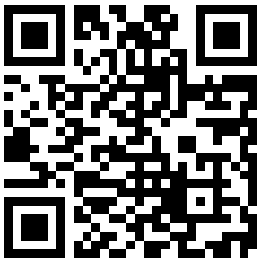

TM 11-1331

WAR DEPARTMENT TECHNICAL MANUAL

TECHNICAL OPERATION

RADIO EQUIPMENT RC-145-A

GENERAL DESCRIPTION, OPERATING INSTRUCTIONS AND EQUIPMENT PERFORMANCE LOG

WAR DEPARTMENT *31 JULY 1944*

WAR DEPARTMENT TECHNICAL MANUAL

TM 11-1331 [redacted]

This manual, together with TM 11-1431 and TM 11-1531, supersedes TM 11-1131, 26 July 1943, 6 September 1943, 1 December 1943.

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United States Government Printing Office
Washington: 1944

WAR DEPARTMENT,
WASHINGTON 25, D. C., 31 July 1944.

TM 11-1331, Radio Equipment RC-145-A, Technical Operation Manual, is published for the information and guidance of all concerned.

[A.G. 300.7 (29 June 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

Armies (5); Sv C (5); Dept (5); Def C (2); IC 4 (10) [1](5), 11, 44 (2); Each Arm and Service Board (2); Sig C Rep Shops (2).

IC 4: T/O 4-260-1; [1]4-87.
IC 11: T/O and E 11-107; 11-237; 11-592; 11-587; 11-597; 11-617.
IC 44: T/O and E 44-16; 44-17; 44-116; 44-117.

For explanation of symbols, see FM 21-6.

CONTENTS

REFERENCE NOTICE

TM 11-1331, TECHNICAL OPERATION MANUAL, is one of three technical manuals on Radio Equipment RC-145-A. It is used in conjunction with TM 11-1431, PREVENTIVE MAINTENANCE MANUAL, and TM 11-1531, SERVICE MANUAL. This manual, TM 11-1331, includes a general description of the radio equipment and instructions for installation and operation of the equipment and for use of the Equipment Performance Log. It is prepared to acquaint IFF operators and repairmen with the general operating features of the equipment and to provide a practical guide on how to use it. The book is written and arranged in such a manner that it gives the reader a logical story of the technical operation of the equipment and attempts to answer all questions that may arise in the reader's mind. This book is an introduction to the equipment and forms the basis for further study and work with the equipment.

DESTRUCTION NOTICE

WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut—Use axes, handaxes, machetes.

3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—All tubes, meters, dials, and knobs. Take special care to destroy completely the oscillator tubes in the transmitter.

2. Cut—All connecting cables and wiring.

3. Burn—All literature and schematic diagrams.

4. Bend—The antenna matching section, antenna, and transmitter tuning rods.

5. Bury or scatter—All nameplates and other parts that cannot be destroyed otherwise.

DESTROY EVERYTHING

WARNING

HIGH VOLTAGE

is used in the operation
of this equipment

DEATH ON CONTACT

may result if personnel fail
to observe safety precautions

Be careful not to contact high-voltage connections or 115-volt a-c input connections when installing or operating this equipment.

When working inside the equipment, after the power has been turned off, always ground every part before touching it.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:

Power Supply RA–105–A
Control Unit BC–1266–A
Radio Receiver and Transmitter BC–1267–A
Indicator I–221–A

FIRST AID TREATMENT FOR ELECTRIC SHOCK

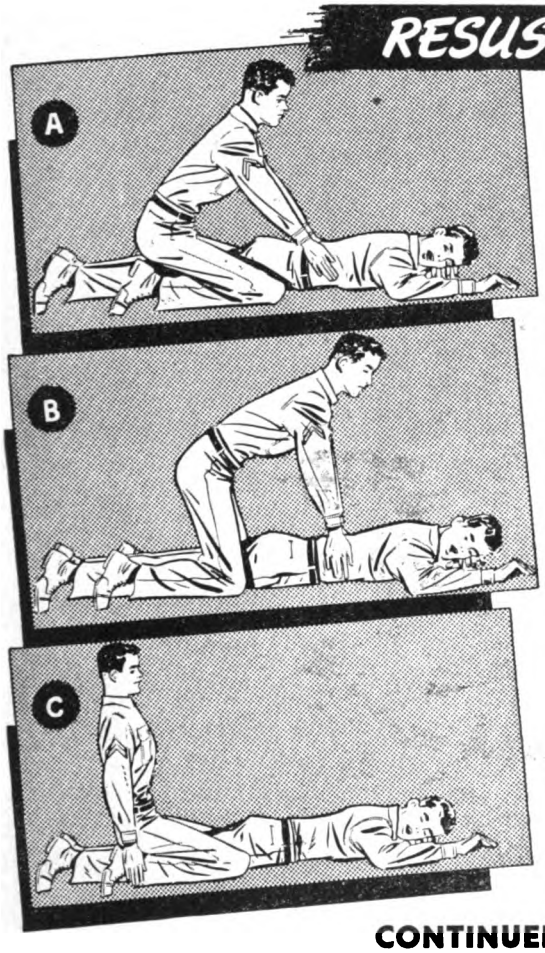
I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

Shut off the current. If this is not **immediately** possible, use a dry nonconductor (rubber gloves, rope, board) to move either the victim or the wire. Avoid contact with the victim. If necessary to cut a live wire, use an axe with a dry wooden handle. Beware of the resulting flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING.

Begin resuscitation at once on the spot. Do not stop to loosen the victim's clothing. Every moment counts. Keep the patient warm. Wrap him in any covering available. Send for a doctor. Remove false teeth or other obstructions from the victim's mouth.

RESUSCITATION



POSITION

1. Lay the victim on his belly, one arm extended directly overhead, the other arm bent at the elbow, the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing (fig. A).

2. Straddle the patient's thighs, or one leg, with your knees placed far enough from his hip bones to allow you to assume the position shown in figure A.

3. Place your hands, with thumbs and fingers in a natural position, so that your palms are on the small of his back, and your little fingers just touch his lowest ribs (fig. A).

FIRST MOVEMENT

4. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the victim. Your shoulders should be directly over the heels of your hands at the end of the forward swing (fig. B). Do not bend your elbows. The first movement should take about 2 seconds.

SECOND MOVEMENT

5. Now immediately swing backward, to remove the pressure completely (fig. C).

6. After 2 seconds, swing forward again. Repeat this pressure-and-release cycle 12 to 15 times a minute. A complete cycle should require 4 or 5 seconds.

CONTINUED TREATMENT

7. Continue treatment until breathing is restored or until there is no hope of the victim's recovery. Do not give up easily. Remember that at times the process must be kept up **forhours**

8. During artificial respiration, have someone loosen the victim's clothing. Wrap the victim warmly; apply hot bricks, stones, etc. Do not give the victim liquids until he is fully conscious. If the victim must be moved, keep up treatment while he is being moved.

9. At the first sign of breathing, withhold artificial respiration. If natural breathing does not continue, immediately resume artificial respiration.

10. If operators must be changed, the relief operator kneels behind the person giving artificial respiration. The relief takes the operator's place as the original operator releases the pressure.

11. Do not allow the revived patient to sit or stand. Keep him quiet. Give hot coffee or tea, or other internal stimulants.

HOLD RESUSCITATION DRILLS REGULARLY

Figure 1. Tactical operation of Radio Set SCR-545-A and Radio Equipment RC-145-A.

This manual together with TM 11-1431 and TM 11-1531 supersedes TM 11-1131, 26 July 1943, 6 September 1943, 1 December 1943.

CHAPTER 1

GENERAL DESCRIPTION

Section I. PURPOSE OF THE EQUIPMENT

1. Scope of Manual

a. This manual is prepared to acquaint radar operators and repairmen with the general features and technical operation of Radio Equipment RC-145-A in conjunction with Radio Set SCR-545-A. The chapters are as follows:

(1) General Description.
(2) Installation.
(3) Operation.
(4) Equipment Performance.
(5) Conversion for Travel.

b. This manual, TM 11-1331, is a practical guide on how to use the equipment. It is primarily concerned with the installation and technical operation of the equipment. It presents an explanation of the functioning of the major systems, but omits discussion of circuit theory, maintenance, and trouble shooting. (TM 11-1431 is the Preventive Maintenance Manual. TM 11-1531 is the Service Manual covering theory, trouble shooting, and repairs.)

2. Purpose of IFF Systems

Radar identification systems and equipment, known as IFF (Identification Friend or Foe), have been developed to identify aircraft detected by radar sets. IFF equipment serves the same purpose for the radar operator that a knowledge of aircraft recognition does for the individual soldier who must decide quickly whether the approaching plane is friendly or hostile. Radar will detect planes giving their direction and range; IFF will identify them as friend or foe. Any delay in recognition may permit enemy aircraft complete their mission, or cause friendly antiaircraft batteries to fire on friendly planes; therefore the use of IFF equipment is vitally important. With the aid of this equipment, the radar operator can immediately identify the planes he picks up, thus avoiding the danger in delayed recognition.

3. Purpose of Radio Equipment RC-145-A

Radio Equipment RC-145-A is the IFF equipment designed for operation with Radio Set SCR-545-A, which is a mobile medium-range radar set used with antiaircraft artillery (fig. 8). By means of Radio Equipment RC-145-A it is possible to determine whether a plane detected by Radio Set SCR-545-A is friend or foe. The IFF equipment displays an identifying signal from a friendly plane and localizes the source of the signal by indicating the azimuth and the range.

4. Meaning of Range

The slant range of a target is the straight line distance between the observer and the target. In the case of an IFF system, it is the distance from the IFF antenna to the plane. Radio Equipment RC-145-A measures slant range in yards. Since the equipment measures *slant range* only, the terms *slant range* and *range* are used synonymously in this manual.

5. Meaning of Azimuth

The azimuth of a target is the angle measured clockwise from a reference line to an imaginary horizontal line running from the IFF antenna in the direction of the target. The reference line used is an imaginary horizontal line from the IFF set through *true north*. The azimuth angle is measured in mils in antiaircraft artillery work. There are 6,400 mils in a circle; one degree equals 17.77 mils.

Section II. FUNCTIONING OF EQUIPMENT

6. Basic Radar Identification Systems

This section describes the functioning of Radio Equipment RC-145-A, how it identifies targets, and

how it determines range and azimuth. First a basic IFF system is described; then a comparison is made with Radio Equipment RC–145–A.

a. DESCRIPTION. The complete IFF system consists of two separate units; the ground unit, located near the radar set, called the *interrogator-responsor,* and the airborne equipment, called the *transpondor,* which is located in the friendly plane. The radar operator challenges an unidentified plane by putting the interrogator-responsor into operation. As shown in figure 2, pulses of radio-frequency (r-f) energy are radiated toward the plane. These pulses are weak compared with the power in the radar pulses, and therefore the signals reflected from the plane are too small to be detected. If, however, the plane is friendly, it will contain a transpondor. The interrogation pulses are received by the transpondor and are amplified, altered, and retransmitted. These retransmitted pulses are strong enough to be detected by the interrogator-responsor, which amplifies them and displays them on a cathode-ray tube. The signals are linked to a particular plane by obtaining *range* and *azimuth* information. In addition they are identified as friendly through *coding* introduced by the transpondor.

b. INTERROGATOR-RESPONSOR. The ground equipment consists of transmitter and synchronizer (interrogator), receiver and display (responsor), and associated antenna and power units. The transmitted pulses are synchronized with the radar pulses to prevent mutual interference. The synchronizing voltage is obtained from the radar set and modified by the synchronizer to control the transmitter. The r-f pulses from the transmitter are fed to a highly directional antenna. The transmitting and receiving antennas are usually one antenna used for both purposes (fig. 2). The returned coded pulses are detected and amplified by the receiver circuits and then sent to the

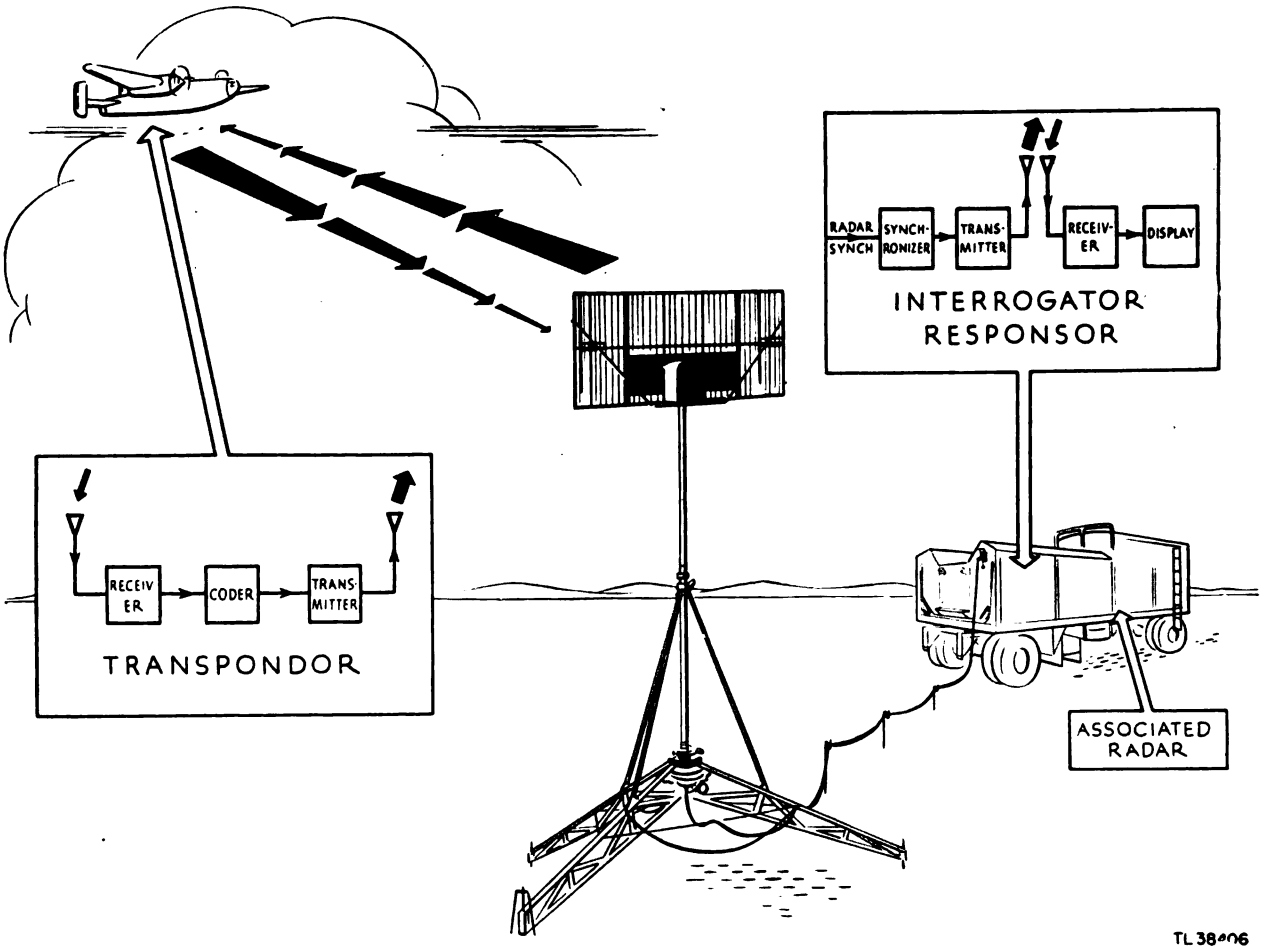


Figure 2. Basic IFF system.

display unit. The display unit is synchronized with the transmitter. Traces on a cathode-ray tube are used to indicate *coding* and *range*. Since there is little delay in the transpondor, the time lapse between the transmitted interrogation pulse and the received coded pulse can be used to measure the range accurately. By rotating the antenna, the operator is able to examine space as he could with any radar set and thus obtain the *azimuth* of the responding plane.

c. TRANSPONDOR. The airborne equipment consists of receiver, coding, and transmitter units; an antenna; and power supply. The very sensitive receiver detects the interrogation pulses and passes them to the code unit. Here they are amplified and the pulse width is varied according to a code, but the repetition rate is maintained. These coded pulses are used to actuate the transmitter which retransmits the altered interrogation pulses. It is because of this additional push given to the original pulses that the IFF equipment with its very low power will have the same range as the larger and more powerful radar set. The transpondor normally uses one antenna for both receiving and transmitting.

7. Radio Equipment RC–145–A

Radio Equipment RC–145–A is an interrogator-responsor. It consists of a control unit containing synchronizing and display circuits, a transmitter and receiver, an indicator for azimuth display and control, a power supply, and an antenna. Paragraphs 8 through 13 discuss the general functioning of Radio Equipment RC–145–A in comparison with the basic IFF system.

8. Transmitting System

The transmitting system contains synchronizing circuits, a transmitter, and an antenna. The control unit receives a signal from the radar set each time the radar set transmits a pulse of energy. Alternate signals are suppressed in the control unit, and the remaining pulses are used to trigger the transmitter. This division is to prevent IFF from challenging the plane too frequently and swamping the transpondor. The control unit also contains a switch to cut off the triggering pulse when interrogation is not desired. The transmitter contains circuits to shape a pulse which modulates an r-f oscillator. Pulses of r-f energy generated by the transmitter are sent to the antenna through an antenna matching network which allows the use of the same antenna for transmitting and receiving. The antenna is highly directional, radiating a narrow beam, the direction of which can be controlled.

9. Receiving System

Identifying signals from a plane are picked up by the antenna, which has the same directional properties when receiving as when transmitting. The direction is under the control of the operator, but it is also continuously switched from side to side automatically. This switching is used for obtaining accurate azimuth information as described in paragraph 12. The signals pass through the antenna matching network to the receiver, which is a superheterodyne using 12 tubes and a tuning eye. The sensitivity control is in the control unit. The receiver sends the received signals to the display system in the form of unidirectional pulses.

10. Display System

The display system consists of two target indicators and their associated control circuits.

a. One target indicator is the dial on the remote indicator that indicates the direction the antenna is pointing (fig. 3). This dial is rotated manually, and a

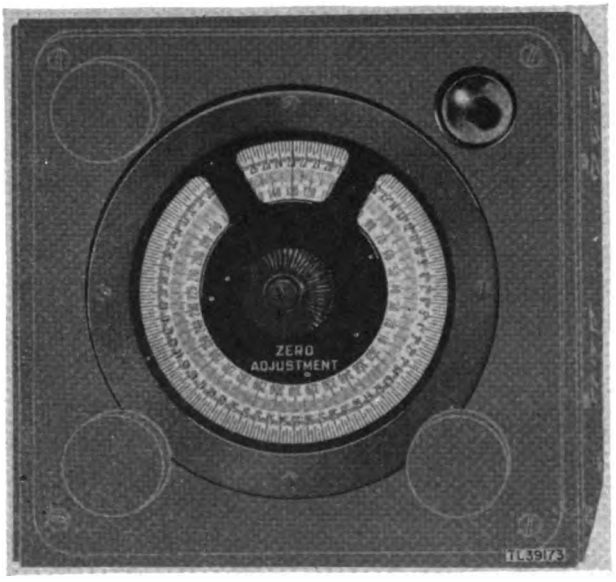


Figure 3. Target indicator, azimuth.

selsyn system causes the antenna to follow the rotation of the dial. The dial can be read in both degrees and mils. When the antenna comes to rest in

the position indicated on the azimuth dial, the tuning eye closes.

b. The other target indicator is an A-type cathode-ray tube display. Signals appear as pips on a horizontal line (fig. 4). The display is synchronized with the transmitted signal by the synchronizer that triggers the transmitter pulse. Synchronization involves starting the sweep at the right instant, calibrating its

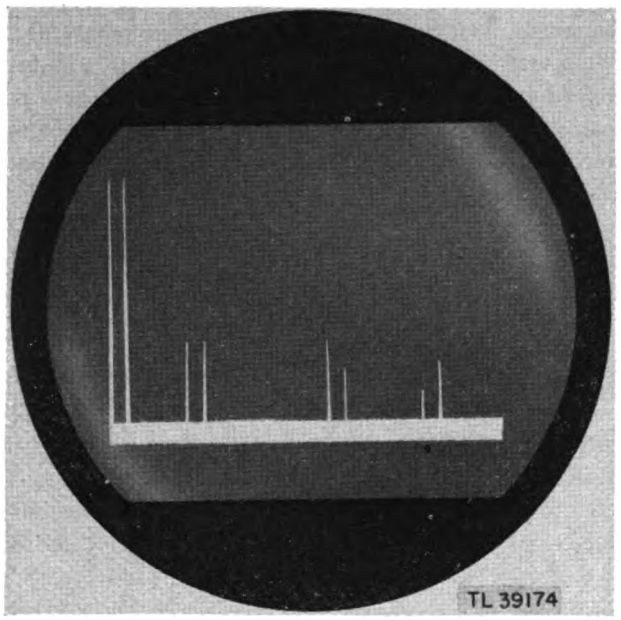


Figure 4. Target indicator, cathode-ray tube.

duration, brightening it, and shifting it with the switching of the antenna beam as described in paragraph 12. By means of the traces on the screen of the cathode-ray tube, the operator can determine the *range* of the target. Two sweeps may be selected by a switch. One measures up to 100,000 yards, the other measures any 10,000-yard section (chosen by the setting of the *radar set* range oscilloscope) to 40,000 yards. *Azimuth* is determined by observing the traces in conjunction with the azimuth indicator. The traces also show *coding*. The cathode-ray tube and its controls are located in the control unit, which also contains the synchronizing and sweep circuits.

11. Determination of Range

a. Range is obtained by converting time into distance. The time involved may be divided into three parts: the time required for an IFF signal to leave the antenna and travel to the target; the time required for the reception, alteration, and retransmission of the signal at the transpondor; and the time required for the return of this signal to the interrogator antenna. The second part, reception and retransmission at the transpondor, takes negligible time. Therefore the time taken for the signal to travel to and from the target is used as a measure of range. The change-over from time to distance is possible because it is known that the velocity of radio waves is constant in space and is such that it takes approximately 6.1 microseconds for the round trip between an interrogator-responsor and transpondor that are 1,000 yards apart.

b. In order to measure this brief time, a spot is started across the screen of the cathode-ray tube when the pulse is transmitted. The speed with which this spot travels is calibrated. When the signal returns from the plane, a mark is made on the path of the spot. The distance the spot has travelled across the screen is a measure of the time taken for the signal to reach the plane and be returned, and therefore a measure of the range of the target.

c. On the cathode-ray tube of Radio Equipment RC–145–A, the spot travels from left to right at such a high velocity and so frequently that its course appears as a line. The received signal appears as a vertical deflection, or pip, above the line. At long ranges, the range of the target is estimated by observing the distance along the line at which the signal appears (fig. 5). At short ranges the *radar set* measures the

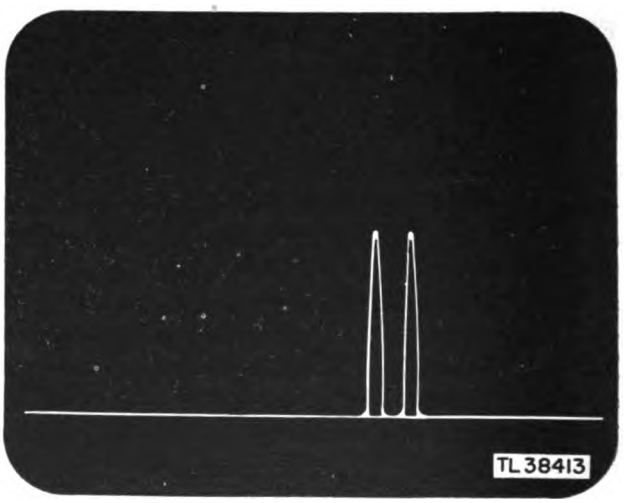


Figure 5. Range determination (100,000 yd.).

range of the target it is tracking. A synchronizing voltage is obtained from the radar set at an instant before the responding signal from the target is re-

ceived. This synchronizing voltage starts the spot moving across the face of the IFF cathode-ray tube. Thus a responding signal from the plane being tracked by the radar set appears at the beginning of the timebase trace (fig. 6).

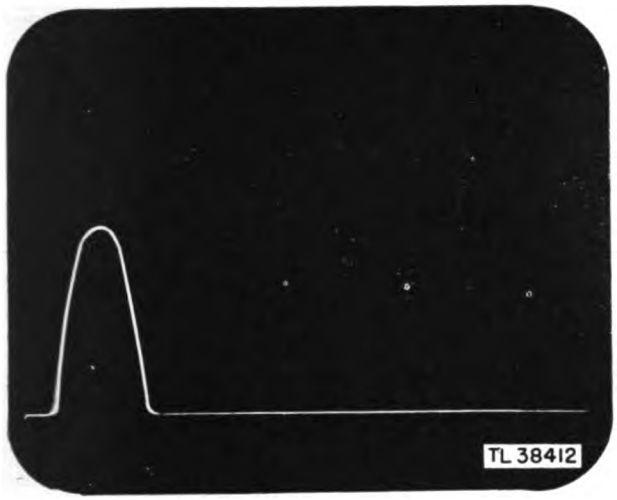


Figure 6. Range determination (10,000 yd.).

12. Determination of Azimuth

a. When the beam from the antenna is directly on the target, the received signal is strongest. If the beam moves to one side or the other, the strength of the received signal decreases. In Radio Equipment RC–145–A, the beam is moved from side to side automatically. This is done by a switch mounted behind the antenna that alters the electrical characteristics of the antenna without actually moving it. If the antenna is pointing directly toward the target, the signals received when the beam is moved to each side will be of equal strength. If the antenna is pointing slightly away from the target, the signal will be stronger when the beam moves to the side toward the target than when it moves away from the target.

b. When the signals are displayed on the cathode-ray tube, the height of the pips indicates the strength of the signals. The path of the spot can be shifted in synchronism with the shifting of the beam so that the signals from the two sides can be seen side by side. This is known as *spread* and can be adjusted by the operator. When the antenna is pointing toward the target, the signals will be of equal height (fig. 7). When the antenna is not at the azimuth of the target, one pip will be higher than the other. The direction in which the antenna is pointing is observed on the azimuth indicator.

13. Coding

Additional security is provided by having signal replies of two different widths transmitted by the transpondor in various sequences. (There is a third width,

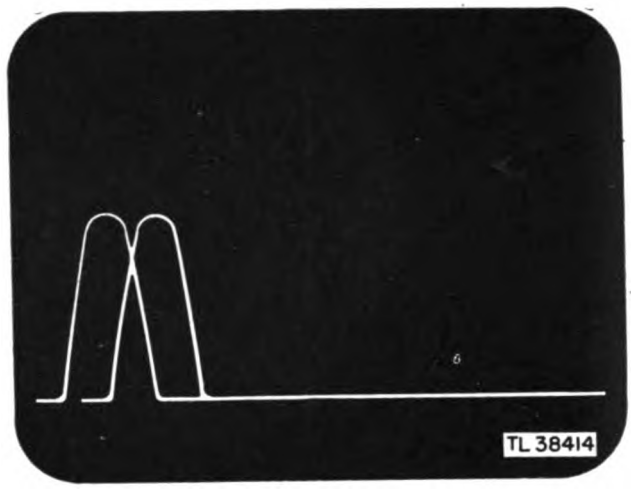


Figure 7. Azimuth determination.

which is the widest, for emergency use only when the aircraft is in trouble.) The two widths are referred to as *wide* and *narrow;* the wide-reply pip appears about three times as wide as the narrow-reply pip. These two types of response, together with a blank (no signal at all), are used in several sequences to form a prearranged code. The identifying signal replies must appear in the correct sequence for the aircraft to be assumed friendly.

Section III. COMPONENTS

14. General Design

Radio Equipment RC–145–A, with the exception of the antenna and its supporting tower, has been designed to fit into the trailer that houses Radio Set SCR–545–A. The tower and antenna are set up for operation near the trailer (fig. 8).

A list of the major components with physical specifications is given in table I. Figure 9 shows the components which mount in the rear of the trailer (fig. 26).

The operating position is located in cab of Trailer K–75–A (fig. 10).

Several of the components of Radio Equipment RC–145–A can be used with other identification equipments as shown in table II.

The tube complements of the components are given in table III.

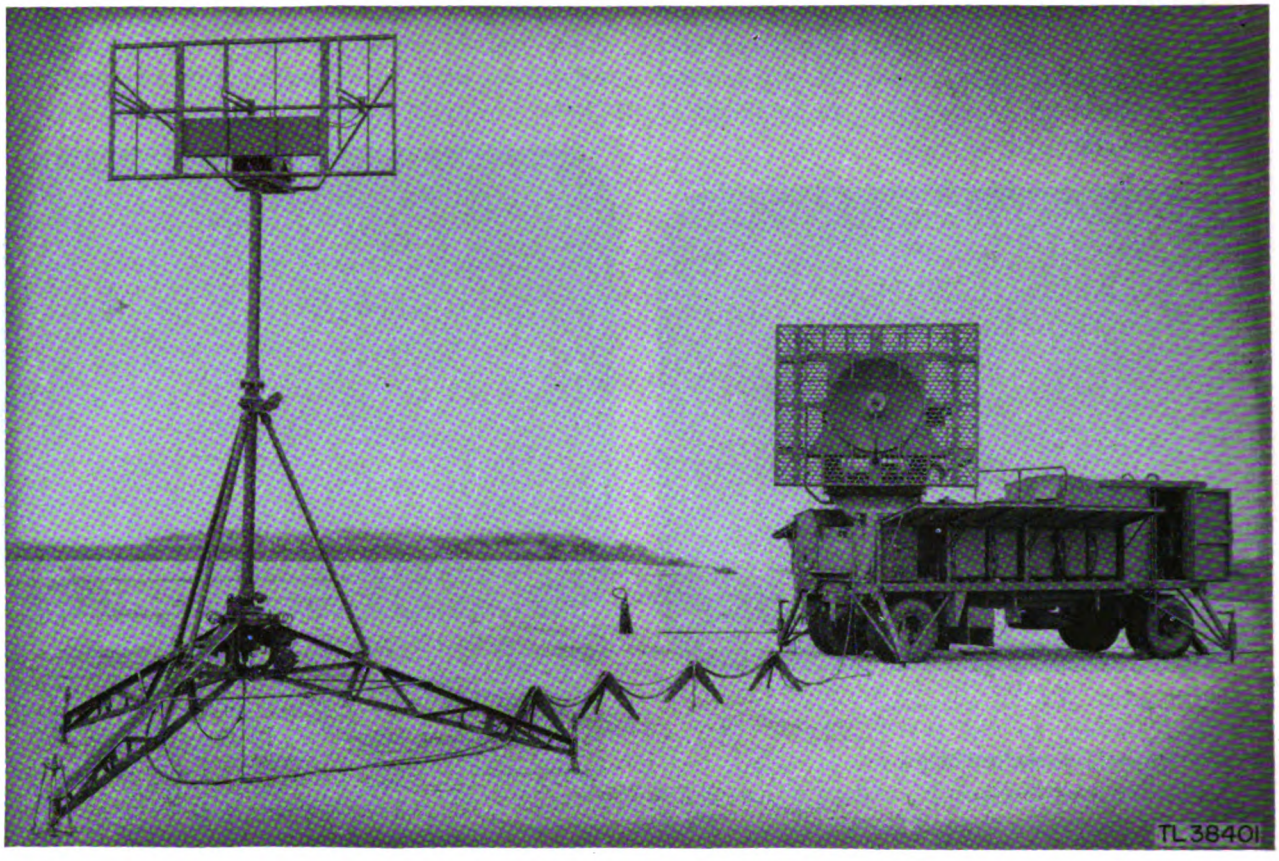


Figure 8. Radio Set SCR-545-A and Radio Equipment RC-145-A.

Table I. Sizes and weights of components

Component	Size (inches)			Weight (lb)
	Height	Width	Depth	
Control Unit BC-1266-A	12¼	8½	26	59.5
Radio Receiver and Transmitter BC-1267-A	10	23⅞	18 13/32	64.5
Indicator I-221-A (Remote Indicator I-227-A removed)	10	23⅞	18 13/32	95
Remote Indicator I-227-A	7⅛	7 3/16	18 11/16	13
Power Supply RA-105-A	10	23⅞	18 13/32	118.5
Rack FM-79	39 5/16	26⅜	20½	110
Tower TR-24-A	Column and supporting legs are 15 feet high and stand on circle of 18-foot diameter.			800
Switch SW-220-A	8	16	8	26
Antenna AN-154-A	41	90	30	110
Signal Generator I-222-A	12	19½	7½	50

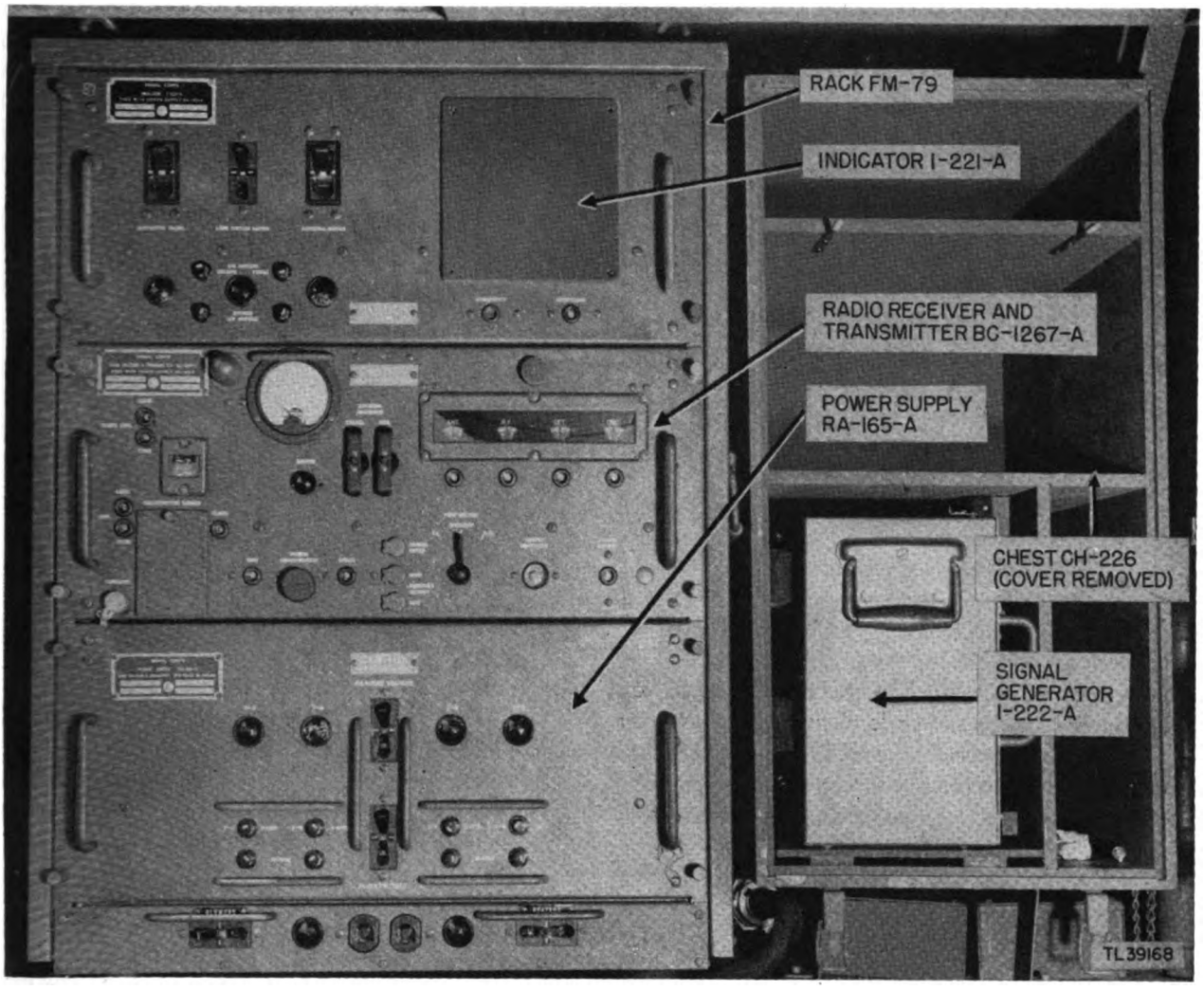


Figure 9. Components installed in rear of Trailer K-75-A.

Table II. Identification components interchangeable on other radio equipments

Component	Radio equipments
Radio Receiver and Transmitter BC-1267-A	RC-127-A, RC-148-C, RC-350, RC-351, RC-182-A, RC-184, RC-188, RC-207-A, RC-215-A, RC-246-A, RC-282-A, AN/CPX-1.
Power Supply RA-105-A	
Signal Generator I-222-A	
Indicator I-221-A	All above except RC-148-C.
Remote Indicator I-227-A	
Antenna AN-154-A	
Control Unit BC-1266-A Rack FM-79	RC-145-A only.
Tower TR-24-A	RC-127-A, RC-350, RC-184, RC-246-A.
Tower rotating mechanism	All above except RC-148-C.

Table III. Tube complements of individual components

Control Unit BC–1266–A	Radio Receiver and Transmitter BC–1267–A	
	Transmitter	Receiver
2 VT–107–A (6V6GT) 3 VT–112 (6AC7) 1 VT–116 (6SJ7) 1 VT–119 (2X2/879) 7 VT–231 (6SN7GT) 1 VT–( ) (5CP1)	1 VT–107–A (6V6GT) 2 VT–94 (6J5) 1 VT–231 (6SN7GT) 2 VT–( ) (2C26) 1 VT–( ) (3E29) 1 VT–( ) (9006)	1 VT–90 (6H6) 1 VT–215 (6E5) 7 VT–( ) (6AG5) 3 VT–( ) (6AK5) 1 VT–( ) (6C4)
Power Supply RA–105–A	**Indicator I–221–A**	**Signal Generator I–222–A**
3 VT–119 (2X2/879) 1 VT–126B (6X5GT) 3 VT–244 (5U4G)	1 VT–168–A (6Y6G) 1 VT–218 (100TH) 4 VT–229 (6SL7GT) 1 VT–231 (6SN7GT) 1 VT–215 (6E5) remote indicator	1 VT–94 (6J5) 2 VT–116 (6SJ7) 1 VT–197–A (5Y3G) 1 VT–202 (9002) 1 VT–( ) (9006)

15. Power System

The equipment is designed to operate from a 115-volt 60-cycle line. This power is obtained from Trailer K–75 which houses Radio Set SCR–545–A. The maximum power consumption with test equipment in operation is 1,560 watts. The power requirements of the individual components are given in table IV. The interconnecting cables supplied with the equipment connect with junction boxes, which are part of the trailer, to supply power to Rack FM–79 and Control Unit BC–1266–A. The circuit breaker marked

Table IV. Power requirements of RC–145–A components

Components	Volts	Cycles	Watts [a]
Power Supply RA–105–A	117.5	60	450
Control Unit BC–1266–A	117.5	60	60, plus 25 from Power Supply RA–105–A.
Radio Receiver and Transmitter BC–1267–A	Obtains power from Power Supply RA–105–A.		
Indicator I–221–A	117.5	60	250[b]
Signal Generator I–222–A	117.5	60	40
Heater and blower in Rack FM–79	117.5	60	350
Tower TR–24–A	Obtain power from Indicator I–221–A.		
Switch SW–220–A			
Remote Indicator I–227–A			

a Maximum power consumption of entire equipment is 1,560 watts.
b Antenna stationary; antenna rotating, 480; antenna "hunting," 390–460; motor starting, 630; motor reversing, 720.

IFF on the power panel of Radio Set SCR–545–A controls power to the rack. The wiring in the rack supplies power to the components that slide into the rack. Power is supplied to the control unit when the range oscilloscope of Radio Set SCR–545–A is turned on.

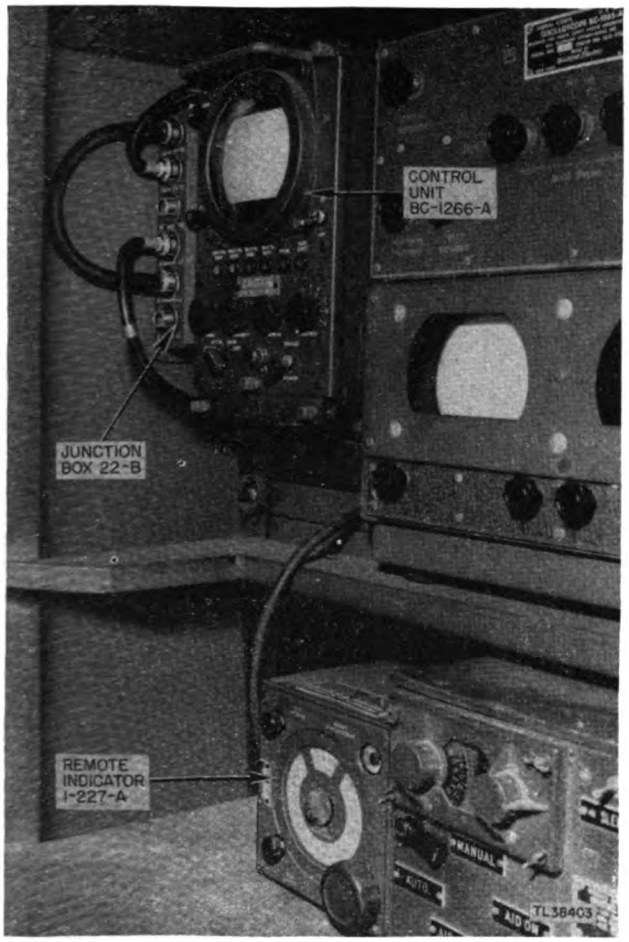


Figure 10. Components installed in cab of Trailer K–75–A.

16. Tower TR–24–A

The antenna tower carries the antenna, the antenna drive gearcase, the drive motor, the lobe switch, and certain supporting and connecting apparatus. It consists essentially of a two-section, rotatable column mounted on a three-legged base. Immediately over the base are the gearcase and the antenna motor assembly. The antenna and the lobe switch are mounted on top of the column (fig. 11). The rotatable column is further supported by a tripod assembly consisting of three struts and a center bearing which is placed approximately halfway up the column. This assembly is used also in raising the antenna and column into place at the time the tower is erected. The center column is composed of two hollow cylindrical iron members bolted together and carries, in the channel through the center, all the cables to the antenna and the lobe switch. This necessitates the use of a rotary joint. The tower receives its power from Indicator I–221–A. Rotation is controlled by Remote Indicator I–227–A. Azimuth information may be obtained from an indicating dial on the upper part of the gearcase. This dial is used in the original orientation of the radio equipment but, subsequent to this, azimuth information is usually obtained from the remote indicator in the cab of Trailer K–75–A.

17. Antenna AN–154–A

The antenna is mounted on Tower TR–24–A (fig. 11). It is an array of three vertical half-way dipoles mounted in front of a plane reflector (fig. 12). The reflector is a tubular framework with vertical wires. The radio-frequency energy is carried to and from the antenna by means of coaxial cables which are connected at the rear of the reflector (fig. 13).

18. Switch SW–220–A

The lobe switch is located in a box connected to the rear of the antenna reflector (fig. 13). It is driven by a 1/12-horsepower synchronous motor which has a speed of 1,800 revolutions per minute. A cam and two sets of contacts are operated. They make circuit connections to switch the beam, spread the signals in synchronism with the beam switching, and blank out the signals while the beam is being switched.

19. Rack FM–79

a. The rack (fig. 14) is divided into three sections which contain the following components (from top to bottom):

(1) Indicator I–221–A.

(2) Radio Receiver and Transmitter BC–1267–A.

(3) Power Supply RA–105–A.

b. Interconnecting plugs and cables for these components are permanently mounted on the rear of the rack, which has been designed so that when a component is slid into the rack, certain cable connections are automatically made. This arrangement facilitates quick assembly and disassembly of the equipment since there is very little external cabling. For purposes of safety, an interlock switch is included in the rack wiring. This switch, located in the center portion of the rear wiring channel, is actuated by

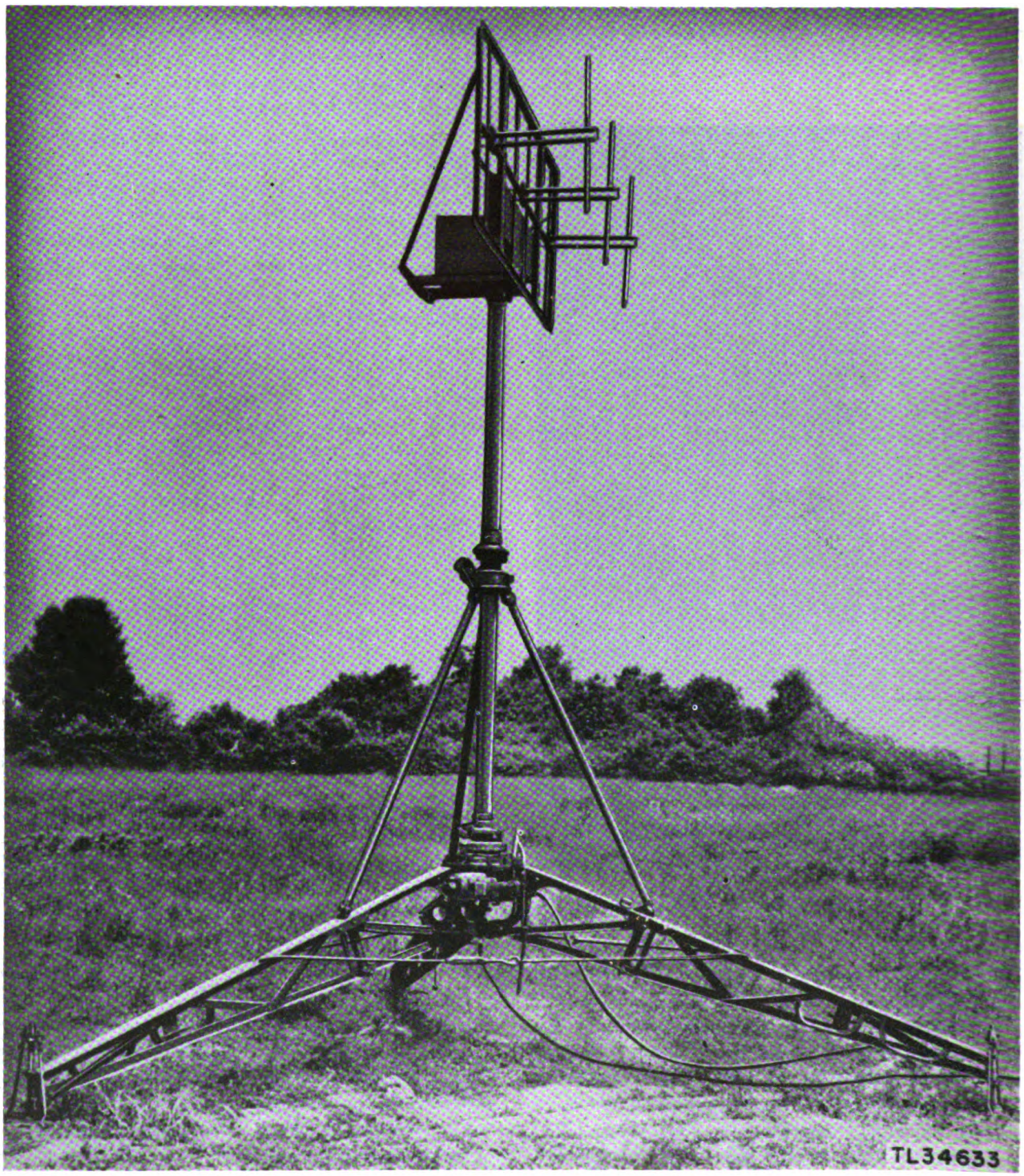


Figure 11. Tower TR-24-A, with Antenna AN-154-A in position.

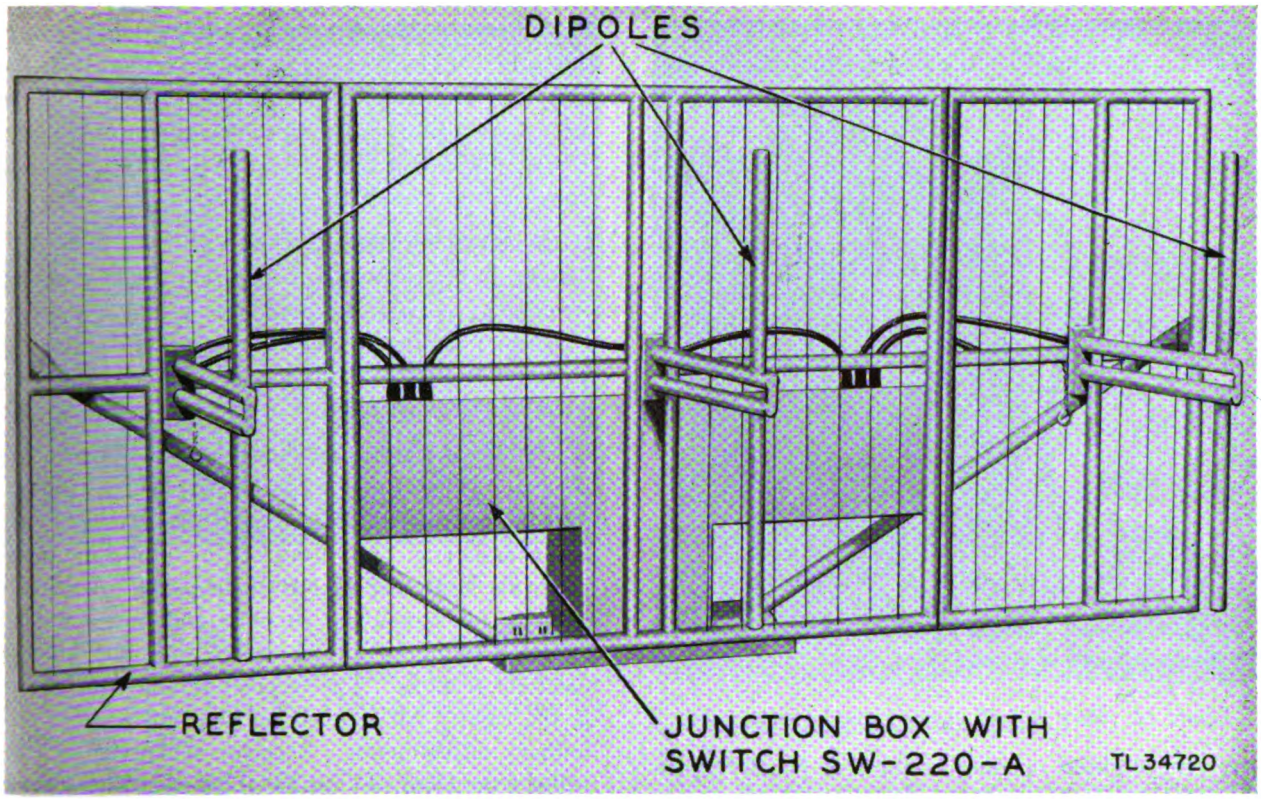


Figure 12. Antenna AN–154–A, front.

