output	5 watts.*

* Varies slightly with frequency, crystal activity, and battery voltage.

Power input	27 watts, 6 volts dc (direct current), 4.5 amperes.
Antenna:	
Height, telescoped	30⅝ inches.
Height, extended	35 feet.
Counterpoise	sixteen 25-foot ribbons extended from 4 reels.

6. Packaging Data

Methods of packaging this equipment will vary, depending on the materials that are available. Prior to packaging, the antenna assembly and the transmitter are placed in their bags. The antenna assembly is then placed in a long cardboard box; the transmitter is placed in a smaller box, which also contains extra equipment and spare parts.

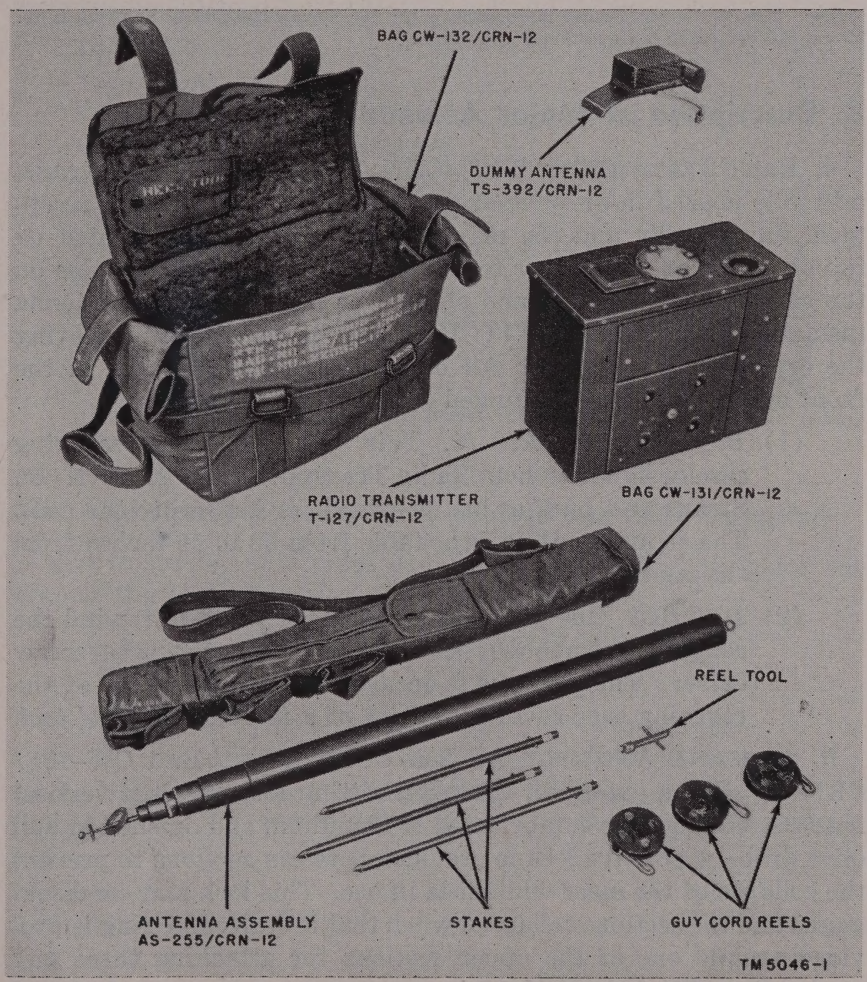


Figure 2. Components of Homing Beacon AN/CRN-12.

7. Table of Components

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu. ft.)	Unit weight (lb.)
Antenna Assembly AS–255/CRN–12.	1	2 1/16	2 1/16	30 5/8	.07	5.5
Bag CW–131/CRN–12.	1	4 1/4	4 1/4	32 1/2	.34	3.
Bag CW–132/CRN–12.	1	12 3/4	10	14 1/2	1.07	6.
Dummy Antenna TS–392/CRN–12.	1	3 1/4	2 1/8	6 1/2	.02	.44
Radio Transmitter T–127/CRN–12.	1	12	6 1/2	12 3/4	.58	14.
Technical Manual (TM 11–5046).	2					

Note. This list is for general information only. See appropriate supply publications for information pertaining to requisition of spare parts.

8. Description of Major Assemblies

a. RADIO TRANSMITTER T-127/CRN–12 (fig. 2). The radio transmitter is housed in an olive-drab metal case. The antenna receptacle subassembly and the manual keying switch are located on top of this case. The cover to the crystal compartment is also on top of the case. Beneath and slightly to the side of the antenna insulator is the BAND SWITCH; it can be reached by removing the crystal cover (fig. 6). All other controls are located in the front of the case under a hinged cover.

(1) *Bag CW–132/CRN–12.* This bag is a canvas carrying case designed to hold Radio Transmitter T–127/CRN–12. Straps and buckles are provided for fastening the case. The strap length is adjustable from 30 to 56 inches from the corner of the case.

(2) *Reel tool.* One end of the reel tool is used to rewind the counterpoise ribbon; the other end is used as a screw driver. The reel tool is secured to the under side of the carrying case cover by means of a flap marked *reel tool.*

b. ANTENNA ASSEMBLY AS–255/CRN–12 AND BAG CW–131/CRN–12. When extended, the transmitting antenna is a vertical mast 35 feet high. It is fabricated of aluminum and finished in dull olive drab. A positive lock is provided between sections to prevent the collapse of the mast while it is in use. This lock may be disengaged and the sections collapsed when that is desired. A ring is provided around one of the upper sections for attaching three guy cords. Bag CW–131/CRN–12 is a canvas carrying case designed

to hold the antenna assembly. The bag consists of one main compartment for the antenna, one large pocket on the side divided into three compartments to hold the antenna guy stakes, and three similar compartments at the side of the bag to hold the guy cords and reels.

c. DUMMY ANTENNA TS–392/CRN–12. The dummy antenna is used in testing and adjusting the transmitter. The base fitting of the dummy antenna makes an electrical connection to the antenna connector which is in the center of the antenna receptacle subassembly. The dummy antenna is fastened under the edges of the top transmitter panel by means of a spring.

9. Additional Equipment Supplied

The following is a list of additional equipment which is supplied with the transmitter:

Tube 6V6GT	2
Tube 6G6G	2
Vibrator	1
Code disk, Taffet No. 96W336	1
Code disk, Taffet No. 96W335	1
Code disk, Taffet No. 96W453	1
Code disk, Taffet No. 96W448	1
Reel sets (4 reels per set)	5
Counterpoise spools and reels	4
Clips	2
Leads	2

Note. One of the code disks listed is already mounted in the transmitter.

10. Additional Equipment Required but Not Supplied

The following additional equipment is required to place the transmitter in operation.

Quantity required	Item	Use
3	Battery BB–54–A (with electrolyte).	6-volt power source (good for 5 hours).
1 to 4	Crystal Holder FT–243 with crystal.	Determines operating frequency of transmitter.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE ON RECEIPT OF EQUIPMENT

11. Siting

In order to prevent the loss of radiated energy, select an antenna location which is as far away as possible from trees, tall metal structures, or hills. Make sure that the location permits driving stakes in the ground or that it at least has shrubbery or other projections to which the antenna guy cords may be attached. Also make sure that there is not too much exposure to the elements.

12. Uncrating, Unpacking, and Checking New Equipment

Note. For used or reconditioned equipment, refer to paragraph 17.

a. Follow the instructions below for uncrating and unpacking all components of Homing Beacon AN/CRN–12.

(1) Place the packing case near a convenient operating position.

(2) Open the cartons that protect the equipment.

(3) Remove the wrapping paper covering the equipment.

(4) Take out the equipment.

(5) Check the contents of the packing case against the master packing slip.

Note. Save the original packing cases and containers. They can be used again when the equipment is repacked for storage or shipment.

b. Check the equipment as follows:

(1) Inspect the tubes and the vibrator. Remove the screws around the edges of the top panel which keep it fastened to the transmitter case. Lift the top panel and the attached transmitter assembly from the case and detach the battery plug J104 from male jack J105. Make certain that the tubes are installed in the proper sockets, that the tube clamps are fastened tightly, and that the vibrator is in place.

(2) Inspect the counterpoise reels. Loosen the Dzus fastener in the center of the counterpoise reel cover plate and remove the cover plate as shown in step ① of figure 3. The reel tool that is secured to the under side of the carrying case cover fits this fastener. Make certain that the counterpoise ribbons are threaded through the proper channels and that all four reels are in place. The ends of the ribbons should protrude from the case so that they may be easily grasped at the time of installation.

(3) Inspect the stakes and the guy cords. Unpack the three guy cords located in the pockets on the antenna assembly bag and check the loops at the snap hooks. Make certain that the three guy stakes and the three reels which hold the three guy cords are in place and ready for use.

(4) Inspect the antenna mast assembly. Remove the antenna mast assembly from the antenna bag and make certain that each section works smoothly and locks positively when in the erected position.

Caution: When unpacking, keep sand and dirt out of the ends of the mast section.

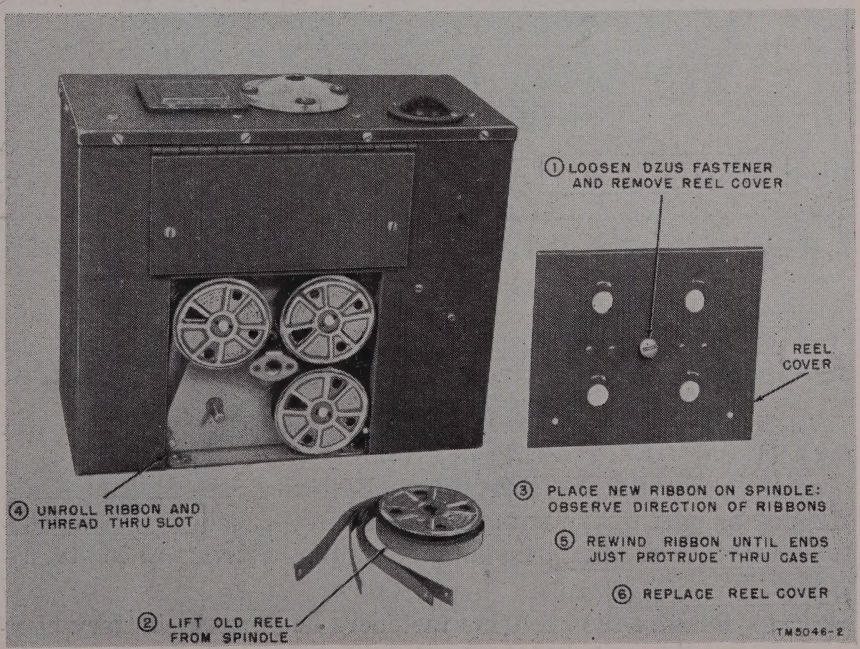


Figure 3. Changing counterpoise reels.

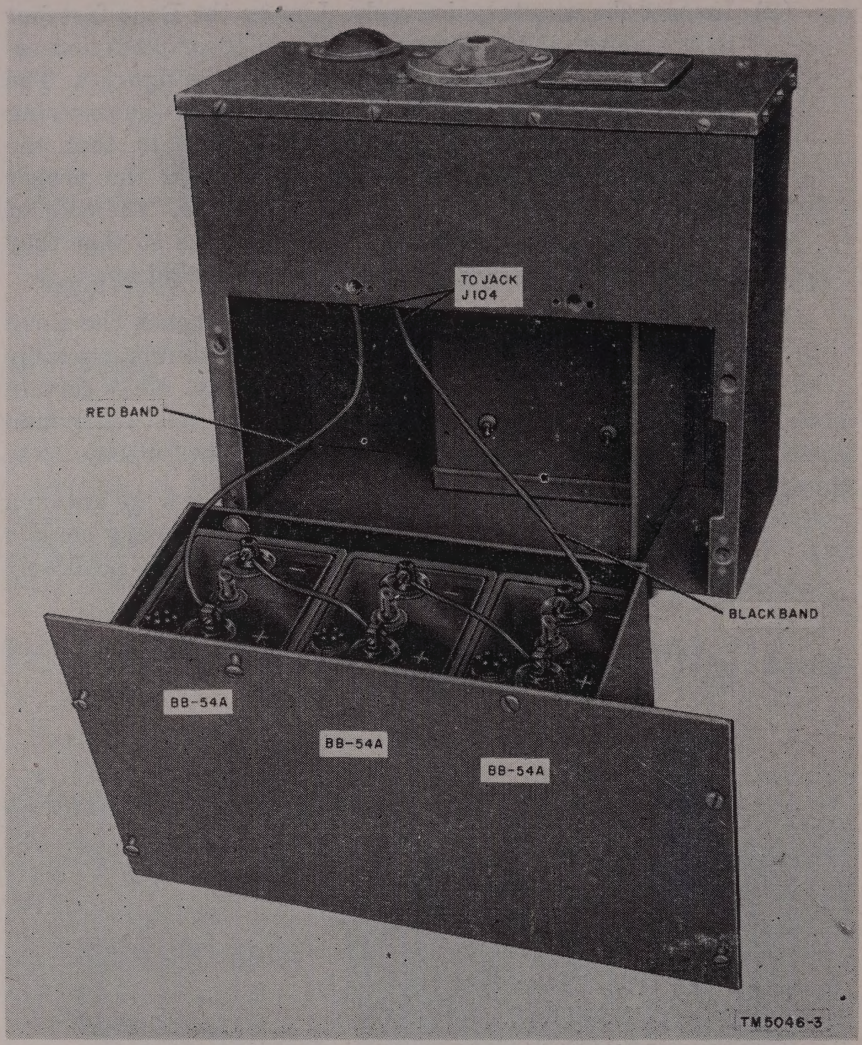


Figure 4. Battery compartment and battery connections.

13. Installation of Batteries, Crystals, and Code Disk

Note. Before connecting the batteries to the transmitter, make sure that the AUT.-OFF-MAN. switch (fig. 6) is in the OFF position.

a. INSTALLATION OF BATTERIES. Batteries BB–54–A are not shipped as part of the transmitter. However, follow the instructions below to facilitate installation of the batteries in the transmitter.

(1) Remove the six Dzus fasteners holding the battery compartment to the back of the set (fig. 4). To install the three batteries in the compartment, first place a battery

at each end of the compartment, then place the third battery in the center; install them with the battery indicators toward the back panel.

(2) Connect the three batteries in series (the positive of one battery to the negative of the next) by means of two short jumper wires (fig. 5).

(3) Connect the transmitter lead painted with a red band to the positive terminal of the battery combination and connect the transmitter lead painted with a black band to the negative terminal. Make sure the plug (J104) these leads are attached to is plugged into jack J105. Jack J105 is male at both ends; one end receives J104, and the other end receives J102. Refer to figure 15.

