CHAPTER 10

MISCELLANEOUS EQUIPMENT

Much of the equipment that we will discuss in this chapter operates on the radio or radar principle. However, its application is so specialized that we shall deal with it as miscellaneous equipment, instead of radio or radar equipment.

The chapter is designed to given an overview of the miscellaneous equipment for which you, as EMO, are responsible.

RADIO DIRECTION FINDERS

The radio direction finder (rdf) is installed aboard most ships for use in locating personnel afloat in life rafts or lifeboats equipped with radio transmitters. It also is used to obtain bearings on intercepted radio and radar signals of both known and unknown origin.

Essentially, the radio direction finder is a sensitive receiver connected to a directional antenna. Early models used a loop antenna that was rotated manually to the position of strongest signal reception. The bearing of the signal was read from an indicating device consisting of a pointer and an azimuth scale. Modern rdf equipment has antennas that are rotated at a constant speed by a motor. Bearing information is indicated on the face of a cathode-ray tube (crt).

You cannot obtain range data by taking a single bearing with an rdf. Usually, several bearings are taken either as rapidly as possible on several radio beacons or radio stations of known geographical locations, or they are taken on a single beacon or station of known location at 10- to 30-minute intervals between bearings.

Plotting these bearings gives a geographic fix that is as accurate as the accuracy of the bearings plotted. One type of shipboard-installed rdf equipment is the AN/URD-4( ) Direction Finder (fig. 10-1).

Shipboard installations of the AN/URD-4( ) Direction Finder Set (fig. 10-1) consist of an antenna, a receiver/power supply unit, an azimuth indicator, and a signal data converter (not shown—converts relative bearing to true bearing). The set provides visual and sometimes aural direction-finding information from radio signals in the frequency range of 225.0 to 399.9 MHz. For surface to surface operation, the maximum range of the equipment is approximately 20 miles; for surface to air, approximately 90 to 125 miles. The bearing accuracy is plus or minus 5°.

Tuning controls for the receiver are located on the front panel of the azimuth indicator. By setting the digit selector switches to the desired frequency, you can tune the receiver to any one of 1750 frequencies which are spaced 0.1 MHz apart. To facilitate rapid tuning, you may preset the receiver to any 20 of the 1750 available frequencies using the digit selector switches. Then, those preset frequencies are selected by means of a single channel selector switch. Also, for convenience in servicing the equipment, or for emergency operation, digit selector switches are provided on the front panel of the receiver.

Visual information appears on the face of a cathode-ray tube in the azimuth indicator. Around the perimeter of the scope is a compass scale from which the signal bearing is read. When no signal is present, the pattern on the scope is a circle. When a signal is present, this circle is resolved into a propeller-shaped pattern

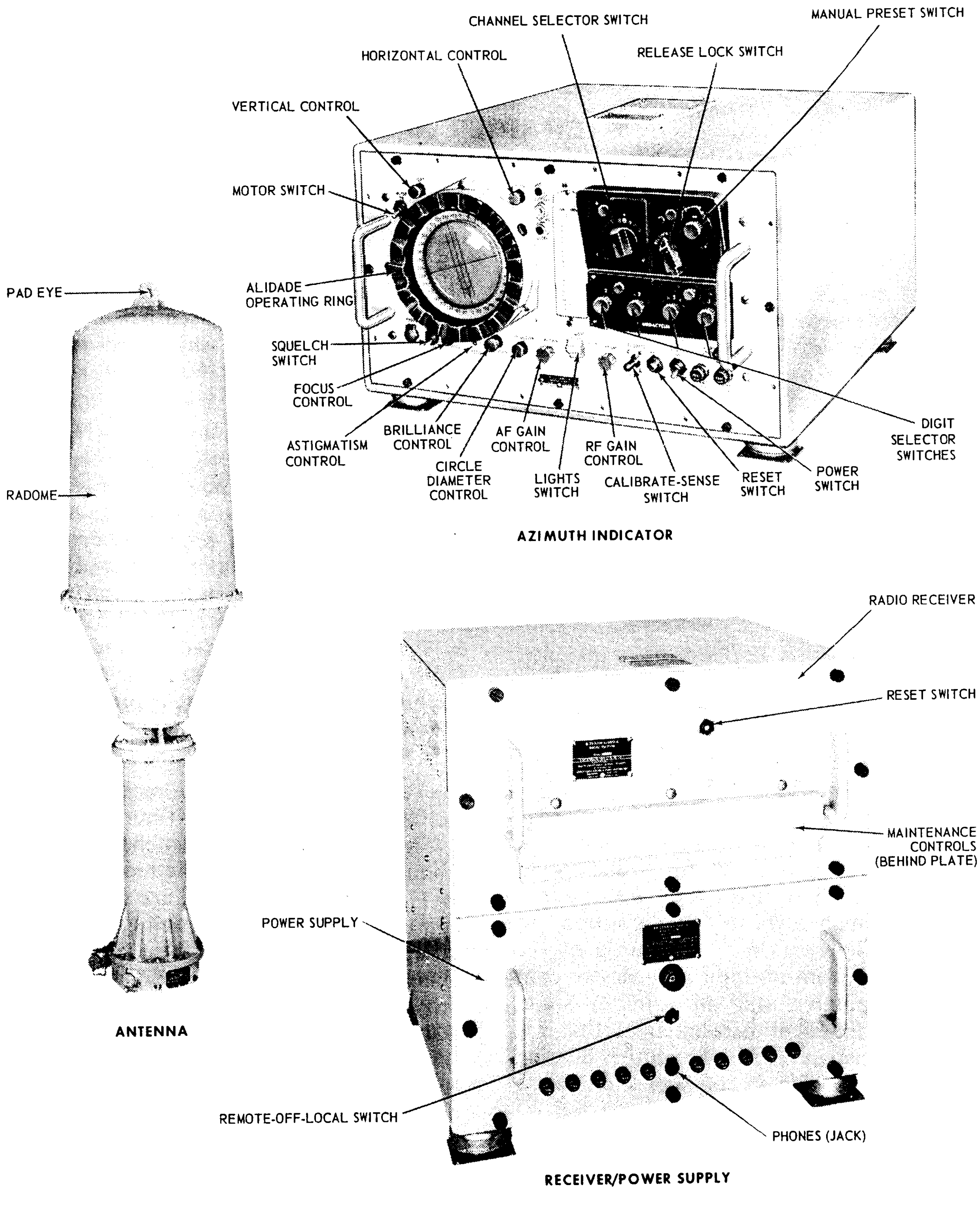

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Figure 10-1.—Radio Direction Finder Set AN/URD-4( ).

whose axis lies along a line indicating the signal source direction. To eliminate ambiguity, it is necessary to cause a further change in the shape of the pattern. Placing the calibrate-sense switch in its sense position causes the propeller-shaped pattern to become a V-shaped pattern, the apex of which indicates the signal bearing.

The direction finder set is designed for either shipboard or shore use. When the equipment is installed on ships with a signal data converter, a switch on the front panel of the azimuth indicator permits selection of either a relative bearing or a true geographical bearing of a received signal.

CLOSED-CIRCUIT TELEVISION

Closed-circuit television systems are being increasingly integrated into shipboard life. In addition to being used for entertainment, they are being used in the work routine of the ship. They make it possible for shipboard personnel at remote locations to view or monitor various operations, and to exchange vital information rapidly.

One closed-circuit TV system installed aboard ship is the Shipboard Information-Training and Entertainment (SITE) II system. The SITE II system is shown in figure 10-2. These systems are used for entertainment, training, combat information, flight operations and secure information purposes.

When the system is used to transfer tactical information from the CIC to remote stations, the TV camera is fastened to the overhead in the CIC so that it overlooks the plotting board. The video output of the camera is sent to viewer units. From these video signals, the viewer units reproduce and display the data on the plotting board. Thus, cognizant personnel are instantaneously and accurately informed of any changes in a tactical situation.

Television systems are also used aboard aircraft carriers for briefing pilots before a mission. When the system is used for this purpose, a viewer unit is installed in each ready room. The TV camera is arranged so that it picks up the briefing officer and any pertinent charts or displays. In this way, all pilots concerned are briefed in one session.

