TM 11-1362

WAR DEPARTMENT TECHNICAL MANUAL

RADIO EQUIPMENT RC-384

TECHNICAL OPERATION MANUAL

GENERAL DESCRIPTION, OPERATING INSTRUCTIONS, AND EQUIPMENT PERFORMANCE LOG

WAR DEPARTMENT 10 MARCH 1945

STOCK NO. 6D13575

THIS ADDENDA WILL REMAIN IN EFFECT ONLY UNTIL THE INFORMATION IS PUBLISHED IN AN OFFICIAL WAR DEPARTMENT PUBLICATION.

ADDENDA

4 APRIL 1945

ADDENDA TO

TM 11-1362

RADIO EQUIPMENT RC-384, TECHNICAL OPERATION MANUAL

The following information, published on Order No. 3047-MPD-44, corrects portions of TM 11-1362, 10 March 1945.

Personnel using the equipment and having custody of this technical manual will enter suitable notations beside each affected paragraph or illustration in the technical manual to indicate the presence of this supplementary information.

SUMMARY OF EQUIPMENT CHANGES. The design of Radio Equipment RC-384 as described in TM 11-1362 has been changed as follows:

a. The fasteners for the waterproof covers of Rack FM-93 and Control Unit BC-1378 have been changed from captive wing-nut type to luggage-type clasps (fig. 70).

b. The a-c convenience outlets on the side of Rack FM-93 have been moved to the lower left-hand side of the front of the rack (fig. 70).

c. The BLOWERS pilot light and switch has been moved from the left-hand side of the lower front panel of Rack FM-93 to the right-hand side (fig. 70).

d. The receptacle for the seven-conductor cable which connects the control unit to the rack has been moved from the right-hand side of the lower front panel of Rack FM-93 to the left-hand side (fig. 70).

e. Ventilation in Rack FM-93 has been improved by eliminating the louver on the bottom front panel of the rack and substituting larger air vents (fig. 70).

f. A second blower has been added in the bottom of Rack FM-93. This additional blower is controlled by the same switch that controls the original blower.

g. A blower has been added inside Control Unit BC-1378 (fig. 71). The ON-OFF switch for this blower is mounted on the back panel of the control unit.

h. Ventilation of Control Unit BC-1378 has been improved by providing vents in the back of the inner case of the control unit.

i. Cord CX-572/CPX (8 ft. 0 in.) has been supplied instead of Cord CD-1106. These cords are electrically the same except that Cord CX-572/CPX (8 ft. 0 in.) is 2 feet longer than Cord CD-1106.

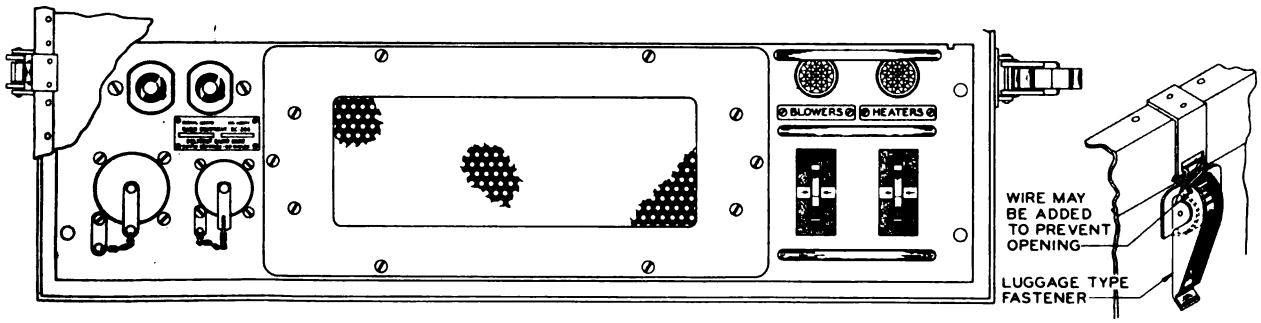

Figure 70. Rack FM-93, lower front panel.

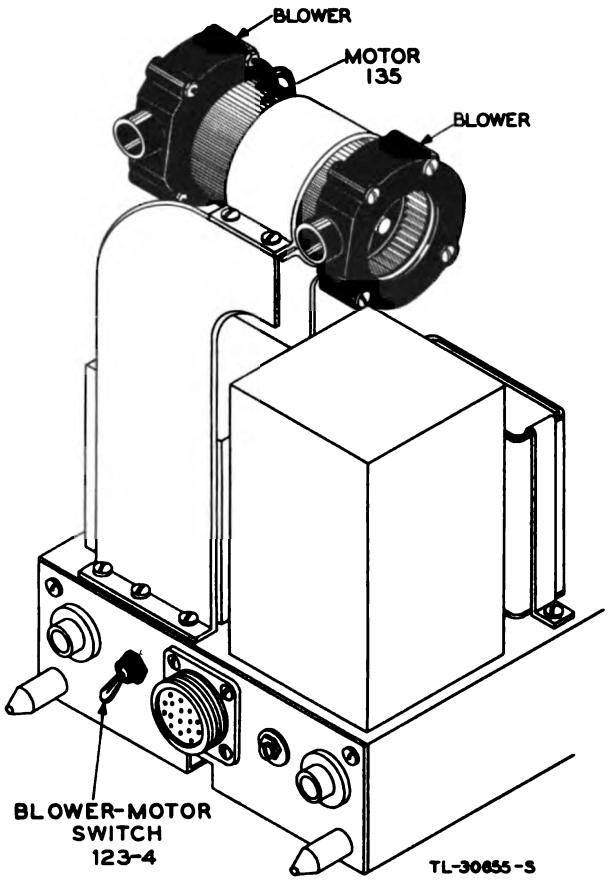

Figure 71. Control Unit BC-1378, rear view.

CHANGES TO TM 11-1362. Make the following changes and additions to TM 11-1362:

Figures 7 to 13, 26, 72, and 63. The captive wing-nut fasteners shown on the waterproof cover of the equipment in these figures have been changed to luggage-type clasps. These clasps are shown in figure 70.

Figures 1, 8, 9, 43, 44, 62, and 63. The lower front panel of Rack FM-93, as shown in these figures, has been rearranged as shown in figure 70 and described in paragraphs **b, c, d,** and **e,** above.

Page 6, Table II. Change first line, first column to read: Heaters and blowers in Rack FM-93. Change first line, fourth column, from "350" to 656. Change fourth line, fourth column, to read: 82, plus 25 from Power Supply RA-105-A. Change note at bottom of table to read: *Maximum power consumption of entire equipment is 1,228 watts.

Page 7, Table III. Change first line, fifth column, from "71.5" to 73. Change fourth line, fifth column, from "83" to 89.5. Change fifth line, fifth column, from "266" to 274.

Page 7, Par. 17b. Change first sentence to read: The rack is divided into three compartments: the top compartment contains the receiver-transmitter, the middle compartment contains the power supply, and the bottom contains two heater and blower units.

Page 7, Par. 17d. Delete this paragraph and substitute the following:

d. The blower and heater units in the bottom section are available when the lower front panel is removed from the rack. The units are dual blowers with a fan mounted on each end of the motor shafts and a heater at the intake of each fan. The air from the rear blower is forced up the rear wiring channel and out into the upper compartment. The air from the front blower is forced into the second compartment through two vents in the shelf of the second compartment. The wiring is so arranged that the heaters cannot be turned on without first turning on the blowers. The blowers, however, can be operated without the heaters. The rear blower unit is mounted on the rear wiring channel by eight screws and the front blower unit is mounted on the under side of the second compartment shelf, also secured by eight screws. Each blower unit receives its power by plugging the cord attached to the blower unit into either of the two receptacles built into the rear channel. A removable air filter is mounted inside the front panel against the intake grille.

Page 9. Fig. 12. Revise this figure to show a toggle switch mounted between the multiple receptacle and the TRIGGER IN jack (fig. 71). Two blower intake vents have been added in the upper part of the panel shown in this figure.

Page 9, Par. 18a. Thirteen lines from end of this paragraph change "The rear plate covers the *** in preliminary adjustment." to read: The rear plate covers the three cable receptacles, the BLOWER toggle switch, and a screwdriver control used in preliminary adjustment.

Page 11. Par. 18d. Add the following sentence to this paragraph: The BLOWER toggle switch controls power to the blower in the control unit. This switch operates independently of the ON-OFF switch on the front panel of the control unit. When the HEATERS switch on the rack is turned on, this blower is automatically turned on. The

toggle switch is provided on the control unit so that the blower may be turned on independently of the rack heaters.

Page 17. Fig. 22. Change label "CD-1106" to read CX-572/CPX (8 ft. 0 in.). (This cord is shown fitted with a single 21-conductor cable. In some cases it is fitted with one 14-conductor cable and one 7-conductor cable instead of the single 21-conductor cable.)

Page 18. Table IV. In sixth line, first column, change "CD-1106" to read CX-572/CPX (8 ft. 0 in.). In sixth line, fifth column, change "21-cond, 6 ft." to read: 21-cond, 8 ft.

Page 23. Par. 32a. After subparagraph (2) add the following sub-paragraph:

(2.1) The BLOWER ON-OFF switch on the rear panel of the control unit.

Page 24. Par. 34. Add the following after sub-paragraph **a**(7):

(7.1) *Control unit* BLOWER *switch:* Snap to ON.

Page 27. Par. 35b (6). In the first sentence, change "fig. 35" to read: fig. 36.

Page 33. Par. 40. Add the following after sub-paragraph **a**:

a.1. On the rear panel of the control unit place the BLOWER switch in the ON position. Air flow should be apparent when the hand is placed over the vents in the upper part of the panel.

Page 37. Par. 41. Add the following after sub-paragraph **e**: Place the BLOWER switch on the rear of the control unit to the OFF position.

Page 38. Par. 46. In the note, change "50" to read 46.

Page 41. Fig. 60. In the blank space after item 10, add the following item:

10.1 Blower [ ] ( ) (OK-N*)

Add this entry to each of the sheets in the Equipment Performance Log pad.

Page 41. Fig. 60. Add "(X)" after items 13 and 18.

Page 48. Between item 10 and item 11, add the following item:

ITEM 10.1—BLOWER.

Sample Entry:

10.1 Blower [ ] ( )(OK-N*)	N*	OK

Log Entry. The blower is working properly if it is possible to feel air flow through the two blower vents in the upper part of the rear panel of the control unit and no odor of overheated windings is present. Write OK if normal conditions prevail; otherwise, enter N*.

Page 50, Fig. 63. Delete arrow marked item 17 to remote antenna drive box.

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RESTRICTED. *DISSEMINATION OF RESTRICTED MATTER.*
No person is entitled solely by virtue of his grade or position to knowledge or possession of classified matter. Such matter is entrusted only to those individuals whose official duties require such knowledge or possession. (See also paragraph 23b, AR 380-5, 15 March 1944.)

WAR DEPARTMENT,
WASHINGTON 25, D. C., 10 MARCH 1945.

TM 11-1362, Radio Equipment RC-384, Technical Operation Manual, is published for the information and guidance of all concerned.

[A. G. 300.7 (3 Oct 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

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

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(For explanation of symbols see FM 21-6.)

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

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 into streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT—1. Smash—All tubes; take special care to destroy completely the two type 2C26 tubes in the transmitter oscillator. All coil forms, transformers, and all chassis.

2. Cut—All cables and coil windings.

3. Burn—All parts of the equipment that cannot be completely demolished by other means.

4. Bend—The dipoles and inductor bar in the transmitter oscillator circuit.

5. Bury or scatter—Nameplates, smashed tubes, and all other parts of the equipment.

DESTROY EVERYTHING

REFERENCE NOTICE

TM 11-1362, Technical Operation Manual, is one of three technical manuals on Radio Equipment RC-384. It is used in conjunction with TM 11-1462, Preventive Maintenance Manual, and TM 11-1562, Service Manual. TM 11-1362 includes a general description of the equipment, instructions for installation and operation, and directions for the use of the Equipment Performance Log. It is intended that this manual will acquaint radar operators and radar repairmen with the general operating features of the equipment and provide a practical guide on how to use it. This book is an introduction to the set and forms the basis for further study and work with the equipment.

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.

Before working inside the equipment, after the power has been turned off, always short-circuit the high-voltage capacitors.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:

Control Unit BC-1378

Radio Receiver and Transmitter BC-1267-A

Power Supply RA-105-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 for hours.

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

TL37451

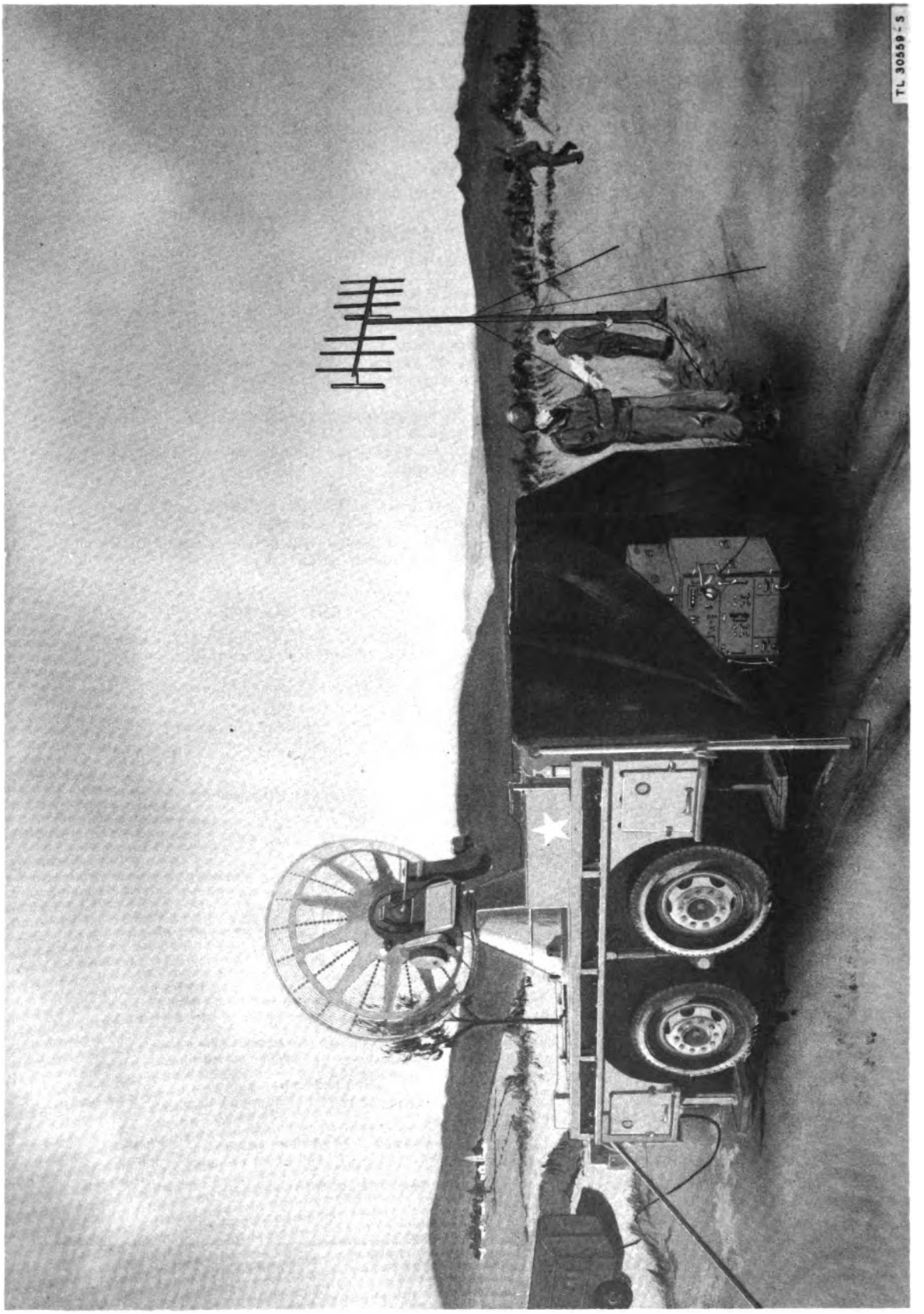

Figure 1—Radio Equipment RC-384 set up for operation with Radio Set SCR-784.

CHAPTER 1

GENERAL DESCRIPTION

SECTION I
PURPOSE OF EQUIPMENT

1. SCOPE OF THIS MANUAL.

a. General. This manual, TM 11-1362, is prepared to acquaint operators and repairmen with the general features and technical operation of Radio Equipment RC-384. The main body of the manual is concerned only with the operation of Radio Equipment RC-384 in conjunction with Radio Set SCR-784. However, since it may become necessary to use Radio Equipment RC-384 with some other radar set or with a different antenna system, appendixes are added to point out the necessary changes in procedure. If another radar set is used, or if a lobe-switching antenna system is substituted, *do not fail* to read the appendix which applies. The chapters of the manual are as follows:

(*1*) *General Description.* Chapter 1 describes the IFF (identification, friend or foe) system in nontechnical language, compares Radio Equipment RC-384 with the basic system, and discusses the physical characteristics of the equipment.

(*2*) *Installation.* Chapter 2 describes the installation of the equipment and the checks and adjustments necessary for correct operation.

(*3*) *Operation.* In chapter 3 the steps in the starting, operating, and stopping procedures are presented in logical sequence.

(*4*) *Equipment Performance Log.* Chapter 4 describes the Equipment Performance Log and includes sample entries to help explain the purpose and use of the log.

(*5*) *Conversion for Travel.* Chapter 5 describes the disassembly and preparation of the equipment for transport.

(*6*) *Appendix I, Universal Operation.* Changes in procedure necessary when Radio Equipment RC-384 is used with a radar set other than Radio Set SCR-784 are given in appendix I.

(*7*) *Appendix II, Operation with Lobe-Switching Antenna.* If a lobe-switching antenna is substituted for Antenna Tower Kit AS-134/TPX which is normally furnished with Radio Equipment RC-384, changes in the operating procedure are necessary. These changes are described in appendix II.

b. Reference. This manual omits discussion of circuit theory, maintenance, and repairs. For preventive maintenance refer to TM 11-1462; for circuit theory and trouble shooting refer to TM 11-1562.

2. PURPOSE OF IFF SYSTEMS.

Radar identification systems and equipment, known as IFF, have been developed to identify the planes detected by radar sets. Radar detects planes and gives their directions and ranges; IFF identifies them as friend or foe. Because delay in recognition may result in enemy planes not being intercepted before their mission is accomplished or in friendly planes being fired at by friendly gun batteries, the IFF equipment is vitally important. With this equipment, the radar operator can immediately identify the planes he picks up and thus avoid the danger of delayed recognition.

3. PURPOSE OF RADIO EQUIPMENT RC-384.

Radio Equipment RC-384 is the IFF equipment designed for operation with Radio Set SCR-784 to identify planes detected by the radar set. In general its functions are:

a. To localize the target, using azimuth and range data obtained from the operator of the radar set.

b. To challenge the unidentified target.

c. To display the coded reply if the target is a friendly plane.

4. MEANING OF RANGE.

The slant range of a target is the straight-line distance between the observer and the target. In an IFF system it is the distance from the IFF antenna to the plane. Radio Equipment RC-384 measures slant range in miles; because it measures slant range only, the terms *slant range* and *range* are used synonymously in this manual.

5. MEANING OF AZIMUTH.

The azimuth angle of a target is the angle, measured clockwise, between a horizontal line from the antenna toward some reference direction, usually true north, and a horizontal line from the antenna toward the target. When the antenna is rotated in azimuth, i.e., rotated horizontally in a clockwise direction, the amount of rotation from true north required to direct the antenna at the target is the azimuth angle. This angle may be measured either in degrees or in mils. In the degree system a circle is divided into 360 equal parts; in the mil system (used in this equipment) a circle is divided into 6,400 equal parts. One degree therefore equals 17.78 mils.

SECTION II
FUNCTIONING OF EQUIPMENT

This section describes the functioning of Radio Equipment RC-384 and explains how this equipment uses range and azimuth data and coding to establish the identity of a target detected by the radar set. A basic IFF system is described first; then a comparison is made between the basic system and Radio Equipment RC-384.

6. BASIC RADAR IDENTIFICATION SYSTEM.

a. Description. The complete IFF system consists of two separate units: the ground unit, located near the radar set and called the "interrogator-responsor"; and the airborne equipment, located in the friendly plane and called the "transpondor." When an aircraft is detected by the radar search set, the range and azimuth are reported to the IFF operator. The IFF operator challenges the unidentified aircraft by turning the antenna of the interrogator-responsor to the reported azimuth and putting the interrogator-responsor into operation. If the aircraft is friendly, it contains a transpondor which is triggered into operation by the interrogation pulses and transmits coded reply pulses. These coded reply pulses are detected and amplified by the interrogator-responsor and displayed on a cathode-ray tube. If the range and azimuth of the reply pulses correspond to those reported by the radar search set operator, and if the reply signals are received in their proper coded sequence, the aircraft is identified as friendly.

b. Interrogator-responsor. The ground equipment consists of transmitter and synchronizer (interrogator), receiver and display (responsor), and associated antenna and power units. The equipment functions in the following manner:

(*1*) A synchronizing voltage from the radar search set controls the circuits in the synchronizer which supplies pulses to operate the transmitter and display units. The radio-frequency (r-f) pulses from the transmitter are fed to a directional antenna. By rotating this antenna, the operator is able to examine space with radio waves in the same manner as with any radar set.

(*2*) The coded pulses from a transpondor are detected and amplified by the receiver circuits and then supplied to the display unit. The time lapse between the transmission of the interrogation pulse and the reception of the coded reply pulse is used to measure the range accurately.

c. Transpondor. The airborne equipment consists of a receiver, coder, transmitter, antenna, and power supply (fig. 2). The receiver is very sensitive; it detects the interrogation pulses and passes them to the coder unit. The repetition rate is not changed, but the pulse width is varied for coding. These pulses trigger the transmitter and cause coded pulses to be radiated to the responsor.

7. RADIO EQUIPMENT RC-384.

Radio Equipment RC-384 has essentially the same fundamental components as the basic IFF interrogator-responsor; it consists of a control unit, a receiver and transmitter, a power supply, and an antenna. Paragraphs 8 through 12 describe the general functioning of Radio Equipment RC-384.

8. TRANSMITTING SYSTEM.

The transmitting system includes the synchronizing circuits in the control unit, the transmitter,

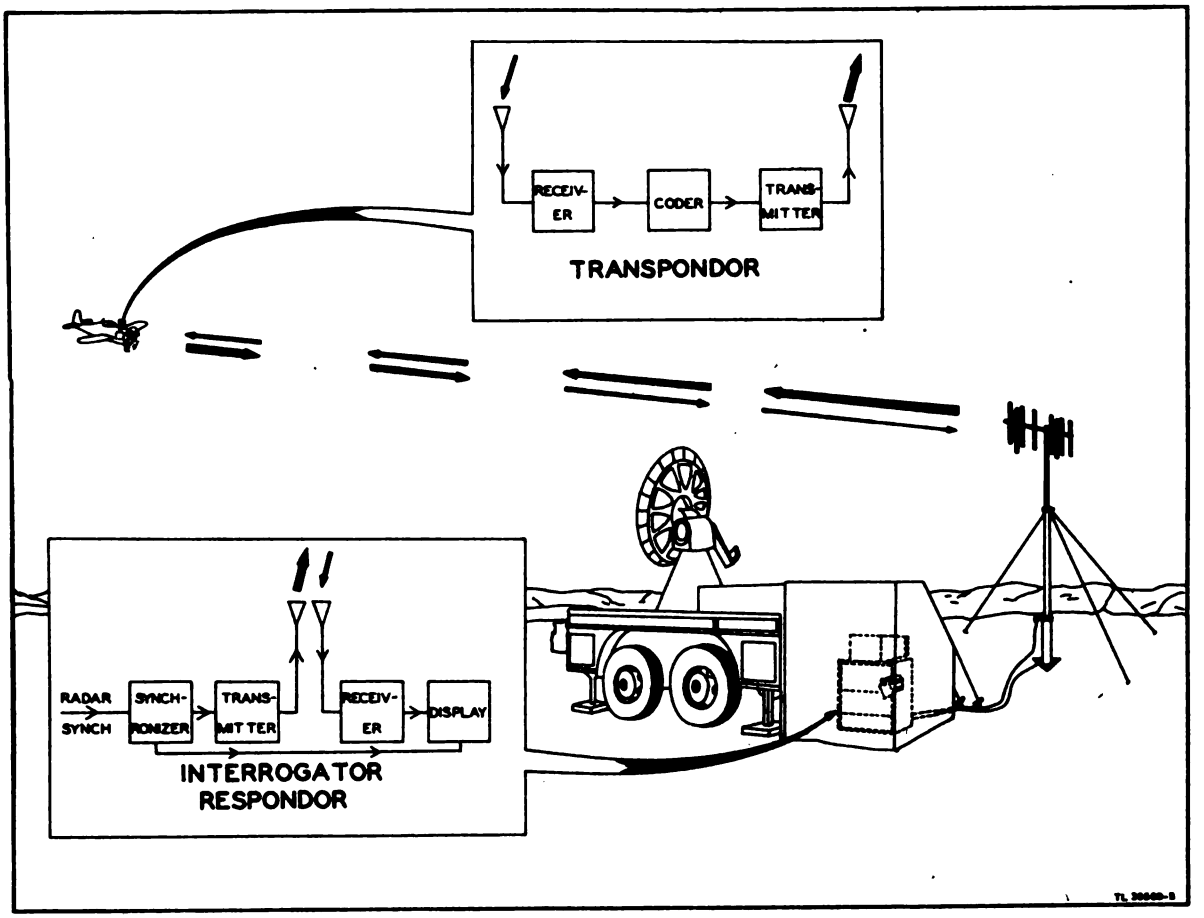

Figure 2—Basic IFF system.

and the antenna. The control unit receives a synchronizing voltage from the radar search set each time the radar search set transmits a pulse of r-f energy. Since the repetition rate of the synchronizing pulses is too great for IFF operation, one out of a certain regular number of pulses is used to trigger the transmitter; the remaining pulses are suppressed in the control unit. This division is used to prevent the IFF from challenging the plane too frequently and swamping the transpondor. A switch on the control unit is used to cut off the triggering pulse when interrogation is not desired. The transmitter contains circuits to shape the pulse which modulates the r-f oscillator. Pulses of r-f energy generated by the transmitter are sent to the antenna through an antenna matching network. This network not only matches impedance but also keeps most of the transmitted energy out of the receiver and prevents received energy from being lost in the transmitter, thus allowing the use of the same antenna for transmitting and receiving. The antenna is directional and radiates a beam, the direction of which can be controlled by rotating the antenna.

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 azimuth information is obtained by controlling the antenna direction as described in paragraph 12. The signals pass through the antenna matching network to a superheterodyne receiver which sends the received signals to the display system where they appear in the form of upward pips.

10. DISPLAY SYSTEM.

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

a. One indicator, an A-type cathode-ray tube, with its sweep circuits and synchronizing circuits, is located in the control unit. This indicator displays the return signals as pips on a horizontal

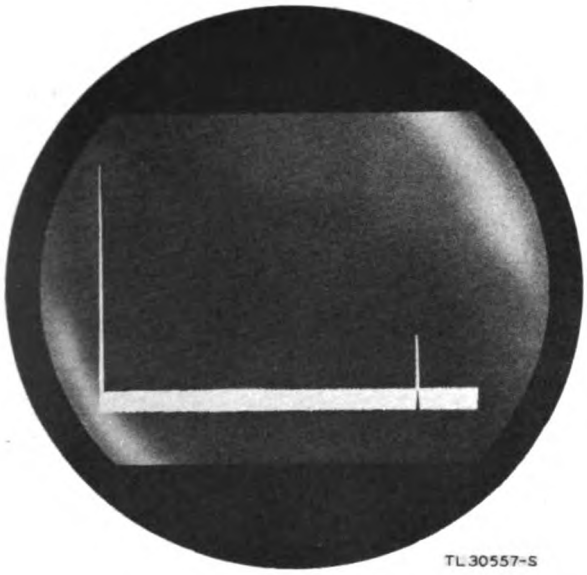

Figure 3—Target indicator, range.

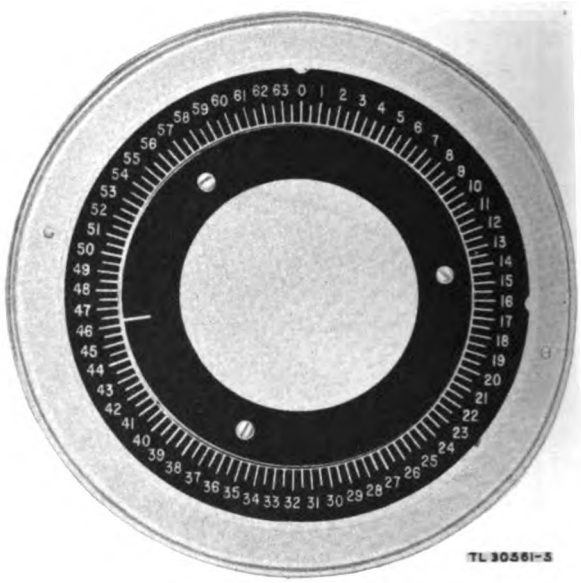

Figure 4—Target indicator, azimuth.

baseline (fig. 3). The display is synchronized with the radar set by the synchronizing circuits which start and brighten the horizontal line at the right instant. By means of the display and the associated azimuth control, the operator identifies the reply pulse as coming from the target found by the radar set by seeing that the pulse comes from a source at the same range and azimuth as the radar target.

b. The other indicator is a dial calibrated in mils, which indicates the direction in which the antenna is pointing (fig. 4). This dial is rotated by the same hand-crank which rotates the antenna.

