TM 11-1312

R DEPARTMENT TECHNICAL MANUAL

TECHNICAL OPERATION MANUAL

DIO SETS SCR-582-A AND SCR-582-T6

GENERAL DESCRIPTION, OPERATING INSTRUCTIONS

AND EQUIPMENT PERFORMANCE LOG

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WASHINGTON 25, D. C., 20 JULY 1944

TM 11–1312, Technical Operation Manual, Radio Sets SCR–582–A and SCR–582–T6 is published for the information and guidance of all concerned.

[A.G. 300.7 (15 JUN 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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IC 11: T/O & E 11–107; 11–237; 11–592; 11–587; 11–597; 11–617; 11–400, Sig AW Org – Radar Rep Platoon (C); 11–500, Sig Serv Org – Radar Instl and Maint Team (EC).

(For explanation of symbols, see FM 21–6.)

CONTENTS

DESTRUCTION NOTICE

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

WHEN – When ordered by your commander.

HOW – 1. Smash – Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut – Use axes, handaxes, machetes.
3. Burn – Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives – Use firearms, grenades, TNT.
5. Disposal – Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT – 1. Smash – Transmission line, transmitter oscillator, all tubes meters, relays, spare parts, and engine unit generator.
2. Cut – All cables.
3. Burn – All buildings, tower, and all technical manuals.
4. Bend – Transmission line, cabinet racks in frames.
5. Bury or scatter – Remains of transmitting oscillator, and all other parts after the above steps have been completed.

DESTROY EVERYTHING

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if operating personnel fail to observe safety precautions.

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

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

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:

Keying Unit BC–912–(*)
Modulator BC–922–(*)
Radio Frequency Unit BC–916–(*)
Power Unit PE–192–(*)
Oscilloscope BC–954–(*)
Oscilloscope BC–956–(*)

REFERENCE NOTICE

TM 11–1312, Technical Operation Manual, is one of three technical manuals on Radio Set SCR–582–(*). It is used in conjunction with TM 11–1412, Preventive Maintenance Manual, and TM 11–1512 (when published), Service Manual. This manual, TM 11–1312, includes a general description of the radio set and instructions for installation, operation, and use of the Equipment Performance Log. It is prepared to acquaint radar operators and radar repairmen with the general operating features of the equipment and to provide a practical guide on how to use it. The book is written and arranged in such a manner that it gives the reader a logical description of the technical operation of the radar set and attempts to answer all questions that may arise in the reader's mind. This book is an introduction to the set and forms the basis for further study and work with the equipment.

SPECIAL NOTICE FOR THE DIFFERENT MODELS OF RADIO SET SCR–582–(*)

The term Radio Set SCR–582–(*) in this manual refers to both Radio Set SCR–582–A and Radio Set SCR–582–T6. Other than minor differences in the specific location of a few parts within components and the external appearance of the cabinets, controls, and nameplates, the two radar sets are identical.

FIRST AID TREATMENT FOR ELECTRIC SHOCK

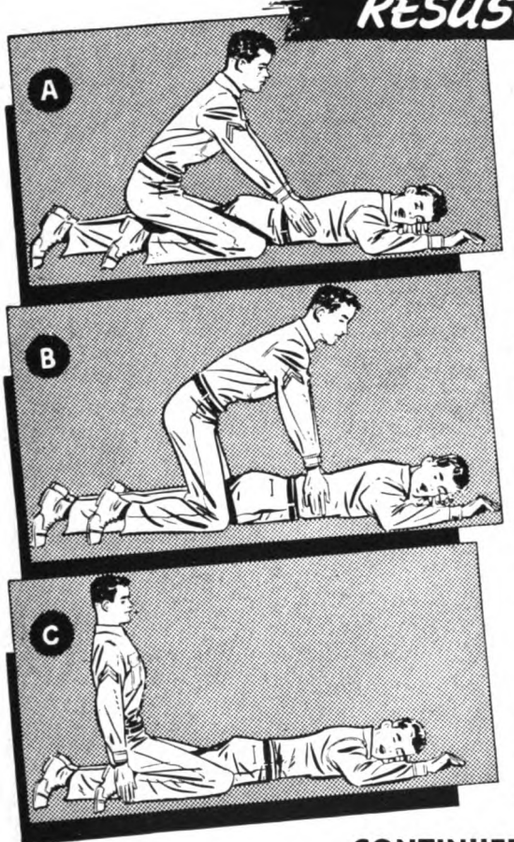
I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

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

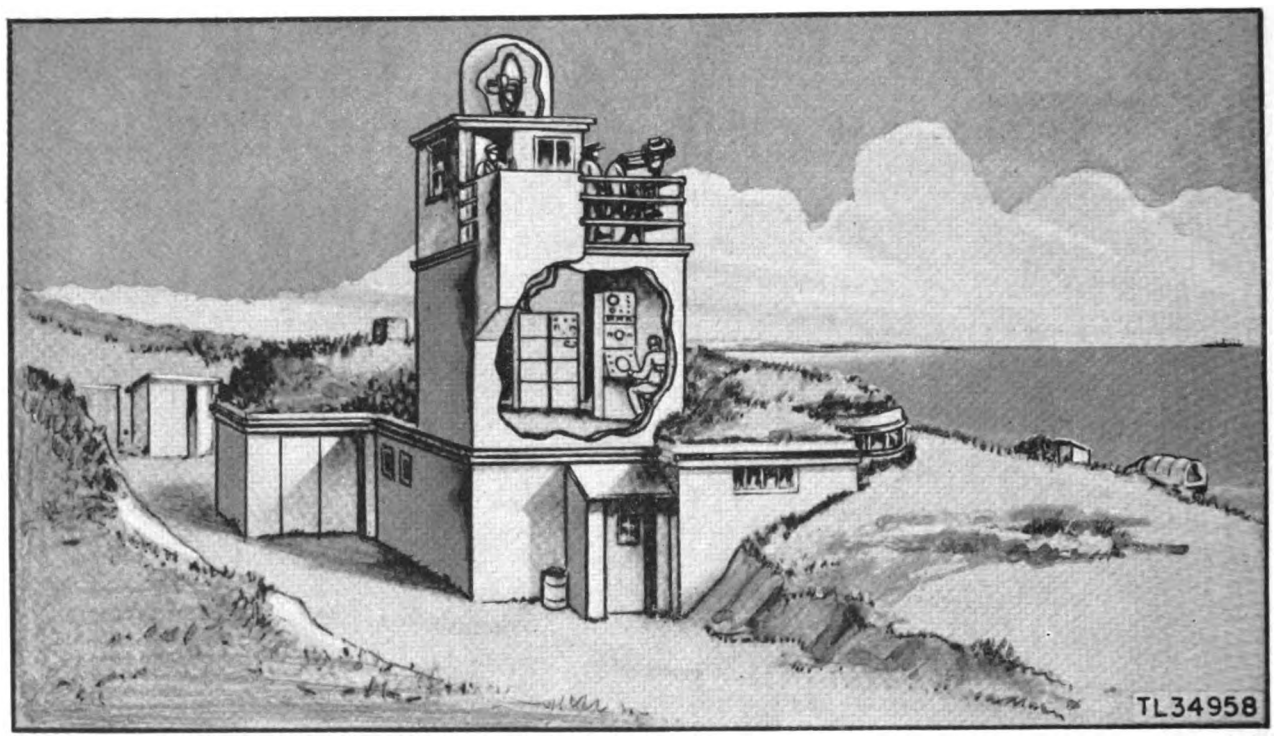


Figure 1. Radio Set SCR–582–(*).

This manual together with TM 11-1412 and TM 11-1512 (when published), supersedes TM 11-1112, 15 October 1943.

CHAPTER 1
GENERAL DESCRIPTION

Section I. PURPOSE OF EQUIPMENT

1. Introduction

Radio Set SCR–582–(*) is a fixed type radar unit (fig. 1) designed for use in locating surface vessels. The operation of the set is independent of both light and weather conditions. This set will detect and locate surface vessels up to a maximum range of 90,000 yards or approximately 45 nautical miles.

a. The radar set is usually installed in harbor areas. The set is used both to supply target locations for intelligence purposes and to direct fire control radar sets and searchlights to the targets.

b. Radio Set SCR–582–(*) may also be used for aircraft detection. Its use for this purpose is limited, however, since the elevation of the antenna cannot be controlled by the radar operator. Because the transmitted beam is usually directed in a horizontal direction, only low-flying aircraft can be detected.

2. Target Information

In addition to detecting the presence of surface vessels within 90,000 yards of the equipment, Radio Set SCR–582–(*) furnishes the information necessary to fix a vessel's position with respect to the radar set. This information is the azimuth and range of the target.

a. **Meaning of Azimuth.** As shown in figure 2, the azimuth (or azimuth angle) of a target is its horizontal clockwise direction with respect to a specified reference direction. In the figure, the reference direction is south. An imaginary reference line, OS, starts at the radar unit and extends southward. With the target at position A, the line OA indicates the direction of the target in azimuth. The angle between lines OS and OA is the angle of azimuth, or more simply, the azimuth. This angle is expressed in degrees.

b. **Meaning of Range.** The term "range" means the straight-line distance between the radar unit and the target. In the figure, the distance OA represents the range and is expressed in yards.

Section II. FUNCTIONING OF EQUIPMENT

3. Range Determination

The transmitter of the SCR–582–(*) generates, at periodic intervals, short bursts of radio frequency energy which are radiated into space by the antenna. If this radio frequency energy strikes a target, such as a surface vessel, a portion of it is reflected, travels back to the radar antenna, and is applied to the receiver. Since the speed of radio waves is known, if the time that elapses between the transmission of the radio energy and the reception of the reflected "energy" is measured, the total distance that the radio waves have traveled (and thus the range of the target) is determined. The SCR–582–(*) measures this length of time electronically and gives the range of the target in yards.

4. Azimuth Determination

During operation, the antenna of Radio Set SCR–582–(*) rotates so as to *scan* the entire horizon. Scanning is the process of examining space with radio waves sent out from the rotating antenna of the radar unit. If a target lies in the path of the radio waves and less than 90,000 yards away, its presence will be detected. When scanning or searching through 360 degrees in azimuth, the antenna describes a circle and completes about ten revolutions in a minute. Assume that at a given instant the antenna is aimed directly at a target. Since the speed of the radio wave is so much greater than that with which the antenna turns, it is possible for a radio wave to leave the antenna, go out to the target, be reflected, and

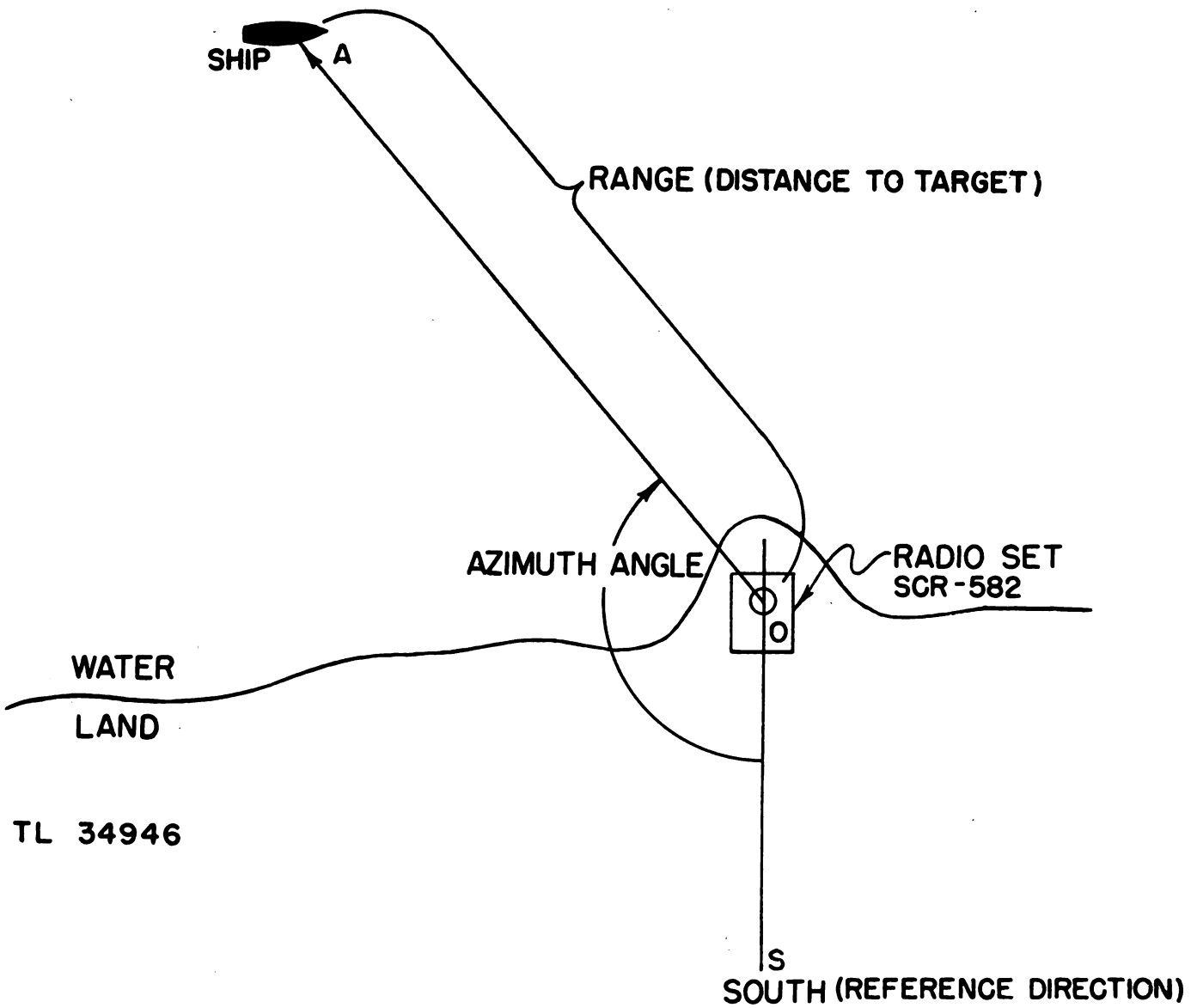


Figure 2. Meaning of range and azimuth.

travel back to the antenna before the antenna has had time to turn away from the direction of the target. By ascertaining the direction in which the antenna is pointing, the azimuth of the target is obtained.

5. Target Information Indicators

Radio Set SCR–582–(*) employs two target indicators, called the Plan Position Indicator and the A-oscilloscope.

a. **Plan Position Indicator.** The range and azimuth of all targets that lie in the path of the radio beam within the 90,000 yard range of the equipment are displayed on the screen of the Plan Position Indicator. This cathode-ray tube, also known as the PPI oscilloscope, can be considered as the searching indicator for all targets located within the 90,000 yard range of the set. The face of the PPI scope used in the set is illustrated in figure 3.

(1) *Direction indicating line.* During operation, the screen of the indicator itself shows a fine line radiating from the center of the tube toward its edge. This line, developed by the cathode-ray beam, is the "direction indicating line" or "sweep trace." If the antenna is turning, this sweep trace rotates in synchronization with it. Thus it indicates at any instant the direction in which the antenna is pointing.

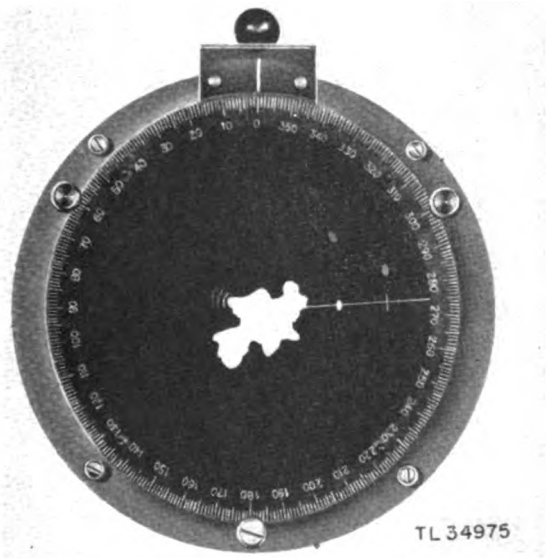


Figure 3. PPI oscilloscope face.

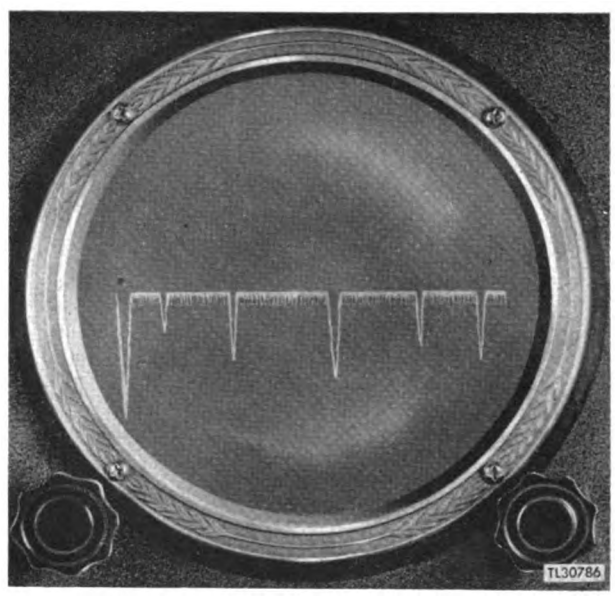


Figure 4. A-oscilloscope face.

(2) *Target echo.* A target echo appears as a bright spot along the direction-indicating line. The linear distance from the center of the screen out to the target echo represents the *range* of the target, and the direction in which the indicating line is pointing when passing through the target echo represents the *azimuth.*

(3) *Calibrated shield.* The face of the PPI scope is furnished with a transparent shield, calibrated along its outer edge in 360 equal divisions. Each division represents one degree. A radial line extending from the center to the outer rim of the shield can also be seen. In operation the shield can be rotated by means of four small projections on its rim until the radial line on the shield passes through the target echo.

(4) *Marker.* The frame in which the indicator is set carries a marker whose position is fixed vertically above the center of the screen. This marker, when used in conjunction with the calibrated shield, marks the azimuth of the target. The exact method used in determining both the range and the azimuth will be discussed in a later section on operating procedure.

b. **A-Oscilloscope.** The A-oscilloscope has a 5-inch screen on which the sweep trace appears as a horizontal line across the center of the screen. A target echo appears on this screen as a sharp vertical pip extending downward from the sweep trace (fig. 4). The distance from the left end of the sweep trace to the target echo on the screen corresponds to the distance between the radar set and the target, or the *range* of the target. When the antenna is aimed directly at a target, the height of this vertical pip is at a maximum, and as the antenna is turned away from the target the echo becomes smaller. Thus when the antenna is rotated continuously, the picture presented by this oscilloscope also varies continually and so provides little useful information as an indicator of range and azimuth. Its primary use, as will be discussed later, is to assist in tuning the system for optimum reception.

Section III. COMPONENTS OF EQUIPMENT

6. General

Radio Set SCR–582–(*) consists of the following four main components: (1) Cabinet Rack (control) FM–52–(*), (2) Cabinet Rack (Radio Frequency) FM–53–(*), transmitter cabinet, (3) an amplidyne motor-generator, and (4) Antenna Equipment RC–162–(*). A plywood housing (or blister) for the antenna is furnished. This serves to protect the antenna from dirt and weather.

7. Control Cabinet

A full-length front view of the control cabinet is shown in figure 5. The cabinet is 22 inches wide, 18 inches deep, and 76 inches high, with a desk extending 15½ inches from the front of the cabinet at the proper level for a seated operator. The complete cabinet with all components in place weighs 520 pounds. This main component contains, one above the other, the following units, (from bottom to top of the cabinet) : Power Unit PE–192–(*), Radio Receiver BC–952–(*), Oscilloscope BC–954–(*) (PPI scope); Oscilloscope BC–956–(*), (control central), and Panel (Power) BD–112–(*). From a plug at the rear base of the control cabinet, a single cable leads to the primary power source. From a square opening, also located at the rear base of the cabinet, five large insulated cables pass to the transmitter cabinet.