Aircraft carriers have a closed-circuit television system that aids the Landing Signal Officers (LSO) in landing the aircraft. In general, the system operates in the following manner. Television cameras mounted in the centerline of the flight deck acquire the plane at the beginning of its landing approach, and follow it to the touchdown. TV cameras on the carrier's superstructure then take over. Viewer units installed at strategic locations reproduce the images picked up by the cameras. Cross hairs on the viewer screens and second-by-second records of time, air speed, wind velocity, and flight number (on dials at the top of the screens) are utilized by the LSO in talking the pilot down to a safe landing. All video and audio information, including the conversations between the pilot and the LSO, is recorded on tape. The tape becomes a complete record of each landing. The system is referred to as the PLAT (Pilot Landing Aid Television) system.

ELECTRONIC WARFARE

Electronic warfare (EW) involves the entire electromagnetic spectrum from the lowest radio frequencies through microwaves, infrared, visible light, and ultraviolet, and is a military activity which can influence the control and employment of the total electromagnetic environment. Management of EW must be integrated into the operational command structure to ensure that EW actions are planned and executed as an integral part of naval operations. EW involves employment of electromagnetic equipment, systems, tactics, and techniques for the purpose of:

1. Determining hostile activity in the electromagnetic spectrum
2. Exploiting hostile use of the electromagnetic spectrum
3. Advancing naval use of the electromagnetic spectrum

Electronic warfare is military action involving the use of electromagnetic energy to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum. It is also action

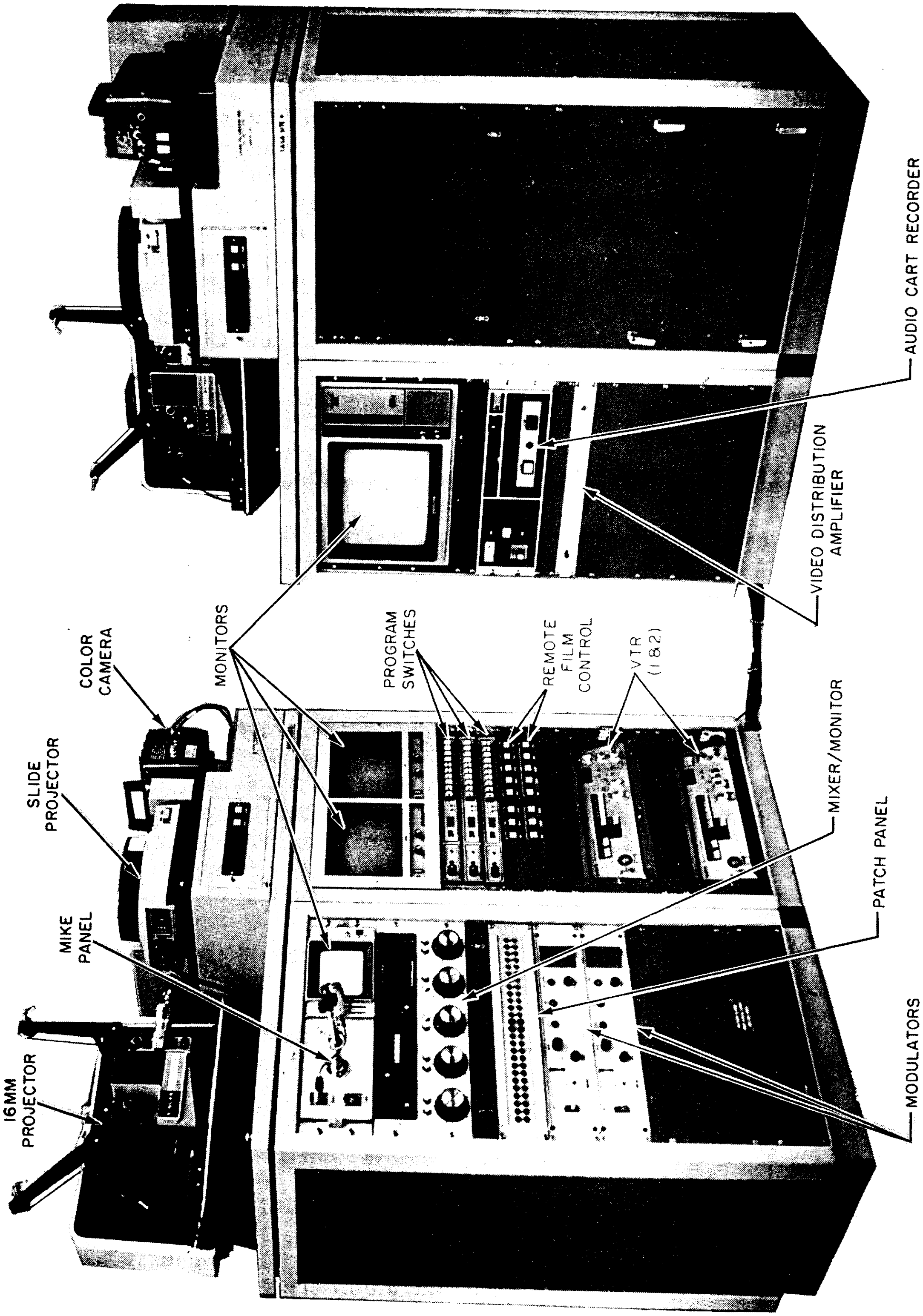

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Figure 10-2.—SITE II Television System.

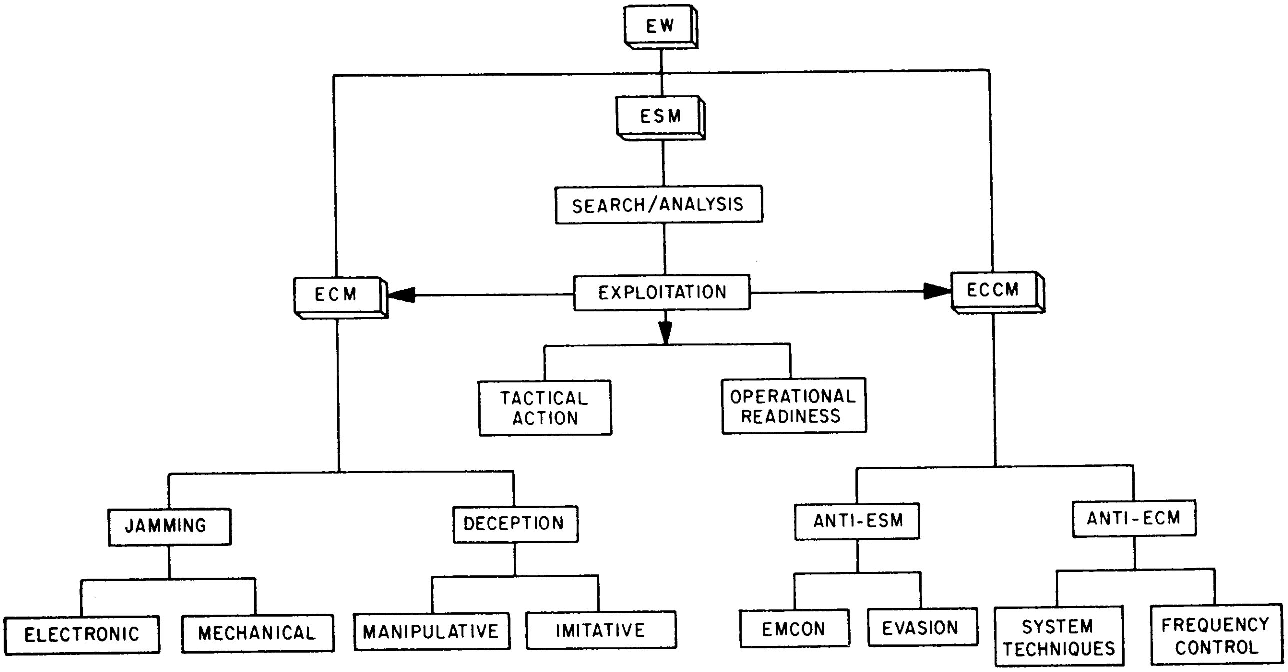

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Figure 10-3.—Functional Relationships of EW Operations.

which retains friendly use of the electromagnetic spectrum. Figure 10-3 shows the functional relationships of EW operations. There are three divisions within EW:

1. Electronic warfare support measures (ESM)
2. Electronic countermeasures (ECM)
3. Electronic counter-countermeasures (ECCM)

ESM is the use of passive (nontransmitting) equipment to intercept enemy electromagnetic emissions. ECM is the use of active electronic and nonelectronic equipment to jam enemy transmissions or to deceive the enemy. ECCM is the means by which the effect of enemy jamming on our own equipment is reduced.