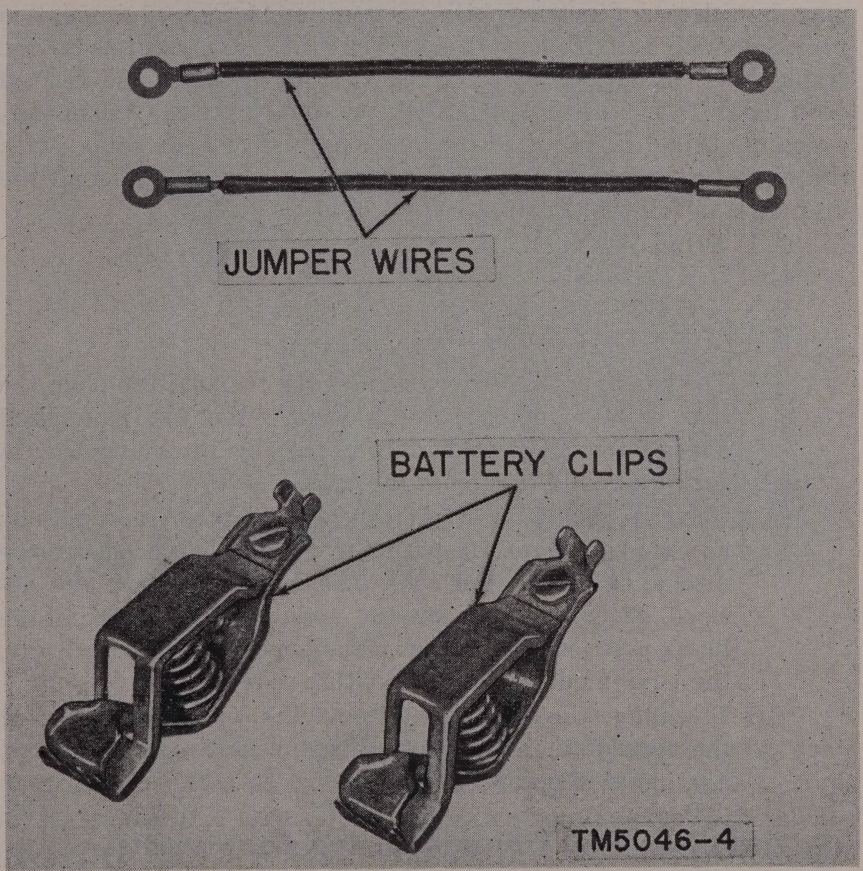


Figure 5. Jumper wires and battery clips.

b. INSTALLATION OF CRYSTALS. Unscrew the four screws holding the crystal cover located next to the antenna insulator on top of the set and remove the cover (fig. 6). Note that the crystal sockets are numbered 1 through 4 to correspond to the numbers on the CRYSTAL FREQUENCIES switch on the control panel. Insert the crystals in the order of increasing frequency, position 1 being the lowest and position 4 the highest frequency. Note, too, that the crystal sockets are of the dual type, making it necessary to install the crystals so that their cover plates face in opposite directions. Disregard the words TRAN and REC on the crystal holders and sockets. After the new crystals have been installed, turn the BAND SWITCH to the position that includes the frequency range of the inserted crystals. Replace the crystal cover and fasten it securely.

Note. The difference between the highest crystal frequency (position 4) and the lowest crystal frequency (position 1) *must not exceed 140 kc.*

c. INSTALLATION OF CODE LETTER. Any one of the 24 letters may be selected for automatic transmission. The equipment is provided with four code disks, one of which is mounted on the transmitter. Each disk has six code letters on it. If the desired code letter is not on the code disk mounted on the transmitter, exchange this disk for the correct one, which will be found with the operating spare parts. The letters and the grouping on the disks are as follows:

A D F L I V—No. 85 stamped on disk.
C N U H Z P—No. 86 stamped on disk.
Q X K Y O M—No. 68 stamped on disk.
S R G W T B—No. 73 stamped on disk.

(1) To change a code letter, remove the transmitter from the canvas carrying case, and remove the top panel and chassis from the transmitter case by removing the 14 screws around the top of the case.

(2) The code disk is located as shown in figure 7 and may be adjusted by hand or with the reel tool. To adjust the mechanism, turn the code disk clockwise until the desired letter stamped on the code disk is opposite the blank position of the gear. When operated automatically, the equipment will transmit this code letter.

(3) To change the code disk, remove the screw in the hub of the code disk on the transmitter, remove the code disk, and install the new disk.

14. Installation of Transmitter and Counterpoise

Installation of the transmitter and the counterpoise involves selection of a position for the equipment, spreading of counterpoise

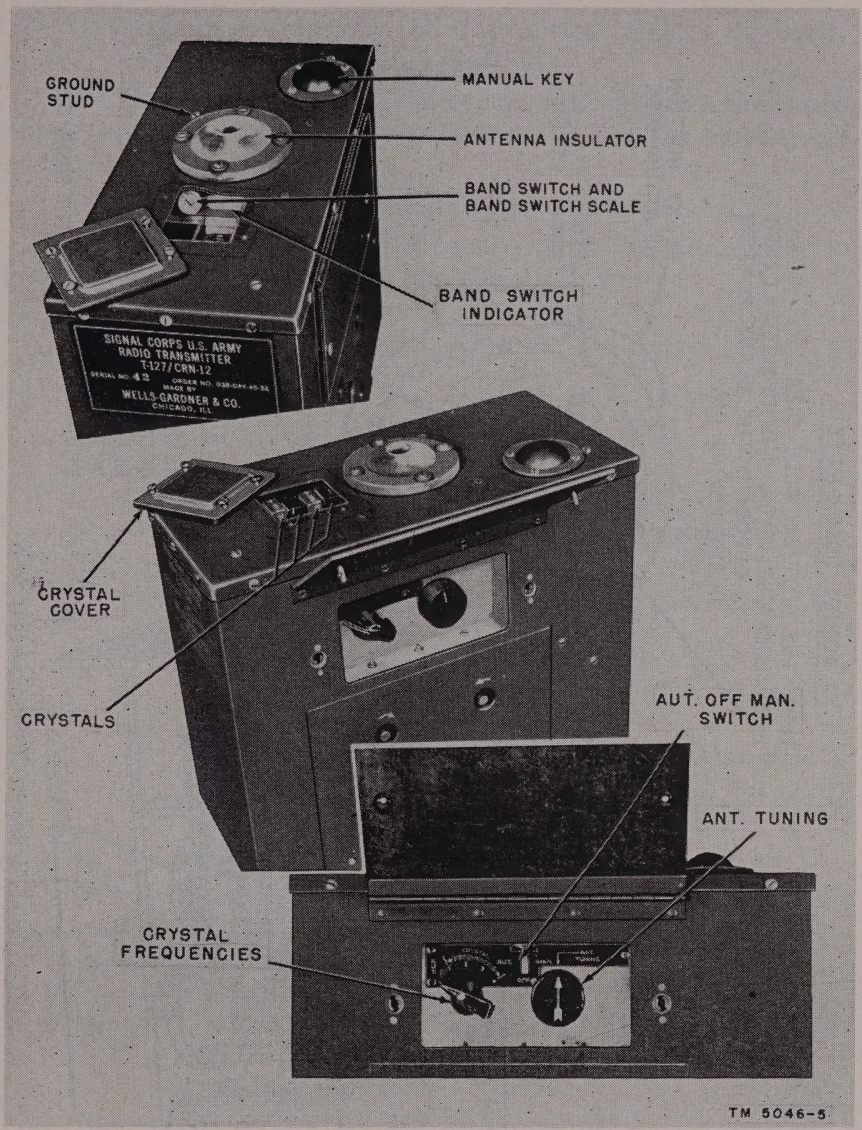


Figure 6. Location of crystals and controls.

ribbons, and erection of the antenna. The counterpoise system consists of sixteen 25-foot ribbons that are wound on four reels located in the transmitter case. These ribbons are to be stretched out on the ground like the spokes of a wheel, with the transmitter at the center. It is important that these ribbons be spaced equally in order to prevent loss of power output.

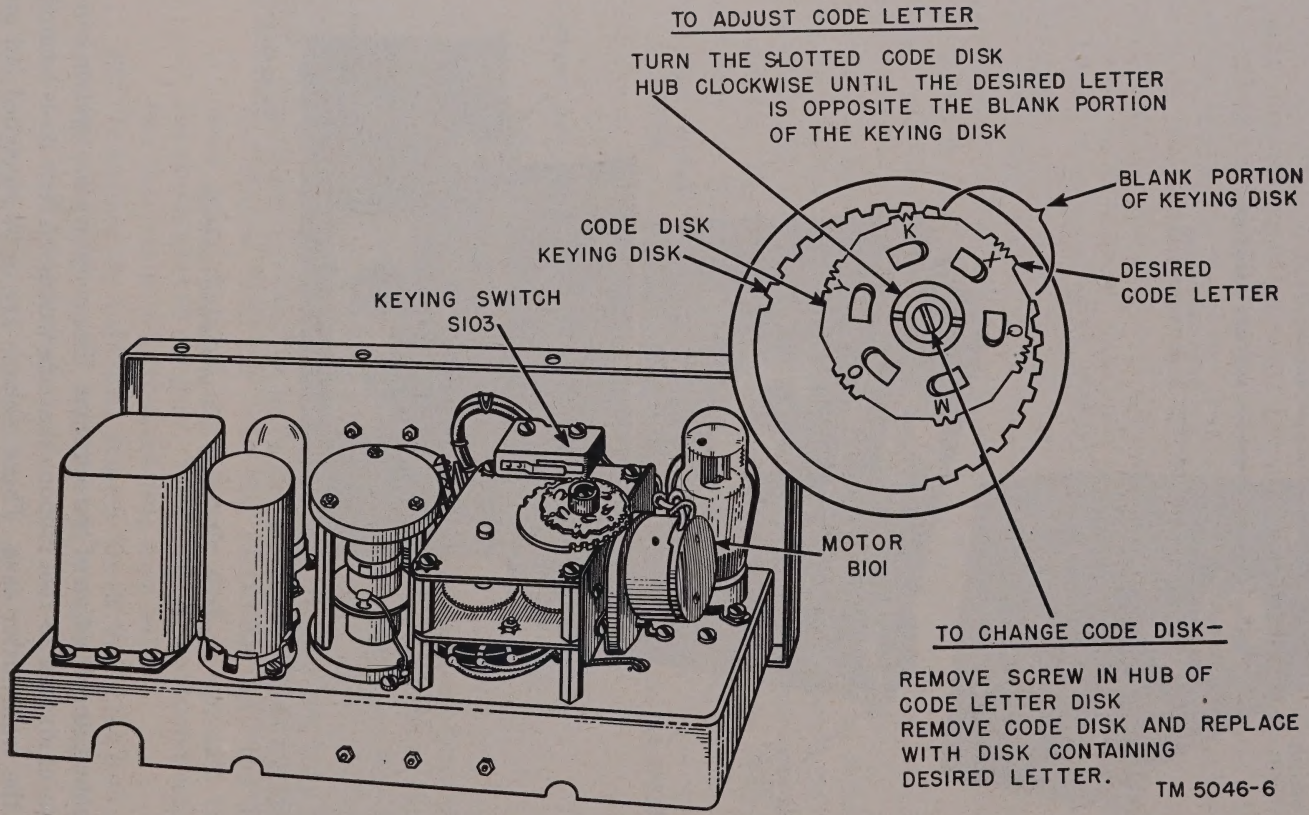


Figure 7. Changing code disk.

a. Open the bag containing the transmitter; remove the transmitter, and place it in the desired position.

b. Pull the four groups of counterpoise ribbons from the transmitter case. Walk from the transmitter, pulling the ribbons out to full length.

c. Break the wires that fasten the ends of the ribbons.

d. Spread the counterpoise ribbons around the transmitter in a pattern similar to the spokes of a wheel (fig. 8).

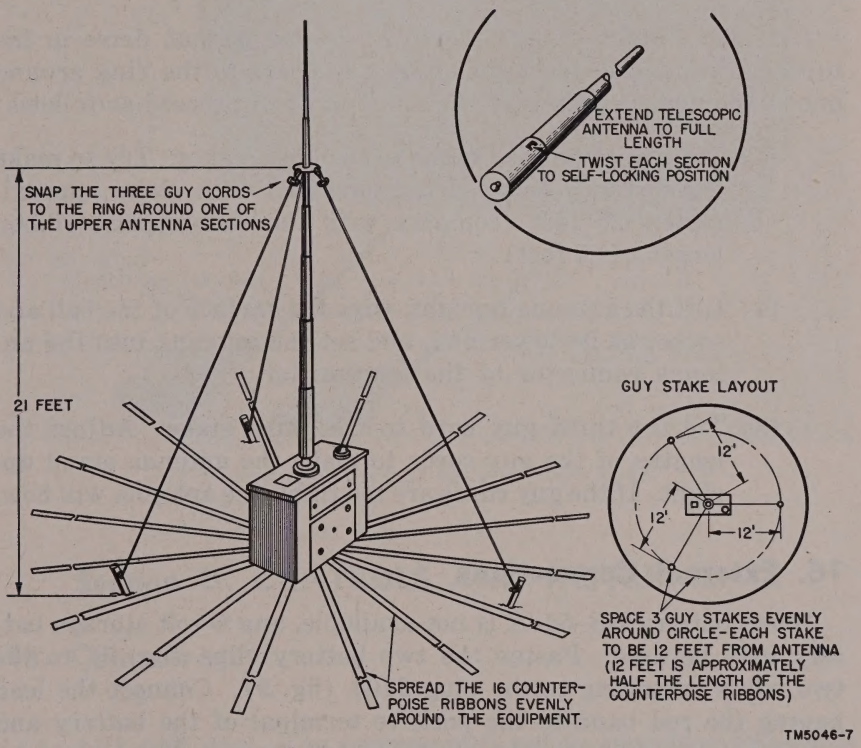


Figure 8. Installation of equipment.

15. Erection of Antenna

a. Remove the antenna mast assembly, the three stakes, and the three guy cords from the canvas carrying bag.

b. Drive the three guy stakes into the ground at approximately equal distance from each other and 12 feet from the transmitter (approximately half the length of the counterpoise ribbons) (fig. 8).

c. Extend the telescopic antenna to its full length and lock the joints.

d. Connect the three guy cords to the ring around one of the upper antenna sections by means of the snap hooks.

e. If two persons are available, one man will lift the antenna upright (wipe the ball and socket on bottom with a clean cloth) and set the lower end into the recessed antenna connector in the center of the antenna receptacle subassembly on top of the set. While the antenna is being held upright, the second man will tie the three guy cords to the three guy stakes.

f. If the antenna must be erected by one person, drive in the three stakes and connect the three guy cords to the ring around one of the upper sections of the antenna, then proceed as follows:

(1) Tie two of the guy cords to two guy stakes. Try to make the distance between the ring and each stake approximately 25 feet (compare with the counterpoise ribbon length of 25 feet).

(2) Lift the antenna upright, wipe the surface of the ball and socket at its lower end, and set the antenna into the antenna connector of the transmitter.

(3) Tie the third guy cord to the third stake. Adjust the lengths of the guy cords to make the antenna stand upright. If the guy cords are too tight, the antenna will bow.

16. External Connections

When battery BB–54–A is not available, any 6-volt storage battery may be used. Fasten the two battery clips (fig. 5) to the two wires extending to the plug J104 (fig. 9). Connect the lead having the red band to the positive terminal of the battery and connect the lead having the black band to the negative terminal.

17. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 12 for unpacking and checking the equipment.

b. Check the used or reconditioned equipment for tags or other identifications pertaining to changes in wiring or substitution of parts in the equipment. If any changes have been made, note the changes in this technical manual.