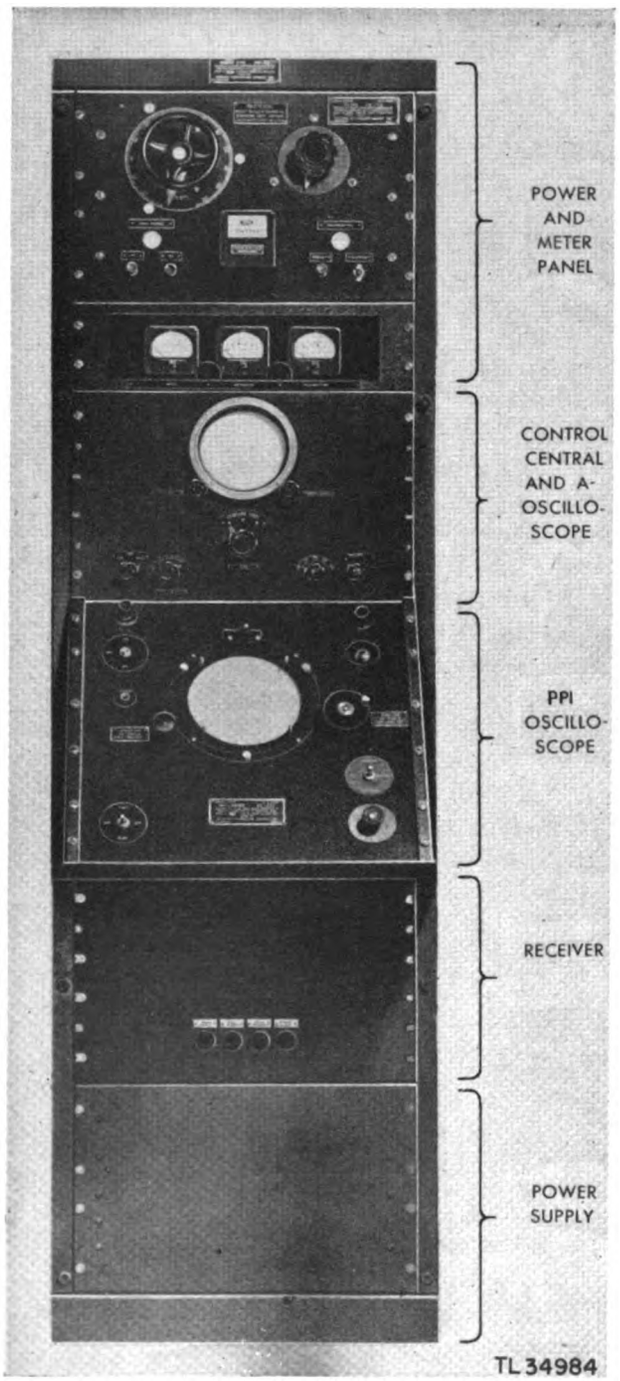


Figure 5. Front view of control cabinet.

8. Transmitter Cabinet

Figure 6 shows a full-length front view of the transmitter cabinet, with the front doors closed and all side panels in place. This cabinet is 32 inches wide, 22½ inches deep and 52 inches high; with all component units in place it weighs 820 pounds. It contains Keying Unit BC–912–(*) the transmitter oscillator, a beating or "local" oscillator, the receiver preamplifier and crystal mixer, part of the radio-frequency transmission and reception system, an automatic pressure pump and dehydrator, Amplidyne Amplifier BC–926–(*) for the scanning controls, and a selenium rectifier power supply. The spun-glass air filter on the lower left-hand corner of the cabinet filters the air drawn into the cabinet by the ventilating fan while the fan cools the transmitter oscillator.

9. Amplidyne Motor-Generator (fig. 7).

This unit, together with a set of synchronous repeaters and an amplifier, is used as the drive and control element of the antenna system. The unit weighs 117 pounds; its dimensions are 25 inches by 13 inches by 12 inches.

10. Antenna Equipment

The antenna equipment is shown in figure 8. The unit consists of a 48-inch diameter parabolic metal reflector mounted on a rotating geared base, with a small dipole antenna located at the focal point of the reflector. The dipole antenna and a second reflecting or dummy dipole are contained in a hollow sphere of polystyrene. The electric motor supplying power for rotation and a synchronous repeator are mounted on the base of the assembly outside the rotating support of the reflector. The entire assembly weighs 210 pounds.

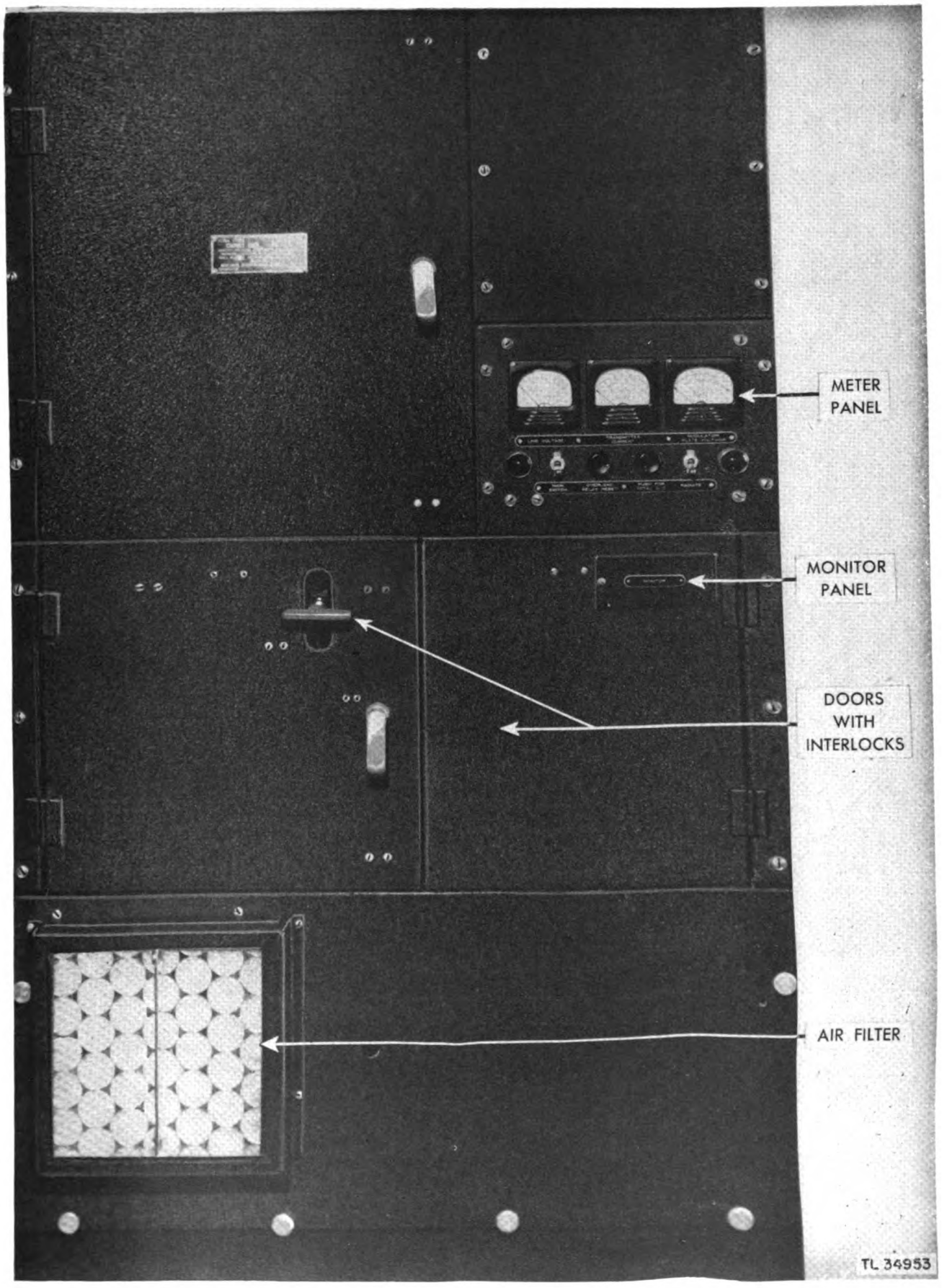


Figure 6. Front view of transmitter cabinet.

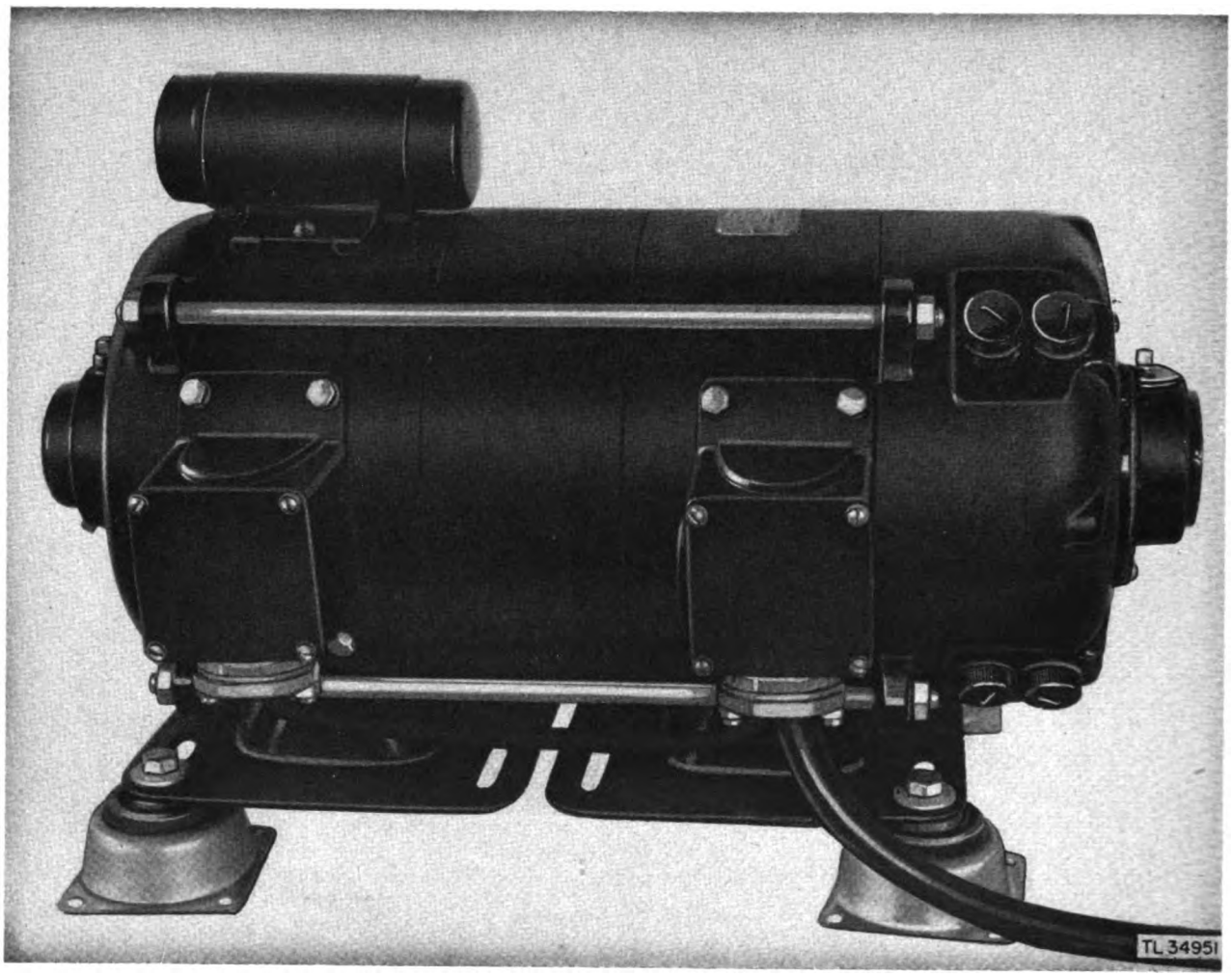
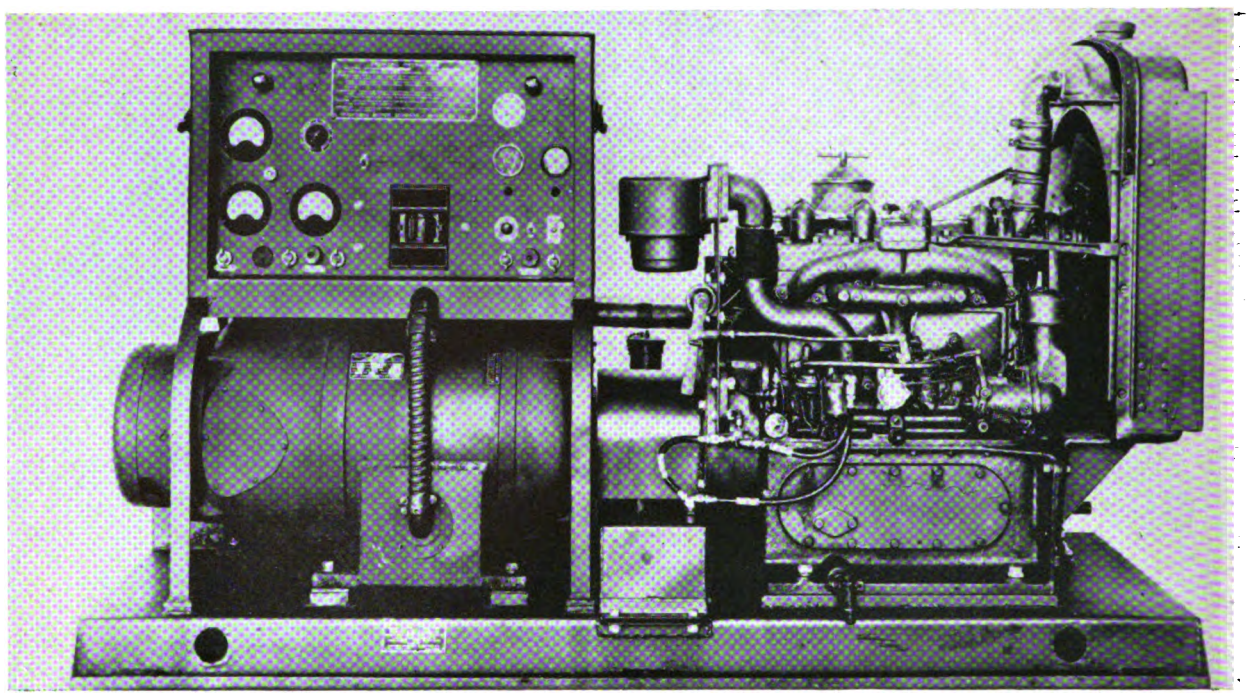


Figure 7. Amplidyne motor-generator.

Figure 8. Antenna equipment.



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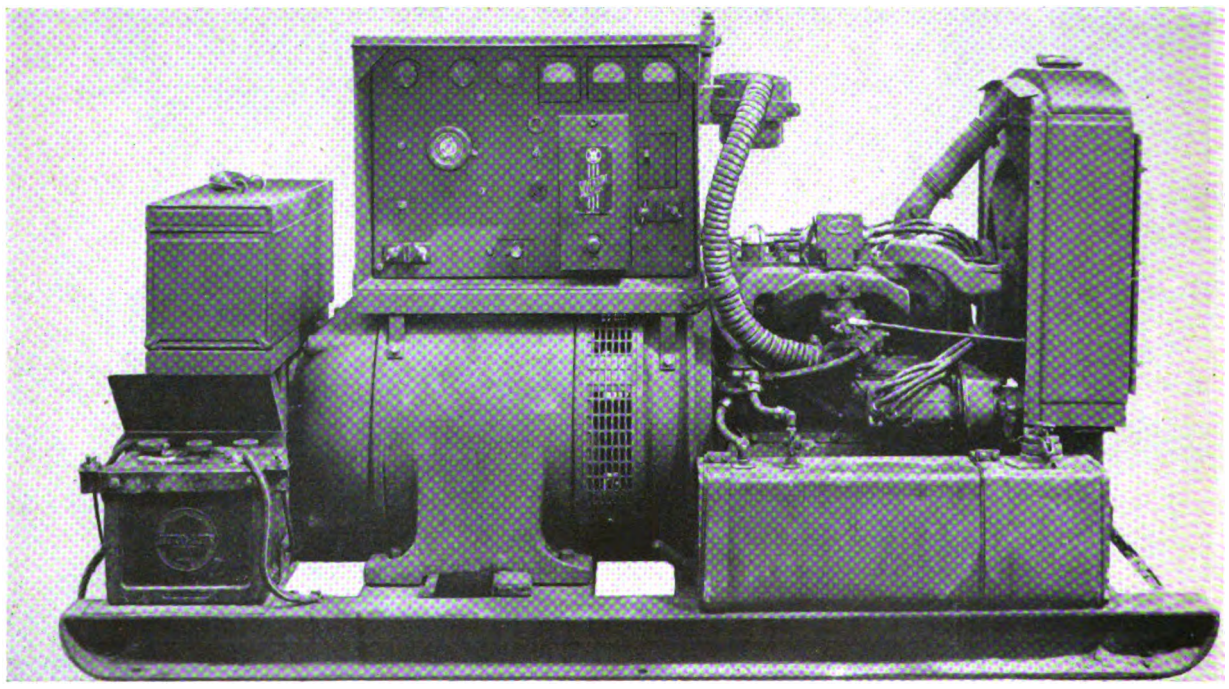
POWER UNIT PE — 196A



TL 34949B

POWER UNIT PE — 196B

Figure 9. Power Units PE–196–A and PE–196–B.

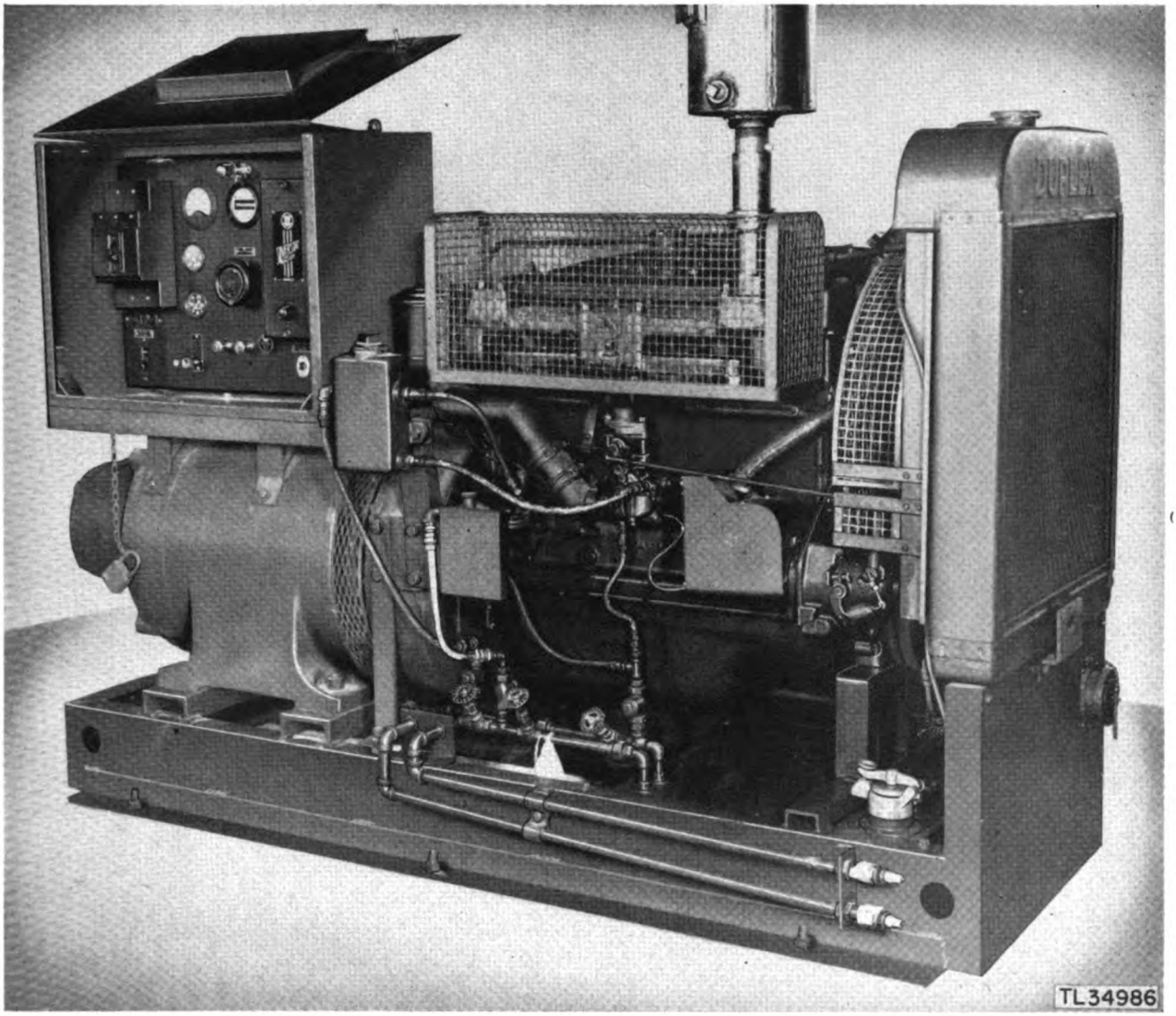


Figure 10. Power Unit PE–127–A.