To ensure the continuing freedom of the seas, the objective of naval EW is to provide operational commanders with an integrated capability to take action using the electromagnetic spectrum, to be aware of hostile intent, to counter hostile action, and to protect own or friendly forces.

This objective includes:

1. Determining the existence, location, disposition, and threat potential of all significant weapons, sensors, and communications systems that use electromagnetic radiations

2. Denying an enemy the effective use of that enemy's own electromagnetic systems by destroying them, degrading them, or rendering them ineffective

3. Ensuring the effectiveness and security of fleet electromagnetic capability regardless of intentional or unintentional counteraction from any source

In planning a tactical mission, the tactical commander must consider all aspects of EW including the capabilities of own forces and that of the enemy. EW policy and plans must be established and promulgated along with timely directives delegating authority and assigning responsibilities. Provision must be established for updating these directives and promulgating the changing intelligence picture which affects the EW posture of the force. General EW plans are provided in all fleet and force operation orders.

Successful application of EW requires that the responsible officers have a thorough knowledge of the EW capabilities of all units available for the operation.

The objective of EW in support of fleet operations is to effect detection and permit timely reaction to an airborne, surface, or subsurface threat. Therefore, rapid and efficient reporting procedures are essential if EW information is to be useful on a force level.

ESM SYSTEMS

ESM equipment is used to detect, locate, analyze, and record electronic emissions throughout the electromagnetic spectrum. It provides U.S. forces with the capability to gain tactical and strategic intelligence on enemy electronic activity of all types while remaining undetected by the enemy. ESM is also used to obtain information on new electronics equipment worldwide.

Intercept Receivers

The fundamental piece of equipment in any ESM system is the intercept receiver, which governs the general capabilities and limitations of the system. The overall system is affected by all basic and associated system components.

Intercept receivers are classified as narrow band and wide band according to methods of searching the frequency spectrum. Intercept receivers detect enemy electromagnetic emissions as a function of frequency and provide selected signal outputs to displays, signal analyzers, recorders, and warning devices. Receivers may be capable of automatic signal processing and identification, thereby providing threat warning for preprogrammed threats. Outputs of these receivers may also be used to automatically gate ECM equipment including deception repeaters and chaff launching devices.

Discrimination circuits which respond to certain signal characteristics may be provided with any receiver to accept or reject appropriate signals for display. Pulse signals which originate on board may be blanked by an interference blanker which receives pretrigger pulses from all ownship's radar transmitters that interfere with the intercept receiver.

The remainder of this section describes some of the narrow band and wide band receivers used in ESM. They have been chosen only because they represent typical ESM receivers; they may or may not be on board your ship.

NARROW BAND RECEIVING SET.—Figure 10-4 shows a diagram of a typical narrow band receiving set (AN/WLR-1). The set has been removed from many ships, but is discussed here because it is representative of support measures equipment. It allows rapid analysis of a received signal by simultaneous direction finding, pulse analysis and panoramic display. Rapid scanning techniques and a long-persistence raster display enhance the probability of intercepting a signal. A servo-driven, direct-reading counter shows the frequency of the intercepted signal.

The frequency range is covered by nine or ten rf tuners which overlap in frequency. You may select any one of the tuners by means of a band selector switch. Either automatic frequency scan or manual tuning is available. In frequency scan operation, the range of a tuner is covered in a few seconds. In manual operation, a tuning knob in conjunction with a servosystem controls the frequency of the rf tuner. A signal control storer enables the operator to return to previously stored frequencies by depressing one of ten select pushbuttons. The rf band on which any particular signal is stored is shown by an indicator adjacent to each select pushbutton.

The acquisition indicator (scan indicator) has a raster-type presentation. The horizontal sweep is synchronous with the tuner as it is scanned through the frequency range. Suitably stretched, detected signals are applied as intensity modulation to the cathode-ray tube and appear as a vertical series of spots, while noise forms a random pattern. Detection of signals below noise level is possible because of visual integration.

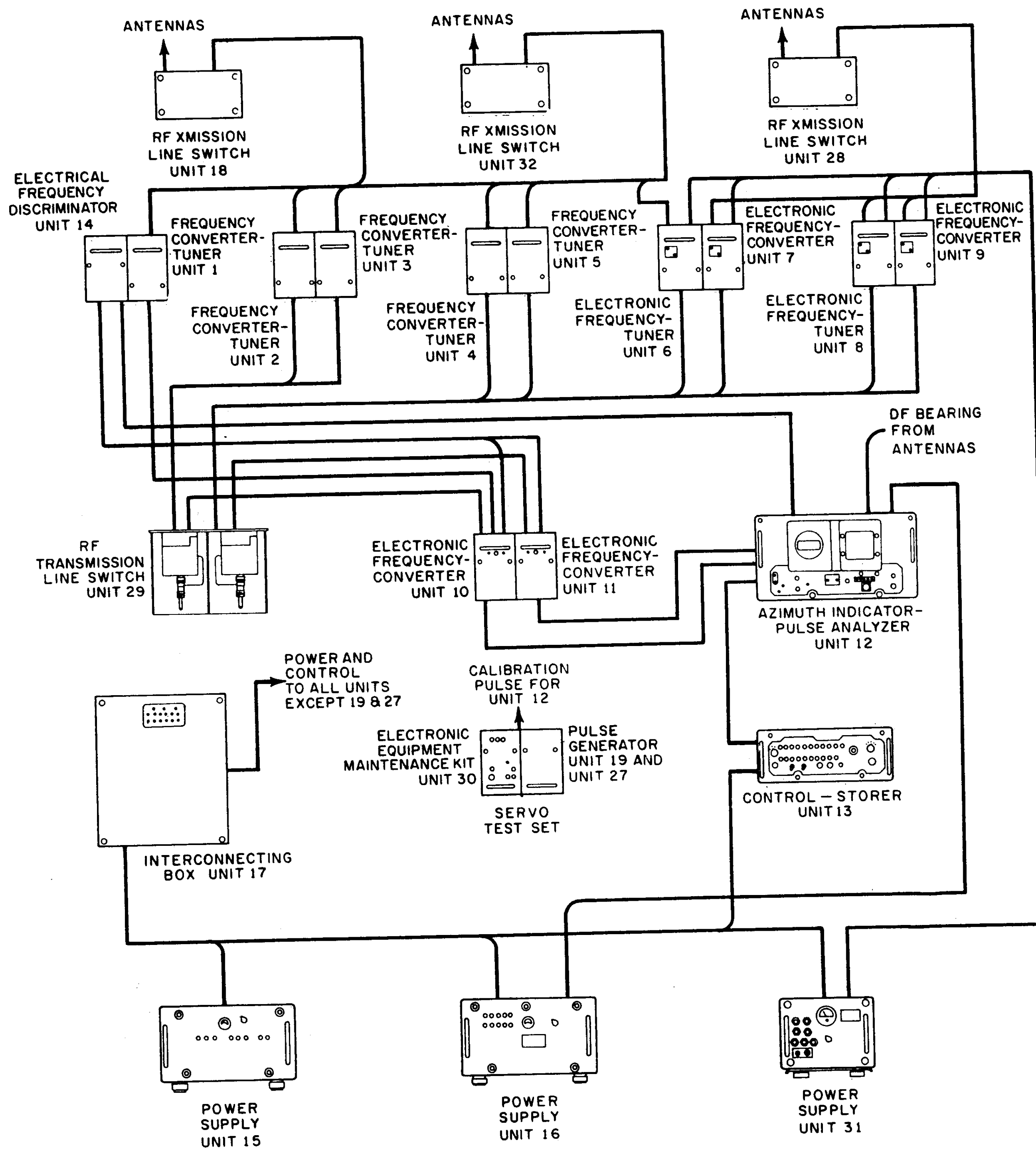
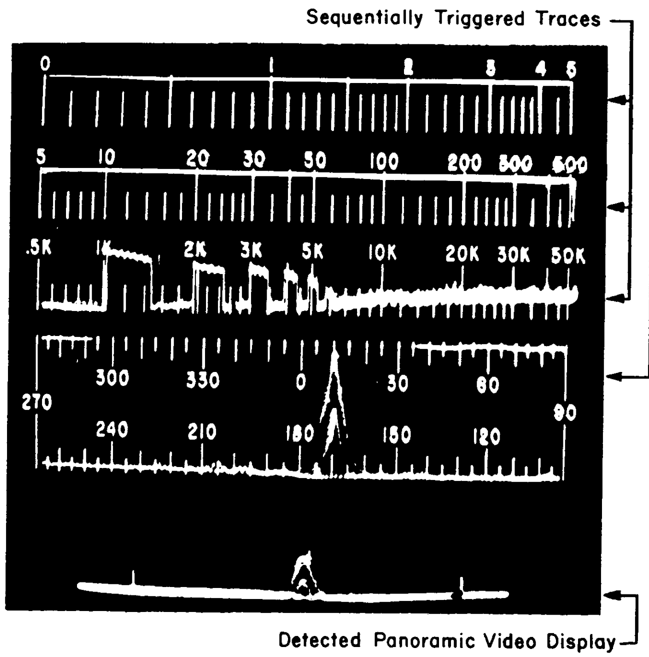