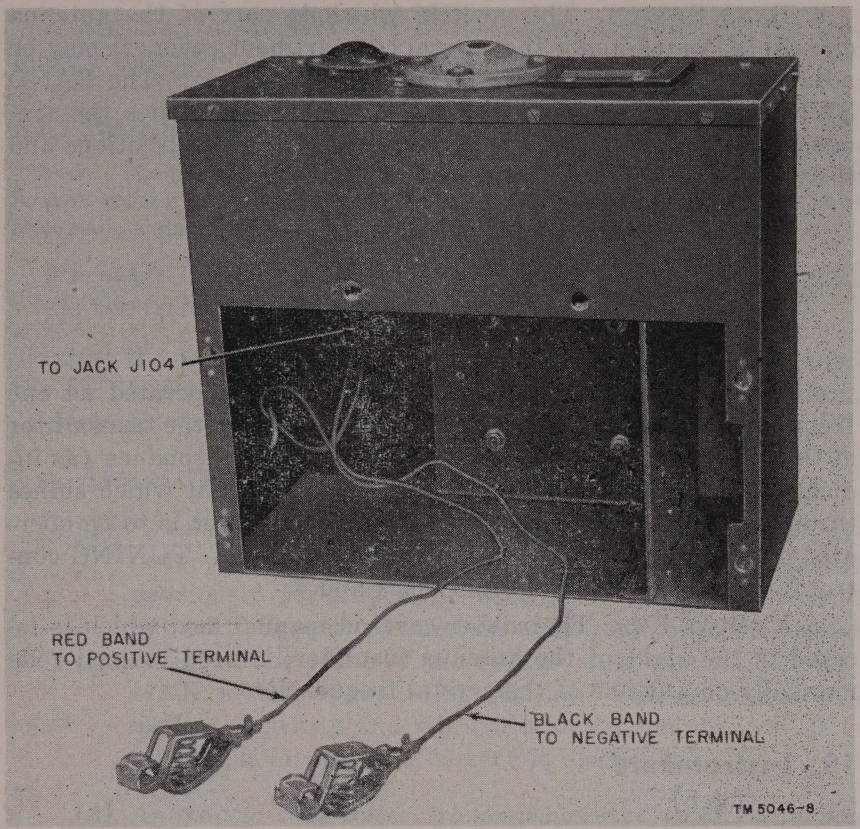


Figure 9. External battery connections.

Section II. CONTROLS AND INSTRUMENTS

18. Controls
(fig. 6)

a. AUT.-OFF-MAN. The equipment is not in operation when this switch is in the OFF position. In the AUT. position, the equipment operates automatically. In the MAN. position, a key is used to operate the set manually.

b. CRYSTAL FREQUENCIES. This switch has five positions: AUT., 1, 2, 3, and 4. In the AUT. position, the equipment will automatically select each of the four operating frequencies in sequence throughout the transmission. On positions 1, 2, 3, and 4, the equipment will operate on only one frequency, either automatically or manually, depending on the setting of the AUT.-OFF-MAN. switch.

c. BAND SWITCH. This switch, which is part of the antenna circuit, is located under the crystal compartment cover; it may be adjusted with the screw-driver end of the reel tool. The BAND SWITCH must be turned to the position that includes the frequency or frequencies of the crystals used. The five positions and the respective frequencies they cover are—

(1) Position A—3.5 to 4.0 mc.
(2) Position B—3.9 to 4.4 mc.
(3) Position C—4.3 to 4.8 mc.
(4) Position D—4.7 to 5.4 mc.
(5) Position E—5.3 to 6.0 mc.

d. ANT. TUNING. If the transmitter is to be operated on one frequency, adjust the ANT. TUNING control with the transmitter at that frequency until the antenna circuit is at resonance (as indicated by the brilliance of the neon indicator light which shines through the antenna insulator). If the transmitter is to be operated on more than one frequency, adjust the ANT. TUNING control for equal brilliance on positions 1 and 4.

e. MANUAL KEY. The rubber-covered manual key, which is located to the right of the antenna insulator, is used to send code manually on any one of the crystal frequencies.

19. Instruments

(fig. 6)

Neon indicator lamp (I101) is mounted permanently beneath the antenna insulator and is part of the antenna receptacle subassembly. This neon lamp glows when the manual keying switch is depressed. The lamp also glows with each pulse of the automatic signal if the transmitter is tuned correctly. It serves to indicate when the equipment is operating and it also serves as a tuning indicator when adjusting the ANT. TUNING control.

Section III. OPERATION UNDER USUAL CONDITIONS

20. Preliminary Starting Procedure

Follow the preliminary starting procedures given below before using the starting procedure described in paragraph 21.

a. Make sure that the AUT.-OFF-MAN. switch is in the OFF position.

b. Set the CRYSTAL FREQUENCIES switch to the position corresponding to the desired frequency or to AUT. for automatic frequency selection.

c. Set the BAND SWITCH to the proper position for the frequency that is to be used (par. 18*c*).

21. Starting Procedure

Note. The tuning and adjusting procedures outlined in paragraph 23 must be performed if any of the crystals have been changed or if any repairs have been made to the equipment.

Warning: Operating personnel must not touch the antenna mast while the transmitter is operating.

To start the equipment, open the cover with the reel tool and turn the AUT.-OFF-MAN. switch to either the AUT. or MAN. position, as desired.

a. AUTOMATIC OPERATIONS.

(1) *Automatic code letter transmission and automatic frequency selection.* If the transmitter has been adjusted previously for automatic code letter transmission and automatic frequency selection (par. 23*a*), open the hinged cover on the front of the set and turn the AUT.-OFF-MAN. switch to the AUT. position. The equipment will begin to operate and will continue to operate until it is turned off or until the battery is discharged.

(2) *Automatic code letter transmission and fixed frequency operation.* If the transmitter has been adjusted previously for automatic code letter transmission and fixed frequency operation (par. 23*b*), open the hinged cover on the front of the set, and turn the AUT.-OFF-MAN. switch to the AUT. position. The equipment will begin to operate and will continue to operate until it is turned off or until the battery is discharged.

b. MANUAL OPERATION. If the transmitter has been adjusted previously for manual operation (par. 23*c*), open the hinged cover on the front of the transmitter and turn the AUT.-OFF-MAN. switch to the MAN. position. The equipment will now transmit a signal whenever the manual key is depressed.

c. EMERGENCY KEYING AND FREQUENCY CHANGING. In case of failure of the automatic keying and frequency changing mechanism, the transmitter may be switched to the MAN. position and keyed by the manual key to simulate the automatic signals. The CRYSTAL FREQUENCIES switch may be turned to each of the four fixed frequency positions for a period approximately equal to that of the automatic frequency changing.

22. Stopping Procedure

To stop the operation of the transmitter, turn the AUT.-OFF-MAN. switch to the OFF position. Close the door located on the front of the transmitter and fasten it in place with the two fasteners.

23. Presetting or Initial Adjustment

To preset the transmitter, first turn the BAND SWITCH to the proper band, then adjust the ANT. TUNING control for the best operation on a particular frequency or band of frequencies, as follows:

a. For automatic code letter transmission and automatic frequency selection—

(1) Open the hinged cover by loosening the two fasteners attaching it to the front of the transmitter case. Then turn the CRYSTAL FREQUENCIES switch to the lowest crystal frequency (position 1).

(2) Turn the AUT.-OFF-MAN. switch to the MAN. position.

(3) Depress the manual key and adjust the ANT. TUNING control for maximum brilliance of the neon indicator lamp as seen through the antenna insulator.

(4) Turn the CRYSTAL FREQUENCIES switch to the highest crystal frequency (position 4).

(5) Depress the manual key and adjust the ANT. TUNING control for maximum brilliance of the neon indicator lamp as seen through the antenna insulator. Note the rotation of the ANT. TUNING control.

(6) Turn the ANT. TUNING control about half way back; then adjust it until the brilliance of the neon indicator lamp is equal for positions 1 and 4 of the CRYSTAL FREQUENCIES switch.

(7) Turn the AUT.-OFF-MAN. switch to the AUT. position, and turn the CRYSTAL FREQUENCIES switch to the AUT. position. The transmitter is now adjusted for automatic transmission of the previously selected code letter and for automatic selection of the four frequencies.

b. For automatic code letter transmission and fixed frequency operation—

(1) Open the hinged cover by loosening the two fasteners attaching it to the front of the transmitter case. Turn the CRYSTAL FREQUENCIES switch to the number corresponding to the desired crystal.

(2) Turn the AUT.-OFF-MAN. switch to the MAN. position. Depress the manual key and adjust the ANT. TUNING control for maximum brilliance of the neon indicator lamp, as seen through the antenna insulator.

(3) Release the manual key.

(4) Turn the AUT.-OFF-MAN. switch to the AUT. position. The transmitter is now adjusted for automatic transmission of the previously selected code letter on the chosen transmission frequency.

c. For manual operation—

(1) Open the hinged cover by loosening the two fasteners attaching it to the front of the transmitter case. Turn the CRYSTAL FREQUENCIES switch to the number corresponding to the desired crystal.

(2) Turn the AUT.-OFF-MAN. switch to the MAN. position. Depress the manual key and adjust the ANT. TUNING control for maximum brilliance of the neon indicator lamp, as seen through the antenna insulator.

Caution: The AUT. position of the CRYSTAL FREQUENCIES switch should not be used for manual operation.

(3) Release the manual key. The transmitter is now adjusted for manual operation.

Section IV.
OPERATION UNDER UNUSUAL CONDITIONS

24. General

The operation of Homing Beacon AN/CRN-12 may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. In the following paragraphs, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

25. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Also, the efficiency of storage batteries is greatly reduced in temperatures encountered in arctic climates. Instructions and precautions for operation under adverse conditions follow.

a. Handle the equipment carefully.

b. Discharged batteries must be recharged immediately because they will freeze at low temperatures.

c. When equipment which has been exposed to the cold is brought into a warm room, it will start to sweat and will continue to do so until the equipment reaches room temperature. When the equipment has reached room temperature, dry it thoroughly.

d. When the equipment is in operation, a certain amount of heat is developed within the transmitter. This heat may be used to keep the batteries warm by placing a blanket or clothing around the transmitter.

Caution: Do not allow any of the protecting material to touch the antenna.

26. Operation in Tropical Climates

When the equipment is operated in tropical climates, ventilation usually is very poor. High relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than that of the ambient air. The antenna insulator must be kept dry. Use every precaution to prevent moisture from entering the equipment.

27. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. The main problem which arises with equipment operated in desert areas is the large amount of sand or dust and dirt which enters the moving parts, such as the motor and the gearing of the automatic transmitting assembly in the transmitter.

c. Never tie the antenna guy cords to tents. Desert areas are subject to sudden wind squalls which may jerk the tent sufficiently to break the antenna cords or the antenna.

d. Take care to keep the equipment free from sand and dust. Make frequent preventive maintenance checks (ch. 3).

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I.
ORGANIZATIONAL TOOLS AND EQUIPMENT

28. Tools and Materials

The following tools and materials may be required for organizational maintenance.

a. TOOLS.
Tool Equipment TE–113.

b. MATERIALS.
Orangestick.
Cheesecloth, bleached, lint-free.
Carbon tetrachloride.
Paper, sand, flint, #000.
Solvent, dry-cleaning (SD) (Fed spec No. P–S661a).

29. Special Tools

Only one special tool, a reel tool (fig. 2), is supplied with Homing Beacon AN/CRN–12. This tool is carried in the pocket which is located in the cover of Bag CW–132/CRN–12. The reel tool is used to rewind the counterpoise ribbons on the reels and is also used as a screw driver.

Section II. PREVENTIVE MAINTENANCE SERVICES

30. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles before they occur. Refer to AR 750–5.

31. General Preventive Maintenance Techniques

a. Use #000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth for cleaning interiors of units.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with solvent (SD); then wipe the parts dry with a cloth.

(2) Clean the electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry cloth.

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch to remove dust from inaccessible places. Be careful, however, or the air blast may damage mechanical parts.

d. Refer to TB SIG 178 for further preventive maintenance techniques.

32. Performing Preventive Maintenance

The following preventive maintenance operations should be performed by organizational personnel at the intervals indicated, unless these intervals are reduced by the local commander.

Caution: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

Daily

1. Clean exterior of transmitter cabinet.
2. Check the automatic keying and frequency changing mechanism for loose contacts and wearing.
3. Check guy cords and guy stakes for looseness.
4. Check position of counterpoise ribbons; they should be evenly spaced on ground.

Weekly

Caution: Disconnect the battery before performing the following operations:

1. Clean interiors of transmitter, exterior of case, and all parts accessible without removal from case.
2. Inspect vibrator for possible looseness.
3. Check tubes to see that they are tight in their sockets.
4. Check all resistors and capacitors for heating.

Monthly

Make visual inspection of the following; tighten and clean if necessary.

1. Tubes and crystal sockets and pins, for loose contacts, dirt, and corrosion.
2. Resistors and capacitors, for blistering, discoloration, and other evidence of overheating.
3. Wires, cords, and cables, for cracked, cut, and frayed insulation.
4. Mountings, machine screws, and nuts, for looseness.
5. All visible terminals and connections for looseness and corrosion.
6. Finish, for scratches, and bare spots. (Retouch, if necessary.) Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting and grounding of circuits.
7. Connectors for dirt, corrosion, and loose contacts.
8. Switches S101, S102, S103, S105, and S106 for dirt, corrosion, and loose contacts.
9. Transformers for effects of heating.
10. Coil L102 for effects of heating.

33. Lubrication

Homing Beacon AN/CRN–12 does not require lubrication during operation. However, when the equipment is disassembled for repairs, one or two drops of oil, lubricating, preservative, special (PL-Special), should be applied to the miter gears and shafts located in the timing unit B102 (fig. 11). These parts ordinarily should be oiled every 6 months to prevent rusting.

Section III. WEATHERPROOFING

34. Weatherproofing

a. GENERAL. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. TROPICAL MAINTENANCE. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

c. WINTER MAINTENANCE. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66.

d. DESERT MAINTENANCE. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 72.

35. Rustproofing and Painting

a. When the finish on the transmitter case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces. Use #00 or #000 sandpaper to clean the surface down to the bare metal; obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up paint job is necessary, remove rust from the case by cleaning corroded metal with solvent (SD). In severe cases it may be necessary to use solvent (SD) to soften the rust and to use sandpaper to complete the preparation for painting. Apply paint with a small brush. Paint used will be authorized and consistent with existing regulations.

Section IV.

TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

36. Scope

a. The trouble-shooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) is necessarily limited in scope by the tools, test equipment, and replaceable parts issued, and also by the existing tactical situation. Accordingly, trouble shooting is based on the performance of the equipment and the use of the senses in determining such troubles as burned-out tubes, cracked insulators, etc.

b. Paragraphs 37 and 38 will help in determining which of the components, such as the antenna, battery, or transmitter, are at fault and will help in localizing the fault to a defective part, such as a defective crystal, tube, or incorrect adjustment of the equipment.

37. Visual Inspection

a. Failure of this equipment to operate properly will usually be caused by one or more of the following faults:

(1) Improperly connected battery.

(2) Broken or disconnected connections to battery.

(3) Inactive (dirty or cracked) crystal.

(4) Defective tubes.

(5) Discharged battery.

b. When failure is encountered and the cause is not immediately apparent, check as many of the above items as is practicable before starting a detailed examination of the equipment. If possible, obtain information from the operator of the equipment regarding performance at the time the trouble occurred.

c. Visually inspect the antenna and counterpoise assemblies for obvious abnormalities.

38. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Antenna	Antenna properly installed.		
	2	Counterpoise	Extended and evenly spaced.		
	3	Crystals	Selected and installed.		
	4	BAND SWITCH.	Set to proper band.		
	5	CRYSTAL FREQUENCIES switch.	Set to AUT. or proper crystal position.		
	6	AUT.-OFF-MAN. switch.	Set to OFF.		
	7	ANT. TUNING control.	Midposition unless preadjusted.		
	8	Battery connection.	Properly connected.		
START	9	CRYSTAL FREQUENCIES switch.	Set to position 1.		
	10	AUT.-OFF-MAN. switch.	Set to MAN.		