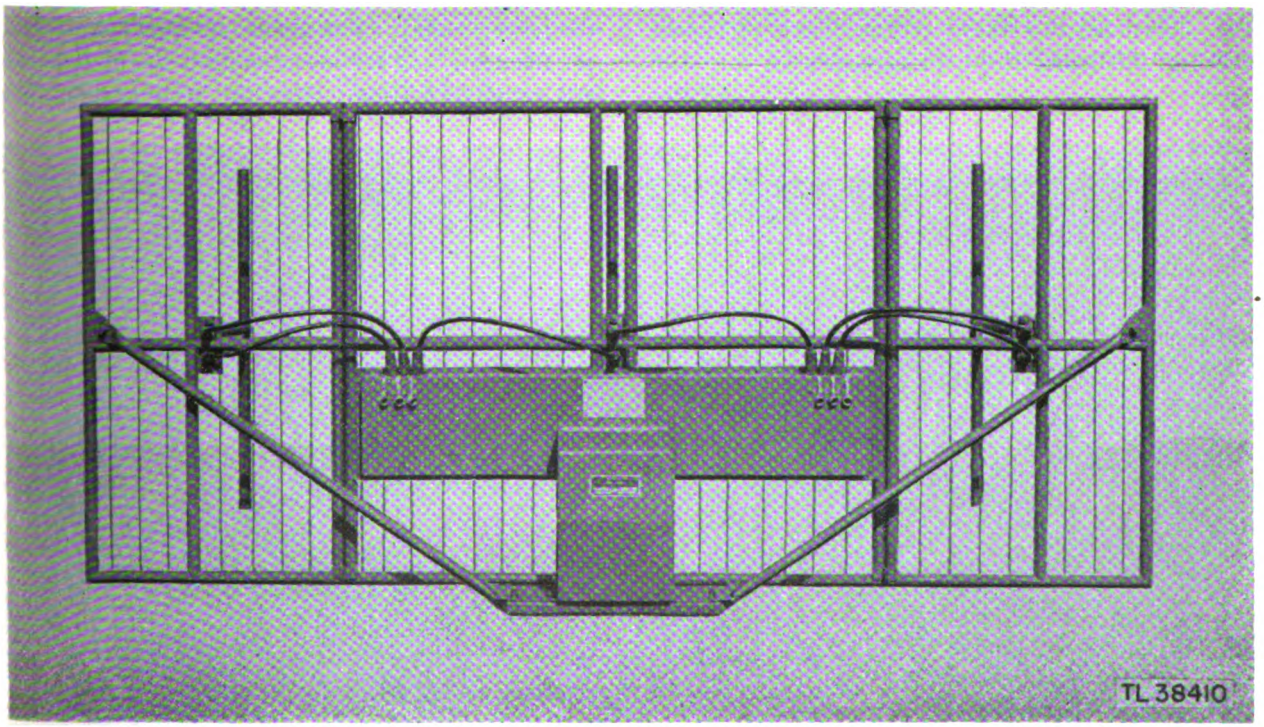


Figure 13. Antenna AN–154–A, rear, showing Switch SW–220–A.

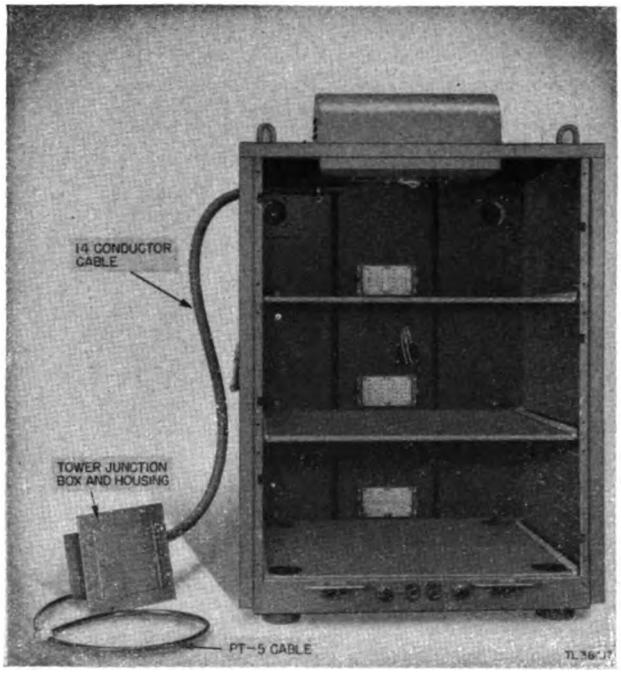


Figure 14. Rack FM-79 showing tower junction box.

even the slightest opening of the rear panel. Opening of the switch breaks all high-voltage circuits to the various components. Permanently attached to the rack by a cable is the tower junction box in its housing. The rack contains a blower and two heaters. Switches for these are on the lower panel. Also on this panel are two receptacles for line voltage.

20. Indicator I–221–A

Indicator I–221–A (fig. 15) has circuit breakers for applying power to the tower and lobe switch and has screwdriver controls for adjusting the motion of the tower. Fuses for the power circuits are accessible from the front panel.

21. Remote Indicator I–227–A

Remote Indicator I–227–A (fig. 16) has controls for turning the antenna and a dial and tuning eye for indicating the position of the antenna. The dial has two scales. One reads from zero to 360° and the other from zero to 6,400 mils.

22. Radio Transmitter and Receiver BC–1267–A

This component contains a transmitter, a receiver, and an antenna matching section, mounted on a common chassis (fig. 17). Controls for tuning the transmitter are located at the left of the panel. A meter is available for measuring currents and power output. The two plungers in the center tune the antenna matching sections. The receiver tuning controls are on the right. All controls on this unit are for preliminary adjustments. Receiver sensitivity is controlled from Control Unit BC–1266–A. The antenna connection is at the lower left corner of the panel.

23. Power Supply RA–105–A (fig. 18)

There are two circuit breakers on the front panel of the power supply. The upper one controls power to the filaments, and the lower controls the plate power. All circuits are fused from the front panel. This

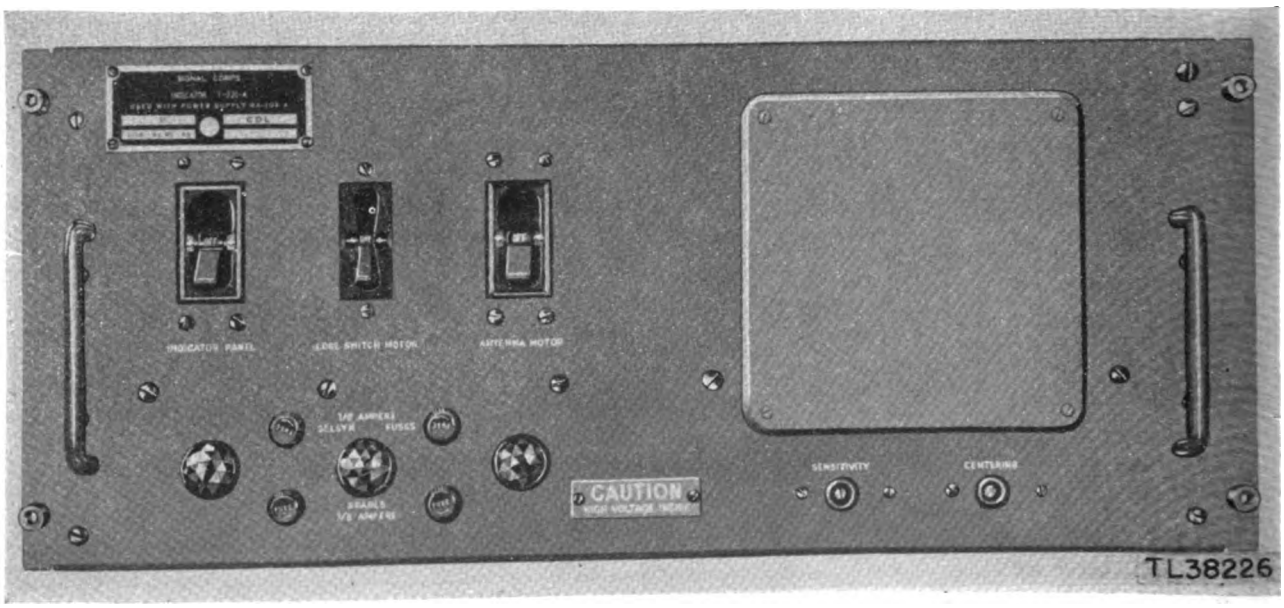


Figure 15. Indicator I–221–A.

Figure 16. Remote Indicator I–227–A.

unit supplies all filament and d-c voltages for Radio Transmitter and Receiver BC–1267–A and plate voltages for Control Unit BC–1266–A except those for cathode-ray tube.

24. Control Unit BC–1266–A (fig. 19)

The control unit contains the cathode-ray tube on which the signals appear. Directly below the cathode-ray tube is a row of screwdriver controls which are used in preliminary adjustments. The other knobs and switches are operating controls. All synchronizing circuits for the transmitter and display are located in this unit. Sweep circuits for the cathode-ray tube and a video amplifier for signals are also located on this chassis.

25. Interconnecting Cables

A set of 16 interconnecting cables, complete with connectors, is furnished with the equipment (table V).

26. Test Equipment

Signal Generator I–222–A (fig. 22), five test cables (fig. 23), and a test antenna (fig. 24) comprise the test equipment. They are packed in Chest CH–226, which mounts permanently beside Rack FM–79. The signal generator is housed in a portable metal cabinet. It has a telescoping antenna, and there is a calibration chart behind a door on the front panel. The test equipment is used in tuning the transmitter and receiver.

27. Spares

Major and minor spares come in five chests (fig. 25). The major spares are complete components with tubes. Table VII gives the chests of spares and their contents. (The contents of Chest CH–226 and Chest CH–232 are not spares.)

28. Travel

When the equipment is prepared for travel, the components mounted in Trailer K–75–A are carried as installed. The antenna, tower, and minor spares are carried in a two-wheeled trailer. Chapter 5 describes disassembling the tower and packing the trailer. No special provisions are made for transporting the major spares.

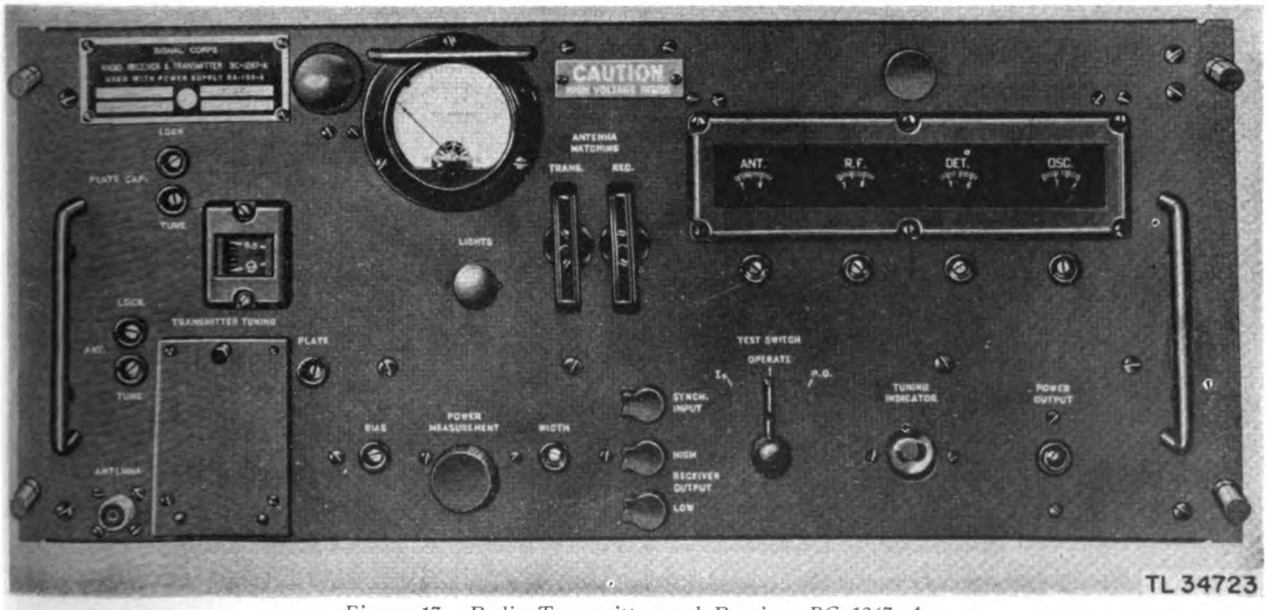


Figure 17. Radio Transmitter and Receiver BC–1267–A.

Table V. Interconnecting cables

Type No.	Length (feet)	Function	Type	Terminal points
CD–981	65	R-f to antenna	PT–5	Tower TR–24–A and tower junction box on Trailer K–75–A.
CD–982	65	Power to antenna tower	14–conductor	Tower TR–24–A and tower junction box on Trailer K–75–A.
CD–1001	3	A-c power	7–conductor	Control Unit BC–1266–A and junction box 48–B.
CD–1002	4.5	Notch voltage	PT–5	Control Unit BC–1266–A and junction box 22–B.
CD–1002	4.5	Synchronizing voltage	PT–5	Control Unit BC–1266–A and junction box 22–B.
CD–1003	5	Plate voltage; a-c input; synch; video	9–conductor	Rack FM–79 and junction box MM.
CD–1004	5	Receiver gain; power to remote indicator	8–conductor	Rack FM–79 and junction box SS.
CD–1005	3	Azimuth control	6–conductor	Remote Indicator I–227–A and junction box 48–B.
CD–1009	10.5	Lobe switch power	6	Top and bottom of Tower TR–24–A.
CD–1010	10.5	R-f to antenna	PT–5	Top and bottom of Tower TR–24–A.
CD–1071	2	R-f to dipoles	PT–5	Antenna junction box to antenna dipoles (6 cables).

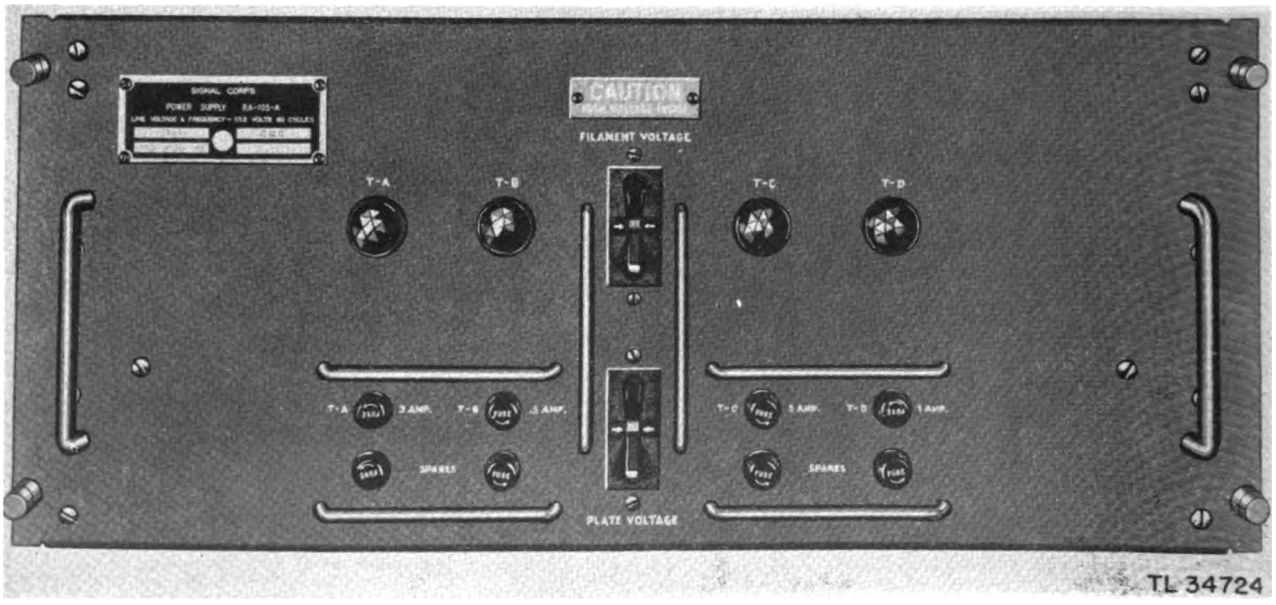


Figure 18. Power Supply RA–105–A.

Table VI. Test cables

Type No.	Quan.	Terminal A	Terminal B	Type and length
CD–1103	1	Plug PL–259	Plug PL–55	Single-conductor, 34 inches.
CD–1104	1	Plug PL–259	Plug PL–259	Single-conductor, 33 inches.
CD–1105	1	Plug PL–55	Plug PL–55	Single-conductor, 12 inches.
CD–1106	1	Plug	Plug	21-conductor, 72 inches.
CD–1141	1	Connector	Connector	2-conductor, 72 inches.

Figure 19. Control Unit BC–1266–A.

Table VII. Chests and contents

	Size	Contents
CH–222	33½" x 31¾" x 24"	Minor spares of Control Unit BC–1266–A and Indicator I–221–A.
CH–223	25" x 26" x 23½"	Major spares of Radio Receiver and Transmitter BC–1267–A and Power Supply RA–105–A.
CH–224	23¼" x 31¾" x 24"	Minor spares of Radio Receiver and Transmitter BC–1267–A and Power Supply RA–105–A.
CH–225	32½" x 24½" x 22½"	Minor spares of tower, rack, signal generator and cables.
CH–226	30" x 16" x 23¼"	Signal Generator I–222–A and cables (not spare).
CH–228	24⅛" x 32½" x 3½"	Major spares of Control Unit BC–1266–A and Indicator I–221–A.
CH–232		Antenna AN–154–A (not spare).

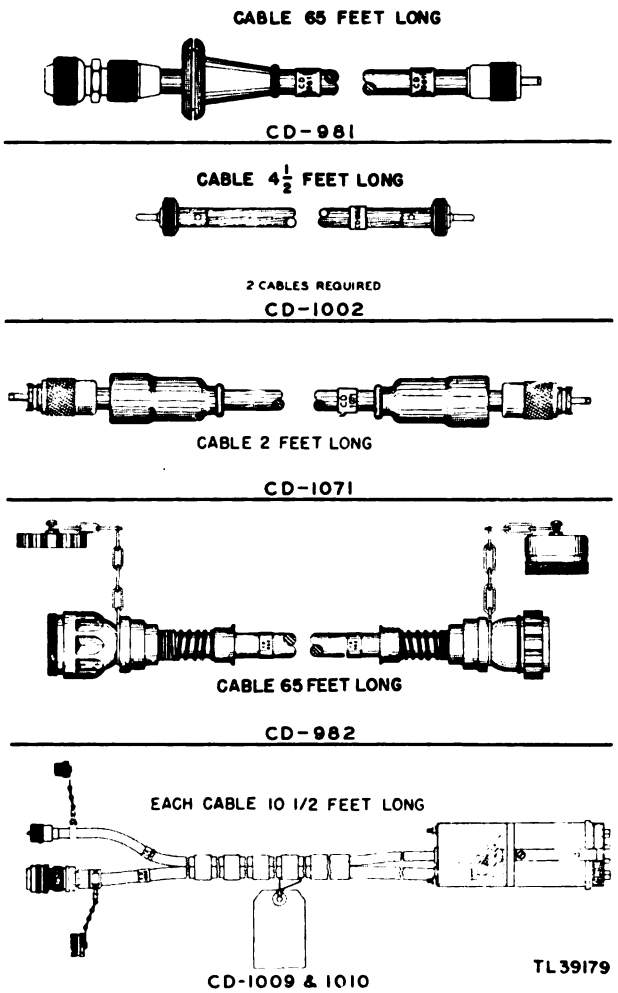
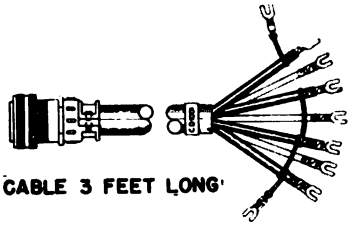
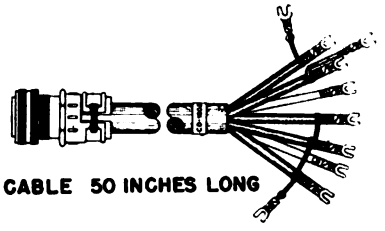


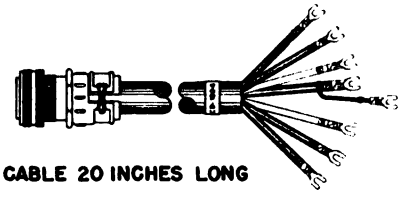
Figure 20. Interconnecting cables.



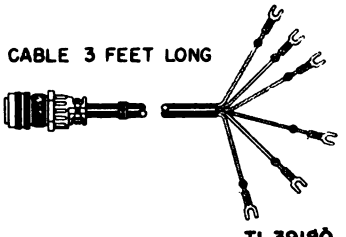
CD-1001



CD-1003



CD-1004



CD-1005

Figure 21. Interconnecting cables.

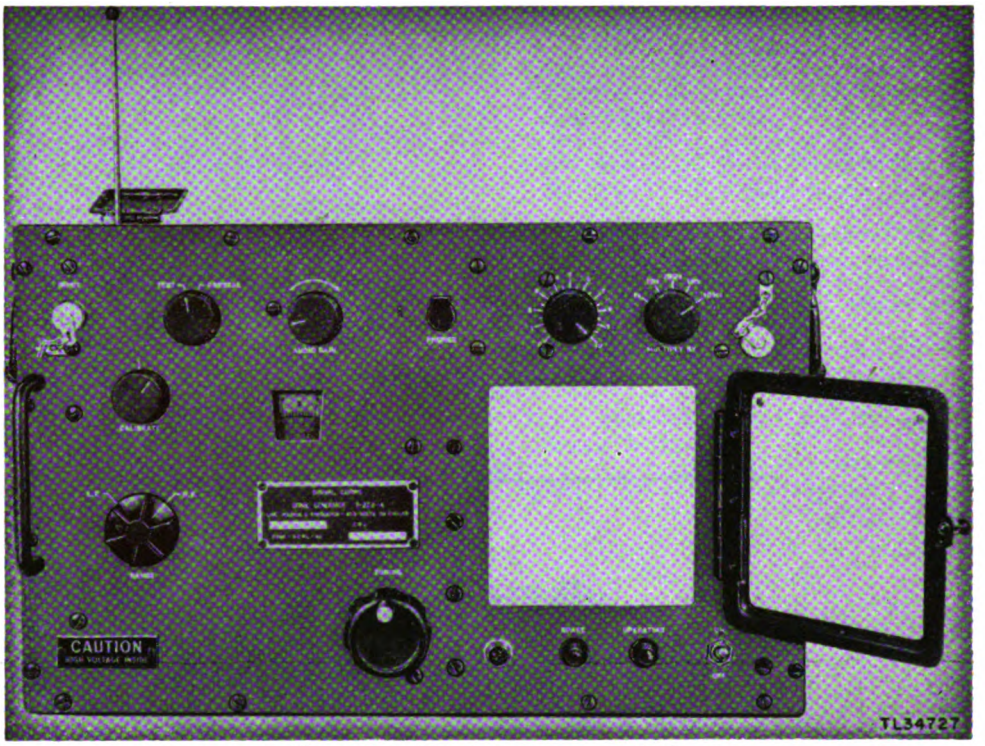


Figure 22. Signal Generator I–222–A.

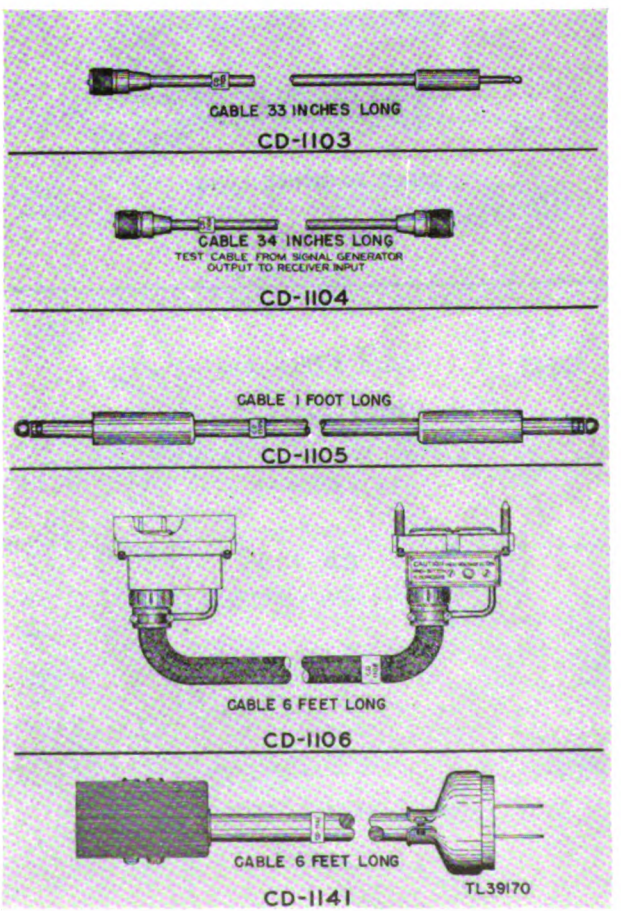


Figure 23. Test cables.

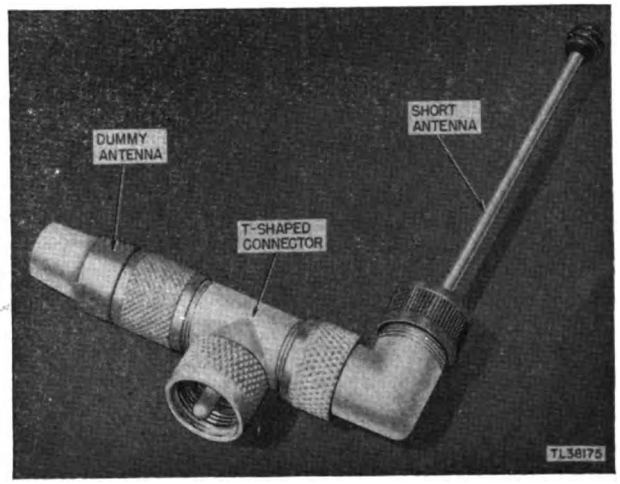


Figure 24. Test antenna.

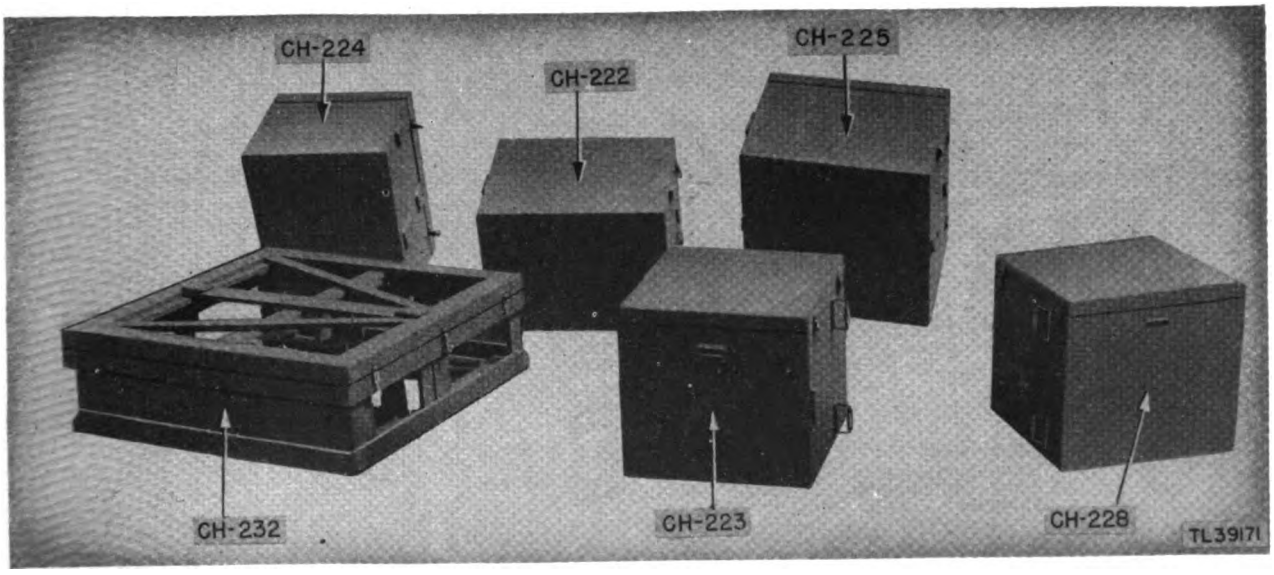


Figure 25. Chests.

CHAPTER 2

INSTALLATION

Section I. INSTALLATION OF COMPONENTS IN TRAILER K-75-A

29. General

Radio Equipment RC–145–A, with the exception of the antenna and its supporting tower, has been designed to fit into Trailer K–75–A of Radio Set SCR–545–A (fig. 26). Section I of this chapter covers installation of the components in the trailer. Section II covers assembly of the antenna and tower. The operating rack is mounted at the rear of the trailer; Control Unit BC–1266–A and Remote Indicator I–227–A are mounted in the cab; Chest CH–226, containing Signal Generator I–222–A and cables, is mounted beside the rack. These components are permanently installed and are not removed when Radio Set SCR–545–A is in transit.

with Radio Equipment RC–145–A. One set is installed in Trailer K–75–A, and the other set is used as spare equipment. Both spare and operating equipments are shipped with all tubes in their respective sockets. Remote Indicator I–227–A is shipped mounted in the chassis of Indicator I–221–A. A functional diagram of the cable arrangement is shown in figure 27. Study this diagram thoroughly before proceeding with the installation of the equipment.

Caution: Make certain that the master power switch located on the main control panel in the cab of Trailer K–75–A is placed in the OFF position before installing any of the identification equipment.

30. Installation of Tower Junction-box Housing

The 14-conductor cable and the PT–5 cable, which are permanently attached to Rack FM–79, terminate

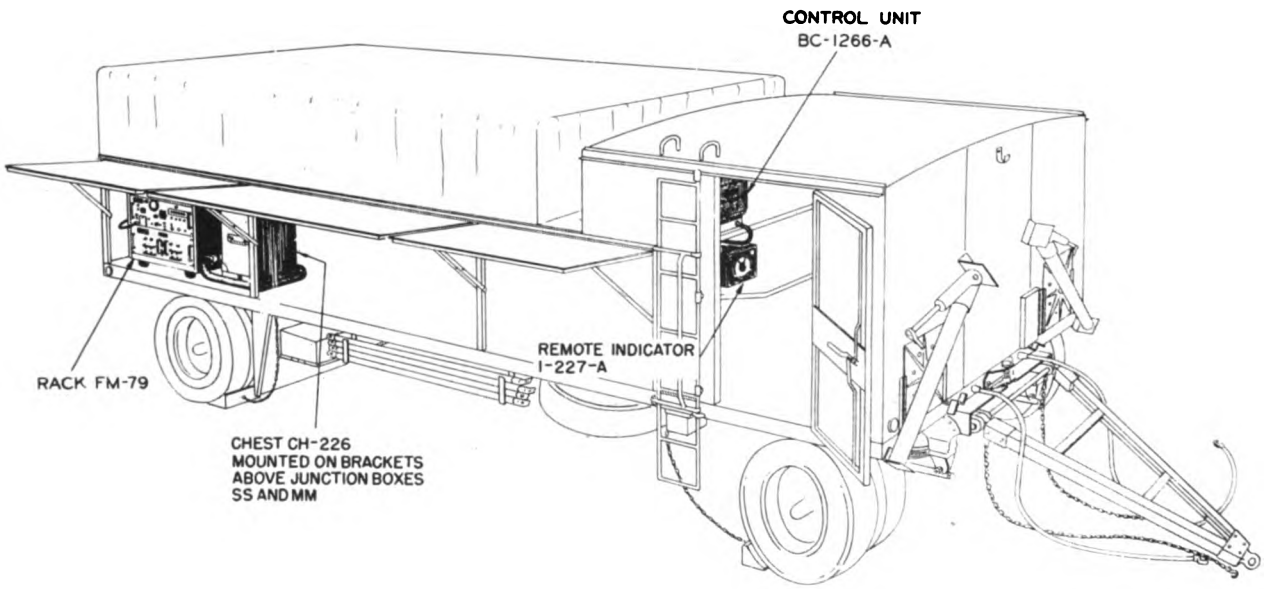


Figure 26. Radio Equipment RC–145–A mounted in Trailer K–75–A.

Two complete control units, power supplies, indicators, and radio receiver-transmitters are supplied at one end in the tower junction box. This junction box and its housing, which are to be installed in the

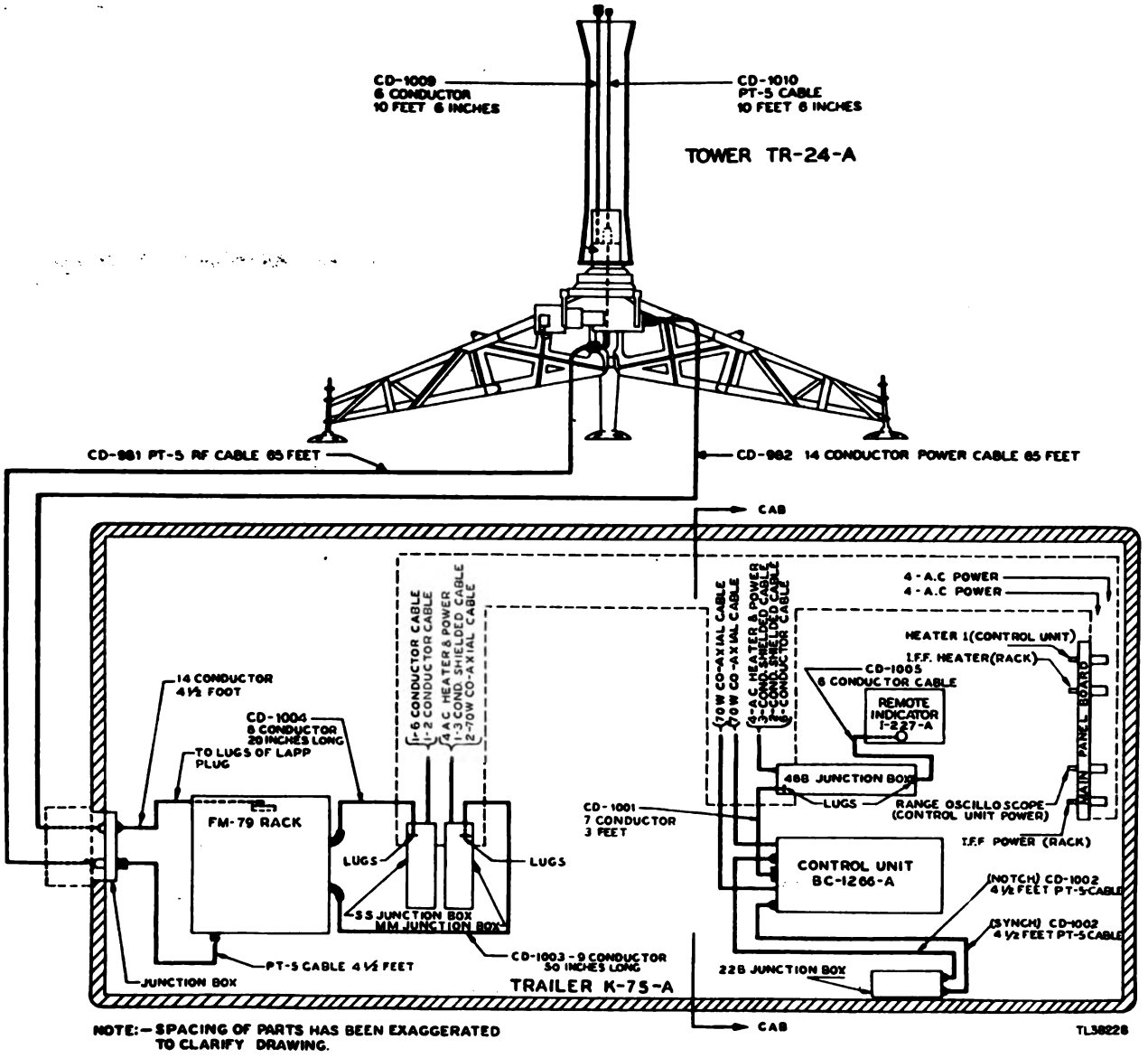


Figure 27. Functional diagram of cable arrangement.

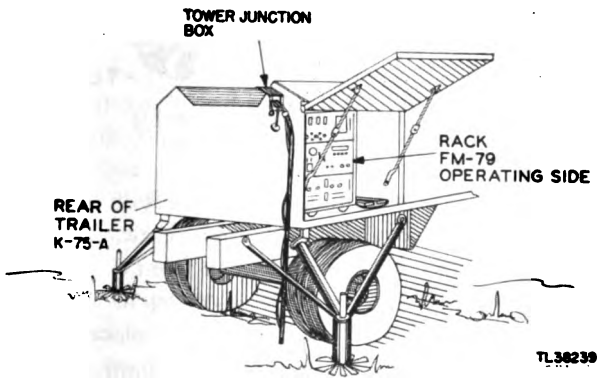


Figure 28. Location of tower junction box housing.

wall of Trailer K–75–A, are shipped as an assembly with the rack.

a. Open the door of the housing and remove the housing from the junction box by unscrewing the four screws inside. Retain these screws.

b. Install the junction box housing in the wall of the trailer as shown in Figure 29, using eight of each of the following: bolts, nuts, and lockwashers. Make certain that the housing is installed so that the hinged door opens upward; this will prevent water from entering the housing.

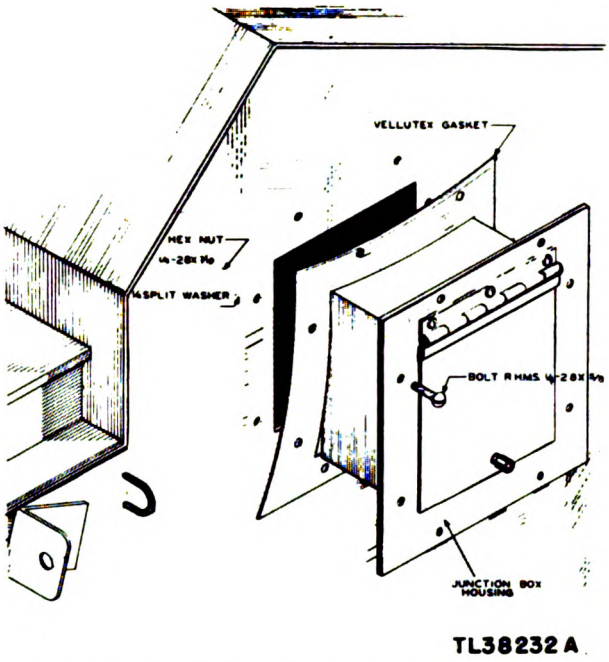


Figure 29. Installation of tower junction box housing.

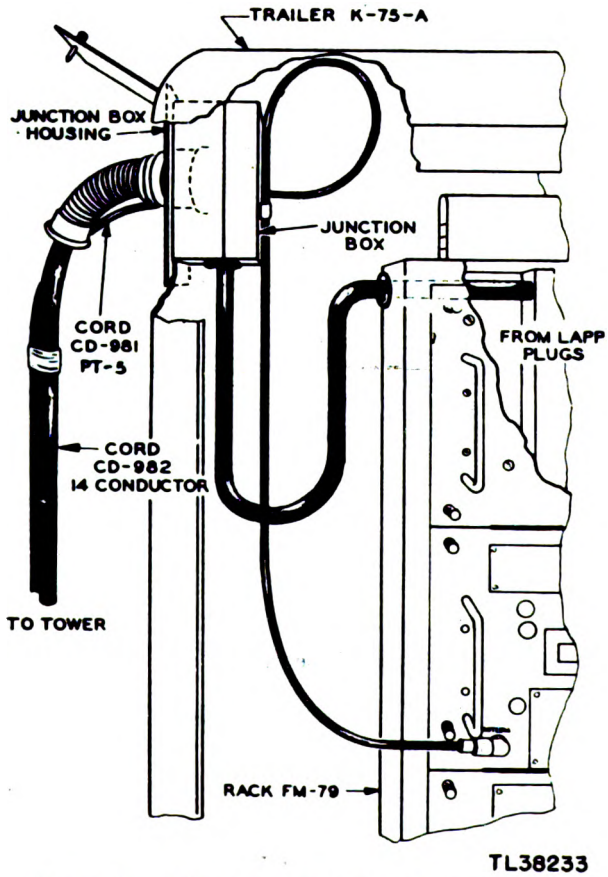


Figure 30. Cable connection at tower junction box.

31. Installation of Tower Junction Box

The tower junction box is to be installed in the position shown in figure 30.

a. Remove the indicator, receiver-transmitter, and power supply from Rack FM–79.

b. Lift the rack into the trailer and place it approximately in its final position.

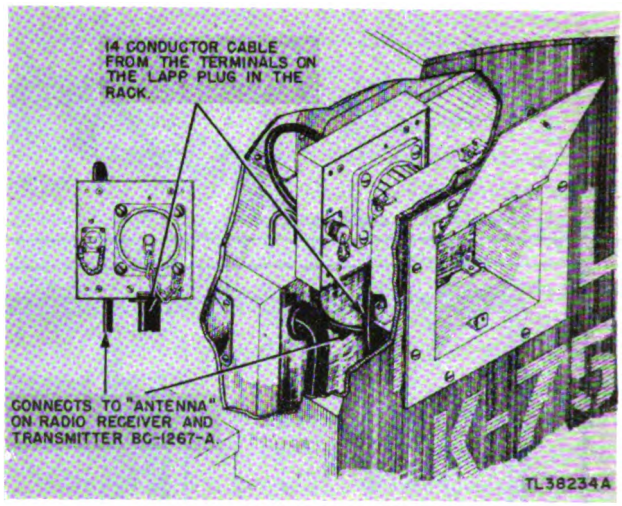


Figure 31. Rack FM–79, installation of tower junction box.

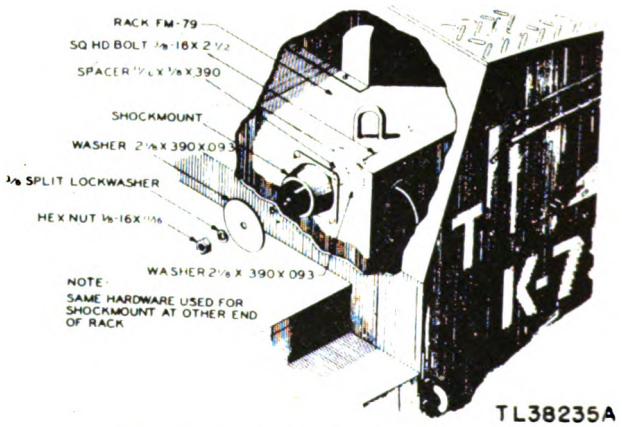


Figure 32. Rack FM–79, securing shock mounts to wall of trailer.

c. Install the tower junction box in its housing as shown in figure 31. Use the four screws removed previously (par. 30*a*); insert them from the outside of the trailer. It may be necessary to tip or move the rack in order to put the junction box in place.

d. Arrange the cables as shown in figure 30, allowing the PT–5 cable to hang free.

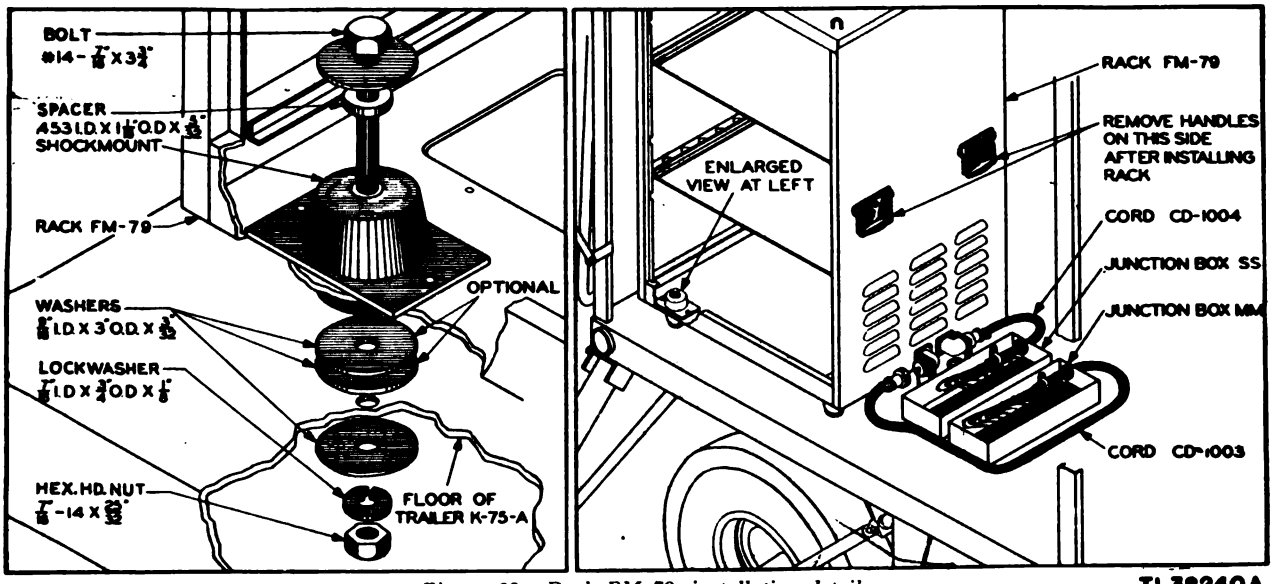


Figure 33. Rack FM–79, installation details.

32. Installation of Rack FM–79 in Trailer K–75–A

Rack FM–79 is installed at the rear wall of Trailer K–75–A (fig. 28). The rack is equipped with two shock mounts on the rear to be secured to the trailer wall and four shock mounts on the bottom to be secured to the trailer floor.

a. Place the rack so that the four mounting holes in the bottom are over the four holes provided in the floor of the trailer. The two shock mounts on the rear of the rack should now be opposite the two mounting holes provided in the wall of the trailer (fig. 32).

b. Secure the shock mounts to the wall of the trailer as shown.

c. Place a bolt through each of the four shock mounts at the bottom of the rack and through the floor of the trailer (fig. 33). If the bottom of any of the shock mounts is more than ½-inch above the floor, use extra washers as shown.

d. Secure the rack to the floor, using the hardware shown in figure 33.

e. Remove the two handles on the side of the rack next to junction boxes MM and SS (fig. 33).

f. Replace Power Supply RA–105–A in the bottom shelf of the rack.

Caution: When interchanging Power Supply RA–105–A, make certain that the rack bolt which actuates the plunger interlock switch in the rear of the power supply is of the correct length. The bolt is made accessible for adjustment by removing the rear rack cover.

