SECTION I
GENERAL DESCRIPTION

DIFFERENCE BETWEEN MODELS AN/CRT-3A AND AN/CRT-3.—Radio Sets AN/CRT-3A and AN/CRT-3 are identical in all respects except the transmitter. The AN/CRT-3A transmitter is designated T-74A/CRT-3 instead of T-74/CRT-3 and has a high frequency of 8364 kilocycles instead of 8280 kilocycles. The higher frequency is attained by use of an 8364-kilicycle crystal and a variable capacitor. Low frequency is the same in both models. Kingston Sets having serial numbers higher than 9980 are model AN CRT-3A. Instructions in this manual for operation and maintenance of the AN/CRT-3 model apply also to the AN/CRT-3A except that any reference to operating frequency of 8280 kilocycles would be changed to 8364 kilocycles. The variable capacitor in the AN/CRT-3A model permits a closer adjustment to the desired frequency.

1. GENERAL.

a. PURPOSE.—Radio Set AN/CRT-3 is a simple, rugged emergency transmitting system carried in aircraft designed for operation from a rubber life raft. The set may be dropped over water by means of the parachute supplied. Radio transmission is provided on two distinct frequencies intended for reception by two groups of stations, each having distinct rescue functions. Stations cooperating in rescue operations at long range generally make use of the 8280-kilocycle transmission whereas aircraft or ships locally engaged in rescue missions make use of the 500-kilocycle signal. The equipment is sufficiently buoyant to float and is brilliant orange-yellow, which color gives greatest visibility against dark backgrounds.

b. TYPES OF OPERATION.—The radio set automatically transmits in code the international distress signal (SOS). Provision is also made to allow manual keying of the transmitted code signals. Any operator, no matter how little training he has had, can send distress signals or messages which, when received, will permit bearings to be taken. The radio set may also be used to supply power for Signal Lamp M-308-B. This combination may be used as a hand-keyed signal light to convey messages visually.

c. RADIO FREQUENCIES USED.

(1) When manual keying is used, the radio set operates on the international distress frequency of 500 kilocycles with a 1000-cycle tone modulation.

(2) When automatic keying is used, the radio set transmits “SOS” signals on 500 kilocycles (with 1000-cycle modulation), and 8280 kilocycles (without tone modulation). The frequency automatically changes every 40 to 50 seconds.

d. POWER OUTPUT.—The power output is approximately 2½ watts on 500 kilocycles and approximately 2 watts on 8280 kilocycles.

e. DISTANCE RANGE.

(1) ON 500 KILOCYCLES.—The signal on 500 kilocycles will be heard at distances from 200 to 300 miles under optimum conditions, that is, when transmitting at sea with the ground cap in the water. High atmospheric noise conditions reduce this range. At the center of an inland lake, the range will be 30 to 50 miles. At the edge of a lake or large stream, the range will be 10 to 20 miles, provided the ground lead is in the water. On land, with the ground cap buried in moist earth, and with a spare antenna assembly laid out as a counterpoise, the range may be only 5 to 10 miles.

(2) ON 8280 KILOCYCLES.—The receivable range of 8280 kilocycle signals will depend on factors influencing skip distance, such as time of day, season, latitude, etc. In general reception of signals transmitted at this frequency will not be possible within short distances of the transmitter but will be good at greater distances. Probable daytime range at 8280 kilocycles will lie between 750 and 1500 miles. The distance range will be affected by the type of ground to an even greater extent than at 500 kilocycles since mistuning with a poor ground is even greater. Night time range may be several thousand miles. (Refer to section VI for more detailed discussion.)

f. POWER REQUIREMENTS.—All electrical power for operating either the radio transmitter or the signal light is furnished by the hand-powered generator inside the transmitter cabinet.

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2. EQUIPMENT SUPPLIED.

(See figure 1-1.)

The following components are supplied in one complete Radio Set AN/CRT-3.