	Item No.	Item	Action or condition	Normal indications	Corrective measures
E Q U I	11	Manual key____	Hold key down__	Neon indicator lamp glows through antenna insulator.	Adjust ANT. TUNING control for maximum glow of indicator lamp.
P P	12	CRYSTAL FREQUENCIES switch.	Set to positions 2, 3, and 4, repeating item 11 for each position.		
E R	13	CRYSTAL FREQUENCIES switch.	Set to AUT.____		
F	14	AUT.-OFF-MAN. switch.	Set to AUT.____	Indicator lamp glows intermittently.	Refer to paragraph 47.
S T O P	15	AUT.-OFF-MAN. switch.	Set to OFF.____		

CHAPTER 4
THEORY OF HOMING BEACON AN/CRN-12

39. Block Diagram

The block diagram for Homing Beacon AN/CRN–12 is shown in figure 10. Each block represents a stage or a major part in the equipment. The solid lines between blocks represent the electrical output of a block and the stage or component to which this output is transmitted. The dotted lines represent mechanical coupling. For example, the motor is mechanically coupled to the crystal selector switch and also to the code disk switch, and the output of the crystal oscillator is electrically coupled to the r-f (radio-frequency) amplifier. The purpose of the block diagram is two-fold. First, it is intended for use by the radio repairman who previously has studied this particular equipment but who has not worked with it for some length of time. In this respect, the diagram serves as a quick review of the theory and operation of the equipment. Second, a technician who has never seen the equipment but who has a knowledge of fundamentals of radio principles can use this diagram to obtain information necessary for a basic understanding of the equipment. The function of the various stages or major parts is as follows:

a. BATTERY. Three Batteries BB–54–A connected in series form a 6-volt power source. All current for operation of the equipment is furnished by these batteries.

b. MOTOR B101. When the AUT.-OFF-MAN. switch (S105) is in the AUT. position, the motor is used to drive the automatic crystal switch (S101) and the code disk switch (S103).

c. AUTOMATIC CRYSTAL SWITCH S101. Switch S101 automatically selects one crystal for a period of about 2 minutes, then another for the same period until all four crystals have been in operation. The cycle is then repeated as long as the equipment is in operation. When the AUT.-OFF-MAN. switch is in the MAN. position, another switch (CRYSTAL FREQUENCIES switch S102 in fig. 19) is set manually to the desired crystal.

d. CRYSTAL OSCILLATOR V101. Tube V101 is connected as an r-f oscillator whose frequency is determined by the particular crystal connected by either switch S101 or S102. The output of V101 is coupled to the r-f amplifier tube.

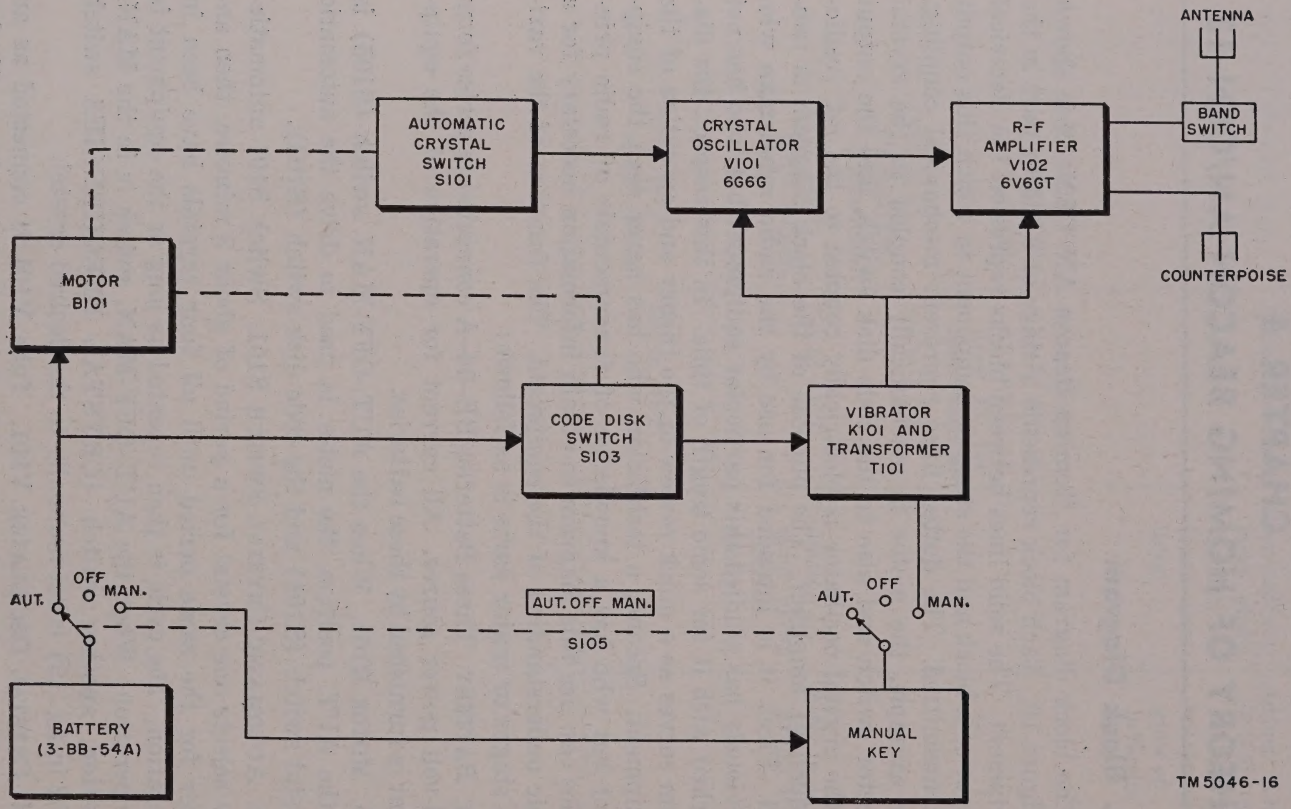


Figure 10. Homing Beacon AN/CRN–12, block diagram.

e. R-F AMPLIFIER V102. R-f amplifier tube V102 amplifies the output of the crystal oscillator and passes the r-f energy through the BAND SWITCH to the antenna and counterpoise system.

f. BAND SWITCH. The BAND SWITCH is used to tune the antenna to the frequency of the crystal (or crystals) used. ANT. TUNING is a fine tuning control.

g. VIBRATOR K101 AND TRANSFORMER T101. The vibrator changes the 6 volts of the battery to an a-c (alternating-current) voltage for the primary of the transformer. Transformer T101 steps up the 6-volt ac to about 400 volts which is used as plate voltage for the oscillator and amplifier tubes (V101 and V102).

h. CODE DISK SWITCH S103. The code disk switch consists of a set of contacts that are operated by the disk. The code disk is a circular plate having a series of notches cut in the outer edge. These notches form the code that is to be transmitted. The disk, which is driven by the motor, causes the contacts to make and break the battery current flowing to the vibrator, thereby keying the oscillator and amplifier plate supply according to the code on the disk.

i. MANUAL KEY S104. When the AUT.-OFF-MAN. switch is in the MAN. position, the motor is disconnected; therefore, automatic selection of crystals cannot be obtained. For manual operation, the CRYSTAL FREQUENCIES switch S102 (fig. 19) must be placed at the position for the desired crystal frequency. The transmitter may be keyed manually by pressing the manual key S104.

40. Crystal Oscillator Circuit
(fig. 19)

The crystal oscillator stage V101 utilizes a pentode tube type 6G6G in a Pierce oscillator circuit. The frequency of oscillation is controlled by the crystal which is connected between the plate and the control grid. The circuit may be considered the equivalent of a Colpitts oscillator with the tuned circuit replaced by the crystal and the necessary voltage division accomplished through the plate-cathode and the grid-cathode capacitance of the tube. The amount of feedback depends on the grid-cathode capacitance which has been increased by the addition of capacitors C102–1 and C103. Resistor R101 provides grid bias because of the voltage drop across it when grid current flows during oscillation. Capacitor C101–1 blocks the plate voltage from the crystal and also provides an r-f path. Plate voltage is supplied to the tube through r-f choke L101. Screen voltage is supplied through dropping resistor R102, which

is bypassed for rf by capacitor C104. Capacitor C102–2 is a plate decoupling capacitor. The oscillator will operate on any of the four crystals, depending on the position of the CRYSTAL FREQUENCIES switch S102. With switch S102 in the AUT. position, the automatic crystal switch S101 automatically selects one crystal at a time for the oscillator circuit. This action provides an r-f output that changes in frequency every 2 minutes. The output of the oscillator is fed to an r-f power amplifier through coupling capacitor C101–2.

41. R-f Amplifier Circuit
(fig. 19)

The r-f amplifier stage V102 utilizes a beam power tube type 6V6GT in a power amplifier circuit. Resistor R103 provides grid leak bias. Capacitor C106 keeps the screen at r-f ground potential. Capacitor C105 serves as a plate decoupling capacitor. The plate load is the primary of L102 which, by transformer action, couples the energy into the antenna circuit.

42. Antenna, Counterpoise, and Band Switch System
(fig. 19)

The antenna is a Marconi type (one-quarter wavelength long) and, therefore, one end must go through a low impedance to ground. Where good grounds are difficult to obtain, a counterpoise may be used. In this case, the long counterpoise ribbons serve to produce a large capacitance between the transmitter ground and the actual earth, thereby grounding the transmitter chassis for rf. To tune the antenna to the proper frequency, the amount of inductance in series with the antenna-counterpoise system is varied in five steps by means of a BAND SWITCH. By means of a movable slug, the ANT. TUNING control varies the inductance of L102 in order to obtain more exact tuning. Since a resonant antenna acts like an ordinary l-c tuned circuit, the antenna reflects a resonant circuit back to the primary of L102. Therefore, tuning the antenna tunes the r-f amplifier at the same time. The antenna circuit is so designed that it will pass a range of frequencies 140 kc wide, which explains why the difference between the lowest and highest crystal frequency used should not be more than 140 kc. The neon indicator lamp I101 glows brightly when both the r-f amplifier and antenna circuits are at resonance.

43. Power Supply and Tone Modulation System (fig. 19)

The power required to supply filament and plate voltages is furnished by a 6-volt storage battery. The battery is connected directly to the filaments for filament power. The plate supply is produced as follows: when the transmitter is keyed, either by the manual key S104 or by the code disk switch S103, the 6-volt potential is applied to the vibrator K101 in the form of dots and dashes representing the information being transmitted. As the vibrator contactor moves between the stationary contacts, the current through the primary of transformer T101 flows first from the top down to the center tap, and then from the bottom up to the center tap, thus producing an ac (alternating current). Across the secondary this a-c voltage is stepped up to approximately 400 volts for the plate supply. A tap on the secondary of transformer T101 provides a screen voltage of 300 volts for tube V102. The vibrator reverses the current flow through T101 360 times a second. Therefore, since there are two alternations in each cycle, the frequency of the output is 180 cps (cycles per second). When this a-f (audio frequency) voltage is applied to the plates and screens of the transmitter tubes, the r-f output is tone modulated at the same frequency.

44. Automatic Transmission (figs. 7, 11, 14, and 19)

a. AUTOMATIC CODE LETTER AND AUTOMATIC FREQUENCY SELECTION.

When the AUT.-OFF-MAN. switch is in the AUT. position, power is connected to motor B101 making it turn. Through the gearing arrangement in timing unit B102, motor B101 causes the shaft of the automatic crystal switch as well as that of the code disk to rotate, but at different speeds. The shaft of the automatic crystal switch makes a complete revolution in 8 minutes, placing the four crystals in turn into the oscillator circuit for a period of 2 minutes each. The code disk rotates 8 times as fast, or one revolution each minute. As the disk rotates, the notches around its edge cause the contacts of code disk switch S103 to make and break. The signals are transmitted in the following order:

(1) Eight 1-second dashes, interspersed with eight, 1-second off periods.

(2) One 19-second dash:

(3) Eight 1-second dashes, interspersed with eight, 1-second off periods.

(4) Previously selected code letter.

Since the automatic crystal switch keeps each crystal in the circuit for 2 minutes before connecting the next crystal, two signal groups are transmitted on each frequency. The entire cycle is repeated until the battery power supply is discharged or until the equipment is turned off.

b. AUTOMATIC CODE LETTER AND FIXED FREQUENCY OPERATION. When the AUT.-OFF-MAN. switch is on AUT., motor B101 operates. However, if the CRYSTAL FREQUENCIES switch is placed on position 1, 2, 3, or 4, only one crystal will be in the oscillator circuit at all times, even though automatic crystal switch S101 is in operation. This can be seen readily from figure 19, where the CRYSTAL FREQUENCY switch is connecting crystal number 1 to the grid of tube V101. No other crystal can operate because no other position is connected to the grid. Although the automatic crystal switch may be ineffective, the code disk still rotates once each minute to produce a group of signals the same as described in *a* above. These signals will be transmitted over and over on one frequency until the battery is discharged or the equipment turned off.

CHAPTER 5
FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

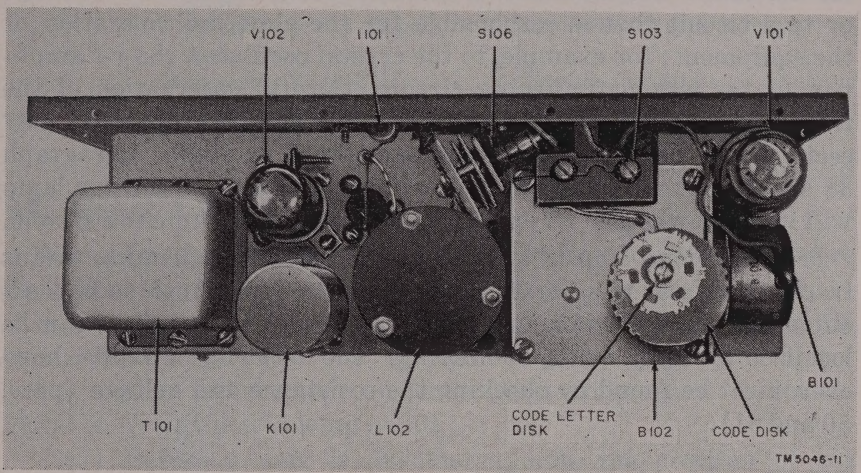


Figure 11. Transmitter chassis, rear view, location of parts.

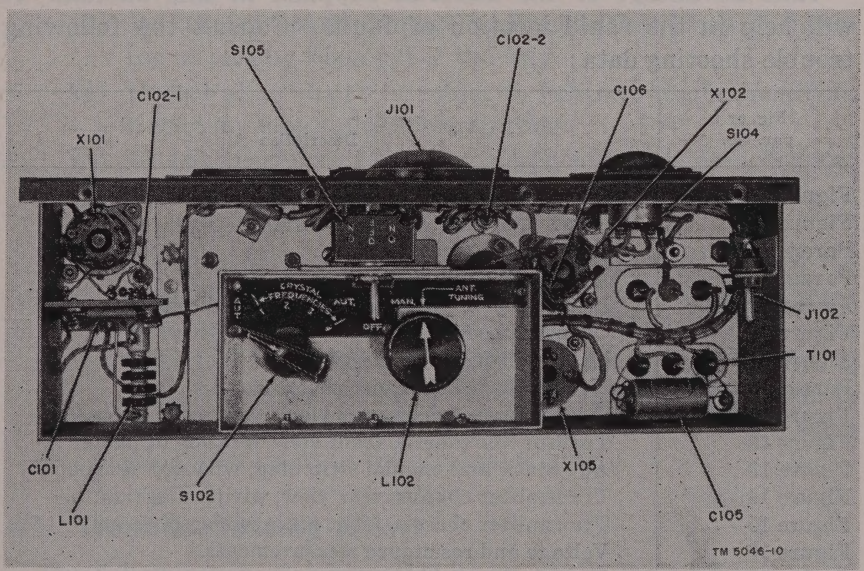


Figure 12. Transmitter chassis, front view, location of parts.