11. Power Source

Radio Set SCR–582–(*) requires 1800 watts of 115-volt, 60-cycle, a-c power. When commercial power of the proper voltage and frequency is available, it is used. In areas where commercial power is not available, gasoline-driven power generators are provided with each SCR–582–(*). One is used as a spare to prevent failure of the power unit from interfering with operation of the SCR–582–(*) for any length of time. The different types of power units that have been used with the SCR–582–(*) are Power Unit PE–196–A, Power Unit PE–196–B, and Power Unit PE–127–A. The PE–196–A and the PE–196–B (fig. 9) can both furnish 5 kw of a-c power at 60 cycles and 120 volts. The PE–127–A (fig. 10) is rated at 7.15 kilowatt of a–c power at the same frequency and voltage.

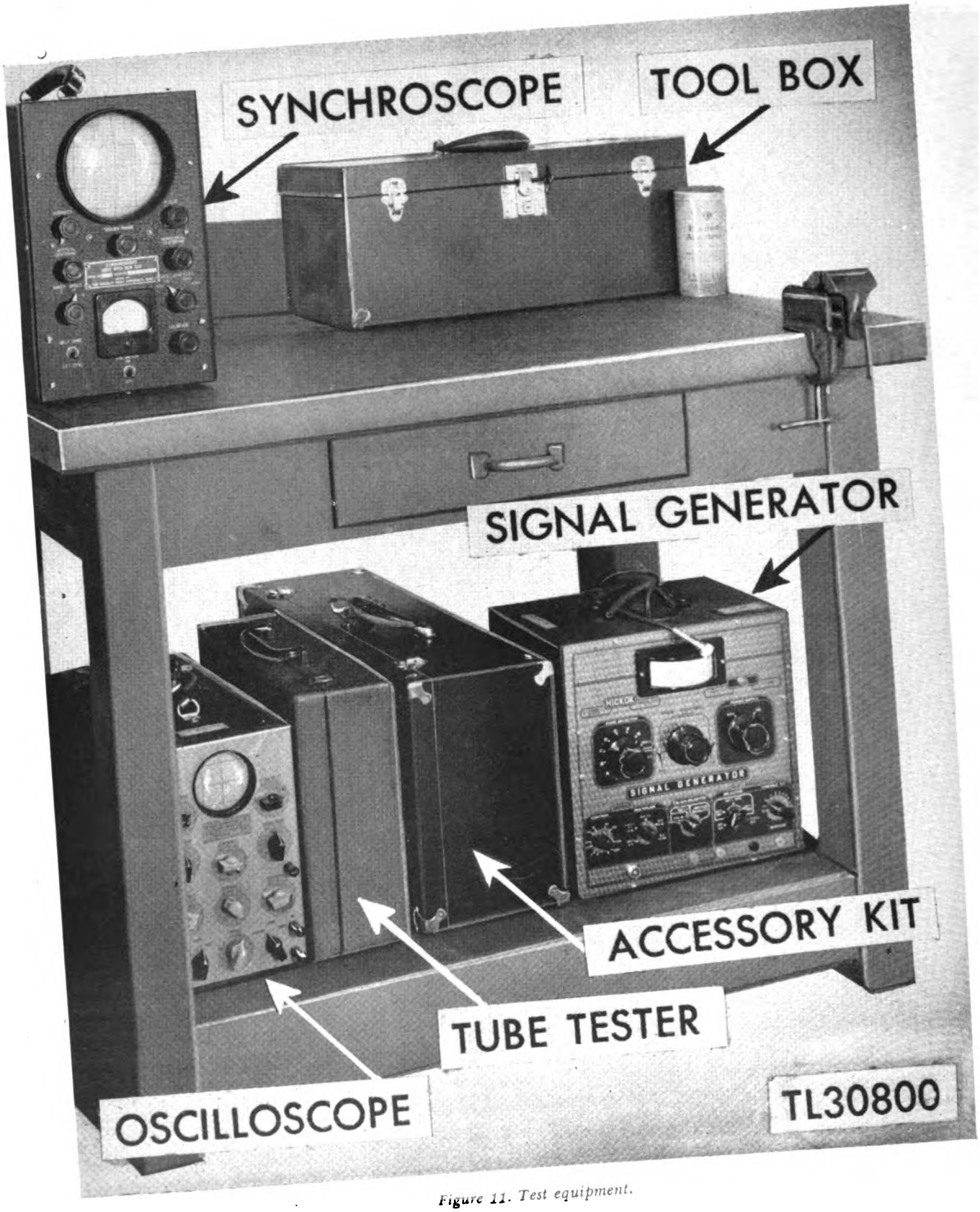


Figure 11. Test equipment.

12. Test Equipment

Various items of test equipment (Test Equipment RC–202) and tools (Tool Equipment TE–102) are included with the Radio Set SCR–582–(*). These are shown in figure 11 and are listed below:

a. Tube tester for checking all common-type tubes.

b. Three-inch cathode-ray oscilloscope for observing voltage and current wave shapes.

c. Signal generator for aligning the radio receiver.

d. Synchroscope used for checking waveforms in the modulator and driver.

e. Tool box containing an assortment of tools used in the installation and servicing of the equipment.

f. Accessory kit containing the following items:

(1) Wavemeter for measuring transmitter and receiver frequency.

(2) Bolometer for measuring standing wave ratios.

(3) Type-H amplifier for use with the bolometer and wavemeter.

(4) Service testmeter for taking voltage, current, and resistance measurements.

(5) Capacity voltage divider and 1,000-ohm, 100-watt resistor used with the synchroscope.

Table I. List of major components.

Name	Common usage	Signal Corps designation
Antenna assembly.	Antenna	Antenna Equipment RC–162–(*)
Transmitter cabinet.	Transmitter cabinet.	Cabinet Rack (Radio Frequency) FM–53–(*)
Modulator	Modulator	Modulator BC–922–(*)
Keying Unit	Keying Unit	Keying Unit BC–912–(*)
Amplidyne amplifier.	Amplidyne amplifier.	Amplidyne Amplifier BC–926–(*)
Local oscillator.	Local oscillator.	
Preamplifier and crystal mixer.	Preamplifier	
Radio frequency unit.	R-f unit	Radio Frequency Unit BC–916–(*)
Selenium rectifier.	Selenium rectifier.	
Dehydrator and compressor.	Dehydrator	
Control cabinet.	Control cabinet.	Cabinet Rack (Control) FM–52–(*)
Power control and meter panel.	Control panel	Panel (Power) BD–112–(*)
Power supply for oscilloscopes.	Power supply for oscilloscopes.	Power Unit PE–192–(*)
A-oscilloscope	Control central.	Oscilloscope BC–956–(*)
PPI oscilloscope.	PPI scope	Oscilloscope BC–954–(*)
Receiver	Receiver proper.	Radio Receiver BC–952–(*)
Amplidyne motor-generator.	Amplidyne	
Test equipment.	Test equipment.	Test Equipment RC–202
Tool equipment.	Tools	Tool Equipment TE–102

CHAPTER 2

INSTALLATION

Section I. SITING

13. Tactical Considerations

The SCR–582–(*) is designed for use in harbor areas. Consequently, the area in which the set is installed will be determined by the mission of the equipment.

14. Technical Considerations

The exact location of the SCR–582–(*) within the desired area of operation depends upon certain facts relating to the performance of the equipment.

a. **Field of View.** The ultra-high-frequency waves transmitted and received by the SCR–582–(*) travel in straight lines similar to the light beam from a searchlight. These radio beams are capable of penetrating darkness, fog, rain, or clouds, all of which would normally conceal a target from detection by optical equipment. However, just as light rays from a searchlight cannot penetrate through solid substances, the SCR–582–(*) cannot "see" through solid obstructions such as mountains, hills, buildings, or trucks.

(1) A hill or a mountain tends to create a "bind spot" for the equipment. Any target in this blind spot would not be "seen" by the radar set. In some cases this screening may be desirable. It can be used to shield one radar set from another; and similarly, unwanted signals from a landward direction can be avoided.

(2) Obstructions very close to the antenna will give no indications on the oscilloscope. However, large masses or large surfaces of metal close to the antenna may distort the beam pattern so as to cause inaccuracies when tracking targets at greater ranges. It is probable that the effect will be small unless the disturbing surface is very large, close to the antenna, and a good conductor.

(3) Lighthouses, water tanks, power transmission lines, and radio transmitting antennas cause no major difficulties if not located close to the radar set. They will cause permanent echoes and make difficult the separation of signals from any targets near them. The permanent echoes, however, from such objects make excellent orienting points, provided no other reflecting objects are near them.

b. **Ground Elevation.** The elevation of the SCR–582–(*) antenna above the water level is of importance. In general, the higher the antenna above water level the greater the maximum range. If, however, the antenna is placed too high above the water level, it cannot "see" targets at close range because the antenna can be depressed (only) 3 degrees from the horizontal and "sees over" nearby targets. Practical experience has indicated that complete coverage of short ranges cannot be obtained with an antenna height above 200 feet. The minimum height of the site (antenna) is determined by ground and wave disturbances and has been found to be 50 feet. Between the upper and lower limits, the best antenna height has been determined to lie between 100 and 150 feet.

Section II. SETTING UP

15. General

The buildings for the SCR–582–(*) are erected by special crews. Only the installation of the radar set components is described here. The major components are: the antenna equipment (fig. 8), the transmitter cabinet (fig. 6), the control cabinet (fig. 5), and the amplidyne generator (fig. 7). If sufficient elevation is obtainable, the antenna equipment can be mounted on the roof of the building housing the other components. Figure 12 shows an installation on a cliff where it was possible to mount the antenna on a short

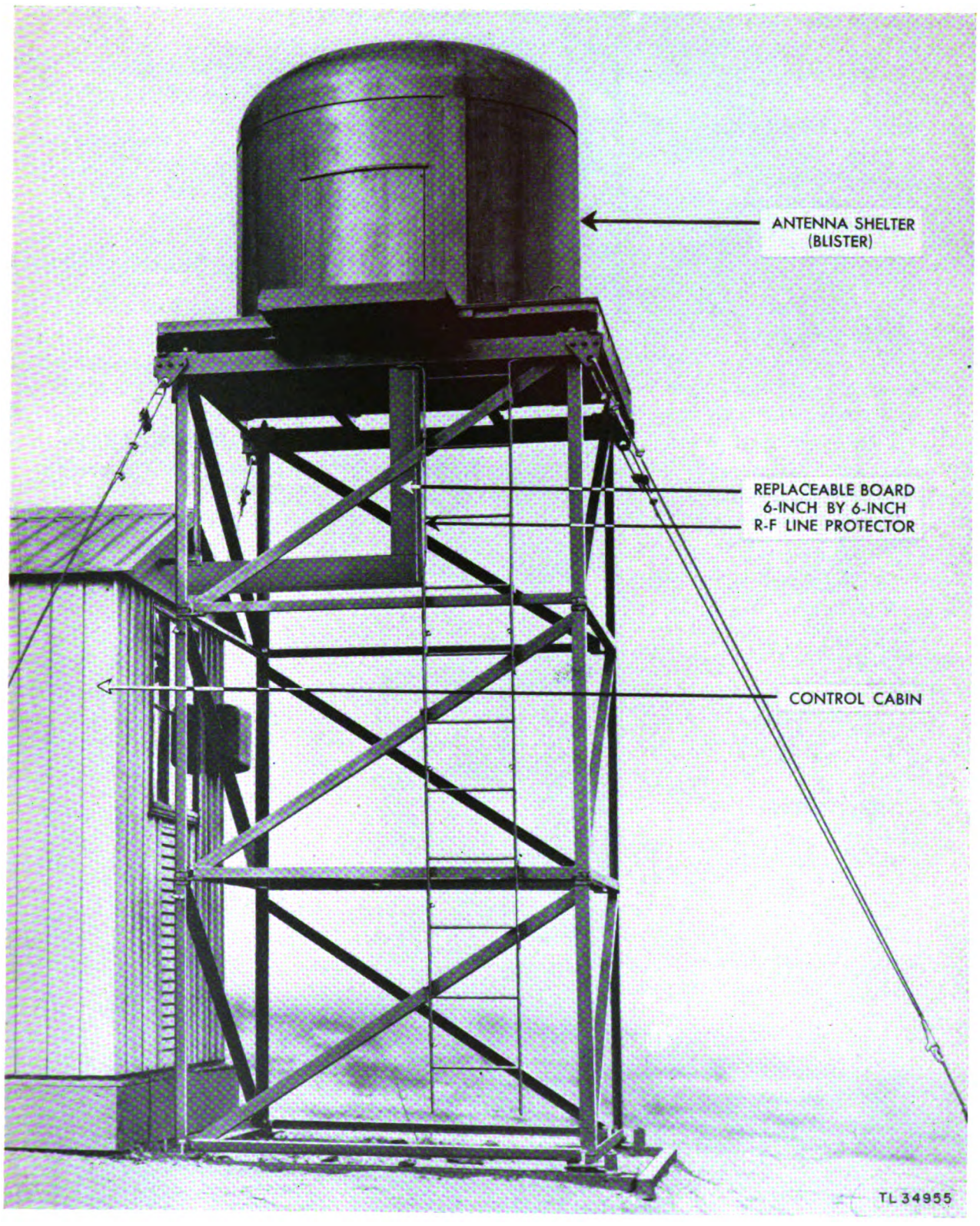


Figure 12. Radio Set SCR–582–(*) installed on a cliff.

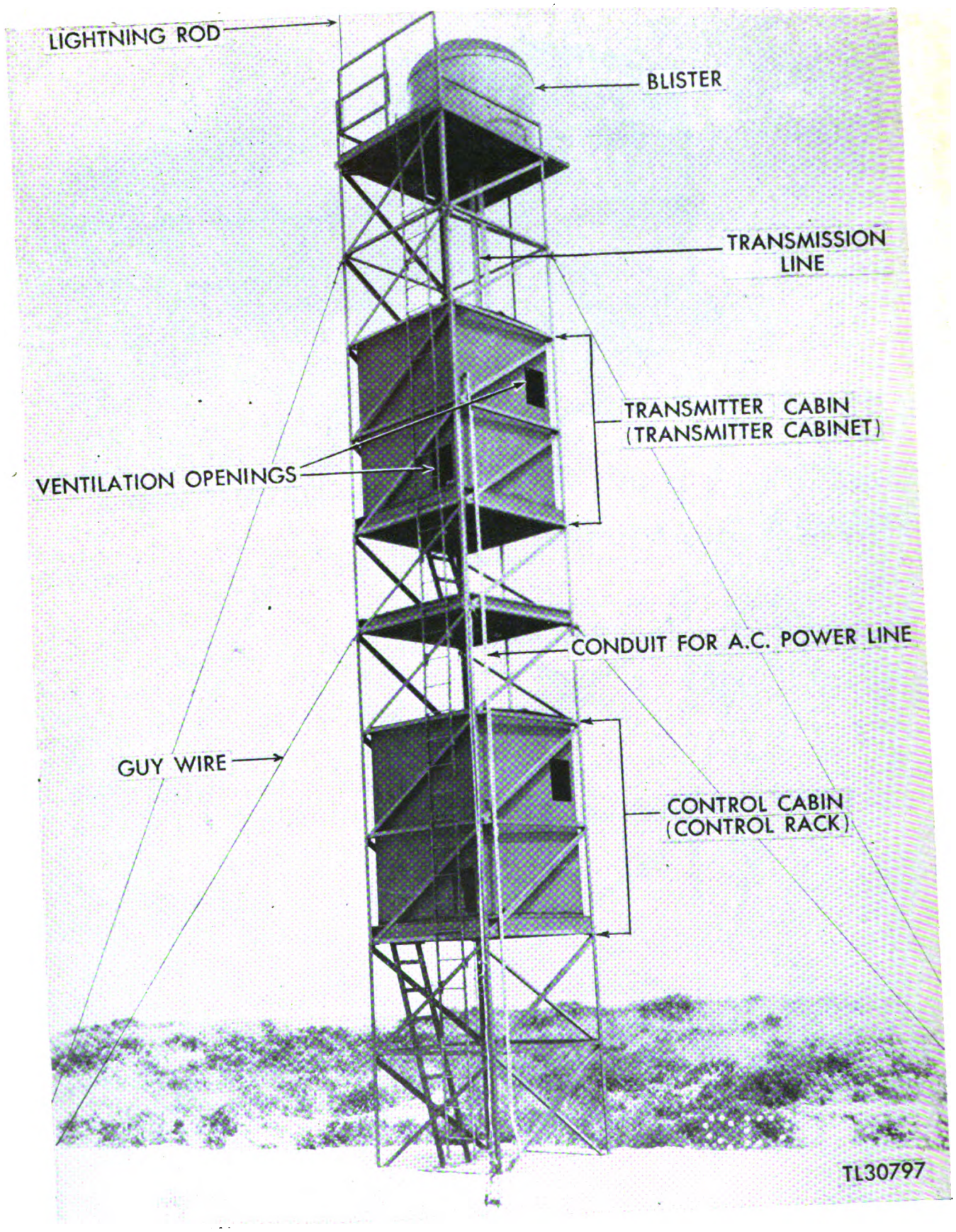


Figure 13. Radio Set SCR–582–(*) installed in a tower.

tower adjacent to the building. Figure 13 shows an installation in which the radar set components were mounted in the antenna tower. In such cases the transmitter cabinet and the control cabinet need not be in the same room. The primary consideration is that the transmitter cabinet should be within 25 feet of the antenna. If this requirement is met, the location of the control cabinet with relationship to the transmitter cabinet should be decided according to the space available.

16. Crating of Components

Radio Set SCR–582–(*) is delivered at the installation point in nine numbered wooden cases (exclusive of cases containing spare parts) as follows:

a. Box No. 1 contains the antenna housing.

b. Box No. 2 contains the antenna equipment (complete antenna system, reflector, and base).

c. Box No. 3 contains the r-f transmission line and parts.

d. Box No. 4 contains the transmitter cabinet, containing: modulator, driver, modulator control panel, receiver preamplifier and crystal mixer, transmitter tube and associated elements, selenium rectifier, amplidyne amplifier, and compressor unit.

e. Box No. 5 contains the control cabinet, including: operator's desk, power and meter panel, control central and A-Oscilloscope, radio receiver, and power supply for oscilloscopes.

f. Box No. 6 contains the PPI scope.

g. Box No. 7 contains the amplidyne motor-generator.

h. Box No. 8 contains the cables, each numbered.

i. Box No. 9 contains the accessories and tool kit.

17. Unpacking Components

Open Box No. 9, containing the tool kit and accessories. This box is provided with a hinged top and padlock, and is intended to serve as a permanent storage chest for its contents. Unpack the remaining boxes, one by one, as the installation proceeds.

18. Antenna Equipment and Housing

The antenna equipment, packed in Box No. 2, is already mounted on its base. The rectangular metal base is to be bolted securely, through the holes provided, to a solid, level area on the roof of the installation structure. The roof must be clear of any large metal obstructions and the antenna platform must be level. The plywood housing, designed to be placed over the finally installed antenna equipment to protect it from dirt and weather, is packed in box number 1.

a. **Antenna Equipment.**

(1) Fasten a ¾- or 1-inch plywood base or flooring to the level antenna platform. It should be 6 feet square to cover the area required for the blister.

(2) Fasten a piece of canvas to the plywood base (figure 14). A circle having a radius 3 inches less than that of the inside of the antenna blister should be cut in the canvas.