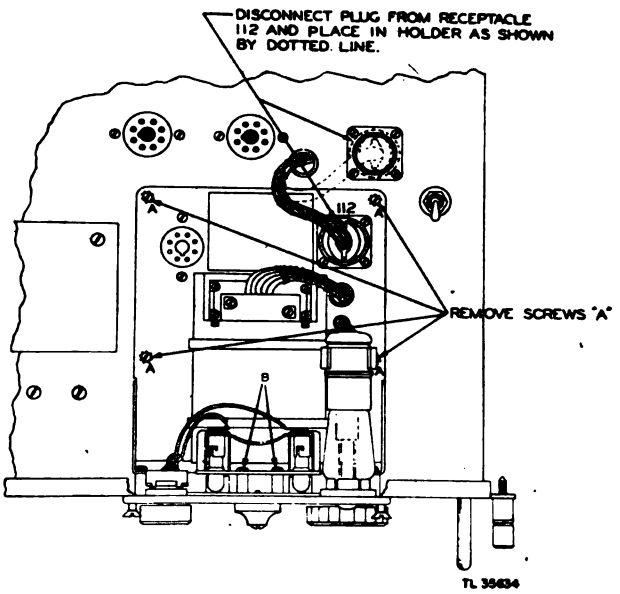


Figure 34. Removal of Remote Indicator I–227–A from Indicator I–221–A.

g. Replace Radio Receiver and Transmitter BC–1267–A in the middle shelf of the rack.

h. Connect a right-angle connector to the ANTENNA connector of the transmitter (fig. 30).

i. Connect the free end of the PT–5 cable, which is connected to the tower junction box, to this right-angle connector as shown in figure 30.

j. Before replacing Indicator I–221–A in the rack, remove Remote Indicator I–227–A as follows:

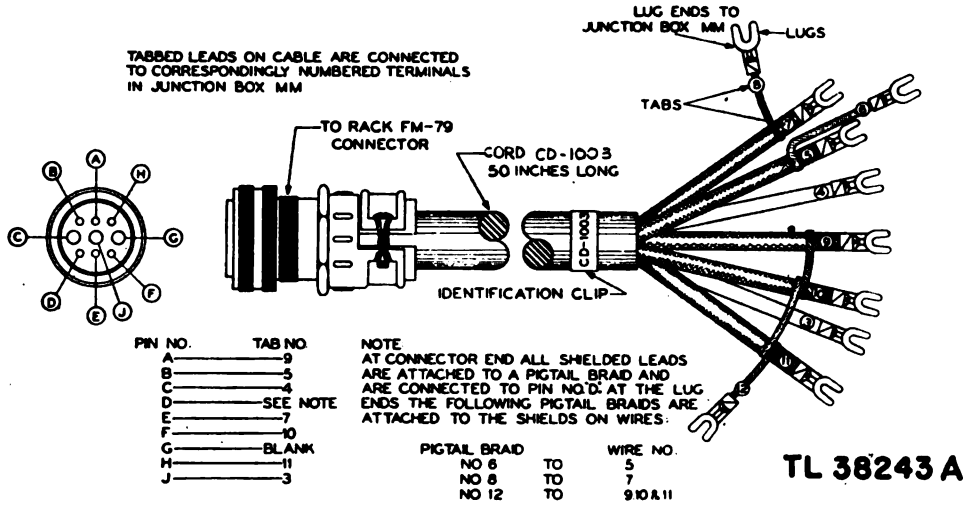


Figure 35. Cord CD–1003.

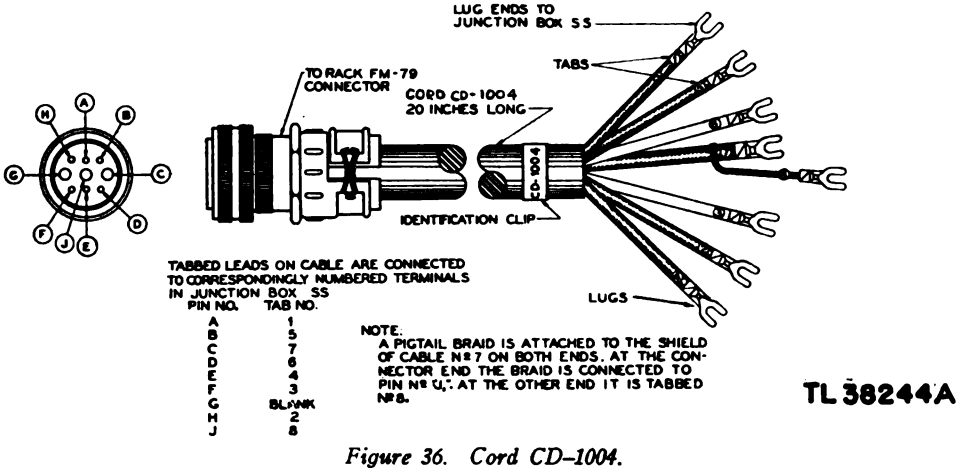


Figure 36. Cord CD–1004.

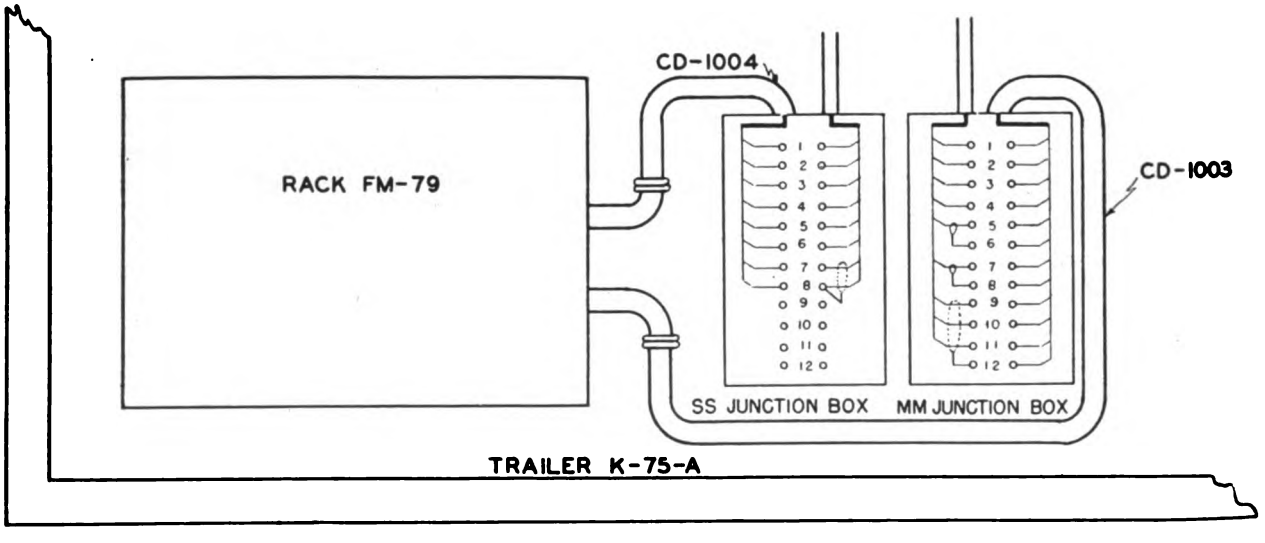


Figure 37. Junction boxes SS and MM, cording diagram.

(1) Disconnect the plug connector from receptacle 112 of the remote indicator and secure the plug in the holder provided in the chassis of Indicator I–221–A (fig. 34).

(2) Remove the four screws A (fig. 34) that secure the remote indicator to the indicator chassis.

(3) Remove the four screws from the front panel of the remote indicator and remove the component through the front of the indicator panel.

(4) Set the remote indicator aside until it is to be installed in the cab of the trailer.

(5) Replace Indicator I–221–A in the top shelf of the rack.

33. Installation of Cords CD–1003 and CD–1004 (fig. 33)

Rack FM–79 is connected to junction boxes MM and SS by Cords CD–1003 and CD–1004 respectively (figs. 35 and 36).

a. Remove the covers from the two junction boxes.

b. On some sets the position of the junction boxes has been interchanged. The box which has only eight of the terminals used is junction box SS. The box which has 12 of the terminals used is junction box MM. The cording diagrams for the two arrangements are shown in figures 37 and 38.

c. Pass the lug end of Cord CD–1004 through the hole in the rear of junction box SS and connect the numbered leads to correspondingly numbered terminals in the box. Secure the cable to the side of the box with the clamp that is provided.

d. Connect the other end of Cable CD–1004 to the rear right-angle connector on the side of the rack.

e. Pass the lug end of Cord CD–1003 through the hole in the rear of junction box MM and connect the numbered leads to correspondingly numbered terminals in the box. Clamp the cable to the inside of the junction box.

f. Connect the other end of Cord CD–1003 to the front right-angle connector on the side of the rack.

g. Replace the covers on the junction boxes.

34. Installation of Chest CH–226

Chest CH–226, which contains spare parts and Signal Generator I–222–A, is mounted on top of junction boxes MM and SS (fig. 39). The mounting brackets are mounted on the chest at the time of shipment and must be removed before the chest is installed.

a. Remove the front cover of the spare parts chest and remove the signal generator.

b. Remove the rubber-cushioned board from the floor of the chest.

c. Unscrew the four bolts holding the mounting brackets to the chest and remove the brackets.

d. Mount the brackets to the floor of the trailer as shown in figure 39[A], using the four bolts removed in step *c*, above.

e. Replace the rubber-cushioned board on the floor of the chest.

f. Replace the signal generator in its compartment.

g. Replace the front cover of the chest.

35. Installation of Remote Indicator I–221–A

The remote indicator is now installed in the cab of Trailer K–75–A.

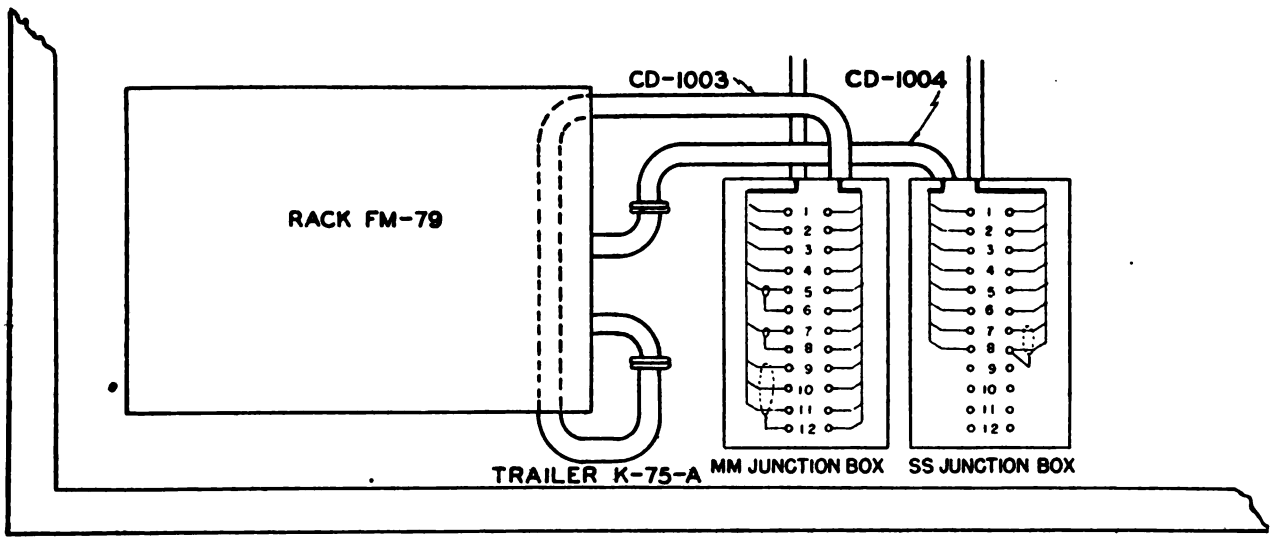


Figure 38. Junction boxes SS and MM, cording diagram.

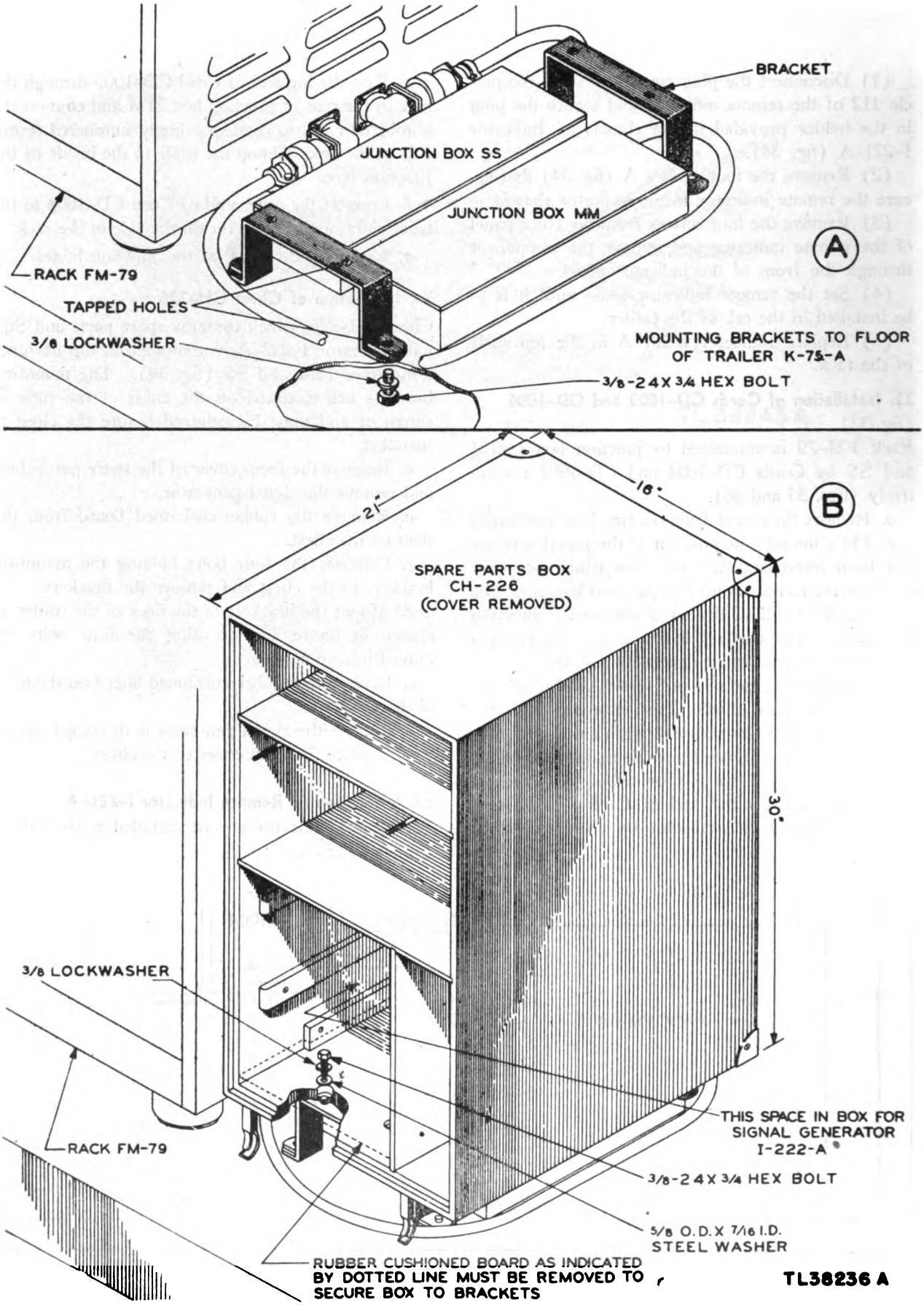


Figure 39. Chest C11–226, installation in Trailer K–75–A.

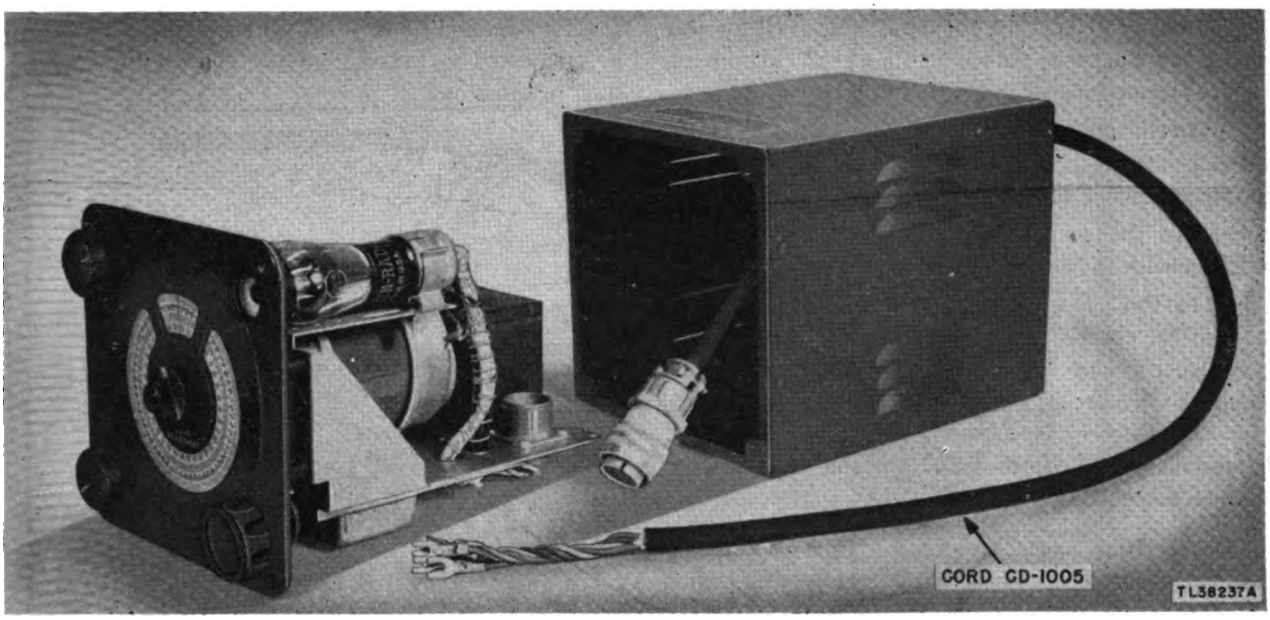


Figure 40. Remote Indicator I–227–A, installation in cabinet.

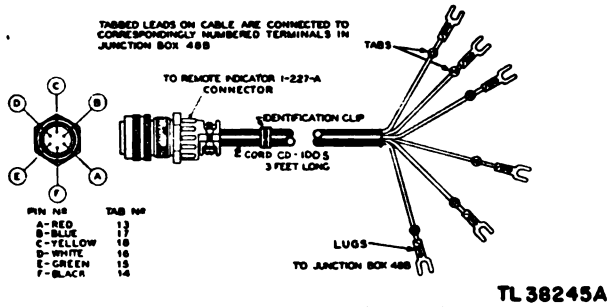


Figure 41. Cord CD–1005.

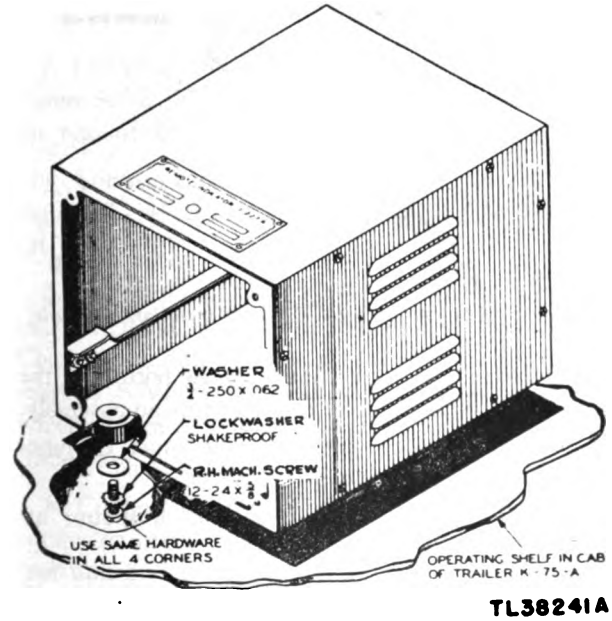


Figure 42.
Remote Indicator I–227–A, installation of cabinet.

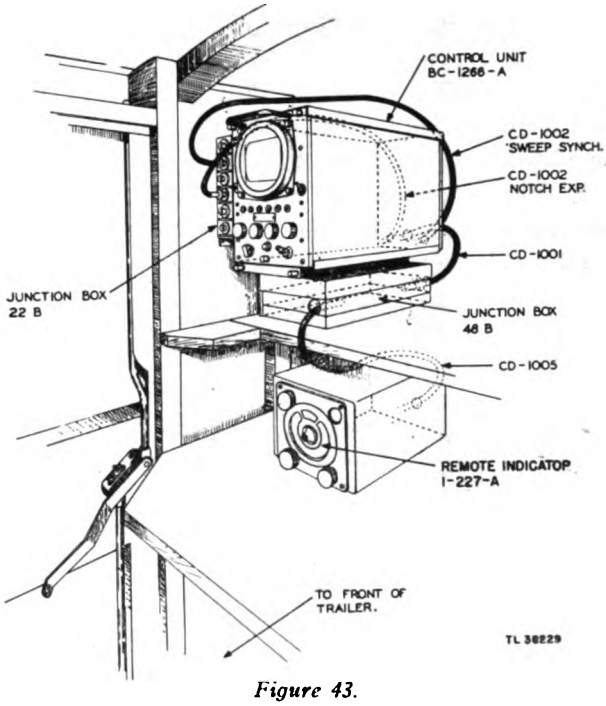


Figure 43.

Control Unit BC–1266–A and Remote Indicator I–227–A installed in cab of Trailer K–75–A.

a. Remove the plate from the front of the remote-indicator cabinet (fig. 40) by removing the four screws.

b. Feed the lug end of Cord CD–1005 from the inside of the cabinet so that it will extend out through the rear as shown in figure 40.

c. Bolt the cabinet to the operating shelf in the cab of the trailer as shown in figure 42. Holes in the shelf are provided.

d. Attach the connector end of Cord CD–1005, which is now inside the cabinet, to the remote indicator receptacle 112.

e. Place the remote indicator in its cabinet and secure it with the four panel screws.

f. Use the plate which was removed from the front of the cabinet to cover the opening in Indicator I–221–A through which the remote indicator was removed. Secure it with four panel screws.

36. Installation of Cords CD–1001 and CD–1005 in Junction Box 48–B

Cords CD–1001 and CD–1005 are used to connect Control Unit BC–1266–A and Remote Indicator I–227–A, respectively, to junction box 48–B (fig. 43).

a. Remove the cover from junction box 48–B.

b. Pass the lug end of Cord CD–1005 through the hole in the front of the junction box and connect the numbered leads to the correspondingly numbered terminals inside the box.

c. Pass the lug end of Cord CD–1001 through the hole in the rear of the junction box and connect the numbered leads to the proper terminals inside.

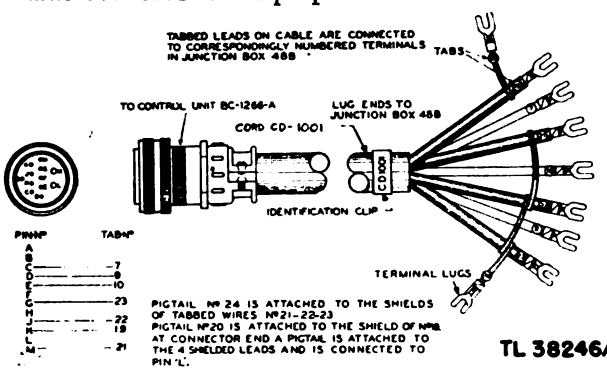


Figure 44. Cord CD–1001.

d. Clamp the two cables in place inside the junction box. Do not replace the cover of the junction box at this time.

37. Installation of Control Unit BC–1266–A and Associated Cables

Before Control Unit BC–1266–A is placed in its fixed position on the operating shelf in the cab of the trailer, its shock mount must be mounted on the cover of junction box 48–B. Five cables are also to be connected to the rear of the control unit before final installation.

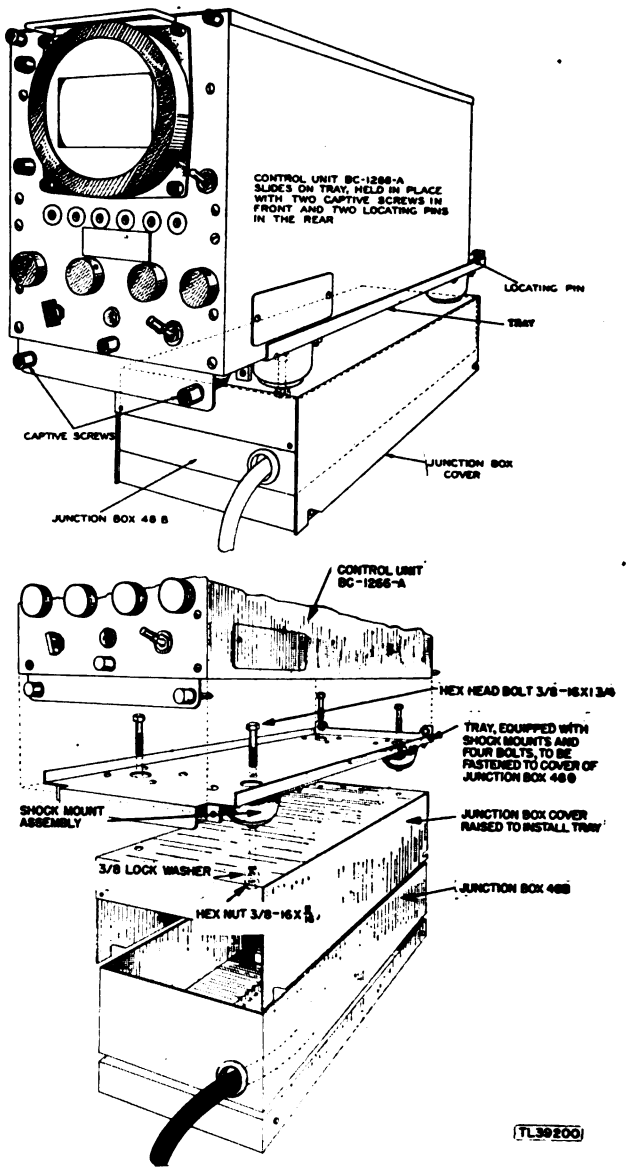


Figure 45. Control Unit BC–1266–A, installation details.

a. Detach the shock mount from the bottom of the control unit with which it is shipped as an assembly.

b. Secure the shock mount to the cover of junction box 48–B as shown in figure 45.

c. Replace the cover with the shock mount attached on the junction box.

d. Place Control Unit BC–1266–A sideways on the operating shelf with the rear of the unit to the left. This will make the receptacles on the rear of

the control unit accessible for the connection of the cables (fig. 46).

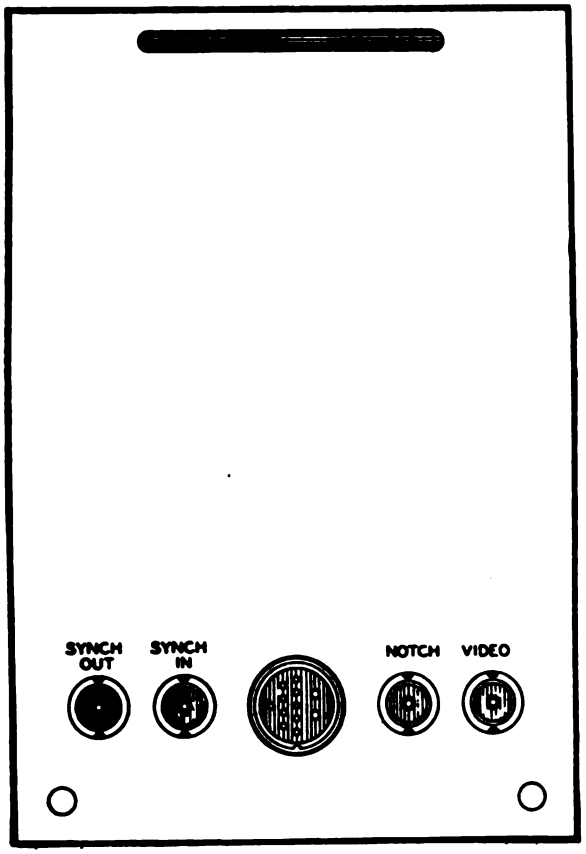


Figure 46. Control Unit BC–1266–A, rear view.

e. Connect cable No. 25, which is furnished with Radio Set SCR–545–A, to the VIDEO connector on the rear of the control unit.

f. Connect cable No. 26, also furnished with Radio Set SCR–545–A, to the receptacle marked SYNCH OUT.

g. Connect one Cord CD–1002 to the receptacle marked SYNCH IN on the rear of the control unit. Connect the other end of this cable to the connector marked SWEEP SYNCH on junction box 22–B, which is located in the upper left-hand corner of the trailer cab.

h. Connect the other Cord CD–1002 between the connector marked NOTCH on the rear of the control unit and the connector marked NOTCH EXP on junction box 22–B.

i. Connect the free end of Cord CD–1001, which was connected to junction box 48–B earlier, to the large center connector on the rear of the control unit.

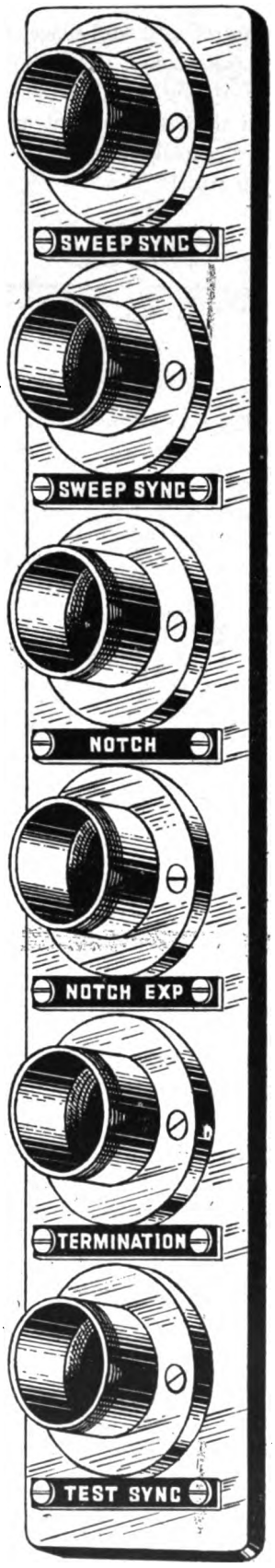


Figure 47. Junction box 22–B.

j. Lift the control unit and place it in position to slide on the shock mount on top of the cover of junction box 48–B (fig. 45). Slide the control unit into position on the shock mount and secure it by means of the two captive thumbscrews at the lower edge of the front panel.

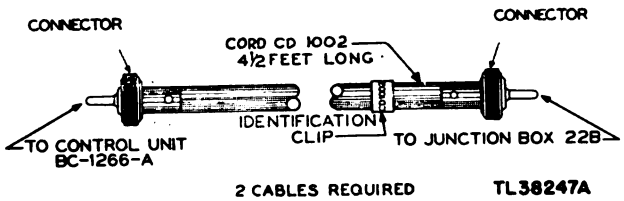


Figure 48. Cord CD–1002.

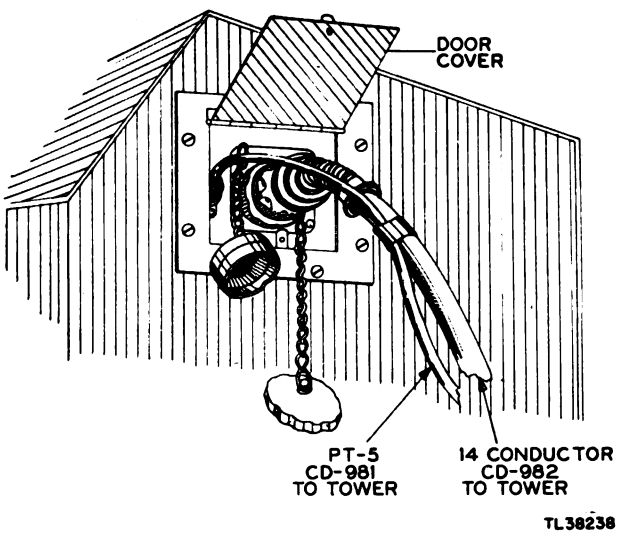


Figure 49.

Cords CD–981 and CD–982, connection at Trailer K–75–A.

38. Connection of Cords CD–981 and CD–982 to Tower Junction Box

Trailer K–75–A is connected to Tower TR–24–A by Cords CD–981 and CD–982 (figs. 50 and 51). At the trailer, these cables are connected to the tower junction box (fig. 49). Cord CD–981 makes connection with the PT–5 cable connected to Rack FM–79 (fig. 30); Cord CD–982 makes connection with the 14-conductor cable. Make the connections as shown; the other ends of the cables are to be connected to Tower TR–24–A after that component is erected.

Section II. FIELD SET-UP OF TOWER TR–24–A AND ANTENNA AN–154–A

39. Siting

The tower and antenna of Radio Equipment RC–145–A are set up in the field after Radio Set SCR–545–A, which is a mobile unit, has been transported to the location at which it is to be operated. Tower TR–24–A, when erected, stands on a circle 18 feet in diameter. It should be set up approximately 50 feet from Trailer K–75–A. This is the maximum distance which Cords CD–981 and CD–982, which connect the tower to the trailer, will allow. Locate the tower and antenna so that the trailer of Radio Set SCR–545–A will not serve as an obstruction by being in line with any section which it is desired to sweep (fig. 52). If it is desired to sweep in all directions, the IFF tower should be placed in the least important section.

40. Determination of Need for Modification of Tower TR–24–A

a. Before proceeding with the erection of the tower, inspect the nameplate on the gearcase. Certain changes must be made in the tower assembly if one of the following conditions applies:

(1) The manufacturer's code letters are CNX and the serial number is less than 1800.

(2) The manufacturer's code letters are CU1, and the serial number is less than 595.

(3) The manufacturer's code letters are CUH.

b. The purposes of the modification are:

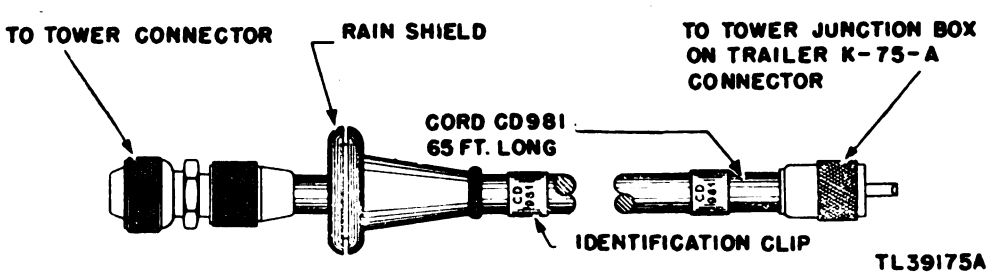


Figure 50. Cord CD–981.

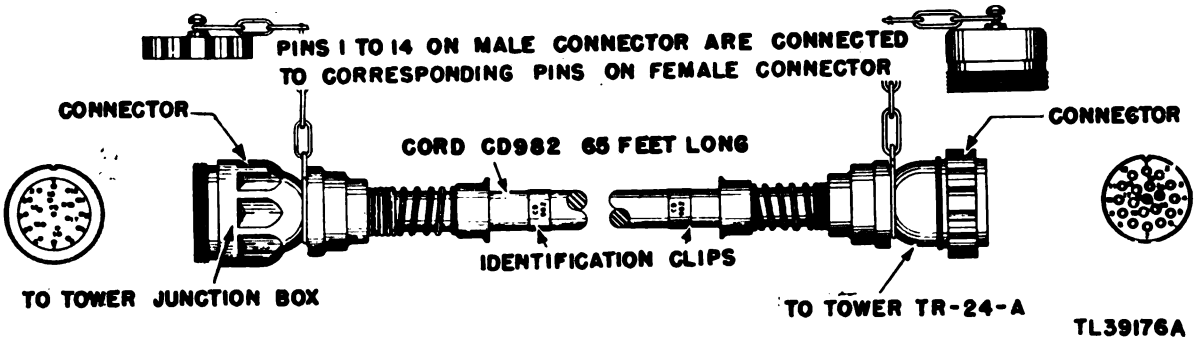


Figure 51. Cord CD–982

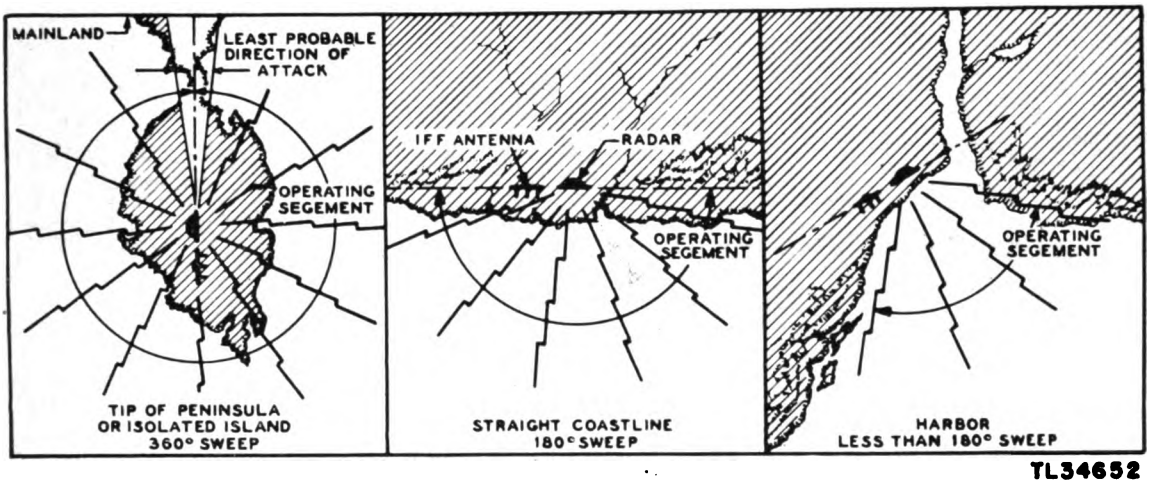


Figure 52. Locating IFF antenna in relation to radar set.

(1) To change the lubricant in the worm gearbox from oil to grease.

(2) To apply an adjustable friction brake to the worm gear to enable regulation of the stiffness of rotation of the tower.

(3) To replace the woven wire slip-ring brushes with carbon brushes.

c. The parts needed to perform the modification will be found in the brake kit for antenna Tower TR–24–A. Figure 55 is a photograph of the individual parts; refer to figure 56 for details of the installation.

41. Modification of Tower TR–24–A

The parts needed for this modification are: Cover plate with friction holder and grease fittings, friction plug, spring, washer, cover plate gasket, small container of gasket cement, round friction flange with two fastening screws and lockwashers, three 1-pound cans of AXS–637 grease, and bronze strip brushholders.

a. Installation of Brake Mechanism and Grease Fittings. To install the brake mechanism and grease fittings, it is necessary to:

(1) Drain the oil from the gearcase by removing the plug from the bottom of the round cover plate located at the base of the worm gearbox; then remove and discard the cover plate (fig. 56).

(2) Turn the gearcase assembly upside down for accessibility.

(3) Fasten the round friction disk to the underneath face of the bronze worm gear by screwing it to the two tapped holes in the gear. Use the slotted-head screws and lockwashers supplied. Be sure the screws are tightened securely.

(4) Fill the worm gearbox with the grease supplied; about one can will be required. Pack the grease in by hand, making sure that it is pressed into all pockets and areas.

(5) Attach the new round cover plate equipped with the friction plug. The washer, spring, and bronze friction plug should be inserted in the holder

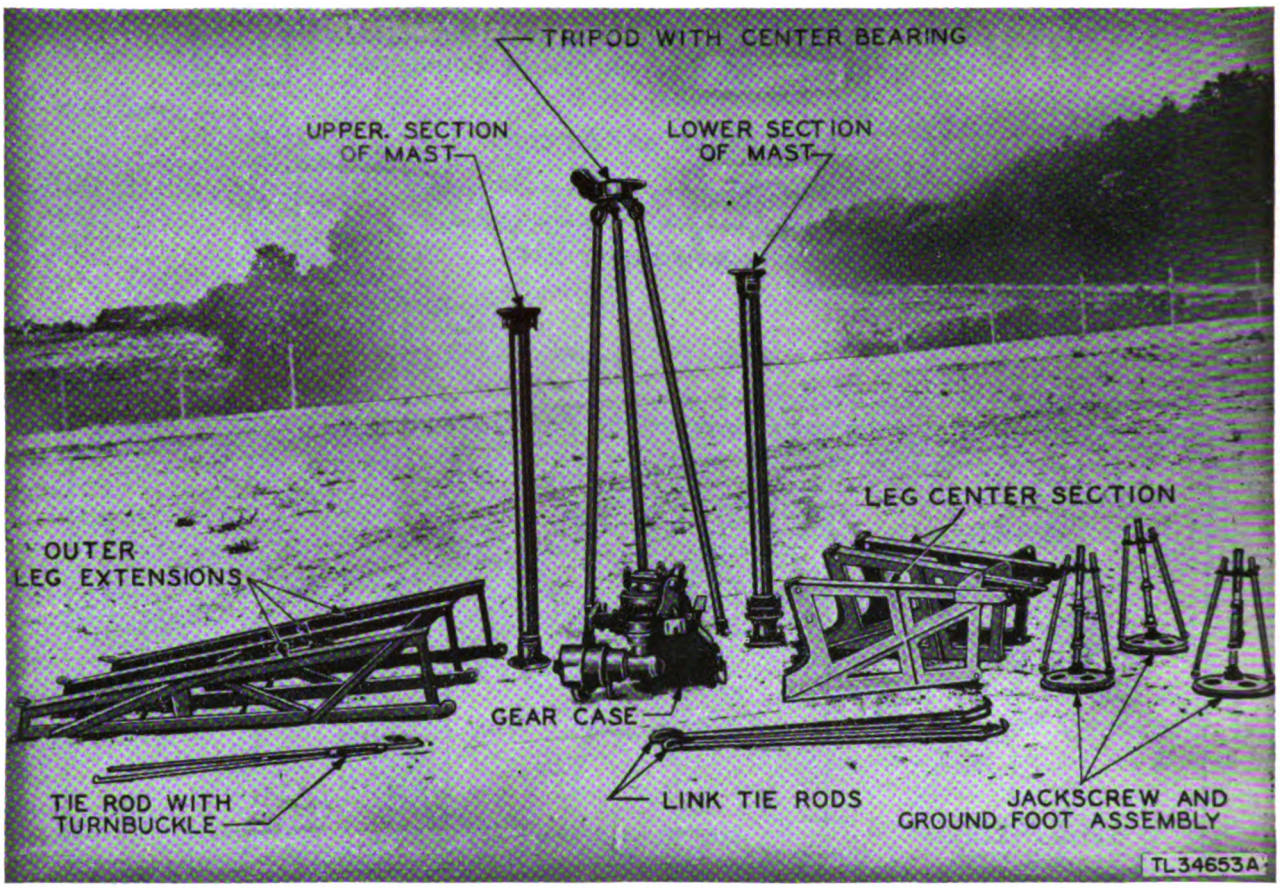


Figure 53. Tower TR–24–A, components.

with the plug on top as shown in figure 56[A]. The gasket and gasket cement should be applied under the plate to make an oil-tight joint.

Caution: Do not withdraw the cover plate after the friction plug has made contact with the grease. The plug may pull out of its holder, and get lost in the grease.

(6) Remove and discard the small caution plate on the antenna-motor housing.

b. Adjustment of Brake Friction. The spring-loaded friction plug engages the worm-gear friction flange; the contact pressure and resulting friction are adjustable by means of the adjusting screw which projects through the cover plate and is inclosed by the oil-tight retaining cap (fig. 56[A]). Remove the cap and loosen the locknut; then lightly screw in the adjusting screw until the contact of the plug against the flange is felt. Screw in the adjusting screw three complete turns from this point. Tighten the locknut and replace the retaining cap. This is an average adjustment setting. In cold climates or on stiff towers it may be necessary to back out the screw and reduce the friction. On limber towers, should excessive "hunting" persist, screw in the adjustment screw and increase the friction. Do not apply any more friction than is necessary.

c. Installation of Carbon Slip-ring Brushes. To install the new brushes it is necessary to take off the selsyn box which is located at the bottom of the gearcase assembly.

(1) Remove the cover from the terminal box on the side of the gearcase (fig. 56[D]).

(2) Disconnect the three wires inside the box.

(3) Unscrew the union (fig. 56[E]) and disconnect the flexible conduit. The conduit and wires remain attached to the selsyn box.

(4) Remove the six 5/16-inch fastening screws (fig. 56[F]) which bolt the selsyn box to the underneath face of the intermediate housing under the gearcase assembly. Lower the selsyn box, being careful to keep it square and perpendicular in order not to damage the slip-ring unit.

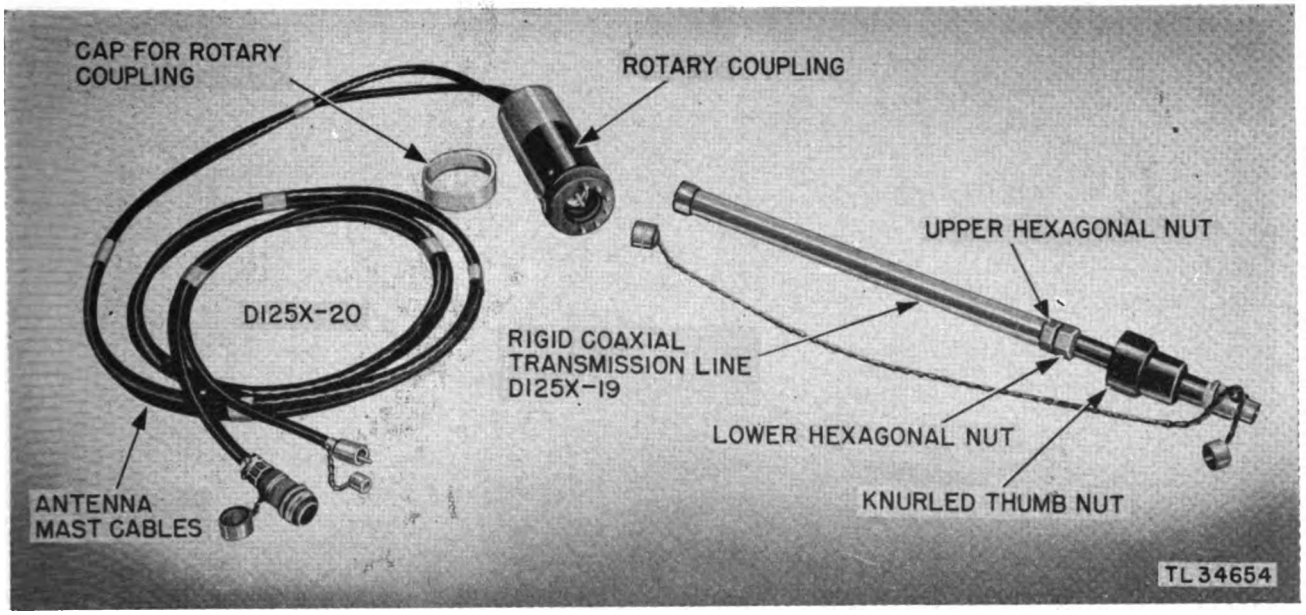


Figure 54. Tower TR-24-A, mast cables, rotary coupling, and transmission line.

(5) Remove the three ¼-inch cap screws (fig. 56[B]) from the supporting bearing at the base of the slip-ring cylinder.

(6) Take the slip-ring unit, with its six connecting wires, out of the selsyn box, and disconnect the wires from the bakelite terminal strip.

(7) Take out and discard the six flexible woven wire brushes (fig. 56[B]).

(8) Replace these brushes with the new bronze strip brush-holders, each containing two carbon brushes (fig. 56[C]).

Note. If the tower has been in operation with the old brushes, the slip-rings may have become rough. Remove any roughness before applying the new brushes.

(9) Replace the slip-ring unit and reconnect the wires to the correspondingly marked terminals.

(10) In replacing the selsyn box, first remove the inspection cover plate in the side of the intermediate housing. It will then be possible to see that the six prongs at the top of the slip-ring cylinder properly engage their respective jacks in the gear at the base of the gear casing.

(11) Coat one side of the selsyn box gasket with Tite Seal compound (supplied in a tube in the kit).

(12) Lift up the selsyn box and see that the dowels are matched with their respective holes.

(13) Bolt the selsyn box to the intermediate housing.

(14) Reconnect the motor wires to their proper terminals in the terminal box.

(15) Couple the flexible conduit to the terminal box.

Note. If the tower has already been set up and correctly oriented to the dial on the panel of Indicator I-221-A, the removal of the selsyn box will destroy this orientation. Therefore, after replacing the selsyn box on such a tower, correct orientation must be reestablished as follows: turn on the current and allow the tower to come to rest. Read the tower-azimuth indicating dial; then turn the dial on the indicator panel to the corresponding position.

42. Assembling Tower TR-24-A

The tower assembly comprises the following parts: the base, which is made up of three center leg sections and three leg extensions; three jackscrew leveling feet; a gearcase; tie-rods; a tripod assembly consisting of a center bearing and three struts; a two-section mast with its associated cables; and a rigid coaxial transmission line. These parts are shown in figures 53 and 54. Antenna AN-154-A, which is shipped with Switch SW-220-A already installed, is to be mounted on top of the tower mast. Remove the components of the tower and antenna from the trailer in which they have been transported.