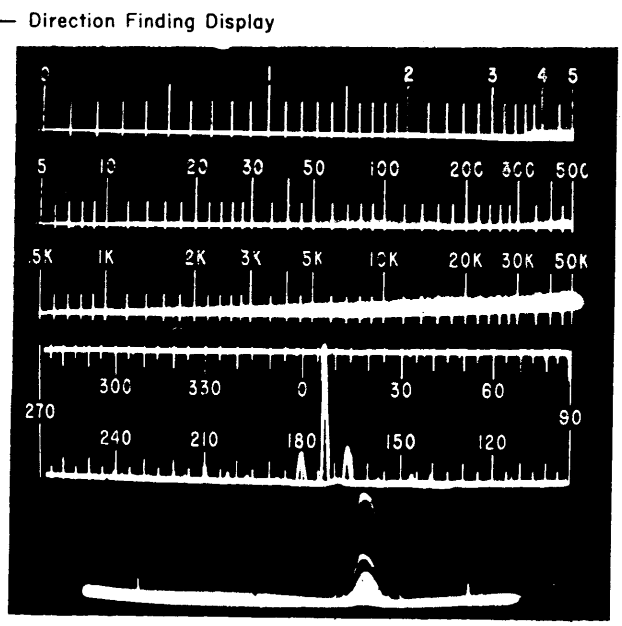
Figure 10-4.—Relationship of units in a narrow band countermeasure receiving set. 32.1(67C)

The scan indicator retains information for approximately two minutes which allows for manual return to a detected signal for storage or analysis. Recent field changes incorporate polar direction finding (df) features. Specific details are available in the technical manual for the AN/WRL-1.

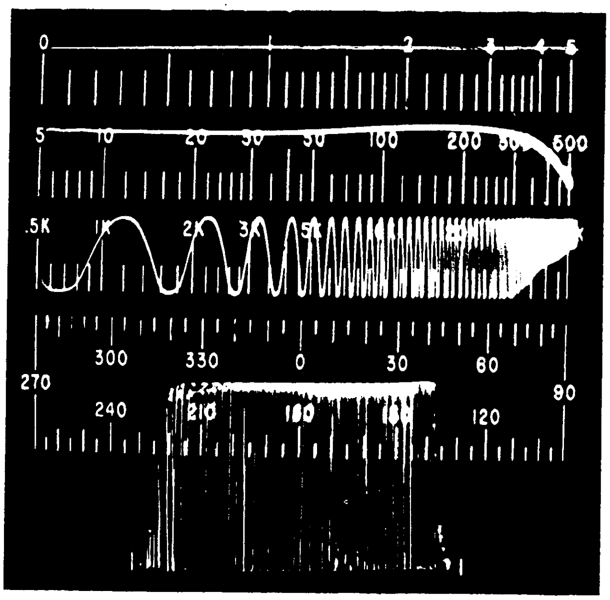
The analysis indicator is a five-gun cathode-ray tube. The demodulated output of the received signal (AM, pulse, cw, video, or fm) is



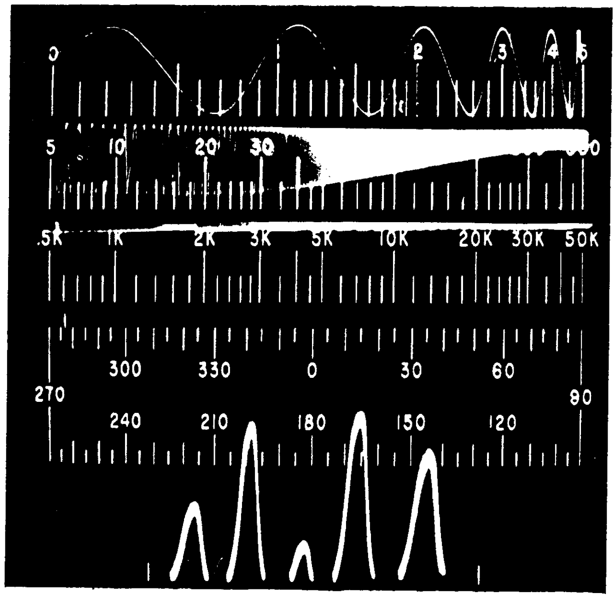
DF DISPLAY, 1 kHz
SQUARE WAVE, ANTENNA SPEED 300 RPM,
BEARING 170 DEGREES



DF DISPLAY,
CW SIGNAL, ANTENNA SPEED 40 RPM,
BEARING 170 DEGREES



FM SIGNAL, SINE WAVE
DEVIATION 6 MHz PEAK TO PEAK, MODULATION
FREQUENCY 1 kHz



FM SIGNAL, SINE WAVE
DEVIATION 6 MHz PEAK TO PEAK, MODULATION
FREQUENCY 1 MHz

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Figure 10-5.—Analysis indicator presentations.

presented by the first three guns on three sequentially triggered traces for measurement of pulse duration and repetition frequency. The first scale is exponential and the second and third scales are logarithmic. The fourth gun provides linear direction-finding information on two calibrated scales separated vertically by one inch. Each scale represents 180 degrees of rotation. The electron beam traverses the rectangular path in synchronization with the antenna rotation. A received signal causes vertical deflection of the spot, at a point on the scale corresponding to the signal bearing. The lower trace (fifth gun) on the analysis indicator is a panoramic presentation of a portion of the frequency spectrum. The trace is 5, 10, or 20 MHz wide, depending on which rf tuner is in use, and is centered about that tuner's frequency. Figure 10-5 shows typical analysis indicator presentations.

Newer receivers, the AN/WLR-8(V) and AN/SLQ-32(V) are replacing the AN/WLR-1 on many ships.

WIDE BAND COUNTERMEASURES RECEIVING SET AN/WLR-3.—The Wide Band Countermeasures Receiving Set AN/WLR-3, a representative unit of equipment, is designed to detect and amplify pulsed type signals within the upper portion of the ultrahigh frequency (uhf) and in portions of the superhigh frequency (shf) range. A functional block diagram of the receiver is shown in figure 10-6.