11. DETERMINATION OF RANGE.

Radio Equipment RC-384 provides a means of establishing the range of a target. This range determination is used in conjunction with the radar search set to establish the identity of a target.

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 between reception and transmission of the signal by the transpondor; and the time required for the return of this signal to the interrogator antenna. The second part, reeeption and transmission by the transpondor, takes a known time which is compensated for by the radar triggering circuits; therefore, the time taken for the signal to travel *to* and *from* the target is used as a measure of range. The conversion from time to distance is possible because it is known that the velocity of radio waves is constant in space and that it takes approximately 6.1 microseconds (millionths of a second) for the round trip between an interrogator-responsor and a transpondor that are 1,000 yards apart.

b. A visual indication on the cathode-ray display tube is used to measure the time required for a signal pulse to go out to the plane and return. This visual indication is presented in the following manner:

(*1*) A concentrated beam of electrons strikes the fluorescent screen of the cathode-ray display tube causing it to glow at the spot struck by the beam. The beam is moved from left to right at a uniform, known speed, and as the glowing spot sweeps across the screen it traces a luminescent line horizontally across the screen.

(*2*) In the 75 K YD. position of the range switch, this trace line is started at almost the same instant that the signal is transmitted by the interrogator. When the return signal is received by the responsor, the moving electron beam is deflected upward sharply, stays up for the duration of the return signal, and then is quickly brought down. Since the vertical deflection produced by the responsor does not affect the horizontal deflection produced by the sweep circuits, the spot continues its lateral motion all the while. The result is a luminescent line with a signal pip as shown in figure 5. The pip at the left end of the

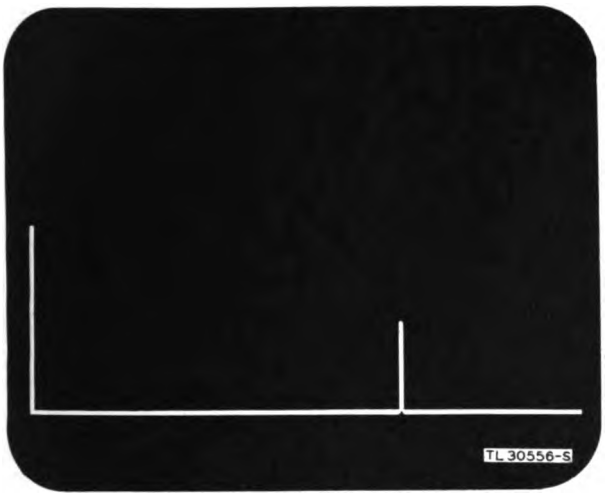

Figure 5—Reply pulse from friendly plane, 75 K YD. switch position.

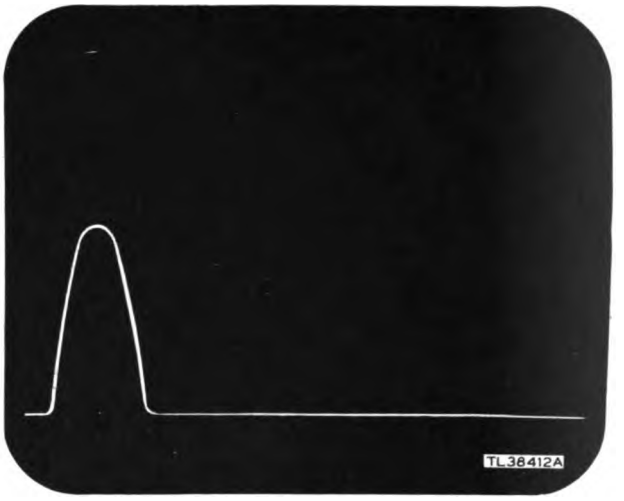

Figure 6—Reply pulse from friendly plane, 10 K YD. switch position.

line in figure 5 is the IFF transmitter pulse picked up by the IFF receiver. Suppose, for example, that the speed of the moving beam were adjusted so as to take 458 microseconds to complete a 3-inch sweep from left to right. This is the time required for a radio wave to travel out to a plane 75,000 yards away and return. If the reply pulse appears on the sweep line 2 inches from the left (starting) end, it is known that the responding plane is 50,000 yards away.

c. The primary purpose of IFF is not to determine range, but to see if a response will come from a plane at a range already determined by the radar operator. Radio Equipment RC-384 is designed to facilitate this operation in the following manner:

(*1*) The radar operator determines accurately the range of any target up to 32,000 yards away by turning the radar SLEWING handwheel until the range pointer is lined up with the leading edge of the target echo. The range of the target is read from the radar range dial. The position of the radar range pointer determines the time at which the IFF sweep starts in the 10 K YD. switch position. This sweep trigger occurs approximately 300 yards ahead of the target.

(*2*) The IFF operator turns his range switch to the 10 K YD. position. The IFF transmitter is still synchronized to the radar transmitter, but the IFF sweep trace is now started by the radar ranging circuit. For example, suppose that the target range is 20,000 yards. The time required for a pulse of r-f energy to make a 20,000-yard round trip is 122 microseconds. The IFF sweep trace starts a little less than 122 microseconds after the IFF transmitter fires. Therefore the IFF reply pulse (if the target is friendly) appears just *after* the IFF sweep trace starts (fig. 6). This position of the reply pulse is evidence that it comes from a plane which is at the same *range* as that indicated by the radar range pointer. If the *azimuth* of the plane corresponds to the radar azimuth, the IFF operator knows that the reply comes from the plane he was asked to identify.

(*3*) In the 10 K YD. switch position, the electron beam must travel from the left end of the screen to the right end in only 60 microseconds (it takes 458 microseconds for the same motion in the 75 K YD. switch position). Therefore the electron beam moves from left to right 7½ times faster and the target reply pulse appears 7½ times wider in the 10 K YD. switch position than in the 75 K YD. switch position. The 10 K YD. switch position thus permits more accurate study of the reply pulse. Another way of expressing this is to compare the 75 K YD. sweep to a yardstick scaled from zero to 75,000 yards, and to compare the 10 K YD. sweep to the same yardstick scaled from zero to 10,000 yards. The scale is 7½ times larger in the latter case, and objects can be studied with greater accuracy.

12. DETERMINATION OF AZIMUTH.

a. In order to establish the reply pulse as coming from a particular aircraft detected by the radar set, the azimuth as well as the range of the IFF reply pulse must correspond to that of the radar echo.

b. The antenna of Radio Equipment RC-384 is directional. The reply pulse on the display screen

has greatest amplitude (i.e., it is tallest) when the IFF antenna is rotated to point directly at a friendly aircraft. Moreover, the transpondor in a friendly plane at some other azimuth angle will not be triggered by signals from the antenna; if it should be triggered by signals from another IFF station, its reply pulses would not be received by this antenna.

c. The azimuth angle at which the antenna is pointed is shown by a dial (fig. 4). To establish the reply pulse as coming from the direction specified by the radar operator, it is merely necessary to point the IFF antenna in this direction.

SECTION III
COMPONENTS OF EQUIPMENT

13. GENERAL.

Radio Equipment RC-384 consists of an operating rack with the receiver-transmitter and power supply installed in it, a control unit, a spare set of major components (receiver-transmitter, power supply, and control unit), an antenna and tower system, interconnecting cables and accessories, test equipment and cables, and necessary spare parts. The entire equipment is designed to be packed for transit in waterproof containers and chests. In an emergency the identification equipment can be used with other radar sets, and several of the major components can be used with other identification equipments (table I).

TABLE I
EQUIPMENTS USING COMPONENTS OF RADIO EQUIPMENT RC-384

Component	*Equipment*
Radio Receiver and Transmitter BC-1267-A.	RC-127-A, RC-145-A, RC-148-C, RC-182-A, RC-184, RC-188-A, RC-207-A, RC-215-A, RC-246-A, RC-282-A, RC-350, RC-351, RC-384, AN/CPX-1, AN/CPX-2
Power Supply RA-105-A.	
Signal Generator I-222-A	
Control Unit BC-1378.	RC-384
Rack FM-93.	
Antenna Tower Kit AS-134/TPX.	RC-192-A, RC-384, AN/TPX-1, AN/TPX-3

14. POWER REQUIREMENTS.

a. Radio Equipment RC-384 obtains its operating power at 115 volts 60 cycles from a line which extends from the operating rack to Radio Set SCR-784. The a-c power is distributed from the rack to the receiver-transmitter and power supply through the rack wiring. When these components are fitted into the rack and secured, the a-c connections are made automatically. The control unit is placed on top of the rack during operation and receives its a-c power and low-voltage d-c power by cable from the rack. The azimuth indicating dial is illuminated by a lamp which receives its power from the rack convenience outlet. All of the a-c lines are fused.

b. The maximum power consumption of the equipment, with all test equipment in use, is 900 watts. The power requirement of each component is shown in table II.

TABLE II
POWER REQUIREMENTS OF COMPONENTS

Component	*Volts*	*Cycles*	*Watts**
Heater and blower in Rack FM-93	117.5	60	350
Radio Receiver and Transmitter BC-1267-A		Obtains power from Power Supply RA-105-A	
Power Supply RA-105-A	117.5	60	450
Control Unit BC-1378	117.5	60	60, plus 25 from Power Supply RA-105-A
Antenna Tower Kit AS-134/TPX (azimuth dial illumination)	117.5	Obtains power from Rack FM-93	Negligible
Signal Generator I-222-A	117.5	60	40

*Maximum power consumption of entire equipment is 900 watts.

15. PHYSICAL SPECIFICATIONS OF EQUIPMENT.

Table III lists the weights and sizes of the individual components.

TABLE III
SIZES AND WEIGHTS OF COMPONENTS

Component	Dimensions (Inches)			Wt (lb)
	Height	Width	Depth	
Control Unit BC-1378	15⅛	10¼	29½	71.5
Radio Receiver and Transmitter BC-1267-A	10	23⅞	18¹³⁄₁₆	64.5
Power Supply RA-105-A	10	23⅞	18¹³⁄₁₆	118.5
Rack FM-93 (without components)	29⅜	24⅛	23	83
Rack FM-93 (with components)	29⅜	24⅛	23	266
Signal Generator I-222-A	12	19½	7½	50
Antenna Tower Kit AS-134/TPX	Bottom of antenna is 16 ft high when tower is erected.			150

16. MAJOR COMPONENTS.

The major components of Radio Equipment RC-384 are: Rack FM-93, Control Unit BC-1378, Radio Receiver and Transmitter BC-1267-A, Power Supply RA-105-A, Antenna Tower Kit AS-134/TPX, and Signal Generator I-222-A. Necessary interconnecting and test cables, fittings, adapters, test accessories, and tools are also included in the equipment.

17. RACK FM-93 (figs. 7 through 9).

a. The rack is a steel and aluminum framework shock-mounted in a waterproof steel and aluminum outer case provided with lifting handles. An adjustable bracket fastens to the right side of the case to mount the remote antenna drive box handy to the IFF operator. The front of the outer case is a removable steel panel screwed to the rest of the case against waterproof rubber gasketing. Removal of the front cover provides access to the rack components, rack controls, and cable connections.

Figure 7—Rack FM-93, front view, waterproof cover in place.

b. The rack is divided into two compartments for holding the receiver-transmitter and the power supply, and a bottom section which contains a heater and blower unit. Wiring to the receiver-transmitter and power supply is contained in a channel at the rear of the rack. A porcelain receptacle is mounted in the channel in each of the two compartments. A corresponding plug is mounted at the rear of each rack component, and the interconnections are made automatically when the components are pushed into place in their shelves. This arrangement facilitates quick assembly and disassembly of the equipment, because there is very little external cabling. Each of the two rack components is held in place in the rack by four captive screws, one in each corner of the component's front panel.

c. The front of the bottom section contains two cable connectors, one for the a-c input to the rack and the other for the seven-conductor cable which connects the control unit to the rack. A double convenience a-c outlet and the circuit breakers and pilot lights for the blowers and heaters are also located in the bottom section. Both pilot lights are provided with adjustable blackout shades.

d. The blower and heater unit in the bottom section is available when the louvered panel is removed from the front. The unit is a dual blower with a fan mounted on each end of the motor shaft and a heater at the intake of each fan. The air is forced up the rear wiring channel and out into the two upper compartments. The wiring is so arranged that the heaters cannot be turned on without first turning on the blowers. The blower, however, can be operated without the heaters. The complete unit is mounted on the rear wiring channel by eight screws and receives its power through a receptacle built into the channel. A plug is fastened to the blower and heater unit so that the contact is made when the unit is pushed against the rear wiring channel and screwed in place. A removable air filter is mounted inside the front panel against the intake louvers.

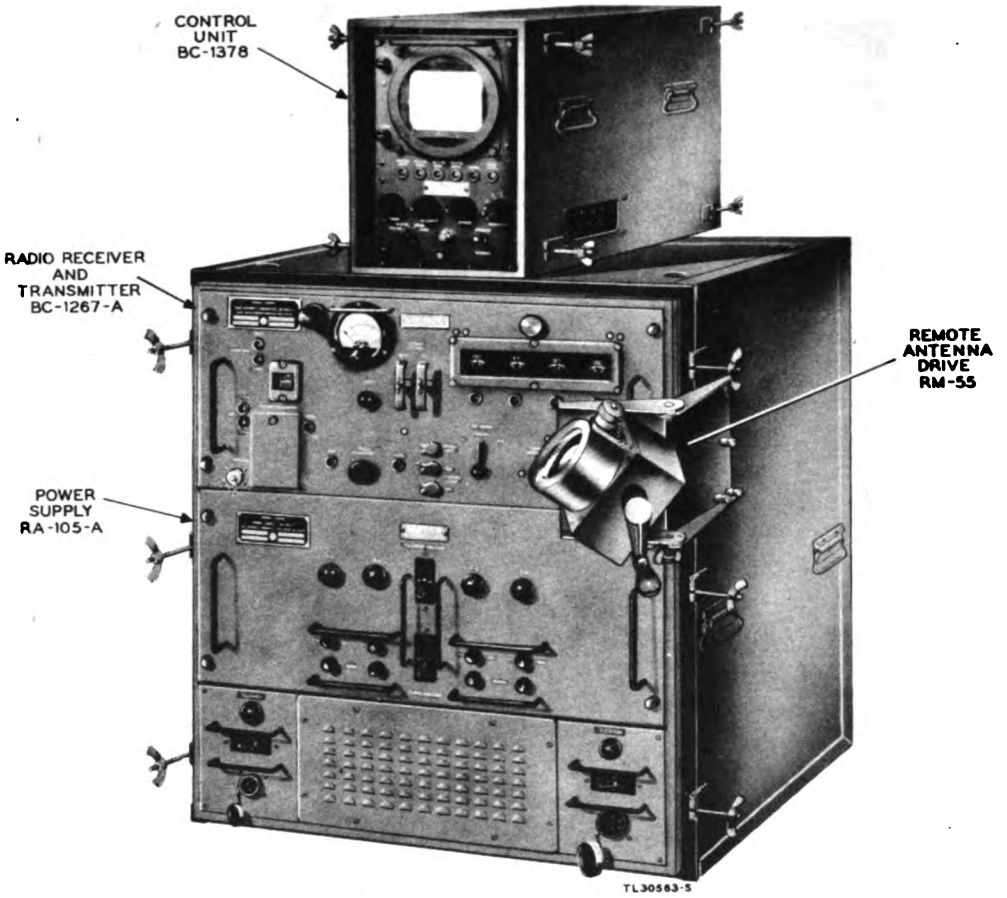

Figure 8—Rack FM-93, cover removed and all components in place.

e. A short steel pipe is fastened to each end of the blower motor (one for each bearing) to facilitate oiling. The upper end of each pipe can be reached from the power-supply compartment when the power supply is removed from the rack. Holes are cut in the shelf of the power-supply compartment, and the pipe ends appear below the holes. A few drops of oil put into each pipe will lubricate the blower-motor bearings.

f. The entire rack framework can be removed from the outer case to permit access to the wiring channel by maintenance personnel. To remove the framework, it is necessary to remove all components and the louvered panel in the front of the bottom compartment. The shock mounts screwed to the framework must then be unbolted from their mountings in the outer case. When the four supporting shock mounts at the bottom and the two antisway shock mounts at the top back of the framework are unbolted, the entire framework can be pulled out of the outer case.

g. After removal from the outer case, the steel panel screwed to the back of the wiring channel must be removed before the wiring can be reached. To protect maintenance personnel, a safety interlock switch is located in the wiring channel. This switch opens automatically when the steel panel is removed. When the switch is open, all primary a-c power is cut off with the exception of the supply to the convenience outlet.

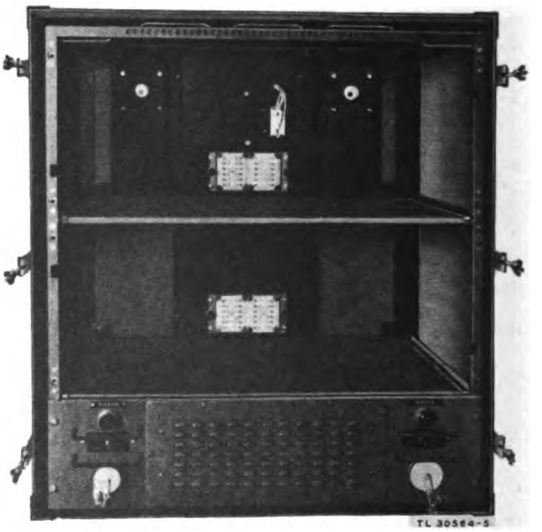

Figure 9—Rack FM-93, front view, components removed.

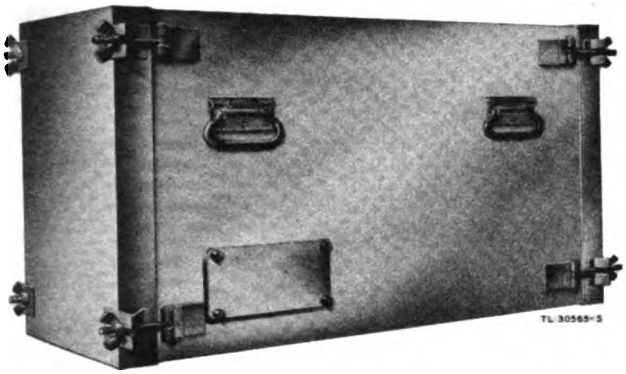

Figure 10—Control Unit BC-1378, waterproof covers in place.

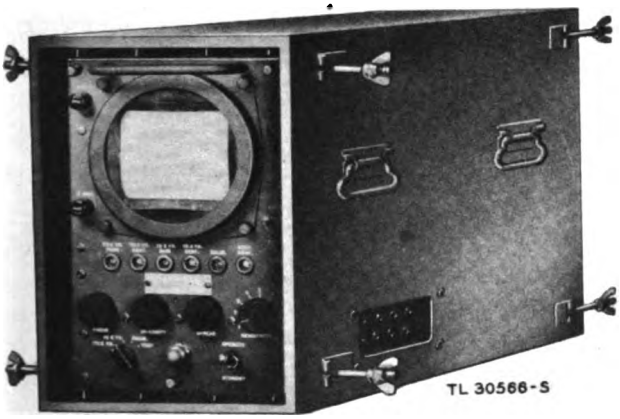

Figure 11—Control Unit BC-1378, front and side panels removed.

18. CONTROL UNIT BC-1378 (figs. 10 through 13)

a. General. The control unit provides the display and synchronization for the equipment. The chassis is contained in an inner steel cabinet, which is shock-mounted in a waterproof aluminum transit case provided with lifting handles. Maintenance personnel can remove the chassis from the inner cabinet by unscrewing three captive thumbscrews, one in each upper corner and one in the center bottom of the front panel. The control unit does not have to be removed from the transit case during operation; access to all controls and cable receptacles is possible by the removal of three waterproof plates from the transit case.

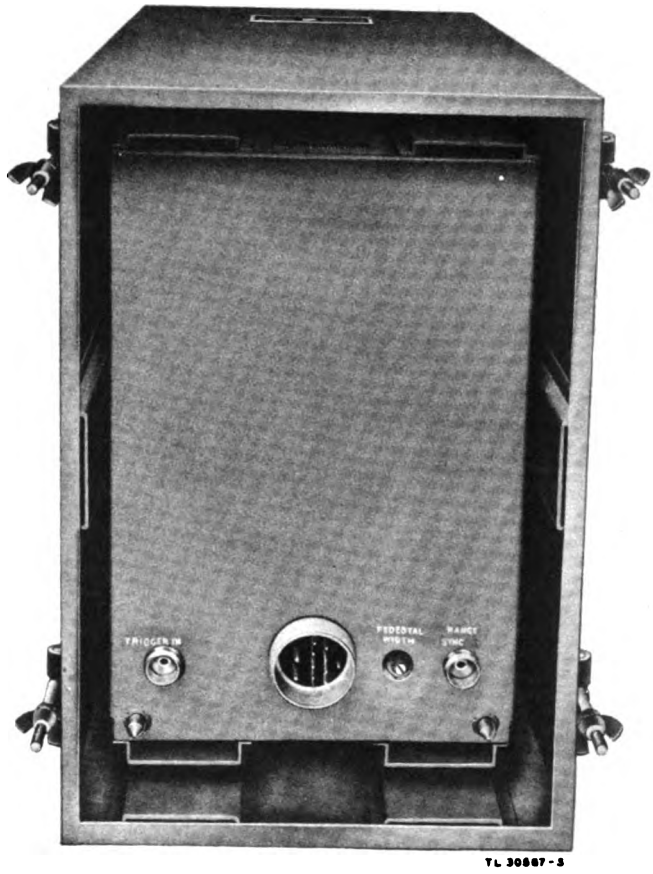

Figure 12—Control Unit BC-1378, rear view, rear cover removed.

These plates are screwed down against rubber gaskets. The front end-plate covers the 5-inch display screen, all but two of the screwdriver controls used in preliminary adjustment; all operating controls, and a pilot light with an adjustable blackout shade. The rear plate covers the three cable receptacles and a screwdriver control used in preliminary adjustment. The third plate is removed from the right side of the aluminum case to premit access to 10 test jacks and the remaining screwdriver control. A heating element is mounted in the bottom of the chassis to warm the parts before use and to dry out excess moisture. The heating element is switched on and off by the rack switch which controls the rack heaters. During operation, the control unit is placed on top of the rack and is connected by one cable to the rack and by two cables to the radar equipment.

b. Front Panel Controls (fig. 13).

(*1*) The ON-OFF switch at the right of the display screen controls the a-c power to the control unit. The a-c line in the control unit is fused by the 2 AMP. fuse at the left of the display screen. A spare fuse is mounted in the panel above the

Figure 13—Control Unit BC-1378, front panel.

2 AMP. fuse. Plate-supply voltage for all tubes in the control unit except the display tube is furnished by the power supply and is fused and controlled at the power supply. The a-c line in the control unit is used to supply power for the heaters of all tubes in the control unit and power for the display tube.

(*2*) Directly below the display tube is a horizontal row of screwdriver controls used in preliminary adjustments. They are discussed below in order from left to right.

(*a*) The 75 K YD. GAIN adjustment is used to control the length of the 75,000-yard sweep on the screen. The sweep, which has a duration of 458 microseconds, can be made to appear across a small portion of the screen or across the entire screen by adjusting the 75 K YD. GAIN control; this control does not affect the duration of the sweep.

(*b*) The 75 K YD. CENT. (centering) adjustment is used to position the 75,000-yard sweep an equal distance from each side of the screen.

(*c*) The 10 K YD. GAIN and 10 K YD. CENT. controls perform the same functions for the 10,000-yard sweep as the corresponding 75 K YD. controls perform for the 75,000-yard sweep.

(*d*) The CALIB. (calibration) control consists of a slotted-end bushing and a slotted-end shaft through the bushing. Either the shaft or the bushing can be turned independently with the special screwdriver provided with the equipment. The shaft adjusts the duration in microseconds of the 75,000-yard sweep; the bushing adjusts the duration of the 10,000-yard sweep.

(*e*) Both the 75 K YD. and the 10 K YD. sweeps always appear in the same vertical position on the screen; therefore only one control is necessary to position the sweep vertically. This adjustment is made with the VERT. CENT. (vertical centering) control which moves the sweep either up or down on the screen.

(*3*) Directly below the horizontal row of screwdriver controls is a horizontal row of four knobs, discussed below in order from left to right.

(*a*) The FOCUS control is adjusted to give a clearly defined sweep on the screen.

(*b*) The INTENSITY control is used to give sufficient brilliance to the sweep.

(*c*) The SPREAD control is left in the extreme counterclockwise position when Radio Equipment RC-384 is used with the antenna system furnished with it. See appendix II for the use of the SPREAD control when a lobe-switching antenna is substituted.

(*d*) The SENSITIVITY control is used to adjust the gain of the receiver; it increases or decreases the upward deflections of the sweep trace.

(*4*) The range switch is the four-position rotary switch in the lower left corner of the front panel. The functions of the four positions are described below.

(*a*) In the 75 K YD. position the entire range of the equipment is displayed.

(*b*) In the 10 K YD. position, any 10,000-yard section of the range from zero to about 40,000 yards is displayed.

(*c*) The CALIB. position is used in conjunction with the screwdriver CALIB. control to adjust the duration of the 10,000-yard sweep to 60 microseconds.

(*d*) The TEST position is used to adjust the division ratio of radar synchronizing pulses to IFF transmitter trigger pulses.

(*5*) The STANDBY-OPERATE toggle switch in

the lower right-hand corner snaps into either position. In the STANDBY position, the IFF transmitter does not operate. The OPERATE position is used for challenging.

c. Side Panel Control and Test Jacks (fig. 11). When the waterproof panel is removed from the right side of the transit case, one screwdriver control and 10 test jacks are uncovered. The control is the DIVISION adjustment; it determines the ratio of the number of radar synchronizing pulses to IFF transmitter pulses.

d. Back Panel Control and Connectors (fig. 12). When the waterproof panel is removed from the rear of the control unit, the three cable connectors and one screwdriver control are exposed. The control is the PEDESTAL WIDTH adjustment; it determines the duration of the pulse which brightens the sweep each time the IFF transmitter fires. This duration must be slightly longer than the time required to make the entire 75,000-yard sweep visible. The large connector in the center is used to connect the control unit to the rack. The radar synchronizing pulse which times the operation of the IFF transmitter is brought by cable to the TRIGGER IN connector. The radar synchronizing pulse which times the 10,000-yard sweep is brought by cable to the RANGE SYNC connector.

19. RADIO RECEIVER AND TRANSMITTER BC-1267-A.

Radio Receiver and Transmitter BC-1267-A (fig. 14) is mounted in the upper of the two rack compartments and houses the receiver and transmitter circuits, as well as the antenna-matching section. The panel contains the screwdriver adjustments used for tuning the receiver and transmitter, the indicating dials associated with some of the adjustments, and the meter and test switch which are used when measuring the power output and cathode current of the modulator tube. The antenna-matching controls are located approximately in the center of the panel. The controls, adjustments, jacks, and indicating dials and meter are as follows:

a. The PLATE CAP. adjustment (TUNE) is used to compensate for differences in the interelectrode capacity of 2C26 r-f oscillator tubes. This adjustment has a locking screw (LOCK) which must be turned counterclockwise before any adjustment can be made.

b. The ANT. (antenna) adjustment (TUNE) is used to adjust the antenna tuning of the transmitter. This adjustment also has a locking screw (LOCK).

c. The PLATE adjustment and its associated indicating dial are used to adjust the transmitter frequency.