43. Erecting Center Section of Base

One of the center leg sections has a collar and two eccentric bolts at its larger end (fig. 57). The other

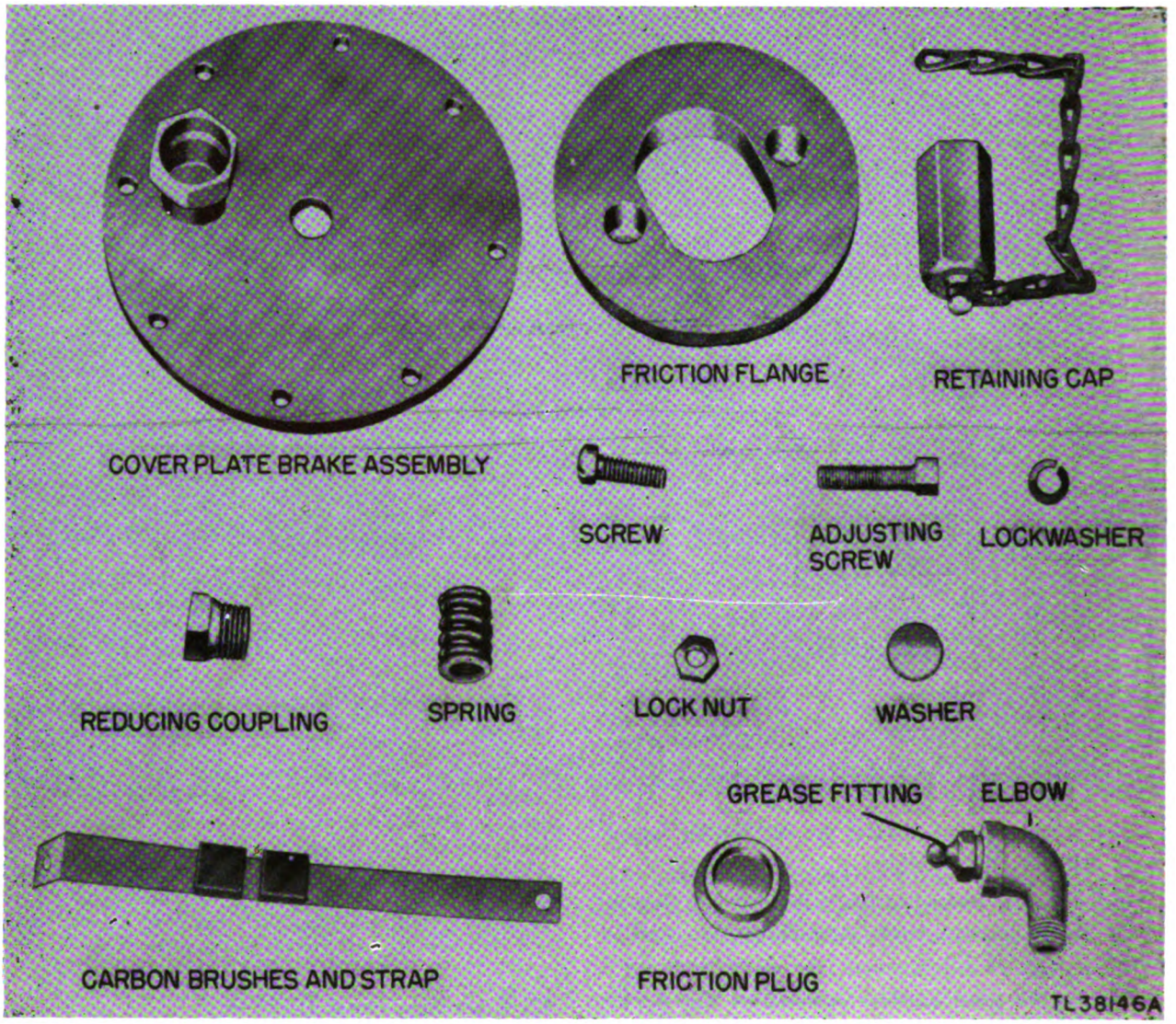


Figure 55. Tower TR–24–A, modification parts.

two leg sections are similar to the first in size and shape, but have slotted projections for fitting over the eccentric bolts (fig. 57B). Put these three sections together as follows:

a. Hold the larger end of the leg with the collar approximately 1 foot from the ground with the collar and bolts on the lower side.

b. Hook the slotted ends of the other two legs over the eccentric bolts as shown in figure 57B. This forms a short tripod.

44. Adding Leg Extensions

Each of the three identical leg extensions is equipped with an eccentric bolt in the upper web about 4 inches from the larger end (fig. 58A and B). These bolts have hexagonal heads; hexagonal nuts are used on the opposite end. Figure 59 shows the position of the leg extensions after they have been installed on the center leg section assembly. The leg extensions are installed as follows:

a. Raise the lower end of one of the center leg sections high enough to install the leg extension.

b. Place the leg extension in its approximate final position and lift it completely off the ground; keep the inner end lower than the outer end.

c. Slip the eccentric bolt into the slot in the upper web of the center leg section, as shown in figure 58C.

d. Move both the center leg and the leg extension simultaneously, permitting the two members to fit together properly.

e. Insert the captive pin through the holes in the lower webs of the two members and secure it with the cotter pin (fig. 58C).

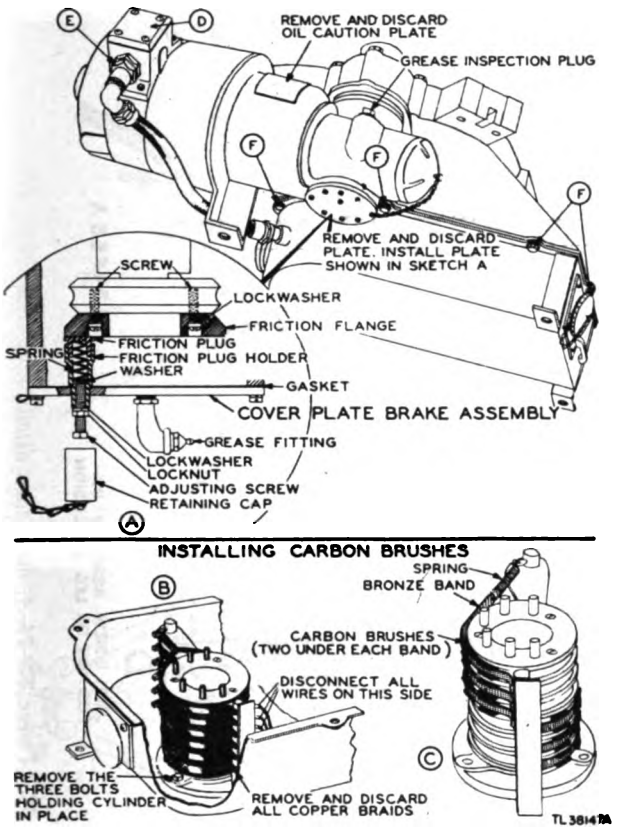


Figure 56. Tower TR–24–A, modification details.

f. Repeat these steps for the other two legs.

g. Tighten the eccentric bolts on all three leg extensions by turning the hexagonal heads counterclockwise as far as possible.

h. Tighten the nuts to lock the bolts into position.

45. Installing Jackscrew Assemblies

The jackscrew assembly is shown in figure 58D. Install the assembly following these steps:

a. Turn the catch on the jackscrew assembly so that it is halfway between the two guys (fig. 58E).

b. Straddle the lower end of the leg extension and lift up the leg. Pull the jackscrew assembly into position so that the slotted end of the leg rests on the brass collars of the jack (fig. 58D).

c. Take the weight off the jackscrew by lifting up the leg extension, and turn the catch counterclockwise one-quarter turn until it snaps into the slot (fig. 58D and E). The jackscrew assembly is now locked in place.

d. Repeat these steps for the other two jackscrew assemblies.

46. Installing Tie-Rods and Gearcase

The tie-rods and gearcase are installed as follows:

a. Install the three link tie-rods as shown in figure 59. Place the rod with the turnbuckle in position as shown in figure 59[A]. The rods extend from one leg of the base to the next leg and hook into holes about halfway up the legs. Adjust the turnbuckle so that there is no tension on the tie-rods or legs.

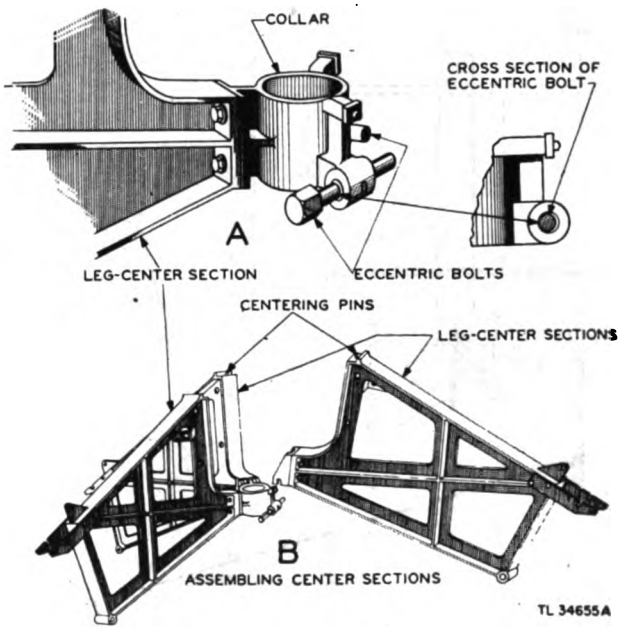


Figure 57. Tower TR–24–A, center leg sections.

b. Mount the gearcase (fig. 60) in the recess at the apex of the base (fig. 59[A]). Four men will be required for this operation. Set the gearcase in position with the centering pins on the top of the center leg sections (fig. 57B) inserted in the centering slots of the gearcase. Before installing the gearcase, be sure that it contains a sufficient amount of grease of the proper grade.

c. Align the legs of the base in order to permit the captive bolts of the gearcase (fig. 60) to fit into the holes in the legs. Do this by rotating the eccentric bolts on the leg section with the collar (fig. 57)

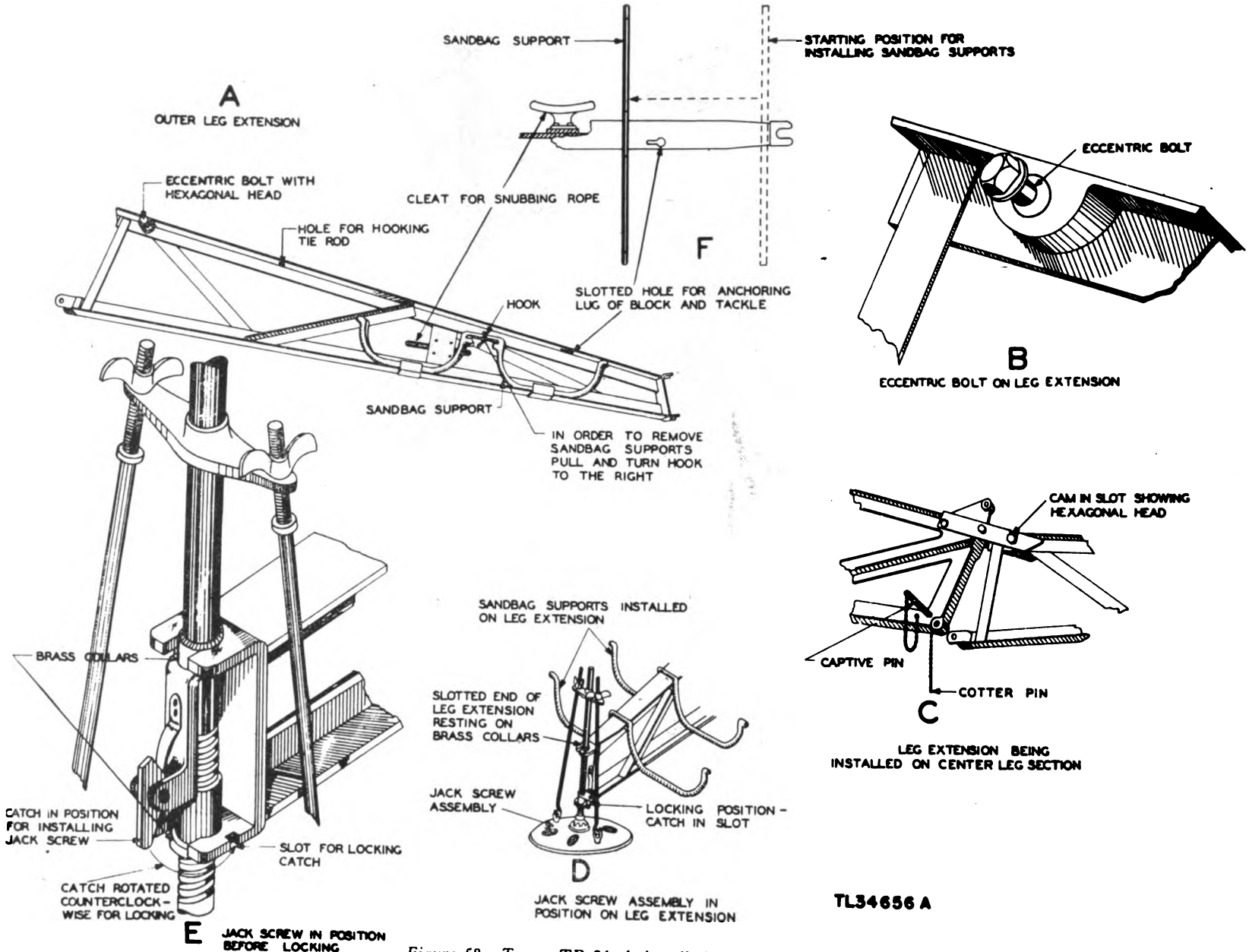


Figure 58. Tower TR–24–A, installation details.

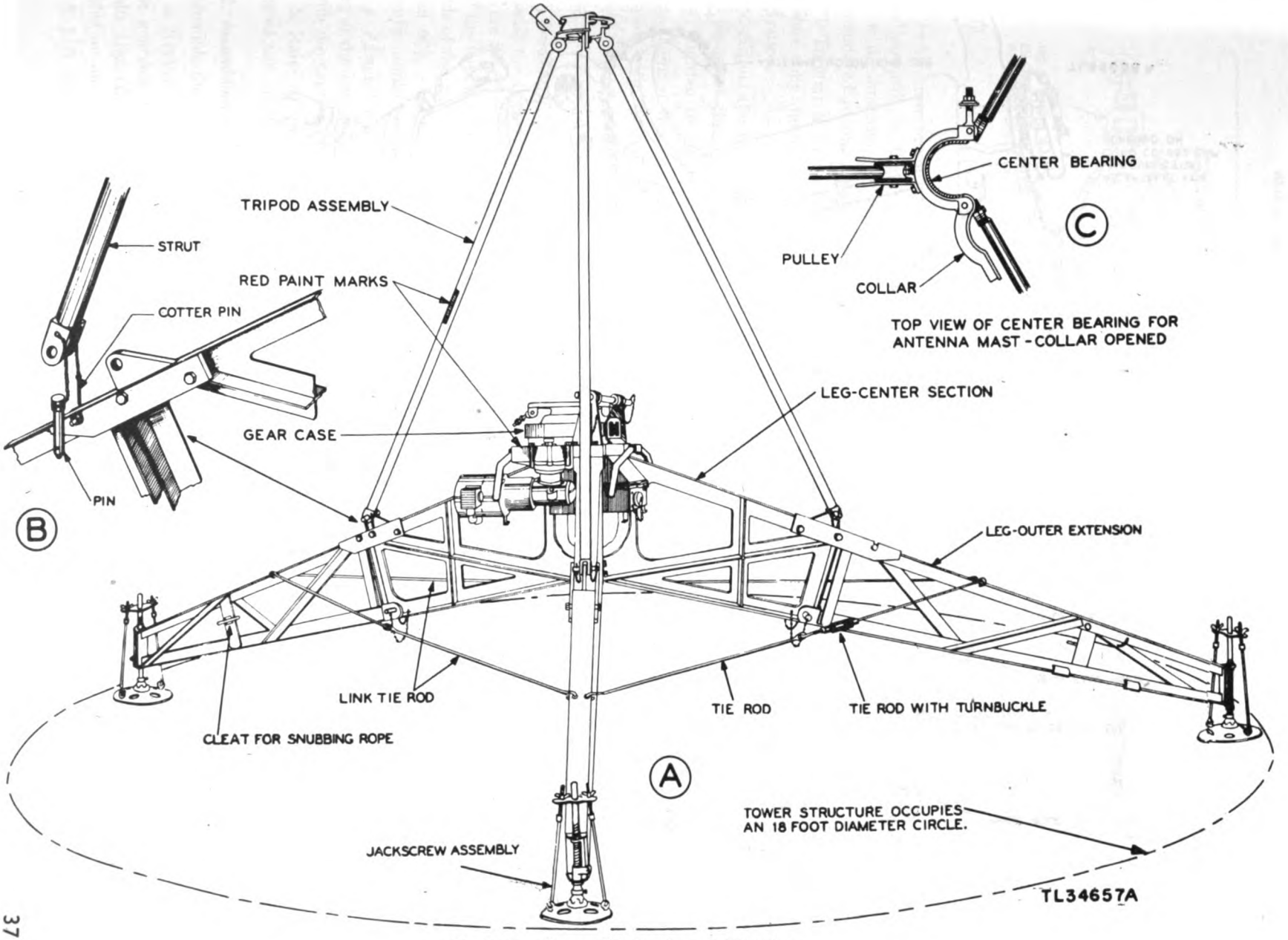


Figure 59. Tower TR-24-A, partial installation.

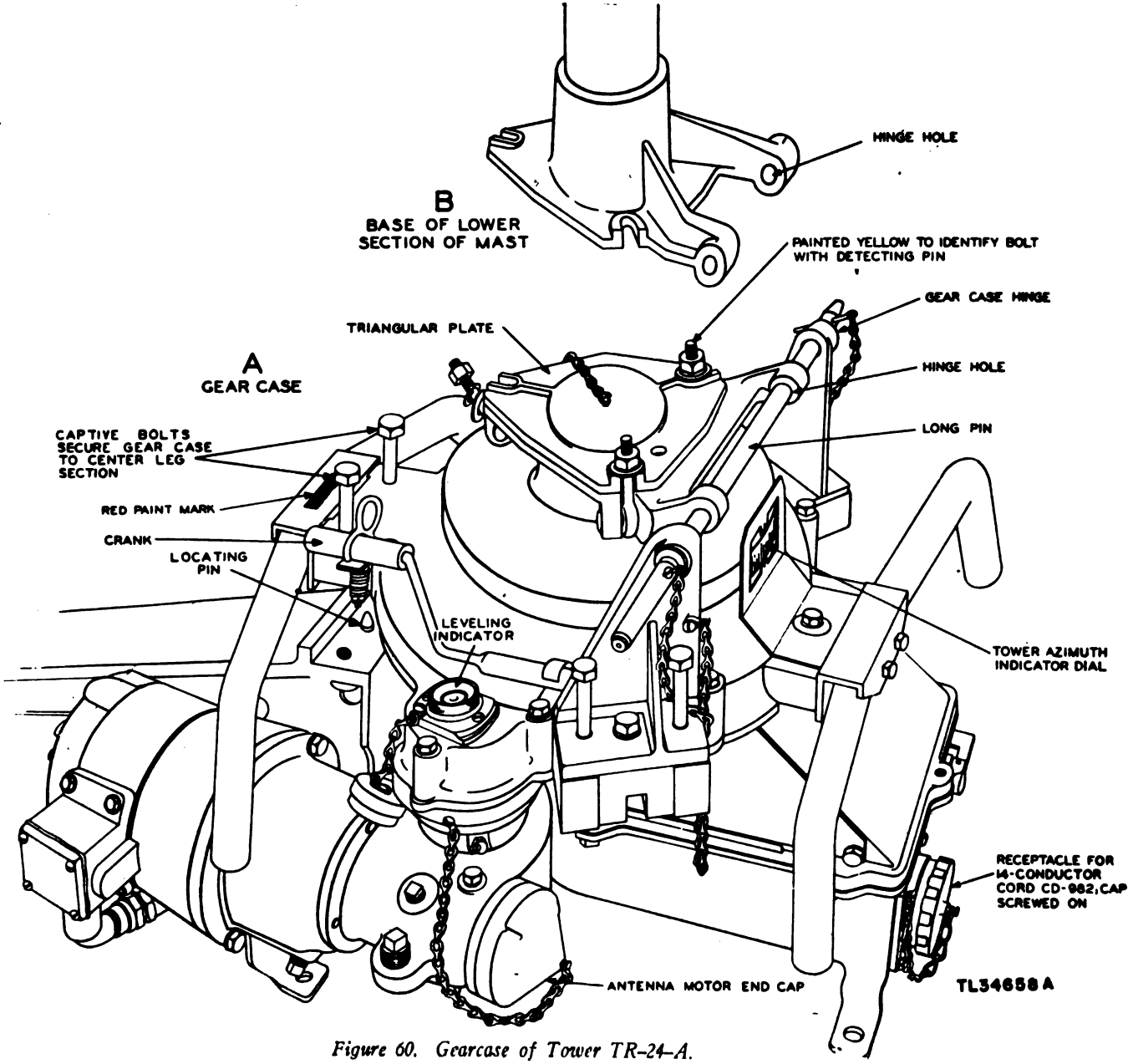


Figure 60. Gearcase of Tower TR-24-A.

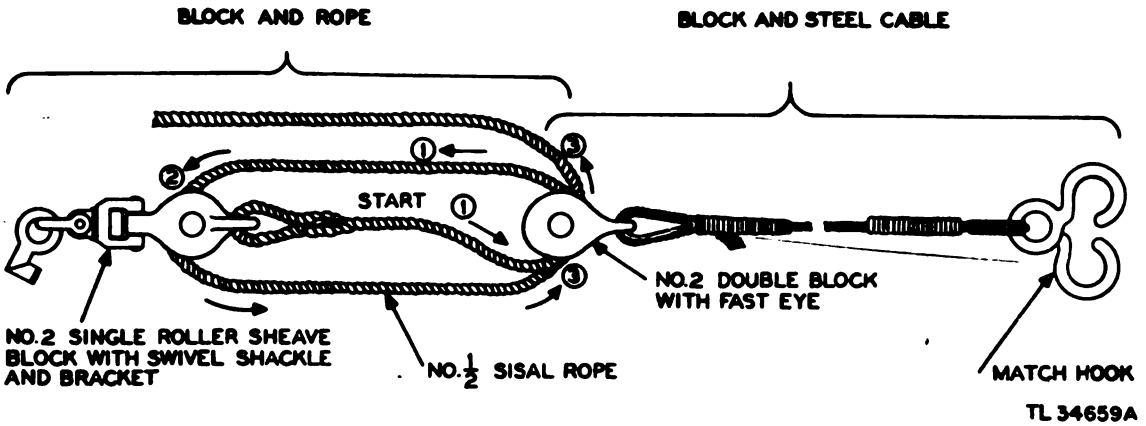


Figure 61. Tower TR-24-A, assembling block and tackle.

in the direction necessary to align the holes properly. Pull upwards on the center of the base enough to allow the insertion of the bolts if difficulty is still encountered in matching the pins with the holes.

d. Tighten the captive bolts two or three turns. Before fully tightening the bolts proceed to the next operation.

e. Adjust the tension on the tie-rods and the legs by means of the turnbuckle (fig. 59[A]).

f. Tighten the gearcase captive bolts.

g. Tighten the eccentric bolts on the center leg section with the collar (fig. 57).

h. Snap one ON-OFF toggle switch on the side of the gearcase to the ON position.

47. Installing Tripod Assembly

Install the tripod assembly in the position shown in figure 59[A]. A red paint mark has been put on one of the tripod struts and another has been put on the side of the gearcase opposite the hinge (figs. 59[A] and 60). When the tripod is erected these two marks should be on the same side of the tower.

a. Attach the strut with the red band to the proper leg of the base as shown in figure 59[B]. Fasten it with the captive pin and insert the cotter pin.

b. Raise the tripod assembly into position and fasten the other two struts in the same manner.

48. Assembling Mast

Assemble the mast by following these 10 steps:

a. Remove the triangular plate from the top of the gearcase by loosening the nuts on the captive bolts (fig. 60A). Hang the plate on the stud provided on one of the center leg sections.

b. Lift the base of the lower section of the mast to the hinge on top of the gearcase. Turn the mast section so that the hinge holes in its base are aligned with the holes of the gear hinge (fig. 60).

c. Insert the long pin into the hinge and secure it with the cotter pin which is chained to the gearcase.

Note. On early models of Radio Equipment RC-145-A this long pin is chained to the rigid coaxial transmission line. On those models the pin should be left chained to the line. On later models the pin is chained to the gearcase (fig. 60).

d. Lower the mast section until it comes to rest. Allow it to remain in this position.

e. Assemble the block and tackle as shown in figure 61.

f. Hook the anchoring lug of the block-and-tackle assembly in the slotted hole of the leg extension directly opposite the gearcase hinge (fig. 58A and F).

g. Run the wire section over the pulley on the tripod (fig. 59[C]). Allow the hooked end to drop between the other two legs so that the hook is directly in line with the ring at the top of the lower mast section (fig. 62). Slip the hook into this ring.

h. Support the lower section of the mast in a horizontal position by snubbing the pulley rope around the cleat on the side of the leg extension to which the anchoring lug is hooked.

i. Lift the upper section of the mast into a horizontal position with its lower flange in position to be bolted to the lower section of the mast (fig. 62). A centering pin in the flange of the upper section indicates the proper position for bolting.

j. Bolt the two sections of the mast together by means of the captive bolts in the flange of the lower section. Leave the mast in a horizontal position so that the antenna may be mounted.

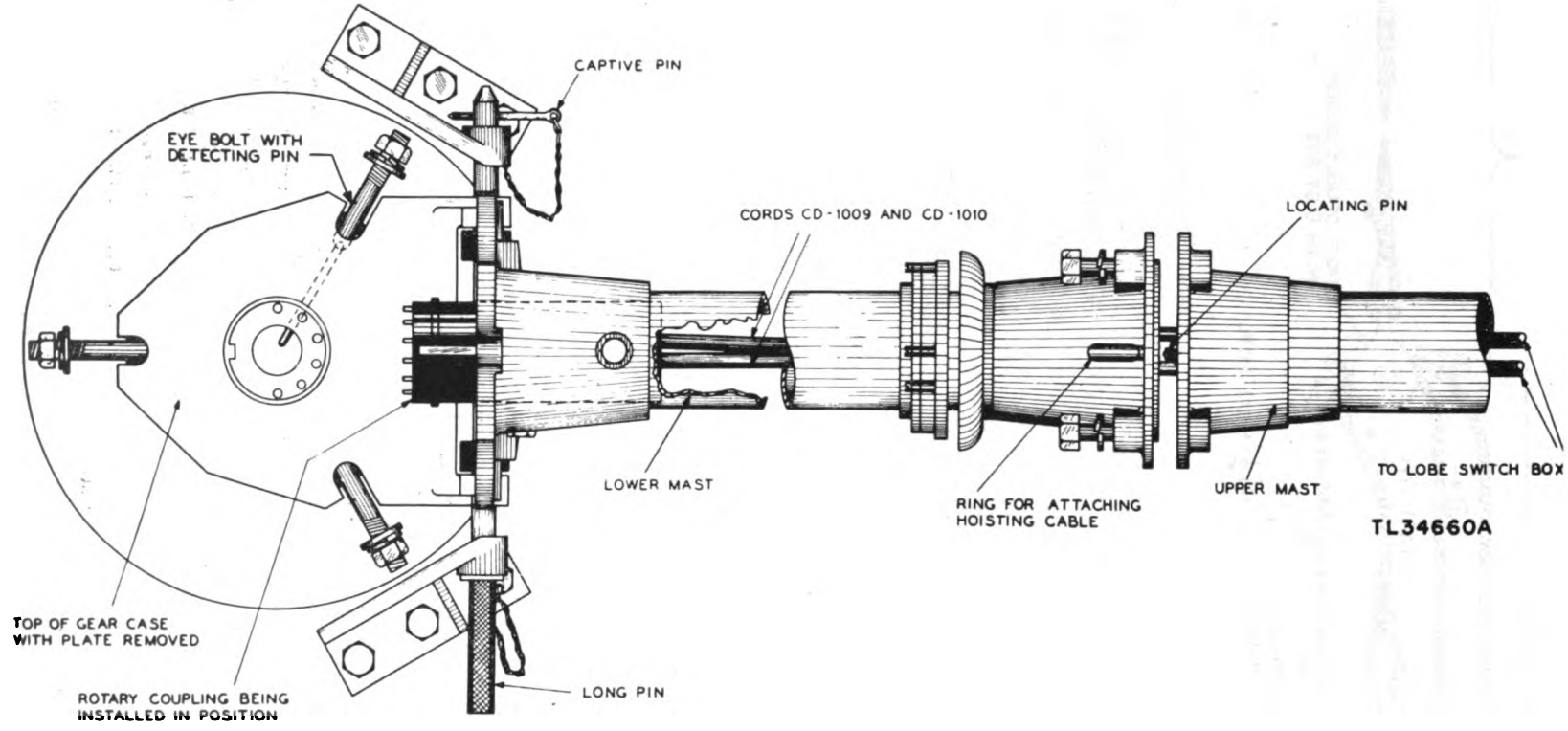


Figure 62. Tower TR-24-A, installation of mast cables and rotary coupling.

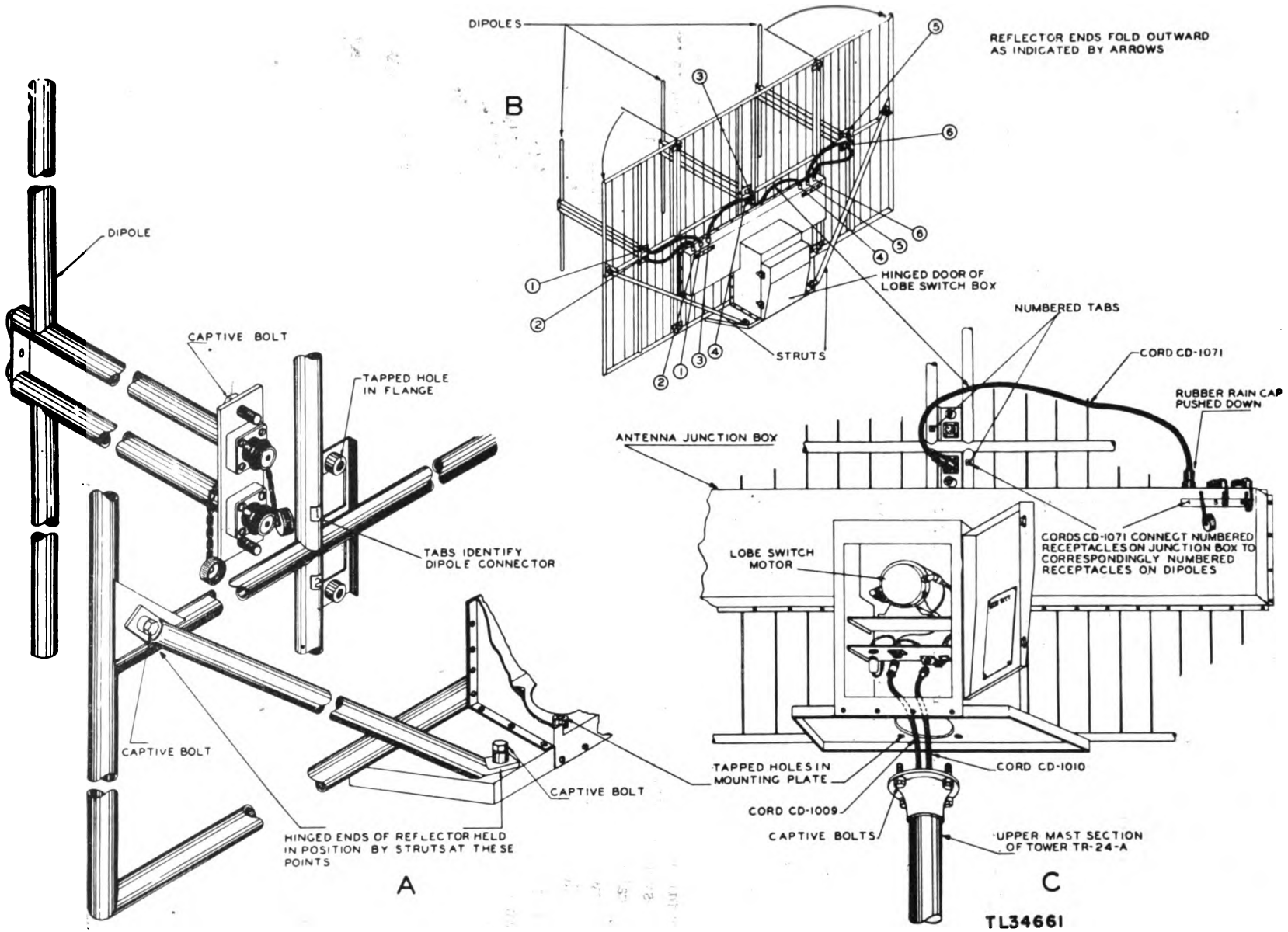


Figure 63. Antenna AN-154-A, installation details.

49. Assembling and Installing Antenna

The antenna reflector, made up of two smaller end sections hinged to a larger center section, is shipped with the end sections folded back. The lobe-switch assembly, completely wired, is housed in a box secured to the rear of the reflector. Three dipoles with their connecting cables and two struts are shipped in the same transport cradle, Chest CH–232. The struts are used for bracing and holding the end sections of the reflector in position. Assemble the antenna by following these step-by-step directions.

a. Swing the hinged end sections of the reflector until the three sections are in line.

b. Install the two struts as braces for the end sections (fig. 63A).

c. Mount the dipoles in position on the front of the reflector (fig. 63A). The dipoles are interchangeable.

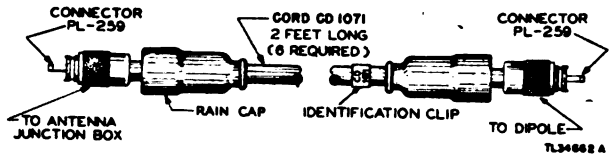


Figure 64. Cord CD–1071.

d. Attach the six Cords CD–1071 (fig. 64) which are provided for making the connections between the lobe-switch box and the dipoles. Connect each of the cables between a numbered receptacle on the lobe-switch box and a correspondingly numbered receptacle on the dipole as shown in figure 63B.

e. Mount the antenna assembly on the mast-mounting flange. The mounting flange has four holes, four captive bolts, and a guide pin. Guided by the pin, align the four holes in the antenna-assembly mounting plate with those in the mounting flange at the top of the mast (fig. 63). Insert the four captive bolts and tighten them securely.

f. Remove the cap from the rotary coupling (fig. 54). This is the large coupling at the end of Cords CD–1009 and CD–1010. To avoid losing the cap, fasten it in place on the lower side of the triangular plate previously removed from the top of the gearcase. Replace the plate and cap on the stud of the center leg section.

g. Push the free ends of Cords CD–1009 and CD–1010 into the base end of the mast until the rotary coupling is up against the base of the mast (fig. 62) and the ends of Cords CD–1009 and CD–1010 are inside the lobe-switch cabinet.

h. Turn the rotary coupling until the key on the coupling is lined up with the keyway in the mast. Insert the rotary coupling into the mast, with the key in the keyway, until the locking stud on the coupling snaps into place.

i. Open the hinged door of the lobe-switch box (fig. 63C). Connect the cables to their respective receptacles, as shown. Close and fasten the door.

Note. On some models of Antenna AN–154–A, a calibration chart will be found attached inside the lobe-switch box door. Remove this chart and DESTROY it.

j. Erect the mast as shown in figure 66. It will be necessary for at least two men to push upward on the mast until it can be erected by block and tackle. Care should be taken that the base of the mast does not jar against the top of the gearcase when the mast is fully erected.

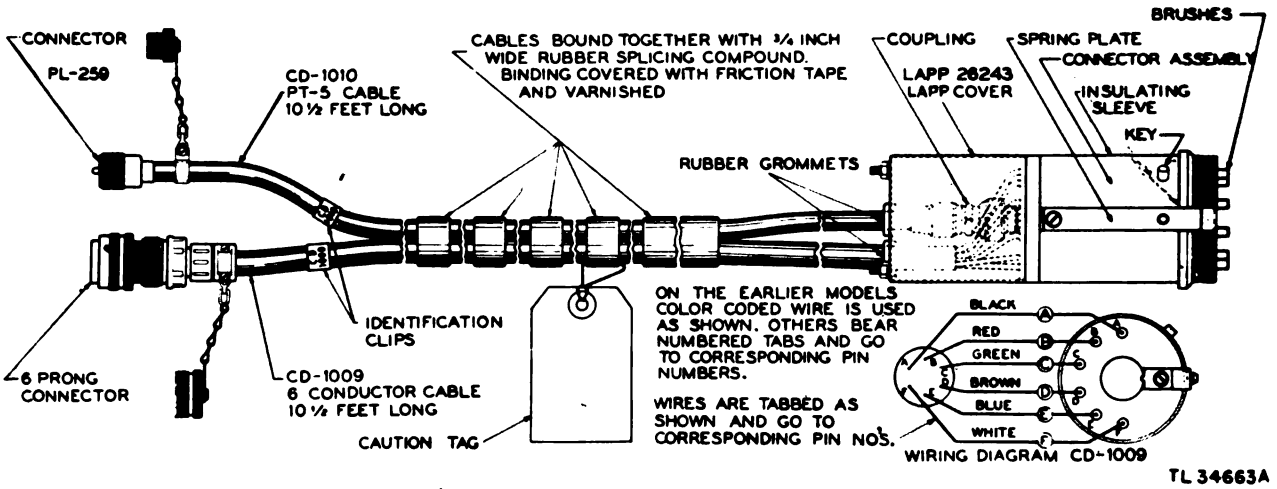


Figure 65. Cords CD–1009 and CD–1010.

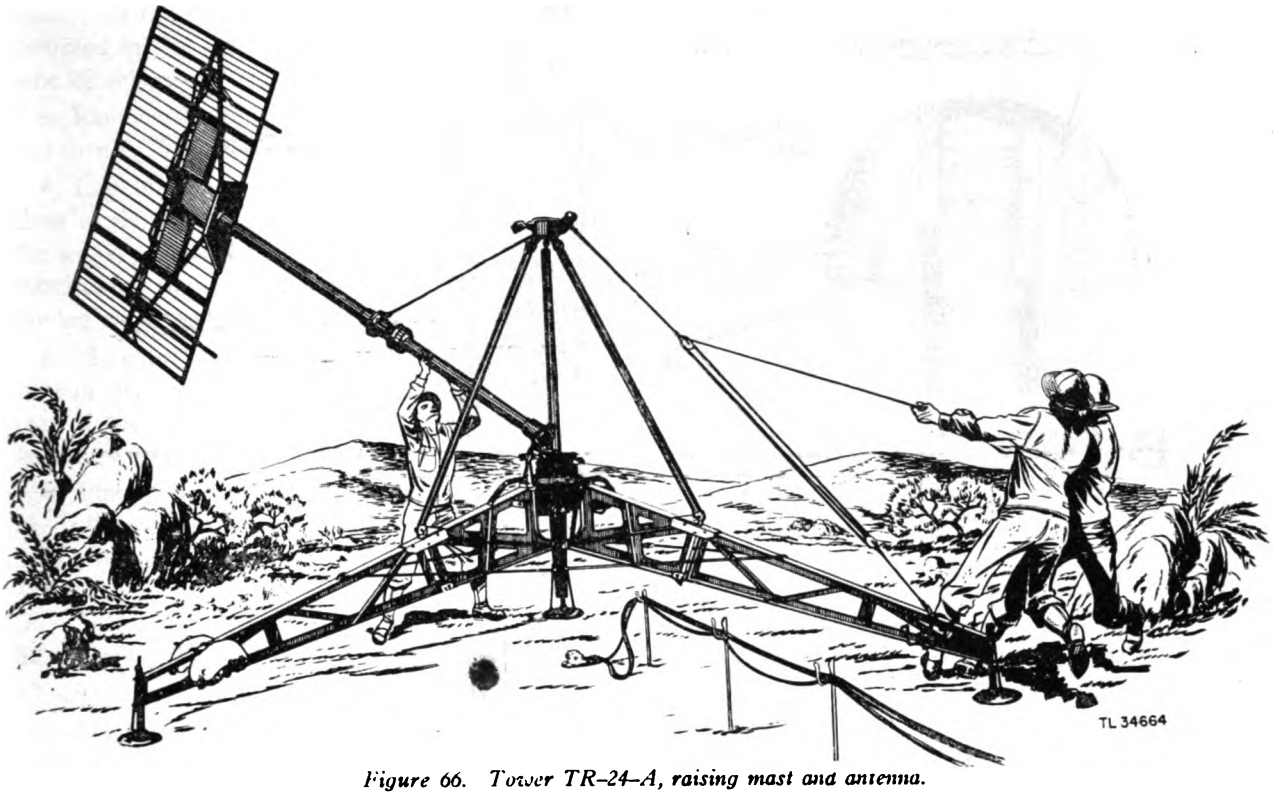


Figure 66. Tower TR–24–A, raising mast and antenna.

k. Secure the base of the mast to the top of the gearcase by means of the three captive bolts and nuts (fig. 60).

l. Close and fasten the collar of the center bearing on top of the tripod assembly. A captive bolt and nut are provided on the collar (fig. 59[C]).

m. Remove the long pin from the gear hinge.

IMPORTANT: THIS PIN MUST ALWAYS BE REINSERTED IN THE HINGE BEFORE LOWERING THE MAST. ON THOSE MODELS ON WHICH THE PIN IS CHAINED TO THE RIGID COAXIAL LINE (PAR. 48) THE PIN CANNOT BE REINSERTED IN THE HINGE UNTIL THE COAXIAL LINE IS REMOVED FROM THE GEARCASE. ON ALL OTHER MODELS, A DETECTING PIN IS CONNECTED TO ONE OF THE GEARCASE CAPTIVE BOLTS WHICH HOLD THE MAST IN POSITION (FIG. 67). THIS BOLT IS PAINTED YELLOW (FIG. 60). THE DETECTING PIN WILL NOT ALLOW THE BOLT TO BE SWUNG BACK UNTIL THE RIGID COAXIAL LINE HAS BEEN REMOVED FROM THE GEARCASE.

n. Remove the hoisting cable from the mast.

50. Installing Rigid Coaxial Transmission Line

Install the rigid coaxial line (fig. 54) in the tower assembly by referring to figure 67 and the following instructions:

a. Remove the caps from the bottom of the gearcase and from the ends of the rigid coaxial transmission line.

b. Insert the smaller end of the transmission line into the bottom of the gearcase and push it up as far as it will go. Keep it in this position by holding on the upper hexagonal nut. At the same time push upward on the lower hexagonal nut and rotate it until the key of the retainer at the upper end of the line enters the keyway of the connecting sleeve (fig. 67B). Turn the nut until it is finger-tight.

c. Push the large knurled thumbnut upward until it engages the threaded sleeve of the gearcase (fig. 67A). The lower hexagonal nut seats in a hexagonal socket in the thumbnut assembly. The keys on this assembly must enter the keyways of the threaded sleeve before the threads are engaged. Tighten the knurled thumbnut finger-tight.

51. Installing Sandbag Supports

Tower TR–24–A is equipped with six sandbag supports for the purpose of adding stability, when nec-

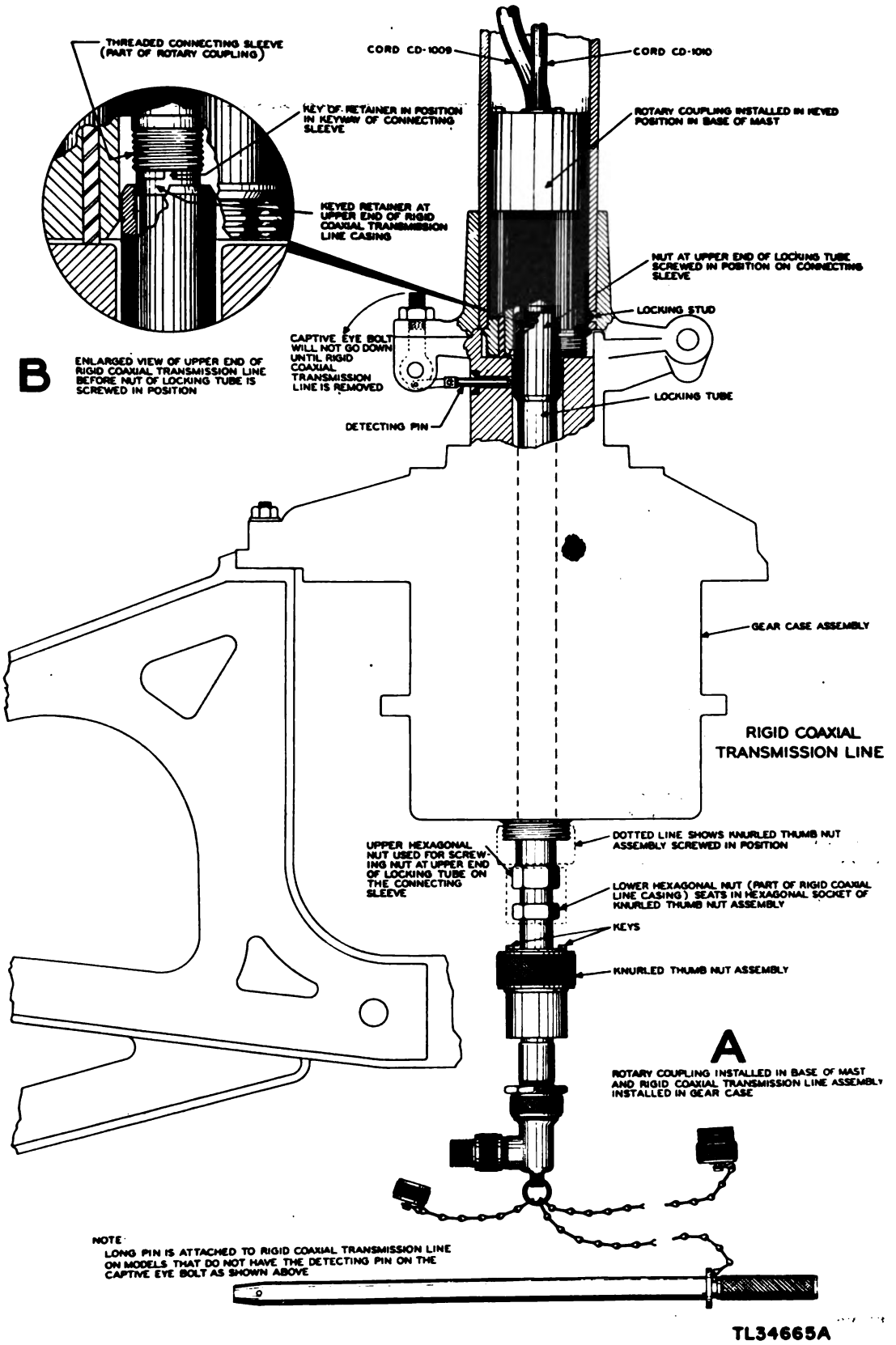


Figure 67. Tower TR–24–A, installation of rigid coaxial transmission line.

essary, to the tower assembly. Two supports are mounted in the channel of each leg extension at the time of shipment (fig. 58A).

a. Remove the supports from each leg by pulling and turning the hooks which secure them.

b. Lay one support across the leg extension as close to the foot as possible with the bowed part of the support down (fig. 58F). Slide the support upward along the leg, making certain that the web of the leg engages the slots of the support.

c. Place the second support on the leg at a convenient distance from the first. Figure 58D shows two of the supports installed on the leg extension. Install two supports on each leg.

d. Place four sandbags on each leg extension. If needed, additional sandbags may be used. The sandbags are not supplied with Radio Equipment RC–145–A.

52. Leveling the Assembly

Check the leveling of the tower assembly as follows:

a. Go over the entire assembly to make sure that all bolts are tightened.

b. Remove the cap from the leveling indicator on top of the gearcase (fig. 60). This indicator is located directly above the antenna motor.

c. Turn the jackscrews of the ground feet clockwise to raise and counterclockwise to lower the tower legs. Adjust the jackscrews until the bubble of the leveling indicator is in the center of the circle etched in the glass cover.

d. Replace the cap on the leveling indicator when this adjustment has been made.

53. Checking Rotation of Mast

Follow these five directions to check the rotation of the mast:

a. Remove the hand crank from its position on top of the gearcase (fig. 60).

b. Remove the protective cap from the end of the antenna-motor housing (fig. 60).

c. Insert the crank through the holes in the tower leg and into the end of the motor housing.

d. Slowly turn the crank and observe whether the mast rotates smoothly through at least one complete turn. If it does not, check the cause before proceeding further.

e. If proper rotation is obtained, remove the crank, replace it in its bracket, and replace the protective cap on the end of the motor housing.

54. Tower TR–24–A, Connection of Cords CD–981 and CD–982

Tower TR–24–A is connected to Trailer K–75–A by two cables, Cords CD–981 and CD–982. Both of the cables are kept off the ground between the trailer and the tower by rod supports driven into the ground at convenient distances apart (fig. 66). Paragraph 38 describes the connection of the two cables to the tower junction box on the trailer. Connect the cables to the tower as follows:

a. Connect the free end of Cord CD–981 to the right-angle connector on the end of the rigid coaxial transmission line of the tower assembly (fig. 67).

b. Connect the free end of Cord CD–982 to the 14-terminal receptacle on the side of the gearcase (fig. 60).

CHAPTER 3

OPERATION

Section I. PREPARATION FOR USE

55. General

The adjustments described in this section are to be distinguished from the normal starting procedure given in section II. Section I gives the adjustments that must be made after installation. It includes setting up the oscilloscope pattern, calibrating range, tuning the transmitter and receiver, orienting the antenna with the indicator, and alignment of IFF and radar antennas. When these adjustments have been made, the normal starting procedure is used to put the set into operation. The adjustments described in section I must be made after the equipment is moved or as often as necessary to keep the equipment in correct operating condition.