Section I.
TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing this equipment, make certain that the battery is disconnected. Potentials as high as 400 volts are within the transmitter when it is in operation.

45. Trouble-shooting Procedures

a. The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to a stage or to a circuit that is responsible for the abnormal operation of the equipment; for example, to the crystal oscillator, the r-f amplifier, or the automatic keying circuit. Careful observation of the transmitter while the various controls are being operated may sectionalize the fault to a particular circuit or stage. Paragraph 38 shows normal operating indications. The neon indicator lamp will indicate whether r-f energy is being fed to the antenna system.

b. The second step is to localize the fault. Localization means tracing the fault to a particular part. Some faults such as burned-out resistors, r-f arcing, and shorted transformers often can be localized by sight, smell, or hearing. The majority of faults, however, must be found by checking the resistance and voltage (pars. 50 and 51).

46. Trouble-shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

Fig. or par. No.	Description
Figure 3	Changing counterpoise reels.
Figure 6	Location of crystals and controls.
Paragraph 5	Technical characteristics.
Paragraph 9	Additional equipment supplied.
Paragraph 13	Installation of batteries, crystals, and code disk.
Figure 7	Changing code disk.
Figure 9	External battery connections.
Paragraph 38	Equipment performance checklist.
Figure 11	Transmitter chassis, rear view, location of parts.
Figure 12	Transmitter chassis, front view, location of parts.
Figure 13	Automatic and manual switching, wiring diagram.
Figure 14	Transmitter chassis, rear view, wiring diagram.
Figure 15	Transmitter chassis, front view, wiring diagram.
Figure 16	Voltage and resistance measurements.
Figure 19	Homing Beacon AN/CRN–12, complete schematic.

47. Test Equipment Required for Trouble-Shooting

The following items of equipment are required in making the various tests on the transmitter. Typical items are listed. However, other equipments of similar characteristics may be used.

Quantity required	Item	Use
1	Dummy Antenna TS–392/CRN–12	Final testing of transmitter.
1	Ammeter, d-c, 0–10 ampere scale.	Measuring input current.
1	Ammeter, r-f, 0–1 ampere scale.	Measuring output current.
1	Multimeter TS–352/U	Trouble-shooting.
1	Tube Tester I–177 (TM11–2627).	Testing tubes.

48. General Precautions

Whenever the transmitter is to be serviced, carefully observe the following precautions:

a. Be careful when the transmitter is operated outside of its case; high voltage (400 volts) is exposed.

b. Careless replacement of parts often makes new faults inevitable. Note the following points:

(1) Before a part is unsoldered, note the position of the leads. If a part has a number of connections, tag each lead before disconnecting it.

(2) Be careful not to damage or break other leads by pushing or pulling them out of the way.

(3) Do not allow drops of solder to fall into the transmitter, since they may cause short circuits.

(4) Be absolutely sure to make a well-soldered joint, because a poorly soldered connection is one of the most difficult faults to locate.

(5) When a part is replaced in the crystal oscillator or r-f amplifier circuits, it must be placed in exactly the same location as the original part. A part which has the same electrical value but a different size may cause trouble in high-frequency circuits. Give particular attention to proper grounding when replacing a part. Use the same ground point as in the original wiring.

49. Trouble-shooting Chart

The following chart is supplied as an aid in locating trouble in

the transmitter unit. This chart lists the symptoms which the repairman observes, either visually or audibly, while making a few simple tests. This chart also lists the probable trouble and a possible correction procedure. After the trouble has been traced to a circuit or stage, make resistance and voltage measurements using the diagram in figure 16.

Symptom	Probable trouble	Correction
1. No output on I101 with set in operation.	Antenna circuit improperly adjusted.	Follow instructions in paragraph 23.
	I101 burned out	Replace antenna receptacle subassembly.
2. Transmitter inoperative. Motor not heard.	Discharged battery	Replace or recharge battery.
3. Normal manual operation but inoperative on automatic.	Defective switch S103	Replace switch.
	Defective switch S101	Check placement of switch. Mounting screws may be loose.
	Defective motor B101	Replace motor.
4. Transmitter fails to operate on one of the four crystals.	Defective crystal	Install new crystal.
	Defective crystal holder contacts.	Clean contacts.
5. Vibration felt when transmitter case is touched.	Overload in high-voltage circuit.	Replace tubes, one at a time. If trouble is not cleared, make resistance checks.
6. No r-f output, but motor sounds are normal.	Defective vibrator	Replace vibrator K101.
	Defective r-f amplifier tube.	Replace V102.
	Crystal not connected or burned out.	Connect or replace crystal.
7. No output. Battery current about 7 amperes. Crystals test normal.	V101 inoperative	Coil L101 may be burned out. Check values of R101 and R102. Check C102–1, C103, and C104 for shorts.
8. Crystals crack when set is turned on.	Shorted or leaky capacitor C101–1.	Replace C101–1.
9. No output. Battery current more than 10 amperes.	Defective r-f amplifier stage.	Replace tube V102.
		Make resistance measurements on r-f amplifier circuit.
10. Low output. Input current normal.	Antenna detuned	Check tuning of L102 and proper setting of S106.
11. Low output. Input normal. Peak cannot be found when tuning antenna.	Defective antenna circuit.	Check continuity of L102 and contacts of switch S106.

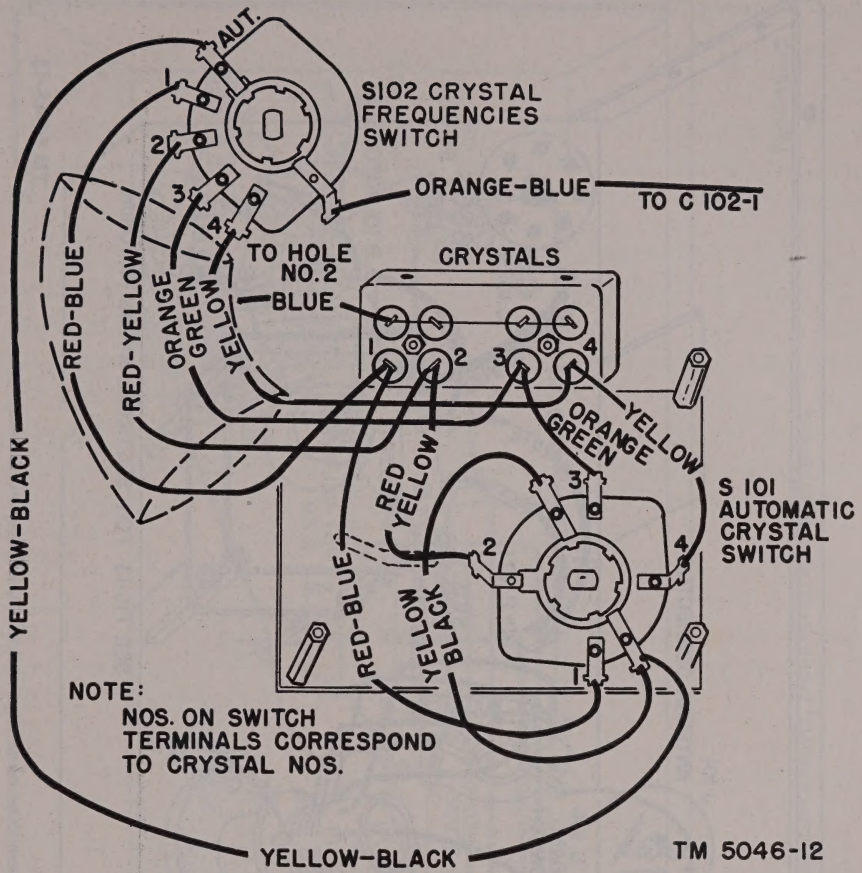


Figure 13. Automatic and manual switching, wiring diagrom.

50. Resistance Measurements

Warning: Disconnect the batteries before making resistance measurements.

When trouble has been traced to a particular stage or circuit, the quickest way to locate the defective part is to make resistance checks of that circuit. Figure 16 shows the bottom view of the two tube sockets and the vibrator socket with resistance (R) values between each socket pin and chassis. For example, if a measurement between pin 4 of V101 and the chassis shows a zero resistance, capacitor C104 is probably shorted; and if the resistance of pin 5 of V102 to chassis is infinite (very high resistance), resistor R103 must be open because the correct reading should be 82,000 ohms.

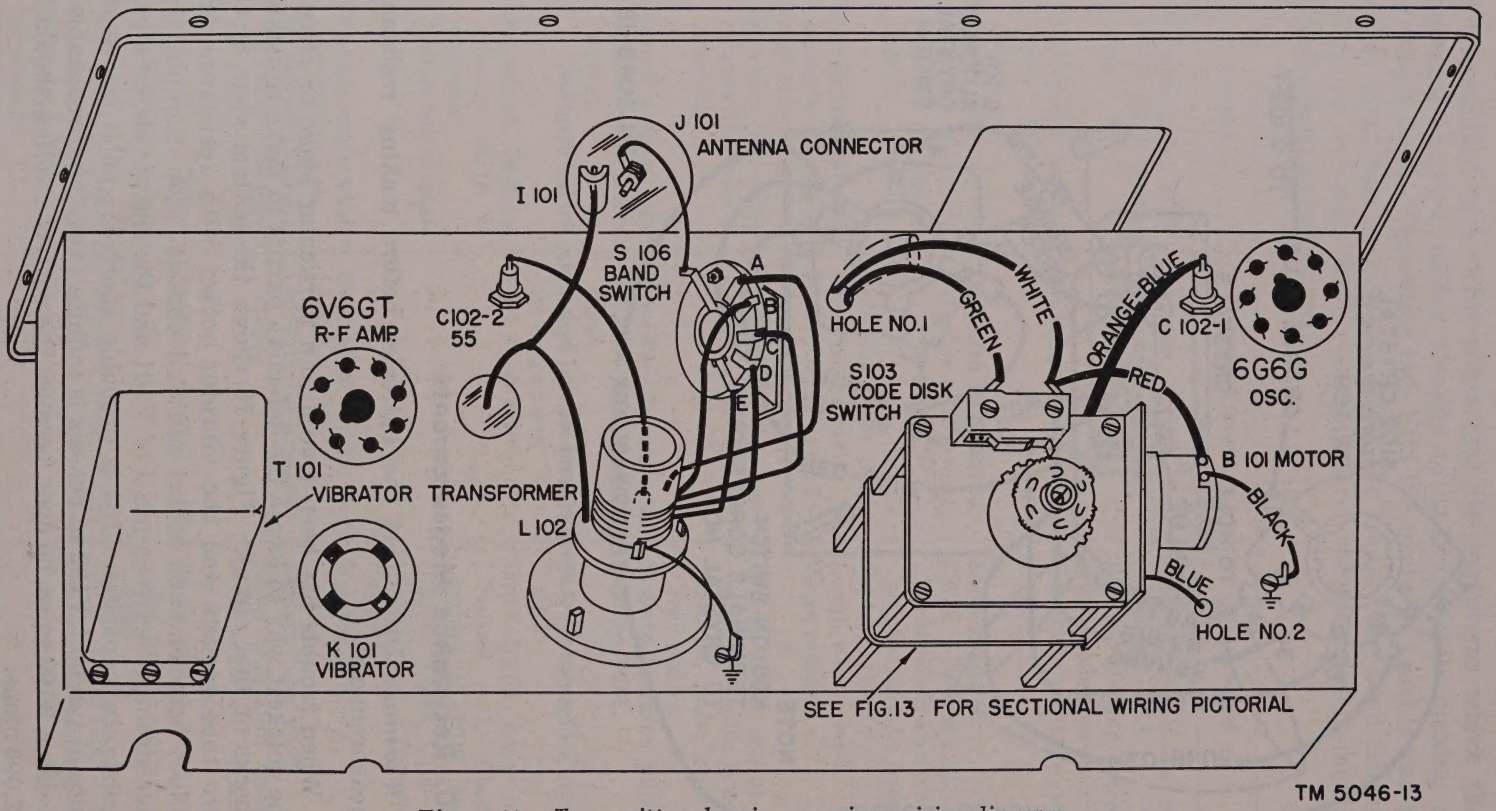


Figure 14. Transmitter chassis, rear view, wiring diagram.

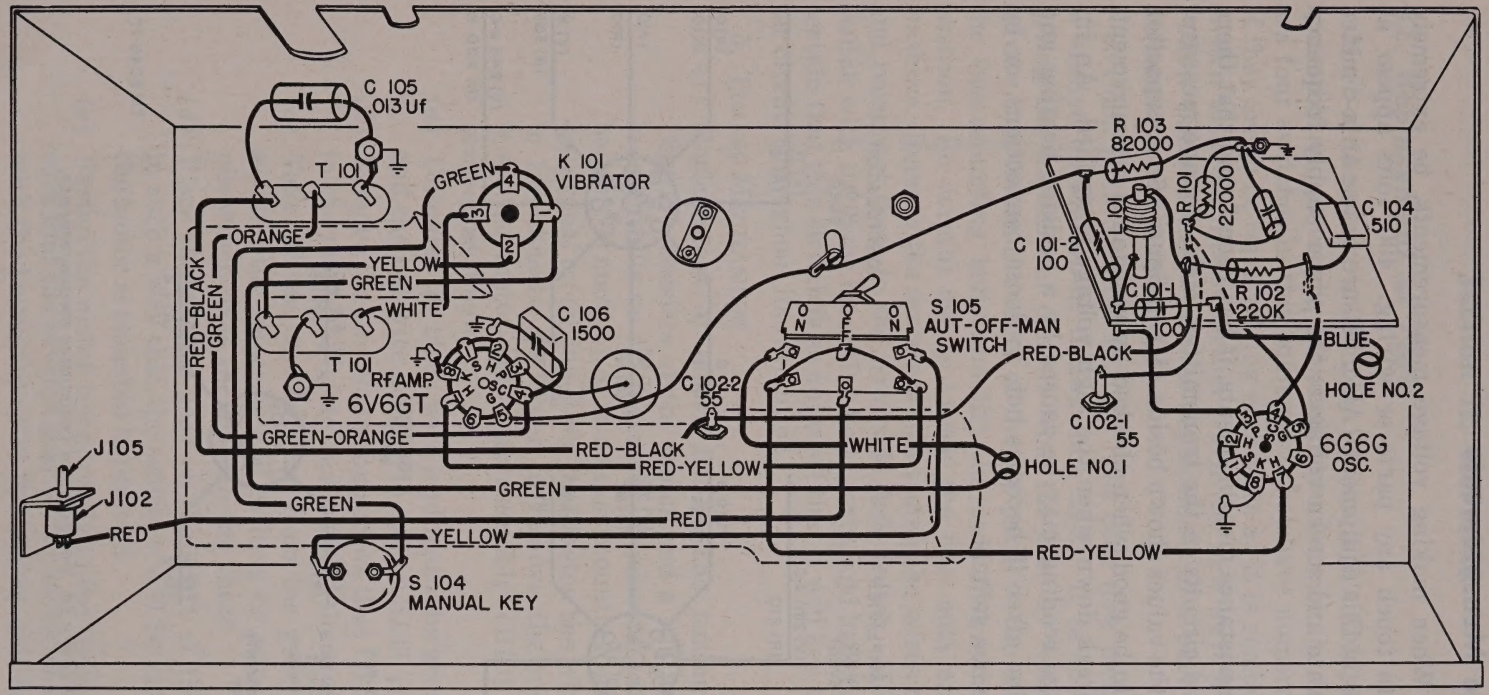


Figure 15. Transmitter chassis, front view, wiring diagram.

51. Voltage Measurements

Warning: When making voltage measurements, be extremely careful not to touch any parts or wiring. 400 volts appear at several places in this equipment. Also, be sure to use an a-c meter to measure plate and screen voltages; the power supply frequency is 180 cps.