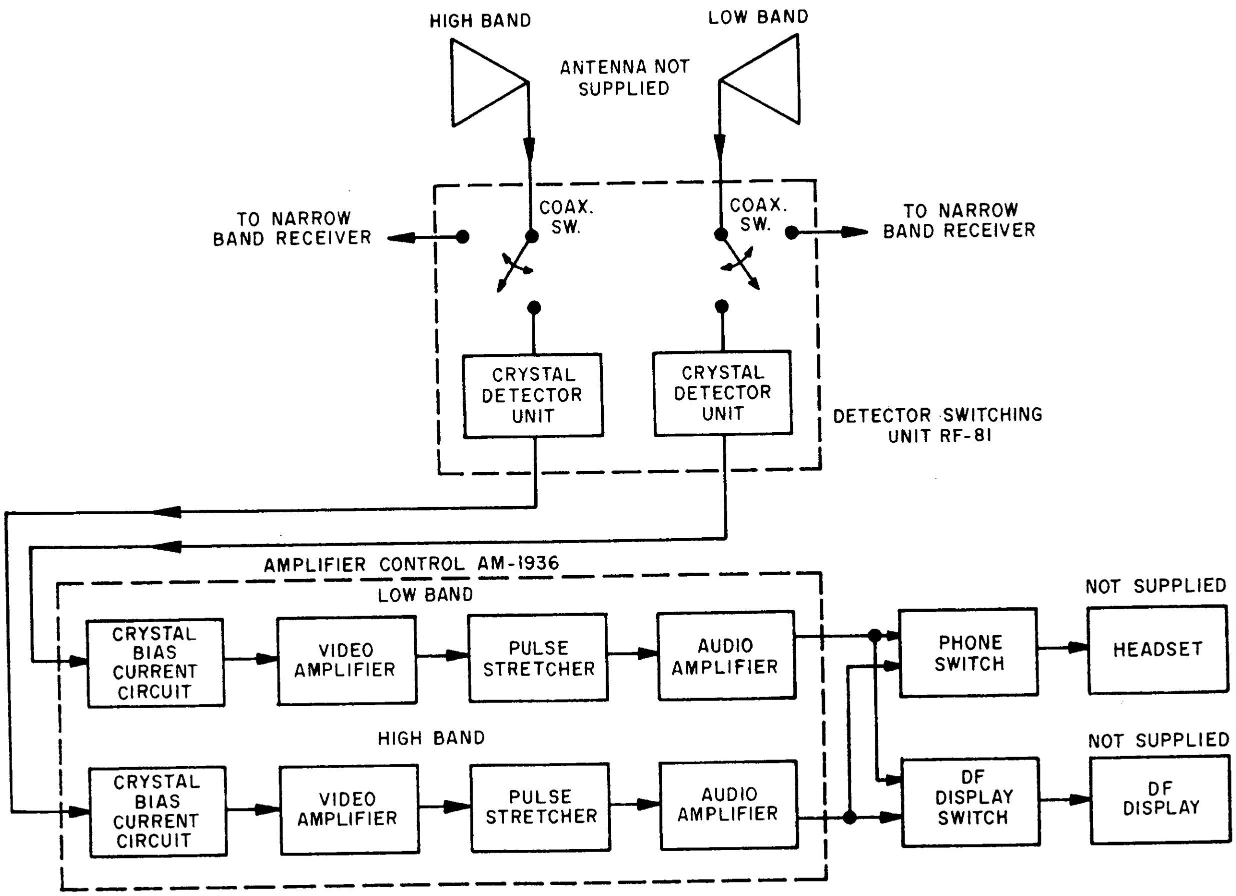

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Figure 10-6.—Functional block diagram of a wide band receiver.

A pulsed signal is intercepted by either the low-band or high-band antenna. Each antenna is connected to a detector-switching unit, RF-81, where the received signal is switched either to the narrow-band receiver for normal operation or switched to the wide-band receiver for wide-band operation. When switched to the wide-band receiver, the signal is detected by one of the two coupler detectors (depending on whether the signal is in the high or low band) located in the Detector Switching Unit RF-81, and is then fed into the appropriate video channel, located in the Amplifier Control AM-1936, where the signal is amplified, made audible, further amplified and delivered to a set of headphones for audio presentation. In addition, the output is connected to a panel jack for connection to the df display of the narrow-band receiver.

The AN/WLR-3 is commonly used in conjunction with a narrow-band receiver to combine the wide-band reception characteristics of the AN/WLR-3 with the analysis capabilities of the narrow-band receiver.

ECM

Electronic countermeasures (ECM) is that major subdivision of electronic warfare involving actions taken to:

1. prevent or reduce the effectiveness of enemy use of electronic equipment
2. prevent or reduce the effectiveness of the enemy's electromagnetic radiation use tactics
3. exploit the enemy's use of electromagnetic radiation

Jamming ECM is the deliberate radiation, reradiation, or reflection of electromagnetic energy with the objective of impairing the use of electronic devices, equipment, or systems being used by an enemy. The purpose of jamming is to deny the enemy full use of their electromagnetic sensors and control systems.

Deception ECM (DECM) is the deliberate radiation, reradiation, alteration, absorption, or reflection of electromagnetic energy in a manner intended to mislead an enemy's interpretation or use of information received by their electronic system. There are two categories of deception:

1. Manipulative deception is the alteration or simulation of friendly electromagnetic radiations to accomplish deception.

2. Imitative deception is the introduction into enemy channels, of radiation which imitates their own emissions.

ECCM

Electronic counter-countermeasures (ECCM) is that major subdivision of electronic warfare which concerns actions taken to ensure our own effective use of electromagnetic radiation despite the enemy's use of countermeasures. It is easy to assume that all the electronic warfare officer has to do is to place a transmitter at the same frequency as the enemy's radar and deny them position information. This is an ideal situation that seldom is realized, and no assumption should be made that this can be accomplished. However, such action may serve to reduce an enemy's effectiveness and provide the few extra seconds needed to escape that threatening situation.

Electromagnetic "noise," another means of jamming radar systems, is the random fluctuation of the electromagnetic field picked up by an antenna. It is displayed on a radar scope as scatter (flickering returns which can mask the returns of real signals). Noise jamming is an artificial means of increasing the amplitude of the noise picked up by a radar receiver. Whether or not an echo will be detected by a particular radar receiver depends primarily on the ratio of signal power to noise power.

ECM and ECCM Equipment

Since ECM and ECCM equipment are classified, they will not be discussed in this manual. A description of the equipment and an explanation of how each is used may be found in EW rate training manuals, *Combat Information Center Officer* text (NAVPERS 10823-D), and the appropriate technical manuals.

INFRARED EQUIPMENT (NANCY GEAR)

Infrared equipment belongs to a family of devices which use electro-optics for communication, surveillance, detection, and navigation. Also included are image-intensifying night observation devices, low level television, and lasers.

Infrared equipment is designed to create, control, or detect invisible infrared radiations. The equipment is of two types, transmitting and receiving. The transmitting (source) equipment produces and directs the radiations. The receiving equipment detects and converts the radiations into either visible light for viewing purposes, or into voice or code signals for audible presentation.

Infrared devices can be used for weapon guidance, detection of enemy equipment and personnel, navigation, recognition, aircraft proximity warning, and communications. Depending on its application, the equipment is either passive or active. The active method employs both transmitting and receiving equipment, whereas the passive method requires only receiving equipment.

The infrared spectrum, which extends from the upper limits of the radio microwave region to the visible light region in the electromagnetic spectrum is divided into three bands: near infrared, intermediate or middle infrared, and far infrared. Devices operating in the near and middle bands are used for ranging, recognition, and communications. They normally have a maximum usable range of 6.5 to 10 miles. Equipment that operates in the far infrared band is used for ranging, missile guidance, and the detection and location of personnel, tanks, ships, aircraft, and the like. This equipment normally has a maximum usable range of 12 miles.

Perhaps the most widely used infrared transmitting gear is the VS-18( )/SAT Hood, with filter lens. It is mounted on the standard Navy 12-inch searchlight (fig. 10-7). It blocks most of the visible light so the searchlight cannot be seen at a distance. The light is operated in the same manner as an ordinary communication searchlight. Design variations to the VS-18( )/SAT Hood are used on nonmagnetic minesweepers with the 8-inch signal light, and hand signal lamps.

Another type of infrared transmitting equipment is a 360° light. These lights are generally installed in pairs on yardarms (fig. 10-8) and are located on the majority of naval ships. These lights, designated AN/SAT-( ), are operated in the same manner as yardarm blinkers. They can be used as a steady source for "point of train" (pot) purposes, or they can be used for signaling or recognition purposes.