56. Preliminary Adjustments of Control Unit BC–1266–A

The control unit is supplied with power directly from the main switch that supplies power to the range oscilloscope of Radio Set SCR–545–A. The ON-OFF switch, located on the right center portion of the control unit panel, controls this power. All filament voltages and the high voltage for the cathode-ray tube are supplied by the control unit. The 300-volt d-c plate voltage is supplied by Power Supply RA–105–A and is applied when this unit is turned on. Make the following adjustments before applying power to the control unit. Refer to figure 68 for the location of the control.

a. Turn the 100K YD. CENT. and 10K YD. CENT. controls to a position in the middle of their respective rotational ranges.

b. Turn the VERT. CENT. control to a position in the middle of its rotational range.

c. Turn the 100K YD. GAIN control to its extreme counterclockwise position and then turn it to a position one-third of the way towards its extreme clockwise position.

d. Repeat the above adjustment procedure for the 10K YD. GAIN control.

e. Turn the CALIB. control to its extreme clockwise position.

f. Turn the SPREAD control to its extrem counterclockwise position.

g. Turn the INTENSITY and FOCUS controls to the middle of their respective rotational ranges.

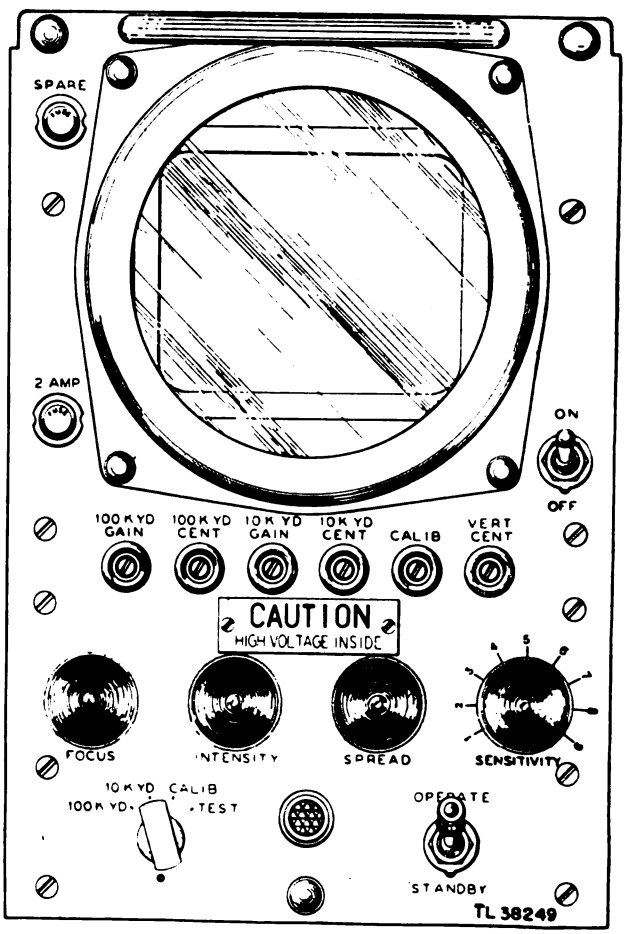


Figure 68. Control Unit BC–1266–A.

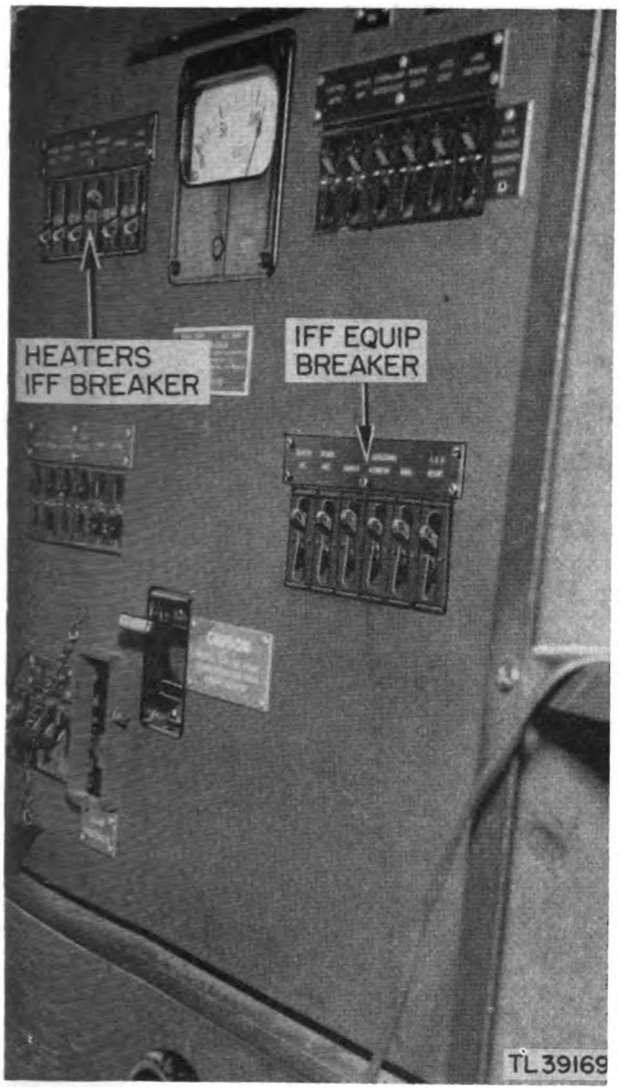


Figure 69. Power Panel BD–125–A.

57. Operating Adjustments of Control Unit BC–1266–A

a. Turn on the switch marked IFF on the power panel of Radio Set SCR–545–A (fig. 69). This switch controls power to Rack FM–79.

b. Turn the STANDBY-OPERATE switch of the control unit to the STANDBY position.

c. Turn the range switch, located in the lower left-hand portion of the control unit panel, to the 100K YD. position.

d. Snap the ON-OFF switch to the ON position. The pilot light, located in the lower center portion of the control unit panel, should light.

e. Snap the FILAMENT VOLTAGE circuit breaker on the power supply to the ON position. Wait 45 seconds and then snap the PLATE VOLTAGE circuit breaker to the ON position (fig. 70). Allow at least 1 minute for the equipment to warm up before making further adjustments. This assures more stable adjustments.

f. If no image appears on the screen of the control unit, slowly turn the INTENSITY control clockwise until a line appears.

Caution: Do not turn the INTENSITY control too far in the clockwise direction because there is danger of damaging the fluorescent screen of the cathode-ray tube.

g. Adjust the FOCUS control by turning the control in one direction and then in the opposite direction until a sharply defined line is obtained.

h. Readjust the INTENSITY control until a visible, but not bright, line is obtained (fig. 71).

i. Adjust the 100K YD. CENT. control until the left end of the line is ⅛-inch from the left edge of the visible portion of the screen.

j. Adjust the 100K YD. GAIN control until the right end of the line is ⅛-inch from the right edge of the visible portion of the screen. It may now be necessary to readjust the 100K YD. CENT. control.

k. Turn the range switch to the CALIB. position. A series of waves will appear on the screen.

l. Turn the CALIB. control in a counterclockwise direction until 12 complete cycles are visible (fig. 72).

m. Turn the range switch back to the 10K YD. position. Follow the same procedure for adjusting the 10K YD. GAIN control as was used for adjusting the 100K YD. GAIN control.

58. Final Operating Adjustments of Control Unit

In order to check the division, proceed as follows:

a. Turn the range switch to the TEST position.

b. Turn the INTENSITY control in a clockwise direction until a line is plainly visible on the screen.

c. Plug one end of Cord CD–1105 to jack 120 and the other end to jack 121–6 on the side of the control unit (fig. 73). For this operation the control unit is drawn forward a short distance and the plate covering the jacks removed. Be sure that the control unit is not pulled out far enough to tip forward.

d. Adjust potentiometer 93 (fig. 73) until a distinctive sharp pulse appears on each extremity of the baseline (fig. 74).

e. Pull out the test cable plugs.

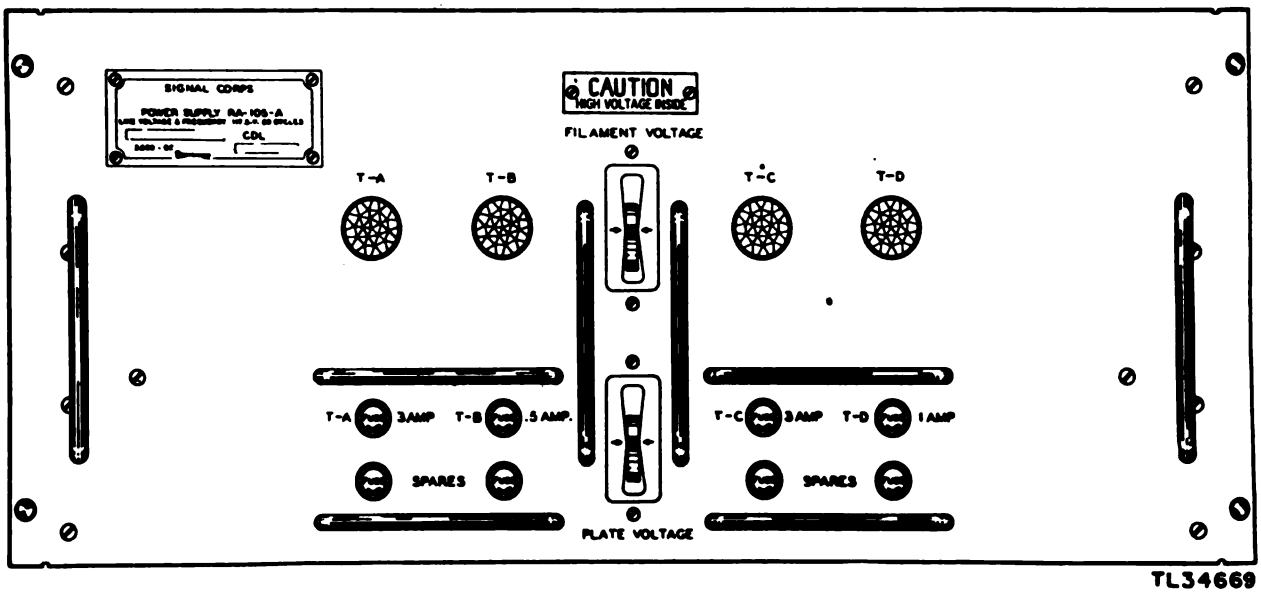


Figure 70. Power Supply RA–105–A.

f. Turn the range switch to the 100K YD. position.

g. Turn the INTENSITY control in a counterclockwise direction until the line is plainly visible but not bright.

h. Adjust the VERT. CENT. control until the pattern is ½ inch above the bottom of the visible portion of the screen.

59. Preliminary Steps Before Adjustment of Receiver and Transmitter

In order to make frequency measurements or to set up the RC–145–A equipment, the modulator of Radio Set SCR–545–A must be turned off. The synchronizing voltage for the identification equipment is then obtained from Calibrator I–189–A, which is supplied with Radio Set SCR–545–A. This is accomplished in the following manner:

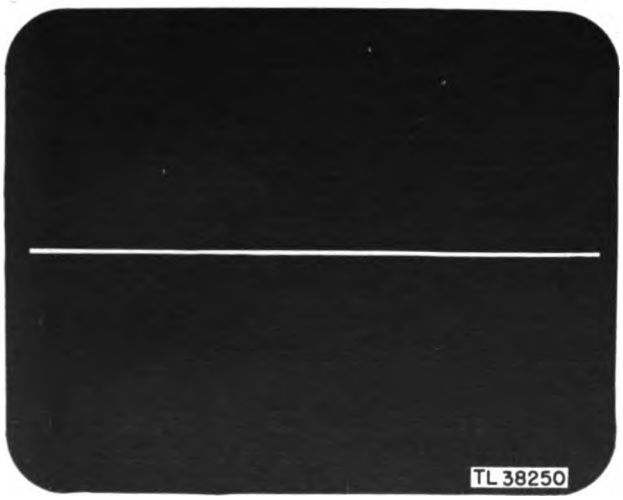


Figure 71. Focusing.

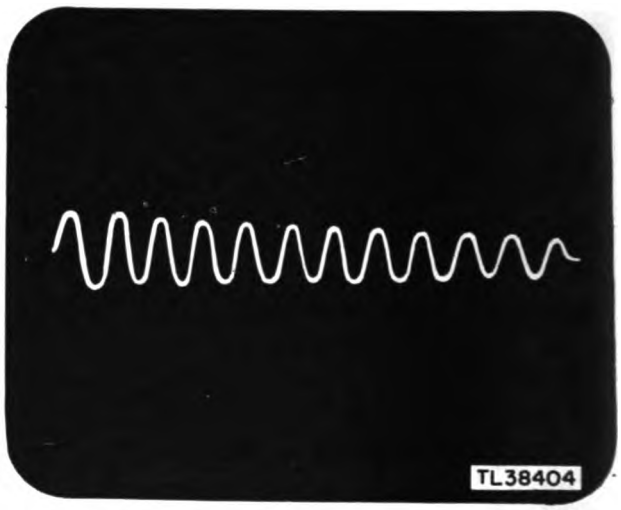


Figure 72. Calibration.

a. Connect a test cable from the TEST SYNCH output of Calibrator I–189–A to TEST SYNCH input on Power Panel BD–125–A, which is located at the left of the calibrator.

b. Turn on the calibrator as described in the instruction book for Radio Set SCR–545–A.

c. A jumper cable is connected between the top receptacle of junction box 22–B and the receptacle marked TERMINATION, also on the junction box.

Transfer the end which is connected to the TERMINATION receptacle to the receptacle marked TEST SYNCH.

d. Turn the range switch on the control unit to the 100K YD. position and leave it in this position until all adjustments have been made.

e. On completion of the adjustments on the receiver and transmitter, as described in the following paragraphs, return the jumper cable to the receptacle marked TERMINATION.

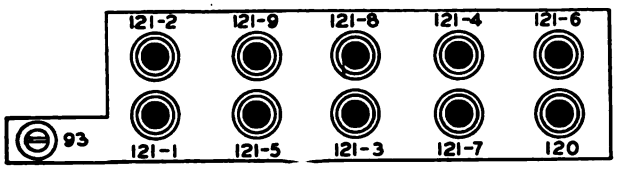


Figure 73. Jack panel, side of Control Unit BC–1266–A.

60. Adjustment of Radio Receiver and Transmitter BC–1267–A Before Application of Plate Voltage

a. Disconnect the PT–5 cable and the right-angle connector to which it is attached from the ANTENNA connector on the transmitter.

b. Connect the T-shaped connector to the ANTENNA connector as shown in figure 77.

c. Connect the short test antenna, which is mounted on a right-angle connector, to the upper branch of the T-connector.

d. Connect the dummy antenna to the lower branch.

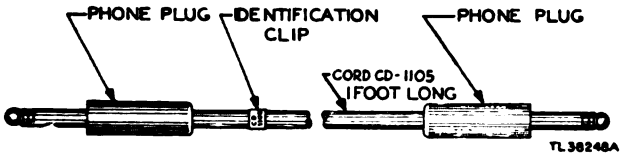


Figure 74. Cord CD–1105.

e. Apply voltage to the low-voltage circuits by snapping the FILAMENT VOLTAGE circuit breaker on the power supply to the ON position.

f. Set the STANDBY-OPERATE switch on the control unit to the STANDBY position.

g. The adjustments in paragraphs *g* through *p* are made with the screwdriver which is located above the receiver dials. This screwdriver, which has a knurled knob handle, can be removed by unscrewing (fig. 76).

h. Set the WIDTH control of the transmitter to its extreme counterclockwise position. This corresponds to the minimum width. The WIDTH control allows a variation of 5 microseconds in the width of the pulse which will be between 4 and 9 microseconds.

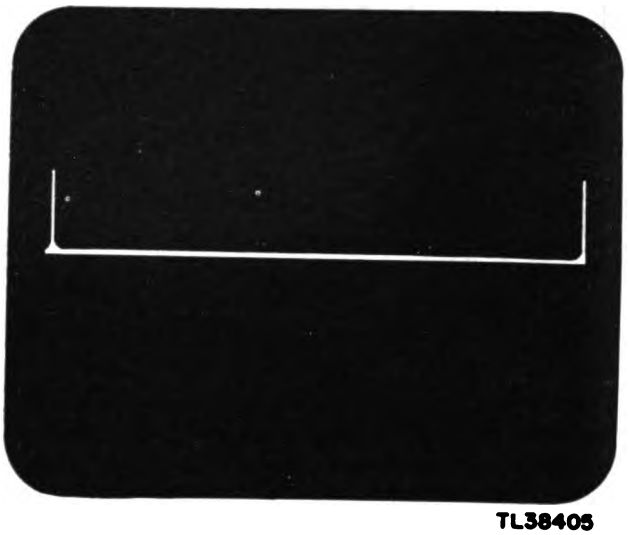


Figure 75. Division.

i. Set the POWER MEASUREMENT control to its extreme counterclockwise position. This control varies the voltage applied to the cathode of the diode voltmeter circuit and has a range of zero to 400 volts. This corresponds to a power range of zero to 1 kilowatt.

j. Set the BIAS control to its extreme counterclockwise position. This control varies the bias voltage on the 3E29 modulator tube and has a range of 120 to 145 volts. It is necessary because the cutoff bias is not the same for all commercial 3E29 tubes.

k. Set the POWER OUTPUT control to its extreme clockwise position, which corresponds to maximum power. This control varies the screen voltage of the 3E29 modulator tube and affords a smooth variation in power from 1 kilowatt to 50 watts.

l. The control marked LIGHTS, which controls the illumination of the dials and meter, may be left in any position, depending on the illumination required.

m. Set the receiver and transmitter dials to the

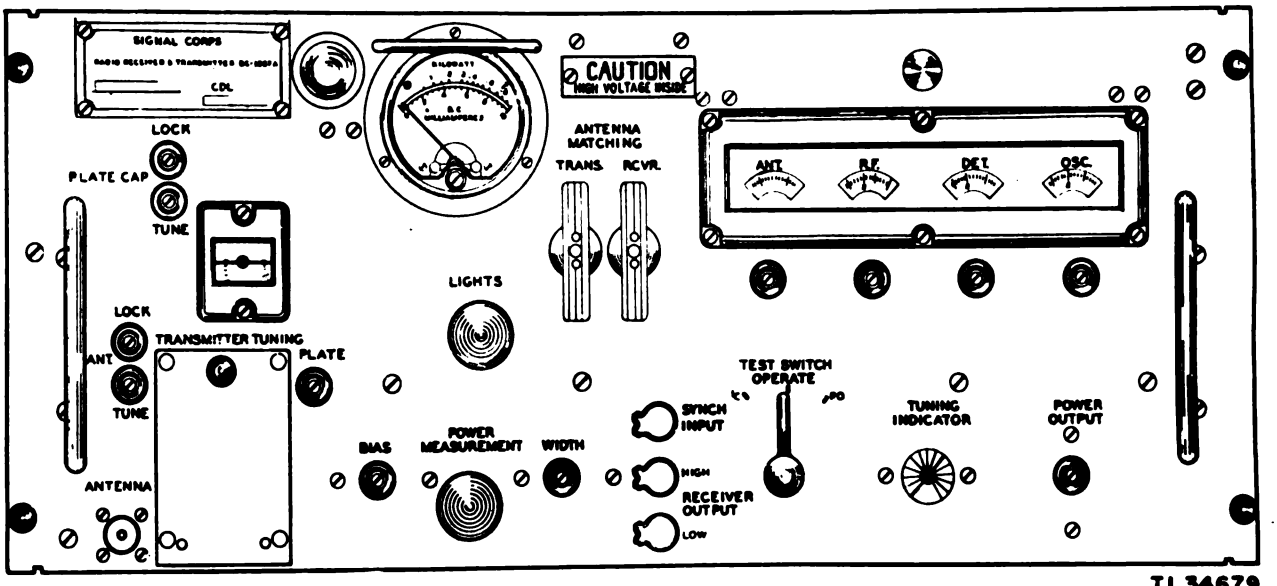


Figure 76. Radio Transmitter and Receiver BC–1267–A.

position corresponding to the frequency desired. (The transmitter dial is rotated by means of the control marked PLATE.) These positions are obtained from the calibration chart inside the hinged door below the transmitter dial. It is important that the oscillator and detector circuits of the receiver be set to the same dial setting initially, as there is some interlocking between them.

n. The antenna tuning control (ANT.) has a locking device (LOCK) on it which must be released by turning counterclockwise with a screwdriver before adjustment can be made. This control is set to any position and is properly tuned later.

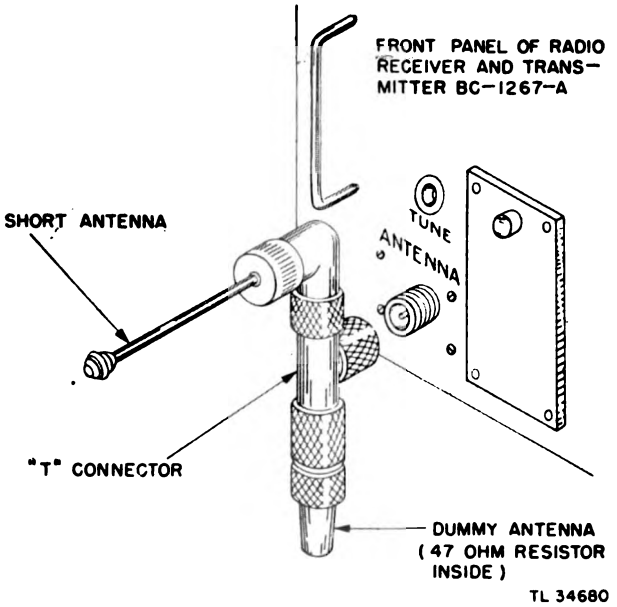


Figure 77. Test antenna being installed.

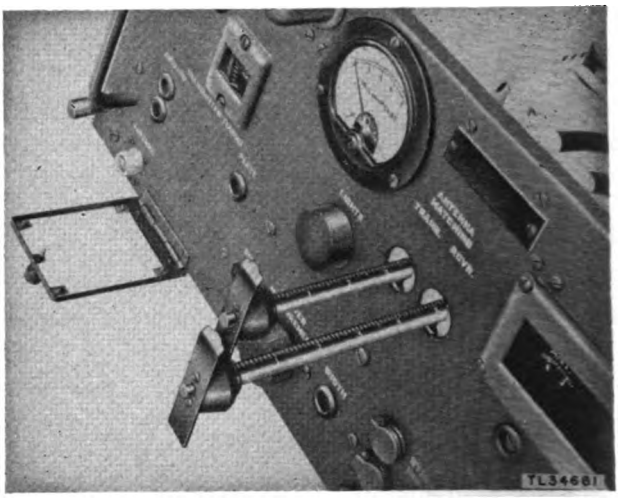


Figure 78. Adjusting rod of antenna matching section.

o. The PLATE CAP. control also has a locking device which must be released before adjustments are made. The setting of this control depends on the tubes used. The PLATE CAP. control is used to correct for variation in the interelectrode capacity of the 2C26 tubes. If the calibration of the transmitter frequency is in error, as shown by a signal generator, the plate capacity may be varied to correct the calibration. The control is set when the transmitter leaves the factory and need not be reset except when the tubes are changed.

p. The ANTENNA MATCHING section is used to enable the receiver and transmitter to work into a common antenna (fig. 78). The setting should correspond roughly to maximum length of the matching section (0 on the calibrated bakelite rods) for the low-frequency end of the band, and minimum length of the matching section (7.5 on the rods) for the high-frequency end.

q. The control adjustments which must be made before plate voltage is applied may be summarized as follows:

(1) PLATE CAP. (plate capacity): Preset for tubes at factory.

(2) ANT. (antenna tuning): Set at any position and peak for desired frequency according to detailed instructions which follow.

(3) PLATE (transmitter tuning): Set for desired frequency.

(4) ANT, RF, DET, and OSC (receiver tuning): Set for desired frequency. Be sure that the oscillator and detector circuits are set at the same reading of the dials.

(5) ANTENNA MATCHING: Set approximately at the desired position as indicated in paragraph *p* above.

(6) LIGHTS (dial lights control): Set at any position.

(7) WIDTH: Set at extreme counterclockwise position.

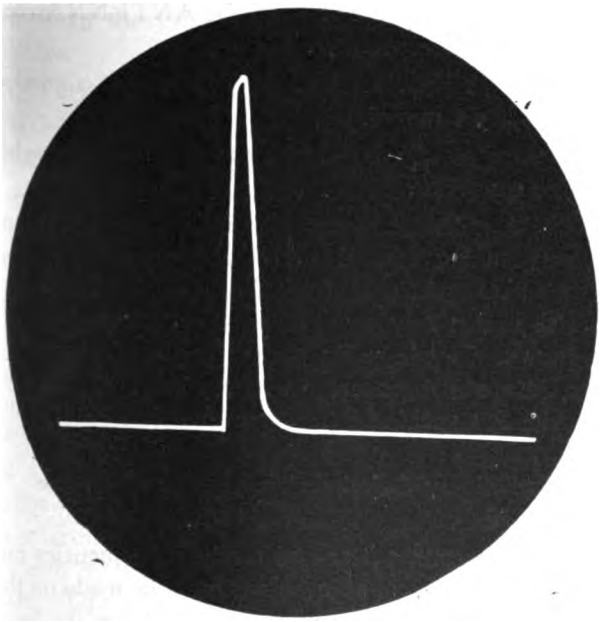


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Figure 79. Test pulse.

(8) POWER MEASUREMENT: Set at extreme counterclockwise position.

(9) BIAS: Set at extreme counterclockwise position.

(10) TEST SWITCH: Set at OPERATE position.

(11) POWER OUTPUT: Set at extreme clockwise position.

61. Adjustment of Radio Receiver and Transmitter BC–1267–A After Application of Plate Voltage

Before proceeding further with the adjustment of the receiver and transmitter, set up a test oscilloscope next to the Radio Equipment RC–145–A rack. Connect the X INPUT terminals to the SWEEP jack on the search receiver test panel of Radio Set SCR–545–A. If the test oscilloscope has provisions for use of intensity modulation, connect the UNBLANK jack on the test panel to the appropriate posts on the test oscilloscope. Turn the test panel on by means of the toggle-type power switch mounted on its left side. Connect the LOW RECEIVER OUTPUT jack of Radio Receiver and Transmitter BC–1267–A to the VERT INPUT posts of the oscilloscope. Adjust the FOCUS and INTENSITY controls for a suitable picture. Rotate the SWEEP switch on the search receiver test panel to position 3. The sweep length of the test oscilloscope is now set to 55 microseconds.

a. Set the PLATE VOLTAGE circuit breaker of the power supply to the ON position.

b. Hold the TEST SWITCH in the Ic position and adjust the BIAS control until the 3E29 modulator cathode current is at 1 milliampere, as indicated by the meter on the panel.

c. Apply the synchronizing voltage to the transmitter by turning the STANDBY-OPERATE switch of the control unit to the OPERATE position.

d. Again hold the TEST SWITCH in the Ic position and read the cathode current of the modulator tube. This should be approximately 4 to 7 milliamperes.

e. Turn the TEST SWITCH to the PO position. A picture of the envelope of the r-f pulse, similar to figure 79, will appear on the screen of the test oscilloscope.

f. Adjust the antenna tuning control (ANT.); then adjust the receiver and transmitter portions of

the ANTENNA MATCHING section for maximum amplitude of the pulse. The receiver portion of the ANTENNA MATCHING section is adjusted by pulling the rod marked RCVR out to the desired position. When this position is reached, press in the button in the center of the rod handle and push the rod in as far as it will go. The transmitter portion is adjusted in a similar manner by means of the rod marked TRANS. If the height of the power output pulse increases on the screen of the oscilloscope when the antenna tuning control is rotated, or when the matching section is adjusted, it indicates that the power output is increasing.

g. The transmitter and receiver should now be accurately tuned to the desired frequency.

(1) Tune the transmitter to the operating frequency as described in paragraphs 62 and 63.

(2) Retune the antenna tuning control (ANT.) and the receiver and transmitter portions of the ANTENNA MATCHING section (subpars. *e* and *f*).

(3) Turn the STANDBY-OPERATE switch of the control unit to the STANDBY position.

(4) Disconnect the short test antenna and the dummy antenna from the transmitter ANTENNA T-connector.

(5) Tune the receiver to the transmitter frequency as described in paragraph 64.

(6) Remove Cord CD–1104 from the transmitter ANTENNA T-connector.

(7) Connect the short test antenna and the antenna to the T-connector (fig. 77).

(8) Turn the STANDBY-OPERATE switch of the control unit to the OPERATE position and check the transmitter tuning.

(9) Turn the TEST SWITCH to the PO position.

(10) Adjust the receiver and transmitter portions of the ANTENNA MATCHING section for maximum amplitude of the pulse on the oscilloscope screen.

(11) Recheck the receiver tuning as described in subparagraphs (3), (4), and (5) above.

(12) The foregoing tuning adjustments should be rechecked several times because of the interaction of the antenna circuits.

h. At this time the width of the pulse should be set by adjusting the width control and observing the pulse on the oscilloscope screen. *Do not operate the equipment with the pulse width such that the cathode current of the 3E29 tube is in excess of 7.5 milliamperes.*

(1) Set the SWEEP switch on the search receiver test panel of Radio Set SCR–545–A to position 2, which gives a sweep duration of 18 microseconds.

(2) Adjust the X GAIN control until the length of the baseline is equal to a multiple 18 divisions on the screen.

(3) Hold the TEST SWITCH in the PO position.

(4) Adjust the WIDTH control until the width of the pulse, measured halfway from the baseline to the top of the pulse, is approximately 7 microseconds. The measurement of the width is made by comparison with the length of the baseline.

i. The power output of the transmitter is measured as follows:

(1) With the transmitter on, throw the TEST SWITCH to the PO position. The pulse will appear on the test oscilloscope screen.

(2) Turn the POWER MEASUREMENT control clockwise just until the pulse disappears. The power can now be read on the meter.

(3) The power output of the transmitter can be decreased by turning the POWER OUTPUT control counterclockwise.

j. After the above measurements have been made, remove the T-connector from the ANTENNA connector of the transmitter.

k. In its place connect the right-angle connector previously removed.

l. Connect the PT–5 antenna cable to the right-angle connector.

m. A slight readjustment of the transmitter antenna tuning control (ANT.) and receiver and transmitter portions of the ANTENNA MATCHING section may now be necessary. These adjustments are made while observing the pulse height on the oscilloscope screen with the TEST SWITCH in the PO position.

62. Preliminary Adjustments of Signal Generator I–222–A

Before the transmitter and receiver frequencies can be checked, certain adjustments must be made on the signal generator. Refer to figure 80 for the location of the various controls.

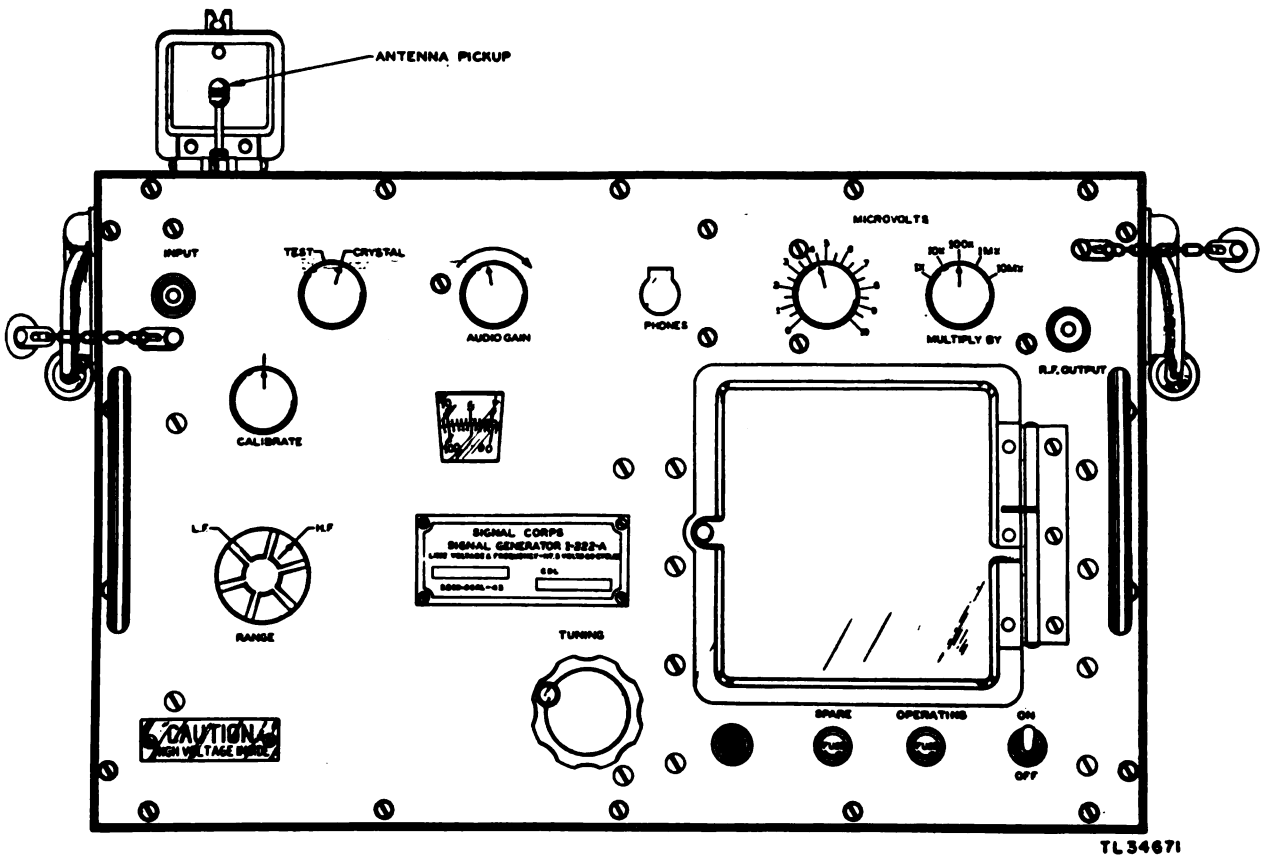


Figure 80. Signal Generator I–222–A.

a. Plug the headphones into the jack marked PHONES.

b. Snap the ON–OFF toggle switch to the ON position.

c. Turn the operating switch (TEST-CRYSTAL) to the position marked CRYSTAL. Allow the crystal 15 minutes to warm up.

d. Turn the RANGE switch to the H.F. position.

63. Setting Transmitter Frequency With Signal Generator I–222–A

A chart, giving calibration points for both the high- and low-frequency bands, will be found under the hinged cover on the right side of the signal generator panel. This cover may be opened by turning the captive locking screw in a counterclockwise direction. Figures in red on the chart indicate crystal reference points for restoring the calibration of the unit to the value indicated on the calibration chart. This adjustment can be made by setting the dial (by means of the TUNING knob) to these reference points, and listening for the zero beat in the headphones when the control marked CALIBRATE is rotated in a clockwise or counterclockwise direction. Restoration of calibration is made by selecting the crystal point that is closest to the frequency to be monitored. When this frequency is unknown restore the calibration at the center of the band or 180 megacycles as given by the chart.

a. Six crystal points are given on the h-f band. Select the crystal point that is closest to the desired frequency when restoring the calibration.

b. Snap the antenna door open and pull the antenna rod up out of the case.

c. Couple the transmitter to the wavemeter by means of the short antenna assembly (fig. 77) which will radiate a signal to the wavemeter antenna. It is imperative that the input of the unknown frequency source be adjusted to the correct level for monitoring. This is accomplished by listening to the received signal with the headphones and adjusting its level by sliding the antenna pick-up rod in and out of the case until a very weak signal is obtained. This adjustment is made with the control

marked AUDIO GAIN rotated to its extreme clockwise position. The detector used in the unit is of the untuned type. Therefore when monitoring a pulse-modulated signal the repetition rate will be heard throughout the range of the monitoring oscillator; when monitoring a sine-wave modulated signal a continuous audio note will be heard.

d. Set the dial to the desired frequency by turning the TUNING knob. It is assumed that the nearest crystal point has been checked.

e. Rotate the operating switch (TEST-CRYSTAL) to the TEST position and adjust the transmitter frequency control (PLATE) until the note of the repetition rate (buzzing noise), as heard in the headphones, is interrupted. Make sure that the interruption is sharp and can be approached from both directions of rotation of the transmitter frequency control.

64. Setting Receiver Frequency With Signal Generator I–222–A

The receiver section of Radio Receiver and Transmitter BC–1267–A is to be set to the same frequency to which the transmitter is tuned. If the procedure

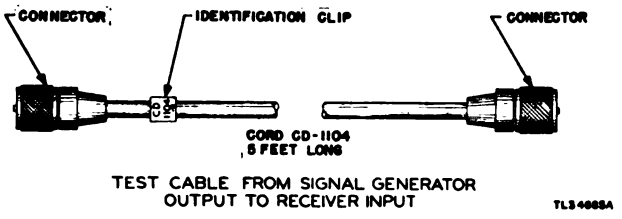


Figure 81. Cord CD–1104.

described in paragraph 63 has been carried out, the signal generator is now tuned to that frequency. The gain control for the receiver is located on the control unit panel (SENSITIVITY) and should be turned to its maximum clockwise position.

a. Connect one end of Cord CD–1104 to the R.F. OUTPUT connector of the signal generator.

b. Connect the other end of the cable to one branch of the T-connector on the transmitter ANTENNA connector.

c. Refer the h-f oscillator to the reference crystal point nearest to the desired frequency (par. 63).

d. Determine the receiver dial settings from the calibration chart below the transmitter tuning dial.

e. Set the receiver dials (OSC, DET, RF, and ANT), in the order named, to these settings. This will tune the receiver approximately to the desired frequency.

f. For final adjustment, set the right-hand attenuator dial (marked MULTIPLY BY) to the 1Mx position and adjust the receiver dials for maximum closure of the TUNING INDICATOR. If the eye overlaps reduce the receiver gain by turning the SENSITIVITY control on the control unit counterclockwise. The right-hand control of the attenuator is for coarse adjustment; the left-hand control is for fine adjustment. The 1Mx position of the attenuator is used because in this position the attenuator has the desired impedance of 50 ohms.

65. Adjustment of Indicator I–221–A

Before the indicator can be put into operation there are several adjustments that are necessary. These are made in the following sequence: eye adjustment, centering adjustment, sensitivity adjustment, and zero adjustment. The antenna should be oriented with the radar antenna before the zero adjustment is made. Normally the centering and sensitivity adjustments need to be made only after considerable tube aging or wide changes in ambient temperature. The zero adjustment must be made each time the antenna has been resynchronized with the radar antenna. The eye opening, dial light, azimuth, and zero adjustment controls and the mount displacement eye are located on Remote Indicator I–227–A in the cab of Trailer K–75–A. After the antenna

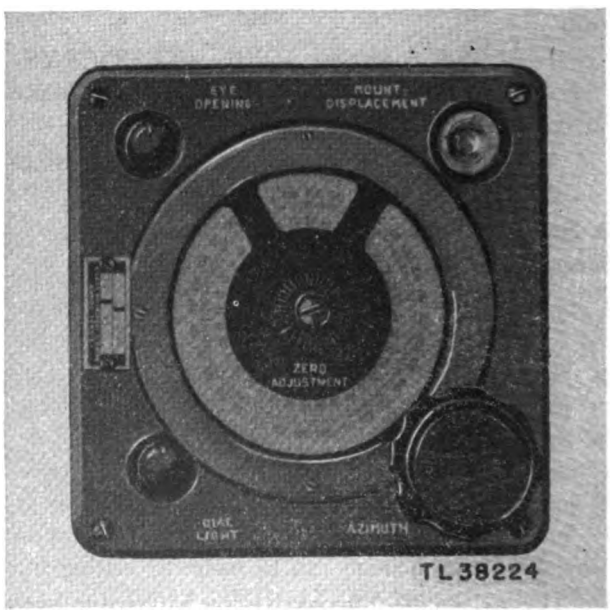


Figure 82. Remote Indicator I–227–A.

has been set up and connected to the trailer by means of the proper cables, and after the power cable has been connected to the rack, the indicator may be put into operation. The indicator operates independently of the other panels in the rack and need not be adjusted in any particular order with respect to them.

a. EYE ADJUSTMENT. The eye should be adjusted first, as its indications are useful in making the other adjustments. When proper adjustments are made, any opening of the eye indicates that, for some reason, the antenna does not have the azimuth that the azimuth dial indicates.

(1) Snap the INDICATOR PANEL circuit breaker to the ON position.

(2) Turn the CENTERING control with a screwdriver until the relay in the chassis of Indicator I–221–A can be heard to click. A high noise level in the trailer may make it necessary to press the ear against the indicator panel in order to hear the clicks.

(3) As the relay closes and opens at slightly different settings of the CENTERING control, the control should be set at a position halfway between two relay clicks.

(4) If the noise level in the trailer is high enough to make it impossible to hear the relay clicks and cannot be conveniently reduced, it will be necessary to remove the remote indicator from its cabinet and replace it in the chassis of Indicator I–221–A.

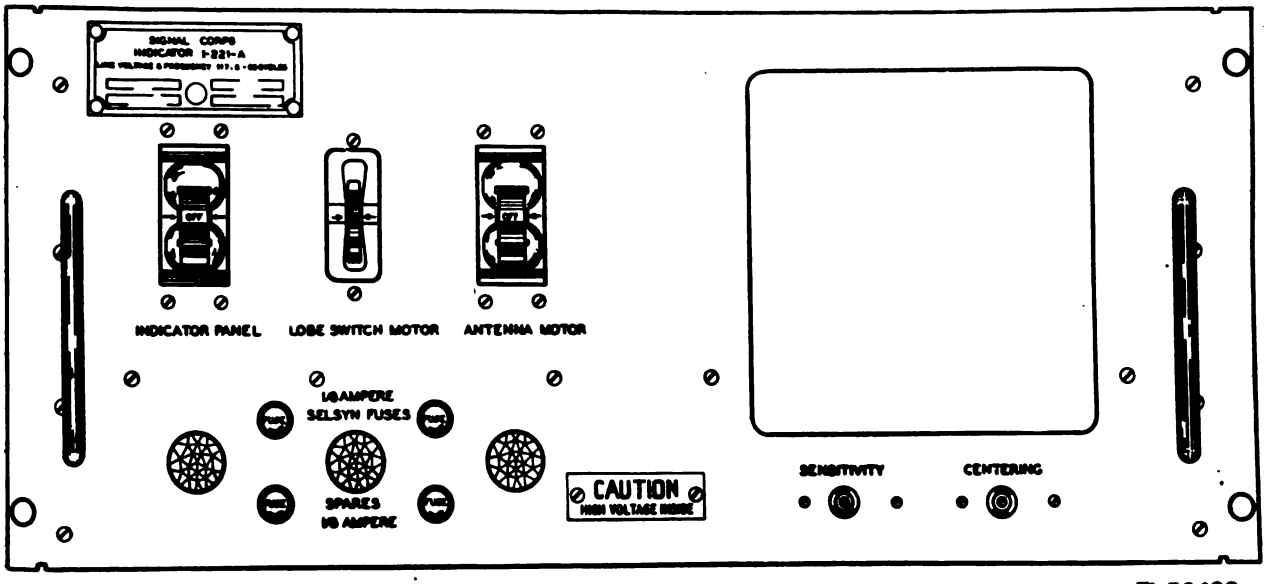


Figure 83. Indicator I–221–A with remote indicator removed.

(2) After the tubes have warmed up, which is indicated by the MOUNT DISPLACEMENT eye becoming bright, turn the AZIMUTH dial until the eye opening becomes a minimum.

(3) Adjust the EYE OPENING control until the eye just closes but does not overlap. Any opening of the eye now indicates that the antenna is displaced from the desired position of rest.

b. CENTERING ADJUSTMENT. The CENTERING control adjusts the circuit so that the motor-reversing relay reverses exactly at the desired rest position.

(1) Turn the AZIMUTH control until the eye closes.

Caution: Make certain that the power is removed from the identification equipment before disconnecting the remote indicator.

(5) Centering can now be accomplished as follows: turn the SENSITIVITY control to its extreme clockwise position (maximum sensitivity) and set the ANTENNA MOTOR circuit breaker to the ON position. The antenna will now oscillate about the position of rest and the MOUNT DISPLACEMENT eye will continually open and close. If the circuit is not centered properly, alternate eye openings will not be of the same magnitude. This indicates that the antenna swings farther to one side of the rest position than it does to the other. If

the centering adjustment is too far off center, the antenna may continue to turn in one direction or the other, only pausing at the rest position, rather tha oscillate about the position of rest. Set the CENTERING control so that alternate eye openings are of the same magnitude.

c. SENSITIVITY ADJUSTMENT. The SENSITIVITY control provides a means for adjusting the indicator for optimum operation under different conditions of antenna tower friction. With too little sensitivity the antenna may not stop on the desired rest position with very great accuracy. With too great sensitivity the accuracy of the rest position will be high, but the antenna may "hunt" several times before coming to rest or may never come completely to rest.

(1) Turn the SENSITIVITY control to the extreme clockwise position.

(2) Set the ANTENNA MOTOR circuit breaker to the ON position. It should be noticed that the antenna is oscillating about the rest position.

(3) Slowly turn the SENSITIVITY control counterclockwise until the antenna just comes to rest.

d. ALIGNMENT OF IDENTIFICATION AND RADAR ANTENNAS. Before the zero adjustment can be made, the identification antenna must be directed in the same direction as the radar antenna, and their respective azimuth indicating dials must be synchronized electrically and mechanically.

(1) With an observer at the telescope of the radar antenna, slowly rotate the radar antenna until the observer sights the antenna-supporting column of the IFF antenna.

(2) The observer now directs the operator at the identification antenna to rotate the antenna with the hand crank until he (the observer) sees the center dipole directly between the two center vertical supporting bars of the reflector in his telescope. The two antennas should now be facing each other.

(3) Obtain the azimuth reading of the radar antenna. If it is less than 180°, add 180° to it; if it is greater than 180°, subtract 180° from it. The sum, or differences, is the reading to which the azimuth indicator ring on Tower TR–24–A is to be set.

(4) Loosen the indicator ring on the tower by turning the long hexagonal bolt projecting above the ring.

(5) Rotate the ring, calibrated in degrees, to the proper setting. Do not tighten the ring until after the next step.

e. CORRECTION FOR ELECTRICAL CENTER. A chart attached to the door of the antenna junction box shows the correction necessary to obtain the electrical center at different operating frequencies.

(1) Knowing the operating frequency, determine the corresponding correction from the chart.

(2) Add or subtract the proper number of degrees to the setting made in subparagraph *d* above.

(3) Tighten the indicator ring.

f. ZERO ADJUSTMENT. The ZERO ADJUSTMENT control is provided so that the dial on Remote Indicator I–227–A can be synchronized with the dial on the antenna tower.

(1) Snap the INDICATOR PANEL and ANTENNA MOTOR circuit breakers to the ON position.

(2) When the antenna comes to rest turn off the ANTENNA MOTOR circuit breaker.

(3) Adjust the AZIMUTH control until the eye opening is at a minimum.

(4) Rotate the ZERO ADJUSTMENT knob until the dial on the indicator panel reads the same as the one on the antenna tower.

Important: This knob must be pressed in and rotated with one hand while the AZIMUTH knob is held stationary with the other hand. Since the AZIMUTH knob may move slightly during this operation, recheck to see that the eye is at its maximum closed position when the two dials have the same reading.

Section II. STARTING PROCEDURE

66. General

When all preliminary adjustments have been made and the equipment has been set up for operation, the normal starting procedure is used for subsequent startings. The range oscilloscope of Radio Set SCR–545–A must be on to operate Radio Equipment RC–145–A. In damp weather or cold climate it is desirable to turn on the heaters when the equipment is not operating. The heaters in Rack FM–79 are turned on by operating the switch marked HEATERS on the lower panel of the rack. The heaters will not come on unless the blowers are on. The blowers may be turned on by following steps 1 and 3 (omit step 2). The heaters should be OFF when the equipment is operating.

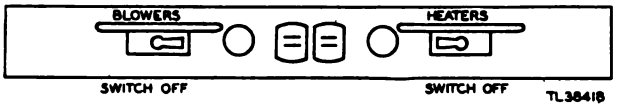


Figure 84. Blower and heater breakers.