When, by resistance measurements, it has been found that there are no shorted circuits in the transmitter, make voltage measurements using the values shown beside (V) in figure 16. A capacitor may appear to be good when checked by resistance measurement, but it may break down when the high voltage is applied. An incorrect voltage reading may be caused by a resistor heating and changing value after it becomes hot, by loose connections, or by poor contacts in a switch.

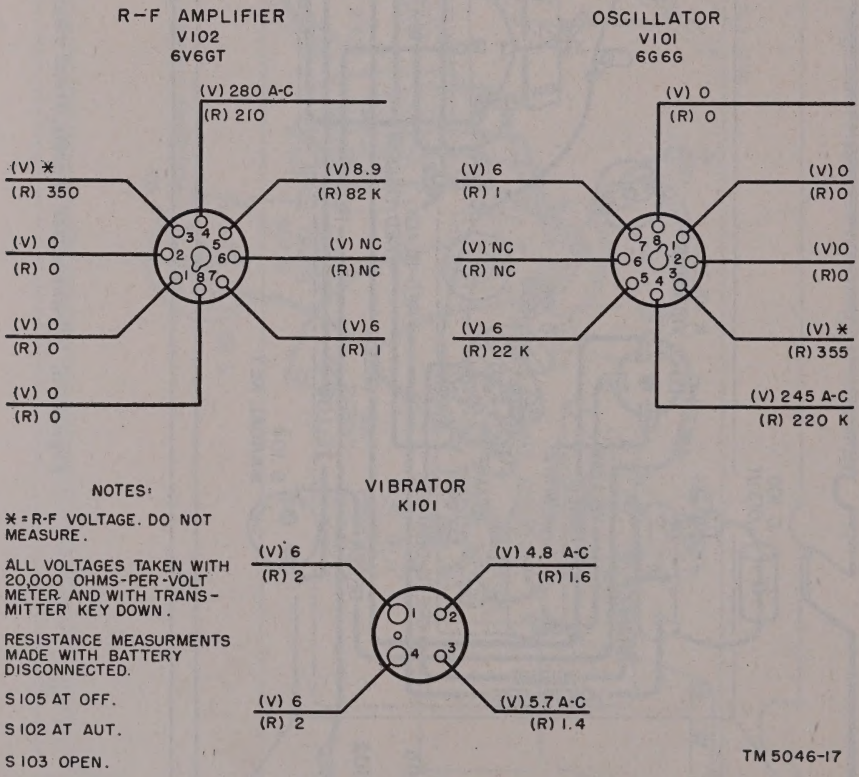


Figure 16. Voltage and resistance measurements.

Section II. REPAIRS

52. Replacement of Parts

Most of the parts in Homing Beacon AN/CRN–12 are readily accessible and are easily replaced when found to be faulty. There are four switches in this equipment that have numerous contacts. If they are to be replaced, tag each wire as it is removed from the switch to avoid misconnection when the new switch is installed. Follow this practice whenever replacement of a part requires the disconnection of several wires.

a. CODE DISK SWITCH (S103). The code disk switch (fig. 11) is located on the top of timing unit B102. It is accessible after lifting the transmitter chassis from the case by removing all the screws that fasten the edges of the top panel to the case. Unscrew the two mounting bolts and lift the code disk switch from its position. Be careful not to loosen the two nuts and two lockwashers. Remove the screws which fasten the wires to the switch and reconnect them to the new code disk switch. Mount the new switch with the same mounting bolts, nuts, and lockwashers. Make certain that this switch is so adjusted that it will key the transmitter circuit throughout its revolution.

b. TIMING MECHANISM.

(1) *Replacement of motor B101.* The timing mechanism (fig. 11) consists of the motor and a timing unit which is essentially an arrangement of gears in a housing. This housing is made up of two brass mounting plates and four hexagonal mounting studs that fasten the whole assembly to the chassis. In order to remove the motor (B101) from the motor and gear assembly (B101 and B102), proceed as follows:

(*a*) Unsolder the black wire leading to the ground terminal and the red wire leading to switch S103 (fig. 14).

(*b*) Remove the two mounting screws that fasten the motor to the mounting plate and remove the motor.

(*c*) Take off the beveled gear from the gear shaft by removing the setscrew and drilling or punching out the pin which fixes the gear to the shaft.

(*d*) Place the beveled gear on the shaft of the new motor in such a way that the setscrew will be accessible after the motor is mounted in position.

(*e*) Fasten the motor *temporarily* to the timing unit. Make sure that the beveled gear on the motor shaft is in mesh with the beveled gear in the timing unit before fasten-

ing the motor permanently to the timing unit. Tighten the setscrew while the gear is in this position.

(*f*) Remove the new motor; drill a hole in the motor shaft in alinement with and the same size as the hole in the gear, and tap the fixing pin in place.

(*g*) Fasten the motor permanently in place by means of the two mounting screws. Drill a hole through both ears of the motor and the mounting plate and tap a locating pin into this hole. Apply glyptal to the heads of the screws and pins.

(*h*) Solder the black wire from the ground terminal and the red wire from switch S103 to the proper contacts on motor B101.

(2) *Replacement of timing unit B102.*

(*a*) Take off the ANT. TUNING control knob and CRYSTAL FREQUENCIES switch knob.

(*b*) Unscrew the nut on the AUT.-OFF-MAN. switch.

(*c*) Remove the three screws mounting the control panel to the chassis apron.

(*d*) Remove the screw on the top side of the chassis which fastens the supporting leg of the control panel to the chassis. Remove the control panel from the chassis.

(*e*) Remove the four mounting screws on the under side of the chassis that fasten the timing unit (B102) to the chassis.

(*f*) After taking off the automatic crystal switch (S101) from the timing unit (B102), remove the timing unit and install a new one by reversing the above process.

Note. When timing unit B102 is removed for replacement, put a drop or two of oil (PL-Special) on the shaft bearings and miter gears to prevent corrosion of the new parts.

(3) *Replacement of automatic crystal switch S101.*

(*a*) Follow the directions for replacement of the timing unit, B102 ((*a*) through (*d*) above).

(*b*) Loosen the 3/8-inch hex nut that fastens the shaft of the CRYSTAL FREQUENCIES switch (S102) to the transmitter chassis.

(*c*) Remove the four mounting screws on the under side of the chassis that fasten the timing unit (B102) to the chassis.

(*d*) Unsolder the wires leading to the automatic crystal switch (S101) terminal lug.

(*e*) Remove the automatic crystal switch and install the new switch by reversing the above process.

c. ANTENNA RECEPTACLE SUBASSEMBLY. When trouble is experienced with the antenna connector, or the antenna insulator, or the neon lamp I101 mounted on the bottom of the subassembly, replace the entire antenna receptacle subassembly, as follows:

(1) Remove the 14 screws located around the top panel of the case. Lift the panel with its attached chassis from the case.

(2) Disconnect the leads to the antenna connector J101 and to lampholder J103 to which lamp I101 is attached (fig. 14).

(3) Loosen the 4 screws holding the antenna receptacle subassembly to the top transmitter panel.

(4) Install a new antenna receptacle subassembly by reversing the above procedure.

53. Final Testing

The final testing of Homing Beacon AN/CRN–12 consists of making two tests on the operation of the transmitter. These tests are described below.

a. R-F CURRENT MEASUREMENT.

(1) Remove Antenna Assembly AS–255/CRN–12 from the antenna connector and install Dummy Antenna TS–392/CRN–12 in its place by hooking the spring clips to the front and back of the top of the transmitter case.

(2) Connect a 0- to 1-ampere r-f ammeter in series with the ground wire of the dummy antenna and the grounding screw located on top of the transmitter case.

(3) Set the AUT.-OFF-MAN. switch to MAN. and set the CRYSTAL FREQUENCIES switch to any one of the crystal positions.

(4) Hold the manual key down for short intervals while tuning the ANT. TUNING control. Observe the indication on the ammeter while tuning for maximum output. It may be necessary to change position of the BAND SWITCH to obtain a maximum reading.

(5) The maximum reading should be between .7 and .9 ampere. Both the neon indicator lamp and the ammeter should indicate maximum at the same time.

(6) Repeat the above test for each crystal to be used in the set.

(7) Adjust the transmitter for automatic frequency selection, following the instructions in paragraph 23*a*. During the 19-second dash, observe the reading on the ammeter. The same readings as obtained in (5) above should be obtained.

b. INPUT CURRENT MEASUREMENT.

(1) Connect a 0- to 10-ampere d-c ammeter in series with the positive lead of the battery. Make sure that the polarity of the ammeter is connected properly (positive terminal of the battery to the positive terminal on the ammeter).

(2) Place the transmitter in operation on any one of the crystals to be used.

(3) The current indication on the ammeter with the key down should be at least 4 amperes and not more than 5 amperes (normal is 4.5 amperes).

(4) Repeat the measurements for all crystal frequencies that are to be used with the transmitter.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

54. Disassembly

Disassemble the equipment for storage or shipment as follows:

a. Disconnect and remove the batteries from the battery case of the transmitter.

b. Turn the AUT.-OFF-MAN. switch to the OFF position.

c. Lower the antenna mast.

d. Unfasten the guy cords from the guy rings on the antenna and the stakes. Wind the guy cord on the guy cord reels.

e. Collapse the antenna and place it in Bag CW–131/CRN–12.

f. Remove the stakes from the ground and store them in the pocket of Bag CW–131/CRN–12.

g. Rewind the counterpoise, using the reel tool to turn the reels. Feed the counterpoise ribbons into the openings in the bottom of the transmitter case while rewinding.

h. Place the reel tool in the pocket located in the cover of Bag CW–132/CRN–12.

i. Place the transmitter in Bag CW–132/CRN–12 and close the flaps of the bag.

55. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored. Make certain that the batteries have been removed before storing or packing this equipment. Use the original packing case if it is available.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the waterproof barrier. Protect the equipment with a waterproof paper barrier, and seal the seams with waterproof sealing compound or paper tape. Pack the protected equipment in a padded wooden box, providing at least 2 inches of excelsior padding. Fill all space within the packing case with excelsior or with folded blocks of heavy corrugated fiberboard.

Section II.

DEMOLITION OF MATÉRIEL TO PREVENT ENEMY USE

56. General

The demolition procedures outlined in paragraph 57 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

57. Methods of Destruction

a. SMASH. Smash the tubes, code disks, vibrator, antenna, motor, dummy antenna, and crystals, using sledges, axes, handaxes, crowbars, or heavy tools.

b. CUT. Cut the battery wires, transmitter wiring, and counterpoise ribbons, using handaxes, axes, or machetes.

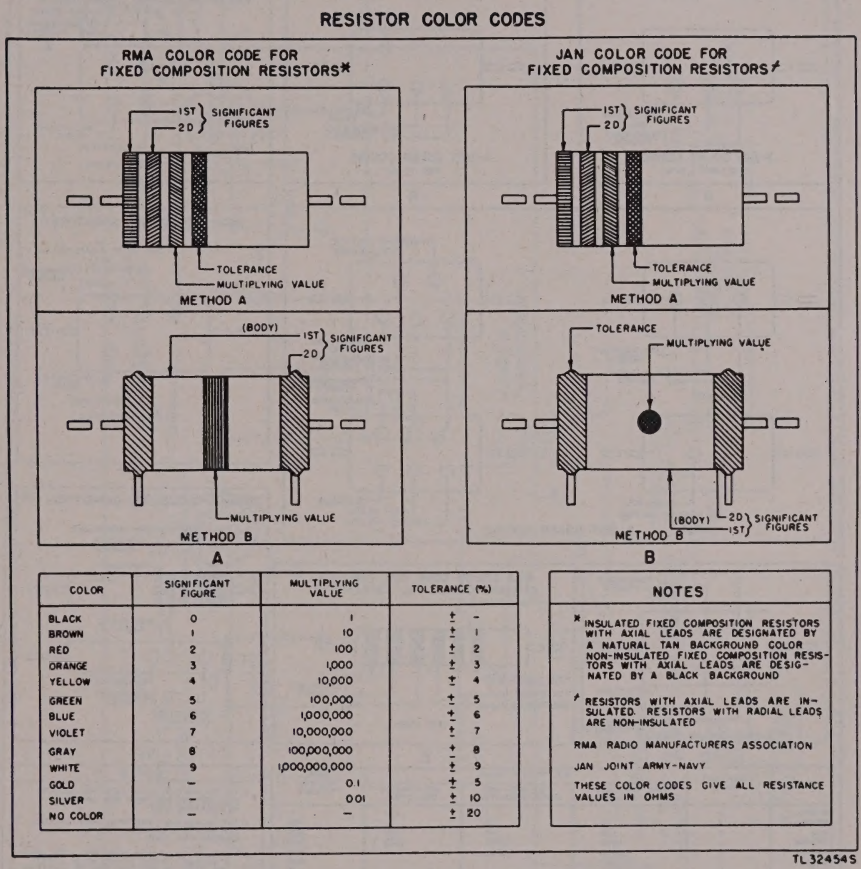
c. BURN. Burn technical manuals, guy cords, and bags, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. BEND. Bend the antenna, transmitter case, and chassis.

e. EXPLOSIVES. If explosives are necessary, use firearms, TNT, or grenades.

f. DISPOSAL. Bury or scatter the destroyed parts in slit trenches, fox holes or other holes, or throw them into streams.

g. DESTROY EVERYTHING.



COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)
BLACK	0	1	± –
BROWN	1	10	± 1
RED	2	100	± 2
ORANGE	3	1,000	± 3
YELLOW	4	10,000	± 4
GREEN	5	100,000	± 5
BLUE	6	1,000,000	± 6
VIOLET	7	10,000,000	± 7
GRAY	8	100,000,000	± 8
WHITE	9	1,000,000,000	± 9
GOLD	–	0.1	± 5
SILVER	–	0.01	± 10
NO COLOR	–	–	± 20

NOTES

* INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A NATURAL TAN BACKGROUND COLOR NON-INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A BLACK BACKGROUND

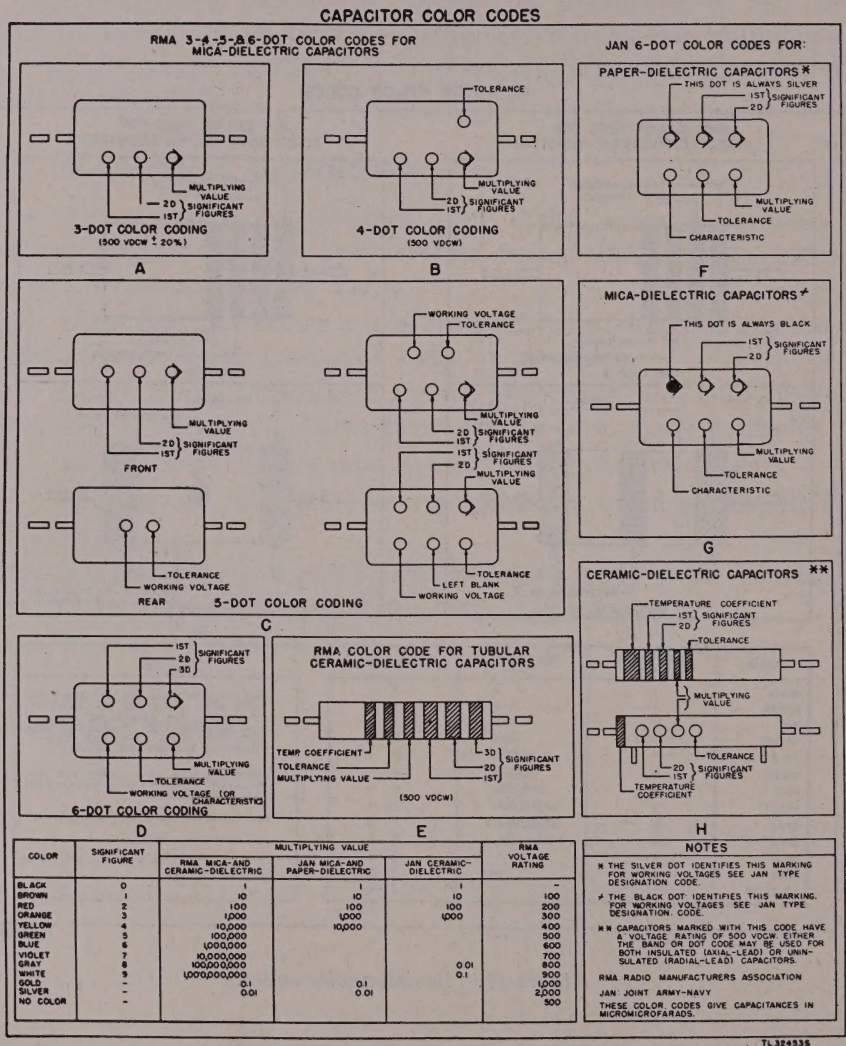
/ RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED

RMA RADIO MANUFACTURERS ASSOCIATION

JAN JOINT ARMY-NAVY

THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS

Figure 17. Resistor color codes.



COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			RMA VOLTAGE RATING
		RMA MICA-AND CERAMIC-DIELECTRIC	JAN MICA-AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	-
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	1,000	1,000	300
YELLOW	4	10,000	10,000		400
GREEN	5	100,000			500
BLUE	6	1,000,000			600
VIOLET	7	10,000,000			700
GRAY	8	100,000,000		0.01	800
WHITE	9	1,000,000,000		0.1	900
GOLD	-	0.1	0.1		1,000
SILVER	-	0.01	0.01		2,000
NO COLOR	-				300

NOTES

* THE SILVER DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

≠ THE BLACK DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. EITHER THE BAND OR DOT CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.

RMA RADIO MANUFACTURERS ASSOCIATION

JAN JOINT ARMY-NAVY

THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

TL 324535

Figure 18. Capacitor color codes.

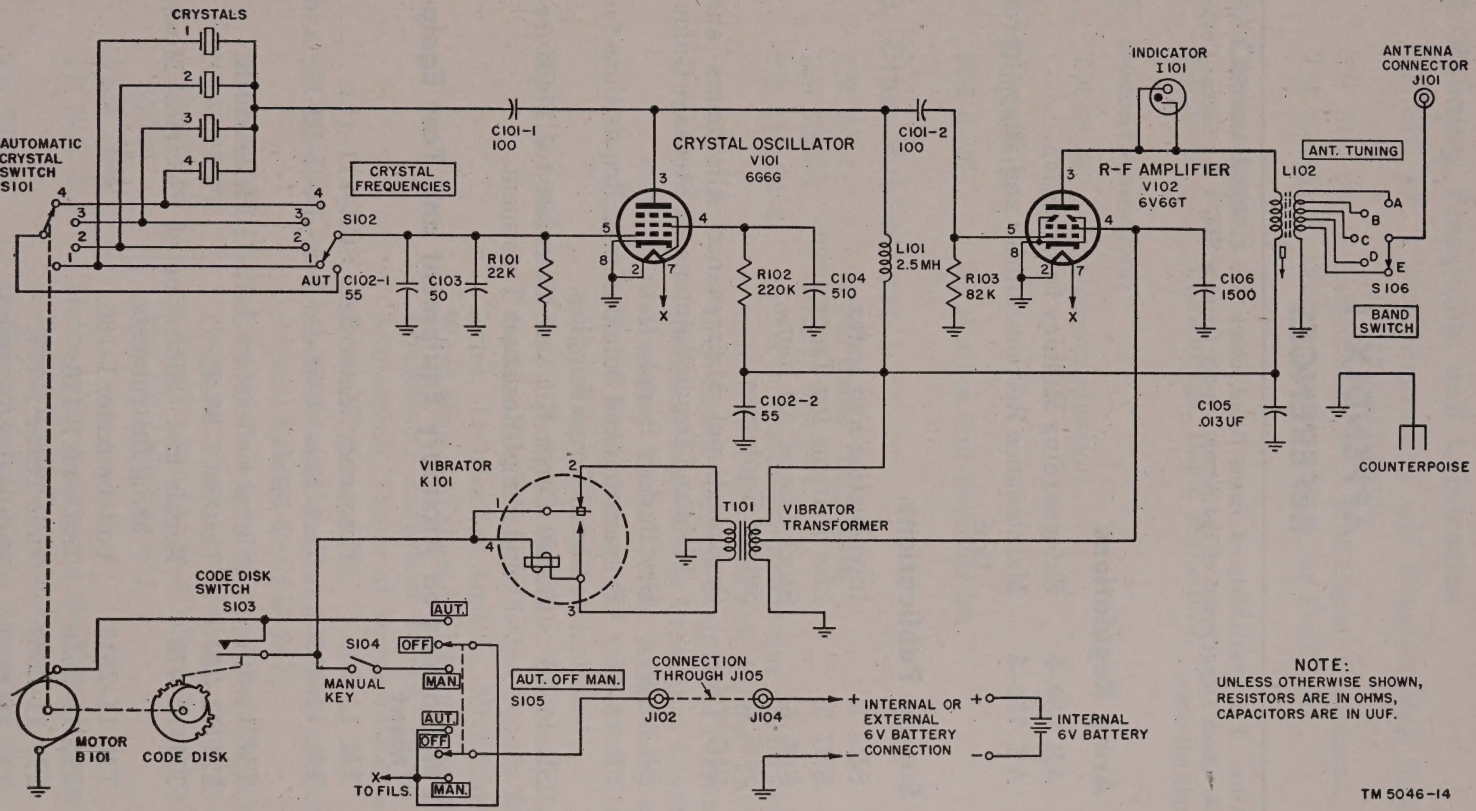


Figure 19. Homing Beacon AN/CRN–12, schematic diagram.

APPENDIX I
REFERENCES

Note. For availability of items listed, check SR 310–20–3 and SR 310–20–4. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalogs.

1. Army Regulations

AR 380–5	Safeguarding Military Information.
AR 750–5	Maintenance Responsibilities and Shop Operation.

2. Supply Publications

SIG 1	Introduction and Index.
SIG 3	List of Items for Troop Issue.
SIG 5	Stock List of All Items.
SIG 6	Sets of Equipment.
SIG 7 & 8	Organizational Maintenance Allowances and Field and Depot Maintenance Stockage Guide.
SB 11–6	Dry Battery Supply Data.
SB 11–47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11–76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Publications on Auxiliary Equipment and Test Equipment

TM 11–300	Frequency Meter Sets SCR–211–(*).
TM 11–303	Test Sets I–56–C, I–56–D, I–56–H, and I–56–J.
TM 11–307	Signal Generators I–72–G, H, J, and K.
TM 11–321	Test Set I–56–E.
TM 11–472	Repair and Calibration of Electrical Measuring Instruments.
TM 11–2613	Voltohmmeter I–166.
TM 11–2626	Test Unit I–176.
TM 11–2627	Tube Tester I–177.
TM 11–5527	Multimeter TS–352/U.

4. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TM 9–2851	Painting Instructions for Field Use.

5. Camouflage

FM 5–20	Camouflage, Basic Principles.

6. Decontamination

TM 3–220	Decontamination.

7. Demolition

FM 5–25	Explosives and Demolitions.

8. Other Publications

FM 24–18	Field Radio Techniques.
FM 72–20	Jungle Warfare.
SR 310–20–3	Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy-Air Force Publications, and Combined Communications Board Publications).
SR 310–20–4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.
SR 700–45–5	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247).
SR 745–45–5 NAV DEPT SERIAL 85P00 AFR 71–4	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD–66 (Army), SandA–70–6 (Navy), and AF–MC–U2 (Air Force)).
TB SIG 4	Methods for Improving the Effectiveness of Jungle Radio Communication.
TB SIG 5	Defense Against Radio Jamming.

TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TM 11–490	Electrical Fundamentals.
TM 9–2857	Storage Batteries Lead-Acid Type.
TM 11–235	Radio Sets SCR–536–A, –B, –C, –D, –E, and –F.
TM 11–310	Schematic Diagrams for Maintenance of Ground Radio Communication Sets.
TM 11–314	Antennas and Antenna Systems.
TM 11–430	Batteries for Signal Communication. Except those pertaining to Aircraft.
TM 11–453	Shop Work.
TM 11–455	Radio Fundamentals.
TM 11–462	Signal Corps Tactical Communication Reference Data.
TM 11–476	Radio Direction Finding.
TM 11–483	Suppression of Radio Noises.
TM 11–486	Electrical Communication Systems Engineering.
TM 11–496	Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
TM 11–499	Radio Propagation Handbook.
TM 11–660	Introduction to Electronics.
TM 11–4000	Trouble Shooting and Repair of Radio Equipment.

APPENDIX II
IDENTIFICATION TABLE OF PARTS

1. Requisitioning Parts

The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O&E, T/A, SIG 7–8–10, SIG 10, list of allowances of expendable material, or another authorized supply basis. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1, Introduction and Index.

2. Identification Table of Parts for Homing Beacon AN/CRN–12

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	TRANSMITTING SET, Radio: Army-Navy Homing Beacon AN/CRN–12( ); MCW; freq range 3.5 to 6 mc; power output 5 w; input 6 v DC, 4.5 amp, 27 w; knapsack mtd; 12⅝" lg x 6⅛" wd x 10⅝" h o/a; xtal controlled; c/o Army-Navy Antenna Assembly AS–255/CRN–12 and Army-Navy Radio Transmitter T–127/CRN–12; incl Army-Navy Dummy Antenna TS–392/CRN-12, Army-Navy Bag CW–131/CRN–12, Army-Navy Bag, CW–132/CRN–12, and counterpoise c/o 4 film spools w/metallic ribbon; set of spare tubes, spare plug-in vibrator, and spare code disks; U. S. Army spec #71–3409.	Complete equipment	2S1504–12
	TRANSMITTER, radio: Army-Navy Radio Transmitter T–127/CRN–12; MCW; freq range 3.5 to 6.0 mc; power output 5 w; input 6 v DC, 4.5 amp, 27 w; knapsack mtd; 12⅝" lg x 6⅛" wd x 10⅝" h o/a; xtal controlled; incl counterpoise and real tool; can be automatically keyed by mechanical keyer; U. S. Army spec #71–3409.	Radio transmitter	2C6900–17
E201	ANTENNA: vertical mast; #24 ST aluminum, dull olive drab finish; telescopic construction; 35 ft extended, 30⅝" lg collapsed, 2 1/16" OD; 16 sect, ea 30⅝" lg; ¾" ball on bottom for mtg in spherical socket on transmitter; fixed; 3.5 to 6 mc freq range; furnished w/guy ring; p/o Army-Navy Antenna Assembly AS–255/CRN–12; Taffet Radio #96W333.	Radiates r-f energy	2A288A–110
H200	ANTENNA EQUIPMENT: Army-Navy Antenna Assembly AS–255/CRN–12; RF radiator and accessories; c/o 1 antenna, 3 guy stakes, 1 guy, Army-Navy Bag CW–131/CRN–12; U. S. Army spec #71–3409.	Radiates r-f energy	2A264–255

	ANTENNA RECEPTACLE SUBASSEMBLY: p/o AN Radio Transmitter T–127/CRN–12; c/o; 1 circular polystyrene ins 3¼″ diam x ¾″ lg o/a, 1 hemispherical copper silver pl cont 1$\frac{5}{16}$″ lg x ¾″ diam w/1 central mtg screw #8–32 x 1″ Taffet Radio #81S730; 1 lucite lampholder 1″ lg x ½″ diam o/a glued w/Amphenol polystyrene #912 to flat mtg surface Taffet Radio #05S005, 1 neon glow lamp unbased bulb T–2 GE #NE2; 3¼″ diam x 1$\frac{5}{16}$″ lg o/a; mts by four .150″ diam holes spaced 90 deg apart thru outer rim ¼″ from edge; Taffet Radio #TR–1000.	Connector for antenna and resonance indicator.	2C6900–127–1
MS400	BAG: Army-Navy Bag CW–131/CRN–12; canvas, olive drab; inside dimen 31″ lg x 2¼″ wd x 2¼″ d; snap fastener closing; no supporting framework but w/heavy felt lining throughout; cotton webbing shoulder strap; 5 compartments; water repellant and mildew proof; u/w Army-Navy Antenna Assembly AS–225/CRN–12; Daniels CR #5–999 (lg); Taffet Radio #65S02; Weldgardco #56x19; U. S. Army spec #71–3409.	Carrying case for antenna assembly.	2A312–131
MS300	BAG: Army-Navy Bag CW–132/CRN–12; canvas, olive drab; external o/a dimen 14½″ lg x 12¾″ h x 8″ d; ring and strap closing; no supporting framework; cotton webbing shoulder strap; 1 main compartment; water repellant and mildew proof; u/w Army-Navy Radio Transmitter T–127/CRN–12; Daniels CR #5–999 (short); Taffet Radio #65S91; U. S. Army spec #71–3409.	Carrying case for radio transmitter.	2Z553–132
E105	BOARD, terminal: 6 tinned copper lug term irregularly spaced; lam phenolic board, JAN type PBE per spec MIL–P–3115; 1⅞″ lg x 1$\frac{13}{16}$″ wd x $\frac{3}{32}$″ thk o/a; mtg bracket w/two .014″ diam holes on ¾″ mtg/c; Taffet Radio #7W853.	Mounting strip for small resistors and capacitors.	3Z770–6.12
C101–1, C101–2	CAPACITOR, fixed: ceramic; 100 uuf ±5%; 500 vdcw; JAN type CC25UK101J.	C101–1: R-f feedback C101–2: Couples oscillator plate to r-f amplifier.	3D9100–186

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
C102–1, C102–2	CAPACITOR, fixed: ceramic; 55 uuf ±20%; neg temp coef; 500 vdcw; 1 1/32" lg x 5/16" diam o/a; #16 B&S gauge axial wire term formed into hook; capacitor body threaded w/#12–28 NF–2 thd 9/32" lg for mtg thru chassis; ceramic ins; Erie style #N 750 L.	C102–1: Oscillator grid feedthrough. C102-2: R-f bypass.	3D9055–14
C103	CAPACITOR, fixed: ceramic; 51 uuf ±5%; 500 vdcw; JAN type CC21UJ510J.	R-f regeneration	3D9151
C104	CAPACITOR, fixed: mica; 510 uuf ±5%; 500 vdcw; JAN type CM20D511J.	R-f bypass to ground	3K2051142
C105	CAPACITOR, fixed: paper; 10,000 uuf ±20%; 1000 vdcw; JAN type CP28A1EG103M.	Plate decoupling for V102	3DA10–537
C106	CAPACITOR, fixed: mica; 1500 uuf ±10%; 500 vdcw; JAN type CM30B152K.	R-f bypass for screen of V102.	3K3015221
O101	CLIP, battery: steel, lead pl; 2 27/32" lg x 5/8" wd x 1 1/8" h o/a; uninsulated; rated 25 amp; 1 screw term; max jaw opening 7/8"; MUELLER ELEC #24; Taffet Radio #81586.	Connects d-c power input lead to battery.	3Z1086B–1
L101	COIL, RF: 4 pie universal wnd; unshielded; 2.5 mh ±10%, .125 amp, 50 ohms DC resistance; 1 15/16" lg x 5/8" diam o/a; steatite grade L–4B per spec JAN–I–10 coil form; single #6–32 tapped mtg hole 3/8" d on end of core; 2 brass cotter pins for solder junctions; impr for tropical use; Natl Co. #R–100U.	Plate choke for oscillator	3C326–100.2
L701	COIL, RF: single layer wnd; 21 turns #30 Cupron wire; unshielded; 1 7/8" lg x 5/8" OD less term; coil form type JAN type PBE per spec MIL–R–3115; 2 holes .150" diam spaced 1 1/2" c to c; 2 solder lug term on ends; coil impr w/fungicidal varnish per spec JAN–C–173; p/o Army-Navy Dummy Antenna TS 392/CRN–12; Taffet Radio #2WO450 (modified).	Artificial load	3C1084Z83