(3) Remove the canvas circle and cement the rest of the canvas to the plywood base.

(4) Cut a 6-inch square hole in the center of the platform (fig. 14) to accommodate the short section of coaxial line projecting downward from the base of the antenna system.

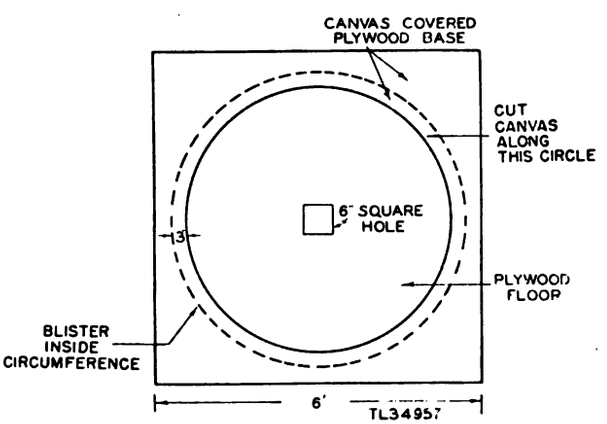


Figure 14. Blister platform.

(5) Mount the antenna equipment on the platform. Drill four holes in the platform and bolt the rectangular base of the antenna to the platform.

(6) Drill a 1-inch hole in the platform to let the cable pass from the transmitter cabinet to the antenna. It is recommended that another 1-inch hole be drilled for an a-c service plug. Both these holes and the one under the base of the antenna system must be well packed to keep out dirt and grit injurious to the antenna system.

(7) Screw the special antenna assembly on the end of the feed line. The antenna assembly consists of the dipole antenna in its hollow plastic shell, attached to a short piece of coaxial transmission line. This small but essential part of the antenna equipment is shipped fastened inside the

shell of the reflector. It must be screwed tightly into place on the end of the tapered feed-line which projects forward from the center of the reflector. The open end of the feed-line is provided with a rubber gasket, which pressure-seals the union of the two pieces of line. A "silver bullet" line-connector is provided to join the inner conductors across the union. This bullet is the shorter one of the two which will be found fastened with scotch tape to one of the supporting arms of the reflector. It is important that this bullet be firmly in place, with the slotted ends spread to make a snug contact, and that the rubber gasket be in place on the outer conductor of the feed-line when the union is made. In screwing the antenna assembly on the end of the feed-line, be sure that when it is finally in position the dipole antenna itself is *horizontal.*

b. **Antenna Housing.**

(1) Apply varnish or paint (nonmetallic) to the house (blister) before installation to protect the wood from weather. The following paints and varnishes are acceptable:

(*a*) Tuf-On Aircraft Spar Varnish No. 72 (not more than two coats recommended unless absolutely necessary). Government specifications on this item: AN–TT–V–118.

(*b*) Tuf-On Camouflage Paint No. 261 (one coat only). United States Air Corps specifications No. 2.

(2) Set the blister in position with the door facing landward.

(3) With a long-shank extension bit, drill a minimum of six $\frac{3}{8}$-inch holes through the mounting ring fastened along the inner wall at the bottom of the blister (fig. 15).

(4) With the use of wedges, raise the blister about one inch above the antenna platform and spread a heavy layer of caulking compound over the surface of the canvas on which the blister will rest.

(5) Remove the wedges and force the house in the caulking compound down to the canvas on the plywood floor.

(6) Fasten the blister to the platform (fig. 15) by using bolts, washers, and nuts.

(7) Smooth the remaining caulking compound evenly inside and outside the blister wall.

(8) Check for operation and fitting of the weathertight door which gives access to the blister. Whenever the door is closed, it should be protected with the canvas door cover, properly fastened.

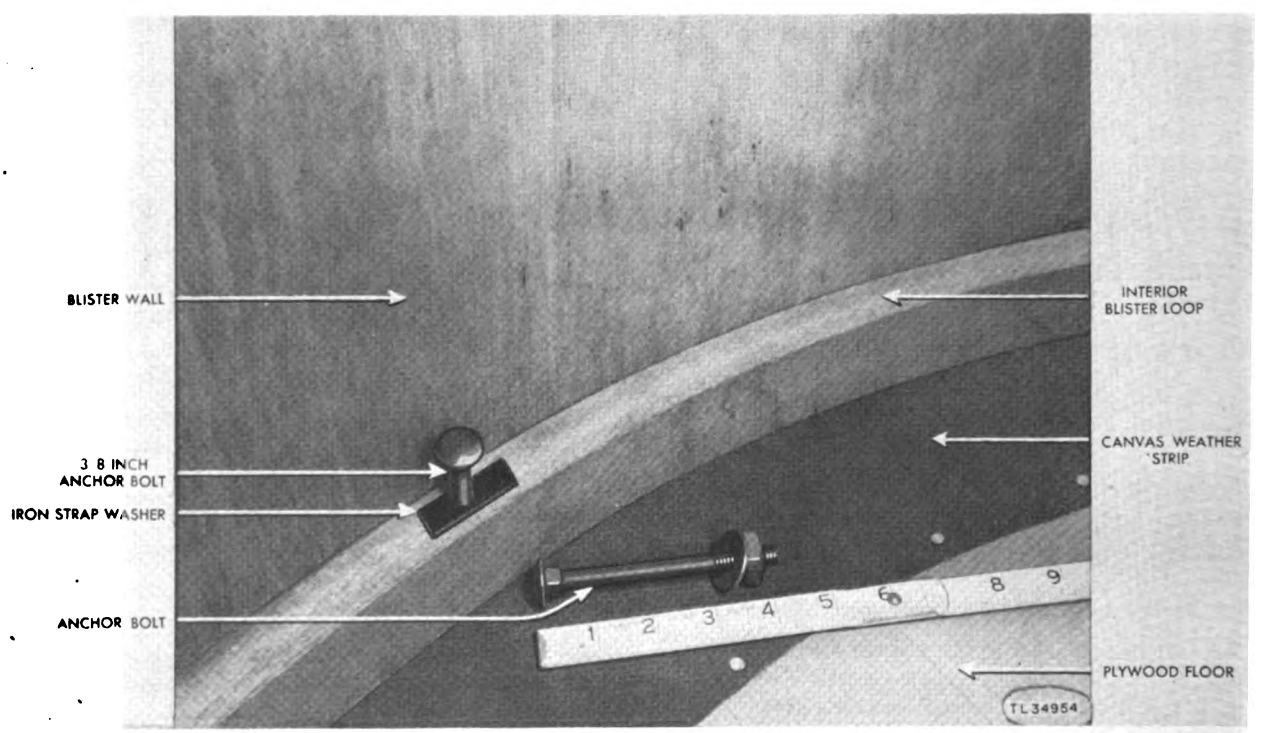


Figure 15. Fastening blister to platform.

19. Control Cabinet and Indicator Assembly

The control cabinet packed in Box No. 5 is complete on shipment except for the PPI scope assembly which is packed in Box No. 6. The control cabinet should be placed in a room conveniently near the transmitter cabinet — in the same room, if enough space remains for the operating personnel. Because the cabinet weighs about 500 pounds, the flooring under it should be sturdy. The total distance between it and the transmitter cabinet should not exceed 25 feet, since the full length of the interconnecting cables shipped with the equipment is 35 feet, and approximately 10 feet are used in the cabinet. If the cabinets are less than 35 feet apart, do not cut the cables.

a. After the control cabinet is unpacked and placed in position, remove the operator's desk, which is temporarily fastened inside the cabinet in the space provided for the PPI scope assembly. Fasten the desk securely with the screws provided to the front of the cabinet, directly below the empty panel space.

b. Inside the cabinet will be found two metal runways on which the PPI scope assembly is to slide into position. These runways have been turned up for shipment. They now must be turned down so that their outer ends project from the face of the cabinet, and must be bolted down securely through the holes provided in the cabinet frame.

c. The PPI scope assembly is packed completely in Box No. 6. The base of this assembly is provided with metal rails which fit the runways inside the control cabinet. After unpacking it, slide the entire PPI scope assembly into position in the control cabinet and bolt it securely in place. The front panel of the assembly projects and makes an angle with the face of the cabinet.

d. A number of loose ends of cable, fitted with connectors, will be found inside the control cabinet. These will be discussed in paragraph 23.

20. Transmitter Cabinet

The transmitter cabinet, packed in Box No. 4, is to be placed in a room as close to the antenna equipment as possible. The cabinet with contents weighs in excess of 800 pounds; therefore the flooring on which it is to stand must be sturdy. No provision is made for securing the cabinet to the floor. The distance from the top of the cabinet to the transmission line fitting which projects from the center of the antenna base *must not exceed 25 feet,* as this is the maximum distance provided for in furnishing the sections of r-f transmission line which join these two components.

21. R-F Transmission Line

The sections of transmission line provided for this equipment are packed in Box No. 3. The line is coaxial copper tubing. The outer conductor is $\frac{5}{8}$ inch in diameter. The inner conductor, $\frac{1}{4}$ inch in diameter, is supported inside the outer conductor by insulating spacers. Fourteen sections of line of different lengths are provided, each section being fitted at both ends with hexagonal nuts and rubber gaskets so that each can be joined to any other such section by the procedure described below. The lengths provided are designed to fit, in some combination, any requirement likely to be met in installing the equipment. *These sections of line must not be cut and refitted in an attempt to change their lengths.* The arrangement of the supporting spacers inside the line is critical and has been properly designed for each of the sections furnished. Use as few sections as possible to extend the line from the fitting under the center of the antenna system to the fitting on top of the transmitter cabinet.

a. The first connection to be made in installing the r-f line is to the fitting projecting from the bottom of the antenna base. This fitting is a short section of line provided with a sliding hexagonal nut at the lower end. It requires a special inner conductor which has been removed before shipment. This inner conductor is the longer of the two silver bullets fastened to the supporting arm of the reflector, and has only one slotted bullet end. The other end is drilled to take the slotted end of another such line-connector. Put this long bullet in place inside the fitting under the center of the antenna base, with the bullet end up, first spreading the slots slightly to secure proper fitting. It is necessary to hold the drilled end of the bullet with long-nosed pliers in order to force the slotted end into the drilled opening in the inner conductor at the top of the base fitting.

b. Among the r-f line parts in Box No. 3 are a number of "stub angles" (fig. 16). These are right-angle sections of coaxial line supported at

the bend by a built-in insulator. The inner conductor of the stub angle, terminated at both ends by a slotted "nose" identical with the end of a "bullet," is intended to be used in the same way as a bullet. Each end of the outer conductor of the stub angle is threaded on the outside. Inside, each arm of the angle is machined to form a shoulder against which the outer conductor of a standard coaxial line section will butt in a tight metallic contact.

c. Make sure that the projecting section of line under the antenna base has a rubber gasket on the outer conductor, under the sliding hexagonal nut. With the long bullet in place, slide one arm of a stub angle over the outer conductor of this section of line, so that the bullet end of the inner conductor of the stub angle presses tightly into the drilled end of the long bullet, and so that the outer conductor of the antenna fitting butts tightly against the shoulder inside the arm of the angle. Screw the hexagonal nut tightly on the threads outside the angle arm.

d. The next section of line to be attached is horizontal and begins at the free end of the stub angle, now in place under the antenna system. From this point on, the remainder of the r-f transmission line must be put together, with the sections of line provided, in whatever combinations are necessary to cover exactly the distance from this stub angle to the line fitting on top of the transmitter cabinet. Note that the inner conductor of each section of line is drilled at both ends of the section to take a bullet line-connector. In attaching such a section to one arm of a stub angle, no bullet is needed because the stub angle has bullet ends built into it.

e. In joining together two ordinary sections of r-f line, the following procedure must be observed:

(1) With a fine-bladed penknife slightly spread both slotted ends of one of the short, silver bullet connectors found in Box No. 3 to insure a snug contact.

(2) Clean the lines and the silver bullets in carbon tetrachloride before using.

(3) Force one end of the bullet (fig. 17) into the drilled opening in the inner conductor of one of the line-sections to be joined.

(4) Slide a line-coupler over the outer conductor at the same end of the line-section. These line-couplers are supplied in Box No. 3 and are short brass sleeves threaded on the outside at both ends and provided with a hexagonal flange at the center. The line-coupler sleeve slides over the outer conductor of the coaxial line until it butts firmly against the rubber gasket *which must be in place* on the outer conductor, in front of the shoulder under the sliding hexagonal nut.

(5) Slide the outer conductor of the second line section into the union sleeve, with the drilled end of the inner conductor pressing tightly over the free end of the silver bullet (fig. 18), until the two outer conductors meet firmly inside the union. *Make certain that a second rubber gasket is also in place on the outer conductor of the second section of line.* Thus two rubber gaskets, a line coupler, bullet line connector, and two sliding hexagonal nuts are needed to complete a standard union of two sections of line.

(6) Screw the two nuts tightly on the sleeve threads to complete the union.

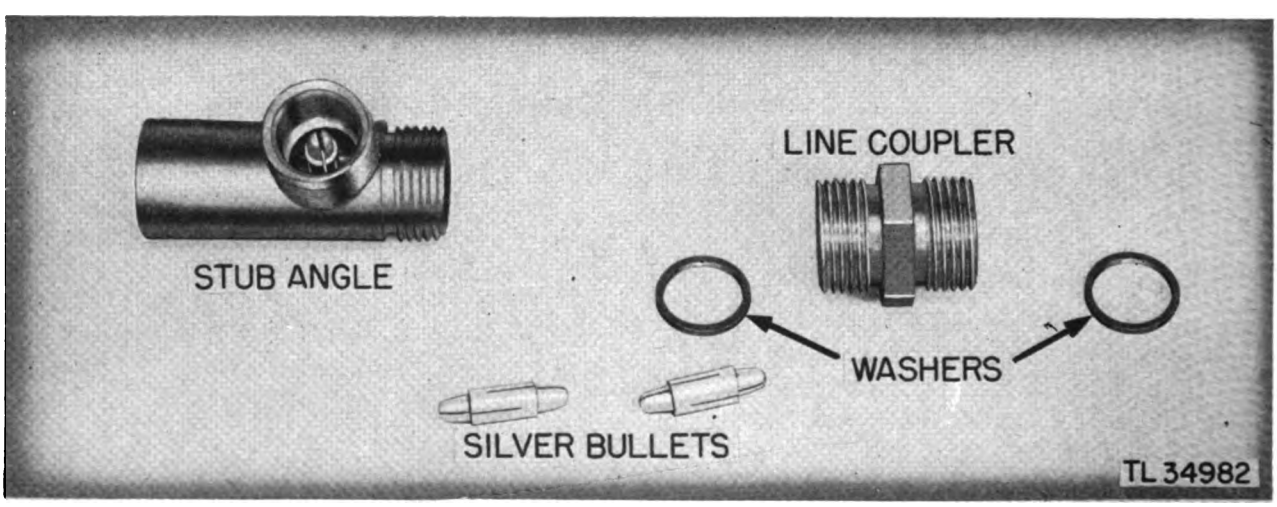


Figure 16. Elements of r-f line.

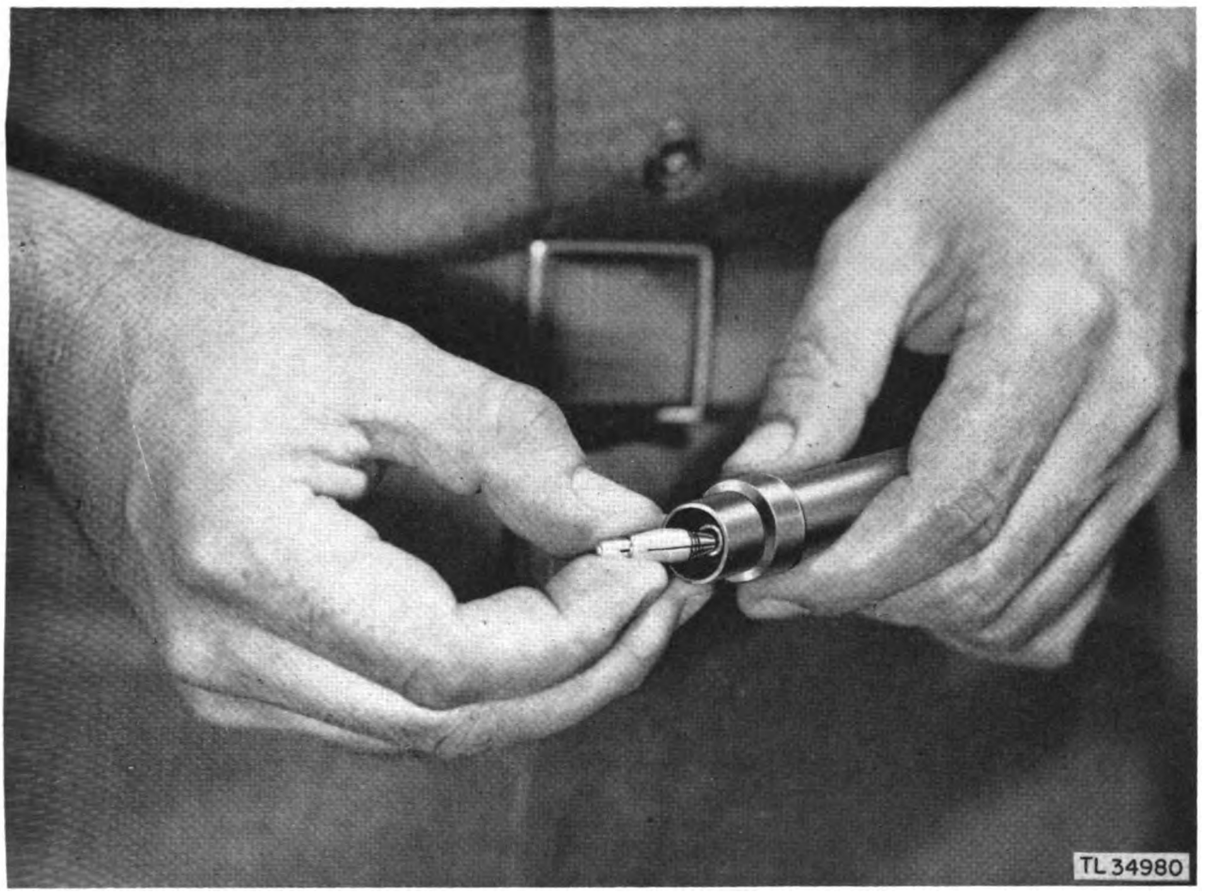


Figure 17. Inserting bullet in line.

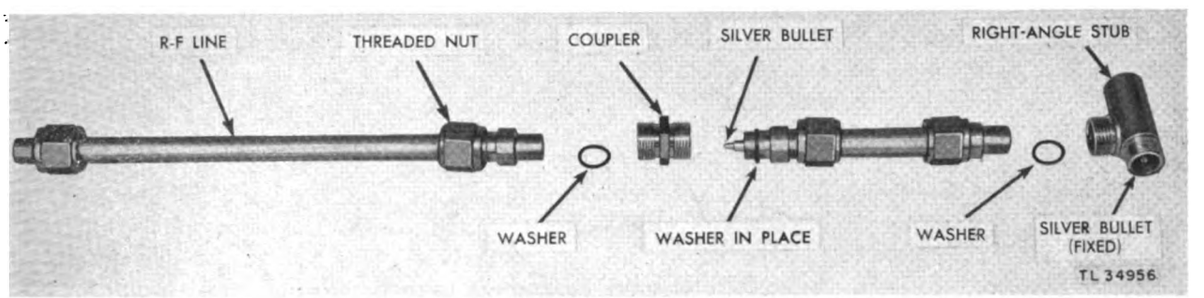


Figure 18. Assembling r-f line.

f. Where the r-f line is not protected by being inside a building, a protector should be built for it. Figure 12 shows such a line protector. It is a box made of 1-inch boards 6 inches wide. Figure 19 gives a cross-sectional view of the completed protector box. The side of the box nearest the r-f line should be attached with screws so that it can be removed when it is necessary to make repairs on the line.

22. Amplidyne Motor-Generator Set

This set is packed in Box No. 7, with cable attached. It is provided with shock-insulated supports and is to be mounted on a separate base not more than 25 feet from the transmitter cabinet because the attached cable is only 25 feet long. This cable enters the base of the transmitter cabinet. A metal fitting near the free end of the cable is attached in the transmitter cabinet.