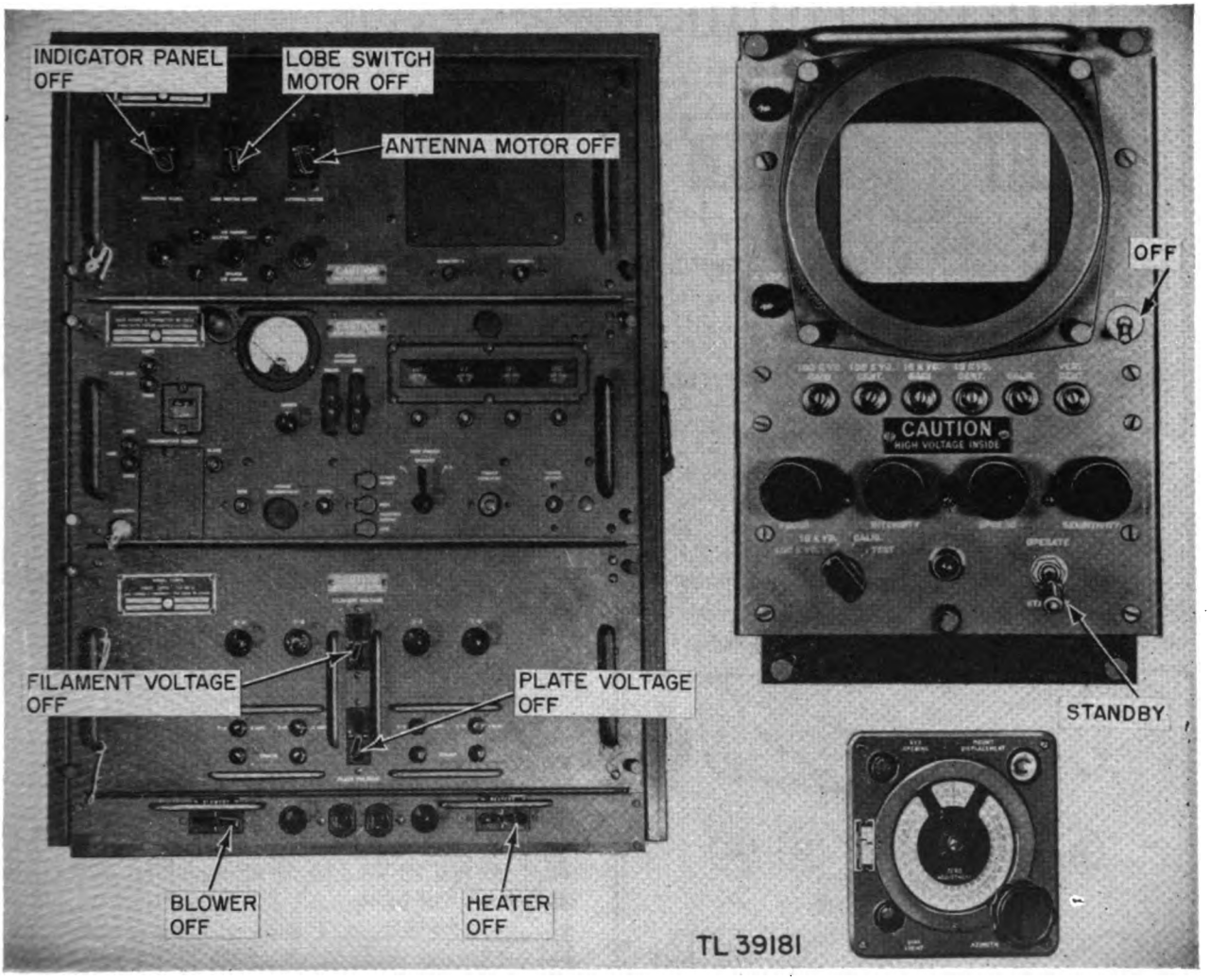


Figure 85. Position of controls before starting.

STEP 1

Set the switch marked IFF, located on the Radio Set SCR–545–A power panel to the ON position.

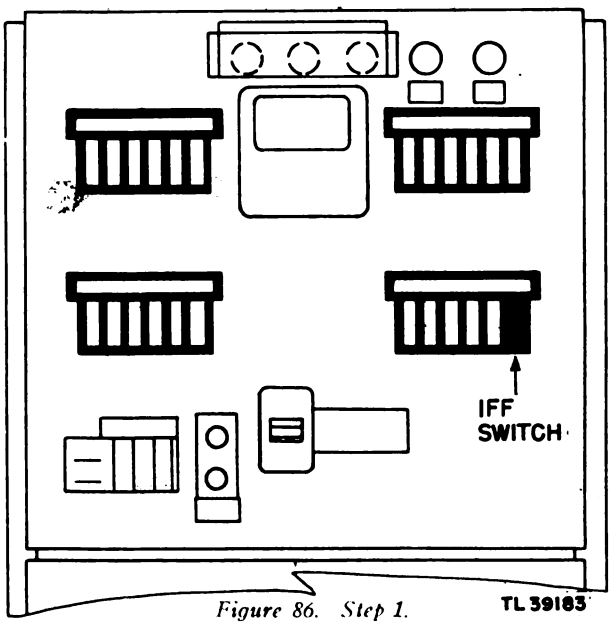


Figure 86. Step 1.

STEP 2

Set the ON–OFF switch located on Control Unit BC–1266–A to the ON position. The pilot light on the lower center position should light.

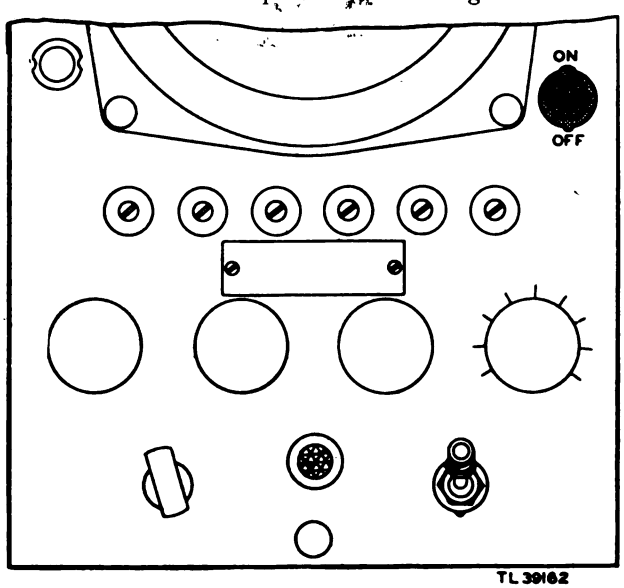


Figure 87. Step 2.

STEP 3

Set the BLOWER switch located on Rack FM–79 to the ON position. The pilot light beside the switch should light.

Figure 88. Step 3.

STEP 4

Set the FILAMENT VOLTAGE switch on Power Supply RA–105–A to the ON position. Pilot lights T–A and T–B will ight.

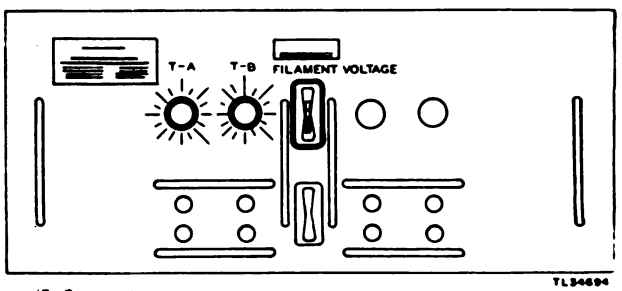


Figure 89. Step 4.

STEP 5

Wait 45 seconds and then set the PLATE VOLTAGE switch to the ON position. Pilot lights T–C and T–D will light.

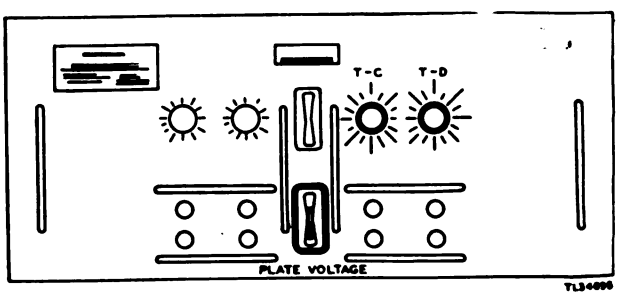


Figure 90. Step 5.

STEP 6

Set the INDICATOR PANEL circuit breaker of the indicator to the ON position. The pilot light below the switch should light.

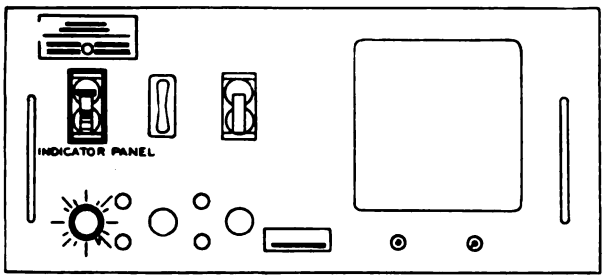


Figure 91. Step 6. TL 38421

STEP 7

Set the LOBE SWITCH MOTOR circuit breaker to the ON position. (This switch can be turned ON or OFF at any time.)

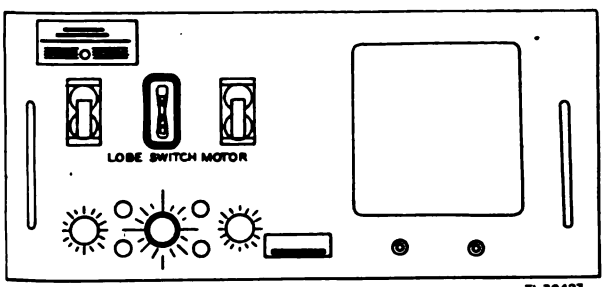


Figure 92. Step 7. TL 38423

STEP 8

After the MOUNT DISPLACEMENT eye on the remote indicator has become bright, set the ANTENNA MOTOR circuit breaker to the ON position. The pilot light below the switch should light.

Note. Unless Step 6 has been completed, the antenna motor can receive no power and the pilot light will not light.

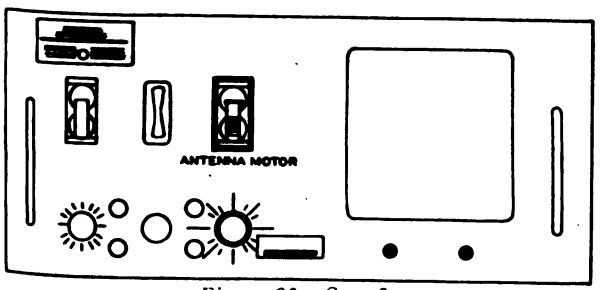


Figure 93. Step 8. TL 38422

STEP 9

Adjust the INTENSITY control on the control unit until a clearly visible but not bright line appears on the screen of the cathode-ray tube.

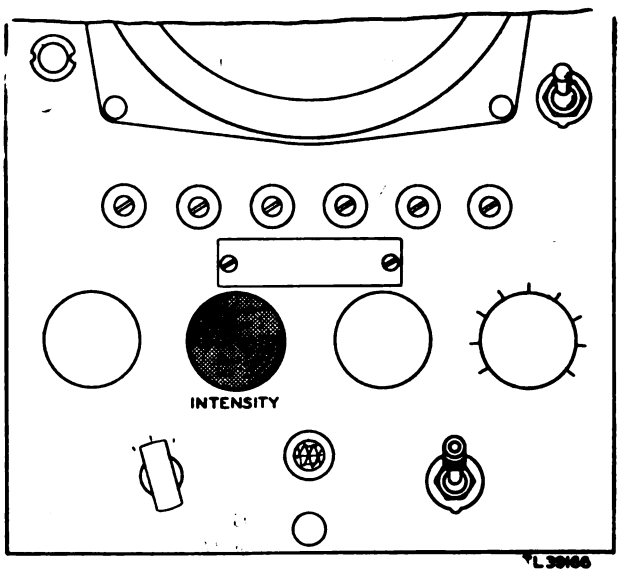


Figure 94. Step 9.

STEP 10

Adjust the FOCUS control until a sharp line appears on the cathode-ray tube screen.

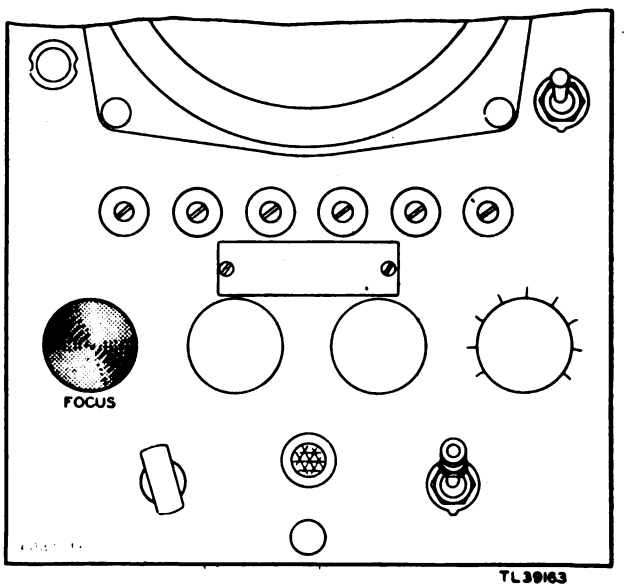


Figure 95. Step 10.

STEP 11

The indicator eye on the remote indicator should be closed. Rotate the AZIMUTH control knob until the eye opens. The eye should close again in several seconds.

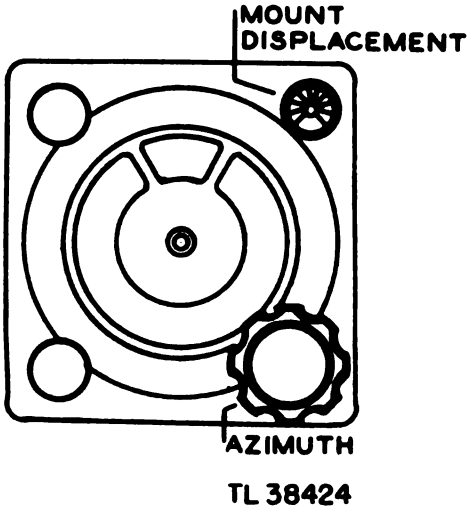


Figure 96. Step 11.

STEP 12

Set the STANDBY-OPERATE switch to the OPERATE position. Noise should appear when the SENSITIVITY control is rotated clockwise.

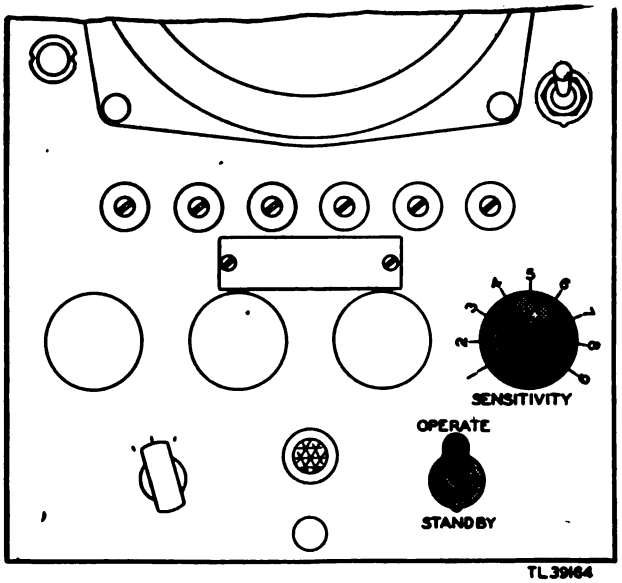


Figure 97. Step 12.

STEP 13

Rotate the SPREAD control to its maximum clockwise position. A split pattern should appear on the cathode-ray tube screen.

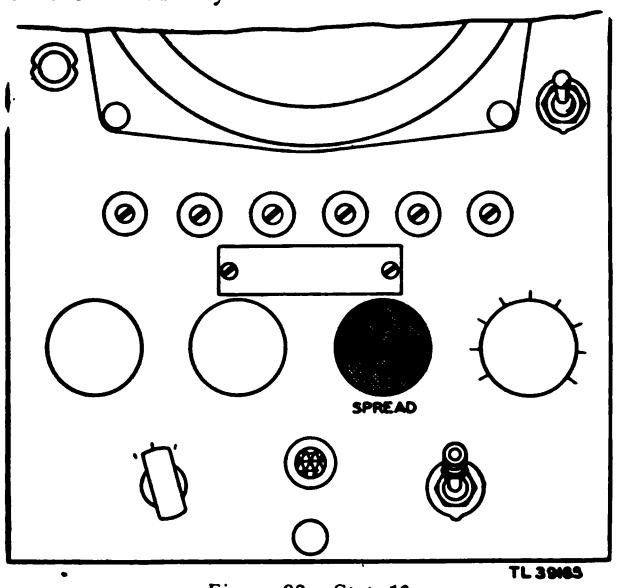


Figure 98. Step 13.

Section III. TECHNICAL OPERATION

68. General

a. To challenge a plane or other target that is picked up by Radio Set SCR–545–A, Radio Equipment RC–145–A is put into full operation. A challenging signal is sent into the area in which the target is located. If a proper response is received, it must be determined whether or not the response is from the plane being challenged. This is done by comparing the range and azimuth of the target as found by the radar set with the range and azimuth of the responding signal as found by the IFF set. If they are identical it is assumed that the target being challenged is sending a response. As a further safeguard, the response is coded.

b. The STANDBY-OPERATE switch must normally be left in the STANDBY position to prevent unnecessary radiation of signals which might be of value to the enemy. It is placed in the OPERATE position only when it is desired to identify aircraft.

c. The INTENSITY control is always adjusted to give a visible, but not bright, line. Too bright an

image wears out the oscilloscope screen rapidly.

d. The SPREAD control is adjusted to suit the operator. Spread may be used only for azimuth determination or may be kept on continually if this does not confuse the operator.

e. SENSITIVITY is increased until "noise" is visible. Then any signals of sufficient strength to be received will be visible. If the signals are so high that they flatten off on top, sensitivity must be reduced so that azimuth determination can be made.

69. Range Determination

a. Set the azimuth of the plane to be challenged, as obtained from the radar operator, on the azimuth dial of the remote indicator.

b. If the target is in the notch of Radio Set SCR–545–A, turn the range switch to the 10K YD. position. This will give an accurate determination of range to 50,000 yards.

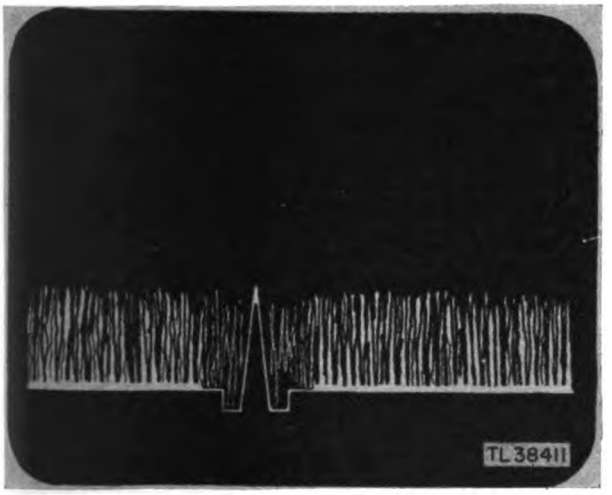


Figure 99. Target in notch of Radio Set SCR–545–A.

c. Turn the STANDBY-OPERATE switch to the OPERATE position.

d. If the target is in the notch, the signal must appear at the left end of the sweep to be friendly.

e. If no target appears or if the target is not at the left end of the sweep (fig. 101), the responding signal is not coming from the plane to be challenged. If the target is at a range such that it is not in the notch on Radio Set SCR–545–A, turn the range switch to 100K YD. position. The entire sweep represents 100,000 yards of range, reading from left to right. The range of a responding signal must be estimated from its position on the sweep.

70. Azimuth Determination

a. If the responding signal is at the correct range, the next step is to determine whether it is at the azimuth of the plane being challenged. The procedure is the same on the 10K YD. and 100K YD. ranges.

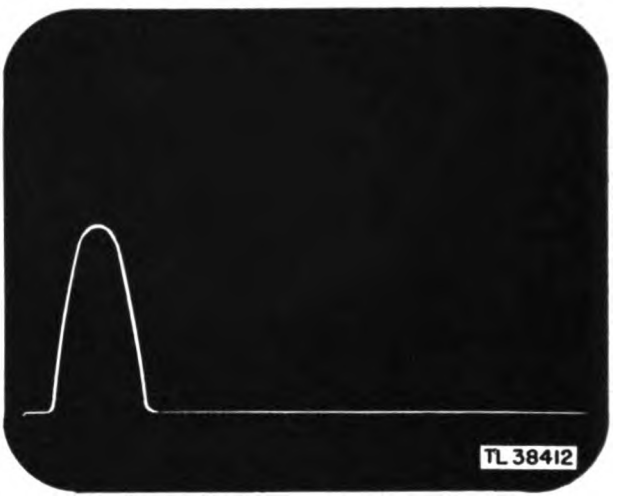


Figure 100. Correct range (10K yd. position).

b. Rotate the SPREAD control clockwise until the image splits. A response from the correct azimuth appears as two signals of equal height. A response from an incorrect direction appears as signals of unequal height.

c. If only one pip appears on the screen of the cathode-ray tube, refer to paragraph 83, TM 11–1531, for corrective measures. Should it be necessary to continue operation with only one pip

Figure 101. Incorrect range (10K yd. position).

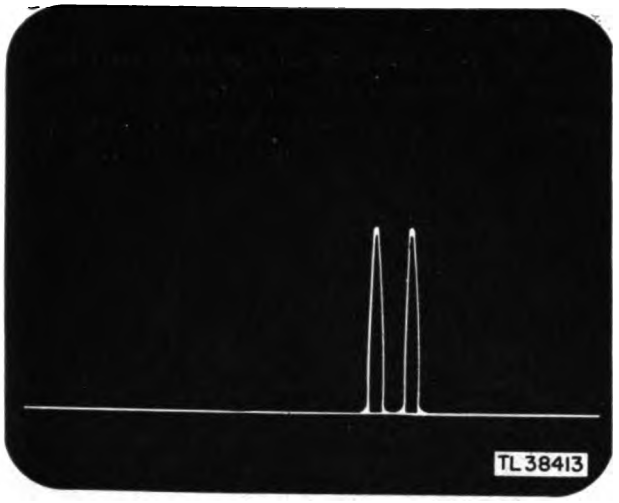


Figure 102. Range (100K yd. position).

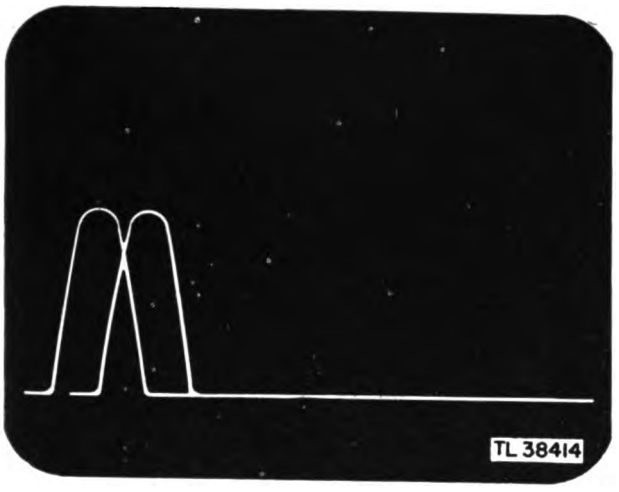


Figure 103. Correct azimuth.

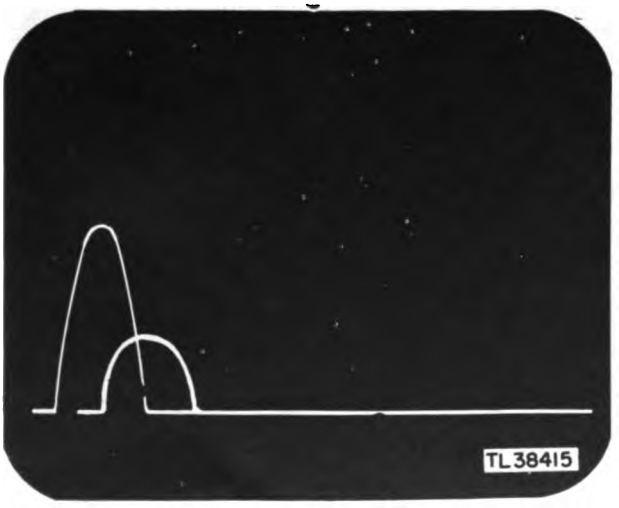


Figure 104. Incorrect azimuth.

representing the returned signal, accurate azimuth determination will not be possible. The position in azimuth of the challenged craft can be estimated by attempting to maximize the pip on the screen. Because the pip appears for only a small portion of the time, this method provides only an approximation to the true position.

71. Coding

IFF mark III transpondors send a responding signal every 2½ seconds. Each response remains on the screen of the oscilloscope of Radio Equipment RC–145–A for approximately ⅓ second. The responses can be coded using three types of responses: a narrow response, a wide response, or no response. There are six combinations available.

Section IV. STOPPING PROCEDURE

72. Normal Stopping

STEP 1

Turn the INTENSITY control to its maximum counterclockwise position.

STEP 2

Set the ON–OFF switch of the control unit to the OFF position.

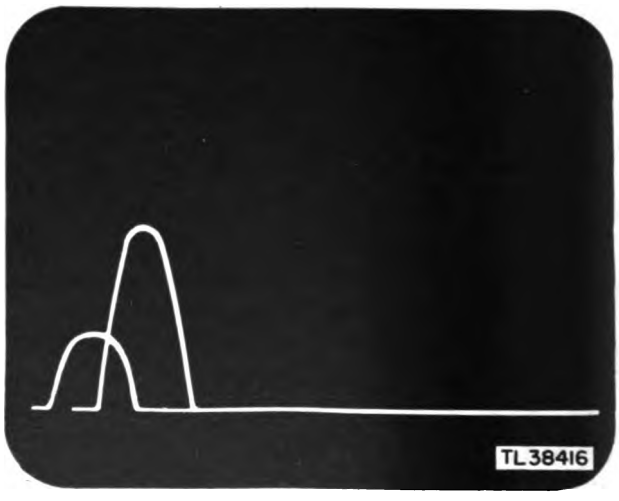


Figure 105. Incorrect azimuth.

STEP 3

Set the ANTENNA MOTOR, LOBE MOTOR, and INDICATOR PANEL switches to the OFF position.

STEP 4

Set the PLATE VOLTAGE switch on the power supply in the OFF position.

STEP 5

Set the FILAMENT VOLTAGE switch to the OFF position.

STEP 6

Set the switch marked IFF on the Radio Set SCR–545–A power panel to the OFF position.

73. Emergency Stopping Procedure

STEP 1

Set the ON–OFF switch on the control unit to the OFF position.

STEP 2

Set the IFF switch on the Radio Set SCR–545–A power panel to the OFF position. Steps 1 and 2 shut off power to the equipment. The normal stopping procedure should be carried out before starting again.

CHAPTER 4

EQUIPMENT PERFORMANCE

Section I. GENERAL ASPECTS OF EQUIPMENT PERFORMANCE

74. Equipment Performance Log

a. GENERAL. An equipment performance log has been developed to insure the most efficient technical operation of Radio Equipment RC–145–A. The front of the log sheet is shown in figure 106 and the reverse side is shown in figure 107. Regular and conscientious use of this *chart of technical operation* will insure the most efficient functioning of the radio equipment.

b. FUNCTIONS OF THE LOG SHEET. The equipment performance log has several functions, as follows:

(1) It directs routine and systematic checks of the equipment while the set is on the air and eliminates careless and haphazard methods of technical operation.

(2) It presents the conditions of normal equipment performance and indicates the operating tolerances outside of which meter readings should not be permitted to go, except under circumstances of emergency.

(3) It reveals the signs of abnormal functioning and indicates the need for the application of corrective measures. Therefore, it trains operating personnel to recognize the evidences of abnormality and to apply corrective measures where possible while the equipment is on the air.

(4) It aids in the prevention of major breakdowns. When signs of irregular operation are discovered, total break-down may often be avoided if the set is turned off immediately and the necessary repair is made.

(5) It provides complete records of equipment performance while the equipment is on the air, since checks are required several times during the operating period of the day. This visible record gives each succeeding watch an itemized picture of the functioning of all components. In addition, the log sheet fixes responsibility, provides information valuable for obtaining continuous performance of the radio set, and forms the basis for maintenance to be performed during shut-down periods. The more important information on the log may be transferred each day to the Station Record Book, where it can be studied when occasion demands.

(6) The log will be returned periodically to a central headquarters where it will be carefully analyzed, along with logs from other RC–145–A installations, to provide over-all information on the technical operation of the set and possible improvements in design. Also, because the log lists all faults and repairs, full details on the number and causes of parts-failure are obtained.

75. Description of Log

The equipment performance log comes in pad form and consists of the following parts:

a. ABRIDGED INSTRUCTIONS. For easy reference, an abridged and simplified form of major instructions for using the Equipment Performance Log is given in the front of each log pad.

b. WORK-TO-BE-DONE SECTION. At the back of the log pad a Work-To-Be-Done section is provided which should be used to keep notes on repairs that must be done at the earliest opportunity, but that do not require an emergency shut-down of the equipment.

c. LOG SHEETS. There are 35 regular log sheets, enough for 15 weeks of operation, in each log pad. Each sheet is divided into sections. These sections are divided into items which appear on the front and back of the log sheet.

(1) *Front of log sheet.* The front of the log sheet (fig. 106) contains the heading, which consists of Roman numeral items I through VII, and the

EQUIPMENT PERFORMANCE LOG

RESTRICTED WHEN BLANK
CONFIDENTIAL WHEN FILLED IN

III. Organization _____

I. Radio Equipment RC-145-A Ser. No. _____ IV. Address _____ VI. Dates: From _____ Through _____ , 19 __

II. Assigned Frequency _____ Megacycles V. Location _____ VII. Signature _____
(Person in charge)

MONTH: YEAR: DAY:												
Start first set of log entries 15 minutes after equipment goes on the air.	A	B	C	D	A	B	C	D	A	B	C	D
1 Log starting Time [ ] ( ) (Hr.-Min.)												
2 Weather Conditions [ ] ( ) (Symbols)												
3 Temperature Outside [ ] ( ) (°F.)												
4 Humidity [ ] ( ) (Abbrev.)												
5 [ ] ( ) ( )												
6 *Line Voltage* (SCR-645-A Ser.) [113-117] ( ) (Volts)												
7 [ ] ( ) ( )												
8 POWER SUPPLY Ser. ( ) [Oper. Cond.] ( ) (OK-N°)												
9 [ ] ( ) ( )												
10 CONTROL UNIT Ser. ( ) [ ] ( ) ( )												
11 Division (X) [ ] ( ) (OK-N°)												
12 Range Calibration [ ] ( ) (OK-N°)												
13 Lobe Switching [ ] ( ) (OK-N°)												
14 [ ] ( ) ( )												
15 INDICATOR UNIT Ser. ( ) [ ] ( ) ( )												
16 Centering (X) [ ] ( ) (OK-N°)												
17 Sensitivity (X) [ ] ( ) (OK-N°)												
18 Orientation (X) [ ] ( ) (OK-N°)												
19 [ ] ( ) ( )												
20 RECEIVER AND TRANS. Ser. ( ) [ ] ( ) ( )												
21 Bias Adjustment (Standby) [1] ( ) (Ma.)												
22 Modulator Cathode Current [4-7] ( ) (Ma.)												
23 Power Output [1] ( ) (Kw.)												
24 Pulse Width [4-9] ( ) (μ sec.)												
25 Frequency Check [±1] ( ) (Mc.)												
26 Antenna Tuning [ ] ( ) (OK-N°)												
27 Receiver Tuning (X) [ ] ( ) (OK-N°)												
28 [ ] ( ) ( )												
29 RACK FM-79 Ser. ( ) [ ] ( ) ( )												
30 Blowers [ ] ( ) (OK-N°)												
31 [ ] ( ) ( )												
32 *System Sensitivity* (Ax. Ra. S.) [80-100] ( ) (%)												
33 *Signal-to-Noise Ratio* [20%] ( ) (Ratio)												
34 Log Finishing Time [ ] ( ) (Hr.-Min.)												
35 Operating Time, On (Hr.-Min.)												
36 Operating Time, Off (Hr.-Min.)												
37 Operating Time, Total (Hr.-Min.)												
38 Break-down Time, Total (Hr.-Min.)												

39 THREE-DAY SUMMARY		TOTALS
40 Hours of Operation	(Hr.-Min.)	
41 Break-down Time	(Hr.-Min.)	
42	( )	
43	( )	
44	( )	
45	( )	

46 SIGNATURE OF PERSON KEEPING LOG					
47 Signature	48 Rank	49 Date	50 On	51 Off	

SIGNATURE OF PERSON KEEPING LOG (Continued)				
Signature	Rank	Date	On	Off

Make entries in ink or indelible pencil, if available. Do not use ditto marks. Do not erase. In case of error, strike out the mistake and make the correct entry. Place an asterisk (*) after an abnormal entry.

W. D., A. G. O. Form No. 11-111
15 June 1944

52 SHEET No. ____

Figure 106. Front of Equipment Performance Log.

I. Radio Equipment RC-145-A Serial No. _____ III. Organization _____ V. Location _____

II. Distance From Sea _____ IV. Address _____ VI. Elevation _____

Sections A, B, C, and D

SECTION B — COMPONENT RECORD — SECTION B

MAKE ENTRIES IN THIS PANEL WHEN A COMPONENT IS TAKEN OUT OR PUT IN

COMPONENT		1 NAME OF COMPONENT	2 NAMEPLATE TYPE No.	3 NAMEPLATE SER. No.	4 NAMEPLATE ORDER No.	5 SERVICE DATES IN	6 SERVICE DATES OUT	7 HOUR METER READINGS IN	8 HOUR METER READINGS OUT	9 HOUR METER READINGS TOTAL	10 REASON FOR REMOVING COMPONENT	11 DISPOSITION OF REMOVED COMPONENT	12 WORK DONE BY—
TAKEN OUT	A												
" "	B												
" "	C												
PUT IN	A												
" "	B												
" "	C												

SECTION C — PART RECORD — SECTION C

MAKE ENTRIES IN THIS PANEL WHEN PART OR TUBE IS TAKEN OUT OR PUT IN

PART		1 NAME OF COMPONENT CONTAINING PART	2 TYPE No. COMPONENT	3 SER. No. COMPONENT	4 ORDER No. COMPONENT	5 SCHEMATIC PART NO.	6 NAME OF PART	7 DESCRIPTION OF PART (MANUFACTURER—TYPE—SERIAL NO.—ELECTRICAL RATING—SIZE)	8 FUNCTION OF PART AND LOCATION FROM SCHEMATIC	9 NEW, USED, OR REBUILT	10 DISPOSITION OF PART TAKEN OUT
TAKEN OUT	A										
" "	B										
" "	C										
PUT IN	A										
" "	B										
" "	C										

PART		11 SERVICE DATES IN	12 SERVICE DATES OUT	13 HOUR METER READINGS IN	14 HOUR METER READINGS OUT	15 HOUR METER READINGS TOTAL	16 HOURS AT SET	17 WHERE DID YOU GET THE PART?	18 SYMPTOM OF FAILURE	19 FAULT	20 WHAT CAUSED THE FAULT?	21 ACTION TAKEN AND RESULTS	22 WORK DONE BY—
TAKEN OUT	A												
" "	B												
" "	C												
PUT IN	A												
" "	B												
" "	C												

SECTION D — REMARKS — RADAR OFFICER

SECTION A — NOTES — SECTION A

ITEM No.	TIME AND DATE	ENTER EACH ABNORMAL CONDITION FOUND AND STEPS TAKEN TO CORRECT IT

SEE TM 11-1331 FOR SAMPLE ENTRIES AND FOR DETAILED EXPLANATION OF DATA WANTED.

ELECTRONICS SECTION
GROUND SIGNAL MAINTENANCE BRANCH
QUALITY CONTROL DIVISION, SCOSA
CAMP EVANS, BELMAR, NEW JERSEY

WHEN COMPLETED SEND LOG SHEET TO UNIT RADAR OFFICER.

IF ADDITIONAL SPACE IS REQUIRED TEAR OUT ANOTHER LOG SHEET AND ATTACH TO THIS ONE.

SHEET No. ____

U. S. GOVERNMENT PRINTING OFFICE 16—41490-1

Figure 107. Back of Equipment Performance Log.

main part of the log sheet, which consists of Arabic numeral items 1 through 52. Items 1 through 52 may be grouped as indicated below:

(*a*) *Four-times-daily items.* Items 1–4, 6, 8, 12–13, 20–26, 29–30, and 32–34 are to be filled in four times a day.

(*b*) *Once-daily items.* Items 11, 16–18, and 27 are filled in once a day. For identification these items are followed by (X) on the log sheet.

(*c*) *Blank item spaces.* These lines are provided for item entries directed by the person in charge.

(*d*) *Operating time items.* Items 35–38 are filled in as required.

(*e*) *Three-day summary items.* Items 40 and 41 are filled in at the end of each 3-day period.

(*f*) *Signature of person keeping log.* Items 47 through 51 provide space for the technician to sign his name and log the time he comes on and goes off duty.

(*g*) *Numbering log sheets.* Item 52 provides a space for numbering the log sheet.

(2) *Back of log sheet.* The back of the log sheet (fig. 107) is divided into the following parts:

(*a*) *Heading.* Items I through VI form the heading.

(*b*) *Section A.* This space, labeled NOTES, is provided for the description of any abnormal condition and an explanation of the steps that were taken to correct that condition.

(*c*) *Sections B and C.* This space is provided for a report on the components and the parts installed or removed from the set. Section B is labeled COMPONENT RECORD; section C is labeled PARTS RECORD.

(*d*) *Section D.* This space is provided on the back of the log sheet for the recording of any ideas, suggestions, recommendations, or remarks that the unit radar officer considers suitable for transmittal to higher authority.

76. General Instructions for Filling in Log Sheet

Specific instructions for filling in the separate items and sections of the log sheet are given in section II of this chapter. However, the following general rules apply to filling in all items:

a. Location. The exact location of the component or the particular equipment is referred to in each item.

b. Normal Condition. Consider the condition of the equipment normal if it is operating within the normal tolerance values. Keep the set operating between the points designated by the instructions.

c. Log Entries. Make the proper entries on the log sheet at the correct time intervals and according to the instructions given for each item. Use one log sheet for each 3-day period. The condition of the reading *seen* is the one to be recorded on the log sheet, regardless of whether the reading is normal or abnormal. If an entry cannot be made, or if an abnormal condition is found while readings are being taken, enter an asterisk (*) in the appropriate space on the front of the log sheet. Notify the person in charge if the condition is likely to cause damage to equipment. On the reverse side of the log sheet in section A, explain the reason for the asterisk and state what was done to correct the condition. If an abnormal condition is discovered at any time other than when the readings are being taken, make a note in section A, but omit the asterisk on the front of the log sheet. In general, a meter reading is considered abnormal if it is not within the range of values (tolerances) shown in the brackets to the right of the item title on the front of the log sheet. In addition, any sudden shift in a meter reading, even though it is still within the tolerance range, is to be regarded with suspicion, investigated thoroughly, and explained in section A on the back of the log sheet.

d. Method of Making Entries. Make all entries with ink or indelible pencil if either is available. If a mistake is made, do not erase it. Cross out the incorrect entry, and make a new one above it. Do not use ditto marks. Write as neatly as possible; the log sheet is a part of the permanent record. Accuracy is of primary importance, and the entries must be legible enough to be used as a reference. In section II of this chapter, examples of the log entry are given for each item.

e. Optimum Values. Enter the optimum operating values, the meter indications that represent most efficient operation, to the right of the brackets in the column of empty parentheses provided. These values will be determined by the person in charge.

f. Tolerances. Tolerances may be defined as the low and high values for normal operation. They appear in the brackets to the right of the item titles. Do not permit meter indications to go above or below the stated limits. By using specified corrective measures and adhering to the indicated tolerances, operators will be able to keep break-downs at a minimum.

g. LIMITS. In certain tactical situations it may be necessary to keep the equipment on the air regardless of whether or not it is performing satisfactorily. At such a time it is important for the technician to know at what point he may expect the equipment to fail. Limits, where known, will be found in the discussion of the individual items.

h. UNITS. Make all once-daily and four-times-daily entries in terms of the units (volts, degrees, hours, etc.) given in the last column of parentheses to right of the item title. Following is a list of abbreviations used on the log sheet, and their meanings:

Hr.–Min.	Hours and minutes
°F	Degrees Fahrenheit
Abbrev.	Abbreviation
Ma.	Milliamperes
Kw.	Kilowatt
μ sec.	Microseconds
Mc.	Megacycles

i. ITALICIZED ITEMS. Check the items printed in *italics* more often than four times a day. Observe these items carefully; they tend to standardize operating conditions by providing a general check on the over-all efficiency of the equipment. Apply corrective measures whenever necessary.

j. CHANGE OF WATCH PROCEDURE. If a change of watch coincides with a log starting time, both the incoming and outgoing technicians take a set of readings together. If it is not time to take log readings when the new shift reports for duty, the incoming technician checks the last set of readings with the technician being relieved. If the operation of the set is normal, the incoming technician signs the log sheet, thereby assuming responsibility for the performance of the radio equipment. If the operation is abnormal, make a note in section A, stating wherein the abnormality lies. Both technicians initial the entry in section A.

k. HOW TO OBTAIN THE INFORMATION. Instructions for securing the pertinent data from which the log entry is made are given for each item in section II of this chapter.

l. REMARKS. Pertinent facts or miscellaneous information regarding an item are given under the REMARKS heading.

m. REFERENCES. At the end of each item in the log, there is a series of open parentheses, with the heading REFERENCES. These parentheses are furnished the technician for the purpose of cross indexing the several books on this equipment. In other words, if the technician wishes to record a reference to a paragraph in another book, he can make the entry in the parentheses provided in the manual.

77. Corrective Measures

Specific corrective measures to be taken while the equipment is on the air are not described in the log pad. In section II of this chapter they are presented in detail with the discussions of specific procedures for each log item.

78. General Corrective Steps

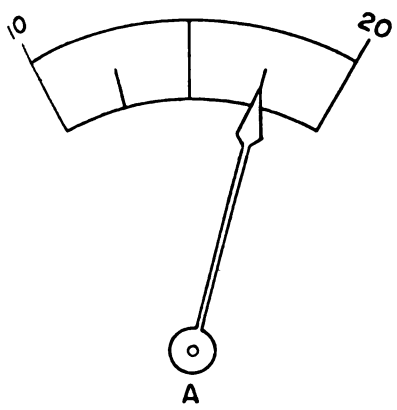
In contrast to specific corrective measures that are applied while the equipment is running, there are certain general corrective steps that should be taken. These general steps are as follows:

a. GENERAL CLEANLINESS. The routine cleaning of outside surfaces of the components of the equipment, including meter glasses, is covered in TM 11–1431, Preventive Maintenance Manual. Every operator of Radio Equipment RC–145–A should take all necessary steps to keep the unit and its contents clean at all times. However, the process of making the log entries and performing specific corrective measures is not to be interrupted to permit cleaning.

b. BROKEN METER-COVER GLASSES. The repair of cracked or broken meter-cover glasses is done in connection with routine preventive maintenance. However, if a meter glass becomes cracked or broken during operation, it is usually desirable to make temporary repair immediately. This can be done with adhesive tape or similar material, but care should be taken not to cover the meter scale with any opaque substance.

c. PILOT LIGHTS. Pilot lights are often used in Radio Equipment RC–145–A to indicate that certain elements in the system are operating as required. Consequently, if a pilot light is not glowing when it should be, an important fault may be present, or the pilot-light bulb may be burned out. If a light goes out during operation, replace the bulb with a new one as a first and immediate step. If the new bulb does not light and if equipment performance seems satisfactory, simply make a note so that repair will be made during a shut-down period. If the new bulb does not light and equipment performance is faulty, the person in charge should be informed immediately and asked for instructions relative to shut-down.

d. Cracked or Broken Knobs and Switch Buttons. Ordinarily, broken knobs and switch buttons are repaired during a period of routine preventive maintenance. However, if a knob or button is cracked or broken, temporary repair can sometimes be made with tape or similar material. In some cases it may be possible to replace a broken knob while the equipment is operating, but care must always be taken to avoid any changes in equipment operation.

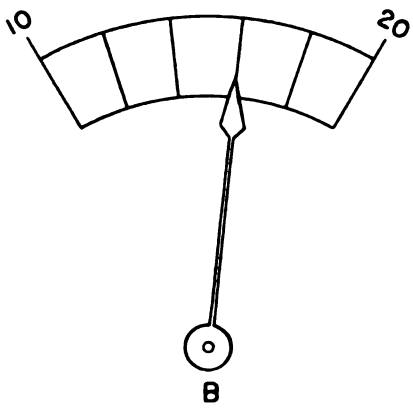


A

THE NUMBER OF SPACES BETWEEN 10 AND 20 IS 4.

VALUE OF EACH SUBDIVISION IS $\frac{20-10}{4}=2.5$

THE METER IS READING 17.5

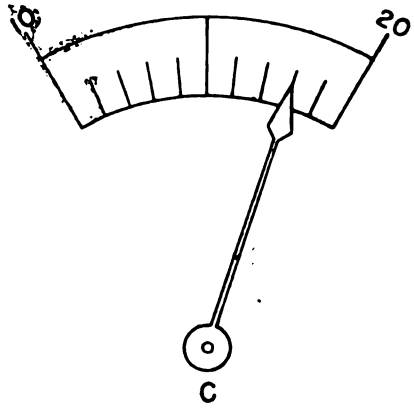


B

THE NUMBER OF SPACES BETWEEN 10 AND 20 IS 5.

VALUE OF EACH SUBDIVISION IS $\frac{20-10}{5}=2$

THE METER IS READING 16.0

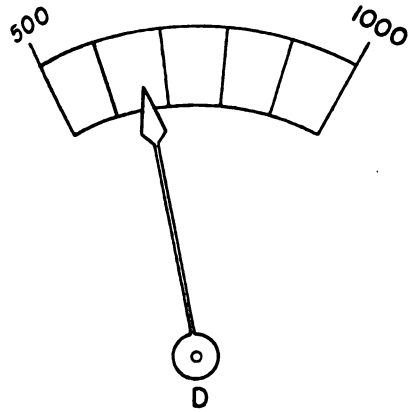


C

THE NUMBER OF SPACES BETWEEN 10 AND 20 IS 10.

VALUE OF EACH SUBDIVISION IS $\frac{20-10}{10}=1$.

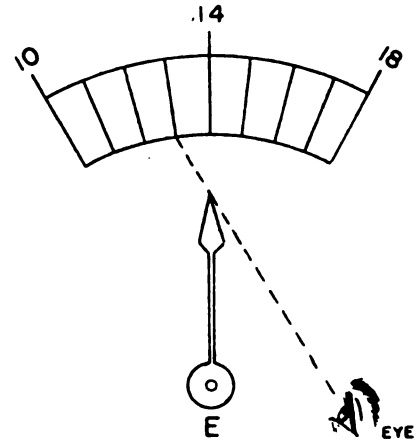
THE METER IS READING 18.0



D

ESTIMATION OF METER READING

METER IS READING 660.

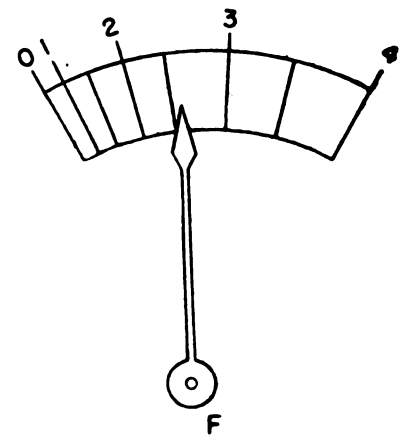


E

ERROR DUE TO PARALLAX

METER IS READING 14.

FALSE READING IS 13.



F

NONLINEAR SCALE

METER IS READING APPROXIMATELY 2.55, EVEN THOUGH NEEDLE IS MIDWAY BETWEEN 2 AND 3.

TL-30046

Figure 108. How to read a meter.

79. Reading Meters

Reading meters accurately is a matter of common sense plus carefulness (fig. 108). The following rules and cautions will help prevent errors:

a. SCALE NUMBERING. In reading a meter, observe how the scale is numbered; that is, whether the numbering is 1–2–3, 2–4–6, 5–10–15, 10–20–30, 20–40–60, etc., or in some other sequence.

b. OBTAINING VALUE OF A SUBDIVISION. Count the divisions of scale space between the two main-numbered graduations on each side of the needle. Divide the numerical difference between the two numbers by the number of divisions of scale space. This process gives the value of each subdivision, as illustrated in figure 108.

c. SCALE READING ACCURACY. In general, the construction of the pointer and the graduation of the scale are such that, under steady conditions, the position of the pointer may be read by estimation to one-tenth of a scale division.

d. AVOIDING PARALLAX ERROR. Guard against the error caused by parallax. To prevent this error, stand directly in line with the meter. If possible, have the eye on the same level as the meter; if this is impossible, be sure the eye is on the plane of the meter needle and the needle axis.

e. LINEAR SCALES. In reading a meter, observe whether or not the scale is linear; that is, whether the needle deflection is directly proportional to the quantity being measured or not. A-c ammeters and voltmeters usually have scales on which the graduations are not directly proportional to the measured quantity. Linear scales are usually found on d-c instruments.

f. NONLINEAR SCALES. One meter using a nonlinear scale is known as the current-squared type. The needle deflection on this type of meter is proportional to the square of the current. This nonlinearity must be considered when estimating the reading on such a meter. For instance, when the needle is halfway between 2 and 3 on the meter, the reading is not 2.5, but approximately 2.55. During operation of the unit some fluctuations in the readings may occur, but the readings usually can be averaged mentally.

80. Adjusting Meters

a. CHECKING. Normally, all meters on the equipment should read zero when the unit is inoperative. Make an inspection of the zero setting of the meters during the shut-down period. The zero settings cannot be checked while the radio equipment is in operation.

b. OVERCOMING STARTING FRICTION. Tap lightly on the meter case with the tips of the fingers before deciding that a meter needs readjusting. This enables the needle to overcome the slight starting friction of the bearing which sometimes prevents an otherwise normal meter from resting at zero.

c. ZERO SHIFT. Zero shift is caused by the gradual yielding of the spring when the instrument is kept at a large deflection for a considerable length of time. If, when the circuit is broken, the pointer does not return at once to its original zero position, it will probably do so gradually. For this reason, it is most important that the zero settings of meters be checked and readjusted *only after the unit has been off the air for some time.*

d. ADJUSTING SCREW. Adjust the zero setting of any meter only if it fails to return to its zero mark. Turn the adjusting screw on the front of the meter with a small screwdriver while tapping very lightly on the meter case with the tips of the fingers.