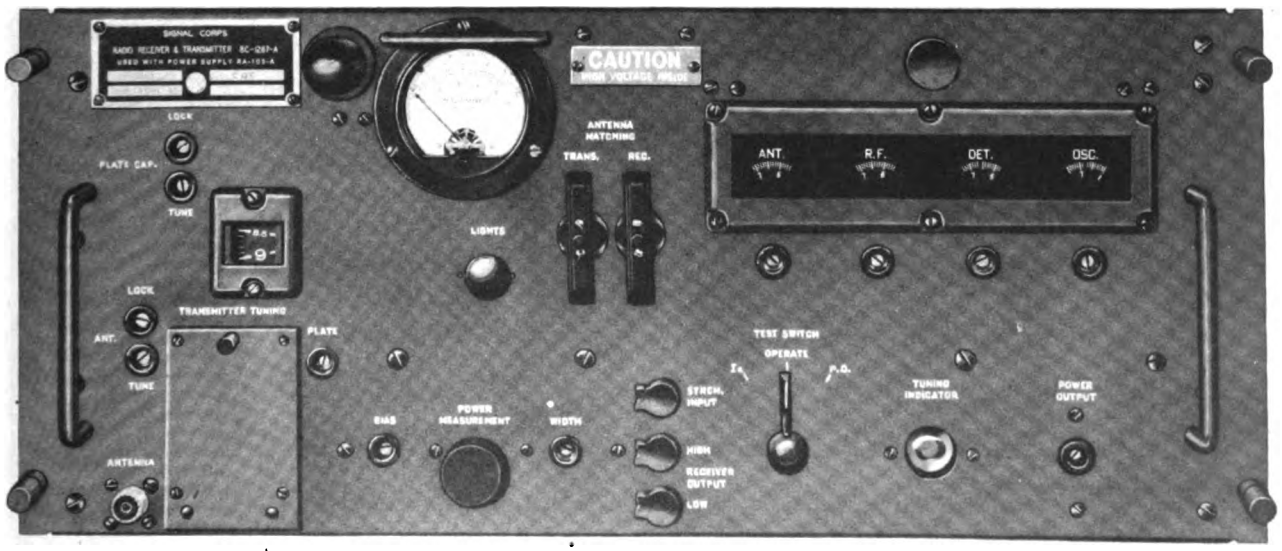

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Figure 14—Radio Receiver and Transmitter BC-1267-A, front panel.

d. The BIAS adjustment is used to adjust the cathode current of modulator tube 3E29.

e. The LIGHTS control is used to adjust the brilliance of the pilot lamps that illuminate the indicating dials and the meter.

f. The POWER MEASUREMENT control is used in measuring the power output of the transmitter.

g. The WIDTH control is used in the adjustment of the output pulse width.

h. The ANTENNA MATCHING section consists of TRANS. (transmitter) and REC. (receiver) rods. When adjusted properly, these rods form a matching network which allow the transmitter and receiver to work into the same antenna with maximum efficiency.

i. The SYNCH. INPUT and RECEIVER (HIGH and LOW) test jacks make available the synchronizing pulse and the receiver output, respectively.

j. The TEST SWITCH in the Ic position is used for measuring the cathode current of tube 3E29; in the P. O. position, the power output of the transmitter can be measured. Normally the switch remains in the OPERATE position.

k. The four adjustments directly under the ANT., R.F., DET., and OSC. dials are used to tune the receiver to the operating frequency.

l. The TUNING INDICATOR eye provides a visual indication of the operation of the receiver and is also used to indicate correct receiver tuning.

m. The POWER OUTPUT adjustment is used to adjust the power output of the transmitter.

n. The indicating meter is provided with two scales: the upper one is calibrated in kilowatts and is used when reading the power output; the lower scale is calibrated in milliamperes and is used when checking the cathode current.

20. POWER SUPPLY RA-105-A.

The power supply (fig. 15) is the lower of the two rack components. It furnishes all the voltages for the receiver and transmitter and all the plate voltages for the control unit except those for the display tube. The upper circuit breaker controls power to the filaments and the lower circuit breaker controls the plate power. All circuits are protected by fuses mounted in the front panel. Spare fuses and four pilot lights with adjustable blackout shades are also contained in the front panel. The pilot lights marked T-A and T-B indicate whether the FILAMENT VOLTAGE circuit breaker is ON; the pilot lights marked T-C and T-D indicate whether the PLATE VOLTAGE circuit breaker is ON.

WARNING: The power supply weighs more than 118 pounds. It is a two-man job to install or remove it from the rack. Do not attempt to do it alone except in emergency.

Figure 15—Power Supply RA-105-A, front panel.

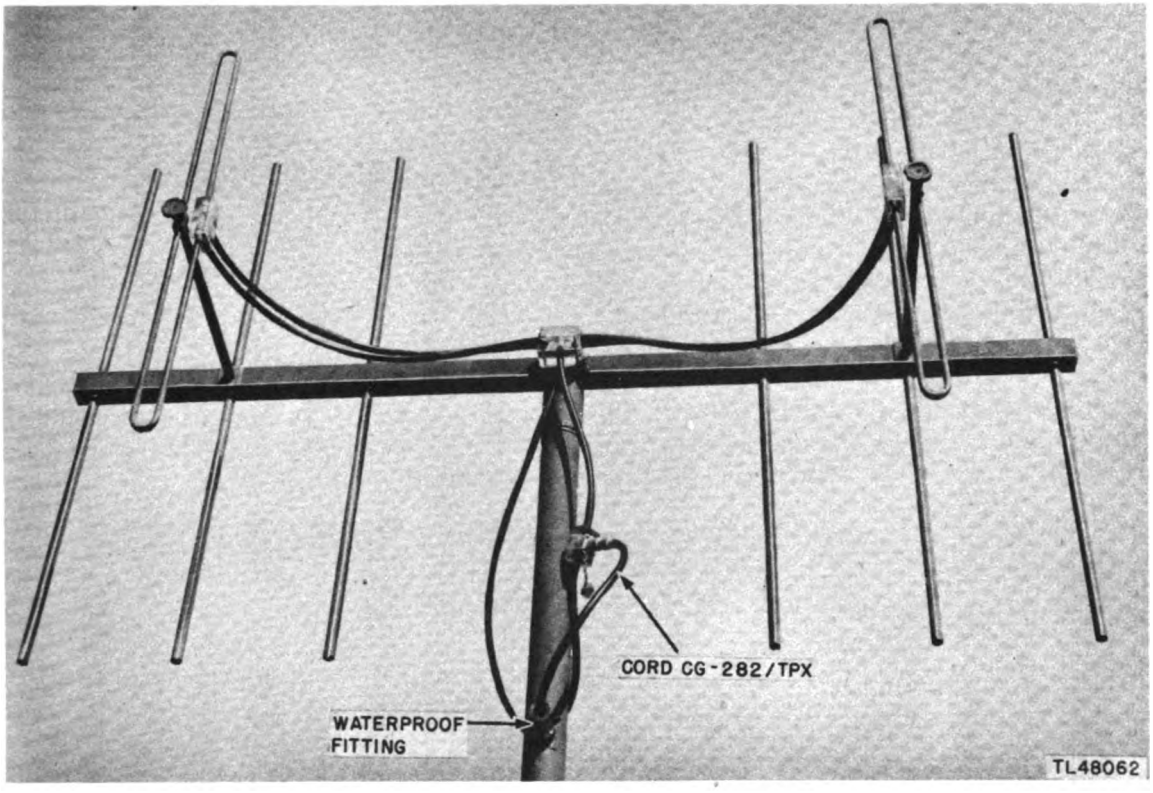

Figure 16—Antenna Assembly AS-109/TPX attached to top of Tower TR-29.

21. ANTENNA TOWER KIT AS-134/TPX.

The antenna system furnished with Radio Equipment RC-384 is a kit designed for use with this and other IFF equipments (table I). The kit is composed of Antenna Assembly AS-109/TPX, Tower TR-29, Remote Antenna Drive RM-55, two 25-foot lengths of flexible drive cable (Cord MX-363), two mechanical couplings for the flexible drive cable, electrical cables, and miscellaneous small items and tools. Two of the electrical cables and a few cable fittings are not used with Radio Equipment RC-384, but are left in the kit to facilitate supply and storage. The entire system can be erected and assembled in 25 minutes by one man or by three men in less than 10 minutes.

a. Antenna Assembly AS-109/TPX (fig. 16). The antenna is a directional array composed of two folded vertical dipoles fed by a phasing section. Three reflectors are mounted behind each dipole. The antenna is so constructed that it transmits and receives efficiently throughout the frequency range of the IFF equipment. All coaxial cable connections on the assembly are inclosed in polystyrene blocks. The antenna is mounted on top of Tower TR-29.

b. Tower TR-29 (fig. 17).

(*1*) The tower consists of a three-section, 16-foot mast mounted on a triangular base and supported by three guy cables. The guy cables fasten to a floating-type bearing on the top mast section and are secured to the ground with screw-in type anchors. Three 15-inch angle-iron stakes are supplied for use where the ground is not suitable for using the screw-in type anchors. The base is staked to the ground and has a hinge pin and wing nut for fastening the mast in place.

(*2*) Rotation of the tower is controlled by Remote Antenna Drive RM-55 through two 25-foot lengths of flexible drive cable which connect to a worm gear drive (50:1 ratio) in the bottom section of the mast. This section also contains a rotating coaxial joint to maintain the electrical connection to the antenna, thus permitting continuous rotation. A fixed pointer and slip dial at the top of the section permit azimuth orientation. Both the flexible shaft and the r-f coaxial line are connected at the lower section.

(*3*) A coaxial cable, Cord CG-282/TPX, connects the antenna assembly (fig. 16) to the rotary coaxial joint in the bottom mast section. This cable is inserted through a hole in the top

mast section and travels down through the mast to the coaxial joint.

c. Remote Antenna Drive RM-55 (figs. 18 and 19). The remote drive is a hand-operated gear box which is mounted on the side of Rack FM-93. The gear drive ratio is 1:2½, so that 20 rotations of the hand crank produce 50 rotations of the flexible shaft and one rotation of the antenna. A 20:1 worm gear drive is also contained in the box to rotate the azimuth indicating dial in the box once for each antenna rotation. A dial lamp in the box lights up the azimuth dial about 50 mils on each side of the azimuth pointer. An a-c connector and switch for the dial lamp are on the rear of the unit. A knob, which provides zero adjustment for the azimuth indicating dial, is located under a cap on top of the drive unit (fig. 18).

d. Cables. The following cables are supplied with the antenna system.

(*1*) Cord CG-282/TPX is used to connect the antenna assembly to the rotary joint in the bottom mast section.

(*2*) Cord CX-596/TPX, an a-c cable, connects voltage to the pilot lamp in Remote Antenna Drive RM-55.

(*3*) Two 25-foot lengths of flexible drive cable, Cord MX-363/TPX, form the mechanical link between Remote Antenna Drive RM-55 and Tower TR-29.

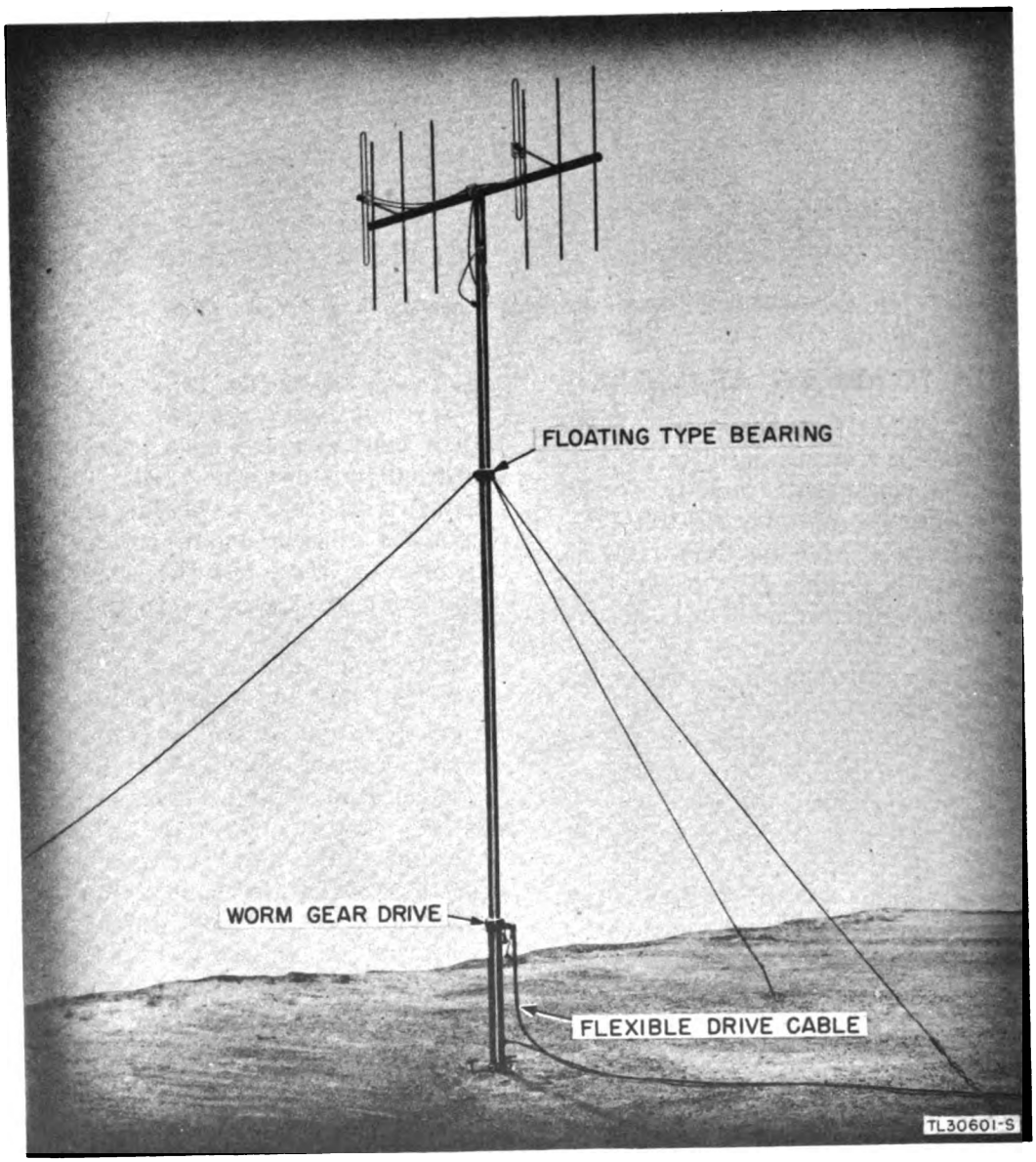

Figure 17—Tower TR-29 set up with Antenna Assembly AS-109/TPX in place.

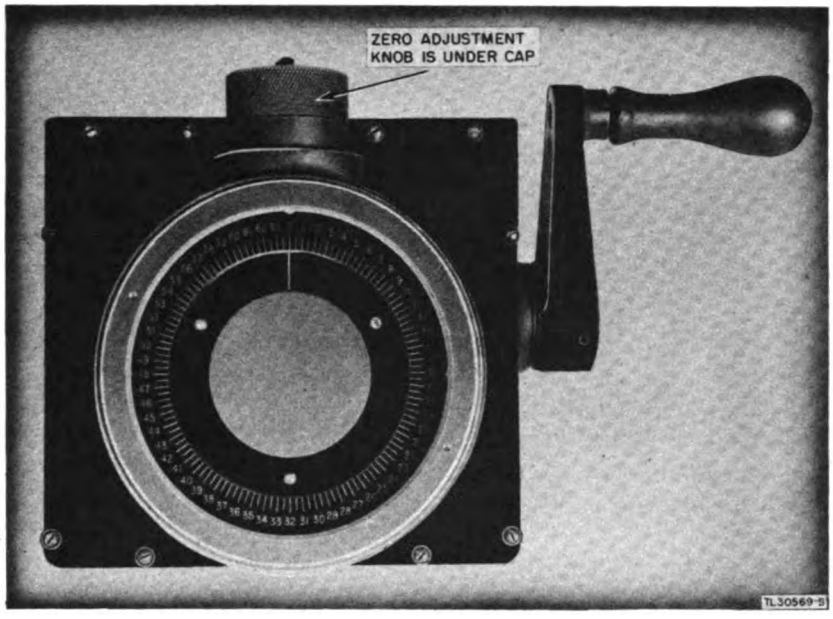

Figure 18—Remote Antenna Drive RM-55, front view.

(*4*) Two short lengths of coaxial cable, Cord CG-242/U (22 inches long) and Cord CG-245/U (17 inches long) are supplied but not used with Radio Equipment RC-384.

e. Miscellaneous. The following miscellaneous items are supplied with Antenna Tower Kit AS-134/TPX.

(*1*) An a-c plug, used to alter one end of Cord CX-596/TPX to fit the convenience outlet on Rack FM-93.

(*2*) Two flexible shaft connectors: the straig connector joins the two lengths of flexible ca together, and the right-angle connector preve a sharp bend where the flexible cable attaches the tower worm shaft.

(*3*) Miscellaneous parts and tools as shown figure 25.

(*4*) Three Connectors UG-21/U, one Connector M-358, and one Adapter M-359, nc of which is used with Radio Equipment RC-3,

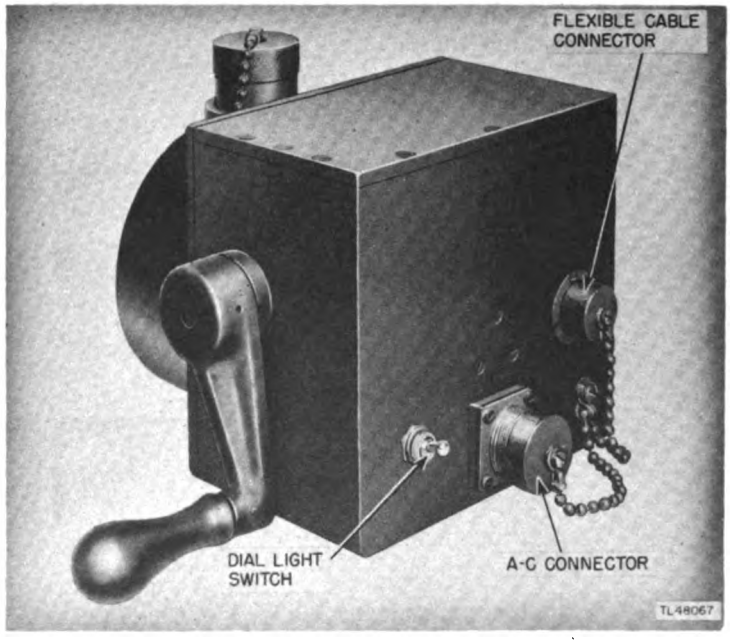

Figure 19—Remote Antenna Drive RM-55, rear view.

Figure 20—Signal Generator I-222-A.

22. TEST EQUIPMENT.

The test equipment supplied with Radio Equipment RC-384 includes Signal Generator I-222-A, a test antenna assembly, and test cables.

a. Signal Generator I-222-A (fig. 20).

(*1*) This unit is a combination signal generator and heterodyne wavemeter; it is used to tune the transmitter and receiver to the operating frequency. A 5-megacycle crystal oscillator is incorporated as a frequency-standard calibrator. The entire unit is housed in a portable metal cabinet and operates from a 115-volt, 60-cycle line. A set of headphones with a 5-foot phone cord and jack is furnished with the equipment for use in monitoring signals. TM 11-1082 gives complete information on Signal Generator I-222-A.

(*2*) The wavemeter incorporated in the signal generator is used to check the transmitter frequency (par. 37b). The output of the transmitter is picked up by the antenna which is located on top of the signal generator. The strength of the received signal is controlled by adjusting the length of the antenna. The received signal frequency is then checked against a calibrated oscillator.

(*3*) The receiver is tuned by feeding it a calibrated signal and adjusting the receiver tuning controls for maximum output (par. 37c).

(*4*) The vernier scale mounted above the dial on Signal Generator I-222-A makes it possible to read dial settings accurately to tenths of the dial scale divisions. The zero end of the vernier scale is indicated by an arrowhead which corresponds to the line engraved in the panel above an ordinary dial. Figure 21 shows a typical vernier dial. If it is desired to set the dial to approximately 25½,

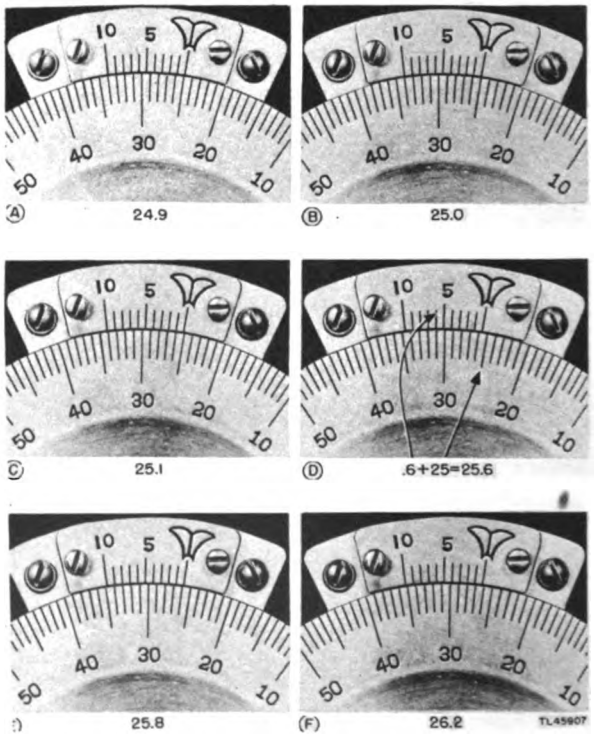

Figure 21—Reading a vernier dial.

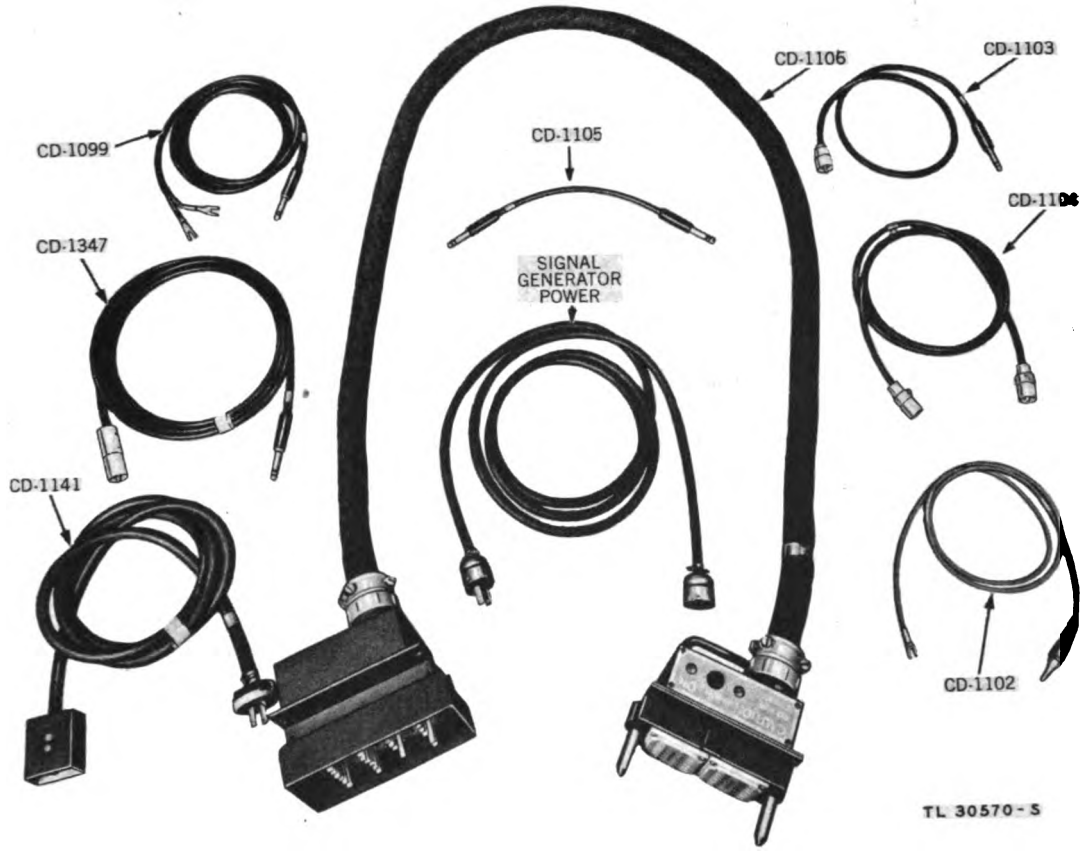

Figure 22—Radio Equipment RC-384, test cables.

for example, only the arrow at the zero end of the vernier scale is used. Figure 21-D shows the arrow pointing to approximately 25½ on the dial scale. If it is desired, however, to determine more exactly where the dial in figure 21-D is set, find the mark on the vernier scale which lines up exactly with *any line* on the dial scale. Line 6 on the vernier scale is directly opposite an engraving on the dial scale. No other engraving on the vernier scale lines up exactly with any engraving on the dial scale. The dial setting in figure 21-D is therefore 25.6. The only time two engravings on the vernier scale both line up with marks on the dial scale are for settings with zero tenths, as 15.0, 25.0, 92.0, etc. In figure 21-B the vernier arrow lines up with 25 on the dial, as would be expected for a setting of 25.0, and vernier 10 lines up with another line on the dial. Figure 21 shows four other examples of vernier dial settings to help the operator to become familiar with vernier readings.

b. Test Cables. Thirteen test cables (fig. 22) are provided with Radio Equipment RC-384. Table IV gives the details of these cables.

c. Test Antenna and Dummy Antenna. This assembly is used for test purposes (fig. 23). The two antennas are used together to provide the proper antenna load when a reduced transmitter output signal is required. The T-shaped connector provides a means of coupling between the dummy and the short antennas and the equipment.

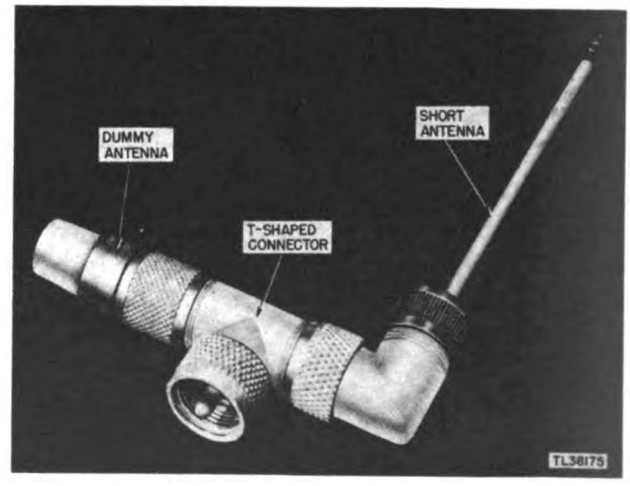

Figure 23—Dummy and test antennas with T-connector.

TABLE IV
TEST CABLES FOR RADIO EQUIPMENT RC-384

Signal Corps type No.	*Quantity*	*Terminal A*	*Terminal B*	*Type and length*	*Function*
CD-1099	2	Plug PL-55	Two spade lugs	Low C, shielded microphone cable 6 ft	General utility for trouble shooting.
CD-1102	4	Alligator clip	Spade lug	Single cond, 4 ft	General utility for trouble shooting.
CD-1103	1	Plug PL-259	Plug PL-55	Low C, shielded microphone cable, 33"	Signal Generator output to i-f input test jack on receiver chassis.
CD-1104	1	Plug PL-259	Plug PL-259	Low C, shielded microphone cable, 5 ft	Signal Generator output to receiver input.
CD-1105	1	Plug PL-55	Plug PL-55	Low C, shielded microphone cable, 1 ft	Interconnects jacks at control unit jack panel.
CD-1106	1	Special	Special	21-cond, 6 ft	Interconnects wiring-channel receptacle in rack with plug on receiver-transmitter when removed from rack.
CD-1141	1	2-prong a-c plug	Special	2-cond, 6 ft	Brings a-c power to power-supply plug when power supply is removed from rack.
CD-1347	1	Plug PL-55	Plug PL-259 with special adapter UG-176/U (Amphenol)	Coax RG-54A/U, 10 ft	Brings radar calibration pips to control unit input test jack (120).
	1	2-prong a-c plug	61-F11 (Amphenol) 2-slot a-c receptacle.	2-cond, 8 ft	A-c power to signal generator.

23. TUBE COMPLEMENTS OF INDIVIDUAL COMPONENTS.

Radio Equipment RC-384 uses a total of 49 tubes, several of which perform more than one function. Tubes for which Signal Corps type numbers have not been assigned are designated throughout this manual by the commercial number. Table V gives the tube complements of the individual components. Both spare and operating equipments are shipped with all tubes in their sockets.

24. CABLES.

A set of ten interconnecting cables complete with connectors, is furnished with Radio Equipment RC-384 (fig. 24 and table VI). These cables are labeled so that the various components can be connected for operation with the associated radar set by reference to the cabling diagram, figure 27.

25. ACCESSORIES, SPARES, AND CHESTS.

Cables, accessories, and major and minor spares come in waterproof chests. The major spares are complete components with tubes. The control unit is so designed that its outer cabinet is a transit chest. The rack is designed so that its outer case is a transit chest not only for the rack itself but also for the receiver-transmitter and the power supply. The spare Radio Receiver and Transmitter BC-1267-A and the spare Power Supply RA-105-A are each packed in a Chest CY-372/CPX. Signal Generator I-222-A is packed in Chest CY-371/CPX; a spare signal generator is not furnished. Antenna Tower Kit AS-134/TPX is packed in three transit bags and two carrying chests.

TABLE V
TUBE COMPLEMENTS

Control Unit BC-1378		*Signal Generator I-222-A*		*Radio Receiver and Transmitter BC-1267-A*			
				Transmitter		*Receiver*	
2 VT-107-A	(6V6GT)	1 VT-94	(6J5)	2 VT-94	(6J5)	1 VT-90	(6H6)
2 VT-112	(6AC7)	2 VT-116	(6SJ7)	1 VT-107-A	(6V6GT)	1 VT-215	(6E5) .
1 VT-116	(6SJ7)	1 VT-197-A	(5Y3G)	1 VT-231	(6SN7GT)	7	(6AG5)
1 VT-119	(2X2)	1 VT-202	(9002)	2	(2C26A)*	3	(6AK5)
2 VT-229	(6SL7GT)	1	(9006)	1	(3E29)	1	(6C4)
6 VT-231	(6SN7GT)			1	(9006)		
1	(5CP1)						

Power Supply RA-105-A

3 VT-119		(2X2
1 VT-126-B	-	(6X5GT)
3 VT-244		(5U4G)

*Interchangeable with type 2C26.