<table>
<thead>
<tr>
<th>Quantity per Equipment</th>
<th>Name of Unit</th>
<th>Army Type Designation</th>
<th>Navy Type Designation</th>
<th>Overall Dimensions (inches)</th>
<th>Weight (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radio Transmitter, including:</td>
<td>T-74/CRT-3</td>
<td>T-74/CRT-3</td>
<td>10-1/2 x 10 x 9 (dimensions excluding belt and wrench)</td>
<td>16.0 (weight including belt and wrench)</td>
</tr>
<tr>
<td>1</td>
<td>Hand Crank</td>
<td>CG-18-A</td>
<td></td>
<td>6 x 4-1/4 x 1</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>Wrench</td>
<td></td>
<td></td>
<td>6-5/8 x 2-1/2 x 7/16</td>
<td>0.1</td>
</tr>
<tr>
<td>1</td>
<td>Antenna Assembly wound on:</td>
<td>AS-207/CRT-3</td>
<td>AS-207/CRT-3</td>
<td>310 ft. long</td>
<td>0.6</td>
</tr>
<tr>
<td>1</td>
<td>Reel</td>
<td>RL-48</td>
<td></td>
<td>1-1/2 x 3 diam.</td>
<td>0.1</td>
</tr>
<tr>
<td>1</td>
<td>Kite</td>
<td>M-357-A</td>
<td></td>
<td>19 x 4 diam.</td>
<td>0.8</td>
</tr>
<tr>
<td>2</td>
<td>Balloon (in container)</td>
<td>M-278-A</td>
<td></td>
<td>5-1/8 x 4-1/4 diam.</td>
<td>1.3 each</td>
</tr>
<tr>
<td>2</td>
<td>Generator (hydrogen), including:</td>
<td>M-315-B</td>
<td></td>
<td>11-5/8 x 4-1/4 diam. (dimensions excluding inflating tube)</td>
<td>3.3 each (weight including inflating tube)</td>
</tr>
<tr>
<td>2</td>
<td>Inflating Tubes</td>
<td></td>
<td></td>
<td>19 x 1-1/4 diam.</td>
<td>0.5 each</td>
</tr>
<tr>
<td>1</td>
<td>Signal Lamp (in container)</td>
<td>M-308-B</td>
<td></td>
<td>3-1/8 x 3 diam.</td>
<td>0.3*</td>
</tr>
<tr>
<td>2</td>
<td>Antenna Assembly (wound on spare reel inside container)</td>
<td>AS-207/CRT-3</td>
<td>AS-207/CRT-3</td>
<td>2-1/2 x 3 diam.</td>
<td>0.7</td>
</tr>
<tr>
<td>1</td>
<td>Bag including:</td>
<td>BG-155-A</td>
<td></td>
<td>20-1/4 x 17 x 14-1/2 (weight including pads and bag)</td>
<td>8.1</td>
</tr>
<tr>
<td>1</td>
<td>Bag (for kite and inflating tubes)</td>
<td></td>
<td></td>
<td>23 x 5-1/4</td>
<td>0.1</td>
</tr>
<tr>
<td>1</td>
<td>Pad</td>
<td></td>
<td></td>
<td>15 x 11 x 1/2</td>
<td>0.4</td>
</tr>
<tr>
<td>1</td>
<td>Pad</td>
<td></td>
<td></td>
<td>14-1/2 x 10 x 1/2</td>
<td>0.4</td>
</tr>
<tr>
<td>2</td>
<td>Pads</td>
<td></td>
<td></td>
<td>7 x 4 x 2</td>
<td>0.3 each</td>
</tr>
<tr>
<td>2</td>
<td>Pads</td>
<td></td>
<td></td>
<td>14 x 4 x 2</td>
<td>0.6 each</td>
</tr>
<tr>
<td>1</td>
<td>Parachute</td>
<td>M-390-B</td>
<td></td>
<td>16 (packed) x 9 x 4</td>
<td>3.7</td>
</tr>
<tr>
<td>1</td>
<td>Handbook of Maintenance Instructions</td>
<td></td>
<td></td>
<td>8-3/8 x 10-7/8</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Total Weight 40 pounds

Note: Radio Transmitter T-74/CRT-3 is supplied with one JAN-12SC7 vacuum tube, one JAN-12A6 vacuum tube, and one Crystal Unit CR-1A/AR installed in the proper sockets.
SECTION III

OPERATION

IMPORTANT

International law provides for ships' radio operators to maintain a watch on the distress frequency of 500 kilocycles, during 3 minutes after the quarter hour and three-quarter hour; that is, from 15 to 18 minutes and from 45 to 48 minutes after the hour. Probability of interception, therefore, will be greatly increased if transmission is conducted during these periods. Operate the transmitter for several minutes during and after these periods to allow rescue parties to take bearings.

Note

Refer to Section I for explanation of difference between Radio Sets AN/CRT-3A and AN/CRT-3, including difference between transmitters T-74A/CRT-3 and T-74/CRT-3

1. AUTOMATIC RADIO TRANSMISSION.

   a. STARTING RADIO TRANSMITTER
      T-74/CRT-3

      (1) Set the selector switch pointer to "500 K.C.-8280 K.C.-AUTOMATIC." (See fig. 2-1.)

      (2) To start transmission rotate the crank (see fig. 2-2) in a clockwise direction at approximately 80 to 100 revolutions per minute. When sufficient speed has been attained the lamp marked "SPEED INDICATOR KEEP LIGHTED" (see fig. 2-2) located on the top of the transmitter will light. Faster crank speeds are ineffective since the transmitter contains automatic voltage regulation, and undesirable since they will speed up the transmitter code characters.

      (3) Continue cranking. Allow at least 20 seconds for the filaments of the vacuum tubes to heat, after which time the "RADIO OUTPUT" light should flash on and off with the keying of the transmitted signal. There are no further adjustments.