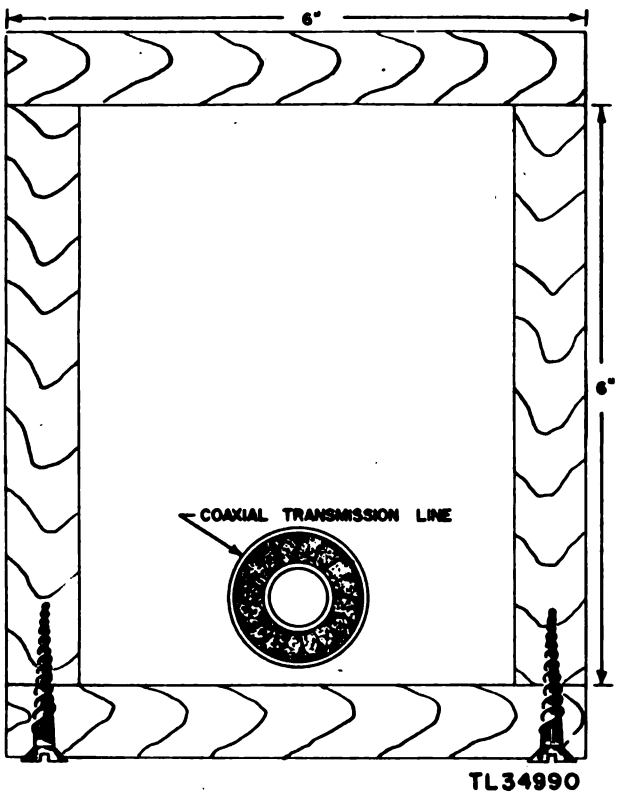


Figure 19. Line protector box.

23. Cabling

The electrical equipment of Radio Set SCR–582–(*) is made up of a number of components which are arranged together and interconnected to form the set (fig. 20). As much as possible of the interconnecting cabling between components is permanently installed before shipment. The rest of the cabling must be completed at this time. Figure 21 is the general cabling diagram for the entire radio set. Figure 22 is the routing diagram showing the arrangement of interconnecting cables inside the control and transmitter cabinets. These cables are held tightly by clips, and the routing diagram must be followed in the cabling procedure. It shows all the cabling connections which now must be made, as well as some which are already in place when the equipment is shipped. In the terminal markings shown in figure 21, black circles indicate connections to be made on installation. In some cases the same terminal is used for two leads, one of which is permanently connected before shipment. In such cases the circle indicating the terminal tap is half solid and half empty.

a. The cabling is done by beginning with the control cabinet and proceeding through the transmitter cabinet to the antenna equipment. Seven cables are found in Box No. 8, numbered to tie in with figures 21 and 22, as follows: 2, 8, 11, 12, 13 and 14, 16 and 17, and 23. Of the remaining numbered cables appearing in figure 21, those numbered 1, 4, 5, 6, 9, 15, 18, 19, 20, 21, 22, 24, and 25 are permanently connected at both ends before shipment. Those numbered 3, 7, 10, and 26 are permanently connected before shipment at one end only and must be connected at the other end at the time of installation.

b. Before beginning to cable the radar set, remove the panel in the upper front right-hand corner of the transmitter cabinet, both right-hand side panels, the filter panel along the lower part of the front of the cabinet, and open all the doors. Also open the rear door of the control cabinet.

c. In the following procedure for cabling the control cabinet, close attention must be paid to both the routing diagram (fig. 22) and the cabling diagram (fig. 21):

(1) One end (marked "2A"), of cable 2 goes to the control cabinet. Pass this end of the cable through the square opening in the rear of the cabinet base and inside along the left-hand side panel through the routing clips designated in figure 22. This cable splits into two parts near the top of the cabinet, one ending in two terminal lugs, the other, in twelve. The two lugs on the one lead are to be connected to terminal taps 1 and 2 on the shorter of the two terminal strips located in back of the power control and meter panel assembly. The twelve lugs on the other lead connect to terminal taps 3 through 14 on the longer terminal strip mounted vertically on this same assembly. Note that terminal taps 10 through 14 have the leads from cables 3 and 4 already connected to them. In cables terminating in lugs, such as cable 2, the different lugs have been brought out of the main body of the cable at carefully arranged intervals, so that in connecting them to their terminal taps it would be difficult, if not impossible, to make the wrong connections.

(2) Cable 3 is connected at one end to terminal taps 11 through 20 on the long strip mounted on the control and meter panel assembly. The other end of this cable has been fastened temporarily inside the control cabinet and terminates in an AN (Army-Navy) connector. Plug this connector into the socket marked CONTROL PANEL mounted on the rear of the PPI scope assembly. This socket is farthest to the right of the five which appear there. All AN connectors

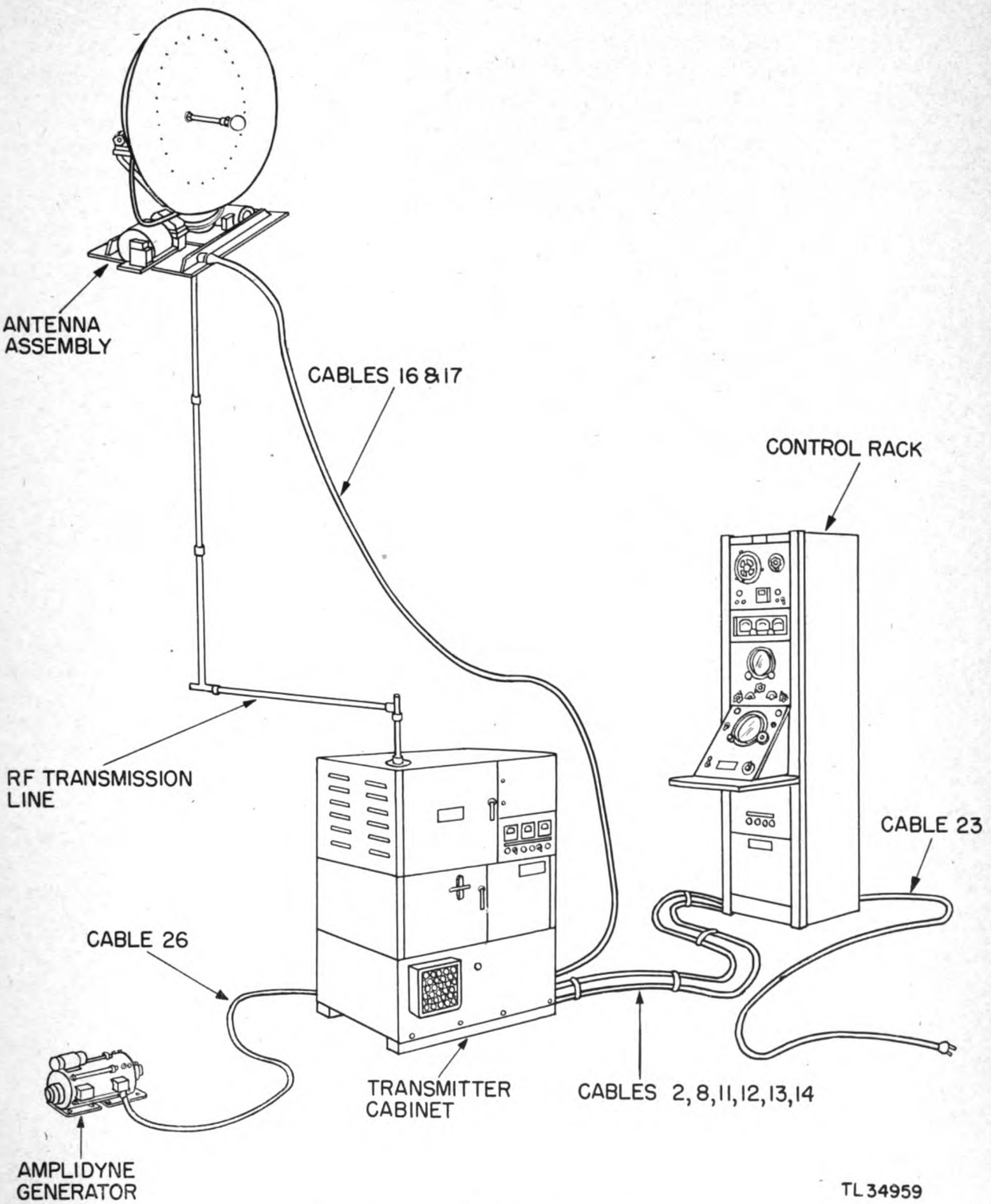


Figure 20. Cabling of Radio Set SCR–582–(*).

and their corresponding sockets are provided with keyways, so that the metal prongs inside the socket will go only to the correct holes in the plug.

(3) Cable 5 is already connected at its upper end to the AN socket marked RECEIVER on the rear of the control central chassis, and at its lower end to the AN socket marked REMOTE CONTROL on the rear of the receiver chassis. From this last AN connector, however, a second part of cable 5 proceeds, terminating in a third AN plug. This plug is to be connected now to the AN socket marked RECEIVER on the rear of the PPI scope assembly.

(4) Cable 7 is already attached with an AN connector to the socket marked INDICATOR on the rear of the control central assembly. The other end terminates in an AN plug. Connect this plug to the socket marked CONTROL CENTRAL on the rear of the PPI scope assembly.

(5) Cable 8 is shipped separately in the box of cables. Each end of this cable is fitted with an AN plug. One of the plugs fits the socket marked TRIGGER on the rear of the control central chassis. Pass this end of the cable through the square opening in the back of the control cabinet, through the routing clips designated for it in figure 22, and connect the plug to the socket marked TRIGGER.

(6) Cable 10 is already connected to the power supply chassis by the AN connector marked "5000 V" on the rear of that chassis. The other end of this cable is fitted with an AN plug which is to be connected after routing through the proper clips, to the socket marked "5000 V" on the rear of the PPI scope assembly.

(7) Cable 11 is packed separately in the box of cables. One end is fitted with an AN connector. Bring this end of the cable into the control cabinet through the square hole in the rear and through the routing clips designated in figure 22. Attach the AN plug to the socket marked SPINNER on the rear of the PPI scope assembly.

(8) Cable 12 is packed separately in the box of cables. Both ends are fitted with AN connectors, one end of which fits the socket marked INTERMEDIATE FREQUENCY on the rear of the receiver chassis. Bring this end of the cable into the control cabinet through the hole in the rear, pass it through the proper routing clips, and attach the plug to the socket marked INTERMEDIATE FREQUENCY.

(9) Cables 13 and 14 are placed together to form a single cable for most of their length. At one end this double cable splits again into its two parts, each terminating in an AN plug. At the other end also the cable terminates in two AN plugs, but in addition has four more terminals of various types proceeding from cable 14. Bring the end of the double cable terminating in two plain AN plugs into the control cabinet from the rear. Pass it through the proper routing clips, and attach the two AN plugs to the sockets marked PREAMPLIFIER and KLYSTRON on the rear of the receiver chassis. Cable 13 goes to PREAMPLIFIER, and cable 14 goes to KLYSTRON. Although the two AN plugs are of the same size, they will not fit the wrong sockets without forcing.

d. In cabling the transmitter cabinet, use the following procedure:

(1) Cable 2 now has been attached at one end to its terminals inside the control cabinet. The other end of this cable, marked "2B," also terminates in one group of two lugs and another of twelve lugs. Pass this end of the cable into the transmitter cabinet through the square hole in the right-hand side of the base, up through the square hole in the floor-plate of the cabinet, and through the routing clips designated in figure 22. Attach the group of two lugs to terminal taps 18 and 19 in the lower of the two long terminal strips found at the front of the lowest part of the transmitter cabinet, and attach the group of twelve lugs to taps 1 through 12 on the upper of these same two terminal strips.

(2) The unattached end of cable 8 terminates in an AN plug. Pass this end of the cable into the transmitter cabinet through the opening in the right side of the base, through the routing clips designated in figure 22, and attach the AN plug to the socket found inside the base of the cabinet. This is the only AN socket in the lower right-hand corner of the transmitter cabinet.

(3) The free end of cable 11 terminates in four lugs. Pass this end of the cable into the transmitter cabinet through the opening in the right side of the base, through the opening in the base plate, and along the inside of the frame through the designated routing clips. Attach the four lugs to terminal taps 16, 17, 18, and 19 located on the terminal panel of the selenium-rectifier unit at the upper right-hand corner of the cabinet.

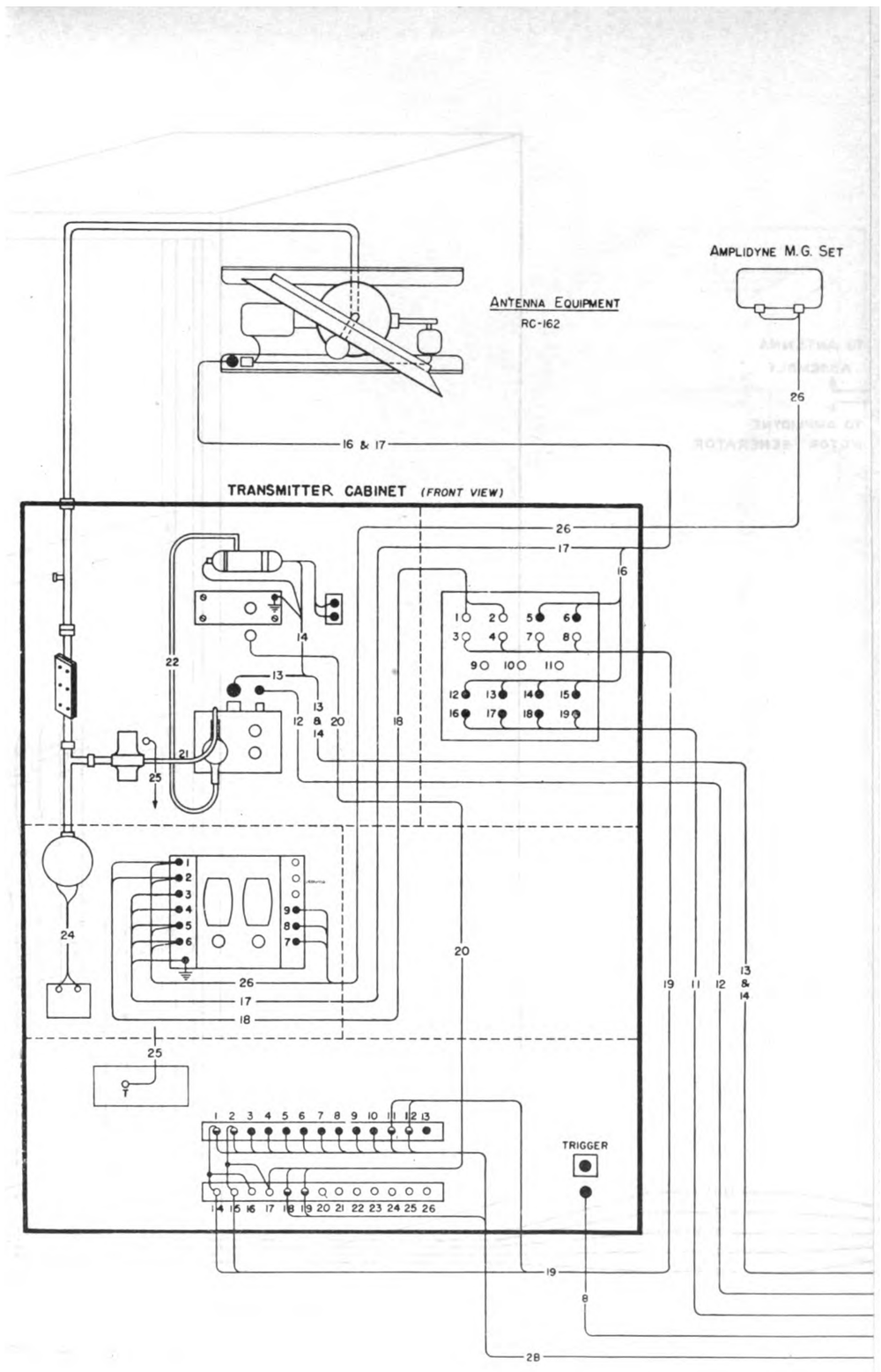
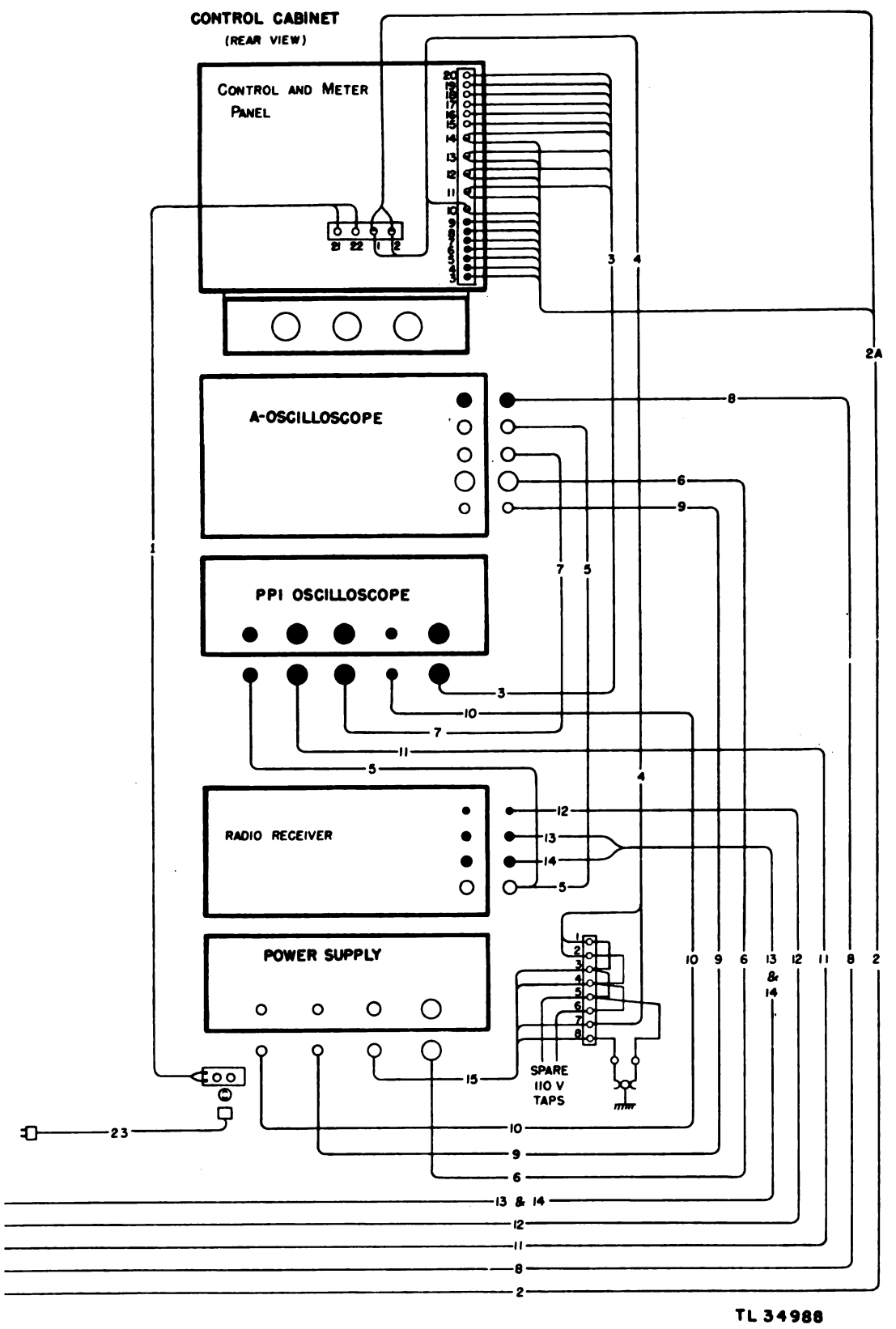


Figure 21. Cabli



ıg diagram.

(4) The free end of cable 12 terminates in an AN plug. Pass this end of the cable into the cabinet in the same way as above. Route it through the proper clips, inside the cabinet frame, and attach the plug to the smaller of the two AN sockets found on the housing of the preamplifier.