J101	CONNECTOR, receptacle: See ANTENNA RECEPTACLE SUB-ASSEMBLY.	Antenna connector.	
J102, J104	CONNECTOR, receptacle: 1 cont w/2 flat parallel blades; straight type; banana type connector, mica filled bakelite; 7/8" lg x 1/2" diam o/a; 10,000 v DC breakdown; cylindrical mica filled bakelite body, natural finish; feed thru type requiring single mtg hole .375" diam w/Amphenol #2–11 retainer ring; RSW; jack, Amphenol #78–ILT; Taffet Radio #8W709.	Connectors on A+ lead	2Z3062–214
J105	CONTACT, connector: brass, silver pl; 15/16" lg x 5/32" diam o/a; plugs into female connector; 3/32" x 1/8" diam 1 end, 1/16" rad other end; Taffet Radio #92S591.	Connects J102 and J104	2Z3193–119
E107, E108, E109, E110	COUNTERPOISE: radial type; 4 brass ribbons, 25 ft lg ea, 1/2" wd x .002" thk; soldered connection; 1 end of ea ribbon soldered to core of 16 mm 50 ft capacity steel spool and wnd simultaneously, other ends w/eyelets; Taffet Radio #96W438.	Counterpoise	2A264–85/R1
H101	COVER: aluminum, dull olive drab finish; sq cover plate; 2 7/8" lg x 2 7/8" h x 1/4" d o/a; 4 holes .147" diam on 1 1/2" x 2 7/16" mtg/c; Taffet Radio #64S076.	Covers access opening to crystal holders.	2Z3351–216
A101	COVER, battery: incl 1 cover pad, and 2 rubber spacers; vulcanized fiber board; 8 23/32" lg x 4 1/8" wd x approx 5/8" thk o/a; Taffet Radio #96W277.	Covers the battery and holds battery in place.	2Z3351–217
H103	CUSHION: neoprene rubber; rectangular shape; 4 11/16" lg x 3 13/16" wd x 1/8" thk; placed between 2 glass batteries; Taffet Radio #4S005.	Prevents breakage of the glass-cased batteries.	3B1290
H105	CUSHION: neoprene rubber; rectangular shape; 7 3/4" lg x 4" wd x 1/8" thk o/a; used as bottom of battery case; Taffet Radio #4S007.	Protects batteries from shock.	2Z3600–50
Q101	DIAPHRAGM, switch: neoprene rubber, black smooth finish; circular shape w/hemispherical ctr; 2 1/4" diam x 1/16" thk o/a; four .144" mtg holes spaced 90 deg apart 3/8" from outer edge; Taffet Radio #4S012.	Covers manual switch key	2Z3775–9

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
O101	DISK, keying: aluminum, natural finish; 1⅜" circular disk w/knurled knob; 1⅜" diam x 11/32" thk o/a; single axial hole to pass #6–32 screw; stamped #85; 6 sets of teeth on outer edge of disk for mechanical keying; Taffet Radio #96W336.	Keys transmitter for codes A, D, F, L, I, or V.	2Z3807–23
O102	DISK, keying: aluminum, natural finish; 1⅜" circular disk w/knurled knob; 1⅜" diam x 11/32" thk o/a; single axial hole to clear #6–32 screw; stamped #86; and 6 sets of teeth on outer edge of disk for mechanical keying; Taffet Radio #96W335.	Keys transmitter for codes C, N, U, H, Z, or P.	2Z3807–24
O103	DISK, keying: aluminum, natural finish; 1⅜" circular disk w/knurled knob; 1⅜" diam x 11/32" thk o/a; single axial hole to clear #6–32 screw; stamped #68; 6 sets of teeth on outer edge of disk for mechanical keying; Taffet Radio #96W453.	Keys transmitter for codes K, M, O, X, Y, or Q.	2Z3807–22
O104	DISK, keying: aluminum, natural finish; 1⅜" circular disk w/knurled knob; 1⅜" diam x 11/32" thk o/a; single axial hole to pass #6–32 screw; stamped #73; 6 sets of teeth on outer edge of disk for mechanical keying; Taffet Radio #96W448.	Keys transmitter for codes B, T, W, R, G, or S.	2Z3807–25
E103	GASKET: neoprene rubber; 5 holes circular ring shaped, 2¼" ID x 3¼" OD x 3/64" thk; p/o Army-Navy Radio Transmitter T–127/–CRN–12; Taffet Radio #4S013.	Separates feedthrough insulator from panel.	2Z4867.680
E104	GASKET: neoprene rubber; 5 holes; sq shape, 2⅞" lg x 2⅞" wd x 1/16" thk; p/o Army-Navy Radio Transmitter T–127/CRN–12; Taffet Radio #4S018.	Gasket for crystal cover	2Z4867.681
O201	GUY: sheet metal, cad pl; c/o 1 metal spool assem, 1 snap fastener, and 1 nylon cord 35 ft lg; guy kit fits into 3 pockets on exterior of Army-Navy Bag CW–131/CRN–12; p/o Army-Navy Antenna Assembly AS–255/CRN–12; Taffet Radio #96W204.	Antenna guy line	2A1344–97

E106	INSULATOR, disk: circular; polished polystyrene; ¼" h o/a; ¼" lg x 1 17/32" OD o/a; Taffet Radio #05S011.	Prevents plate lead of r-f amplifier from grounding.	3G280–30
E102	INSULATOR, feedthru: round, hemispherical shape; polystyrene plastic; 3¼" diam x ¾" lg o/a; mts by four .150" diam holes spaced 90 deg apart thru outer rim, ¼" from edge; Taffet Radio #05S008.	Insulator for J101	
I101	LAMP, glow: See ANTENNA RECEPTACLE SUBASSEMBLY.	Indicates resonance of transmitter.	
J103	LAMPHOLDER: See ANTENNA RECEPTACLE SUBASSEMBLY.	Lampholder for I101	
W101	LEAD, electrical: uses JAN type WL 2½ (19) 16C wire Sig C stock No. 1B1316.1; 5" lg excluding terminations; 1 Zierick #76 ring type term lug on ea end; Taffet Radio #96W777.	Power connection	3E7998–5.8
E700	LOAD, dummy: Army-Navy Dummy Antenna TS–392/CRN–12; u/w Army-Navy Radio Transmitter T–127/CRN–12; c/o 1 bakelite base plate, 2 clamps, 1 cont stud, 1 spring, 1 test clip, 1 dummy antenna coil, and 1 cover; rectangular cube 2" lg x 3" h x 1½" wd w/2 external spring clamps extending from either end of box; 6⅝" lg x 2" wd x 2¾" d o/a; connector stud fits into female socket on Army-Navy Radio Transmitter T–127/CRN–12 panel, 2 ext clamps hook on to top and bottom sides of panel; Sig C dwg #SC–C–9252.	Testing and adjusting transmitter.	2A203A–392
B101	MOTOR, DC: permanent magnet type; 6 v DC, .1 amp input, 1.3 rpm; constant speed, eddy current damping, and speed governor; closed frame type; 72°F operating temp; shaft .375" lg x .125" diam; 2 7/16" lg x 2⅛" wd x 1 13/32" d; Haydon #9200 series; fixed base; 2 mtg holes 1⅞" between ctr; Haydon #71525–A.	Operates the timing unit	3H3100–85
R103	RESISTOR, fixed: comp; 82,000 ohms ±10%; ½ w; JAN type RC20BF823K.	R-f amplifier grid bias	3RC20BF823K
R102	RESISTOR, fixed: comp; 220,000 ohms ±10%; ½ w; JAN type RC20BF224K.	Screen-dropping resistor	3RC20BF224K
R101	RESISTOR, fixed: comp; 22,000 ohms ±10%; ½ w; JAN type RC20BF223K.	Oscillator grid bias	3RC20BF223K

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
O105	RING, retainer: p/o Army-Navy Radio Transmitter T–127/CRN–12; aluminum, olive drab finish; ring shape; 2¼" OD x ⅜" wd x 1/16" thk o/a; four .150" diam mtg holes spaced 90 deg apart, ⅜" from outer edge; Taffet Radio #64S064.	Holds keying switch diaphragm cover.	2Z7093–253
X101	SOCKET, tube: 8 cont octal; under chassis mtg; 2 mtg holes 5/32" diam on 1½" ctr, 15/32" diam cutout; cylindrical mica filled bakelite body 1 1/16" diam x ½" lg molded on mtg plate 1⅞" lg x 1¼" wd; phosphor bronze, silver pl cont; Amphenol #77–MIP–8 (low loss); Taffet Radio #8W716.	Holds V101 in circuit	2Z8678.289
X103, X104	SOCKET, crystal: low-loss bakelite; 4 pin sq socket; 25/32" lg x 11/16" wd x ⅝" h o/a; single central mtg hole ⅛" diam; Cinch #9800.	Crystal holders	2Z8678
X105	SOCKET, tube: 4 cont; under chassis mtg; one 15/32" diam cutout and two 5/32" diam holes on 1½" ctr; cylindrical mica filled bakelite body 1 1/16" diam x ½" lg molded on to oval mtg plate 1⅞" lg x 1¼" wd; phosphor bronze, silver pl cont; low loss mica filled bakelite body; Amphenol #77–MIP–4 (low loss).	Holds vibrator in circuit	2Z8674.159
O106	SPOOL, film: 16 mm, 50 ft cap; steel; 2⅞" OD x 1¼" ID x ¾" wd; storage can not incl; Taffet Radio #96W438.	Holds counterpoise ribbons	2Z8810–1
H201	STAKE, guy: p/o Army-Navy Antenna Assembly AS–255/CRN–12; aluminum, dull olive drab finish; 14" lg x ½" diam; 1¼" x ⅛" pin thru stake 1½" from top, ½" wd luminous band painted ½" from top of stake; Taffet Radio #92S621.	Guy line ground stake	2A3330–19
S101	SWITCH, rotary: single pole, 4 position; single sect; phosphor bronze, silver pl; JAN type PBE insulation per spec MIL–P–3115; approx 2⅛" lg x 1½" wd x ½" d less shaft; shorting type cont; positive locking type; 6 solder lug term; 2 holes drilled to pass #6 screw on 1 9/16" mtg/c; wafer type switch mtd w/stand-off bushings; Centralab #12215.	Automatic crystal switch	3Z9825–58.194

S102	SWITCH, rotary: single pole, 5 position; single sect; brass cont, silver pl; JAN type PBE insulation per spec MIL–P–3115; approx 2⅛" lg x 1½" wd x 13/16" h o/a less shaft and bushings; shorting type cont; positive locking action; 6 solder lug term; single hole surface mtg bushing ⅜"–32 thd x ¼" lg, shaft ¼" diam x 1 9/16" lg; Centralab #12213 (modified).	Crystal switch	3Z9825–58.195
S103	SWITCH, sensitive: SPST; switch should make and break a circuit of 700 v DC at 50 ma, 180 times per minute; molded bakelite body; 1 15/16" lg x 1 1/16" wd x 17/32" h o/a; nonshorting type; leaf type actuating mechanism; 1¼" oz max oper pressure; 1/32" max differential in travel of actuating mechanism; 3/32" max pre-travel; ⅛" min over travel; momentary action, normally open; solder lug term; 2 mtg holes, one .173" diam, other .140" diam on 1" mtg/c; Acro Elec #X0–1H (special).	Code disk switch	3Z9827–8.2
S104	SWITCH, push: SPST; single sect; 6 amp at 125 v AC; molded bakelite body; ⅞" diam x 1⅛" lg excl term; momentary cont normally open; 2 solder lug term; mtg bushing .465"–32 thd x ⅜" lg; Acro Elec #2N05–5P.	Manual key	3Z9824–4
S105	SWITCH, toggle: DPDT; molded bakelite body; 1 5/16" lg x ¾" h x ¾" d o/a; 1 1/16" lg bat type handle; positive locking action, ctr position is off; 6 screw type term; mtg bushing 15/32"–32 thd x ¾" lg; C–H #8821K2.	AUT.-OFF-MAN. switch	3Z9849.239
S106	SWITCH, rotary: single pole, 5 position; single sect; brass, silver pl cont; ceramic body; 2¼" lg x 2" wd x 1" thk o/a less mtg bushing and shaft; shorting type cont; positive locking action; 6 solder lug term; mtg bushing ⅜"–32 thd x ¼" lg; shaft ⅞" lg x ¼" diam; mp and fp impr; JAN–C–173; Centralab #12214.	Antenna bandswitch	3Z9825–58.196
B102	TIMING UNIT: brass and aluminum, natural finish; 2 sq brass plates separated by 1¼" studs; 3¼" lg x 2¾" wd x 4¼" d o/a; 4 holes .166" diam located on 2¾" x 2¾" mtg/c; incl 1 spur gear w/22 teeth, 1	Keying mechanism	2C7990A

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	spur gear w/44 teeth, 2 spur gears w/66 teeth, 2 miter gears, 1 key disk assem, 1 #68 code disk, 1 keying switch, 1 bandswitch, 1 Haydon 6 v DC motor; Taffet Radio #96W331.		
L102	TRANSFORMER, RF: 2 wnd, single layer wnd; unshielded; 3 1/16" lg x 2 7/16" diam o/a; powdered iron core, steatite grade L–4B per spec JAN–1–10; coil form 2½" lg x 1" diam; adj iron core tuning slug; knob tuning adj below chassis; mts by three #6–32 x .531" lg studs on bottom equally spaced on 1 1/16" rad; 4 solder term on side and 5 radial leads; Taffet Radio #2W0469 (modified).	R-f output transformer	2Z9629–258
T101	TRANSFORMER, power: vibrator; input 6 v DC, 4½ amp; output 300 v AC; 180 cps output; 2500 v ins; pri 58 turns #17 enamel wire, secd 3150 turns #34 enamel wire, 270 ohms DC resistance; HS metal case, 3" lg x 2½" wd x 3 1/32" h less term; 6 solder lug term protruding from bottom; 4 mtg holes 3/16" diam on 2 11/16" x 1¾" ctr; Kenyon #S–25485; Taffet Radio #2W0467; spec MIL–T–27.	H-v supply	2Z9625–76
V101	TUBE, electron: JAN–6V6GT	Oscillator tube	2J6V6GT
V102	TUBE, electron: JAN–6G6G	R-f amplifier tube	2J6G6G
K101	VIBRATOR, nonsynchronous: input 6 v DC, 4 amp; single reed 180 cps; 1½" diam x 2⅞" lg less prongs; base connection A–4; HS by spinning case to rubber base; Radiart #VN–21; Taffet Radio #02W82.	D-c make and break for T101.	3H6691–22
H102	WRENCH, spanner: two 3/32" diam pins between ctr; 3¼" lg x 2" wd x ⅝" d o/a; CRS, zinc, irridited finish; straight; cylindrical shaft w/⅛" diam x 2" lg pins driven perpendicularly thru shaft; special for Taffet Radio #96W438 counterpoise film space; scdr point on 1 end of tool; Taffet Radio #54S80.	Facilitates winding counterpoise on reels.	6R38478–1

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