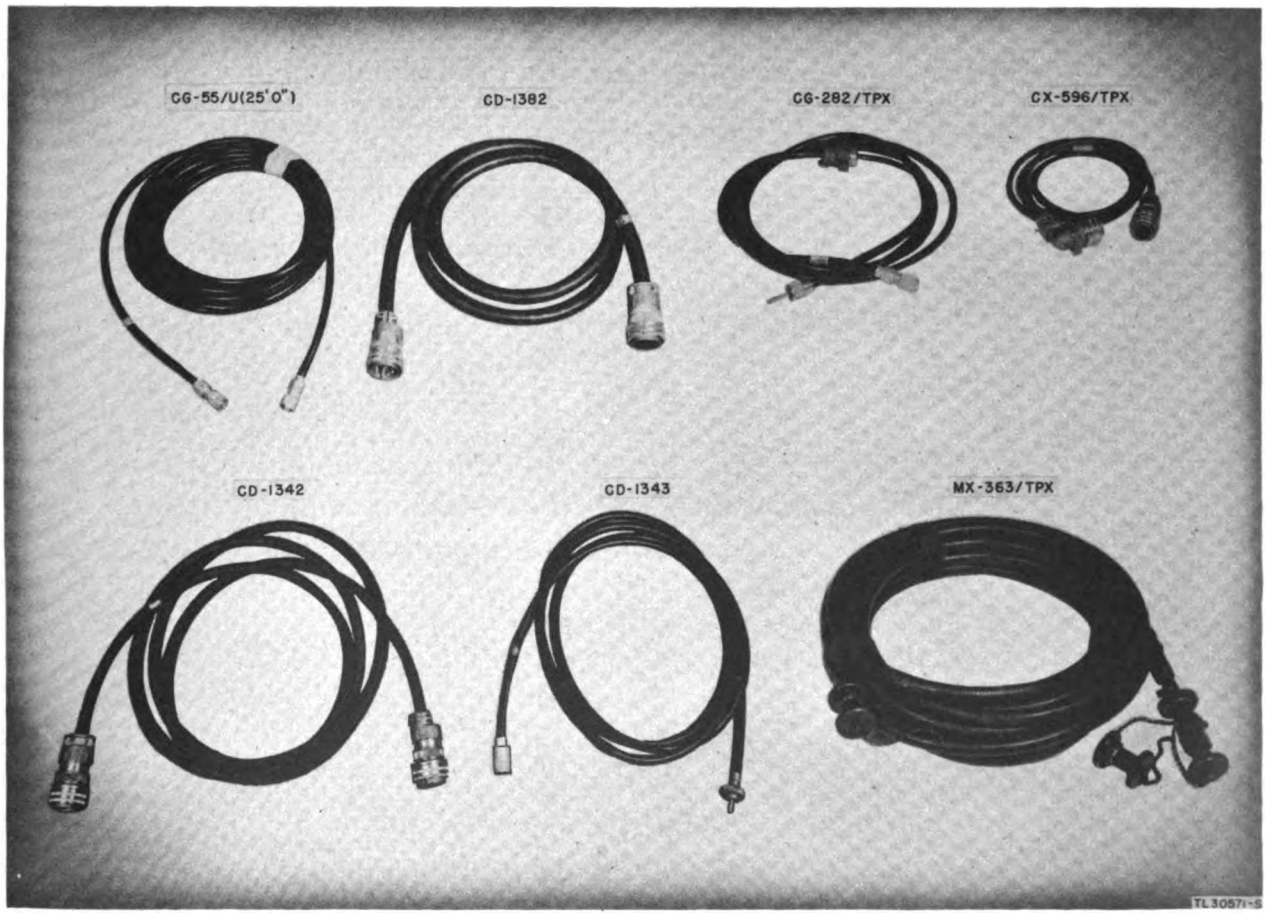

Figure 24—Radio Equipment RC-384, interconnecting cables.

TABLE VI
INTERCONNECTING CABLES FOR RADIO EQUIPMENT RC-384

Signal Corps type No.	*Quantity*	*Terminal A*	*Terminal B*	*Type and length*	*Function*
CD-1342	1	AN-3106-22-8S (to rack)	AN-3106-22-8P (to radar)	2-cond #14 stranded, 10 ft	A-c power to rack
CD-1343	2	Plug PL-259 (to radar set)	P-201-3/8 (Jones) (to control unit)	RG-8/U coaxial, 10 ft	Radar sync to transmitter-triggering circuits and 10,000-yard sweep circuits
CG-55/U (25 ft 0")	2	Connector UG-21/U (to tower)	Connector UG-21/U (a straight Adapter UG-83/U, and a right-angle M-359 are added to connect to the receiver-transmitter)	RG-8/U, coaxial, 25 ft (the two cords are joined by straight connector UG-29/U to make a 50-ft length)	R-f from tower to receiver-transmitter
CD-1382	1	AN-3106-28-8S (to control unit)	AN-3106-28-1P (to rack)	7 cond, 8-ft	Connects control unit rack
CG-282/TPX*	1	Plug UG-21/U (to antenna)	26243 (Lapp) (to rotary joint in tower)	RG-8/U coaxial, 10 ft 10"	Connects antenna to rotary joint in tower
CX-596/TPX*	1	AN-3108-18-3P** (to rack)	AN-3106-18-35 (to remote antenna drive)	2-cond rubber covered, 6 ft	A-c power to illuminate azimuth dial
MX-363/TPX*	2	Right-angle flexible-shaft connector (to tower)	Straight flexible-shaft connector (to remote antenna drive)	Flexible shaft, 25 ft (the two cables are connected by a straight mechanical connector to make a 50-ft length)	Rotates antenna from remote antenna drive box

*Comes with Antenna Tower Kit AS-134/TPX; this kit contains two other cables which are not used with Radio Equipment RC-384. See paragraph 21d(4).

**See paragraph 32b.

CHAPTER 2

INSTALLATION

SECTION I
SETTING UP

26. GENERAL.

Radio Set SCR-784 is contained in Trailer K-84 which is pulled by a cargo truck. Radio Equipment RC-384 is packed in the cargo truck for transit. When an operating site is selected, the IFF equipment is removed from the cargo truck which may then leave the site. Rack FM-93 is set up on the ground under the canvas shelter at the rear of Trailer K-84.

27. INSTALLATION OF ANTENNA AND TOWER.

a. Selection of Site. The tower must be installed on a level site not more than 50 feet away from the radar shelter. It should be located in a sector where it will have least interference with the operation of the radar set.

b. Assembly of Tower. After the site has been selected, assemble the tower in the following manner. The parts referred to are shown in figure 25.

(*1*) Fasten down the base with the three stakes provided.

(*2*) Starting from the corners of the base, measure out to points an equal distance apart and six lengths of the anchor driving pipe from the base. Screw in the anchors at these points. The anchors should lean in toward the base.

(*3*) Hinge the bottom section of the mast to the base with the hinge pin which is chained to

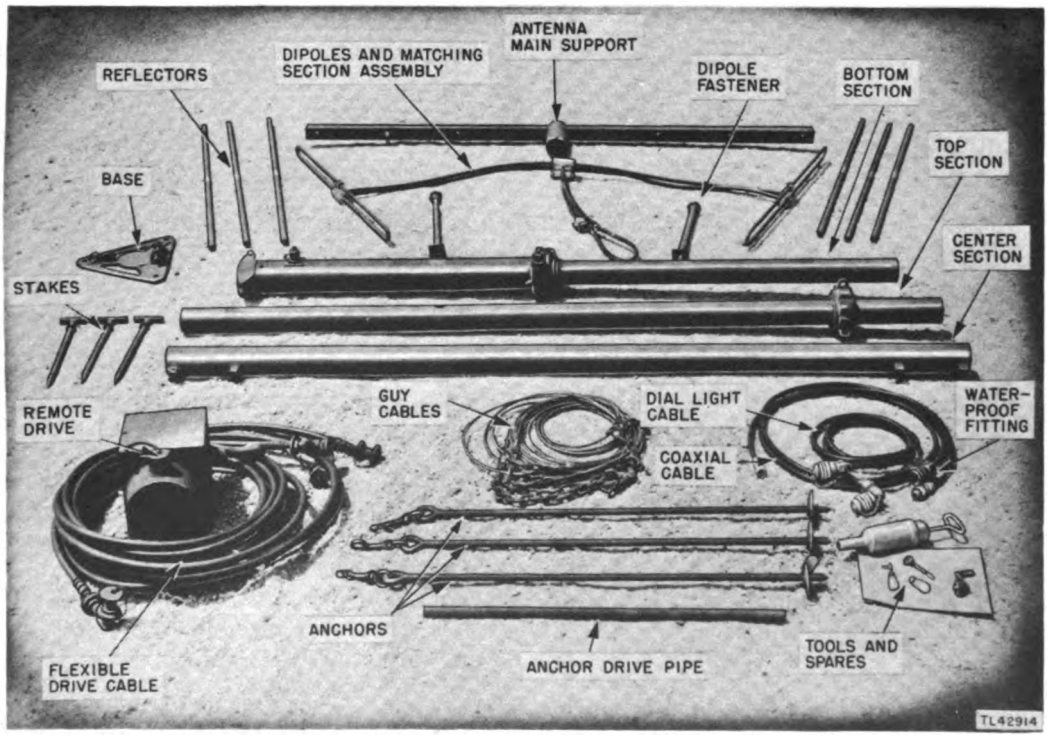

Figure 25—Antenna Tower Kit AS-134/TPX, disassembled.

the base. Lock the pin in place by turning the key in the end of the pin crosswise.

(*4*) Put the center mast section and top mast section together and tighten the clamping screws.

(*5*) Push the coaxial cable, Cord CG-282/TPX, through the hole in the top mast section until it goes through the center mast section. The end of the cable with the large connector should come out of the bottom end of the center mast section.

(*6*) Connect the coaxial cable connector to the connector at the top of the bottom mast section.

(*7*) Slip the center mast section over the end of the bottom mast section and tighten the clamping screws.

(*8*) Screw the waterproof fitting on Cord CG-282/TPX into the hole in the top mast section.

(*9*) Raise the top end of the mast and support it on a chest or box.

c. Assembly of Antenna.

(*1*) Push the reflectors into the holes in the main support.

(*2*) Fasten the center polystyrene block to the flat plate on the center of the main support with the captive wingscrews in the block. The matching section should hang downward.

(*3*) Fasten the dipoles to the main support with the dipole fasteners. Each fastener consists of a long handscrew inserted through a metal sleeve.

(*4*) Install the antenna on the top mast section as shown in figure 19. Tighten the captive handscrew.

(*5*) Connect Cord CG-282/TPX to the connector on the matching section.

d. Tower Erection.

(*1*) Snap the guy cables to the three rings on the floating-type bearing on the top mast section.

(*2*) Fasten two guy cables to the anchors on either side of the tower.

(*3*) Raise the tower to the vertical position and fasten the remaining guy cable to its anchor.

(*4*) Tighten the mast at the base with the hinged bolt and wingnut.

(*5*) Extend the guy cable turnbuckles to their full length and take up the slack by moving the snaps up on the chains. Then tighten the turnbuckles until all guy cables have equal tension but are not tight enough to cause the bearing to bind.

28. INSTALLATION OF RACK FM-93.

a. Remove Rack FM-93 from the cargo truck and place it in the position shown in figure 1. Four men are needed to handle the rack.

b. Remove the waterproof front cover of the rack.

c. Bolt the antenna-drive mounting bracket to the rack (fig. 26).

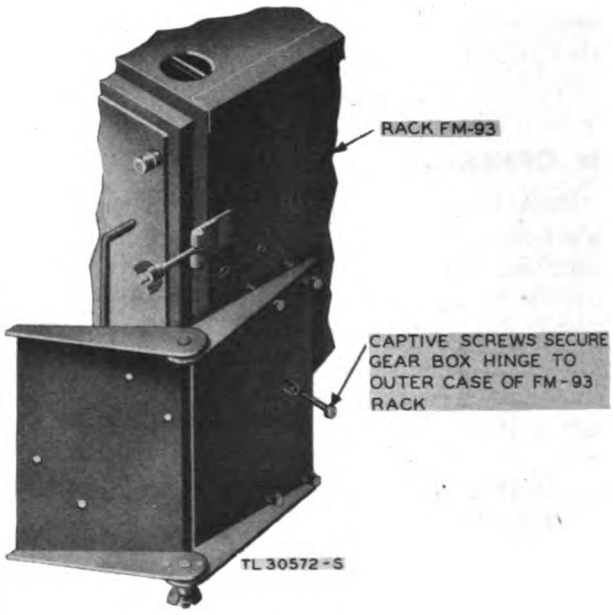

Figure 26—Installation of mounting bracket for Remote Antenna Drive RM-55.

29. INSTALLATION OF REMOTE ANTENNA DRIVE RM-55.

a. Bolt the remote antenna drive box to the mounting bracket (fig. 26) and adjust its position by means of the thumb nut, guide pins, and guide holes at the hinge of the bracket assembly.

b. Using the straight coupling, join the two 25-foot lengths of flexible drive cable together to make one 50-foot drive cable.

c. Connect one end of the 50-foot drive cable to the fitting on the bottom of the remote antenna drive box.

d. Using the right-angle coupling, connect the other end of the 50-foot drive cable to the worm gear drive on the tower.

30. CHANGING THE AZIMUTH DIAL.

The azimuth dial used with Radio Equipment

RC-384 is calibrated in mils. A dial calibrated in degrees is also furnished with the antenna kit. If the wrong dial was installed at the factory, replace it as follows:

a. Remove the four screws which hold the inner ring to the front of the unit. Take out the ring and the glass.

b. Remove the dial-light bezel that is in front of the azimuth dial.

c. Remove the four screws from the outer edge of the calibrated dial and remove the dial. Put the other dial in its place and replace the screws.

d. Replace the dial-light bezel.

e. Replace the glass and ring removed in subparagraph a above.

31. INSTALLATION OF CONTROL UNIT BC-1378.

a. Place the control unit on top of the rack (fig. 8).

b. Remove the waterproof cover from each end.

32. CABLING (fig. 27).

a. Snap all IFF power switches to the OFF position. These switches are:

(*1*) FILAMENT VOLTAGE and PLATE VOLTAGE switches on the power supply.

(*2*) The ON-OFF switch on the control unit.

(*3*) The azimuth dial-light switch on the bottom of the remote antenna drive box.

b. Connect one end of Cord CX-596/TPX to the dial-light connector on the bottom of the remote control antenna box. Remove the screw-type fitting from the other end and replace it with the two-prong a-c cap plug (par. 21e). Insert this plug into the convenience outlet at the bottom of Rack FM-93.

c. Connect Cord CD-1382 between the large connector in the center back of the control unit and the large receptacle on the front bottom of the rack.

d. Connect one end of a Cord CG-55/U (25 ft 0 in.) to the r-f connector at the upper end of the bottom tower section. Join the other end of the cord to the second Cord CG-55/U (25 ft 0 in.) with a straight Connector UG-29/U to provide a 50-foot total length of r-f cable. Connect a straight Adapter UG-83/U to the free end of the second cord. Connect a right-angle Adapter M-359 to the straight adapter. Connect the right-angle

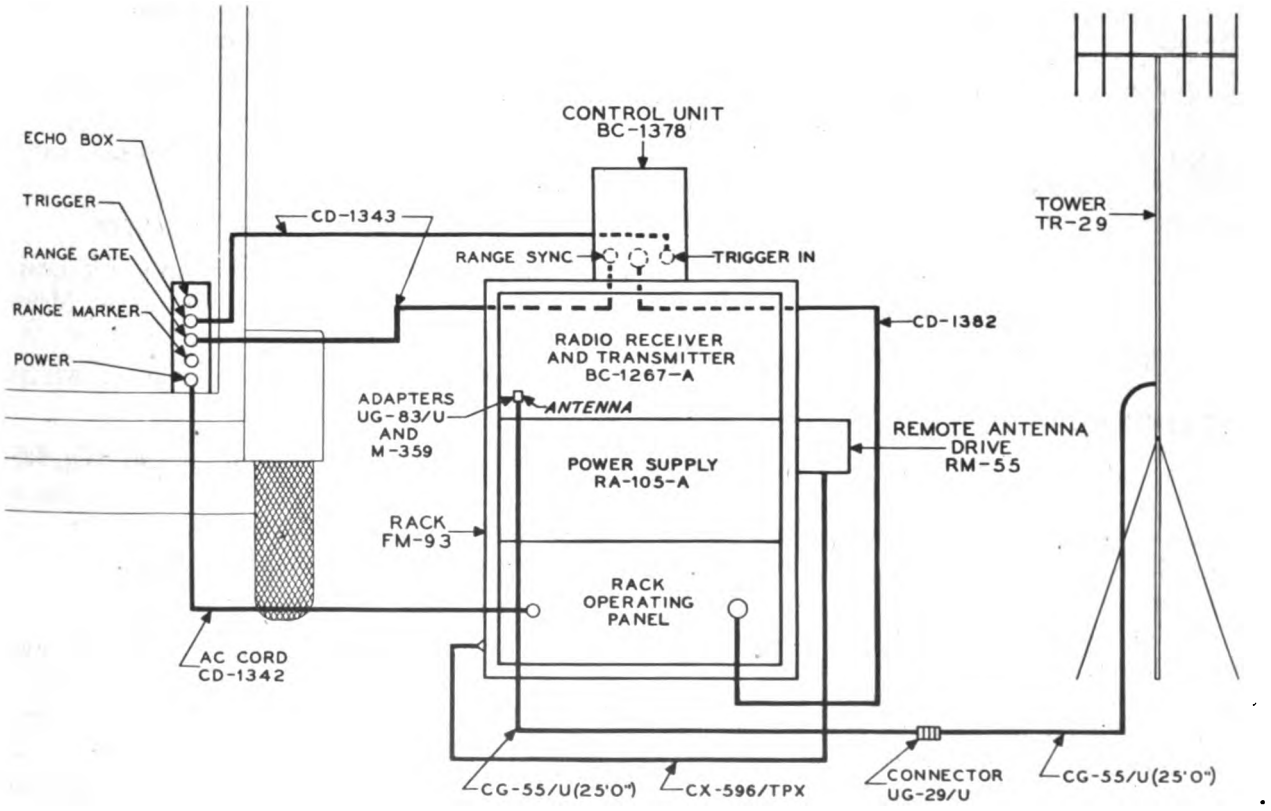

Figure 27—Radio Equipment RC-384, cabling diagram.

adapter to the ANTENNA receptacle in the lower left corner of Receiver and Transmitter BC-1267-A.

e. A bracket with five connectors is provided at the lower right-hand corner of the radar equipment. The top connector is not used by the IFF equipment. Reading from top to bottom, the remaining four connectors are named and used as follows:

(*1*) TRIGGER. This connector provides the radar synchronizing pips which time the IFF transmitter. Connect the Plug PL-259 end of a Cord CD-1343 to TRIGGER on the radar set. Connect the Jones 201-3/8 plug at the other end to the TRIGGER IN receptacle at the back end of Control Unit BC-1378.

(*2*) RANGE GATE. This connector provides the radar synchronizing pips which determine the start of the IFF sweep in the 10 K YD. position of the range switch. Connect the Plug PL-259 end of the second Cord CD-1343 to RANGE GATE on the radar set. Connect the other end of the cord to the RANGE SYNC receptacle at the back end of Control Unit BC-1378.

(*3*) RANGE MARKERS. This connector provides the pips used in calibrating the 75,000-yard IFF sweep. One end of Cord CD-1347 is connected to RANGE MARKERS during the calibration procedure (par. 35c).

(*4*) POWER. This connector provides all power to the IFF equipment at 115 volts, 60 cycles. Connect one end of Cord CD-1342 to POWER on the radar set. Connect the other end to the two-pole connector on the front bottom of the rack.

SECTION II
PREPARATION FOR USE

33. GENERAL.

a. The adjustments described in this section are to be distinguished from the normal starting procedure given in chapter 3. This section describes the adjustments that must be made after installation. It includes setting up and adjusting the display patterns, adjusting the transmitter, tuning the transmitter and receiver to the frequency specified by the person in charge, and orienting the antenna for correct azimuth readings. When these adjustments have been made, the normal starting procedure (ch. 3) is used to put the set into operation.

b. The adjustments described in this section must be made after the equipment is moved and relocated or as often as necessary to keep the equipment in correct operating condition. To make these adjustments it is necessary that the radar equipment be operating; the control unit must receive both the transmitter synchronizing pulses and the 10,000-yard sweep synchronizing pulses from the radar set.

c. A short knurled-handle metal screwdriver is mounted in the right side of the receiver-transmitter panel above the receiver dials. Unscrew it from its mounting and use it for all screwdriver adjustments (except CALIB.) when an ordinary screwdriver is not available. A special screwdriver (fig. 30) is provided for the CALIB. adjustments.

d. Perform all adjustments in the order in which they appear, starting with paragraph 34.

34. PRELIMINARY ADJUSTMENTS.

a. General.

(*1*) *Power Supply* PLATE VOLTAGE *Switch:* Snap to OFF.

(*2*) *Control Unit* ON-OFF *Switch:* Snap to OFF.

(*3*) *Power Supply* FILAMENT VOLTAGE *Switch:* Snap to ON.

(*4*) *Signal Generator:* Plug power cord into the convenience outlet on the rack.

(*5*) *Signal Generator* ON-OFF *Switch:* Snap to ON.

(*6*) *Signal Generator* TEST-CRYSTAL *Switch:* Turn to CRYSTAL.

(*7*) *Rack* BLOWERS *Switch:* Snap to ON.

(*8*) *Rack* HEATERS *Switch:* Snap to ON. Leave at ON for 30 minutes. Then snap to OFF. Meanwhile, continue as below.

(*9*) *Back of Control Unit,* PEDESTAL WIDTH: Turn all the way up (clockwise).

b. Control Unit, Front Panel Controls (fig. 28).

(*1*) 75 K YD. CENT.: Turn halfway up, that is, to the middle of its rotational range.

(*2*) 10 K YD. CENT.: Turn halfway up.

(*3*) VERT. CENT.: Turn halfway up.

(*4*) 75 K YD. GAIN: Turn one-third of the way up from the extreme counterclockwise position.

(*5*) 10 K YD. GAIN: Turn one-third of the way up.

(*6*) CALIB.: Turn both the shaft and the bushing all the way up.

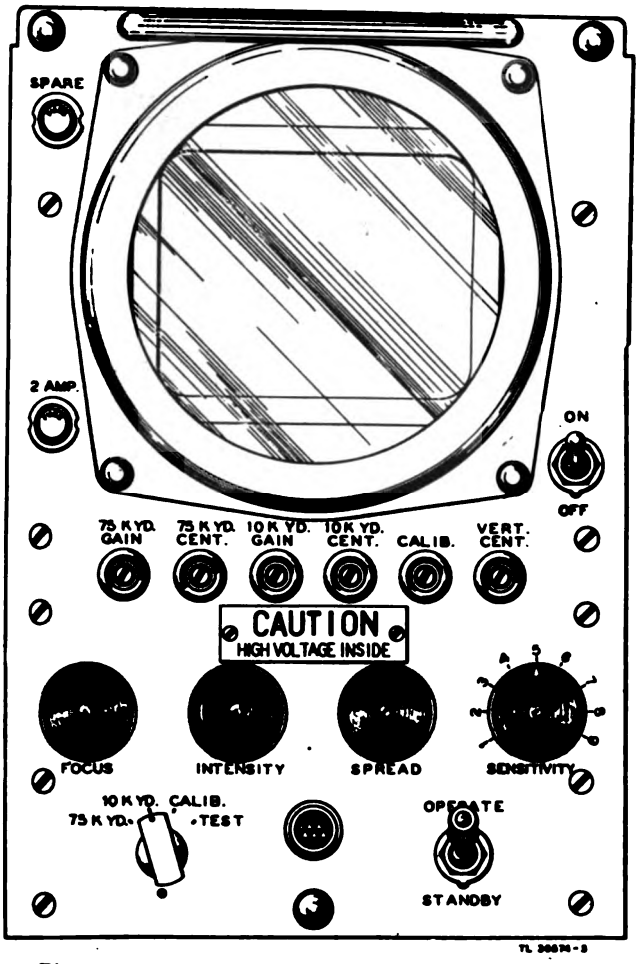

Figure 28—Control Unit BC-1378, front panel controls.

(*7*) SPREAD: Turn all the way down (counterclockwise).

(*8*) SENSITIVITY: Turn all the way down.

Figure 30—Special screwdriver for CALIB. *controls.*

c. Receiver-Transmitter Adjustments (fig. 31).

(*1*) ANTENNA *Connector:* Remove the r-f cable with its fittings. Attach the T-shaped fitting containing the test and dummy antennas (fig. 32).

(*2*) WIDTH: Turn halfway up.

(*3*) POWER MEASUREMENT: Turn all the way down.

(*4*) BIAS: Turn all the way down.

(*5*) POWER OUTPUT: Turn all the way up.

(*6*) LIGHTS: Turn to position which illuminates the meter and dials satisfactorily.

(*7*) CALIBRATION CHART: A small, rectangular plate is hinged to the left side of the panel below the transmitter dial. It is held against the panel by a knurled captive screw. Loosen the knurled screw and pull the plate down. A calibration chart is screwed to the inside of the plate. This chart gives the transmitter and receiver dial settings for the IFF frequencies.

(*8*) PLATE: Turn until the transmitter dial is set to the position corresponding to the desired frequency. This position is obtained from the calibration chart.

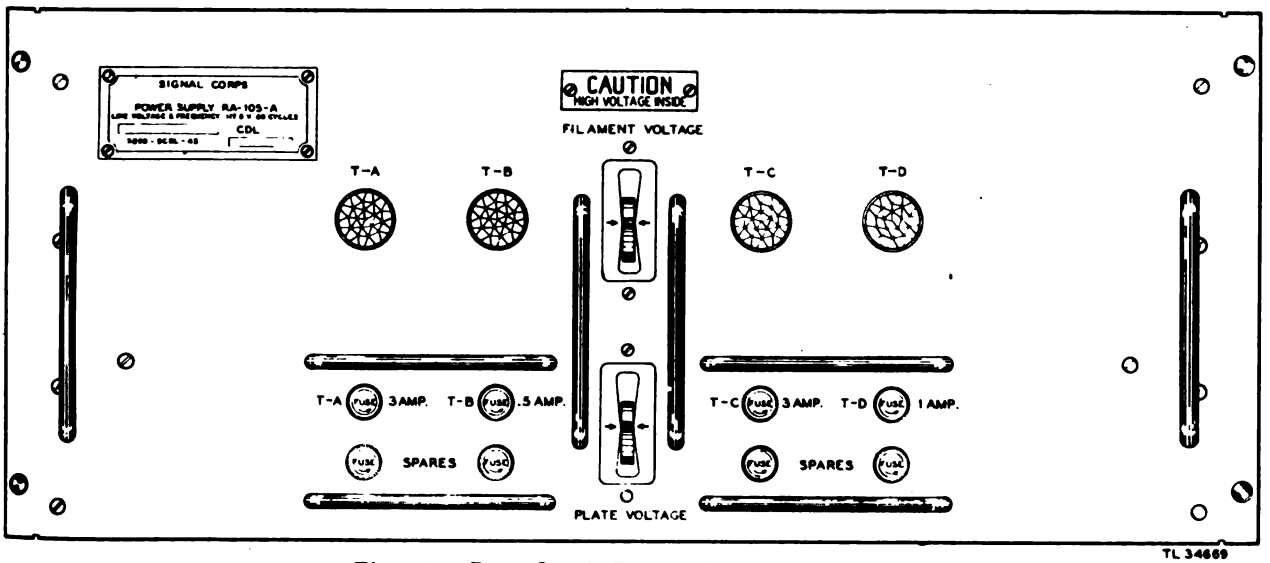

Figure 29—Power Supply RA-105-A, front panel controls.

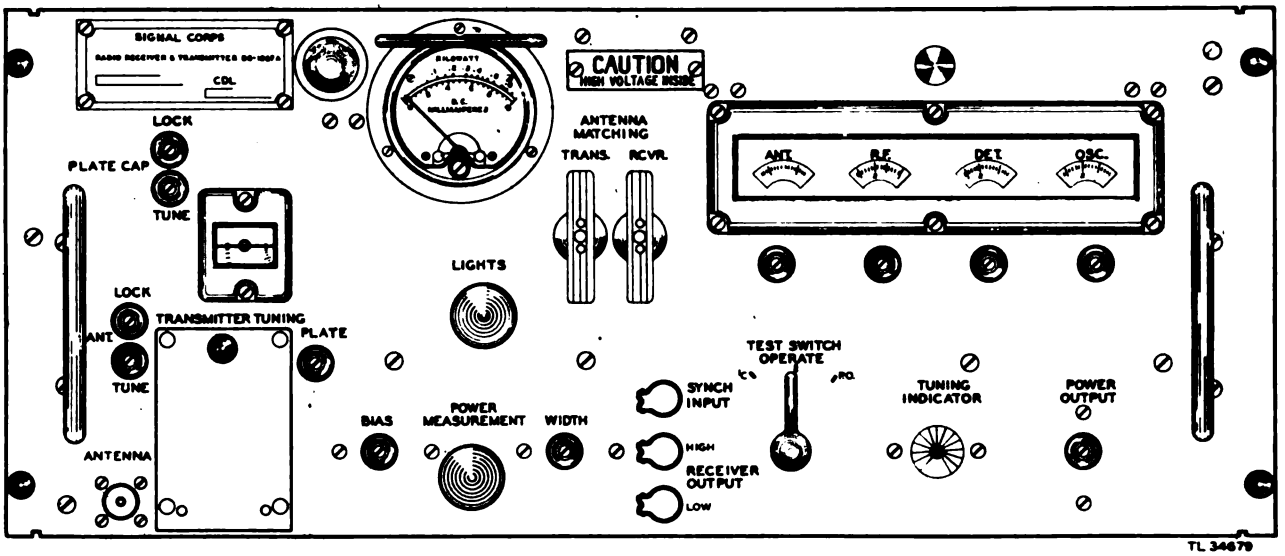

Figure 31—Radio Receiver and Transmitter BC-1267-A, front panel controls.