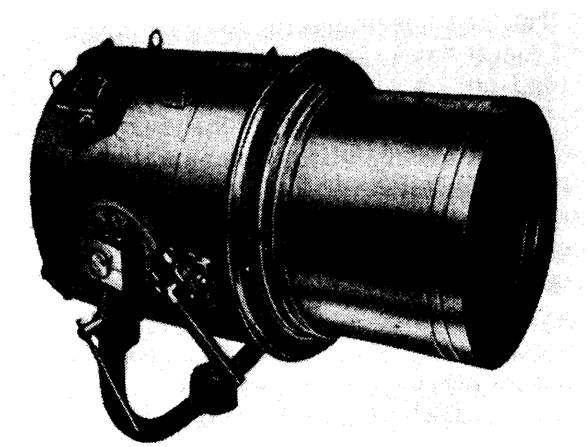

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Figure 10-7.—The VS-18( )/SAT Infrared Hood on 12-inch search light.

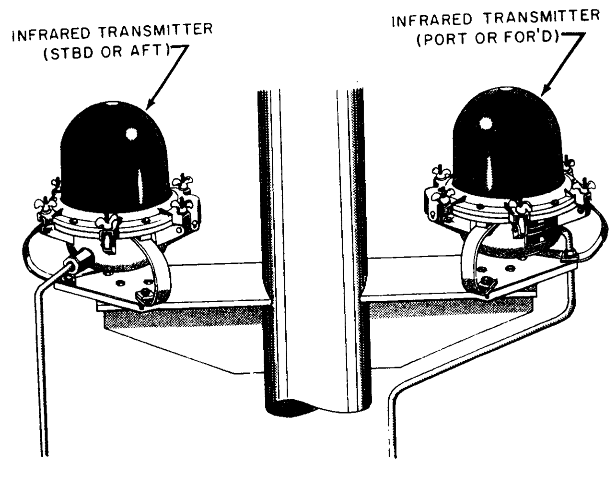

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Figure 10-8.—Infrared Yardarm Beacons AN/SAT-( ).

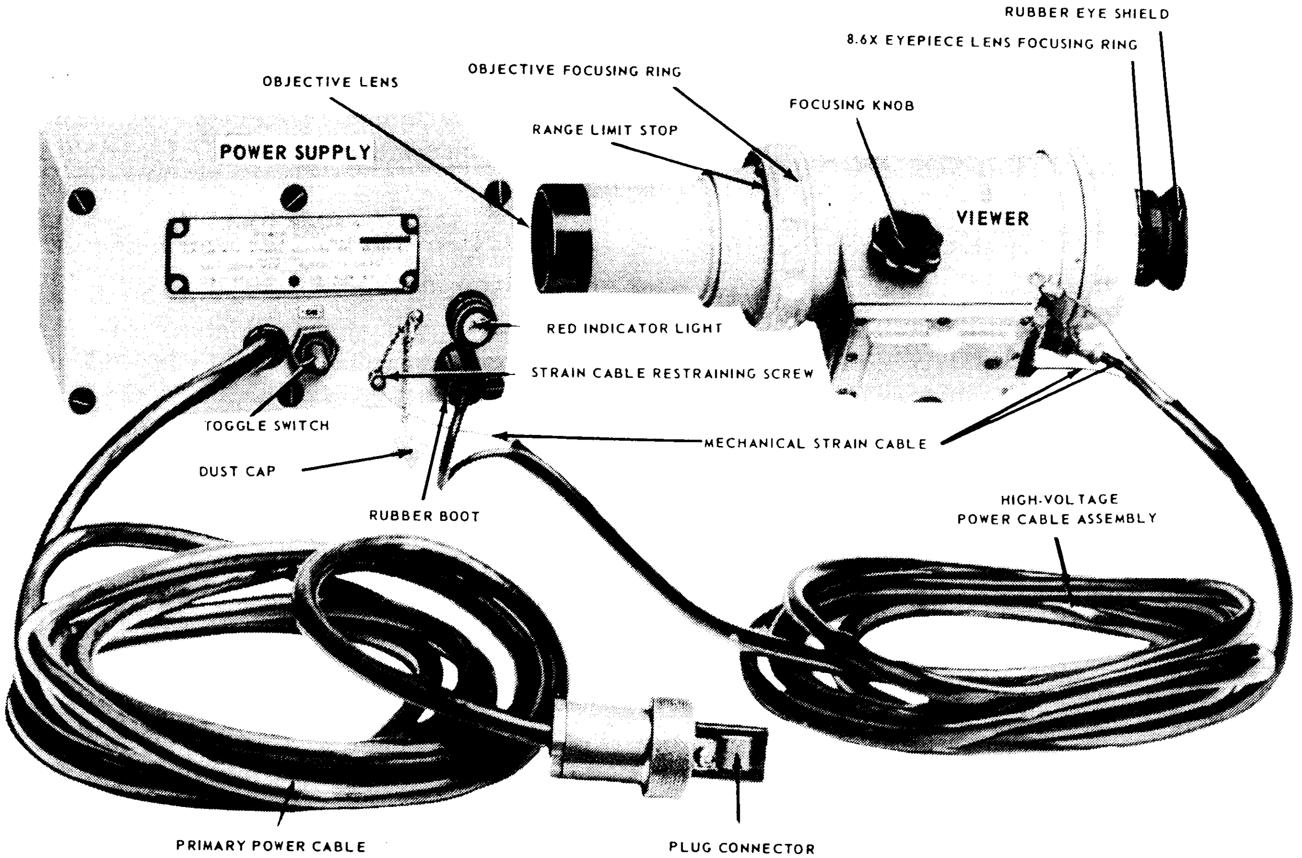

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Figure 10-9.—Electronic Infrared Receiver AN/SAR-4( ).

Voice-tone equipment units are not in general use at the present time. They work by modulation of a light beam which is received and amplified by a photocell receiver.

Electronic infrared viewers convert the infrared rays to visible light. They must be used to detect signals from the VS-18( )/SAT or AN/SAT-( ), or to observe a night scene illuminated by an infrared searchlight.

The AN/SAR-4( ) Viewing Set (fig. 10-9) is a very old set still used in the fleet. It consists of two main units: (1) 115 volts a.c. converted to 20,000 volts d.c. power supply, and (2) the viewer unit which consists of a sealed housing and two interchangeable sets of lenses. The housing contains an image converter tube which produces an image of the infrared scene on a phosphorescent screen. The AN/SAR-6 Viewing Set (fig. 10-10) is similar to the AN/SAR-4( ) except that it has an internal battery power supply instead of a separate power unit. The AN/SAR-7( ) Viewing Set (not shown) is similar to the AN/SAR-6 but is smaller and lighter. The Type T-7 AN/PAS-6 Infrared Metascope (not shown) is a small pocket-sized viewer used chiefly in amphibious operations. It includes an infrared flashlight which can be used for signaling, chart reading, and the like.

RADIAC EQUIPMENT

An important factor in the control of danger to personnel from ionizing radiation is the determination of how much radiation has been received by personnel and how much is present