(5) Pass the unattached end of combined cables 13 and 14 into the transmitter cabinet as above and route it through the designated clips. Inside the cabinet, this large cable again splits into its two parts, marked separately 13 and 14. Cable 13 then terminates in an AN plug. Attach this plug to the larger of the two sockets -- the only one now unused -- on the housing of the preamplifier. Cable 14 terminates in an octal plug, a ceramic covered grid-cap clip, and three lugged leads. Connect the octal plug to a ceramic covered socket found at one end of the klystron beating oscillator. Connect the ceramic covered clip to the cap at the other end of the klystron. Two of the lugged leads are laced together for most of their length, and these go to terminal taps found on the side of one of the vertical members supporting the klystron. Because these leads are filament heater connections, it makes little difference which lead goes to which tap. The one remaining wire goes to ground by connection to a screw found in the klystron support next to the terminal taps.

(6) The right-hand side panels of the transmitter cabinet should be replaced and fastened tightly with the slip screws along their edges. In the upper one of these panels are two round openings. One end of the combined cables 16 and 17 terminates in lugged leads. Pass this end of the cable through one of the above openings and route it through the clips designated in figure 22. Inside the cabinet, this large cable divides into its two component parts, and cable 16 again splits into two lines. One of these lines ends in two lugs which go to terminal taps 5 and 6 on the selenium rectifier panel. The other ends in four lugs which go to taps 12, 13, 14, and 15 on the same panel. Cable 17 now passes along the under side of the top panel of the transmitter cabinet, through the proper routing clips, to the amplidyne amplifier. The four short terminal lugs connect to taps 3, 4, 5, and 6 in the strip located on the far side of the amplifier case. The fifth lug found on this cable is longer than the other four, and goes to a "ground" screw located on the amplifier housing itself, at the end of the terminal strip.

(7) Fasten the "squeeze fitting," which has been slid on combined cables 16 and 17, securely in place over the opening in the transmitter cabinet through which this large cable passes. Then lead the free end of the cable up to the antenna system, through the hole in the roof, and connect the AN plug found on the end of the cable to the socket in the rotating base of the antenna equipment.

(8) Cable 26 is fastened permanently at one end to connections on the amplidyne motor-generator set and is shipped in the same box with that unit. Pass the free end of this cable into the transmitter cabinet through the unused opening in the upper right-hand side panel, and route it inside the cabinet, through the proper clips, to the amplidyne amplifier. At its end, this cable splits into two parts. One part terminates in three lugs, which go to taps 7, 8, and 9 in the strip located on the right side (viewed from the front) of the amplifier housing. The other line terminates in four lugs, which go to taps 1, 2, 5, and 6 located on the left side of the amplidyne chassis.

e. The only remaining cable to be installed is cable 23, the line which connects the control cabinet to the primary power supply. The plugs at each end are constructed so that a wrong connection is almost impossible without damaging the plug. However, it is necessary to check the polarity of the connections. One end of cable 23 goes to the twist lock socket at the rear base of the control cabinet. The other end goes to the primary power supply socket. One of the connections inside the primary power supply socket is grounded. By means of an ohmmeter, check that this connection goes to terminal tap 21 in the short strip on the back of the power control and meter panel assembly, reaching this tap through cables 23 and 1. Terminal tap 22 in this strip is then on the "hot" line from the primary power supply plug. It may be necessary to change the connections inside the primary power supply socket in order to be sure of the correct polarity at terminal taps 21 and 22.

Note. There are two different types of transmitter tubes which may be used with this equipment. They are interchangeable, but the design of cable 24 differs for each of the two types. A transmitter tube is installed in the transmitter cabinet before shipment, and the particular cable 24 installed with it is correct for that type of tube. If it should be found necessary to replace this tube with one of the other type, the appropriate cable 24 for the new type of tube can be found among the spare parts shipped with the equipment.

Section III. PREPARATION FOR REGULAR OPERATION

24. Inspection of Factory Cabling

After the procedure previously outlined has been completed, before the set is put in operation, those cables installed at the factory must be checked. Check the correctness of the cabling and also the tightness of the connections.

a. The cabling in the control cabinet which was installed before shipment should be inspected to ascertain that the following connections are correct:

(1) Cable 1, going from the duplex plug in the base of the cabinet to terminal taps 21 and 22 in the short strip on the back of the control and meter panel assembly at the top of the cabinet.

(2) Cable 4, going from taps 1, 2, and 7 in the strip at the rear of the power supply chassis (next to the door interlock), to taps 1 and 2 in the short strip on the back of the control and meter panel assembly and to tap 10 in the longer strip on the back of the same assembly.

(3) Cable 6, going from the AN connector marked CONTROL CENTRAL on the back of the power supply chassis to the AN connector marked POWER SUPPLY on the back of the control central chassis.

(4) Cable 9, going from the AN connector marked "2000 V" on the back of the power supply chassis to the AN connector marked "2000 V" on the back of the control central chassis.

(5) Cable 15, going from the AN connector marked AC INPUT on the back of the power supply chassis to terminal taps 3, 4, 7, and 8 in the strip at the rear of the power supply chassis, next to the door interlock.

b. The following cabling in the transmitter cabinet is also to be inspected: (1) Cable 18, going from terminal taps 1 and 2 in the selenium rectifier panel to taps 1 and 2 in the strip on the left side of the amplidyne amplifier case.

(2) Cable 19, going from terminal taps 3, 4, 7, and 8 in the selenium rectifier panel to taps 14 and 15 in the lower one of the two long strips found at the front of the lowest part of the transmitter cabinet, and, through a second lead, to taps 11 and 12, in the upper one of the same two strips.

(3) Cable 20, going from an AN connector, on the support for the remote-control tuning motor of the local or beating oscillator, to taps 17, 18, and 19 in the lower one of the two long strips mentioned above.

(4) Cable 21, a section of small coaxial copper tubing, going from the transmit-receive box to the brass crystal mixer located on the face of the preamplifier housing. This cable joins to the upper connection on the crystal mixer.

(5) Cable 22, a flexible dielectric-filled cable, going from the klystron beating oscillator to the mixer.

(6) Cable 24, connecting the input leads of the transmitter tube to the high-voltage supply from the modulator.

(7) Cable 25, a red d-c lead connecting the transmit-receive box to a high-voltage source.

(8) The terminals of cables 24 and 25 are not shown in figure 21, but the cables themselves are shown and their presence can and should be checked at this stage of the installation.

25. Precautionary Visual Checks

At this point several visual checks of a precautionary nature should be made before the set is put in operation.

a. Make sure that the rotating gear assembly at the base of the antenna system is free to turn and is properly greased and that, as it rotates, the reflector will not strike any obstructions. The antenna housing should be entirely empty of any pieces of equipment other than the properly mounted antenna equipment.

b. Examine all the subassemblies contained in both the transmitter cabinet and the control cabinet for missing tubes. An empty tube socket should be immediately evident and a spare tube should be inserted.

c. Be sure that the dipole antenna, in its transparent spherical shell, is horizontal.

26. Initial Operation of Components

After installation has been completed and inspection checks made according to the instructions above, the components must be put into operation in a step-by-step manner, and the proper functioning of each part observed before the equipment as a whole can be placed in regular operation. The equipment is tested carefully before being shipped, and no major adjustments should be necessary unless some damage has been done in transit.

a. Disconnect the rotating antenna assembly by disconnecting the AN connector on the base

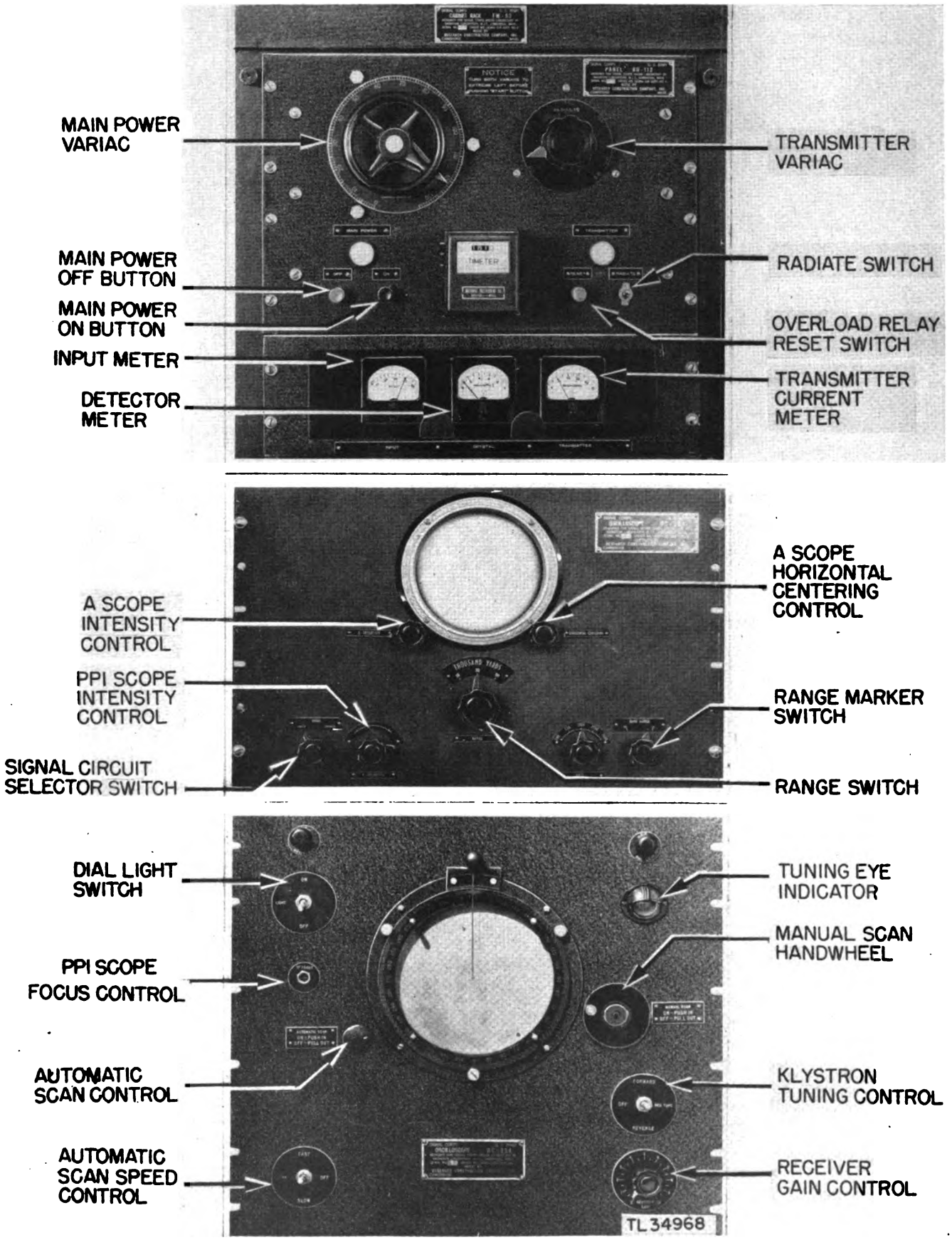


Figure 23. Controls on control cabinet.

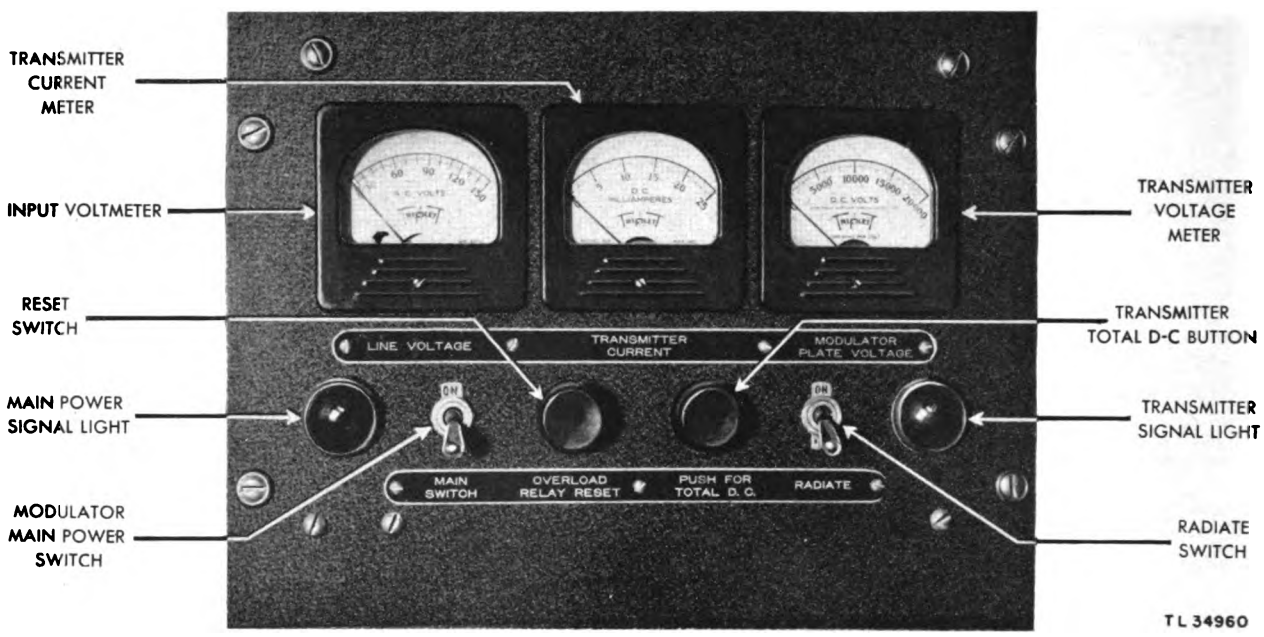


Figure 24. Control and instrument panel of transmitter cabinet.

of the assembly. Turn the MAIN POWER variac and the TRANSMITTER variac on the control cabinet (fig. 23) all the way to the left, and turn the MAIN SWITCH on the transmitter cabinet to OFF (fig. 24). This last precaution is to keep the high-voltage driving power out of the modulator and allow an independent check of controls and indicators without operating the transmitter. Turn the P-INTENSITY and the A-INTENSITY controls fully counterclockwise.

b. Turn on the main power at the control cabinet by pushing the MAIN POWER ON button. Turn up the MAIN POWER variac until the INPUT meter on the control cabinet reads 115 volts (fig. 23). Turn up the P-INTENSITY and the A-INTENSITY controls. In about 15 seconds, the A-scope and the PPI scope will show their characteristic bright traces or sweep lines — a horizontal sweep on the A-scope, passing through the center of the screen, and a radial sweep on the PPI scope, starting at the center of the screen and extending in a straight line to the outer edge. Both sweeps should appear stationary.

c. Adjust the P-INTENSITY and the A-INTENSITY controls (fig. 23) until the sweep traces are bright enough to be seen clearly, but not so bright as to produce excessive illumination or "blooming" on the fluorescent screens. This is particularly important on the PPI scope.

d. Adjust the HORIZONTAL CENTERING control for the A-scope until the left end of the sweep line is about one-quarter of an inch from the edge of the screen.

e. Throw the RANGE MARKER control to ON, and set the SIGNAL circuit selector control to the LIMITED position. Range pips now should appear along the A and PPI sweep lines.

(1) Set the RANGE control to 10,000 yards and check to see that there are five pips on each sweep line. The outermost range pip on each sweep should be visible at the edge of the screen.

(2) Set the RANGE control for 30,000 yards and then for 90,000 yards, and check again that the pips appear. There should be six pips clearly visible on each sweep for these two ranges. Note that the range pips on the A-scope vanish when the SIGNAL circuit selector control is returned to the UNLIMITED position.

f. The sweep line on the PPI scope now must be focused by means of the "P" FOCUS control to give the sharpest possible definition. This is done best by using the range pips. With the RANGE MARKER control switched to ON. observe the range pips on the PPI sweep line. If the sweep focus is out of adjustment, these pips will appear slightly elongated in one direction. When the "P" FOCUS control is turned through the point of best focus, the pips become fairly round and then elongated in a direction about 90 degrees from the first point of focus. The best point of focus is that at which the pips are smallest.

g. Push the MAIN POWER OFF button on the control cabinet and thus remove all power from the set. Reconnect the antenna cable to the AN connector on the base of the antenna assembly. Check to be sure that the automatic scan control is off. Push the MAIN POWER ON button on the control cabinet, with the MAIN POWER variac turned up, and listen for the hum of the amplidyne motor-generator set.

h. Make sure that the AUTOMATIC SCAN control knob for automatic rotation of the antenna assembly is pulled out and disengaged; push *in* the MANUAL SCAN handwheel and turn it slowly. The antenna assembly now should rotate smoothly in the same direction, clockwise or counterclockwise, as that in which the hand wheel is turned.

i. Disengage the MANUAL SCAN gears by pulling the MANUAL SCAN handwheel and push in the AUTOMATIC SCAN knob for automatic rotation of the antenna assembly. Turn the AUTOMATIC SCAN speed control switch to SLOW. The antenna assembly now should rotate smoothly and automatically with a constant speed.

j. Although the antenna assembly should turn smoothly on automatic scan, it may actually "hunt"; that is, it may oscillate about a fixed position. Violent hunting can damage the antenna equipment seriously; turn off the automatic scan the instant such oscillations are noticed. Instructions for correcting hunting are given in paragraph 36 of this manual.

k. Make sure that the switch marked RADIATE (fig. 24), on the control panel of the transmitter cabinet, is turned to the OFF position. This is its position for normal operation of the equipment. If this switch is on, the duplicate switch located on the panel of the control cabinet will not turn the transmitter off. It is intended that all operation of the equipment be centralized at the control cabinet. Turn the MAIN SWITCH on the modulator cabinet to ON, and check all tubes in that cabinet for filament glow. This can be done easily by opening the upper left-hand door of the cabinet and looking into the interior. This door is not provided with circuit-breaking interlocks, since it does not give immediate access to points of dangerously high voltage as do the doors just below it. At this point the blower motor for cooling the transmitter cabinet should be running and easily heard.

l. The DETECTOR meter located on the control cabinet now should read between 0.2 and 0.6 milliamperes. If the reading is less than 0.2, the beating oscillator may be coupled too loosely to the mixer or may not be oscillating. In this case it requires adjustment. See paragraph 28.

m. Turn the RADIATE switch, located on the top panel of the control cabinet, to ON. Wait until a definite click from the transmitter cabinet indicates that the time-delay relay has put the high-voltage from the modulator on to the transmitter tube itself. The closing of the time-delay relay may require from 30 seconds to two minutes. If the click is not heard clearly, the full two minutes' wait should precede any further operation.

n. After the time-delay relay closes, turn up the TRANSMITTER variac located on the control cabinet until the TRANSMITTER meter reads between 6 and 10 milliamperes. Listen at this point for any high pitched buzz characteristic of an r-f arc. If such an arc is heard, try to locate it quickly by feeling for a warm spot on the r-f line. Shut off the equipment in order to repair or replace the faulty part.

o. If the equipment runs properly up to this point, a small "peanut" neon tube, such as is provided in the accessory kit, will glow if held in front of the antenna reflector in the axis of the paraboloid. It should continue to glow even to a distance of five or six feet, and indicates that the beam of r-f energy is being produced as intended.

p. The A-scope and the PPI scope or indicator now should show the reception of reflected signals. If signals are not seen at this point, the instructions of paragraphs 27, 28, and 29 should be carried out. Directions for proper tuning of the beating oscillator and setting of the gain control are given in paragraph 35 with the instructions for regular operation of the equipment. If the components of the set are functioning properly, as tested by the above steps, the equipment should be turned off by first turning the TRANSMITTER and then the MAIN POWER variacs all the way to the left, and pushing the MAIN POWER OFF button on the control cabinet.

27. Checking Standing Wave Ratio

When a set is first installed, the standing wave ratio must be checked to test the efficiency of the transmission line. A high standing wave ratio shows that the transmission line is not functioning efficiently. A very high standing wave ratio

indicates the presence of voltages which may cause the line to break down. In checking the standing wave ratio, follow the steps indicated below:

a. Turn on the transmitter in the prescribed manner and wait several minutes for it to warm up. Take a "peanut" neon bulb out of the accessory kit and hold it close to the polystyrene ball on the antenna. If the bulb assumes a reddish glow, the check for standing waves should be continued. If the bulb fails to glow, the following steps are necessary:

(1) Note the reading of the TRANSMITTER CURRENT meter on the transmitter meter panel. This reading should be between 6 to 10 milliamperes.