(*9*) OSC., DET., R.F., *and* ANT.: From the calibration chart, obtain the receiver setting corresponding to the desired frequency. Turn all four receiver dials to this setting.

(*10*) ANTENNA MATCHING: Pull handles out until rods are engaged. Then set to positions corresponding to desired frequency. Zero on the rods corresponds to the low end of the IFF frequency band, and 7.5 corresponds to the high end. For example, if the desired frequency is one-third of the way from the low-frequency end of the IFF band, set both rods to 2.5.

35. CONTROL UNIT ADJUSTMENTS.

a. Sweep Line.

(*1*) *Power Supply* FILAMENT VOLTAGE *Switch:* Should be at ON.

(*2*) *Power Supply* PLATE VOLTAGE *Switch:* Snap to ON. It is safe to apply plate voltage only if it is known that 45 seconds have elapsed since applying the filament voltage.

(*3*) STANDBY-OPERATE: Snap to STANDBY.

(*4*) *Range Switch:* Turn to 75 K YD.

(*5*) ON-OFF *Switch:* Snap to ON.

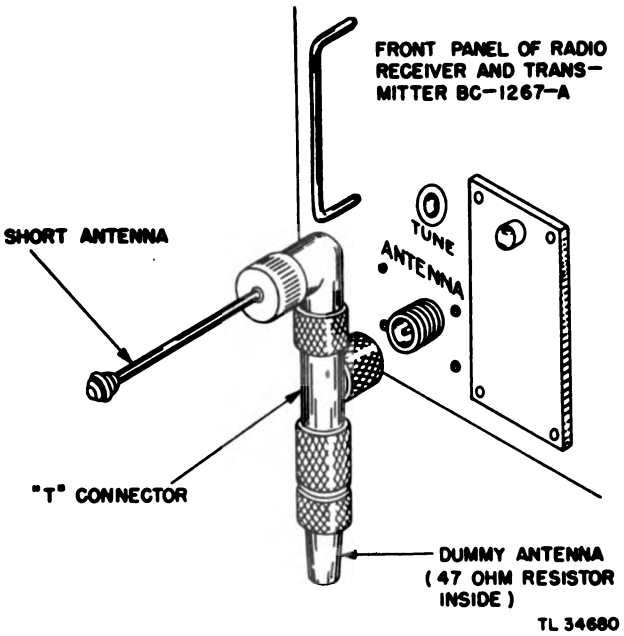

Figure 32—Test and dummy antennas installed.

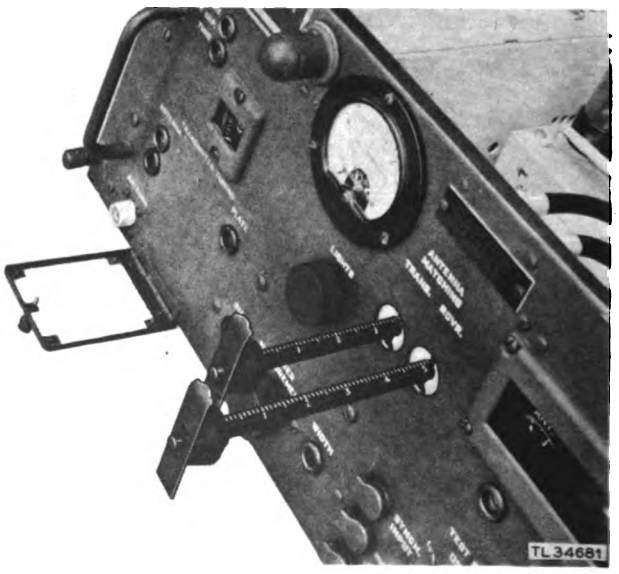

Figure 33—Adjusting rods of antenna-matching section.

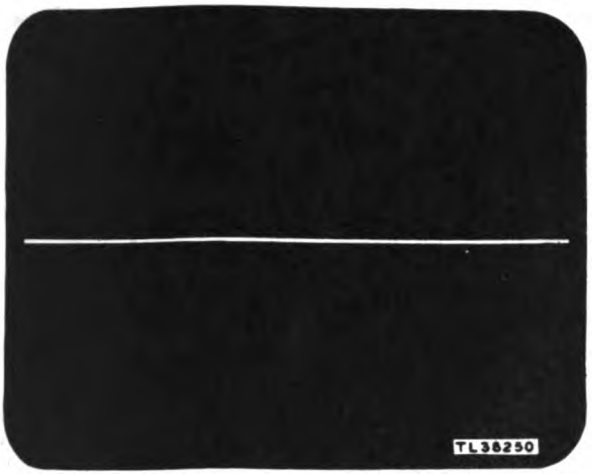

Figure 34—Sweep line.

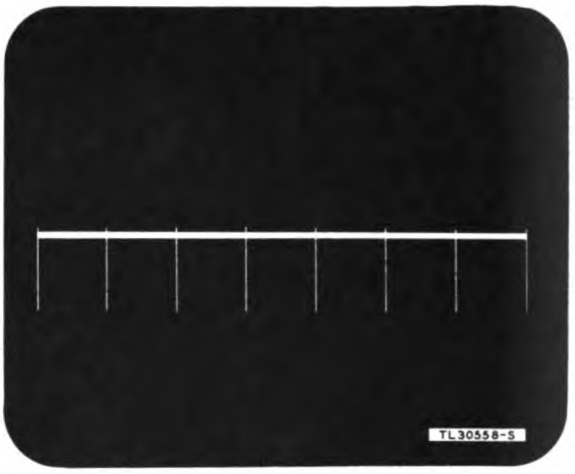

Figure 36—Division pattern, ratio 8:1.

(*6*) INTENSITY: When the sweep appears, adjust until a visible, but not bright, line is obtained. A sweep which is too bright damages the screen (see note below).

(*7*) FOCUS: Adjust until the sweep line (fig 34) is sharply defined (see note below).

NOTE: INTENSITY and FOCUS controls are interrelated. Steps (6) and (7) above must be performed together to obtain a clear sweep line. It may be necessary to readjust VERT. CENT., 75 K YD. CENT., and 75 K YD. GAIN to position the line as in figure 34.

b. Division Adjustment. Adjust the counting action of the dividing circuit as follows:

(*1*) STANDBY-OPERATE: Should be at STANDBY.

(*2*) *Range Switch:* Turn to TEST.

(*3*) INTENSITY: Turn up until sweep reappears.

(*4*) *75* K YD. CENT. *and 75* K YD. GAIN: Adjust until sweep is centered as in figure 34.

(*5*) *Side Panel:* Remove the plate covering the test jacks and the DIVISION control (fig. 35). Plug Cord CD-1105 between jack 120 and jack 121-6.

(*6*) DIVISION: Adjust until eight stationary pips appear as shown in figure 35. It may be necessary to readjust 75 K YD. CENT. and 75 K YD. GAIN to keep the pattern on the screen during the DIVISION adjustment.

NOTE: If a radar set other than Radio Set SCR-784 is used, see appendix I.

(*7*) INTENSITY: Turn down until pattern disappears.

(*8*) *Test Jacks:* Remove Cord CD-1105.

(*9*) STANDBY-OPERATE: Snap to OPERATE.

(*10*) *Receiver-transmitter* TEST SWITCH: Hold in Ic position and note the reading on the lower scale of the transmitter meter. This is the correct reading for the division adjustment. Release TEST SWITCH.

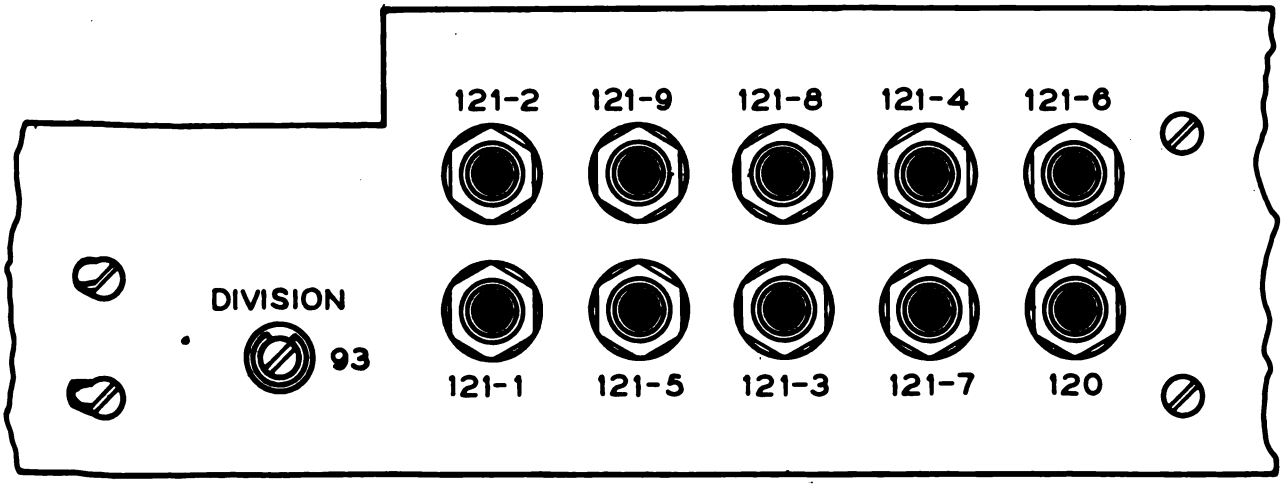

Figure 35—Control Unit BC-1378, side panel.

(*11*) *Range Switch:* Turn to 75 K YD.

(*12*) TEST SWITCH: Hold in IC position and again note the meter reading. If it has changed, readjust DIVISION until the correct reading is obtained.

(*13*) DIVISION: Hold the TEST SWITCH in IC position, observe the meter, and slowly turn DIVISION counterclockwise until the meter needle jumps to a higher value. Then slowly turn DIVISION clockwise until the meter needle jumps, first to the correct value, and then to a lower value. Repeat a few times to get the feel of how much rotation is necessary to move the needle between the two wrong values. Then set DIVISION to the middle of this rotation.

(*14*) STANDBY-OPERATE: Snap to STANDBY.

(*15*) INTENSITY: Adjust until sweep line is plainly visible but not bright.

(*16*) *75* K YD. CENT. *and 75* K YD. GAIN: Adjust until sweep is centered as in figure 34.

c. 75 K YD. Calibration. Adjust the duration of the 75,000-yard sweep as follows:

(*1*) *Range Switch:* Should be at 75 K YD.

(*2*) STANDBY-OPERATE: Should be at STANDBY.

(*3*) *Cord CD-1347:* Insert phone-plug end into jack 120 on side panel of control unit. Connect other end to the RANGE MARKERS pip receptacle on radar set (fig. 27).

(*4*) CALIB. *Shaft:* Adjust for pattern on control unit screen shown in figure 37. The positive (upward) pulses are 10,000 yards apart, and therefore the 75,000-yard sweep line should be one-half a space longer than the seven 10,000-yard spaces between the positive pulses.

(*5*) *Cord CD-1347:* Remove the phone plug from jack 120.

(*6*) *75* K YD. CENT. *and 75* K YD. GAIN: Adjust until sweep is centered as in figure 34.

(*7*) *Side Panel of Control Unit:* Replace the waterproof cover.

d. PEDESTAL WIDTH Adjustment. Two men are required to adjust the duration of the sweep-brightening pulse. One man observes the control unit screen and instructs the second man who turns the PEDESTAL WIDTH control on the back of the control unit.

(*1*) *Range Switch:* Should be at 75 K YD.

(*2*) STANDBY-OPERATE: Should be at STANDBY.

(*3*) PEDESTAL WIDTH *on Back Panel of Control Unit:*

(*a*) Slowly turn counterclockwise until told that the sweep line is beginning to shorten from the right-hand end. Continue turning counterclockwise until told that ⅛ inch is clipped from the end of the line.

(*b*) Slowly turn the control clockwise until told that the ⅛ inch of length is restored to the line; carefully note the amount of rotation necessary.

(*c*) Continue with the same amount of clockwise rotation from this point; that is, turn the control clockwise enough to brighten an imaginary sweep which is ⅛ inch longer than the actual sweep.

e. 10 K YD. Calibration. Adjust the duration of the 10,000-yard sweep as follows:

(*1*) *Range Switch:* Turn to CALIB.

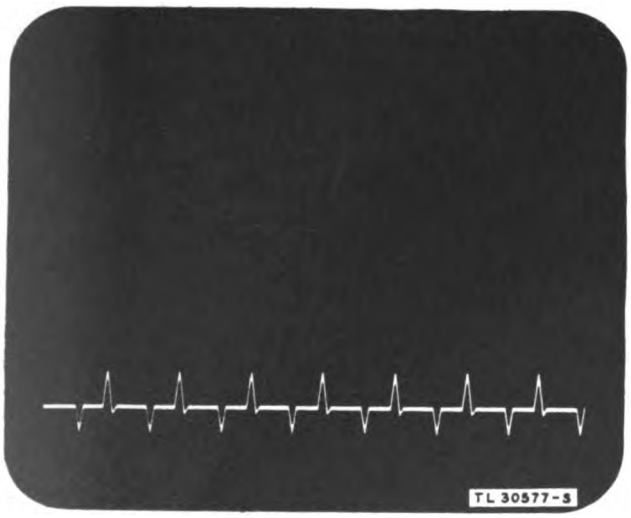

Figure 37—Calibration pattern, 75 K YD.

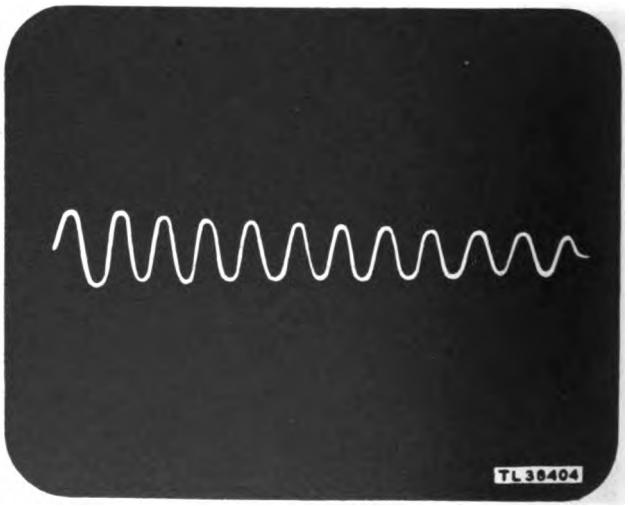

Figure 38—Calibration pattern, 10 K YD.

(*2*) STANDBY-OPERATE: Should be at STANDBY.

(*3*) CALIB. *Bushing:* Adjust for pattern on control unit screen (fig. 38) showing 12 complete wave cycles. It may be necessary to readjust 10 K YD. CENT. and 10 K YD. GAIN to keep the pattern on the screen.

(*4*) *Range Switch:* Turn to 10 K YD.

(*5*) *10* K YD. CENT. *and 10* K YD. GAIN: Adjust until sweep is centered as in figure 34.

f. Vertical Positioning. Adjust VERT. CENT. until the sweep line is ½ inch above the bottom of the screen (fig. 39). The control unit is now ready for operation.

36. TRANSMITTER ADJUSTMENTS.

a. Modulator Cathode Current.

(*1*) *Control Unit* STANDBY-OPERATE *Switch:* Should be at STANDBY.

(*2*) TEST SWITCH: Hold at Ic.

(*3*) BIAS: Adjust until lower scale of meter on transmitter panel reads more than 0 but less than 2 milliamperes.

(*4*) STANDBY-OPERATE: Snap to OPERATE.

(*5*) *Meter Reading:* Should be between 3.5 and 7.5 milliamperes.

(*6*) TEST SWITCH: Release the switch.

b. Antenna Tuning and Matching.

(*1*) STANDBY-OPERATE: Should be at OPERATE.

(*2*) *Range Switch:* Turn to 75 K YD.

(*3*) SENSITIVITY: Turn up until transmitter pulse appears on left end of the sweep line (fig. 40).

(*4*) TEST SWITCH: Hold at P.O.

(*5*) POWER MEASUREMENT: Adjust until transmitter pulse on control unit screen is about half screen height (fig. 40).

(*6*) ANT. TUNE: Loosen LOCK and adjust ANT. TUNE for maximum pulse height.

(*7*) ANTENNA MATCHING *Rods:* Adjust for maximum pulse height.

(*8*) TEST SWITCH: Release the switch.

c. Pulse Width.

(*1*) STANDBY-OPERATE: Should be at OPERATE.

(*2*) *Range Switch*: Turn to CALIB.

(*3*) *10* K YD. GAIN: Turn all the way up.

(*4*) *10* K YD. CENT.: Turn up until left end of pattern is about ½ inch from left edge of screen.

(*5*) *Control Unit Screen:* The calibrating waves are now spread out on the screen. Each complete wave cycle represents 5 microseconds. (A cycle is the distance from any point on a wave to the corresponding point on the next wave.)

(*6*) INTENSITY: Turn up until the screen pattern is very bright, but not bright enough to be too fuzzy.

(*7*) *Radar Range:* Request that the radar operator turn the SLEWING handwheel on the radar range indicator to bring the radar range pointer to zero yards range.

(*8*) TEST SWITCH: Hold at P.O. The envelope of the transmitter pulse will appear on the control unit screen (fig. 41).

(*9*) WIDTH: Adjust until pulse width (measured halfway up) is between 4 and 10 microseconds, that is, any width from slightly less than one wave cycle up to two wave cycles wide.

Figure 39—Sweep positioned correctly for operation.

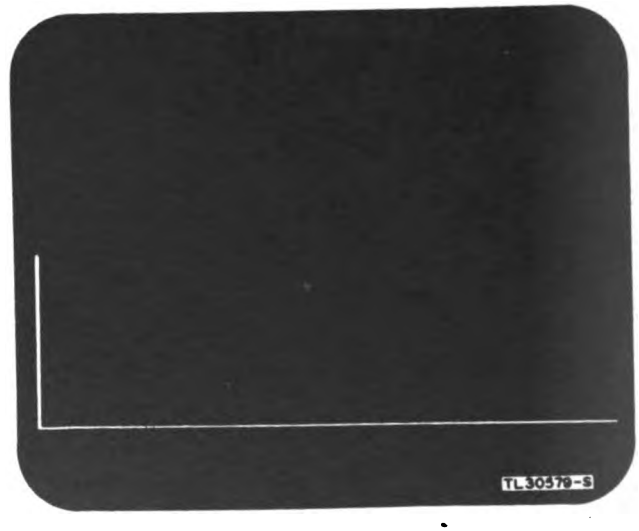

Figure 40—Transmitter pulse on display screen, 75 K YD. *range.*

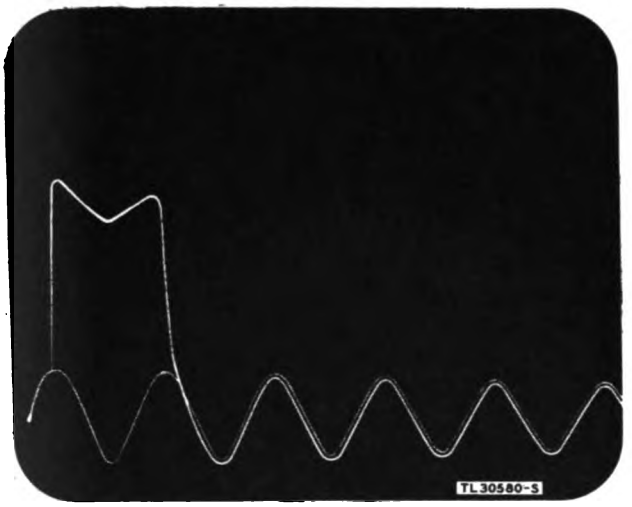

Figure 41—Transmitter pulse and CALIB. *waves.*

(*10*) TEST SWITCH: Move to Ic and read meter. Cathode current ***must be less than 7½ milliamperes.*** (Decrease pulse width if it is more. If this does not help, remove plate power and notify the person in charge.) Release TEST SWITCH.

(*11*) *Radar Range:* The radar operator can resume normal operation.

(*12*) INTENSITY: Turn down to normal brilliance.

(*13*) *Range Switch:* Turn to 10 K YD.

(*14*) STANDBY-OPERATE: Snap to STANDBY.

(*15*) 10 K YD. CENT. *and* 10 K YD. GAIN: Readjust for correctly positioned sweep line (fig. 39).

d. Power Output.

(*1*) STANDBY-OPERATE: Snap to OPERATE.

(*2*) *Range Switch:* Turn to 75 K YD.

(*3*) TEST SWITCH: Hold at P.O.

(*4*) POWER MEASUREMENT: Slowly turn clockwise until transmitter pulse (fig. 40) decreases in height and disappears; then stop turning. Read the power output on the upper scale of the meter. The reading should be about 0.25 kilowatt.

NOTE: Excessive power output reduces the azimuth selectivity of the antenna. Experience will enable the operator to determine the lowest reading possible for 75,000-yard coverage.

(*5*) TEST SWITCH: Release the switch.

(*6*) POWER OUTPUT: Turn up to increase power output, or down to decrease it.

(*7*) POWER MEASUREMENT: Turn back to give a transmitter pulse of about half screen height when TEST SWITCH is held at P.O.

37. TUNING TO OPERATING FREQUENCY.

a. Preliminary Adjustments of Signal Generator I-222-A.

(*1*) TEST-CRYSTAL: Should have been at CRYSTAL, with power on, for more than 15 minutes.

(*2*) *Headphones:* Plug into jack marked PHONES.

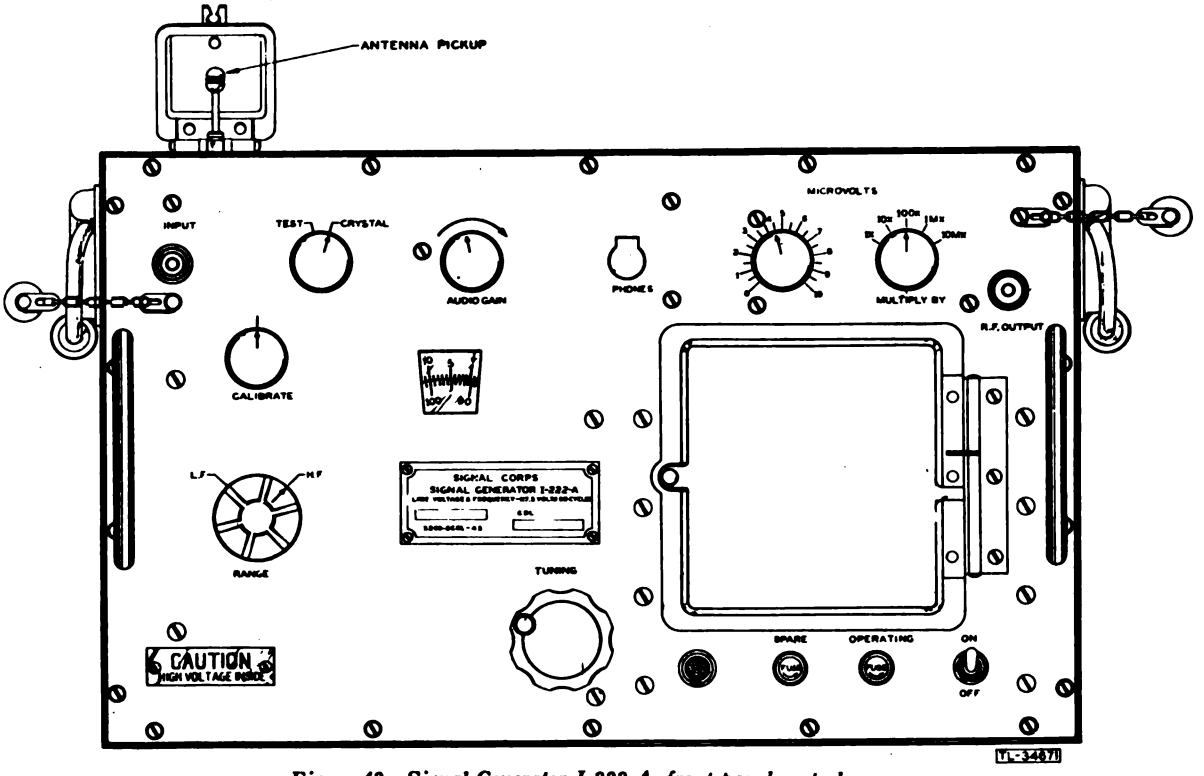

Figure 42—Signal Generator I-222-A, front panel controls.

(3) AUDIO GAIN: Adjust for comfortable headphone tone.

(4) RANGE: Turn to H.F.

(5) *Chart:* A chart, giving dial settings and calibration points for both the high and low frequency bands, will be found underneath the hinged cover on the right side of the signal generator panel. (This cover may be opened by loosening the captive locking screw.) The figures in red on the chart indicate crystal reference points for restoring the calibration of the signal generator. Select the red figure which is closest to the frequency at which the IFF equipment is to operate.

(6) TUNING: Turn dial to setting corresponding to red reference frequency closest to operating frequency. If in doubt as to how to read the vernier scale on the dial, see paragraph 22a (4).

(7) CALIBRATE: Adjust for zero beat in headphones.

(8) TEST-CRYSTAL: Turn to TEST.

(9) TUNING: Turn dial to setting corresponding to the operating frequency.

(10) *Antenna Door on Top of Case:* Snap open and pull antenna rod up as far as possible.

b. Tuning the Transmitter.

(1) STANDBY-OPERATE: Should be at OPERATE.

(2) AUDIO GAIN *on Signal Generator:* Turn all the way up.

(3) *Antenna of Signal Generator:* Push in until tone in headphones is weak.

(4) PLATE *on Receiver-transmitter:* Tune for sudden scratching noise in headphones (zero beat).

NOTE: If the 2C26 transmitter oscillator tubes have been changed, the zero beat may be obtained with the transmitter dial far from the setting specified in the calibration chart. When time permits, correct the dial tuning to agree with the chart by loosening the PLATE CAP. LOCK and readjusting PLATE CAP. This control is used to correct for variation in the tubes. It is set when the transmitter leaves the factory and need not be reset except when the tubes are changed.

(5) *Headphones:* Remove headphones.

(6) *Range Switch:* Should be at 75 K YD.

(7) TEST SWITCH: Hold at P.O.

(8) ANT. TUNE: Tune for maximum pulse height on screen (fig. 40). Tighten LOCK.

(9) ANTENNA MATCHING *Rods:* Tune for maximum pulse height. When the best positions are reached, press the buttons in the center of the rod handles and push in the handles as far as they go. Make sure that pressing the buttons disengages the rod gripping mechanism by observing that the pulse does not vary when the handles are pushed in.

(10) TEST SWITCH: Release the switch.

c. Tuning the Receiver.

(1) SENSITIVITY: Turn all the way up.

(2) STANDBY-OPERATE: Snap to STANDBY.

(3) MICROVOLTS *Controls on Signal Generator:*

(a) *Left-hand Knob:* Turn to 5.

(b) *Right-hand Knob Marked* MULTIPLY BY: Turn to 1MX.

(4) ANTENNA *Connector on Receiver-transmitter:* Remove the T-connector containing the test and dummy antennas.

(5) *Cord CD-1104:* Connect between ANTENNA connector on receiver-transmitter and R.F. OUTPUT on signal generator.

(6) OSC., DET., R.F., *and* ANT. *Dials on Receiver-transmitter:* In the order indicated, tune for maximum closure of the TUNING INDICATOR eye on the receiver-transmitter. If the eye overlaps, turn down SENSITIVITY (on the control unit).

(7) ANTENNA *Connector:* Remove Cord CD-1104, and disconnect and put away the signal generator. Attach the r-f cord from the antenna to the ANTENNA connector on the receiver transmitter. The receiver-transmitter is now ready for operation.