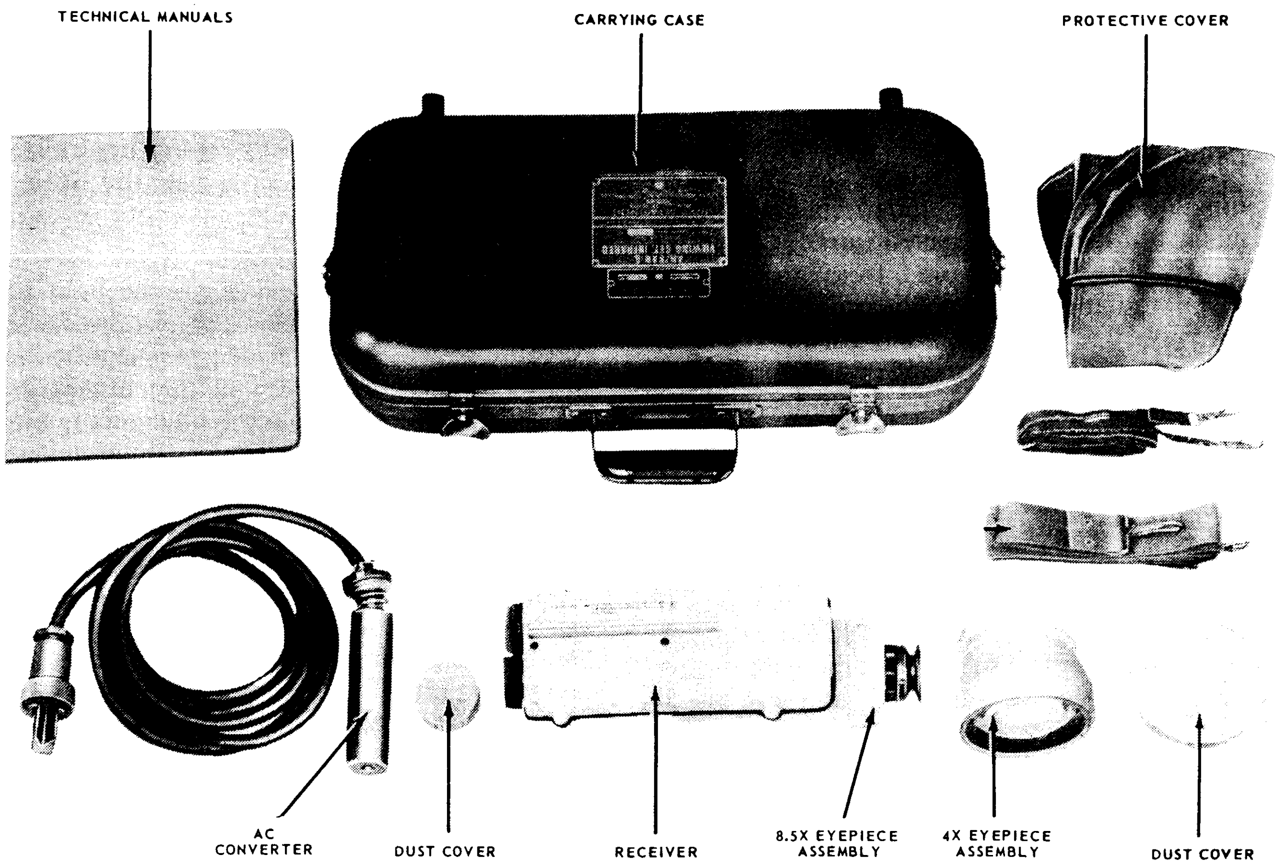

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Figure 10-10.—Electronic Infrared Receiver AN/SAR-6.

on the ship. Because it is impossible to detect radiation with the five senses, special instruments have been developed to detect and measure radiation. These radiological measuring instruments are known as radiac devices. (Radiac is a short term derived from the underlined letters of the words radioactivity detection, indication, and computation.) Radiac instruments are designed to (1) detect or measure alpha, beta, gamma, and neutron radiation, (2) measure the intensity of radiation, (3) determine the extent of contamination, (4) provide information for calculating the length of time that contamination will exist in an area, and (5) protect personnel by providing means for determining the radiation exposure received.

Radiation measurements are made in two ways: by measuring rate of exposure and by measuring total exposure. To help you fully understand these measurements the following definitions are provided:

1. Roentgen (r)—That amount of x- or gamma radiation which will produce 2.083×10^9 ion pairs in 1 cc of air under standard conditions. For the purpose of this discussion, one roentgen of x- or gamma-radiation is considered to deliver one rad.

2. Roentgen Equivalent Man (rem)—An equilibration of the dose of ionizing radiation to the body in terms of its estimated biological effect, relative to an absorbed dose of 1 roentgen of high voltage x-rays. The rem shall be the unit of dose for record purposes.

3. Radiation Absorbed Dose (rad)—The unit of absorbed dose of radiation, equal to 100 ergs of energy absorbed per gram.

All types of radiation do not produce the same ionizing potential and tissue damage. Whereas the term roentgen applies to x- or gamma radiation only, the term Roentgen Equivalent Man refers to radiations of all types. The term Radiation Absorbed Dose is a measure of total radiation absorbed from any source. You may find instruments scaled to make readings in any of the three terms.

Radiac instruments are of two general types: (1) those that show how much radiation has been received over a period of time (accumulated exposure); and (2) those that indicate the amount of radiation at any particular instant (exposure rate). Instruments of the first type, usually called dosimeters, are used to measure the amount of radiation to which a person has been exposed during a given period of time. Equipment of the second type are radiacmeters, and are used chiefly for surveying contaminated areas, structures, or objects to determine the amount and type of radiation emitted.

DOSIMETER

A typical pocket dosimeter of the self-reading type is the IM-9( )/PD (fig. 10-11). It may be used at any time you, or anyone else, become exposed to gamma or high energy x-ray radiation. This instrument uses a charging unit (not shown).

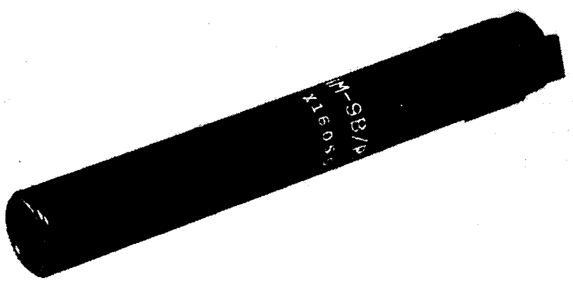

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Figure 10-11.—Pocket Dosimeter IM-9( )/PD.

At one end of the dosimeter is an optical eyepiece; at the other end, a charging contact. When the dosimeter is fully charged, an indicator viewed through the eyepiece is at the zero point on a scale. As radiation penetrates the instrument, its charge is dissipated or neutralized, and the indicator moves along the scale a distance proportional to the quantity of radiation received.

By holding the dosimeter to the light and peering through the eyepiece, the total radiation exposure received in milliroentgens can be read directly from the scale. The instrument measures (up to 200 milliroentgens) the high energy x- or gamma radiation accumulated by an individual. It is used by personnel who work in radiation areas to indicate when the accumulated maximum permissible exposure is reached.

Although self-reading, a dosimeter requires a separate charging device for setting the movable element on the zero of the interior scale. The charger requires no external power source; it produces a static electrical charge when the knob on the front of the unit is rotated. This pocket-sized device, known as the PP-4276( )/PD Charger, can serve many types of dosimeters.

The high-range non-self-reading dosimeter, DT-60/PD (not shown), is for use by personnel of all ships except submarines. This dosimeter consists of a special phosphate glass housed in a moistureproof plastic case. The dosimeter is about the size of a pocket watch, weighs less than an ounce, and is of sturdy construction. It will measure accumulated exposure from 10 to 600 roentgens. A special instrument, CP-95/PD, is required to read it.

RATEMETER

Ratemeters used for measuring radiation intensity (exposure rate) contain electronic circuits that detect the presence of radiation and indicate its intensity on a direct-reading meter. These radiac instruments are available in various sizes: some are portable; others are fixed. The meters use different detection methods to measure alpha, beta, gamma, and neutron radiation. Among the various types are the AN/PDR-27, -43, -45, -56, -65, and -70. A description of some of these ratemeters follows.