(2) If the TRANSMITTER CURRENT meter reading is of proper value, then the MAIN POWER OFF button must be pushed and the r-f line inspected for missing silver bullets. Reverse the initial installation procedure in disassembling the r-f line at the coupling unions. The entire length of line between the transmitter oscillator coupler and the antenna should be checked.

(3) Once the "peanut" neon bulb is found to glow when held close to the antenna, the next step in the check for standing waves should be taken.

b. Take the H-amplifier and bolometer out of the accessory kit. Plug the tubular end of the bolometer containing the batteries into the INPUT jack of the H-amplifier (fig. 25).

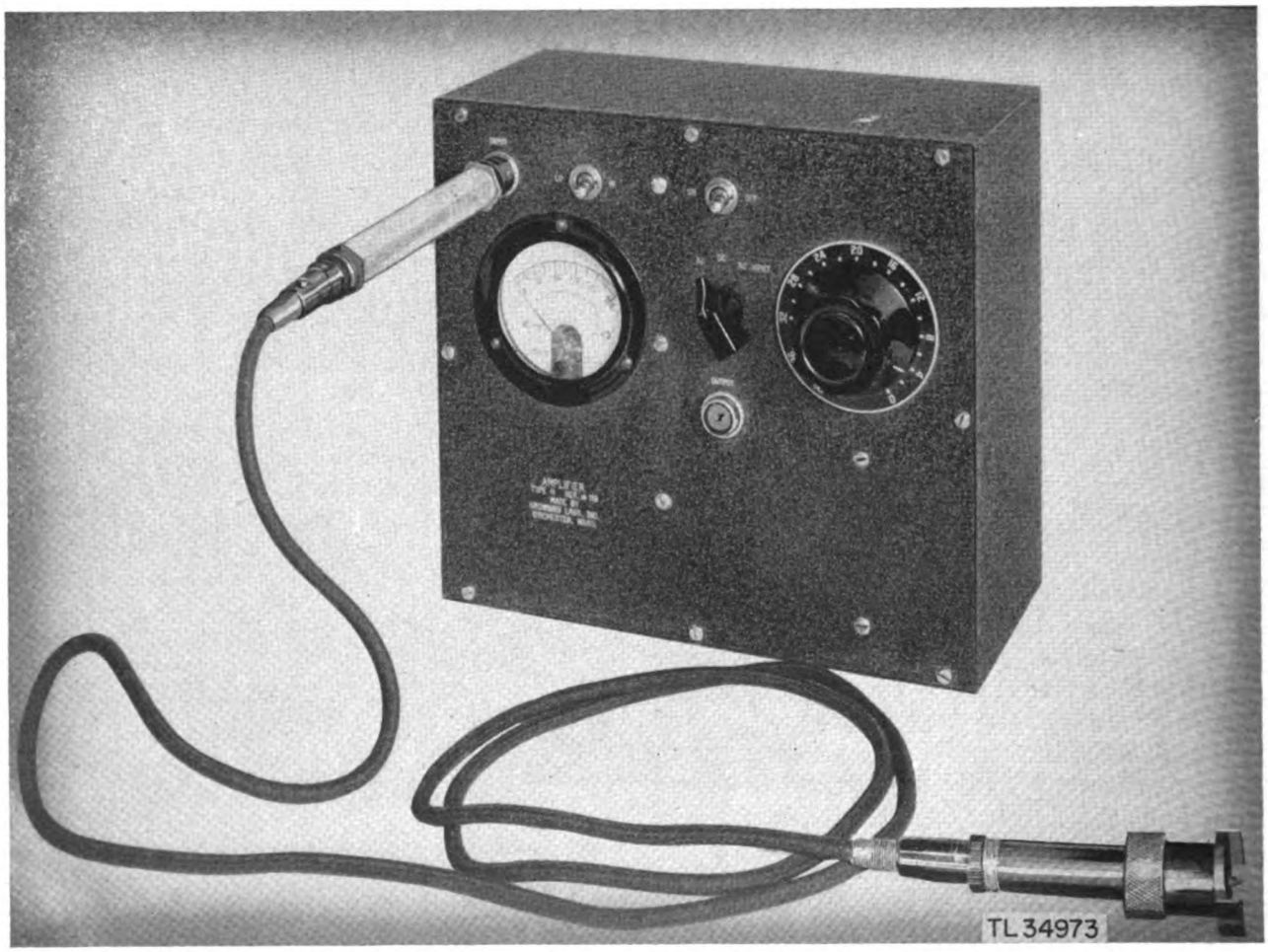


Figure 25. H-amplifier, with bolometer.

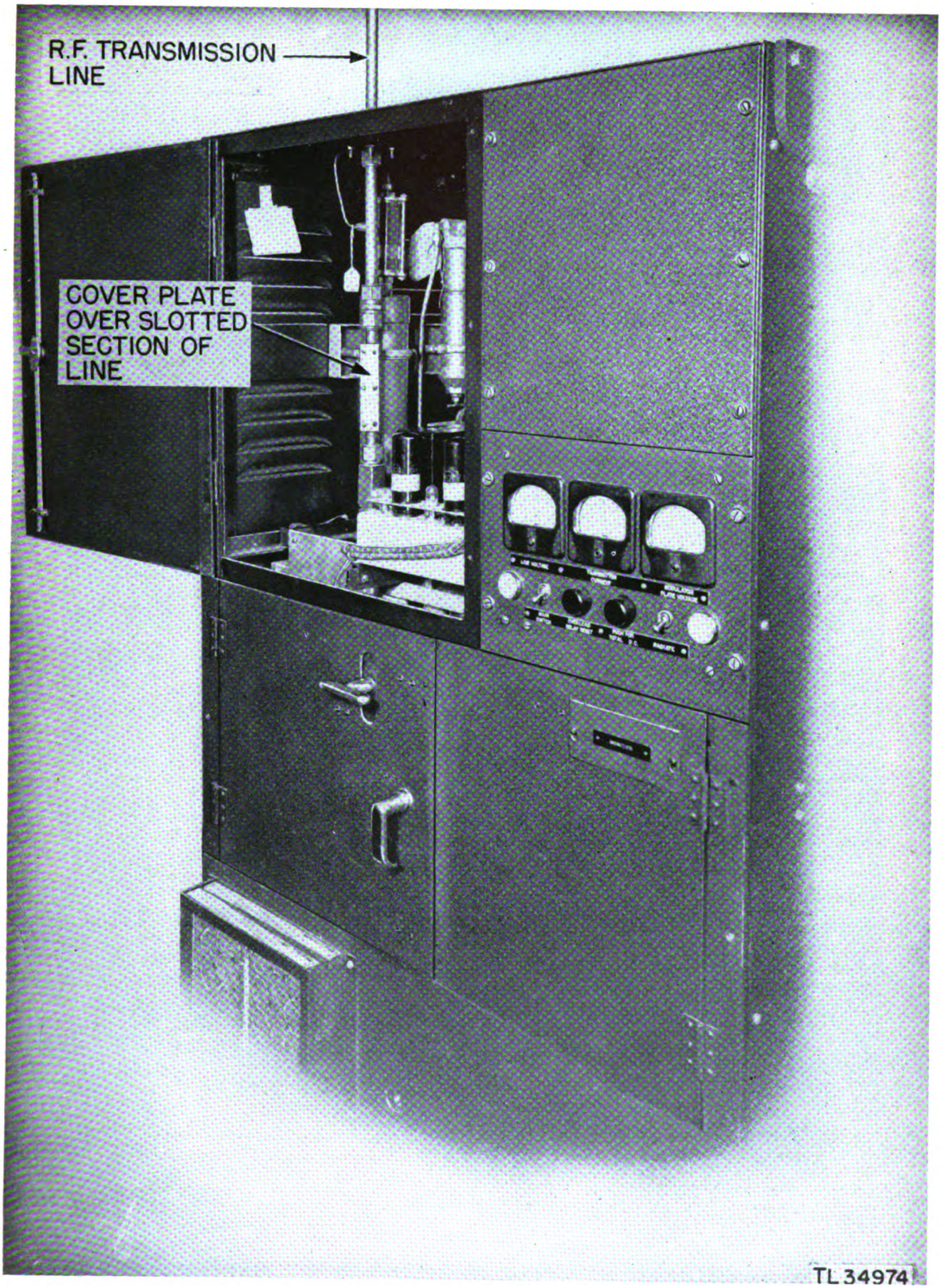


Figure 26. Slotted section of r-f line.

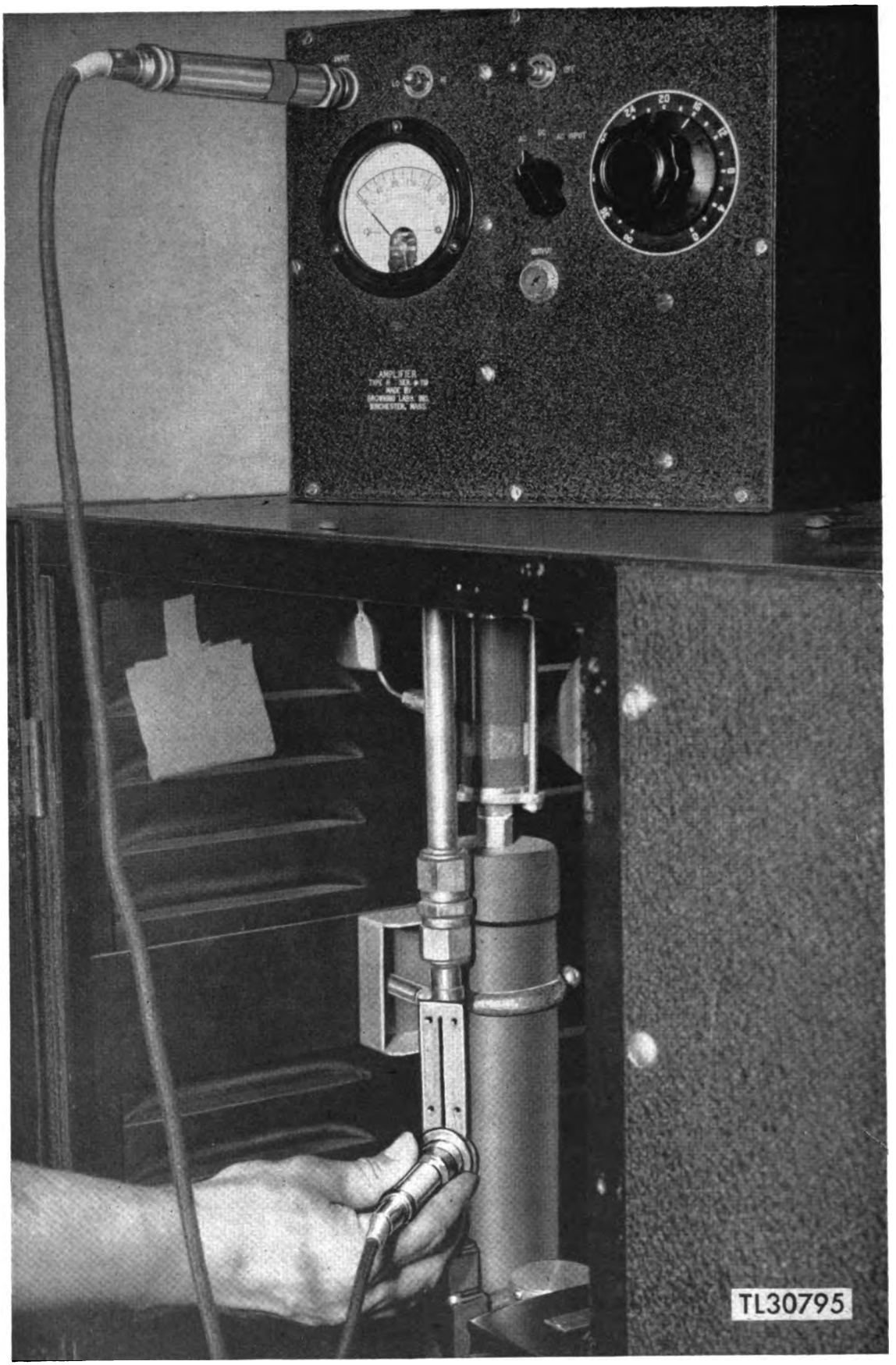


Figure 27. Measuring standing-wave ratio.

c. Open the upper left-hand panel of the transmitter cabinet. Remove the cover from the slotted section of r-f line by unscrewing the 6 retaining screws. (fig. 26).

d. Place the other end of the bolometer test cable (bolometer probe) into the exposed slot of the r-f line (fig. 27). Turn the probe-holder until it fits snugly over the flat surface of the slotted section.

e. Set the 0–40 attenuator to 0. Turn the main amplifier switch on, and the amplifier selector switch to AC.

f. Turn the 0–40 attenuator control counterclockwise until a usable deflection is obtained. While watching the needle of the amplifier meter, move the bolometer probe slowly along in the slot. As the probe is slowly moved, the meter needle will be seen to rise and fall in a regular manner.

g. Note the maximum meter reading and the minimum meter reading as the probe is moved along the slot. Divide the maximum reading by the minimum reading. The figure obtained is the square of the standing wave ratio. It should not exceed 2.25. (To get the actual standing wave ratio take the square root of the figure obtained.) If the square of the standing wave ratio is greater than 2.25, the cause of the high ratio must be determined.

(1) Feel the r-f line (both below and above the slotted section) in the transmitter cabinet. Also feel the section of the line between the transmitter and the antenna. Note any point which seems to be abnormally hot and replace the section of line in which the hot spot is found.

(2) Listen along the r-f line for a high-pitched buzz. Such a sound indicates the arcing of r-f energy within the line. If an arc is found, replace the section of line in which the arc occurs.

(3) If no arc has been discovered, the line should be taken apart and inspected for loose or missing silver bullets.

(4) If none of the above steps aids in localizing the high standing-wave condition, spare sections of r-f line (if available) should be substituted in their appropriate places until the ratio, maximum reading divided by minimum reading, does not exceed 2.25.

h. If the square of the standing wave ratio, as determined in *g* above, is under 2.25, the r-f line is functioning properly. After completion of the test remove the bolometer probe from the slotted section and replace the cover with the six retaining screws.

28. Setting Local Oscillator Voltages

If the DETECTOR meter reading is zero, the local oscillator voltages must be set so that the klystron oscillator will oscillate. The voltage controls are screw driver controls located on the receiver front panel (fig. 28). The instructions for setting the voltages follow.

a. Turn the KLYSTRON REFLECTOR VOLTAGE control until maximum crystal mixer current, as indicated on the DETECTOR meter, is obtained.

b. If the DETECTOR meter reading exceeds 0.6 milliampere, the local oscillator coupling to the receiver must be reduced. The coupling fitting extends downward from the crystal mixer

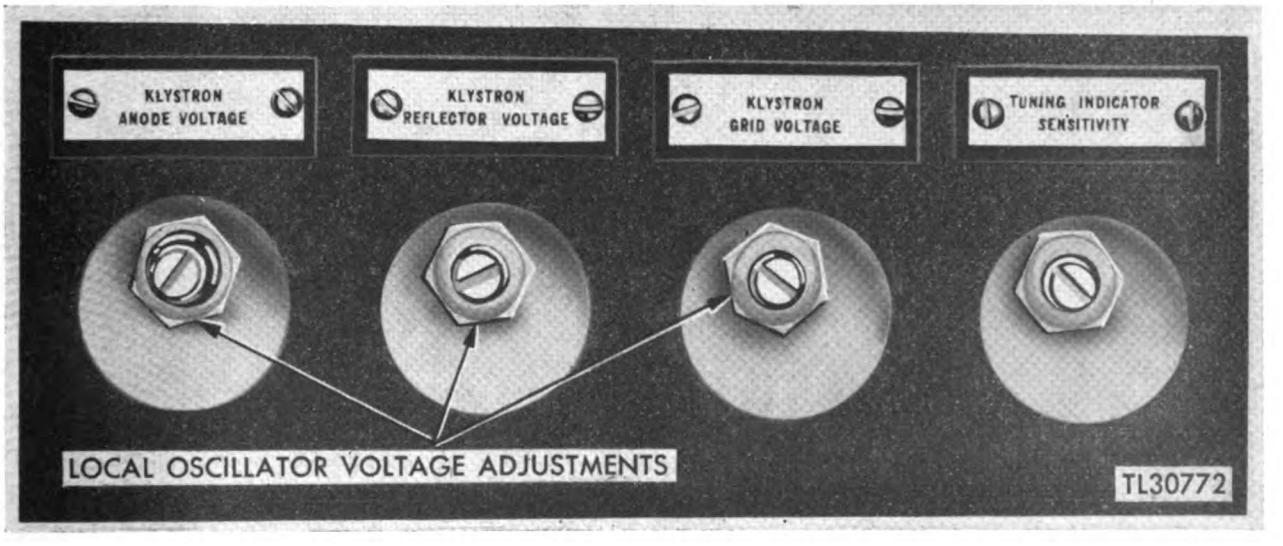


Figure 28. Local oscillator controls.

(fig. 29) and is held in place by a locknut. Loosen the locknut and rotate the fitting counterclockwise to reduce coupling until the DETECTOR current meter reads less than 0.6 milliampere. Tighten the locknut to keep the fitting from slipping.

c. The KLYSTRON GRID VOLTAGE control should be rotated and the minimum reading of the DETECTOR current meter noted. The control should then be set so that the DETECTOR meter reads 0.1 milliampere more than the minimum reading noted. The local oscillator coupling to the mixer should then be set so that the DETECTOR current meter reads about 0.4 milliampere.