38. ANTENNA ORIENTATION.

To receive accurate azimuth information from the antenna system, it is necessary to orient the antenna so that the tower azimuth ring indicates the true azimuth position of an object when the signal on the display tube has maximum amplitude. The reading on the tower azimuth ring must correspond to the reading furnished by the radar equipment. The reading on the remote antenna control box azimuth dial must correspond to the reading on the tower azimuth ring. The antenna is oriented as follows:

a. The antenna can be rotated before the flexible shaft cable is connected to the tower by using the auxiliary hand crank (fig. 25) at the tower; or it can be rotated after the cable is connected from the tower to the remote drive by turning the crank on the remote drive box. Use either method to rotate the antenna until its beam and the radar antenna beam point in the same direction. This can be done most accurately by sighting through the telescope on the radar dish. The observer at the telescope of the radar antenna should instruct a helper to rotate both antennas until both dipoles

of the IFF antenna are in the line of sight of the telescope.

b. The IFF antenna and the radar antenna will be pointing in directions which are 1,600 mils (90°) apart. Note the reading of the azimuth dial on the lower mast section and turn the antenna through 1,600 mils; turn the antenna in the direction which will make it point in the same direction that the radar antenna points.

c. When the two antennas point in the same direction, loosen the screws in the ring above the azimuth dial on the bottom mast section. Rotate the ring until the azimuth reading is the same as the reading of the radar azimuth indicator. Tighten the screws.

d. Connect the remote antenna drive to the tower with the flexible shaft cable, if it is not already connected. Then remove the cap from the knob on top of the remote drive. Push in on the knob and turn until the azimuth dial reads the same as the dial on the tower. Replace the cap.

e. After operation of the equipment for some time, it is likely that a constant error will be noted between the azimuth reading required for maximum pulse height from known friendly aircraft and the azimuth reported by the radar operator for the same aircraft. For example, it may be found that maximum pulse height is always obtained when the IFF antenna is set to an azimuth 150 mils greater than that reported by the radar operator for the same aircraft. Such an error is likely because orientation by eye is inaccurate. If a known error exists, correct the orientation by resetting ***both*** dials. In the example given above, both the tower azimuth dial and the remote dial would be turned clockwise 150 mils, using the method described in subparagraphs c and d above. If the constant error is such that the IFF azimuth settings are always lower than the radar settings, turn the dials counterclockwise. Do not correct inaccuracies of less than 100 mils.

CHAPTER 3

OPERATION

SECTION I
STARTING AND STOPPING PROCEDURES

39. GENERAL.

After the preliminary adjustments have been made on Radio Equipment RC-384, the starting procedure as outlined in the following paragraph should be followed. The starting steps are arranged in logical sequence; if proper operation is not indicated as each step is performed, notify the person in charge.

40. STARTING.

Take the following steps whenever the equipment is to be put on the air.

STEP No. 1

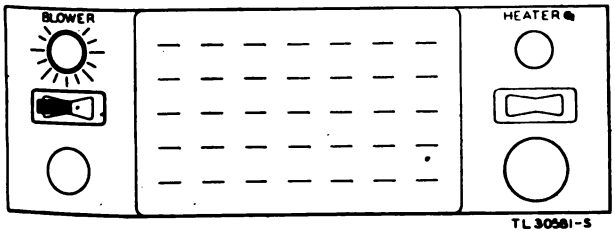

Figure 43—Starting procedure, step No. 1.

a. Place the BLOWERS switch in the ON position. The rack pilot light for the blowers should glow if the jewel is turned counterclockwise. Air intake should be apparent when the hand is placed over the louvers in the front bottom of the rack (fig. 43).

STEP No. 2

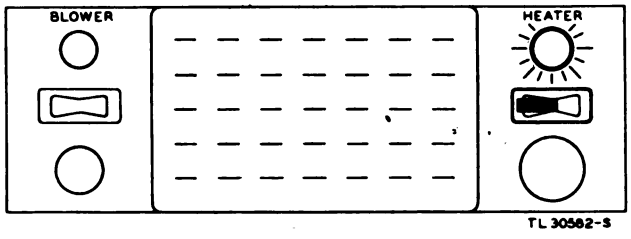

Figure 44—Starting procedure, step No. 2.

b. Place the HEATERS switch in the ON position. The rack pilot light for the heaters should glow if the jewel is turned counterclockwise (fig. 44). Leave the heaters on for 30 minutes. Then turn them off. Meanwhile, continue as below.

STEP No. 3

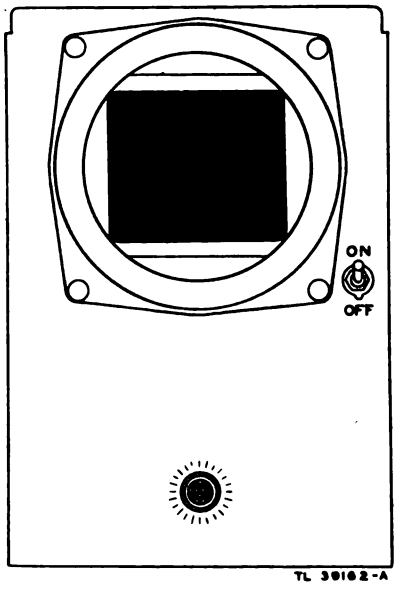

Figure 45—Starting procedure, step No. 3.

c. Snap the ON-OFF toggle switch on the control unit to the ON position. The control unit pilot light should glow if the jewel is turned clockwise (fig. 45).

STEP No. 4

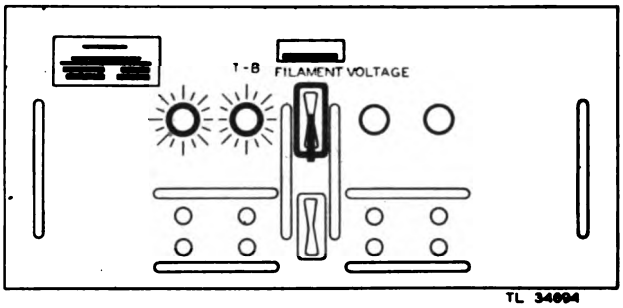

Figure 46—Starting procedure, step No. 4.

d. Place the FILAMENT VOLTAGE circuit breaker of the power supply in the ON position. Pilot lights T-A and T-B should light if the jewels are turned counterclockwise (fig. 46).

STEP No. 5

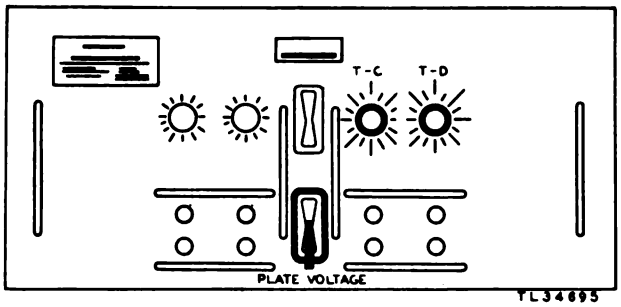

Figure 47—Starting procedure, step No. 5.

e. Wait 45 seconds; then place the PLATE VOLTAGE circuit breaker in the ON position. Pilot lights T-C and T-D should light if the jewels are turned counterclockwise (fig. 47).

STEP No. 6

f. Turn the SENSITIVITY knob on the control unit to its maximum counterclockwise position (fig. 48).

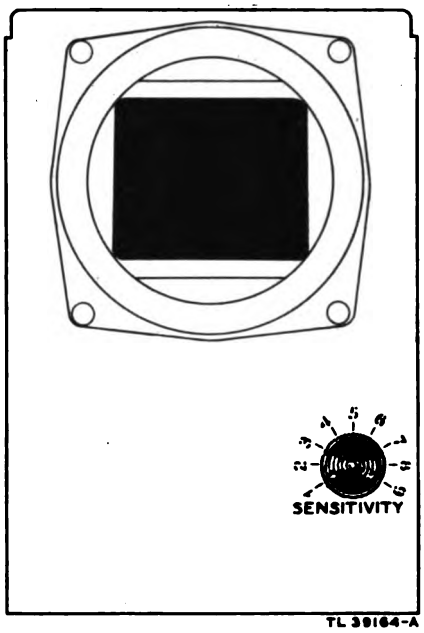

Figure 48—Starting procedure, step No. 6.

STEP No. 7

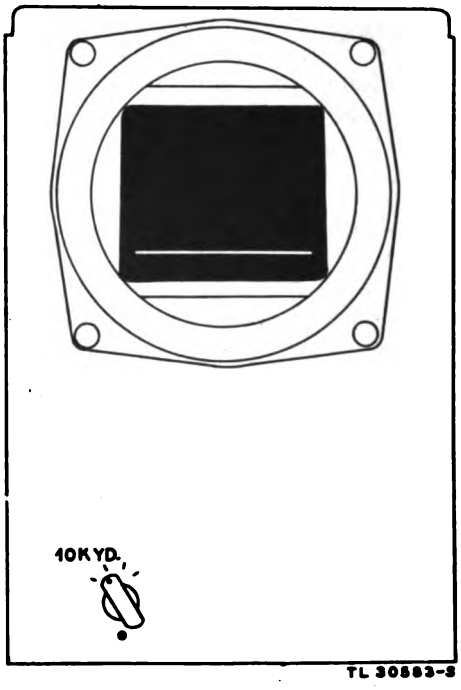

Figure 49—Starting procedure, step No. 7.

g. Turn the range switch on the control unit to the 10 K YD. position. The sweep should appear on the screen of the control unit as shown in figure 49.

STEP No. 8

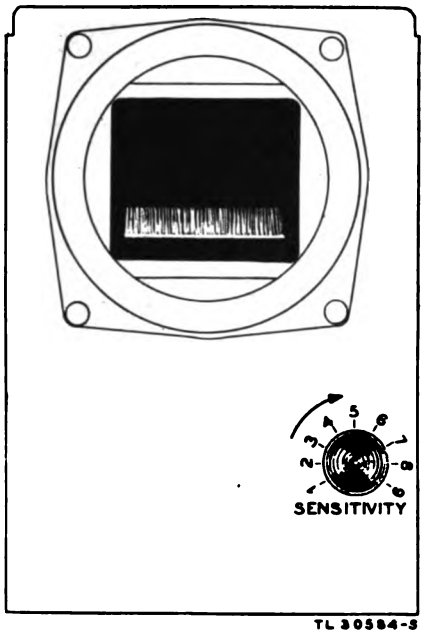

Figure 50—Starting procedure, step No. 8.

h. Turn the SENSITIVITY knob on the control unit in a clockwise direction. Noise signals (grass) should appear on the sweep line (fig. 50).

STEP No. 9

i. Turn the SENSITIVITY knob on the control unit to its maximum counterclockwise position. The grass should disappear from the sweep line.

STEP No. 10

j. Turn the range switch on the control unit to the 75 K YD. position. The sweep should appear on the screen of the control unit as shown in figure 51.

STEP No. 11

k. Turn the SENSITIVITY knob on the control unit in a clockwise direction until the grass, which should appear on the sweep line, is about 1/16 inch high.

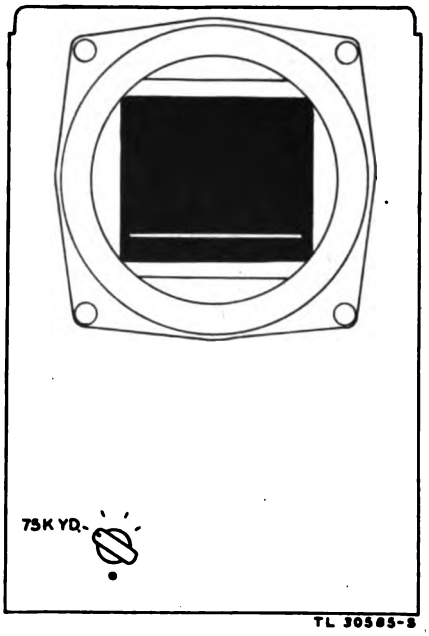

Figure 51—Starting procedure, step No. 10.

STEP No. 12

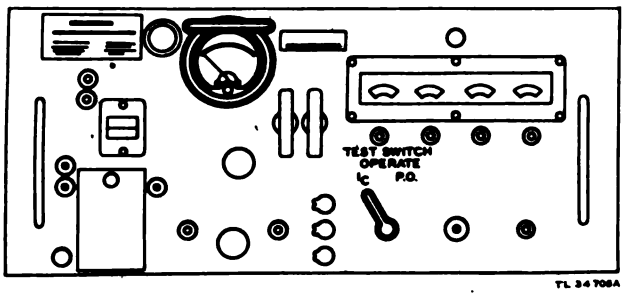

Figure 52—Starting procedure, step No. 12.

l. Hold the TEST SWITCH on the receiver-transmitter in the Ic position and read the current on the lower scale of the meter. The reading should be between zero and 2 milliamperes. Release the TEST SWITCH (fig. 52).

STEP No. 13

m. Snap the STANDBY-OPERATE switch on the control unit to the OPERATE position. The envelope of the r-f transmitter pulse should appear on the screen as a thin vertical line at the left end of the sweep (fig. 53).

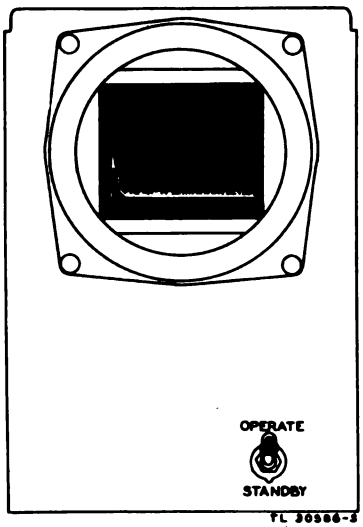

Figure 53—Starting procedure, step No. 13.

NOTE: The irregular-appearing pulse at the right of the transmitter pulse (fig. 53) is r-f energy reflection from the ground and nearby objects, and is called "ground return." Its appearance varies in different localities and in different azimuth settings of the antenna.

STEP No. 14

n. Hold the TEST SWITCH on the receiver-transmitter in the Ic position and read the current on the lower scale of the meter (fig. 52). The reading should be between 3.5 and 7.5 milliamperes. Release the TEST SWITCH.

STEP No. 15

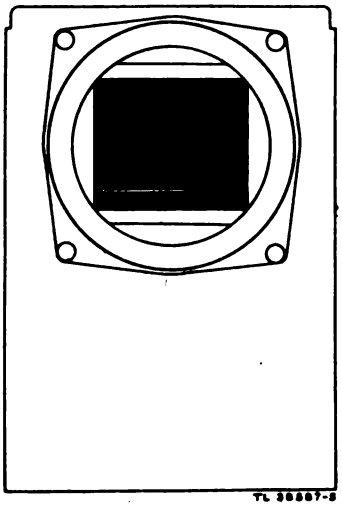

Figure 54—Starting procedure, step No. 15.

o. Hold the TEST SWITCH on the receiver-transmitter in the P.O. position and observe the control unit display screen (fig. 54). The grass and ground return should disappear from the sweep, but the transmitter pulse should appear.

STEP No. 16

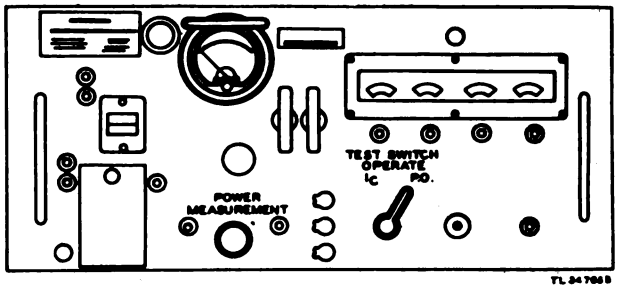

Figure 55—Starting procedure, step No. 16.

p. While holding the TEST SWITCH in the P.O. position and observing the transmitter pulse on the display screen, turn the POWER MEASUREMENT control clockwise until the transmitter pulse grows shorter and finally disappears. At this point, read the transmitter power output on the upper scale of the meter (fig. 55). It should be about 0.25 kilowatt or as specified by the person in charge [par. 36d(4)]. Release the TEST SWITCH and return the POWER MEASUREMENT control to its maximum counterclockwise position.

STEP No. 17

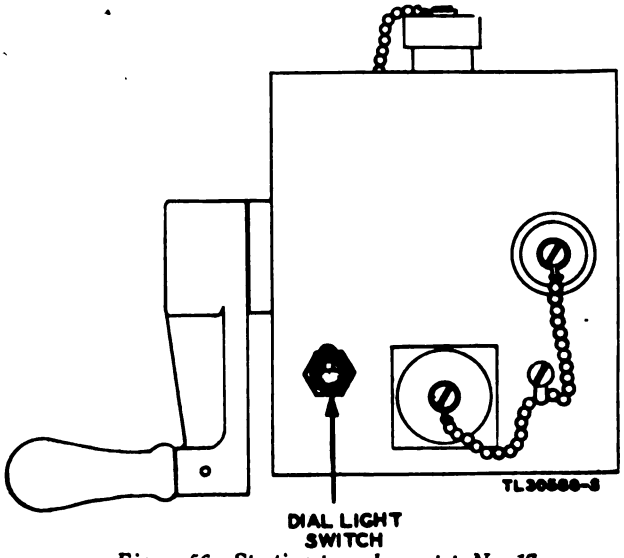

Figure 56—Starting procedure, step No. 17.

q. Snap the switch on the remote antenna drive box to the ON position. The portion of the dial near the indicating mark should light (fig. 56).

STEP No. 18

r. Rotate the crank of the remote antenna drive box so that the dial makes one complete revolution (fig. 56). The crank should turn freely and fairly smooth and the ground return on the display screen will change appearance during the rotation unless the terrain surrounding the installation is absolutely uniform.

STEP No. 19

s. Snap the STANDBY-OPERATE switch to the STANDBY position. The transmitter pulse and ground return should disappear from the display screen, but the sweep and grass should remain.

STEP No. 20

t. If the results of any of the preceding tests do not conform to the normal results and cannot quickly be made to conform by following the procedure in section II of chapter 2, change the component which seems defective for a spare component and notify the person in charge. Consult TM 11-1562 for trouble-shooting instructions.

IMPORTANT: Do not forget to turn the heaters off 30 minutes after the performance of step No. 2.

41. STOPPING.

When stopping the equipment; use the following procedure:

a. Step No. 1. Set the PLATE VOLTAGE circuit breaker on the power supply to the OFF position (fig. 47).

b. Step No. 2. Snap the ON-OFF toggle switch on the control unit to the OFF position (fig. 45).

c. Step No. 3. Set the FILAMENT VOLTAGE circuit breaker on the power supply to the OFF position (fig. 46).

d. Step No. 4. Set the HEATERS switch on the rack to the OFF position (fig. 44).

e. Step No. 5. Set the BLOWERS switch on the rack to the OFF position (fig. 43).

f. Step No. 6. Snap the remote antenna dial illuminating switch to the OFF position (fig. 56).

SECTION II
TECHNICAL OPERATION

42. GENERAL.

a. The first part of this section describes the use and settings of the controls that are used during technical operation. The section concludes with the step-by-step challenging procedure.

b. If a lobe-switching antenna is substituted, a different procedure called "pip matching" is used for azimuth determination. Pip matching is described in appendix II. All other procedures are described in this section.

43. ADJUSTING SPREAD CONTROL.

When Radio Equipment RC-384 is used with Antenna Tower Kit AS-134/TPX, normally furnished with the equipment, the SPREAD control is left in the extreme counterclockwise position and is not used.

44. ADJUSTING SENSITIVITY CONTROL.

In general the best setting of the receiver SENSITIVITY control is that which produces a small amount of noise (approximately $\frac{1}{32}$ to $\frac{1}{16}$ inch of grass) on the display tube. This amount of noise is not sufficient to interfere materially with observation but provides a continuous check of receiver operations.

45. DETERMINING CORRECT RANGE.

The process of range determination has been described in paragraph 11.

a. The 75 K YD. switch position is used to cover the entire 75,000-yard range. In this switch position it is necessary to judge the range by the position of the reply pulse on the sweep line. Figure 57 shows the reply pulse approximately half way from the left end of the sweep; therefore the plane is 37,000 to 38,000 yards away. Figure 5

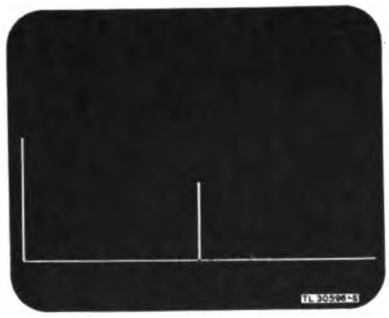

Figure 57—Reply pulse from friendly plane approximately 37,500 yards away, 75 K YD. range switch position.

shows a reply pulse appearing two-thirds of the way over from the left end of the sweep; therefore the plane is about 50,000 yards away.

b. For ranges up to 32,000 yards, the radar operator can request identification to be made with the 10 K YD. range switch position. In this position, range determination by the IFF operator is unnecessary. Figure 58 shows the reply pulse from the plane which the radar operator wanted identified. Figure 59 shows the reply pulse from a friendly plane more distant than the plane in question; the plane in question did not respond and can be assumed to be unfriendly. If it had responded, two pulses would have appeared in figure 59, and the pulse from the plane in question would have been seen at the left end of the sweep, as shown in figure 58.

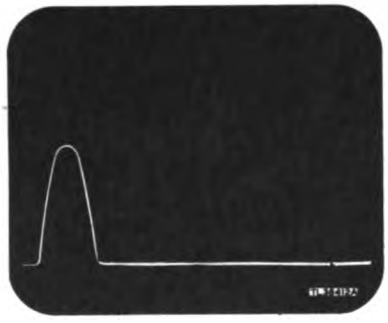

Figure 58—Reply pulse from plane which radar operator wanted identified, 10 K YD. range switch position, plane friendly.

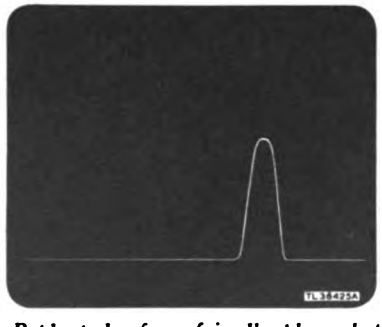

Figure 59—Reply pulse from friendly plane, but not the one which radar operator wanted identified, 10 K YD. range switch position.

46. DETERMINING CORRECT AZIMUTH WITH ANTENNA TOWER KIT AS-134/TPX.

NOTE: If a lobe-switching antenna is used, paragraph 50 does not apply. See appendix II.

Paragraph 12 described the method of determining correct azimuth by rotating the antenna to the azimuth specified by the radar operator before challenging with the STANDBY-OPERATE switch. If the reply pulses *appear*, and appear at the correct *range*, the plane can be assumed to be friendly. However, if the radar operator reports that a group of aircraft are at about the same range and azimuth, the problem of identifying a single plane becomes more difficult, and an attempt should be made to maximize the pulses. Rotate the antenna first to one side and then the other of the specified azimuth; the amplitude of the reply pulses should diminish when the antenna is turned away from the correct azimuth. If it increases instead of diminishing, it can be assumed that the reply is coming from a plane other than the one being interrogated.

47. AIRCRAFT IDENTIFICATION.

NOTE: For a description of the Mark III IFF coding system, see TM 11-1562, paragraph 4.

To insure that an aircraft being identified is friendly, the three conditions listed below must be met. If one or more of these conditions are not met, the aircraft is presumed to be unfriendly.

a. The range indicated by the identification signals should correspond to the range of the aircraft as determined by the radar locator.

b. The identification signals should come from the proper direction as indicated by the same azimuth angle for the identification equipment and the radar locator.

c. The coding of the identification signals should be correct. See paragraph 4 of TM 11-1562 for the table of codes.

48. CHALLENGING PROCEDURE WITH ANTENNA TOWER KIT AS-134/TPX.

The radar operator tells the IFF operator when to use the 75 K YD. range switch position and when to use the 10 K YD. range switch position.

a. Challenging Procedure, 75 K YD. The radar operator furnishes range and azimuth information to the IFF operator. The IFF operator must then:

(*1*) Set the range switch to the 75 K YD. position.

(*2*) Turn the crank on the remote antenna drive box until the dial in the box reads the azimuth reported by the radar operator.

(*3*) Snap the STANDBY-OPERATE switch to OPERATE.

(*4*) Observe the control unit display screen for reply pulses at the range reported by the radar operator (par. 45a).

(*5*) Determine whether the plane is friendly by observing the pulse coding (it is possible that enemy aircraft may be equipped with some device which attempts to duplicate the Mark III transpondor).

(*6*) Snap the STANDBY-OPERATE switch to the STANDBY position. This switch must remain in the STANDBY position until another plane is to be identified.

b. Challenging Procedure, 10 K YD. The radar operator furnishes only azimuth information to the IFF operator. The IFF operator must then:

(*1*) Set the range switch to the 10 K YD. position.

(*2*) Turn the crank on the remote antenna drive box until the dial in the box reads the azimuth reported by the radar operator.

(*3*) Snap the STANDBY-OPERATE switch to OPERATE.

(*4*) Observe the control unit display screen for reply pulses at the left end of the sweep (par. 45b).

(*5*) Determine whether the plane is friendly by observing the pulse coding (it is possible that enemy aircraft may be equipped with some device which attempts to duplicate the Mark III transpondor).

(*6*) Snap the STANDBY-OPERATE switch to STANDBY position. This switch must remain in the STANDBY position until another plane is to be identified.

CHAPTER 4

EQUIPMENT PERFORMANCE LOG

49. EQUIPMENT PERFORMANCE LOG.

a. General. An Equipment Performance Log has been developed to insure the most efficient technical operation of Radio Equipment RC-384. The front of the log sheet is shown in figure 60, and the back of the log sheet is shown in figure 61. Regular and conscientious use of this *chart of technical operation* will assure the most efficient functioning of the equipment.

b. Functions of the Log Sheet. The Equipment Performance Log has several functions:

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

(*2*) It presents the conditions of normal equipment performance. It indicates the operating tolerances within which meter readings must be held (except in an emergency).

(*3*) It reveals the signs of abnormal functioning and indicates the need for the application of corrective measures. It trains the operating personnel to recognize the evidences of abnormality and to apply corrective measures where possible while the set 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, since checks are required several times during the daily operating period. This visible record gives each succeeding watch an itemized picture of the functioning of all components. The more important information on the log may be transferred each day to the Station Record Book, where the information may be studied when occasion demands.

50. 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 instructions for using the Equipment Performance Log is given in the front of each log pad.

b. Log Sheets. There are 75 regular log sheets in each log pad. The front of each sheet is divided into items and the back consists of sections which are divided into items.

(*1*) *Front of Log Sheet.* The front of the log sheet (fig. 60) contains a top portion which forms a heading consisting of Roman numeral items I through VII, and a main portion which consists of Arabic numeral items 1 through 40. Items 1 through 40 may be grouped as indicated below:

(*a*) *Four-times-daily Items.* Items 1 through 6, 12, 15, 16, 17, 19, 20, 22, 23, 25, and 26 are filled in four times a day.

(*b*) *Once-daily Items.* Items 8 through 10, 13, 18, and 21 are filled in once a day. These items are followed by an (X) on the log sheet.

(*c*) *Blank Lines.* These lines are provided for any additional entries directed by the person in charge.

(*d*) *Operating-time Items.* Items 27 through 33 are filled in as required.

(*e*) *Signature of Person Keeping the Log.* Items 35 through 39 provide space for the technician to sign his name and log the time he comes on and goes off duty.

(*f*) *Numbering Log Sheets.* Item 40 provides a space for numbering the log sheet.

(*2*) *Back of the Log Sheet.* The back of the log sheet (fig. 61) is divided into the following parts:

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

EQUIPMENT PERFORMANCE LOG

RESTRICTED WHEN BLANK
CONFIDENTIAL WHEN FILLED IN

III. Organization_____

I. Radio Equipment RC-384 (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 entries 15 minutes after equipment goes on 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 *Line Voltage* (SCR-784 Ser.) [113-117] ( ) (Volts)												
6 Power Supply Ser. ( ) [Oper. Cond.] ( ) (OK-N*)												
7 Control Unit Ser. ( )												
8 Division (X) [ ] ( ) (OK-N*)												
9 75K YD. Calibration (X) [ ] ( ) (OK-N*)												
10 10 K YD. Calibration (X) [ ] ( ) (OK-N*)												
11 Antenna System Ser. ( )												
12 Sensitivity [ ] ( ) (OK-N*)												
13 Backlash [±100 mils]( ) (OK-N*)												
14 Receiver & Transmitter Ser. ( )												
15 Bias Adjustment (Standby) [0-2] ( ) (Ma.)												
16 Modulator Cathode Current [3.5-7.5] ( ) (Ma.)												
17 Power Output [ ] ( ) (Kw.)												
18 Pulse Width [4-10] ( ) (μ sec.)												
19 Frequency Check [±1] ( ) (Mc.)												
20 Antenna Tuning [ ] ( ) (OK-N*)												
21 Receiver Tuning (X) [ ] ( ) (OK-N*)												
22 *System Sensitivity* (As. Ra. S.) [80-100] ( ) (%)												
23 *Signal-to-Noise Ratio* [25%] ( ) (Ratio)												
24 Rack FM-93 Ser. ( )												
25 Blowers [ ] ( ) (OK-N*)												
26 Log Finishing Time (Hr.-Min.)												
27 Operating Time, On (Hr.-Min.)												
28 Operating Time, Off (Hr.-Min.)												
29 Operating Time, Total (Hr.-Min.)												
30 Break-down Time, Total (Hr.-Min.)												

31 THREE-DAY SUMMARY	Totals
32 Hours of Operation (Hr.-Min.)	
33 Break-down Time (Hr.-Min.)	

34 SIGNATURE OF PERSON KEEPING LOG				
35 Signature	36 Rank	37 Date	38 On	39 Off

SIGNATURE OF PERSON KEEPING LOG				
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.

40 SHEET No. ____

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1 February 1945

TL-30652-S

Figure 60—Front of Equipment Performance Log sheet.