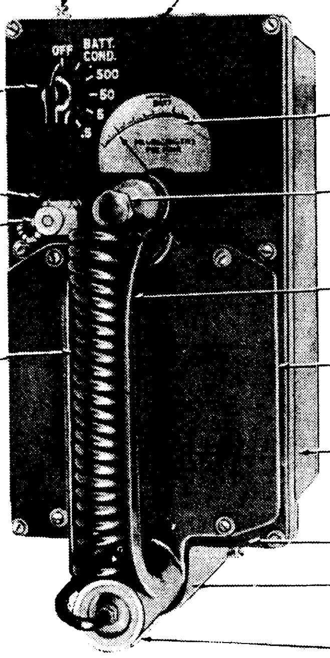

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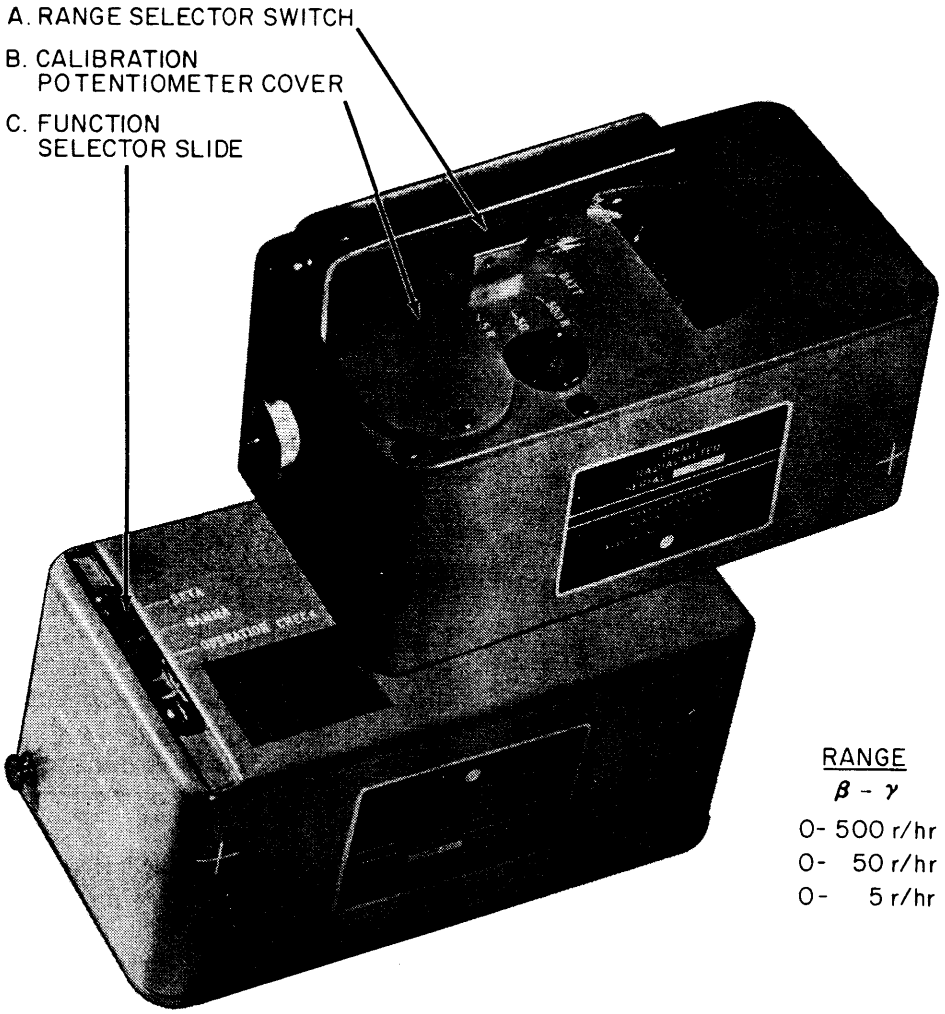
Figure 10-12.—Radiac Set AN/PDR-27.

The Radiac Set AN/PDR-27 (fig. 10-12) is a portable, watertight, battery-operated instrument that furnishes visual and aural indication of the detection and/or measurement of gamma and beta radiation. It has a range of 0 to 500 milliroentgens per hour (mr/hr) and is used to detect low intensity beta radiation or low intensities of beta and gamma radiations together, or to detect and measure gamma radiations alone. It is used to detect low intensities of beta and/or gamma radiation such as might be found on clothing or hands of personnel, or in moderately contaminated radioactive areas. In general, it is used for detailed monitoring of personnel, spaces, and material.

The high-range intensity meter, AN/PDR-43( ) (fig. 10-13), is a "pulsed" (controlled on time) end window Geiger-Mueller (G-M) type, portable radiac for measuring gamma radiation and detecting beta radiation. The end-window G.M. tube and associated electronic circuits are contained in a single metal case. X-ray and gamma radiation penetrates material more readily than does beta; therefore, an "end window" of relatively smaller thickness compared to the remainder of the cylinder wall is used to permit beta penetrations. The gamma-intensity range scales are 0 to 5, 0 to 50, and 0 to 500 roentgens per hour. Beta-gamma radiation may be detected on these range scales by properly positioning the function selector slide (beta shield-source slide) located on the bottom of the case. A source is contained on the function selector slide to check the range scales for response to radiation. The numerals on the meter face change with the position of the range selector switch. The following controls are provided: (1) a range selector switch with positions for OFF, BATT, and the three range scales; and (2) a function selector slide with OPERATION CHECK, GAMMA, and BETA positions. In the OPERATION CHECK position, the end-window of the G.M. tube is exposed to the source. In the GAMMA position, only gamma radiation is detected by the G.M. tube. In the BETA position, the end-window of the G.M. tube is exposed to beta and gamma radiations.

The AN/PDR-56( ) (fig. 10-14) is the Navy's standard alpha survey meter. This radiac set is hand carried and is comprised of a ratemeter with an auxiliary probe, a shoulder harness, headset, a probe handle extension, and a carrying case. The meter receives pulses from the probe and then converts them in a discriminator and ratemeter circuit to a meter reading. The reading is proportional to the amount of alpha contamination as seen by the probe. The AN/PDR-56( ) detects and measures the intensity of alpha radiation in counts per minute.

The AN/PDR-65 (fig. 10-15) is a high-intensity instrument that provides gamma radiation exposure and exposure rate information needed for tactical decisions. It is designed primarily for fixed shipboard installation but can be used as a portable instrument. It measures gamma field intensity to 10,000 rad/hr and exposure to 10,000 rads. The ratemeter portion of the instrument has four sensitivity



100.129

Figure 10-13.—Radiacmeter AN/PDR-43( ).

ranges: 0—10, 0—100, 0—1000, and 0—10,000. Accumulated exposure is given numerically in increments of 1 rad. The instrument consists principally of a detector assembly, power supply and remote control unit, remote detector mounting bracket, 200 feet of remote detector cable, and a carrying case.

The AN/PDR-65 utilizes a recycling ionization chamber detection principle with a recycling event occurring every 0.5 millirad. A recycling ionization chamber charges and discharges like a capacitor. A sounder with a low-range capability gives an aural indication of each recycling event. The detector assembly can operate remotely up to 500 feet from the instrument housing. Two units may be interconnected, e.g., one at a topside station and one below deck, so that the exposure rate topside can be monitored at the readout unit below deck.

The AN/PDR-65 is designed for continuous operation from a 115-volt, 60-hertz circuit. For the portable mode of operation, it is provided with four rechargeable nickel cadmium C batteries.

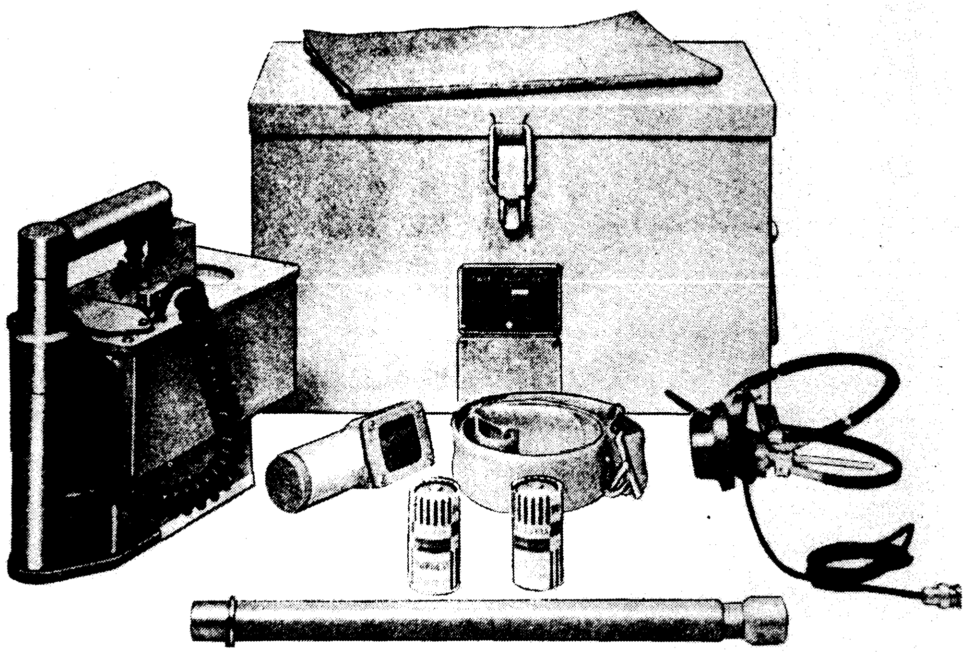


Figure 10-14.—Radiac Set AN/PDR-56( ). 5.184

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Figure 10-15.—Radiac Set AN/PDR-65.