      (4) In the "500 K.C.-8280 K.C.-AUTOMATIC" selector switch position, the transmitter automatically sends a signal consisting of six groups of "SOS" followed by a sustained dash of about 20 seconds duration. This occurs first on 500 kilocycles and then on 8280 kilocycles, automatically switching from one frequency to the other about every 40 or 50 seconds.

   b. STOPPING RADIO TRANSMITTER T-74/CRT-3.—To stop transmission, stop cranking.

   c. GENERAL INSTRUCTIONS FOR TRANSMISSION.

      (1) The note at the beginning of this section tells when ships' operators are most likely to be on watch. Most shore stations and even some ship and aircraft stations maintain continuous watch. Therefore, if no timepiece is available the exact time for transmission is not of great concern.

      (2) Transmit for at least 5 minutes at a time to enable stations to determine bearings after the signal is heard.

      (3) Transmit at least once every half hour during the day. Many short transmissions, close together, are better than one continuous transmission for hours followed by a long period of silence. An airplane using the radio transmissions as a guide for the rescue needs frequent signals so it can keep on the correct course.

      (4) Transmit both at night and during the day to take advantage of the changes in range. Always transmit several times in the periods near dawn and near dusk.

      (5) Radio stations engaged in the rescue operation may be far from the life raft and from each other. They must communicate with each other and with rescue agencies close by before the rescue can be accomplished. The operator, therefore, must not use all of his strength the first day.

      (6) Transmit continuously if a ship or airplane is heard or sighted. At night, use both radio transmission and the signal lamp as circumstances warrant.

      (7) Share the work of cranking. Interchange hands to ease the effort. If possible, let others crank the transmitter while one man holds it between his legs.

2. MANUAL RADIO TRANSMISSION.

   a. STARTING RADIO TRANSMITTER
      T-74/CRT-3.

      (1) Set the selector switch pointer to the "500 KC MANUAL" position. (See fig. 2-1.)

      (2) To start transmission rotate the crank (see fig. 2-2) in a clockwise direction at approximately 80 to 100 revolutions per minute. When sufficient speed has been attained, the lamp marked "SPEED INDICATOR KEEP LIGHTED" (see fig. 2-2) located on the top of the transmitter will light. Faster crank speeds are ineffective, since the transmitter contains automatic voltage regulation. Continue cranking for about 20 seconds to allow the filaments to heat.

      (3) To transmit a signal, the push button marked "KEY" must be pressed. This button is manipulated most conveniently by the operator with one of the

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first two fingers of the left hand. If another person is present, he might telegraph with his right hand while the other cranks. The indicator lamp marked “RADIO OUTPUT” (see fig. 2-2) should light when the “KEY” is depressed. This light provides a means for visually monitoring the message transmitted. The International Morse code is printed on the top of the transmitter.

b. STOPPING RADIO TRANSMITTER
T-74/CRT-3.

(1) To stop transmission for a few moments only, release the “KEY” button; continue cranking.

(2) To stop operation completely, merely stop cranking.

c. GENERAL INSTRUCTIONS FOR MANUAL TRANSMISSION.

(1) Send slowly, about five words per minute at most. It is difficult to send readable code with this transmitter.

(2) Monitor the transmission by reading the “RADIO OUTPUT” light as a blinker.

(3) At intervals transmit a sustained dash to enable planes which may be homing on the transmission to get a bearing.

(4) Use manual keying only when you have a particular message to send.

(5) Never use manual keying alone; switch to “AUTOMATIC” for five minute intervals occasionally. Transmission on 8280 kilocycles, available on automatic keying only, gives the greatest range.

3. OPERATION OF SIGNAL LAMP.
(See figure 1-6.)

Signal Lamp M-308-B may be used for visual signaling at night if an aircraft is heard. This does not require the antenna.

a. Obtain the signal lamp from the accessory bag. Plug the cord attached to the signal lamp into the “SIGNAL LAMP SOCKET” at the upper left corner of the transmitter panel.

b. Strap the transmitter between the legs.

c. Set the selector-switch knob at the “SIGNAL LIGHT” position.

d. Strap the signal lamp on top of the head with the straps under the chin. The lamp is nondirectional, and its light may be seen from any direction.

e. Depress the push-button “KEY.”

f. Crank the transmitter at a speed where maximum brilliancy of the signal light is obtained.

Note

If the lamp bulb does not light or if it burns out during use, unscrew the dome of the signal lamp, replace the bulb with the spare bulb supplied in the spare clip next to the socket, and then replace the dome.

g. To telegraph with the signal light, manipulate the push-button key.

WARNING

No radio transmission occurs when the signal lamp is used.
SAFETY NOTICE

Do not raise the antenna during severe electrical storms. Observe this rule to prevent death or serious injury.

Observe the following precautions when using the hydrogen generator:
Permit no flames, coals, or sparks near the balloon or opened hydrogen generator, since hydrogen gas is explosive.
Do not allow the residue in the can to come in contact with the body or clothing, since it is caustic and will cause burns. Immediately wash in water any part of the body that is burned. Throw the hydrogen generator away immediately after use.
Do not touch the hydrogen generator while it is in use, since it generates large amounts of heat.