I. Radio Equipment RC-384 (Ser. No._____) III. Organization_____ V. Location_____ Sections A, B, C, and D

II. Distance from Sea_____ IV. Address_____ VI. Elevation_____

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 REFERENCE SYMBOL	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 SPARES 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 11-1362 FOR SAMPLE ENTRIES AND FOR DETAILED EXPLANATION OF DATA REQUIRED.

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

WHEN COMPLETED SEND LOG SHEET TO UNIT RADAR OFFICER

SHEET No._____

TL-30651-S

Figure 61.—Back of Equipment Performance Log sheet.

(*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 PART RECORD.

(*d*) *Section D.* This space is provided on the back of the log sheet for such additional entries as are necessary.

51. GENERAL INSTRUCTIONS FOR FILLING IN LOG SHEET.

Specific instructions for filling in separate items and sections of the log sheet are given in paragraphs 53 and 54 of this chapter. However, the following general rules apply to filling in all items:

a. Normal Condition. The condition of the equipment is considered normal if it is operating within the normal tolerance values.

b. Log Entries. Make the proper entries on the log sheet at correct time intervals according to the instructions given in item 1. 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.

c. 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 part of the permanent record. Accuracy is of primary importance, and the entries must be legible enough for reference.

d. Optimum Values. Enter the optimum operating values (the meter indications that represent most efficient operation) in the column of empty parentheses to the right of the brackets.

e. 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 values. By using specified corrective measures and adhering to the indicated tolerances, operators will be able to keep break-downs at a minimum.

f. Limits. In certain tactical situations it may be necessary to keep the set on the air whether it is performing satisfactorily or not. 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 individual items.

g. Units. Make all entries in terms of the units (volts, degrees, hours, etc.) given in the last column of parentheses to the right of the item titles. The following symbols and abbreviations are used in the units column:

Hr—Min	Hours and minutes
°F	Degrees Farenheit
Abbrev	Abbreviation
Ma	Milliampere
Kw	Kilowatt
μsec	Microsecond
Mc	Megacycle

h. Italicized Items. Check the items printed in italics (items 5, 22, and 23) more often that four times a day. Keep these items under close watch because they tend to standardize operating conditions by providing a general check on the over-all efficiency of the equipment.

i. 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 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.

52. CORRECTIVE MEASURES.

Specific corrective measures to be taken while the set is on the air are not described in the log pad. In paragraph 53 of this chapter they are presented in detail with discussions of specific procedures for the log items. The corrective measures may be taken while the set is on the air; these measures are not trouble-shooting procedures. Trouble-shooting procedures are given in TM 11-1562.

NOTE: When corrective measures are not given and an item is abnormal, or when the corrective measures given do not correct the abnormal item, notify the person in charge.

53. HOW TO FILL IN FRONT OF LOG SHEET.

ITEM I—SERIAL NO. OF EQUIPMENT.

Enter the serial number of the Radio Equipment RC-384. The serial number is obtained from the nameplate on top of Rack FM-93.

ITEM II—ASSIGNED FREQUENCY.

Enter the assigned frequency (in megacycles) at which the transmitter operates.

ITEM III—ORGANIZATION.

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

ITEM IV—ADDRESS.

Enter the complete official mailing address of the organization.

ITEM V—LOCATION.

Enter the geographical location of the radar station if within the continental limits of the United States. Otherwise leave the space blank.

ITEM VI—DATES.

Enter the dates covered by the log sheet.

ITEM VII—SIGNATURE.

After the log sheet has been completed, the person in charge of the radar set checks the log sheet and signs it.

ITEM 1—LOG STARTING TIME.

Sample Entry:

1 Log Starting Time	[ ]	(Hr.-Min.)	0115	0315

Log Entry. Enter in the brackets to the right of the item title the suffix for the time zone in which the station is located. For example, if the station is located in Italy, enter A in the brackets. Obtain the *official time zone suffix* from the person in charge. Begin the first set of log entries in Column A about 15 minutes after starting the equipment. Enter the time in hours and minutes, using the 24-hour time system. Succeeding sets of entries are made at intervals prescribed by the person in charge. If the operating period is 3 hours or less, fill in only columns A and D.

ITEM 2—WEATHER CONDITIONS.

Sample Entry:

2 Weather Conditions		(Symbols)	O	F

Log Entry. Use one or more of the following symbols to indicate the general condition of the weather. In case of any unusual wind conditions or weather conditions not covered by these symbols (such as northern lights), enter an asterisk (*) after the log entry. On the back of the log sheet under NOTES, give a description of the condition and any effects on equipment performance.

Weather condition	*Symbol*	*Weather condition*	*Symbol*	*Weather condition*	*Symbol*	*Weather condition*	*Symbol*
Clear sky	O	Smoke	K	Rain	R	Hail	AP
Overcast sky	●	Dust	D	Snow	S	Thunderstorm	
Fog	F	Mist	M	Freezing rain	ZR	Lightning visible	
Haze	H			Sleet	E		

ITEM 3—TEMPERATURE OUTSIDE.

Sample Entry:

3 Temperature Outside	(°F)	25	49

Log Entry. Record in the log space to the nearest degree the outside temperature in degrees Fahrenheit.

ITEM 4—HUMIDITY.

Sample Entry:

4 Humidity	(Abbrev.)	L	VH

Log Entry. Enter in the log space one of the following abbreviations, indicating the estimated humidity:

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

To log the humidity, it is necessary, in the absence of a hygrometer, to judge the humidity from the *feel* of the air and from its other effects. The humidity is probably high when: clothing feels damp; there is rain, fog, or haze (from water vapor); sweat fails to evaporate; moisture condenses on cold surfaces; the walls of the building *sweat;* the air seems warm and close, damp or muggy. The humidity is probably low when: the skin and lips chap, the air is cold and crisp, damp clothes dry quickly, or visibility is good.

ITEM 5—LINE VOLTAGE.

Sample Entry.

5 *Line Voltage*	(SCR-784 Ser.)	[113-117]	( )	(volts)	113	116

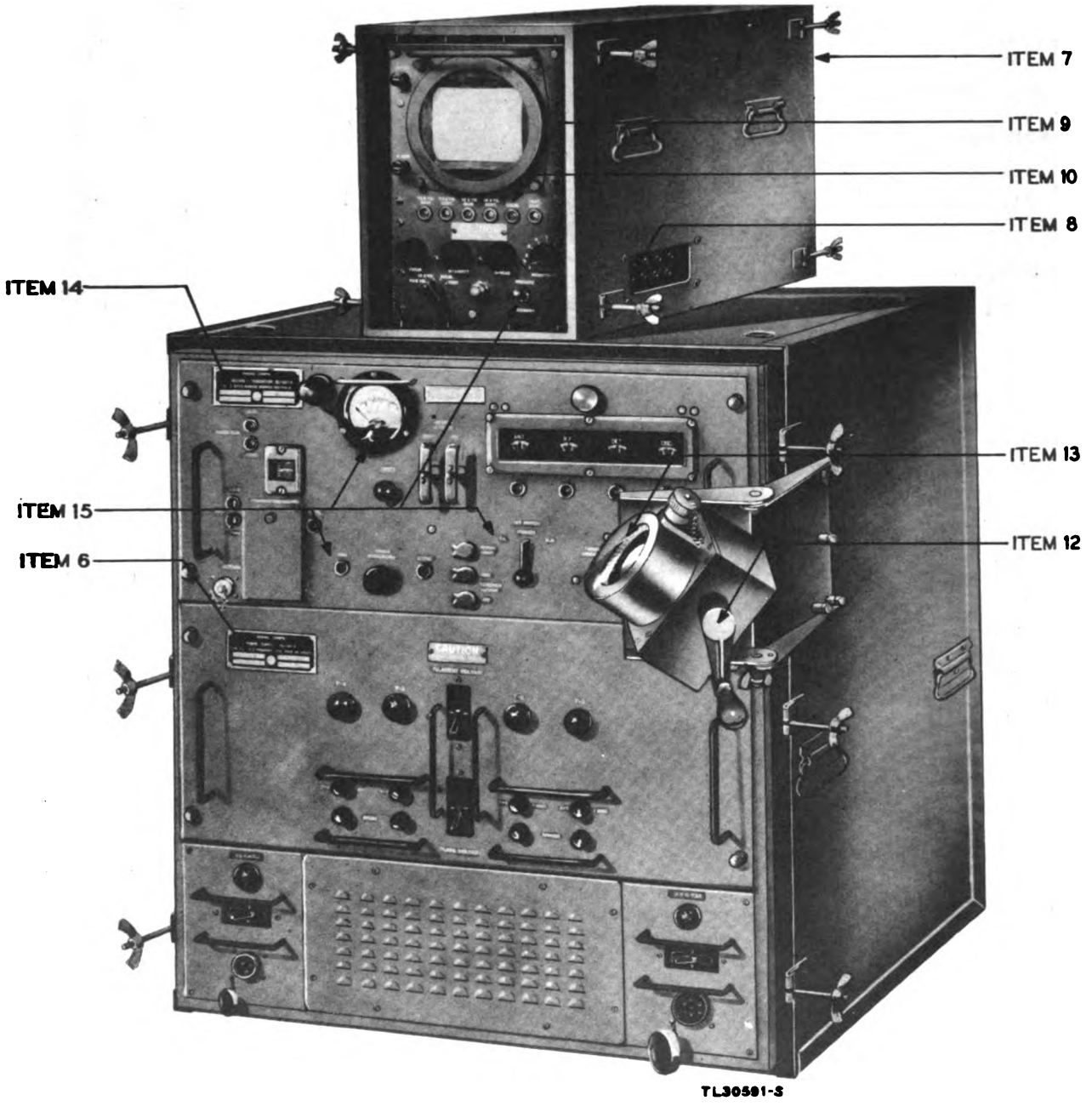

Figure 62—Major components, EPL items.

Log Entry: Enter the serial number of Radio Set SCR-784 in the parentheses to the right of the item. Obtain the meter reading from the SCR-784 line voltage meter. If the reading is between 113 and 117 volts, enter the reading to the nearest volt. If the reading is not within the desired range, enter N* and notify the person in charge.

ITEM 6—POWER SUPPLY.

Sample Entry.

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

Log Entry. Obtain the serial number of the power supply from the nameplate on the front panel (fig. 62). Enter the number in the parentheses to the right of the item title. If the power supply is normal, write OK on the log sheet; if not, write N*.

Corrective Measures. Replace broken or burned-out pilot lights. Notify the person in charge if there is any odor of burning resistors or transformers.

ITEM 7—CONTROL UNIT.

Sample Entry:

7 CONTROL UNIT Ser. ( )		

Log Entry. When recording the first set of log entries, fill in the serial number of the control unit in the first set of parentheses. The serial number is found on the nameplate mounted on the top of the control unit outer case (fig. 62).

ITEM 8—DIVISION (X).

Sample Entry:

8 Division (X) [ ] ( ) (OK-N*)	N*	OK

Log Entry. Check the division as described in paragraph 35b. Write OK on the log sheet if normal conditions prevail; if not, N*. This item should be checked only once a day.

ITEM 9—75 K YD. CALIBRATION (X).

Sample Entry:

9 75 K YD. Calibration (X)	[ ]	( )	(OK-N*)	N*	OK

Log Entry. Check the 75 K YD. calibration as described in paragraph 35c and illustrated in figure 37. Observe the pattern on the control unit display screen. Write OK on the log sheet if normal conditions prevail; if not, N*. This item should be checked only once a day.

Corrective Measures. If the proper pattern is not seen on the display screen, adjust the CALIB. control *shaft* (fig. 62) until the proper pattern is obtained (fig. 37). ***Do not disturb the adjustment of the bushing through which the shaft is reached.*** If this does not correct the trouble, notify the person in charge.

ITEM 10—10 K YD. CALIBRATION (X).

Sample Entry:

10 10 K YD. Calibration (X)	[ ]	( )	(OK-N*)	N*	OK

Log Entry. Using the procedure described in paragraph 35e and illustrated in figure 38, check the 10 K YD. calibration. Observe the pattern on the control unit display screen. Write OK on the log sheet if normal conditions prevail; if not, N*. This item should be checked only once a day.

Corrective Measures. If the proper pattern is not seen on the display screen, adjust the CALIB. control *bushing* (fig. 62) until the proper pattern is obtained (fig. 39). ***Do not disturb the adjustment of the slotted-end shaft inside the bushing.*** If this does not correct the trouble, notify the person in charge.

ITEM 11—ANTENNA SYSTEM.

Sample Entry:

11 ANTENNA SYSTEM Ser. ( )			

Log Entry. When recording the first set of log entries, write in the parentheses the serial number of the antenna tower kit.

ITEM 12—SENSITIVITY.

Sample Entry:

12 Sensitivity	[ ]	( )	(OK-N*)	N*	OK

Log Entry. The tower control mechanism has normal sensitivity if it does not require an unusual amount of force on the hand crank of the remote control box (fig. 62) to rotate the antenna. Enter OK in the log space if rotation is easy; otherwise, enter N*.

NOTE: A slight difference in the feel of the crank for different directions of rotation and for different azimuth positions of the antenna is normal.

Corrective Measures. If the hand crank turns unusually hard or is stuck, check the connections of the flexible shaft couplings. Notify the person in charge if the trouble cannot be immediately located and repaired. Do not operate the antenna in this condition because the flexible shaft may be damaged.

ITEM 13—BACKLASH (X).

Sample Entry.

13 Backlash (X)	[±100 mils]	( )	(OK-N*)	N*	OK

Log Entry. The tower control alignment is normal if the azimuth reading on the dial of the remote antenna drive is not more than 100 mils different from the azimuth shown on the tower azimuth ring. Check the dial alignment by comparing the readings at various azimuth settings of the antenna. If the alignment is normal, enter OK, otherwise enter N*. This item should be checked only once a day.

Corrective Measures. If the error is always the same amount in the same direction, as, for exrection, as, for example, if the dial is always 200 mils less than the tower ring, the two azimuth indicators are misaligned. Align them as described in paragraph 38. If the error is not consistent as described above, notify the person in charge. Do not change the orientation with the radar antenna.

ITEM 14—RECEIVER AND TRANSMITTER.

Sample Entry:

14 RECEIVER & TRANSMITTER Ser. ( )			

Log Entry. When recording the first set of log entires, fill in the serial number of the receiver and transmitter in the first set of parentheses. The serial number will be found on the nameplate on the front panel (fig. 62).

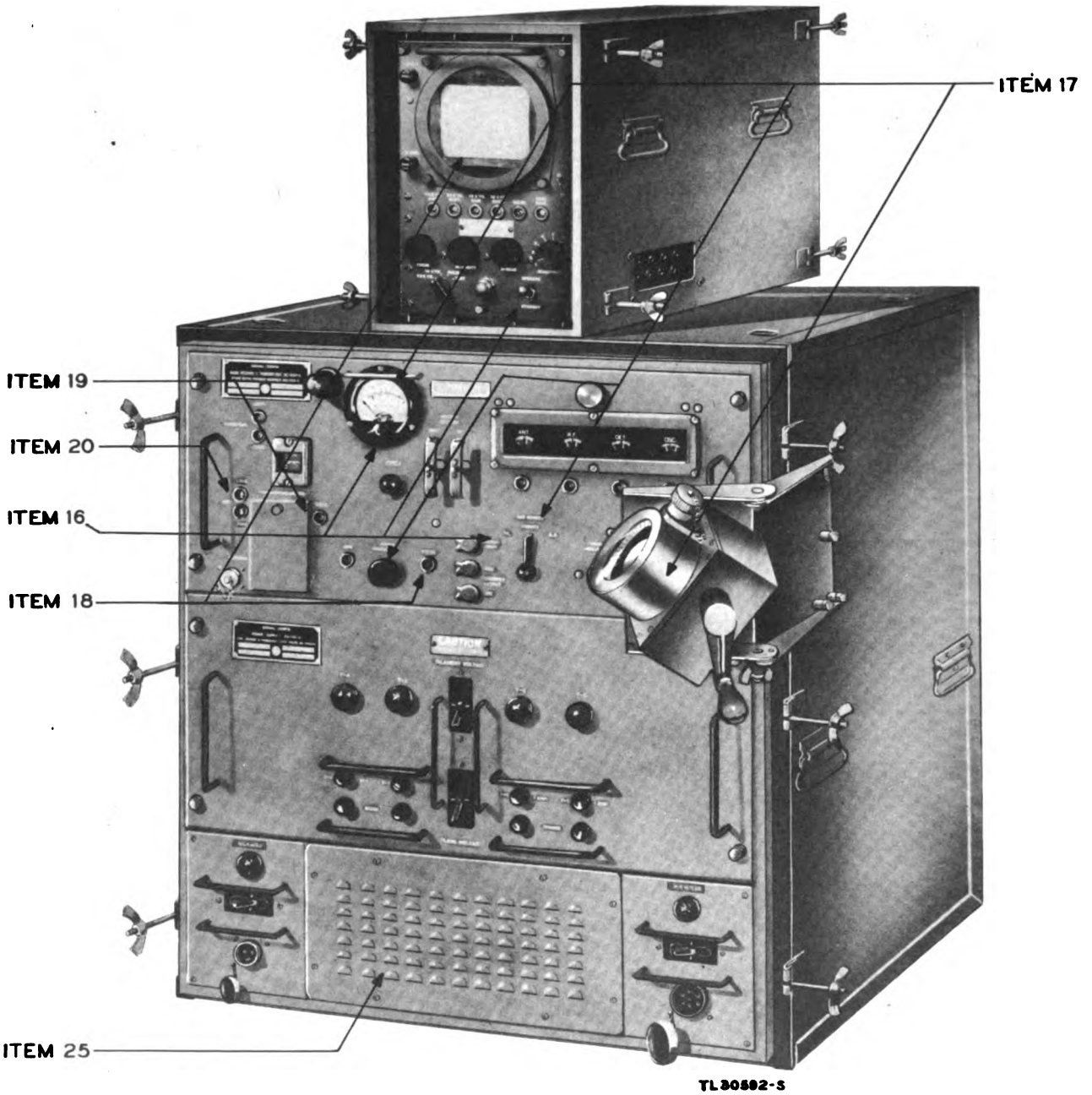

Figure 63—Major components, EPL items.

ITEM 15—BIAS ADJUSTMENT (STANDBY).

Sample Entry.

15	Bias Adjustment (Standby)	[0-2]	( )	(Ma.)	1	1.5*

Log Entry. The BIAS adjustment is normal if the milliammeter reads more than zero but less than 2 milliamperes with the challenge switch in STANDBY position (fig. 62) and the TEST SWITCH in Ic position. Enter the milliammeter reading. If it is other than normal, add an asterisk (*) and explain under NOTES.

Corrective Measures. If conditions are other than normal, adjust the BIAS control until the meter reads more than zero but less than 2 milliamperes. If the condition cannot be remedied by this method, notify the person in charge.

ITEM 16—MODULATOR CATHODE CURRENT.

Sample Entry:

16	Modulator Cathode Current	[3.5-7.5]	( )	(Ma.)	5	2*

Log Entry. The modulator cathode current is normal if the test meter reads between 3.5 and 7.5 milliamperes with the challenge switch in OPERATE position and the TEST SWITCH in Ic position (fig. 63). Enter the reading of the meter. If it is other than between 3.5 and 7.5 milliamperes notify the person in charge. Enter an asterisk (*) in the log sheet and explain under NOTES.

ITEM 17—POWER OUTPUT.

Sample Entry:

17	Power Output	[ ]	( )	(Kw.)	0.8	0.6*

Log Entry: Enter in the brackets the power specified by the person in charge [par. 36d(4)]. Take the reading with the TEST SWITCH in the P.O. position and the POWER MEASUREMENT control turned clockwise to the point where the transmitter pulse disappears (fig. 63). Enter the power output as read on the meter correct to the nearest 0.1 kilowatt. If abnormal, add an asterisk (*) and explain under NOTES.

Corrective Measures. If the power output is abnormal, adjust POWER OUTPUT adjustment on the lower right hand corner of the receiver and transmitter panel. If the adjustment does not result in a normal reading, refer to TM 11-1562 for corrective measures.

ITEM 18—PULSE WIDTH (X).

Sample Entry:

18 Pulse Width (X)	[4-10]	( )	(μsec)	4	2*

Log Entry. The pulse width is normal if it is between 4 and 10 microseconds (fig. 63) and if the entry in item 16 above (modulator cathode current) is no larger than 7.5 milliamperes. See paragraph 36c for method of determining and adjusting pulse width. Enter the pulse width in microseconds. If the width is abnormal, add an asterisk (*) and explain under NOTES.

ITEM 19—FREQUENCY CHECK.

Sample Entry. No sample entry can be shown in this manual because frequency is classified confidential.

Log Entry. A normal condition is attained if the transmitter frequency is within plus or minus 1 megacycle of the assigned frequency. Refer to paragraph 37. Enter the frequency in megacycles as read on the signal generator. If abnormal, add an asterisk (*) and explain under NOTES.

Corrective Measures. If the frequency is off a small amount, adjust the plate tuning (fig. 63) to bring the transmitter to the assigned frequency (par. 37). If the frequency is off to any large degree, refer to TM 11-1562 for corrective measures.

ITEM 20—ANTENNA TUNING.

Sample Entry:

20 Antenna Tuning	[ ]	( )	(OK-N*)	OK	N*

Log Entry. Antenna tuning is normal if, with the TEST SWITCH in the P.O. position, the transmitter pulse on the display screen can be brought to maximum with very little movement of the ANTENNA tuning screwdriver adjustment (fig. 63). If a normal condition prevails, write OK in the log space; otherwise, enter N*.

Corrective Measures. If the pulse does not come to the usual maximum point, refer to TM 11-1562 for corrective measures.

ITEM 21—RECEIVER TUNING (X).

Sample Entry:

21 Receiver Tuning (X)	[ ]	( )	(OK-N*)	N*	OK

Log Entry. If the receiver is tuned to its assigned frequency, it is normal. Refer to paragraph 37. Enter OK an the log space if the receiver is properly tuned; otherwise, enter N* and explain under NOTES. This item should be checked only once a day.

Corrective Measures. If the receiver is not on the assigned frequency, retune (par. 37). If the receiver does not tune up, replace it immediately and repair as soon as possible.

ITEM 22—SYSTEM SENSITIVITY.

Sample Entry:

22	*System Sensitivity*	[Az. 650 Ra. 720 S.8]	[80-100]	(1)	(%)	80	40*

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

Log Entry. The sensitivity of the unit is indicated by the height of the scope image from a fixed reference target with a given setting of the SENSITIVITY control. The system sensitivity is normal if the scope image height is within 80 percent of the reference value. To obtain the reference value, tune the equipment to its maximum sensitivity, rotate the antenna to a permanent target, and adjust the SENSITIVITY control for an echo height of about 1 inch. (The exact height will be decided upon by the person in charge.) Mark this setting of the SENSITIVITY control because it will be the reference mark used for future checks. To complete the log entry, record in the first parentheses, to the right of the item title, the known azimuth in mils and range in yards of the fixed reference target and the sensitivity setting designated by the person in charge. Enter in the second parentheses the standard height in inches of the reference echo for the designated sensitivity setting. Enter in the log space the height of the observed echo in percentage of the standard echo height for the same sensitivity setting. If it is not within 80 percent of the designated value, add an asterisk (*) and explain under NOTES.

Corrective Measures. If the system sensitivity is abnormal, check the over-all tuning of the unit. If still too low, investigate the condition at the next shut-down period.

ITEM 23—SIGNAL-TO-NOISE RATIO.

Sample Entry:

23	*Signal-to-Noise Ratio*	(25%)	(3/1)	(Ratio)		3/1	2/1*

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

Log Entry. The signal-to-noise ratio is determined visually from the screen of the oscilloscope on the control unit. It is normal if the variations in ratio do not exceed 25 percent. To obtain the signal-to-noise ratio, turn the antenna to the fixed reference target. This target should be the same one used to check item 22. With the SENSITIVITY control adjusted to give the designated echo height, compare the height of the fixed echo with the height of the noise or grass. Make the estimate carefully and express it as a ratio. The person in charge should decide upon and designate the scope height

to be used (an echo height of 1 inch is recommended) and the normal signal-to-noise ratio for the reference target. To complete the log entry, record in the first parentheses the ratio between the height of the normal reference signal and the height of the noise or grass as decided upon by the person in charge. Using the same target and the same echo height for successive readings, enter in the log spaces the observed ratios. For example: 3/1, 4/1. If not normal, add an asterisk (*) and explain under NOTES.

Corrective Measures. If the ratio is abnormal, check the echo height on the scope and readjust the sensitivity control if necessary. If such an adjustment does not correct the condition, check item 22, *System Sensitivity*.

ITEM 24—RACK FM-93.

Sample Entry:

24 RACK FM-93 Ser. ( )		

Log Entry. When recording the first set of log entries, fill in the serial number of the rack in the first set of parentheses. The serial number will be found on the nameplate on the removable front cover of the rack.

ITEM 25—BLOWERS.

Sample Entry:

25 Blowers	[ ]	( )	(OK-N*)	OK	N*

Log Entry. The blowers are working properly if it is possible to feel air being taken in through the louvers in the front of the panel and it is impossible to detect any odor of overheated windings (fig. 63). Write OK if normal conditions prevail; otherwise, enter N*.

ITEM 26—LOG FINISHING TIME.

Sample Entry:

26 Log Finishing Time	(Hr.-Min.)	0837	1338

Log Entry. Enter the time, using the 24-hour time system, when the entries for items 1-25 are completed. If the log cannot be finished, enter the time with an asterisk (*) and explain under NOTES in section A.

ITEM 27—OPERATING TIME, ON.

Sample Entry:

27 Operating Time, On	(Hr.-Min.)	1300

Log Entry. Enter the time, using the 24-hour system, the equipment is set into operation after each shut-down. If the equipment is on the air at midnight, enter 0000 in column A for the next day.

ITEM 28—OPERATING TIME, OFF.

Sample Entry:

28 Operating Time, Off	(Hr.-Min.)	2400

Log Entry. Enter the time, using the 24-hour time system, the equipment is shut down. If operation ends at midnight, enter 2400 instead of 0000. There should be an entry for each shut-down. If the equipment stops operating as a result of a break-down or any other abnormal condition, put an asterisk (*) after the log entry and explain fully under NOTES.

ITEM 29—OPERATING TIME, TOTAL.

Sample Entry:

29 Operating Time, Total	(Hr.-Min.)	1100

Log Entry. Enter the length of each period on the air. To get the length of time, subtract the ON entry from the OFF entry (item 28 minus item 27). For example, if the equipment begins operation at 1415 and shuts down at 1445, the TOTAL operating time is 1445 minus 1415, which equals 0030. However, when the *minutes* of the ON time exceed the *minutes* of the OFF time, it is necessary to transform the last hour of the OFF time to minutes before subtracting. For example, 2400 will become 2360 because the last hour has been changed to 60 minutes. Sample calculations follow:

Incorrect method		*Correct method*	
Time OFF.....	2400	Time OFF.....	2360
Time ON.....	0530	Time ON.....	0530
False answer....	1870	Correct answer..	1830

ITEM 30—BREAK-DOWN TIME, TOTAL.

Sample Entry:

30 Break-down Time, Total	(Hr.-Min.)	0115

Log Entry. Enter the total time spent repairing any break-downs in equipment that may have occurred during the operating period. Do not include the time that the equipment was off for routine maintenance. Look under item 28, Operating Time, Off, for any entries followed by an asterisk (*). Check the corresponding note in section A to find out whether or not the equipment was shut down because of a break-down. Total the time that the equipment was shut down because of break-downs, and enter the total in item 30.

ITEM 31—THREE-DAY SUMMARY.

This heading is for items 32 and 33.

ITEM 32—HOURS OF OPERATION.

Sample Entry:

32 Hours of Operation	(Hr.-Min.)	6900

Log Entry. The technician in charge during the last watch of the 3-day period fills in item 32. Enter the total number of hours and minutes the equipment has been on the air during the 3-day period. To obtain this total, add all the entries in item 29, Operating Time, Total. Check section A, NOTES, for any periods of operation during the 3-day period which were not entered on the front because of lack of space.

ITEM 33—BREAK-DOWN TIME.

Sample Entry:

33 Break-down Time	(Hr.-Min.)	0300

Log Entry. The technician in charge during the last watch of the 3-day period fills in item 33. Enter the total number of hours and minutes the equipment has been off the air during the 3-day period because of a break-down or some other accidental cause. To obtain this total add all the entries in item 30, Break-down Time, Total.

ITEM 34-39—SIGNATURE OF PERSON KEEPING LOG.

Sample Entry:

34 SIGNATURE OF PERSON KEEPING LOG				
35 Signature	36 Rank	37 Date	38 On	39 Off
s/ D. Daniels	M/Sgt	2 Dec	0600	1200

Log Entry. The technician keeping the log enters his signature in item 35 when he reports for duty. Enter the rank of the technician keeping the log in item 36. Enter the date in item 37. Enter the time (24-hour system) the technician comes on duty in item 38 and the time he goes off duty in item 39.

ITEM 40—SHEET NO.

In the space provided at the lower right corner of the sheet, enter the number of the log sheet.

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54. HOW TO FILL IN BACK OF LOG SHEET.

a. Heading, Items I to VI. Fill in these items at the beginning of each 3-day period. Items I, III, IV, and V provide the same information as the corresponding items on the front of the sheet. In item II, enter the distance from the sea and be sure to note whether the measurement is in feet or miles. In item VI, enter the elevation, in feet, of the equipment above sea level.