Section II. SPECIFIC LOG PROCEDURES AND SPECIFIC CORRECTIVE MEASURES

81. General

a. As already indicated, an abridged form of the instructions for using the equipment performance log is found in the front of each log pad. In the following paragraphs, a more complete discussion of procedures is given. Normal and abnormal conditions of operation and specific corrective measures are discussed, along with sample entries for each of the principal items on the front of the log sheet. In most cases, three sample entries are included; two are normal, and the other, which follows, is abnormal and shows an asterisk (*).

b. The log emphasizes normal operating conditions. It also stresses the use of corrective measures whenever they can be applied. Furthermore, the log provides for keeping a complete record of abnormal conditions. Whenever an abnormal condition is encountered, an asterisk (*) is to be entered on the front of the log sheet and a description of the condition is to be written in NOTES, section A, on the back of the log sheet. In the itemized discussion which follows, the instruction to keep a record of abnormalities in section A may sometimes not be given specifically, but entries in section A

should always be made when anything unusual concerning the equipment is observed.

82. How to Fill in Front of Log

a. Fill in items I–VI at the beginning of each log period. The person in charge examines the log sheet at the end of the period and signs his name in item VII.

b. In the first line at the top of the main body of the log fill in the month, year, and day.

(1) With the exception of blank items and items marked (X), fill in items 1 to 34 four times a day.

(2) Items marked (X) are filled in once a day as a part of the first set of entries.

(3) Fill in items 35 through 38 as required.

(4) Fill in items 40 and 41 at the end of the 3-day period.

(5) Fill in items 47 through 51 each time a new shift reports for duty.

(6) Number the log sheet in item 52. Sheets are to be numbered in sequence.

83. Item I, Radio Equipment RC–145–A

Serial No......

Enter the serial number of the radio equipment. This number is found on the invoice sent to the person in charge.

84. Item II, Assigned Frequency.....**Megacycles**

Enter the frequency (in megacycles) at which the set operates. Obtain this information from the person in charge.

85. Item III, Organization.....

Enter the official designation of the company, platoon, regiment, or other organization charged with the operation of the unit.

86. Item IV, Address.....

Enter the complete official mailing address of the organization. The Army Post Office number must be entered on all oversea log sheets.

87. Item V, Location.....

Enter the geographic location for all installations within the limits of the continental United States. No entry should be made for oversea installations.

88. Item VI, Dates:

From.....**Through**.....**19**.....

Enter the dates of the period covered by the log sheet. Write the dates in the following sequence: day, month, year.

89. Item VII, Signature.....

(Person in Charge)

After the log sheet has been completed, the person charged with the responsibility for operation of the radio equipment writes his name in the signature space.

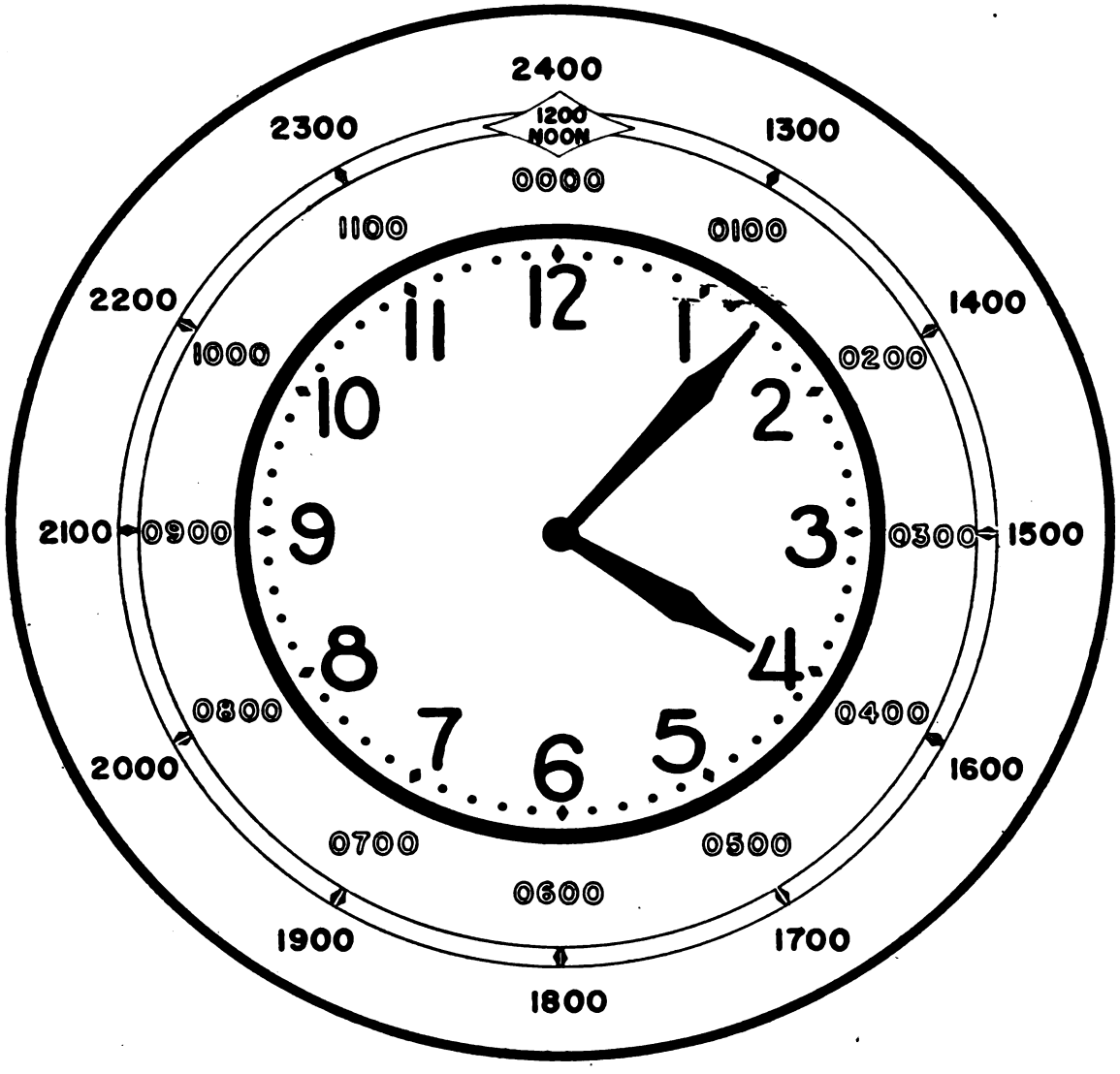
90. Item I, Log Starting time

SAMPLE ENTRY.

1. Log Starting Time [ ] ( ) (Hr.-Min.)	0600	1200	2100

LOG ENTRY. When the log is started, enter the time in hours and minutes, using the 24-hour system. Refer to figure 109 for a guide when converting ordinary time readings to their equivalents in the 24-hour system.

REMARKS. There are four columns (A, B, C, and D) provided on the log sheet for each day's operation. Begin the first set of log entries in column A about 15 minutes after the starting procedure is completed. Make entries in column D just before applying the stopping procedure. Ordinarily, if the operating period is 3 hours or less, fill in only column A and D. If the operating period is to be more than 3 hours, columns B and C will be used at the discretion of the person in charge, to provide for a third and fourth set of entries.



24 HOUR TIME CLOCK

DESCRIPTION

THE INNER CIRCLE REPRESENTS A STANDARD 12 HOUR CLOCK.
THE MIDDLE SECTION (WHITE NUMERALS) COVERS THE A.M. PERIOD FROM MIDNIGHT (0000) TO NOON (1200).
THE OUTER SECTION (BLACK NUMERALS) COVERS THE P.M. PERIOD FROM NOON (1200) TO MIDNIGHT (2400).

INSTRUCTIONS

TIME READINGS ON THE 24-HOUR CLOCK ARE IDENTICAL TO THE STANDARD 12-HOUR CLOCK READINGS DURING THE FIRST TWELVE HOURS (A.M.) OF THE DAY, EXCEPT THAT THE RECORDING DOES NOT SHOW ANY MINUTE NOTATION.

EXAMPLES: AT 7:00 A.M. WRITE: 0700. AT 11:17 A.M. WRITE: 1117.

AFTERNOON (P.M) READINGS ARE SHOWN IN THE OUTER SECTION. THEY BEGIN WITH 1201 AND END WITH 2400 (MIDNIGHT) WHICH IS THE SAME AS 0000.

EXAMPLES: AT 3:26 P.M. WRITE: 1526. AT 9:02 P.M. WRITE 2102.

CLOCK READING

IF A.M THE FIGURE READS 0407 IF P.M THE FIGURE READS 1607. TL30528A

Figure 109. Time conversion chart.

91. Item 2, Weather Conditions

SAMPLE ENTRY.

2. Weather Conditions [ ] ( ) (Symbols)	0	0	ZR

LOG ENTRY. Enter one of the following symbols or abbreviations to indicate the general condition of the weather:

Clear sky .....O	Rain .....R
Overcast sky .....●	Snow .....S
Fog .....F	Freezing rain .....ZR
Hazy .....H	Sleet .....E
Smoky .....K	Hail .....AP
Dusty .....D	Thunderstorm .....⌈⌋
Misty .....M	Lightning visible ....⌋

Record any unusual weather conditions under NOTES on the back of the log sheet.

92. Item 3, Temperature Outside

SAMPLE ENTRY.

3. Temperature Outside [ ] ( ) (°F)	82	84	110*

LOG ENTRY. Enter the outside temperature in degrees Fahrenheit. If the reading seems incorrect, mark the entry with an asterisk (*) and make an entry under NOTES.

CORRECTIVE MEASURES. If the reading is incorrect check the following:

a. Thermometer may be in direct rays of the sun or in the rain; if so, relocate thermometer.

b. Damaged or inaccurate thermometer. Replace if necessary.

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
3	2100	Outside temperature high. Column of thermometer was cracked. After
	15 May	replacement reading was 85°. F. E. O.

93. Item 4, Humidity

SAMPLE ENTRY.

4. Humidity [ ] ( ) (Abbrev.)	M	L	H

LOG ENTRY. Enter the relative humidity as indicated by a psychrometer. If no instrument is available for measuring the humidity, make an estimate and enter one of the following abbreviations:

Very low (air very dry)	VL
Low (air dry)	L
Moderate	M
High (air damp)	H
Very high (air very damp)	VH

REMARKS. The word *humidity* refers to the amount of water vapor in the air. At the low extreme of humidity, the air is very dry; at the high extreme, it is very damp or moist. In areas where there is very little rainfall such as desert country, the humidity is almost always very low. The air as well as the ground is quite dry. In places where rainfall is heavy, the humidity is usually high. On a hot, very humid day, the air seems oppressive and heavy. On such a day enter the symbol VH in the log. In contrast, on a hot day in an arid region even if a heavy rain has just stopped, the air seems fresh and light. Enter the symbol L. Use care in making estimates.

94. Item 5, (blank).

95. Item 6, Line Voltage

SAMPLE ENTRY.

6. Line Voltage (SCR-545-A Ser. 18)	[113-117]	( ) (Volts)	115	115	110*

LOCATION. The line voltage is read from the voltmeter on the top center of the power panel of Radio Set SCR–545–A.

NORMAL CONDITION. The line voltage is normal if the reading is between 113 and 117 volts and not fluctuating more than 1 volt. Optimum value is 115 volts.

LOG ENTRY. Enter the meter reading to the nearest volt; if abnormal enter the reading with an asterisk (*) and explain under NOTES.

CORRECTIVE MEASURES.

a. Adjust the LINE VOLTAGE control on the power panel.

b. Check the voltage at the power van. It should be 120–124 volts.

c. If a large adjustment is necessary to correct the voltage or the meter is fluctuating, make a note in the Work-To-Be-Done section suggesting trouble shooting in the power unit.

LIMITS. The equipment should not be operated if the voltage cannot be adjusted to between 90 and 130 volts.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
6	1500	Line voltage low. Adjusted to 115 volts with LINE VOLTAGE control.
	13 Aug	C. A. J.

96. Item 7, (blank).

97. Item 8, Power Supply

SAMPLE ENTRY.

8. POWER SUPPLY Ser. (29)	[Oper. Cond.]	( ) (OK-N*)	OK	OK	N*

NORMAL CONDITION. The power supply is normal if:

a. The pilot lights are all lighted.

b. There is no smell of burning resistors or transformers.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N* and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Replace broken or burned-out pilot lights.

b. Notify the person in charge if there is any odor of burning resistors or transformers.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
8	1600	Found burned-out pilot light. Replaced bulb. R.J.D.
	13 July	

98. Item 9, (blank).

99. Item 10, Control Unit

SAMPLE ENTRY.

10. CONTROL UNIT Ser. (31) [ ] ( ) ( )

LOG ENTRY. Enter the serial number of the control unit in the first parentheses to the right of the item title.

100. Item 11, Division

SAMPLE ENTRY.

11. Division (X) [ ] ( ) (OK-N*)	OK	N*

LOCATION. The division pattern is seen on the oscilloscope screen of Control Unit BC–1266–A.

NORMAL CONDITION. The division is normal if a distinctive sharp pulse is seen on each end of the baseline (fig. 75).

HOW TO OBTAIN THE INFORMATION.

a. Turn the range switch to the TEST position.

b. Turn the INTENSITY control clockwise until a line is plainly visible on the oscilloscope screen.

c. Pull the control unit slightly forward and remove the plate covering the jack panel.

d. Plug one end of Cord CD–1105 into jack 120 and the other end into jack 121–6.

e. Note the pattern that appears on the oscilloscope screen.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N*.

CORRECTIVE MEASURES.

a. Adjust potentiometer 93, on the jack panel, until the normal pattern is obtained.

b. If the correct pattern cannot be obtained, notify the person in charge.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
11	1730	Pulses could not be seen. Corrected fault by adjustment of potentio-
	5 June	meter 93. R. S. M.

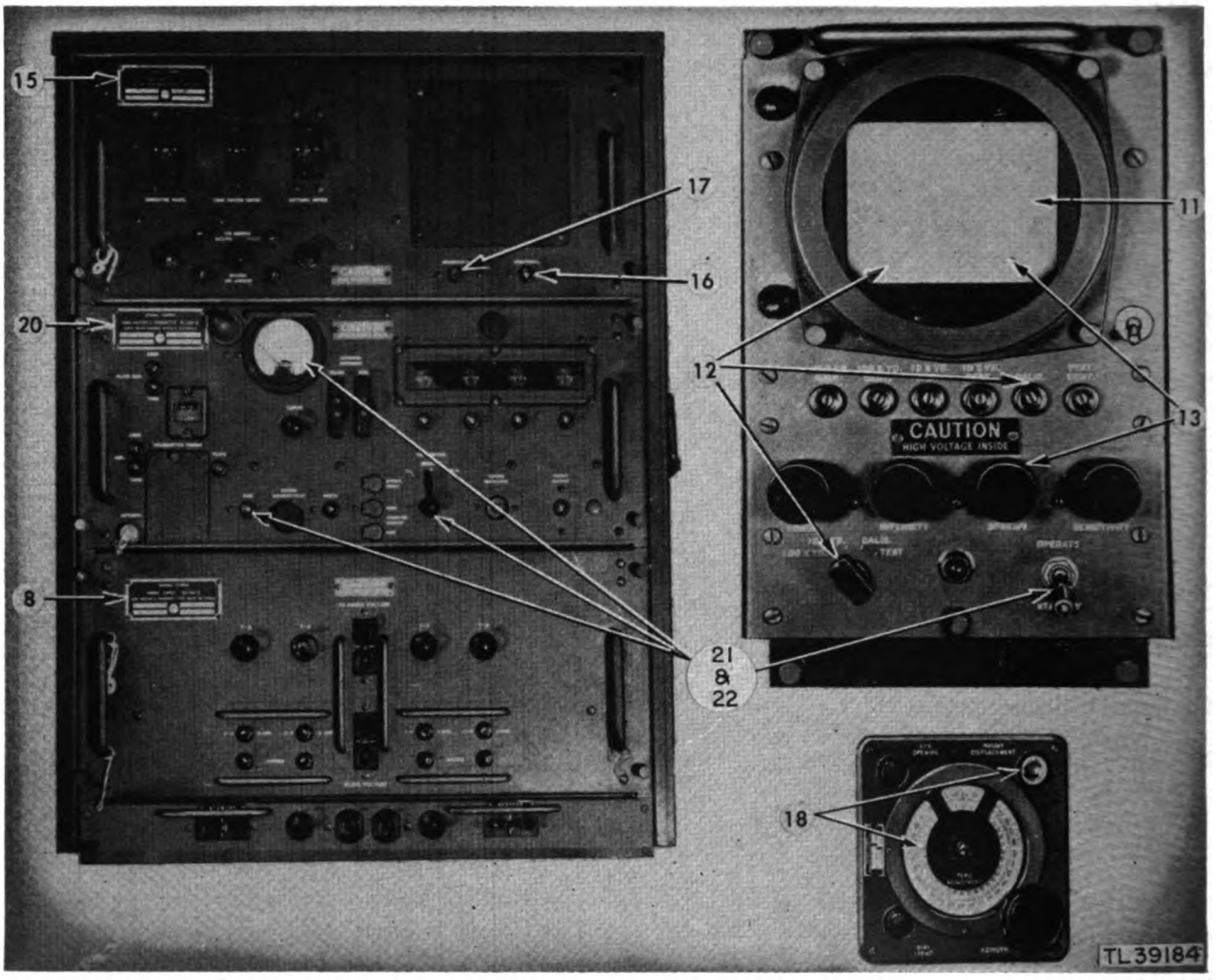


Figure 110. Radio Equipment RC–145–A, showing EPL items.

101. Item 12, Range Calibration

SAMPLE ENTRY.

12. Range Calibration [ ] ( ) (OK-N*)	OK	OK	N*

LOCATION. The calibration signal appears on the oscilloscope screen of Control Unit BC–1266–A.

NORMAL CONDITION. The range calibration is normal if 12 complete cycles appear on the oscilloscope screen (fig. 72).

HOW TO OBTAIN THE INFORMATION. Turn the range switch to the CALIB. position.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N* and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Adjust the CALIB. control until the proper pattern is obtained.

b. If the proper pattern cannot be obtained, make a note in the Work-To-Be-Done section suggesting a check-up of the control unit.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
12	1300	14 cycles were visible. Readjusted CALIB. control and corrected
	24 May	condition. R. P. M.

102. Item 13, Lobe Switching

SAMPLE ENTRY.

13. Lobe Switching [ ] ( ) (OK-N*)	OK	OK	N*

NORMAL CONDITIONS. The lobe switching is normal if a split pattern appears on the oscilloscope screen of Control Unit BC–1266–A.

HOW TO OBTAIN THE INFORMATION. With all other controls in normal operating position, turn the SPREAD control to the maximum clockwise position.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N* and explain under NOTES.

CORRECTIVE MEASURES.

a. Check to see that the LOBE SWITCH MOTOR circuit breaker on Indicator I–221–A is in the ON position.

b. If the circuit breaker is on and spread cannot be obtained, notify the person in charge.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
13	1430	Spread could not be obtained. Notified person in charge. C. A. L.
	17 April	

103. Item 14, (blank).

104. Item 15, Indicator Unit

SAMPLE ENTRY.

15. INDICATOR UNIT Ser. (42) [ ] ( ) ( )

LOG ENTRY. In the first parentheses to the right of the item title, enter the serial number of the indicator unit.

105. Item 16, Centering

SAMPLE ENTRY.

16. Centering (X) [ ] ( ) (OK-N*)	OK		N*

LOCATION. The CENTERING control is located on the front of Indicator I–221–A.

NORMAL CONDITION. The centering is normal if the antenna overshoots the target by equal amounts when approached from either direction.

HOW TO OBTAIN THE INFORMATION. Check the centering as described in paragraph 65*b*(5).

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N* and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Adjust the CENTERING control to its mid-turn position.

b. If this adjustment does not correct the fault, notify the person in charge.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
16	1500	Antenna overshot in clockwise direction further than in counterclockwise
	15 July	direction. Readjusted centering control. M. L. S.

106. Item 17, Sensitivity

SAMPLE ENTRY.

17. Sensitivity (X) ( ) (OK-N*)	OK		N*

LOCATION. The SENSITIVITY control is located on the front of Indicator I–221–A.

NORMAL CONDITION. The sensitivity is normal if the antenna does not oscillate about the final position more than once and does not move sluggishly.

HOW TO OBTAIN THE INFORMATION. Watch the action of the antenna as it is rotated from one setting to another.

LOG ENTRY. Enter OK if the condition is normal; if not enter N*.

CORRECTIVE MEASURES.

a. Adjust the SENSITIVITY control.

b. Check adjustment of friction brake on Tower TR–24–A.

c. If these adjustments do not correct the fault, notify the person in charge.

REFERENCES.

Page	( )	( )	( )	( )
Paragraph	( )	( )	( )	( )
TM 11–	( )	( )	( )	( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
17	1925	Antenna oscillated quite freely. Adjusted the sensitivity control. E. J. N.
	25 May	

107. Item 18, Orientation

SAMPLE ENTRY.

18. Orientation (X) [ ] ( ) (OK-N*)	OK	N*

NORMAL CONDITION. Orientation is normal if, when *looking* at a known fixed echo, the azimuth scales of both the antenna and the remote indicator read the same and the reading is correct.

HOW TO OBTAIN THE INFORMATION. Locate a fixed target of known azimuth and check the reading of the azimuth scales.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N*.

CORRECTIVE MEASURES. Inform operators of the amount of error and its direction. Make a note in the Work-To-Be-Done section, and at the first shut-down period the antenna should be re-oriented.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
18	1925	Error found, + 4 deg. Informed operators and made proper entry in
	8 April	W.T.B.D. section. A. J. N.

108. Item 19, (blank).

109. Item 20, Receiver and Transmitter

SAMPLE ENTRY.

20. RECEIVER & TRANSMITTER Ser. (25) ( ) ( )

LOG ENTRY. Enter the serial number of the receiver-transmitter unit in the first parentheses to the right of the item title.

110. Item 21, Bias Adjustment (Standby)

SAMPLE ENTRY.

21. Bias Adjustment (Standby) [1] ( ) (Ma.)	1	1	4*

LOCATION. This current is read from the meter on the front of Radio Receiver and Transmitter BC–1267–A. The BIAS control is also located on this unit.

NORMAL CONDITION. The bias adjustment is correct if the reading is 1 milliampere.

HOW TO OBTAIN THE INFORMATION.

a. Put the STANDBY-OPERATE switch on the control unit in the STANDBY position.

b. Hold the TEST SWITCH on the receiver-transmitter in the Ic position and read the meter.

LOG ENTRY. Enter the reading of the meter to the nearest 1/10 milliampere. If the reading is incorrect, place an asterisk (*) after the log entry and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Check the adjustment of the BIAS control.

b. If adjustment of the bias does not correct the fault, notify the person in charge.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
21	2000	Current reading 4 ma. Adjusted bias and reading was 1 ma. F. M. W.
	12 Sept.	

111. Item 22, Modulator Cathode Current

SAMPLE ENTRY.

22. Modulator Cathode Current [4-7] ( ) (Ma.)	5	5	8*

LOCATION. This current is read from the meter on the front of Radio Receiver and Transmitter BC–1267–A.

NORMAL CONDITION. The modulator cathode current is normal if the reading is between 4 and 7 milliamperes.

HOW TO OBTAIN THE INFORMATION.

a. Put the STANDBY-OPERATE switch on the control unit in the OPERATE position.

b. Hold the TEST SWITCH on the receiver-transmitter in the Ic position and read the meter.

LOG ENTRY. Enter the reading of the meter to the nearest 1/10 milliampere. If the reading is abnormal place an asterisk (*) after the entry and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Check item 24, pulse width.

b. If item 24 is normal and the reading is still incorrect, notify the person in charge.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
22	0700	Current reading 8 ma. Found pulse too wide. Readjusted pulse width
	17 Dec.	and reading was 6 ma. C. A. J.

112. Item 23, Power Output

SAMPLE ENTRY.

23. Power Output [1] ( ) (Kw.)	1	1	0.5*

LOCATION. The power output is read from the meter located on the front of Radio Receiver and Transmitter BC–1267–A.

NORMAL CONDITION. The power output is normal if the reading is 1 kilowatt.

HOW TO OBTAIN THE INFORMATION.

a. Connect the test scope as described in paragraph 61.

b. Turn the TEST SWITCH to the PO position. A pulse should appear on the screen of the test scope (fig. 79).

c. Turn the POWER MEASUREMENT control clockwise until the pulse just disappears, and read the power on the meter.

LOG ENTRY. Enter the meter reading to the nearest 1/10 kilowatt. If the reading is abnormal place an asterisk (*) after the log entry and explain under NOTES.

CORRECTIVE MEASURES.

a. Check adjustment of the POWER OUTPUT control.

b. Check adjustment of ANT. TUNE control and ANT. MATCHING.

c. If this does not correct the condition, make a note in the Work-To-Be-Done section, suggesting retuning of transmitter.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
23	1500	Power output low. Increased to 1 kw. with POWER OUTPUT control.
	29 Mar.	F. M. W.

113. Item 24, Pulse Width

SAMPLE ENTRY.

24. Pulse Width [4-9] ( ) (μsec.)	7	7	10*

LOCATION. The pulse is seen on the test oscilloscope.

NORMAL CONDITION. The pulse width is normal if it is between 4 and 9 microseconds (fig. 79).

HOW TO OBTAIN THE INFORMATION.

a. Connect the test scope as described in paragraph 61.

b. Measure the width of the pulse as described in paragraph 61*h*.

LOG ENTRY. Enter the pulse width to the nearest microsecond. If it is abnormal place an asterisk (*) after the entry and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Check adjustment of the WIDTH control.

b. If the correct width cannot be obtained, notify the person in charge.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
24	0900	Pulse width too wide. Obtained proper width by adjustment of WIDTH
	12 May	control. F. M. W.

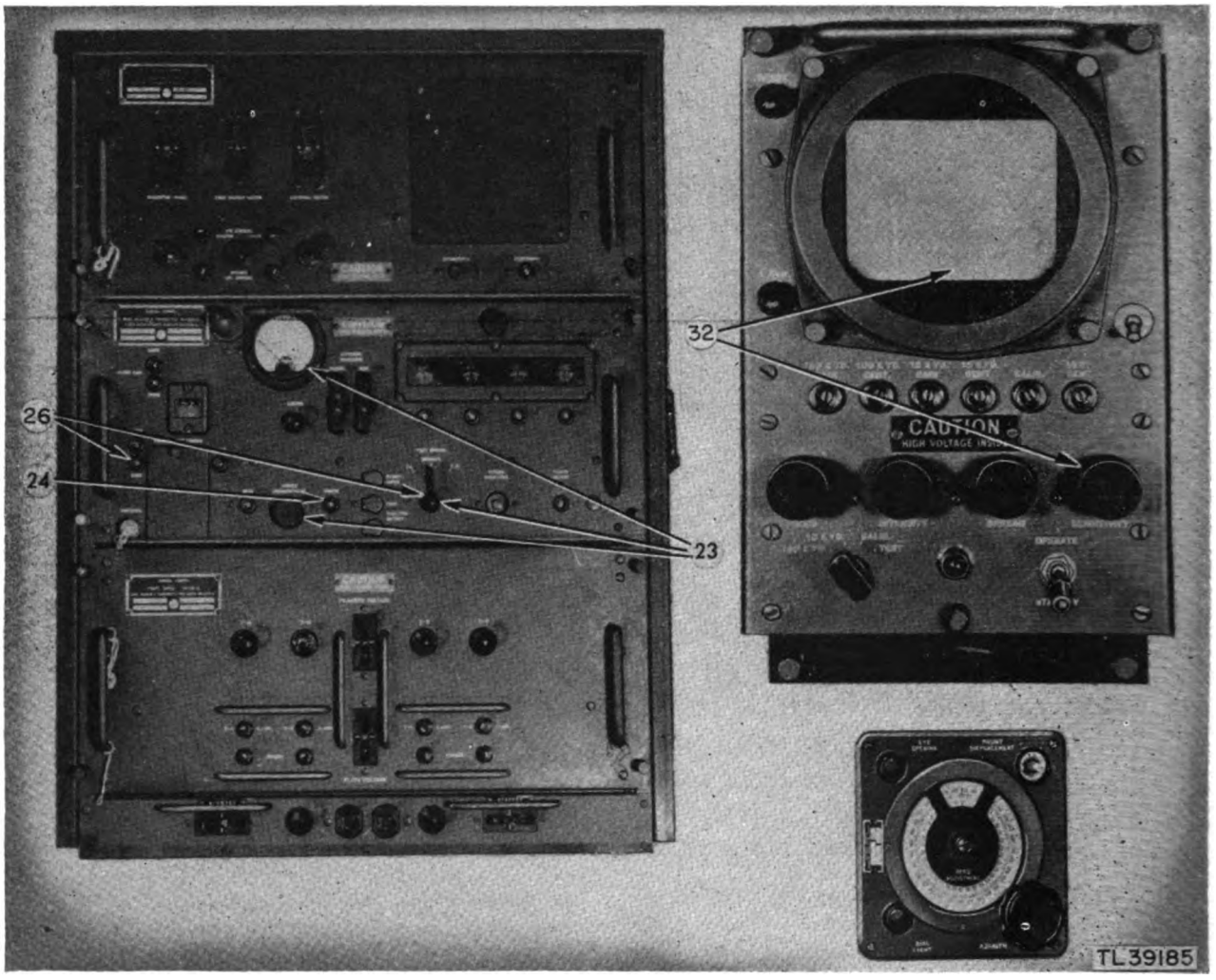


Figure 111. Radio Equipment RC-145-A, showing EPL items.

114. Item 25, Frequency Check

SAMPLE ENTRY.

25. Frequency Check [1] ( ) (Mc.)	165	165	167*

NORMAL CONDITION. The frequency is normal if it is within 1 megacycle of the assigned frequency.

HOW TO OBTAIN THE INFORMATION. Set up the signal generator and check the frequency of the transmitter as described in paragraphs 62 and 63.

LOG ENTRY. Enter the frequency that is measured to the nearest 1/10 megacycle. If incorrect enter an asterisk (*) after the log entry and make an entry under NOTES.

CORRECTIVE MEASURES.

a. Check the tuning of the PLATE control.

b. If this does not correct the frequency, make a note in the Work-To-Be-Done section, suggesting a complete retuning of the transmitter.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11- ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
25	1500	Frequency high. Adjusted PLATE control and obtained correct fre-
	13 Feb.	quency. C. A. J.

115. Item 26, Antenna Tuning

SAMPLE ENTRY.

26. Antenna Tuning [ ] ( ) (OK-N*)	OK	OK	N*

LOCATION. The ANT. TUNE control is located on the front of Radio Receiver and Transmitter BC-1267-A.

NORMAL CONDITION. The antenna tuning is normal if the power output is at a maximum.

HOW TO OBTAIN THE INFORMATION.

a. Connect the test scope as described in paragraph 61.

b. Turn the TEST SWITCH to the PO position.

c. Unlock the ANT. TUNE control and vary it slightly. If the antenna tuning is correct, the height of the pulse on the test scope will decrease when the control is varied.

d. Relock the ANT. TUNE control.

LOG ENTRY. Enter OK if the antenna tuning is normal; otherwise enter N*.

CORRECTIVE MEASURES. If the antenna tuning is abnormal, adjust the ANT. TUNE and ANT. MATCHING controls for maximum pulse height.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11- ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
26	1900	Antenna tuning abnormal. Adjusted controls for maximum pulse height.
	25 Aug.	C. A. J.

116. Item 27, Receiver Tuning

SAMPLE ENTRY.

27. Receiver Tuning (X) [ ] ( ) (OK-N*)	OK		N*

NORMAL CONDITION. The receiver tuning is normal if it is tuned to the transmitter frequency.

HOW TO OBTAIN THE INFORMATION. Check the receiver tuning with the signal generator as described in paragraph 64.

LOG ENTRY. Enter OK if the condition is normal; otherwise enter N* and explain under NOTES.

CORRECTIVE MEASURES. If the receiver is not tuned to the transmitter frequency, record the condition in the Work-To-Be-Done section. Retune the receiver at the next shut-down period.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11- ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
27	1720	Receiver was off frequency. Made note in W.T.B.D. section. C. A. M.
	15 May	

117. Item 28, (blank).

118. Item 29, Rack FM-79

SAMPLE ENTRY.

29. RACK FM-79 Ser. (23) [ ] ( ) ( )

LOG ENTRY. Enter the serial number of the rack in the first parentheses to the right of the item title.

119. Item 30, Blowers

SAMPLE ENTRY.

30. Blowers [ ] ( ) (OK-N*)	OK	OK	N*

NORMAL CONDITION. The blowers are working properly if air is left coming through the front of the panel, and there is no odor of warm windings.

LOG ENTRY. Enter OK if the condition is normal; otherwise, enter N*.

CORRECTIVE MEASURES. Record the condition in the Work-To-Be-Done section.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11- ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
30	0310	Blowers not putting out any air. Made note in W.T.B.D. section. C.J.Q.
	17 June	

120. Item 31, (blank).

121. Item 32, System Sensitivity

SAMPLE ENTRY.

32. System Sensitivity (Az.9°Ra.7Mi.S.5)	[80-100]	(1.5)	(%)	85	90	70*

NORMAL CONDITION. The system sensitivity is normal if the height of the echo observed is at least 80 percent of the height of the standard reference echo.

HOW TO OBTAIN THE INFORMATION. Locate the fixed target and set the SENSITIVITY control at the designated setting. Note height of the echo.

LOG ENTRY. Enter in the first parentheses, to the right of the item title, the known azimuth and range of the fixed reference target and the setting of the SENSITIVITY control designated by the person in charge. Enter in the second parentheses, in inches, the standard height of the reference echo for the designated SENSITIVITY control setting. Enter in the log space the height of the observed echo in percentage of the standard echo height for the same setting.

CORRECTIVE MEASURES.

a. Check items 23 and 27, power output and receiver tuning.

b. If the above items are normal and the system sensitivity is low, notify the person in charge.

REMARKS. If this item cannot be checked against a fixed target, draw a line through the log space.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
32	1300	System sensitivity low. Found receiver tuning abnormal. Made note in
	20 May	W.T.B.D. section for receiver tune-up. F. M. W.

122. Item 33, Signal-to-Noise Ratio

SAMPLE ENTRY.

33. Signal-to-Noise Ratio	[25%]	(3/1)	(Ratio)	3/1	3/1	1/1*

NORMAL CONDITION. The signal-to-noise ratio is normal if the variation is not more than 25 percent from the ratio designated by the person in charge.

HOW TO OBTAIN THE INFORMATION. Locate the same target that was used in item 32 and note the height of the echo and "grass."

LOG ENTRY. Enter in first parentheses the ratio between the height of the normal reference signal and the height of the acceptable noise or "grass" as decided upon by the person in charge. Enter in the log space the observed ratios. If the ratio is abnormal place an asterisk (*) after the log entry and make an entry under NOTES.

CORRECTIVE MEASURES. If the ratio is abnormal, notify the person in charge.

REFERENCES.

Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
37	1400	Noise level too high. Notified person in charge. F. M. W.
	25 Oct.	

123. Item 34, Log Finishing Time

SAMPLE ENTRY.

34. Log Finishing Time [ ] ( ) (Hr.-Min.)	1030	0645	1430*

LOG ENTRY. Enter the log finishing time in hours and minutes, using the 24-hour system. If, for any reason, the log cannot be finished, enter the time with an asterisk (*) and explain under NOTES.

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
34	1430	Station ordered to shut down immediately. Could not finish taking log.
	20 May	C. A. M.

124. Item 35, Operating Time, on

SAMPLE ENTRY.

35. Operating Time, On	(Hr.–Min.)	0500

LOG ENTRY. Enter the time, according to the 24-hour system, at which the equipment is put into operation after each shut-down. If it is in continuous operation, enter the time each day at which the first crew comes on duty. There are four columns for each day's operation, providing sufficient space for entries if the set is not turned on more than four times. If additional space is needed, make additional entries under NOTES.

125. Item 36, Operating time, off

SAMPLE ENTRY.

36. Operating Time, Off	(Hr.–Min.)	1800

LOG ENTRY. Enter the time, according to the 24-hour system, at which the station is shut down. If operation ends at midnight, enter 2400 and not 0000. Place the time the set is turned off directly under the time (item 35) it was last turned on. If additional space is required, make further entries under NOTES.

126. Item 37, Operating Time, Total

SAMPLE ENTRY.

37. Operating Time, Total	(Hr.–Min.)	12:00

LOG ENTRY. Determine the amount of time the station has been on the air since the last shut-down. This figure can be computed from the values in items 35 and 36. Enter the total elapsed time in hours and minutes in the space provided for each of the periods of operation. If there have been more than four such periods, make further entries under NOTES. If there have been three or less periods of operation for the day, the fourth column can be used as the total hours of operation for the day, adding the entries for the separate periods of operation.

127. Item 38, Break-down Time, Total

SAMPLE ENTRY.

38. Break-down Time, Total	(Hr.–Min.)	2:30

LOG ENTRY. Enter the time spent in repairing each break-down for the day. Make an entry under NOTES each time a break-down occurs, explaining what happened each time, what the cause was, and what corrective measures were taken. If more than four break-downs occur during the day, the time spent in repairing the fault must be entered under NOTES.

SAMPLE ENTRY UNDER NOTES.

Item	Time and Date	NOTES
38	0950	Transmitter inoperative. Replaced high-voltage rectifier. C. A. J.
	16 Apr.	

128. Item 39, Three-day Summary

The technician in charge during the last watch of a 3-day period is to fill in items 40 and 41. These items provide a summary for all the items of the log sheet. No entry is to be made in item 39.

129. Item 40, Hours of Operation

SAMPLE ENTRY.

40. Hours of Operation	(Hr.–Min.)	64:00

LOG ENTRY. Find the total amount of time the station has been operating during the 3-day period from the entries in item 37 during the entire period. Make an entry in hours and minutes.

130. Item 41, Break-down Time

SAMPLE ENTRY.

41. Break-down Time	(Hr.–Min.)	4:25

LOG ENTRY. Find the total amount of time spent for break-down repairs during the entire period, from the entries in item 38. Enter the value in the log space, giving hours and minutes.

131. Item 42, (blank).

132. Item 43, (blank).

133. Item 44, (blank).

134. Item 45, (blank).

135. Items 46–51, Signature of Person Keeping Log

SAMPLE ENTRY.

SIGNATURE OF PERSON KEEPING LOG				
46.				
47. Signature	48. Rank	49. Date	50. On	51. Off
s/Leon Kadack	T/4	29 Feb.	0600	1200

LOG ENTRY. Enter the signature of the technician keeping the log (47). Signature is to be entered when he reports for duty. Enter the rank of the technician keeping the log (48). Enter the date (45). Enter the time (24-hour system) the technician comes on duty (50) and the time (24-hour system) that he goes off duty (51).

136. Item 52, Sheet Number

In the space provided at the lower right corner of the sheet, enter the number of the log sheet.

137. How to Fill in Back of Log

a. HEADING, ITEMS I TO VI. Fill in the heading at the start of each new log sheet. Items I, III, IV, and V may be taken from the corresponding items on the front of the log sheet. Information for items II and VI may be obtained from the person in charge.

b. SECTION A, NOTES. When an asterisk (*) is used on the front of the log sheet to indicate an abnormal condition, give the following information under NOTES in section A:

(1) The item number.

(2) The time and date the abnormal condition was found.

(3) A description of the condition and its cause.

(4) What was done about it.

(5) Initials of the technician making the note.

c. SECTION B, COMPONENT RECORD. (1) *General.* Fill in section B whenever a *component* is removed and whenever a *component* is installed. No entries are required in spaces blanked out by diagonal rulings. Entries for the component removed are to be made on one of the three lines marked TAKEN OUT: A, B, and C. Entries for the components installed are to be made on one of the three lines marked PUT IN: A, B, and C. Some examples of components are: power supply, indicator unit, control unit, etc.

(2) *Columns 1 to 4.* Record the *name, type, serial number,* and *order number* of each component, the component TAKEN OUT and the component PUT IN. Find this information on the nameplate of the component.

(3) *Column 5, Service Dates, In.* In column 5 enter the date when the component TAKEN OUT was originally installed. Find the date of the original installation in the station records. In the case

of a component PUT IN, simply enter the date on which the installation is made.

(4) *Column 6, Service Dates, Out.* In this space record the date when the component is taken out.

(5) *Column 7, Hour Meter Readings, In.* In column 7 enter the transmitter filament hour meter reading at the time the component TAKEN OUT was *originally* placed in service. Obtain this information from the station records. In the case of a component being PUT IN, simply enter the transmitter filament hour meter reading at the time the installation is made. The transmitter-filament hour meter is located on the high-voltage rectifier panel of Radio Set SCR–545–A.

(6) *Column 8, Hour Meter Readings, Out.* In column 8 enter the transmitter-filament hour meter reading at the time the component is TAKEN OUT. This reading is usually the same as that entered in the PUT IN space in column 7.

(7) *Column 9, Hour Meter Readings, Total.* In column 9 record the total time the component TAKEN OUT has been in use. To get this figure, subtract the time in column 7 from the time in column 8. Enter the difference in column 9.

(8) *Column 10, Reason For Removing Component.* In this space explain briefly why the component was removed. For example: it may have failed, it may have been running below optimum performance, or it may have been removed for inspection or servicing.

(9) *Column 11, Disposition of Removed Component.* In this space explain exactly what was done with the component after it was removed.

(10) *Column 12, Work Done By.* This space is provided for the signature of the technician who removed or installed the component.

d. Section C, Part Record. (1) *General.* Fill in section C whenever a *part* or *tube* is *removed* or *installed.* In addition, enter all repairs made on spare equipment. No entries are required in spaces blanked out by diagonal rulings. Entries for a part or tube which has been *removed* are to be made on one of the three lines marked TAKEN OUT: A, B, and C. Entries for a part or tube *installed* are to be made on one of the three lines marked PUT IN: A, B, and C. The description of a part or tube entered on line A, B, or C in columns 1 through 10 must be continued on the corresponding line in columns 11 through 22.

(2) *Columns 1 to 4.* Record the name, type, serial number, and order number of the component from which the part or tube was removed, or in which the part or tube was installed. Find this information on the nameplate of the component or in the Station Record Book.

(3) *Column 5, Schematic Part Number.* In column 5 write down the schematic part number of the part or tube PUT IN or TAKEN OUT. Find this number from the schematic drawing of the component concerned or on the part itself.

(4) *Column 6, Name of Part.* In this space record the name of the part PUT IN or TAKEN OUT. Find the name of the part on the schematic of the component concerned.

(5) *Column 7, Description of Part.* In this space give a brief description of the part PUT IN or TAKEN OUT. Some of this information may be obtained from the parts list. Additional information may be found on the part itself. In this description of the part the name of the manufacturer, the manufacturer's type or catalog number, the electrical rating of the part, its size, etc., must be included.

(6) *Column 8, Function of Part and Location From Schematic.* In this column enter the function of the part or tube PUT IN or TAKEN OUT and its location. In describing the location of electrical parts, locate them in relation to other parts or tubes with which they are associated. For example: first i-f plate-load resistor, bypass capacitor in first r-f.

(7) *Column 9, New, Used or Rebuilt.* Tell whether the part or tube which has been PUT IN is new, used, or rebuilt.

(8) *Column 10, Disposition of Part Taken Out.* Tell exactly what was done with the part or tube after it was removed. Example: part destroyed, rereturned to depot, repaired for spare, etc.

(9) *Column 11, Service Date, In.* In column 11 enter the date when the part or tube TAKEN OUT was originally installed. Find the date of the original installation in the Station Record Book. In the case of a part or tube being PUT IN, simply enter the date on which the installation is made.

(10) *Column 12, Service Date, Out.* In this space record the date on which the part or tube is TAKEN OUT.

(11) *Column 13, Hour Meter Readings, In.* In this space enter the transmitter-filament hour meter reading at the time the part or tube TAKEN OUT was originally placed in service. Find this reading in the Station Record Book. In the case of a part or tube being PUT IN, simply enter the transmit-

ter-filament hour meter reading at the time the installation is made. The transmitter-filament hour meter is located on the high-voltage rectifier panel of Radio Set SCR–545–A.

(12) *Column 14, Hour Meter Readings, Out.* In column 14, enter the transmitter-filament hour meter reading at the time the part or tube is TAKEN OUT.

(13) *Column 15, Hour Meter Readings, Total.* Under *Total* in column 15, record the total time the part or tube TAKEN OUT has been in use. To get this figure, subtract the time in column 13 from the time in column 14. Enter the difference in column 15.

(14) *Column 16, Spares at Set.* In column 16 give the number of spares of the part or tube PUT IN that are on hand at the set after the installation is made.

(15) *Column 17, Where Did You Get the Part?* Answer this question as clearly as possible. Find out where the part PUT IN came from and explain in the space provided. Examples of entries which might be made are: had part here at set; from Lexington Signal Depot; from another set in this area.

(16) *Column 18, Symptom of Failure.* In the case of a part or tube failure, describe the first indications that the part or tube was faulty. Symptoms are first evidences of trouble and usually can be detected through the senses of sight, smell, hearing, or touch. Some examples are: abnormal meter reading, the odor of burning insulation, smoke, the hissing noise of an arc, and the heat of an overloaded part.

(17) *Column 19, Fault.* In this space describe exactly what fault developed in the part or tube which was removed. Some examples of vacuum-tube faults are: open filament, low emission, shorted elements, gassy tube, and microphonic tube. Some examples of electrical faults are: dielectric leak, dielectric break-down, insulation break-down, open circuit, short circuit, arcing, and sticking contacts. Some mechanical faults are: a broken, bent or cracked part; frayed leads; frozen bearings; and stripped threads. This column refers only to a part or tube that has been TAKEN OUT.

(18) *Column 20, What Caused the Fault?* In column 20 explain what caused the fault to occur, using additional space in section A if necessary. Describe any external condition which may have contributed to the fault. Indicate the primary cause if it is known. Some examples of causes of faults are: wear and tear in operation, shelf wear, excessive heat, excessive current (overload), high humidity, careless handling, lack of lubrication, improper operation, corrosion, excessive strain, improper adjustment, defectve material, accidental damage, error in wiring, lack of ventilation, failure of some other part, and loose connections.

(19) *Column 21, Action Taken and Results.* In this column describe what was done about the fault. In addition, explain briefly what results were obtained.

(20) *Column 22, Work Done By.* The technician who performed the repair or replacement will sign his name in this column.

e. Section D, Remarks. The daily operation of this equipment is of significant interest to numerous agencies. The interested personnel include engineers in the development laboratories, manufacturers of the equipment, and those associated with the actual use of the apparatus. Few of these personnel, however, have the opportunity of continuous observation or operation of the equipment under field conditions. Those closest to the apparatus are the men actually in the field. Since they are in daily contact with equipment, operators and maintenance men cannot help but discover weaknesses in equipment design and inconveniences in operation. Such information is of no value unless it reaches the proper agencies which can initiate the necessary steps for correction. No suggestion or idea is considered too trivial. These ideas or suggestions should be submitted to the unit radar officer. If these are considered suitable and proper authority so directs, the radar officer can make the necessary entries in the space provided in section D. If a component or part is found to be faulty because of damage in transit, handling at the station, or defective manufacture, enter this information as a REMARK in section D.

f. Sheet Numbers. Enter the sheet number at the bottom right-hand corner. This number must be the same as the number on the front of the log.

CHAPTER 5

CONVERSION FOR TRAVEL

Section I. DISASSEMBLY OF TOWER TR–24–A

138. Preparation for Travel

To prepare Radio Equipment RC–145–A for transport to a new location, turn off the equipment and proceed as follows:

a. Make sure that the receiver and transmitter portions of the ANTENNA MATCHING section of the receiver and transmitter are pushed in and flush with the panel of the unit.

b. Close the hinged door below the transmitter dial on the receiver and transmitter unit.

139. Disconnecting Cords CD–981 and CD–982

a. Disconnect Cord CD–982 from the 14-terminal receptacle on the side of the gearcase of Tower TR–24–A (fig. 60).

b. Disconnect the other end of Cord CD–982 from the tower junction box at Trailer K–75–A (fig. 49). Replace the protective caps on the ends of Cord CD–982.

c. Disconnect Cord CD–981 from the tower junction box at Trailer K–75–A (fig. 49). Close the door of the tower junction box.

d. Disconnect the other end of Cord CD–981 from the right-angle connector on the end of the rigid coaxial line of the tower assembly (fig. 67).

e. Remove the rod supports which held the cables off the ground between the trailer and the tower.

f. Remove the sandbags from the supports on the leg extensions.

g. Remove the sandbag supports. Mount two supports in the channel of each leg extension (fig. 58A). Turn hook to left to secure supports to channel.

140. Removing Rigid Coaxial Transmission Line

a. Loosen the large knurled thumbnut of the transmission line at the bottom of the tower gearcase (fig. 67A).

b. Loosen the upper hexagonal nut of the transmission line until the nut on the upper end of the locking tube is disengaged from the threads of the connecting sleeve.

c. Rotate the lower hexagonal nut until the key of the retainer at the upper end of the line is disengaged from the keyway of the connecting sleeve. Remove the transmission line from the bottom of the gearcase.

d. Replace the caps on the bottom of the gearcase and on the ends of the rigid coaxial transmission line.

141. Disassembling Antenna AN–154–A

a. Install the block-and-tackle assembly.

(1) Hook the anchoring lug of the block-and-tackle assembly in the slotted hole of the leg extension directly opposite the gearcase hinge (fig. 58A and F).