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*) Item number.

(*2*) Time and date abnormal condition was found.

(*3*) Description of the condition and its cause.

(*4*) What was done about it.

(*5*) Initials of technician making note.

c. Section B, Component Record.

(*1*) *General.* Fill in the appropriate spaces in section B whenever a component is removed or installed. Make no entries in the spaces blanked out by diagonal rulings. Make entries for a component that is removed on one of the three lines marked TAKEN OUT: A, B, and C. Make entries for a component that is installed on a line marked PUT IN: A, B, and C. A list of the major components in Radio Equipment RC-384 is given in chapter 1, table I.

(*2*) *Columns 1 to 4.* Record the *name, type, serial number,* and *order number* of each component that is TAKEN OUT or PUT IN. All of this information will be found on the nameplate of the component.

(*3*) *Column 5, Service Dates, In.* In column 5, enter the date the component TAKEN OUT was originally installed. If the component originally came with the equipment, enter the date that the equipment was first placed in operation. Otherwise, the date will be found in the Station Record Book. In the case of a component that is being PUT IN, enter the date the installation is made.

(*4*) *Column 6, Service Dates, Out.* In this space, record the date the component is TAKEN OUT.

NOTE: There is no hour meter on either Radio Equipment RC-384 or Radio Set SCR-784. All data on hours of operation will be obtained from the Equipment Performance Log for Radio Set SCR-784, item 44, cumulative hours of operation. It is assumed, for purposes of time totalization, that the IFF equipment is in operation whenever the radar set is.

(5) *Column 7, Hour Meter Readings, In.* In this space, enter the cumulative hours of operation at the time the component TAKEN OUT was originally placed in service. This information will be found in item 44 of the radar Equipment Performance Log. In the case of a component PUT IN, enter the cumulative hours when the installation is made.

(6) *Column 8, Hour Meter Readings, Out.* In column 8, write down the cumulative hours 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 was in use. To get this figure, subtract the time recorded in column 7 from the time recorded 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 an order may have been given to remove it 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 repairman who removed or installed the component.

d. Section C, Part Record.

(1) *General.* Section C is filled in whenever a part or tube is *removed* or *installed*. No entries are required in spaces blanked out by diagonal rulings. Entries for a part or tube which has been removed are made on one of the three lines marked TAKEN OUT: A, B, or C. Entries for a part or tube installed are made on one of the three lines marked PUT IN: A, B, or 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. This information is given on the nameplate of the component or in the Station Record Book.

(3) *Column 5, Reference Symbol.* In column 5, write down the reference symbol number of the part or tube PUT IN or TAKEN OUT. This number can be found in the schematic drawing of the component concerned (TM 11-1562) 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, for example: vacuum tube, resistor, capacitor.

(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 maintenance parts list included in TM 11-1562. Additional information may be found on the part itself. In this description of the part, it is important to record the name of the manufacturer, the manufacturer's type or catalog number, the serial number, the electrical rating of the part, its size, etc. In order that the part may be positively identified, it is necessary to give a complete description of it.

(6) *Column 8, Function of Part and Location from Schematic.* In this column, describe briefly the circuit 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. This information can be found in TM 11-1562.

(7) *Column 9, New, Used, or Rebuilt.* Tell whether the part or tube that is being 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.

(9) *Column 11, Service Dates, In.* In column 11, enter the date when the part or tube TAKEN OUT was originally installed. This information will be found in the Station Record Book. When a part or a tube is PUT IN, simply enter the date the installation is made.

(10) *Column 12, Service Dates, 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 cumulative hours at the time the part or tube TAKEN OUT was originally

placed in service. This information will be found in item 44 of the radar Equipment Performance Log. When a part or a tube is PUT IN, enter the cumulative hours at the time the installation is made.

(*12*) *Column 14, Hour Meter Readings, Out.* In column 14, enter the cumulative hours 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. Write 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 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. For example, it may have been in the spare parts chest, received from the Lexington Signal Depot, or borrowed from another set in the 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. By symptoms are meant first evidences of trouble. Some examples are: abnormal meter readings, odor of burning insulation, smoke, hissing noise of an arc, or heat from an overloaded part.

(*17*) *Column 19, Fault.* In this space, describe exactly what fault developed in the part or tube that 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 defective, dielectric break-down, insulation break-down, open circuit, short circuit, arcing, or sticking contacts. Some mechanical faults are: a broken, bent, or cracked part, frayed leads, frozen bearings, or stripped threads. This column refers only to a part or a tube that has been TAKEN OUT.

(*18*) *Column 20, What Caused the Fault?* In this column explain what caused the fault. Use additional space in section A if necessary. Describe any external condition which may have contributed to the fault. Indicate the first or primary cause if it is known. Some examples of causes of faults are: wear and tear in operation, excessive heat, excessive current (overload), high humidity, careless handling, lack of lubrication, improper operation, corrosion, excessive strain, improper adjustment, defective material, accidental damage, error in wiring, loose connections, lack of ventilation, or failure of some other part.

(*19*) *Column 21, Action Taken and Results.* In this column, describe briefly what was done about the fault. In addition, explain what results were obtained.

(*20*) *Column 22, Work Done By.* The name of the technician who performed the repair or replacement appears in this column.

e. Section D, Remarks. Space is provided in section D for such additional remarks as are necessary.

f. Sheet Number. 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.

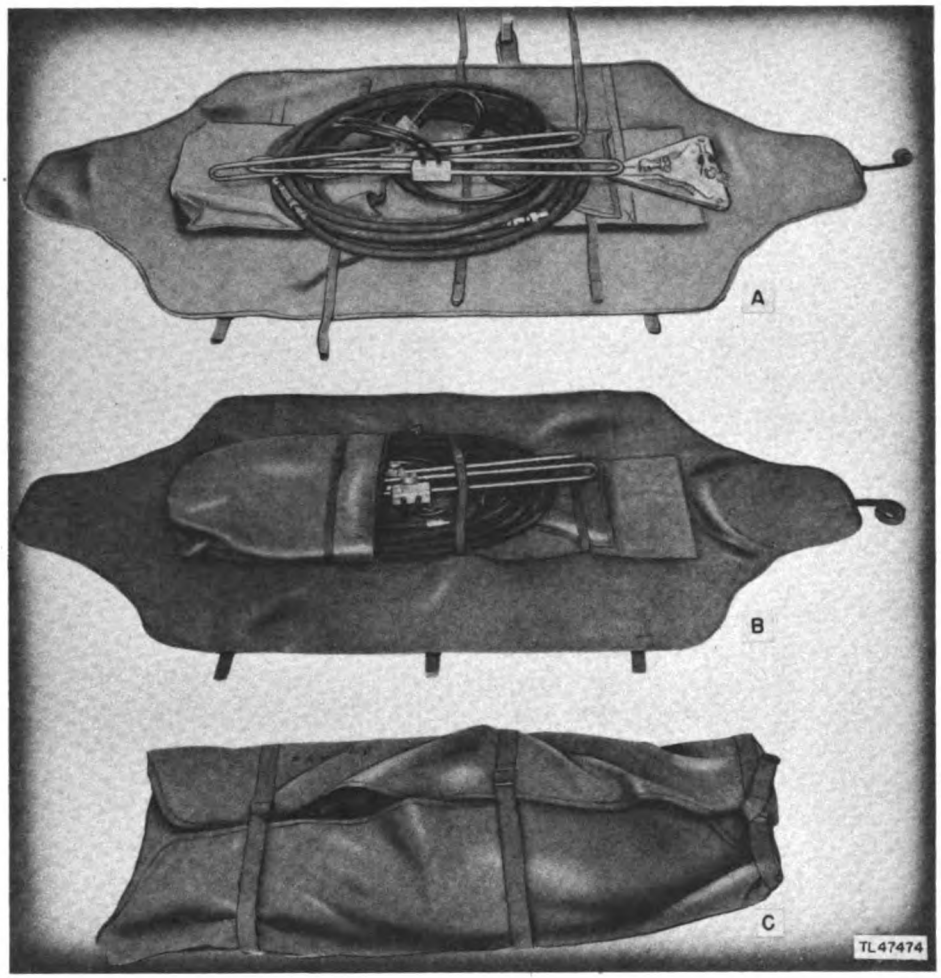

Figure 64—Packing antenna dipoles, phasing-cord assembly, flexible drive cable, and base plate.

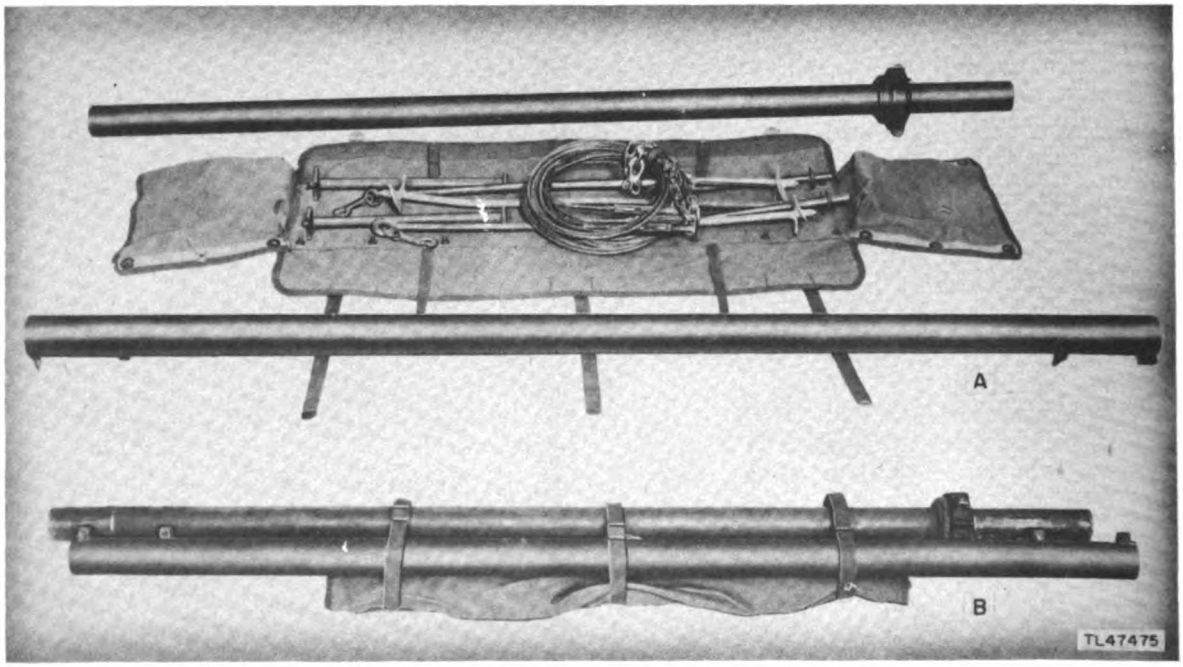

Figure 65—Packing top and center mast sections, guy cables and anchors, dipole fasteners, and angle-iron stakes.

CHAPTER 5

CONVERSION FOR TRAVEL

55. DISASSEMBLING AND PACKING.

a. General. Whenever Radio Set SCR-784 is moved to a new location, Radio Equipment RC-384 must be prepared for transport. This chapter describes the disassembly and packing of the various components of the IFF equipment.

b. Removing Power. Disconnect Cord CD-1342 from the power receptacle in the lower right corner of the radar equipment and from the rack. After this is done, all other operations can be performed in any sequence or simultaneously.

c. Dismantling Antenna System AS-134/TPX.

(*1*) Remove the r-f cord (made up of two Cords CG-55/U (25 ft 0 in.)) and the flexible drive cable (made up of two Cords MX-363/TPX) from their connections on the antenna mast and on the remote antenna drive box.

(*2*) Remove Cord CG-282/TPX from the remote antenna drive box and from the rack.

(*3*) Disconnect the guy cables from the anchors and loosen the wingnut at the base of the tower. Gently lower the tower until it is supported on a box or chest.

(*4*) Disconnect Cord CG-282/TPX from the phasing section and remove the antenna assembly from the tower.

(*5*) Disassemble the antenna assembly.

(*6*) Disassemble the mast and remove the bottom section from the base.

(*7*) Remove the anchors from the ground by unscrewing and pull out the stakes in the tower base.

(*8*) If arrangements in the cargo truck which is to move the equipment permit, do not detach the remote antenna drive box from the rack. Lash it securely to the rack after the rack cover is in place so that the jolting of the truck will not place a strain on the screws which attach the box to the rack. If lack of cargo-truck space makes it necessary, remove the remote antenna drive box.

(*9*) Pack the disassembled parts of Antenna System AS-134/TPX in their original transit

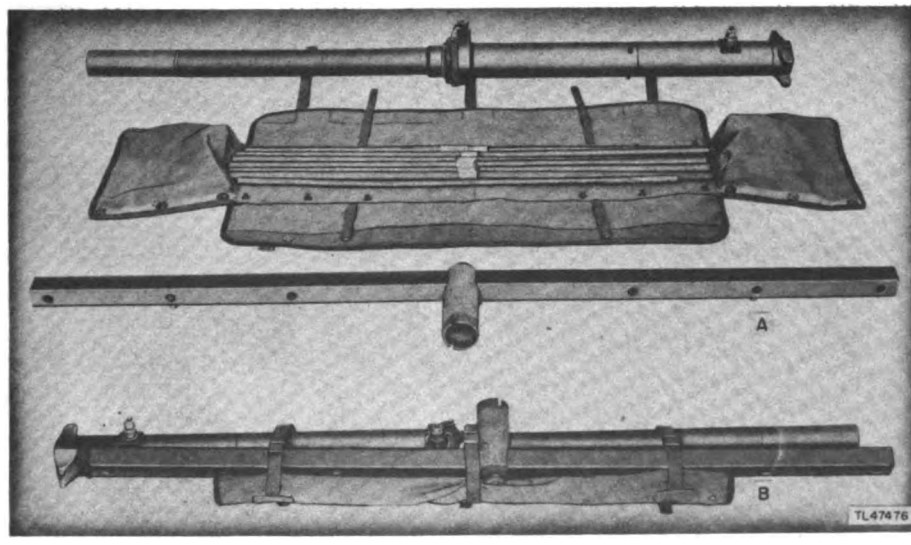

Figure 66—Packing antenna crossarm and reflectors, bottom section of tower, and anchor driving pipe.

chests and bags. The step-by-step bag packing is shown in figures 64, 65, and 66.

d. Preparing Control Unit for Transit. No special procedure is necessary to prepare the control unit for transit. Disconnect the three cords at the back and attach the waterproof ends and side plate to the outer case, which becomes a transit chest.

e. Preparing Rack and Rack Components for Transit. The rack is a transit chest when the front cover is attached. Disconnect Cord CD-1382 which connected the control unit to the rack. Make sure that the receiver-transmitter and power supply are firmly in place and that the four captive thumbscrews (one in each corner) of each component are screwed in tightly. Then attach the waterproof front cover.

f. Miscellaneous. Pack the signal generator in Chest CY-371/CPX. Pack the tools, cords, test and dummy antennas, etc. in their chests and stow and lash all the equipment in the cargo truck which is to transport it.

APPENDIX I

UNIVERSAL OPERATION

56. GENERAL.

When Radio Equipment RC-384 is used with a radar set other than Radio Set SCR-784, several changes in operating procedure may be necessary. This appendix describes these changes.

57. POLARITY OF SYNC FROM RADAR.

a. Transmitter Synchronization. The circuits fed by the TRIGGER IN connector on the back of the control unit are designed to handle pulses of +25 to +160 volts or −15 to −160 volts. However, the TRIGGER POLARITY SELECTOR (switch 123-1) on the top of the control unit chassis (fig. 67) must be snapped to the + position if the trigger pulses from the radar set are positive. This switch is set to the negative position at the factory because the trigger pips from Radio Set SCR-784 are negative.

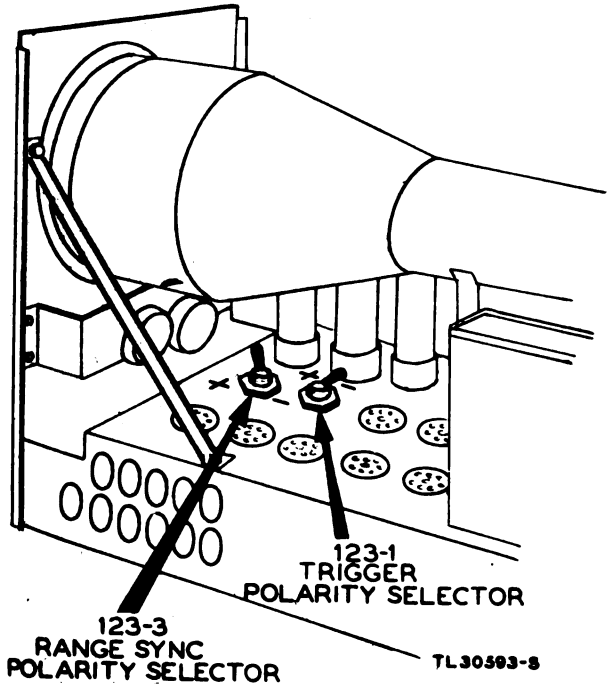

Figure 67—Control Unit BC-1378, synchronization polarity switches.

b. Range Synchronization. The circuits fed by the RANGE SYNC connector on the back of the control unit are designed to handle pulses of +15 to +160 volts or −15 to −160 volts. However, the RANGE SYNC POLARITY SELECTOR (switch 123-3) on the top of the control unit chassis (fig. 67) must be snapped to the − position if the range synchronizing pulses from the radar set are negative. This switch is set to the positive position at the factory because the range sync pips from Radio Set SCR-784 are positive.

c. Access to Polarity Switches. If the three cords have been connected to their fittings at the back of the control unit, remove them. Loosen the three knurled captive screws, one in each upper corner of the front panel and one below the pilot lamp in the bottom center of the front panel. Pull the chassis forward and partly out of the inner case. The switches are not far behind the front panel (fig. 67).

> **WARNING:** Extremely high voltages are present in the control unit when it is connected to the rack and the ON-OFF switch is at ON.

d. Determining Sync Polarity. If the polarities of the radar sync pulses are unknown, they can be determined by using the control unit as an oscilloscope. The fact that a sync starts the IFF sweep does not necessarily mean that the polarity switch is set correctly because a high-voltage sync may start the sweep when the switch is set wrong. If this happens, the IFF timing will be in error. Use the procedure given below.

(*1*) Connect the trigger sync pulses from the radar set to the TRIGGER IN connector at the back of the control unit.

(*2*) Connect Cord CD-1382 between the control unit and the rack.

(*3*) Use starting procedure steps 1 through 6 (par. 40).

(*4*) Turn the range switch to 75 K YD.

(*5*) Manipulate FOCUS, INTENSITY, 75 K YD. CENT., VERT. CENT., and 75 K YD. GAIN to try to obtain a sweep line.

CAUTION: If it is necessary to get at the polarity switches (fig. 67), go through the first three steps of the stopping procedure (par. 41). When operation is to be resumed, use the first six starting procedure steps (par. 40).

(*6*) If the sweep line cannot be obtained, snap the TRIGGER POLARITY SELECTOR (switch 123-1) to its other position (fig. 67). The sweep should now be obtained.

(*7*) After the sweep is obtained, turn the range sweep to TEST and turn up INTENSITY.

(*8*) Connect Cord CD-1105 between jack 121-6 and jack 120 on the side panel of the control unit.

(*9*) A series of pips should appear on the control unit screen.

(*a*) If the pips appear above the sweep, the trigger from the radar set is positive. Comply with the CAUTION above and make sure that the TRIGGER POLARITY SELECTOR (switch 123-1) is set to the + position.

(*b*) If the pips appear below the sweep, the trigger from the radar set is negative. Comply with the CAUTION above and make sure that the TRIGGER POLARITY SELECTOR (switch 123-1) is set to the − position.

(*10*) Connect the range sync pulses from the radar set to the RANGE SYNC connector at the back of the control unit.

(*11*) Remove Cord CD-1105 from jack 121-6 and connect jack 121-7 to jack 120 on the side panel of the control unit.

(*12*) A series of pips should appear on the control unit screen.

(*a*) If the pips appear above the sweep, the range sync from the radar set is positive. Comply with the CAUTION above and make sure that the RANGE SYNC POLARITY SELECTOR (switch 123-3) is set to the + position.

(*b*) If the pips appear below the sweep, the range sync from the radar set is negative. Comply with the CAUTION above and make sure that the RANGE SYNC POLARITY SELECTOR (switch 123-3) is set to the — position.

(*13*) Remove Cord CD-1105 from the test jacks.

(*14*) Turn the range switch to 10 K YD. and reduce INTENSITY.

(*15*) As a final check, manipulate 10 K YD. CENT. and 10 K YD. GAIN to obtain the 10,000-yard sweep. If the sweep now appears normal, both polarity selector switches are set correctly.

58. RECURRENCE FREQUENCY OF SYNC FROM RADAR.

a. If the IFF transmitter fired as often as the radar transmitter, airborne transpondors would be swamped in operational areas containing many IFF interrogators. Therefore every IFF control unit has a division circuit which, while synchronizing each IFF transmitter pulse to a radar transmitter pulse, triggers the IFF transmitter only once for a certain regular number of radar transmitter sync pulses.

b. Paragraph 6 of TM 11-1562, Service Manual, specifies a range of recurrence rates allowable for the IFF transmitter. For example when the sync recurrence rate of Radio Set SCR-784 is divided by 8, the quotient lies between the limits specified in paragraph 6 of TM 11-1562.

c. Determine the sync recurrence rate of the radar set with which Radio Equipment RC-384 is to be used. Divide this rate by 4, 5, 6, 7, 8, 9, and 10. One of the quotients will lie within the limits specified in paragraph 6 of TM 11-1562. For example, if the radar recurrence rate divided by 7 gives a result which falls between the high and low IFF recurrence limits, the division ratio to be used is 7:1. If it should happen that two divisors both give recurrence rates within the limits, choose the divisor which gives the recurrence rate farther from the extremes of the IFF recurrence limits. If the two recurrence rates are equally close to these limits, choose the divisor which gives the lower recurrence rate.

d. Paragraph 35b describes the method of adjusting the division action of Control Unit BC-1378 when the divisor should be 8, for use with Radio Set SCR-784. Figure 36 shows the 8 pips which should be seen during the process. Suppose, for example, that the correct divisor for a different radar set is 6. The procedure of paragraph 35b remains the same except that the DIVISION control should be adjusted to show 6 pips instead of the 8 pips shown in figure 36.

e. The pips seen in the division adjustment process will be below the sweep, as shown in figure 36, only if the transmitter sync from the radar set is negative. If this sync is positive the pips will be seen above the sweep line. The adjustment procedure is the same in either case.

APPENDIX II

OPERATION WITH LOBE-SWITCHING ANTENNA

59. AZIMUTH DETERMINATION WITH LOBE-SWITCHING ANTENNA.

Although the antenna system used with Radio Equipment RC-384 is not designed for lobe switching, circuits are included in the control unit so that it can be used if a lobe-switching antenna system is substituted. With a lobe-switching antenna system, azimuth is determined by matching the heights of two side-by-side pips received from the interrogated transpondor (figs. 68 and 69). These pips are obtained by taking the received signal alternately from two lobes of the antenna, and displacing the signal from one lobe slightly to the right of the signal from the other lobe on the cathode-ray display tube. This is done by a motor-operated switch known as a "lobe switch." The lobe switch alters the electrical characteristics of the antenna without actually moving it, and at the same time shifts the trace on the display screen from side to side. As the antenna is rotated to point to either side of the target, the lobe which is closer to the correct azimuth angle produces the higher pip image (panels A and C of figs. 68 and 69). If the antenna is pointing directly toward the target, the signals received from each lobe are of equal strength, and the two pips on the display screen are of equal height (panels B); the operator then knows that he has directed the antenna to the exact azimuth angle of the target.

60. TECHNICAL OPERATION USING LOBE-SWITCHING ANTENNA.

a. When a lobe-switching antenna is substituted, use this paragraph for information on azimuth determination. For all other operating procedures, refer to chapter 3, section III of this manual.

b. In order to determine the azimuth of the aircraft being interrogated, the process of pip matching is used. This process can be carried out equally well with the range switch in either the 75 K YD. or 10 K YD. position. For the 75 K YD. position, the SPREAD knob on the control unit front panel is adjusted for a pip separation of about ½ inch. When the range switch is in the 10 K YD. position, the SPREAD knob is rotated to its extreme clockwise position. In the 75 K YD. position, the pips may appear any place along the sweep line, depending on the target range (fig. 68). In the 10 K YD. position, the pips from the particular friendly aircraft that is being interrogated will appear at the left end of the sweep line (fig. 69).

c. The double pattern displays the signals picked up on the two lobes of the antenna separately. Where one pip was observed with the SPREAD control in its extreme counterclockwise position, two pips now appear, both representing the same signal. To match these pips in amplitude, it is first necessary to adjust the SENSITIVITY control so that the pips are of moderate height. If they are of sufficient height to overload any part of the equipment, pip matching cannot be accomplished. As the antenna is rotated from a direction different from that of the signal producing the pips in question, through the direction of the signal source, and then to the other wrong direction, the heights of the pips will appear as shown in figures 68 and 69. Proper pip matching occurs when the pips are of equal height as shown in the B panels of figures 68 and 69.

d. If only one pip appears on the screen of the control unit and time does not permit trouble shooting by maintenance personnel, proceed as follows:

(*1*) Convert the antenna to a single-beam dead-ahead type. (Obtain the required information from the service manual for the lobe switch.)

(*2*) Proceed with azimuth determination as in chapter 3, section III of this manual.

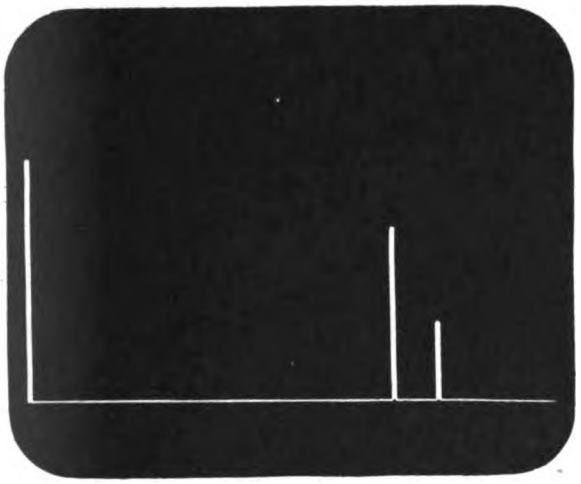

Figure 68—Azimuth determination with a lobe-switching antenna, 75 K YD.

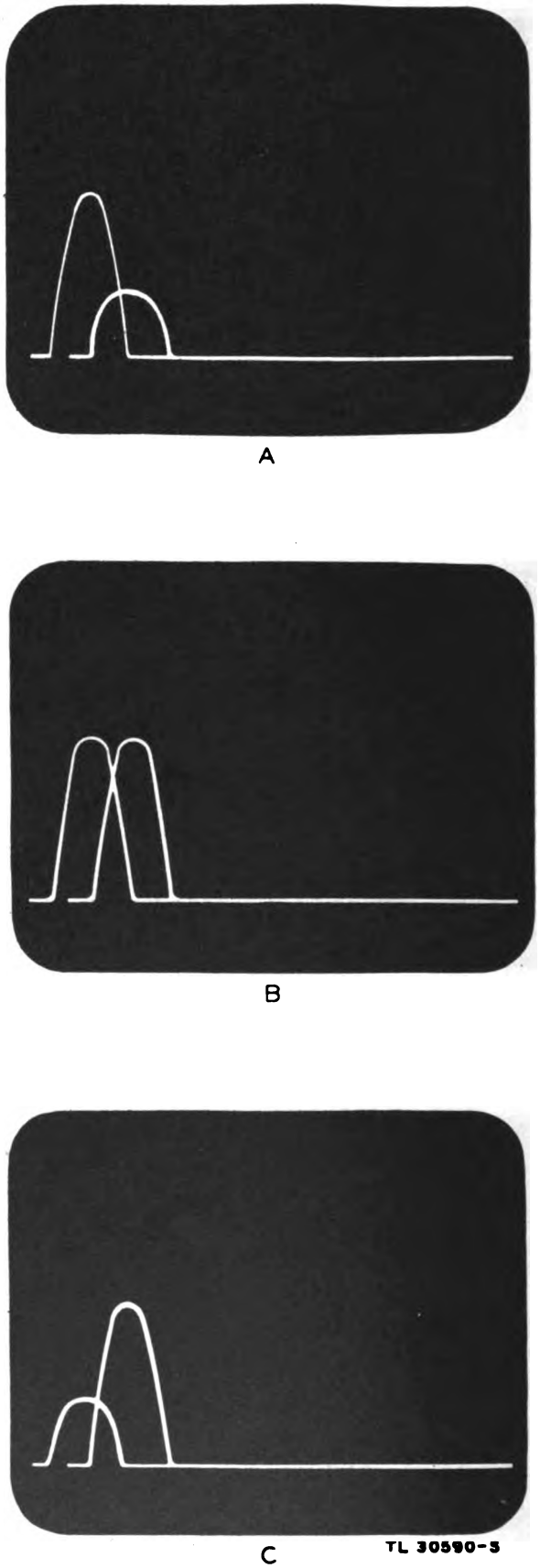

Figure 69—Azimuth determination with a lobe-switching antenna, 10 K YD.

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