(2) Run the wire section over the pulley on the tripod (figs. 59[C] and 66).

(3) Slip the hooked end of the wire into the ring at the top of the lower mast section.

(4) Take up the slack and snub the pulley rope around the cleat on the side of the leg extension to which the anchoring lug is hooked.

b. Insert the long pin in the gearcase hinge.

IMPORTANT: THIS PIN MUST ALWAYS BE REINSERTED IN THE HINGE BEFORE LOWERING THE MAST. ON THOSE MODELS ON WHICH THE PIN IS CHAINED TO THE RIGID COAXIAL LINE THE PIN CANNOT BE REINSERTED IN THE HINGE UNTIL THE COAXIAL LINE IS REMOVED FROM THE GEARCASE. ON ALL OTHER MODELS, A DETECTING PIN IS CONNECTED TO ONE OF THE GEARCASE CAPTIVE BOLTS WHICH HOLD THE MAST IN POSITION (FIG. 67). THIS BOLT IS PAINTED YELLOW (FIG. 60). THE DE-

TECTING PIN WILL NOT ALLOW THE BOLT TO BE SWUNG BACK UNTIL THE RIGID COAXIAL LINE HAS BEEN REMOVED FROM THE GEARCASE.

c. Unfasten and open the collar of the center bearing on top of the tripod assembly (fig. 59[C]).

d. Remove the three captive bolts and nuts which secure the base of the mast to the top of the gearcase.

e. Lower the mast slowly. Have at least two men ready to grasp the mast when it is partially lowered and to help lower it to a horizontal position. Again snub the pulley rope around the cleat on the side of the leg extension to which the anchoring lug is hooked.

f. Open the hinged door of the lobe switchbox (fig. 63C). Disconnect Cords CD–1009 and CD–1010. Close and fasten the door.

g. Disengage the rotary coupling from the base of the mast.

h. Pull Cords CD–1009 and CD–1010 from the center of the mast (fig. 62).

i. Remove the cap of the rotary coupling from the lower side of the triangular plate on the stud on the center leg section. Replace the cap on the rotary coupling.

j. Remove the four captive bolts which secure the antenna assembly to the mounting flange at the top of the mast. Remove the antenna assembly (fig. 63C).

k. Remove the six Cords CD–1071 connected between the lobe switchbox and the dipoles (fig. 63B).

l. Remove the dipoles (fig. 63A).

m. Remove the two struts which serve as braces for the end sections of the reflector (fig. 63A).

n. Fold the end sections of the reflector.

142. Disassembling Tower TR–24–A

a. Remove the captive bolts which secure the upper section of the mast to the lower section. Remove the upper section.

b. Lower the lower mast section. Remove the block-and-tackle assembly.

c. Lift the lower mast section to the horizontal position. Remove the long pin from the hinge on top of the gearcase. Remove the lower mast section.

Note. On early models this long pin is chained to the rigid coaxial transmission line. On those models the pin should be left chained to the line. On later models the pin is chained to the gearcase (fig. 60).

d. Remove the triangular plate from the stud to which it is fastened on one of the center leg sections. Fasten it to the top of the gearcase, using the captive bolts.

143. Disassembling Tripod Assembly

a. Detach the two struts which are *not* marked with a red band from the legs of the base.

b. Lower the tripod assembly and detach the remaining strut from the base leg.

144. Removing Tie-rods and Gearcase

a. Remove the gearcase captive bolts.

b. Remove the gearcase. Four men will be required.

c. Loosen the tension on the tie-rods by means of the turnbuckle.

d. Remove the three tie-rods.

145. Disassembling Jackscrew Assemblies

Repeat the following steps with each jackscrew assembly:

a. Take the weight off the jackscrew by lifting up on the leg extension, and turn the catch clockwise one-quarter turn to unlock the assembly (fig. 58D and E).

b. Straddle the lower end of the leg extension and lift up on the leg. Push the jackscrew assembly free of the slotted end of the leg (fig. 58D and E).

146. Removing Leg Extensions

a. Loosen the eccentric bolts and nuts which lock the bolts into position.

b. Remove the captive pin from the holes in the lower webs of the two members (fig. 58C).

c. Remove the eccentric bolt from the slot in the upper web of the center leg.

d. Remove leg extension.

147. Disassembling Center Section of Base

a. Hold the larger end of the leg with the collar.

b. Lift the slotted ends of the other two legs from the eccentric bolts on the collar of the leg.

c. The tower is now completely disassembled.

Section II. PACKING TRAILER

148. Trailer and Mounting Blocks Kit

a. PURPOSE. Tower TR–24–A, Antenna AN–154–A, and the minor pieces of Radio Equipment RC–145–A are transported in a 1-ton, two-wheeled, cargo Trailer K–52. A kit of mounting blocks is

provided for fitting the chests and loose parts into the trailer. Since the trailer can be used for other purposes, the mounting blocks are designed so as to be removed easily and quickly in order to restore the trailer to its original design.

b. DESCRIPTION. (1) *Kit.* The kit consists of eight wooden blocks each made of 2-inch maple with the corners reinforced with metal. Each block is equipped with steel rectangular collars that fit over the side rack stakes of Trailer K–52 and are finished in olive-drab paint.

(2) *Trailers.* Two types of 1-ton, two-wheel, cargo trailers are used. One type is a Hercules model T–6 of wooden construction, and the other type is a Gerstenslager model A of steel construction The distance from the stake pockets on one side to stake pockets on the other side is slightly greater on the wooden trailer than on the steel trailer. The kit can be used on either model. The only difference is that, when the Gerstenslager steel trailer is used, the hinged blocks on the two side pieces (fig. 112, blocks D and E) must be dropped into place between the side pieces and the trailer body. When the Hercules model T–6 is used, these blocks must be withdrawn from between the side pieces and the trailer body and hang on the inside of the side pieces.

c. PARTS AND USES OF KIT (FIG. 112). The kit consists of the following:

(1) *Block A.* A rear crosspiece of wood construction which supports the rear end of chest CH–225 and helps prevent the gearcase and inner legs from shifting.

(2) *Block B.* A center crosspiece of wood construction which supports the rear end of the tripod and center of Chest CH–224, and helps prevent the gearcase from shifting.

(3) *Block C.* A front piece of steel and wood construction complete with two webbed straps, rectangular metal collars at each end, and two wooden circular collars. The larger collar has a metal leaf which acts as a lock. Block C holds the upper column and tripod in place at one end.

(4) *Block D.* A left side piece of wood and steel construction with two webbed straps, two rectangular steel collars, three channels, and two hinged blocks for use with the wider trailer. This piece

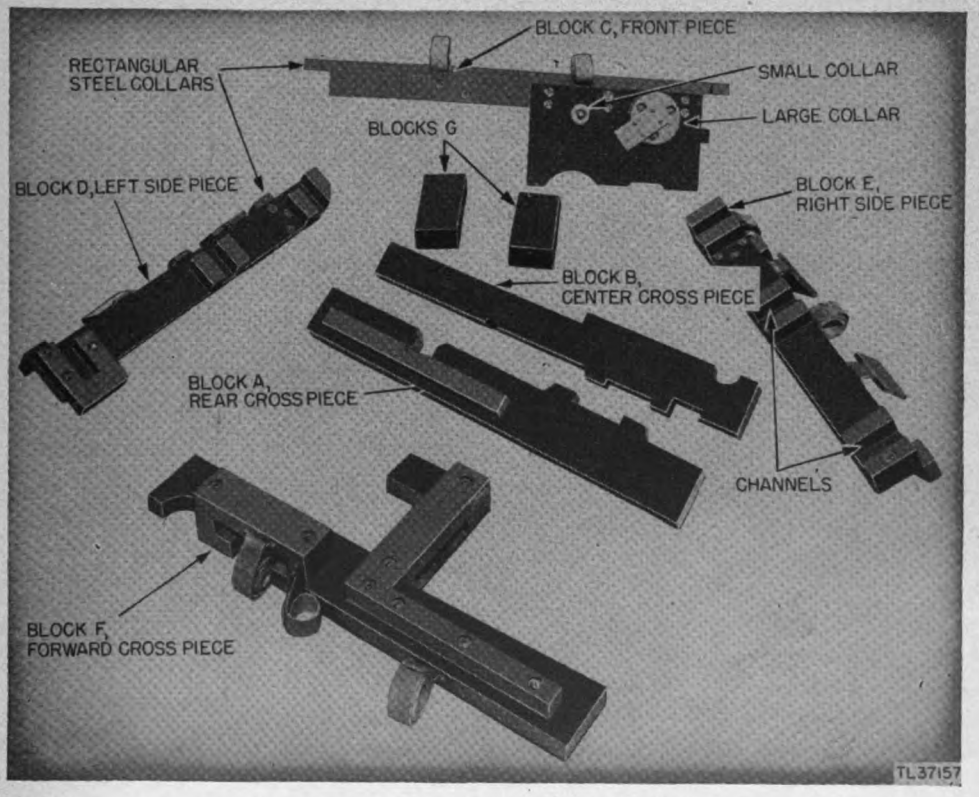


Figure 112. Mounting Blocks Kit X145–V8.

holds the opposite ends of the forward, center, and rear crosspieces (blocks A, B, and F) in place.

(5) *Block E.* A right side piece of wood and steel construction, with two attached webbed straps, three channels, and two hinged blocks for use with the wider trailer. This piece holds one end of the forward, center, and rear crosspiece (blocks A, B, and F) in place.

(6) *Block F.* A forward crosspiece of wood construction with three attached webbed straps. This piece supports part of the tripod, the rear end of the upper column, and the front end of Chest CH–224.

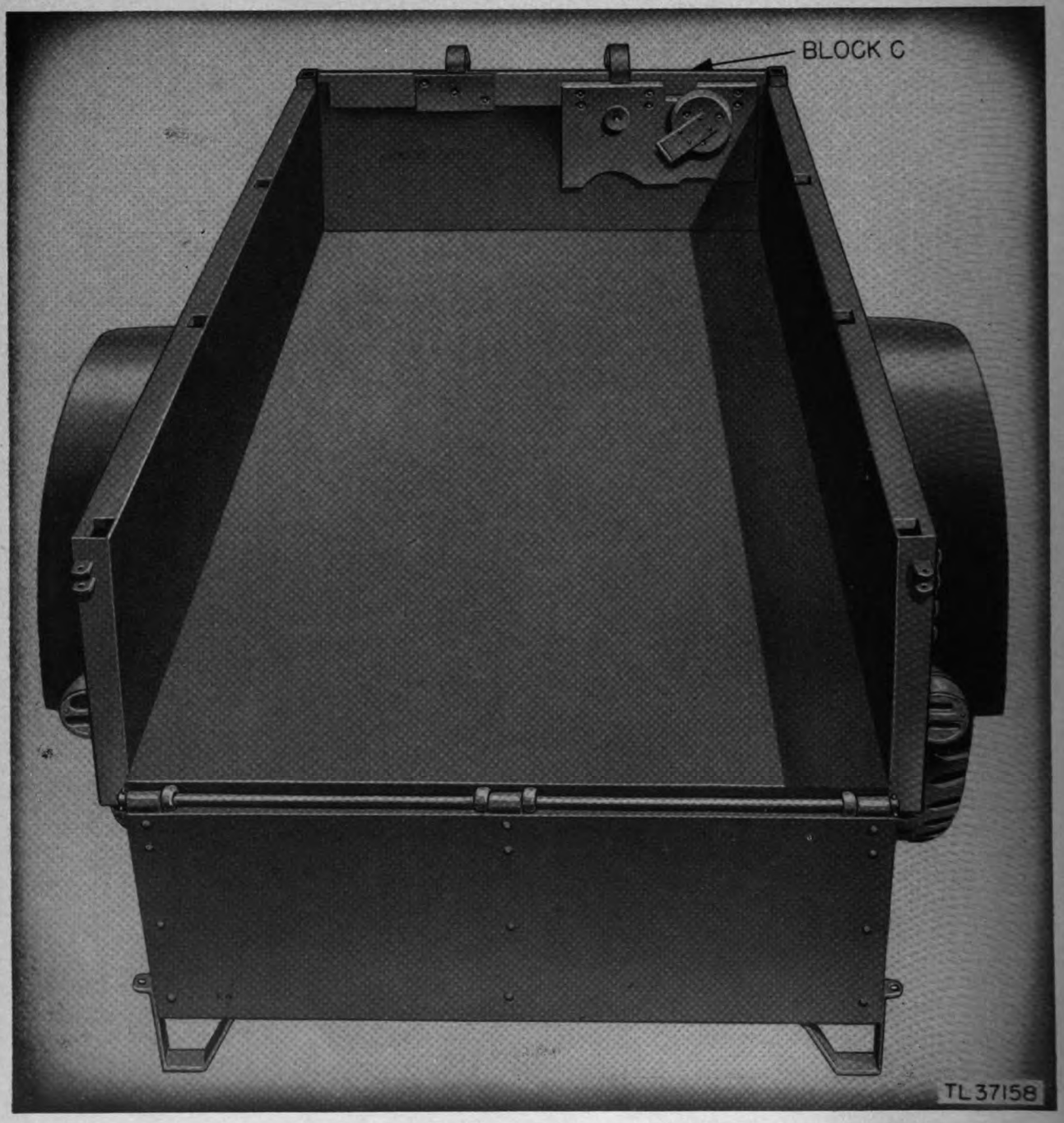


Figure 113. Trailer, two-wheel, 1-ton, cargo, Hercules model T–6.

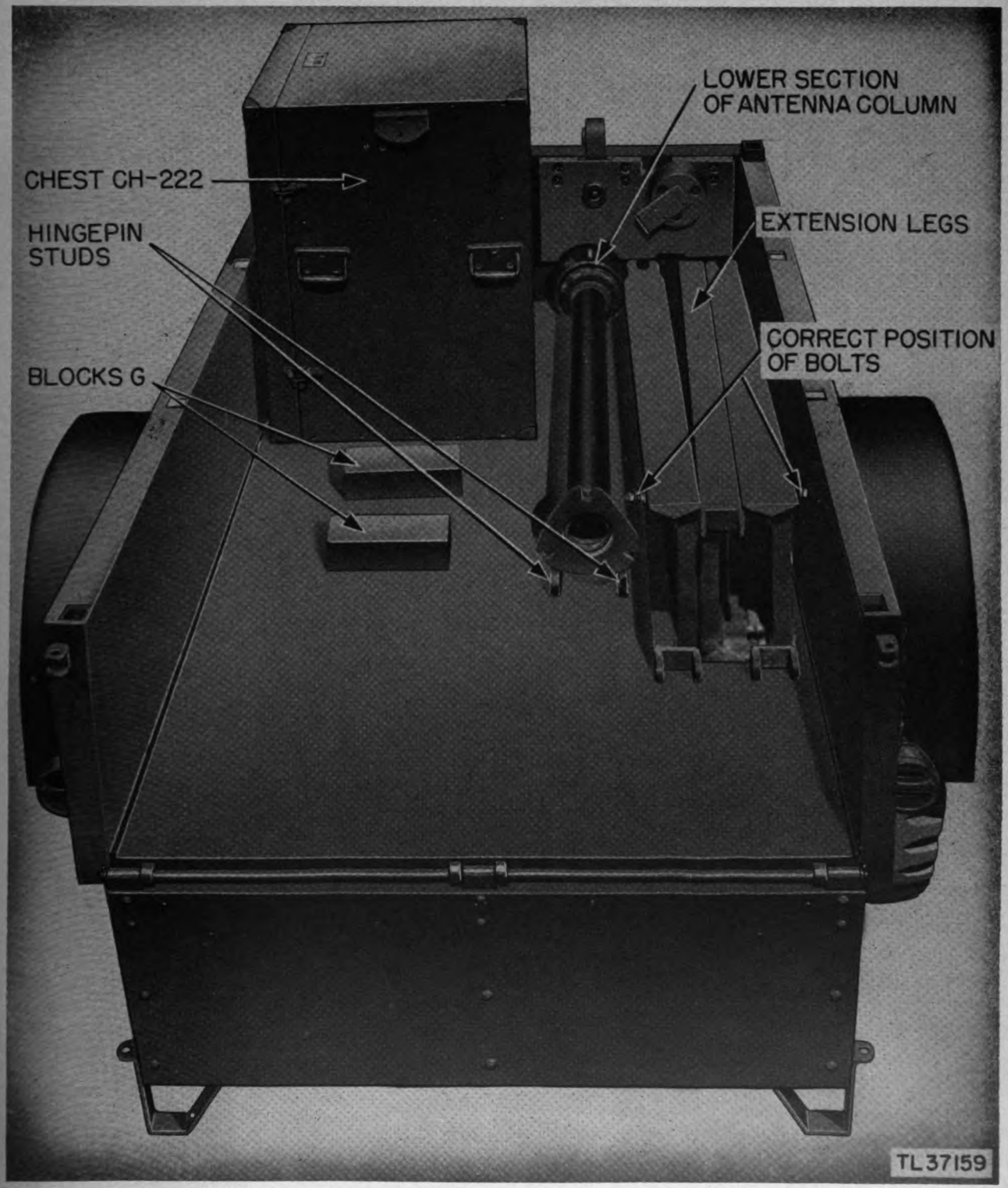


Figure 114. Chest CH–222 in place.

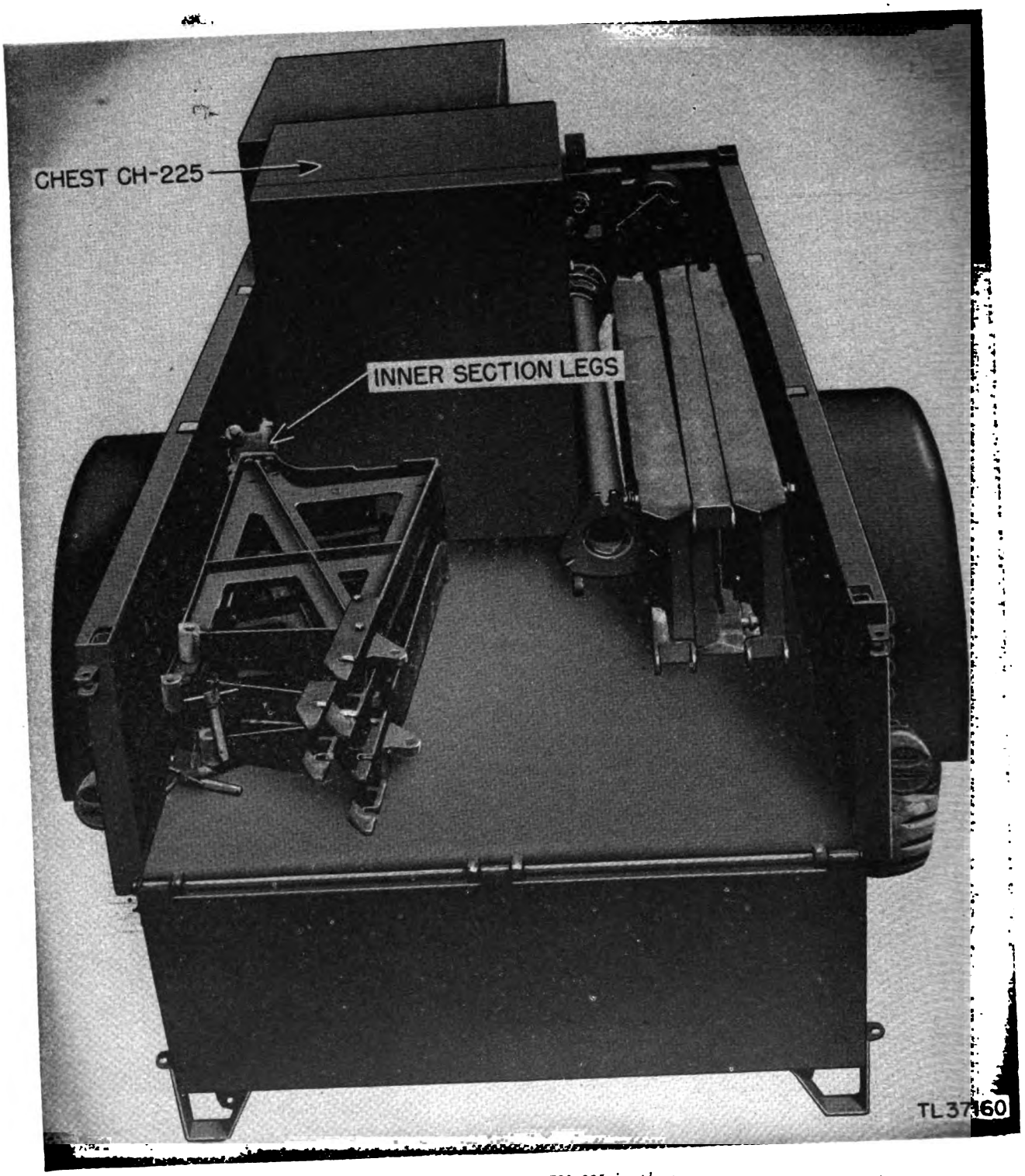


Figure 115. Chest CH-225 in place.

d. WEIGHTS.

Net weight of Hercules model T–6 wooden trailer	1,400 lb
Weight of equipment	1,959 lb
Weight of adapter kit	85 lb
Approximate total	3,444 lb
Net weight of Gerstenslager Model A steel trailer	1,460 lb
Weight of equipment	1,959 lb
Weight of adaptor kit	85 lb
Approximate total	3,504 lb

149. Installation and Packing

a. Strip the trailer of all its accessories such as the tarpaulin, tarpaulin bows, front rack, side racks, and the rear rack (fig. 113).

b. Install block C at the front end of the trailer as shown in figure 113. The rectangular steel collars should be placed directly over the stake pockets.

c. Set Chest CH–222 in the forward left-hand corner tight against block C, with the carrying handles to the front and rear and the cover toward the outside of the trailer (fig. 114).

d. Place the lower section of the antenna column in the groove provided on block C, with the hinge-pin studs resting on the floor boards (fig. 114).

e. Set the three extension legs on the right-hand side of the trailer with the narrow ends up against the front of the trailer and under the groove on block C. The outer legs should have the hinge bolts up (fig. 114).

f. Lay the blocks G on the trailer bed approximately 6 inches on Chest CH–222 (fig. 114).

g. Place Chest CH–225 on the two wooden blocks G (fig. 115), with the carrying handles toward the sides of the trailer and the cover toward the rear. Place Chest CH–225 solidly against Chest CH–222 and close to the upper column, leaving space between the chest and trailer side for the inner section of the tower legs.

h. Place the three inner sections of the tower legs on the rear left-hand side of the trailer in front of Chest CH–225. The section with the collar and eccentric bolts attached should be placed on top of the other two sections, with the collar end fitted into the space between the Chest CH–225 and the side of the trailer. Stagger the sections, as shown in figure 115, in order that they will be firmly seated.

i. Before blocks D and E are installed, they will have to be arranged for either the steel or wooden trailer. The hinged blocks will be on the inside of the side pieces for the wooden trailer and on the outside for the metal trailer (figs. 116 and 117).

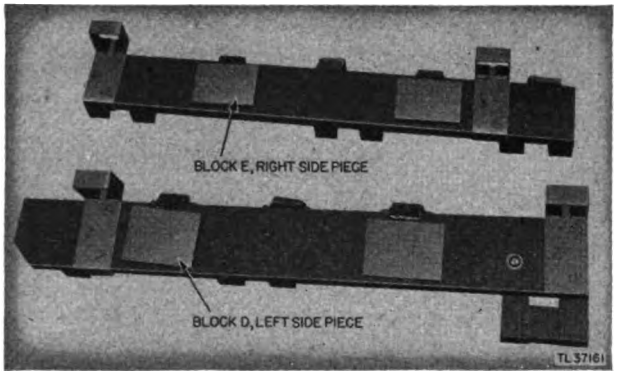


Figure 116.
Hinged blocks in place for Gerstenslager model A trailer.

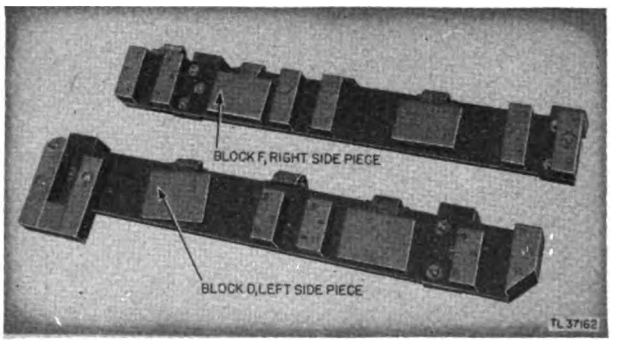


Figure 117.
Hinged blocks in place for Hercules model T–6 trailer.

j. Install blocks D, E, and F (fig. 118). The rectangular steel collars attached to blocks D and E must line up with the stake pockets. Insert block F in the forward channel of blocks D and E.

k. Set the gearcase on the remaining free floor space at the rear right-hand corner of trailer (fig. 119).

l. Install blocks A and B in the channels provided on the blocks D and E. These sections have cut-outs to fit over the gearcase and the inner legs. This holds them in place and prevents shifting from side to side while in transit (fig. 119).

m. Set Chest CH–224 over the inner legs in the cut-out portion of block B and on the supporting shoulders attached to blocks A and F (fig. 120).

n. Place the upper section of the antenna column on the right side of Chests CH–222 and CH–225,

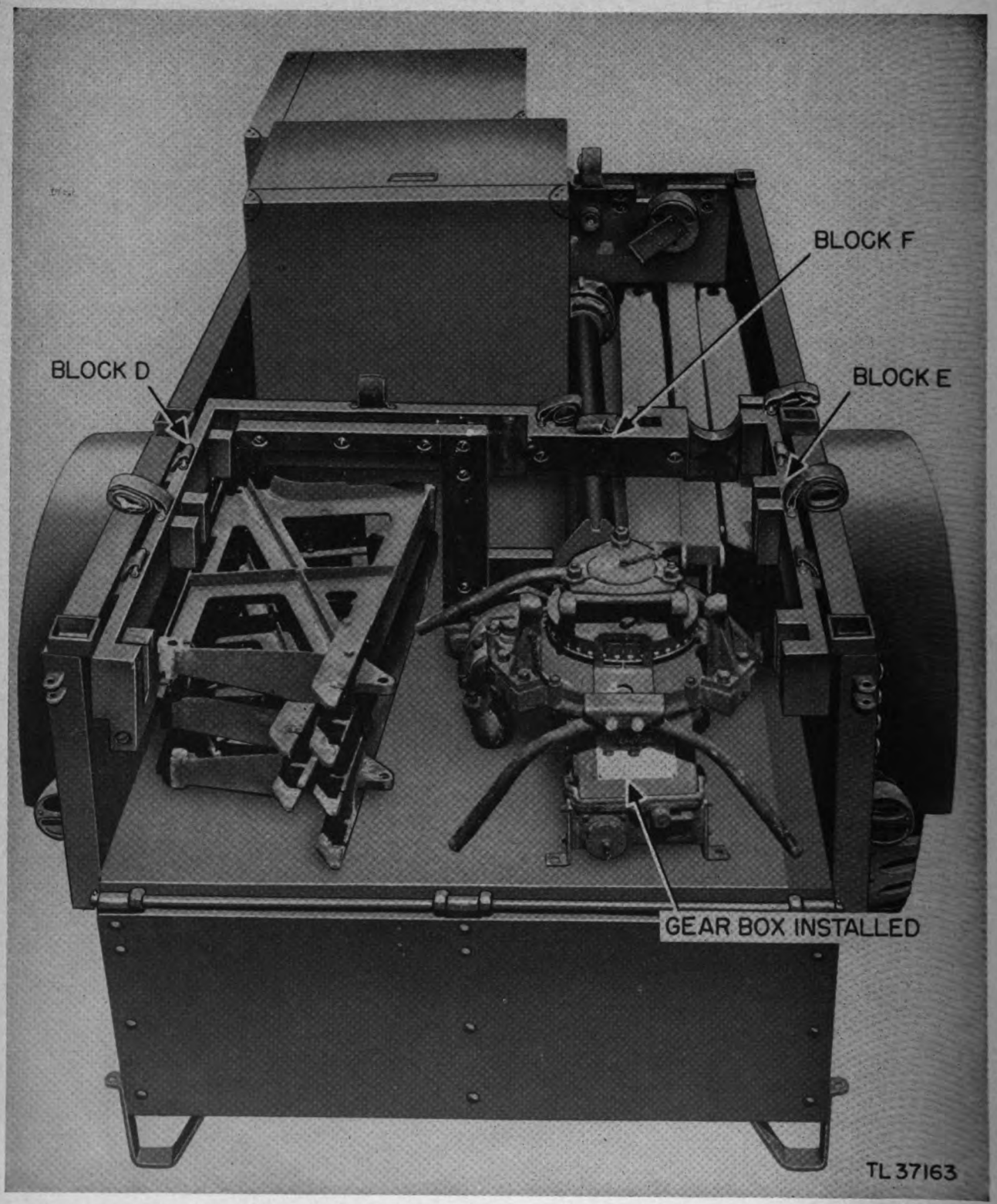


Figure 118. Blocks D, E, and F installed.

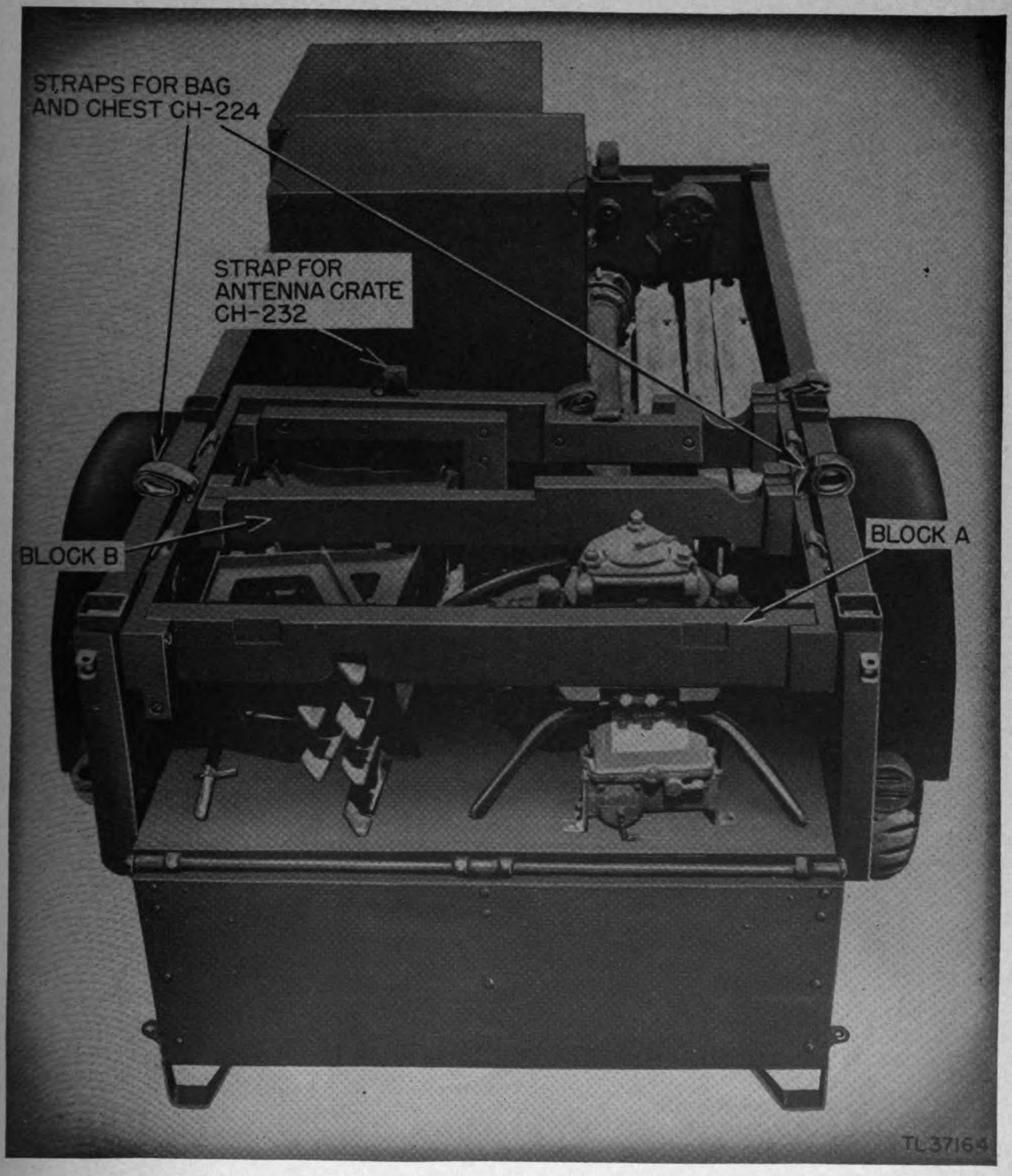


Figure 119. Blocks A and B installed.

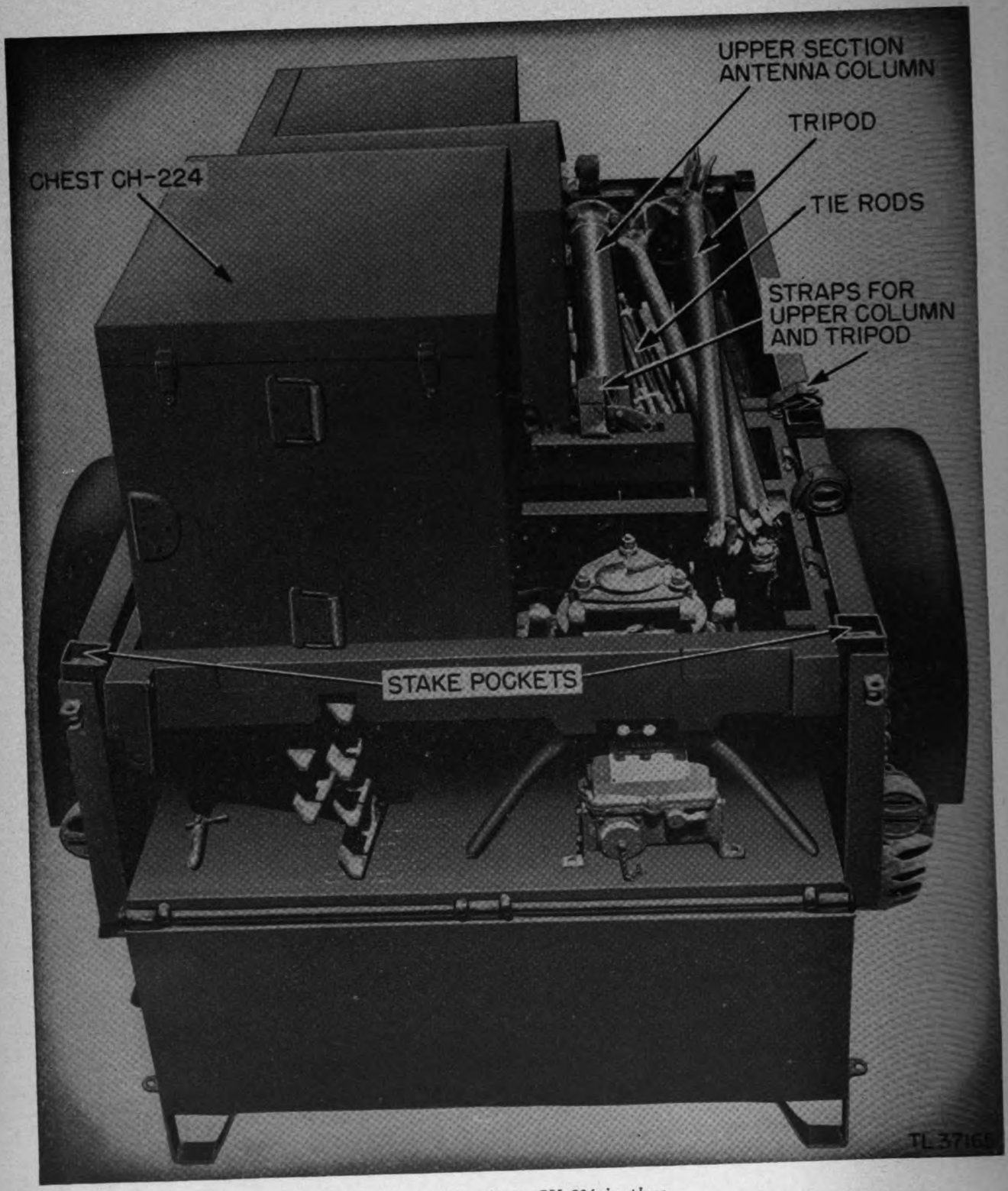


Figure 120. Chest CH–224 in place.

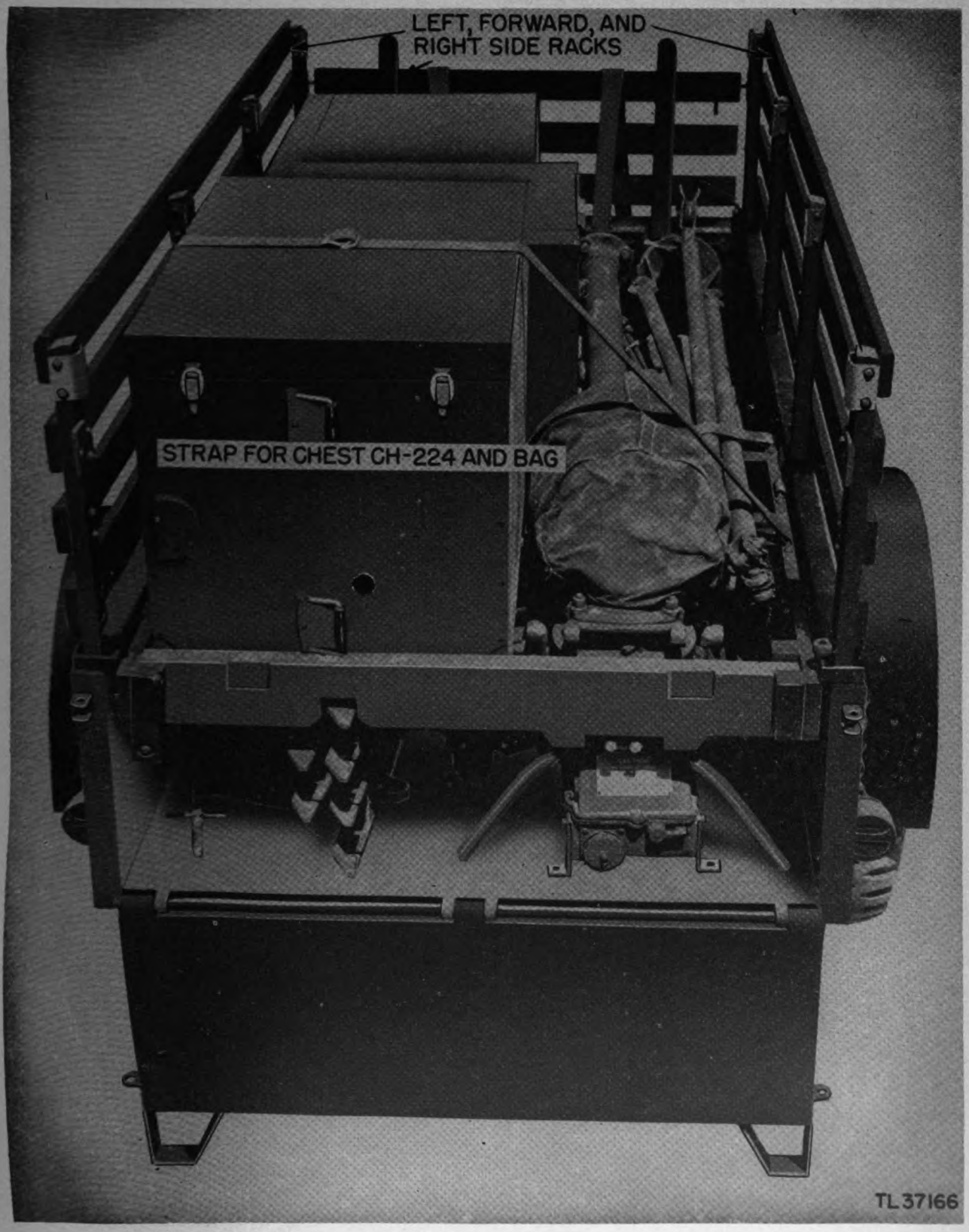


Figure 121. Trailer racks installed.

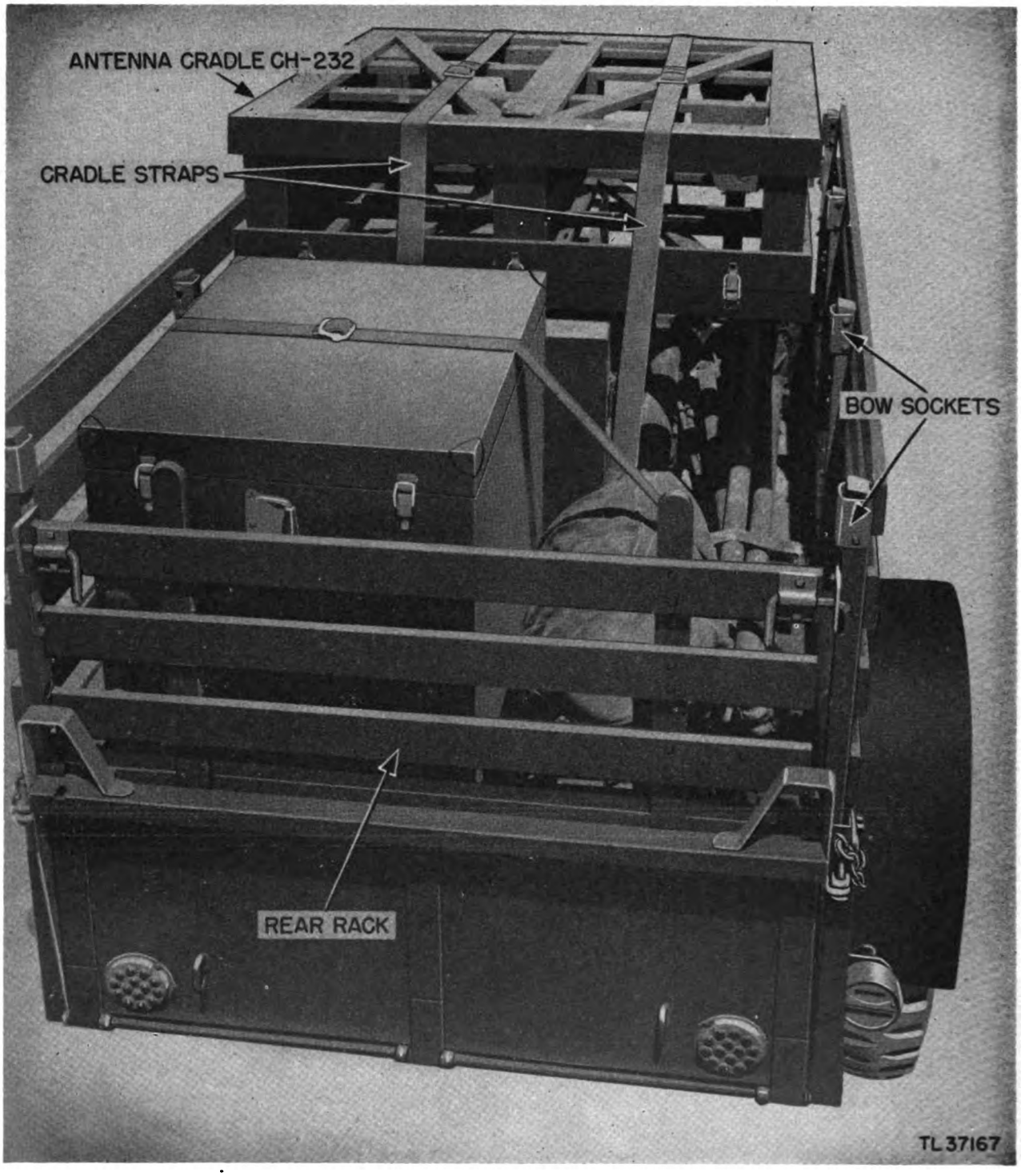


Figure 122. Antenna Cradle CH-232 in place.

mounting the small flanged end of the upper antenna column on the small collar attached to block C. Drop the other end of the column having the larger flange into the slot provided on block F. (fig. 120).

o. Install the tripod next. Fold the tripod legs, open the split flanged collar at the upper end of tripod, and mount the tripod over the collar attached to block C. Close the flange collar and secure with the bolt and nut (fig. 120). Fasten the other end of the tripod with the short webbed straps attached to blocks E and F. These same straps pass over the flange of the upper section of the antenna column and hold it in place.

p. Tie the three steel tie-rods together with light rope and place them on the extension legs between the tripod and the upper section of the antenna column (fig. 120). Two of these rods are linked together, while the third rod has a turnbuckle. When disassembled, one section is separated. They are used with the tower legs.

q. Set the canvas bag over the gearcase and across blocks A and B (fig. 121).

r. Replace the right, left, and forward side racks by inserting the rack stakes through the rectangular steel collars attached to blocks D and E and into the stake pockets. Fasten the forward trailer rack in place with the latches and side bolts (fig. 121).

s. Place antenna Cradle CH–232 on top of Chests CH–222 and CH–225. Secure in place with the four webbed straps. Two of these straps are attached to block C and two are attached to block F (fig. 122).

t. Anchor down Chest CH–224 by means of the long webbed straps fastened to blocks D and E. This strap also passes over the canvas bag (fig. 122).

u. Fasten the rear trailer rack in place with the latches and sliding bolts provided (fig. 122).

v. Close the tail gate, and lock it in place with the pins provided for this purpose (fig. 122).

w. Install the two rear trailer tarpaulin bows and the forward tarpaulin bow (fig. 123).

x. Place the tarpaulin over the equipment and anchor it with the attached straps and ropes (fig. 124).

y. The trailer is now ready for transit.

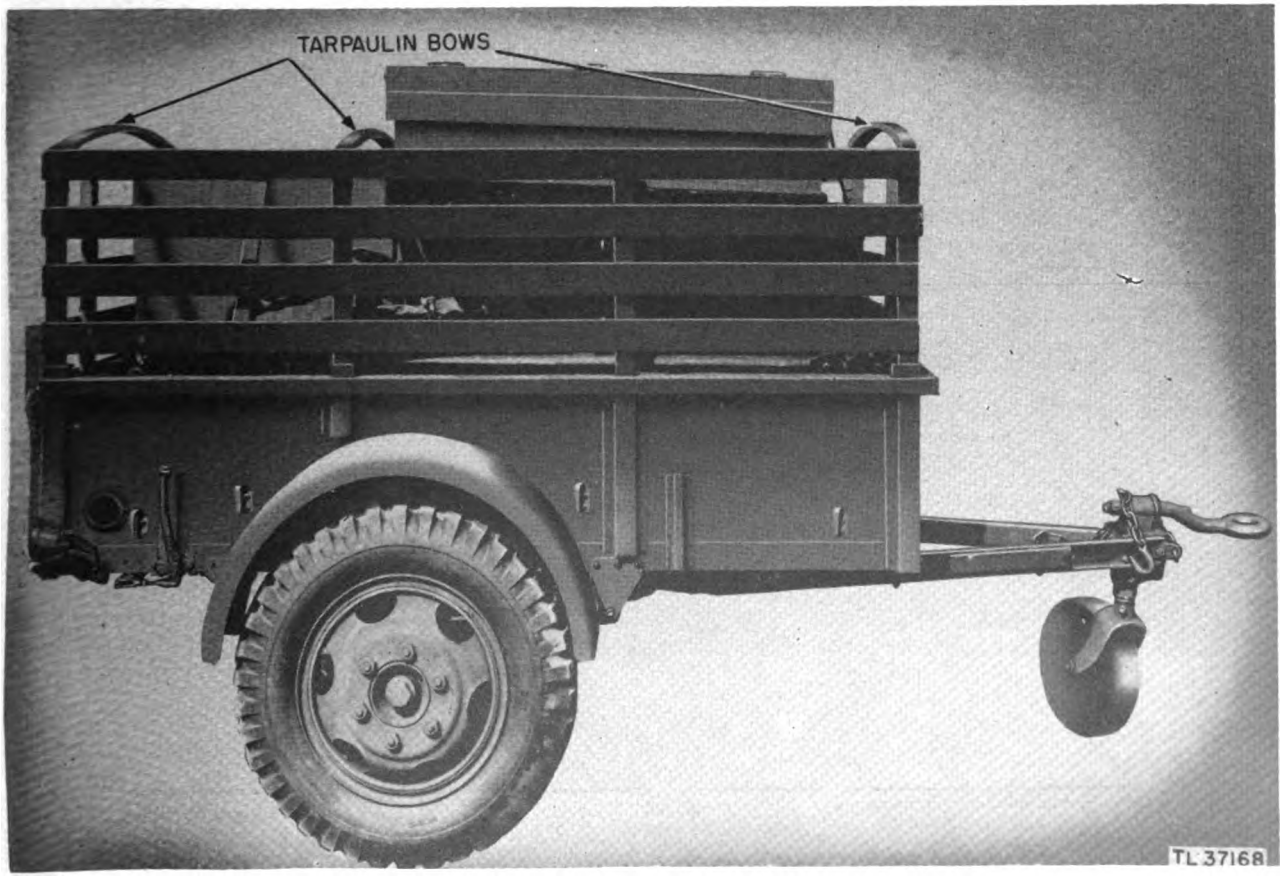


Figure 123. Tarpaulin bows installed.

Figure 124. Trailer, Hercules model T-6, ready for transit.

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