29. Mixer and T-R Box Adjustment

When a set is first installed, it may be found necessary to tune the mixer and T-R box to obtain proper operation of the set. The reception of weak signals from targets which should return strong echoes will indicate this condition. It will also be necessary to adjust the mixer and T-R box whenever the transmitter oscillator is changed. In performing the adjustments given in the following procedure refer to figure 29.

a. Rotate the antenna with the MANUAL SCAN handwheel until a distinct signal pip is observed on the A-scope. Leave the antenna aimed in this direction.

b. Figure 29 shows a knurled tuning plunger at the front of the mixer. Loosen the locknut which holds it in place. The plunger can now be screwed in or out. Rotate it slightly, first in one direction and then in the other, and observe whether or not this produces a noticeable change in the depth of the signal pip as seen on the A-scope. If there is none, leave the plunger in its

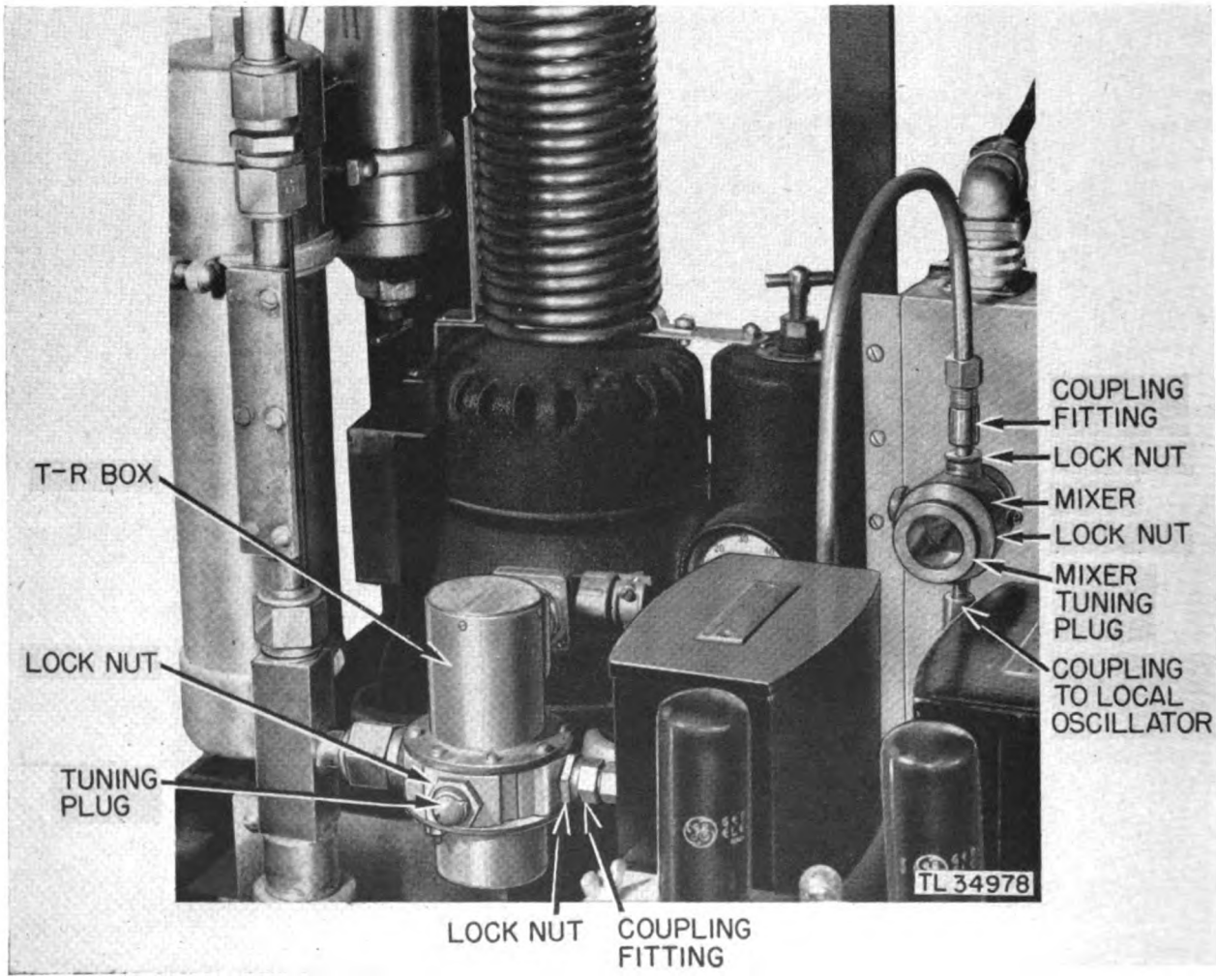


Figure 29. Tuning T-R box and mixer.

original position; otherwise, leave it at the point of greatest signal strength. Tighten the locknut.

c. The DETECTOR current meter on the control cabinet should read between 0.2 and 0.6 milliampere. If the current exceeds 0.6 milliampere, the coupling from the klystron local oscillator to the mixer must be reduced. The coupling is obtained through the fitting extending downward from the mixer. (In figure 29 this coupling fitting and the locknut which hold it in place cannot be seen, but they are similar to the ones which extend upward.) Loosen the locknut and rotate the fitting one way or the other until the correct current reading (0.2 to 0.6 milliampere) is obtained. Tighten the locknut to keep the fitting from slipping.

d. At the center of the T-R box, facing the front of the transmitter cabinet, is located a tuning plug which is held in place by a locknut. Loosen the locknut and turn the tuning plug in and out slowly to locate the setting at which the signal on the A-scope is strongest. Set the plug carefully at the point and tighten the locknut. Make certain that the setting of the tuning plug does not change while the locknut is tightened.

e. The coaxial copper line extending from the T-R box toward the right couples the output of the T-R box into the mixer. It is connected to the T-R box by means of a coupling fitting. Loosen the locknut on the coupling fitting and rotate the fitting for maximum signal strength on the A-scope. Notice that a rotation of 90 degrees varies the signal from minimum to maximum strength. The *depth* to which the coupling loop is adjusted is not very critical. *Make certain, however, that the plug is not screwed in so far that it hits the glass tube in the T-R box.*

30. Dehydrator Adjustment

The dehydrator has an automatic pressure switch which keeps the pressure in the r-f line constant. The pressure switch adjustment can be seen in figure 30.

a. To raise the pressure, turn the adjusting screw in; turn it out to lower the pressure. The pressure should be kept between 5 and 10 pounds per square inch as read on the pressure gauge.

b. The silica-gel indicator will turn from blue to pink when the dehydrator cartridge is wet. The dehydrator must not be allowed to run with a wet cartridge because water will be pumped into the line.

c. If no replacements for a wet cartridge are available, the dehydrator motor must be disconnected.

Figure 30. Dehydrator System.

31. Antenna Orientation

The accuracy of the azimuth readings obtained with the SCR–582–(*) depends upon the accuracy with which the antenna and the sweep trace of the PPI scope have been oriented with respect to true south.

a. With the set operating on manual scan, rotate the antenna with the MANUAL SCAN handwheel until a signal can be selected which corresponds to a known target whose position is certain. The target selected may be either a fixed target, such as a water tower, or a surface vessel within the range of the equipment. Because it must be possible to say definitely that a certain target echo observed on the PPI scope screen corresponds to that particular target, the target should be isolated from other targets.

b. Make certain that the antenna is pointed directly at the target. This condition is obtained by positioning the antenna so that the target echo on the A-scope is at a maximum.

c. Determine by optical means the azimuth from true south of the selected target. The antenna is now pointed in this direction, and it is necessary to point the PPI sweep line so that it indicates the proper azimuth.

d. Rotate the transparent shield on the face of the PPI scope until the azimuth reading, obtained above by optical means, is set up directly in line with the marker. If the set is already properly orientated, the fine indicating line on the shield will coincide with the sweep trace and pass

directly through the target echo. If this is not the case, the remaining steps must be performed.

e. Turn off the equipment as outlined in the stopping procedure (par. 40).

f. Open the rear door of the control cabinet and locate the synchro-generator mounted on the same chassis as the PPI scope (fig. 31).

g. Tape the synchro-generator shaft so that it will not rotate. This is done to keep the antenna directed towards the target while the following steps are performed.

h. Loosen the setscrew in the coupling between the synchro-generator and the adjoining shaft until the gear on the shaft is free to rotate without turning the synchro-generator (fig. 32).

i. Close the rear door and start the equipment by using the normal starting procedure (par. 34).

j. Using the MANUAL SCAN handwheel, rotate the sweep line until it coincides with the indicating line on the transparent shield. The indicating line must pass through the center of the target. (If the indicating line does not pass through the center of the target, the antenna has moved and the orientation procedure must be started at the beginning.) *Leave the handwheel in this position.*

k. Make certain that the antenna has not moved during this time by observing that the depth of the target echo on the A-scope is unchanged.

l. Turn off the equipment, open the rear door, and tighten the set screw previously loosened. Remove the tape from the shaft.

m. Close the door, start the equipment, and obtain an azimuth reading for the selected target by following the method given in the section on operating procedure. This will be the same as that previously obtained by optical means if the procedure has been properly performed.

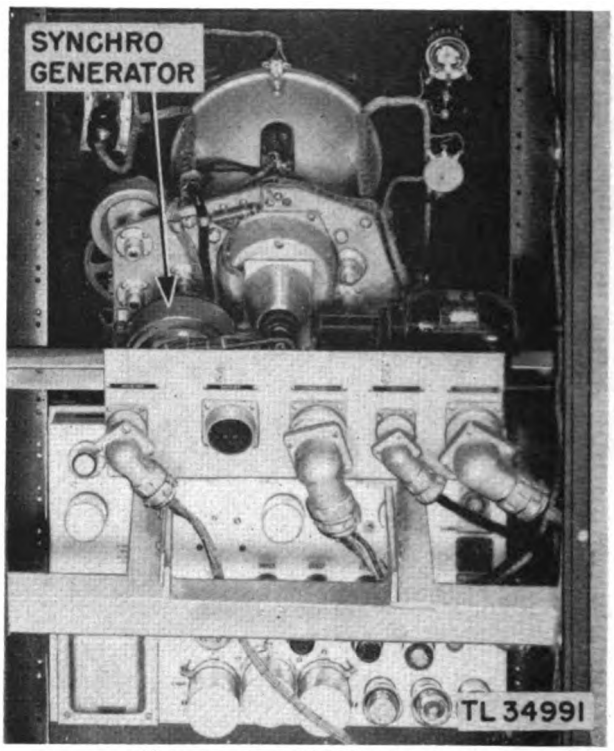


Figure 31. Rear of PPI scope chassis.

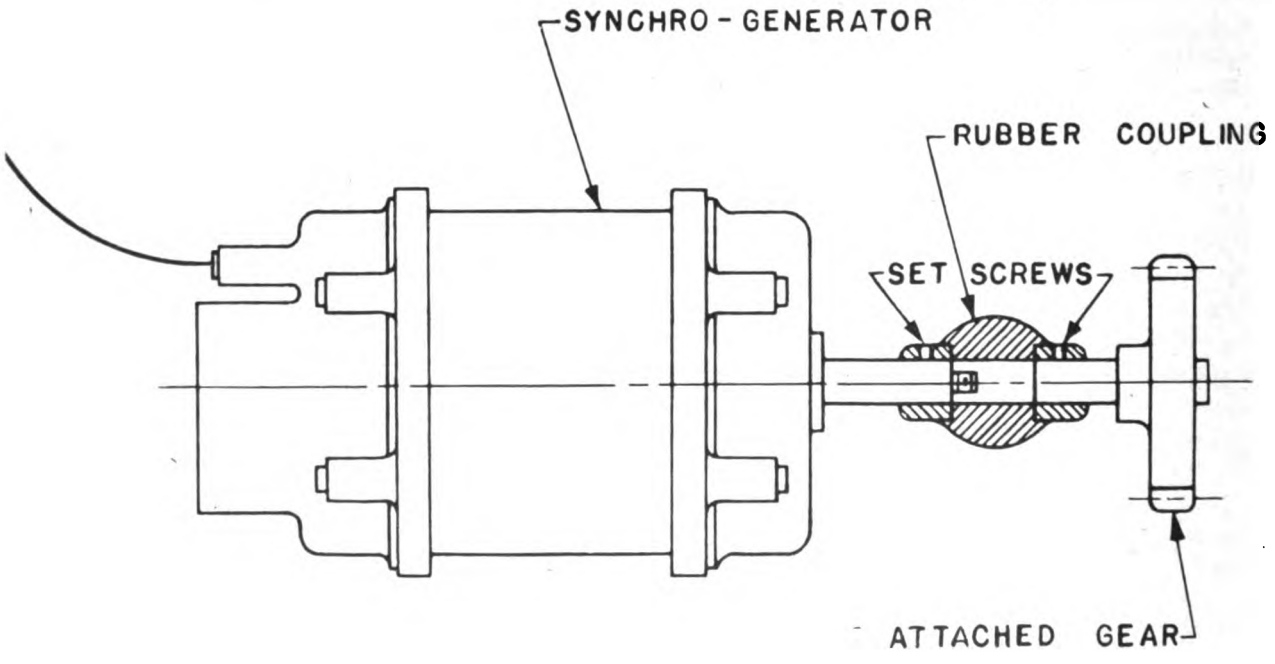


Figure 32. Synchro-generator coupling.

CHAPTER 3

OPERATION

Section I. STARTING PROCEDURE

32. Starting Power Unit

Where a commercial source of 60-cycle 115-volt a-c power is available, it is used for Radio Set SCR–582–(*). Where commercial power is not available, a motor generator set is used as a source of power. Three different power units are supplied for use with Radio Set SCR–582–(*). They are Power Unit PE–196–A, Power Unit PE–196–B, and Power Unit PE–127–A. The procedure for starting each of these units is given below.

a. **Power Unit PE–196–A (fig. 33).**

(1) Turn the IGNITION switch ① upward to the ON position. The red OIL FAILURE LIGHT ② should go on.

(2) Press the push-button ③ on the oil-pressure-relay bypass switch. The OIL FAILURE LIGHT ② will go out.

(3) Make certain that the CIRCUIT BREAKER ④ is off, and that the HAND THROTTLE ⑤ is pulled back. The latter precaution insures that the motor will start at slow speed.

(4) Press the STARTER button ⑥. The motor should start readily, but if it does not, release the button and repeat the procedure. Do not hold the STARTER button pressed for more than a few seconds at a time.

(5) When the OIL PRESSURE GAUGE ⑦ registers a pressure of 15 pounds, release the oil pressure bypass switch ③.

(6) Allow the engine to run a few minutes at low speed and then push the HAND THROTTLE ⑤ forward to a position that will allow the governor ⑧ to operate the throttle freely.

(7) If automatic regulation is desired, turn the VOLTAGE REGULATOR switch ⑨ to ON and check the a-c voltmeter ⑩ to see if the desired voltage is being developed. It may be necessary to adjust the VOLTAGE REGULATOR RHEOSTAT ⑪. If manual control of the voltage is desired, turn the VOLTAGE REGULATOR switch ⑨ to OFF and vary the EXCITER FIELD RHEOSTAT ⑫ until the a-c voltmeter ⑩ indicates the desired voltage.

(8) Connect the load either by using the a-c output terminals ⑬ on the panel board or by plugging into the side convenience outlet ⑭ (if it is not already connected), and turn the CIRCUIT BREAKER ④ to the ON position.

(9) After the load has been connected, again check the a-c voltmeter ⑩.

(10) To stop the engine, remove the load, turn the CIRCUIT BREAKER ④ off, and turn the IGNITION switch ① to the OFF position.

b. **Power Unit PE–196–B (fig. 34).**

(1) Turn the IGNITION switch ① to the ON position.

(2) Turn the SAFETY switch ② to the ON position. When the engine starts and the oil pressure builds up, this switch will be thrown automatically to the RUN position.

(3) See that the CIRCUIT BREAKER ③ is in the OFF position.

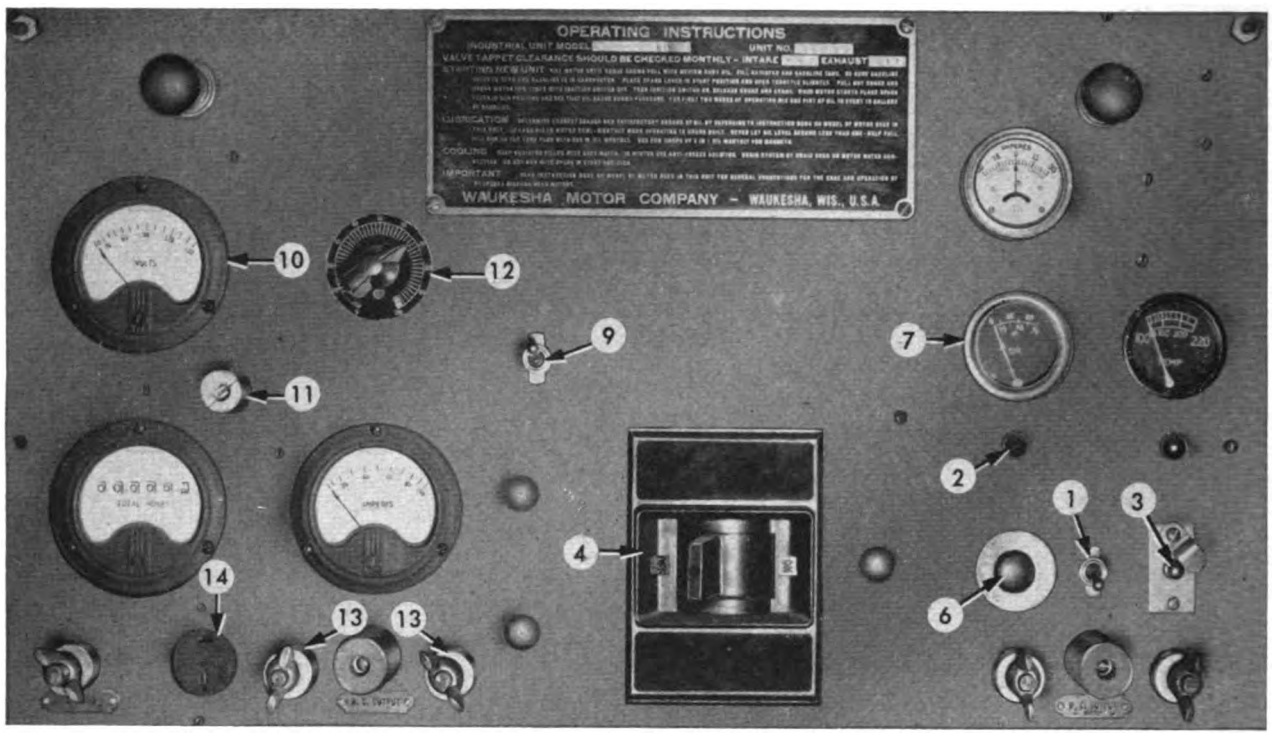
(4) Press the STARTER button ④ until the engine fires.

(5) After the engine comes up to speed, be sure that the OIL PRESSURE GAUGE ⑤ on the control panel indicates at least 15 pounds.

(6) See that the battery-charging AMMETER ⑥ registers current. This current should read 14 to 16 amperes at the start; then drop back to between 2½ and 5 amperes, depending on the condition of the battery.

(7) Allow the engine to warm up for about 5 minutes, and then check by means of the a-c voltmeter ⑦ that the output voltage is satisfactory. The voltage may be adjusted by means of a small rheostat on the voltage regulator cover ⑧.

(8) If the load is not already connected, con-



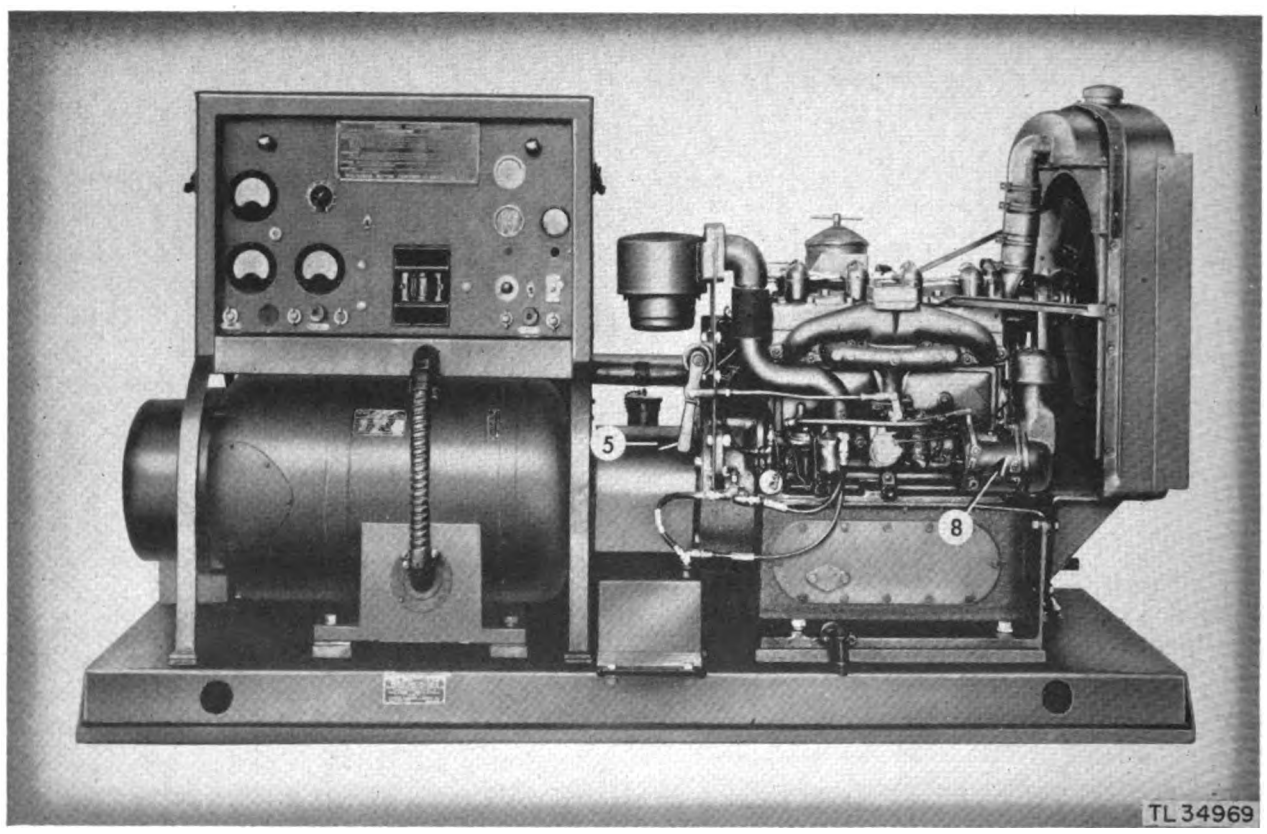
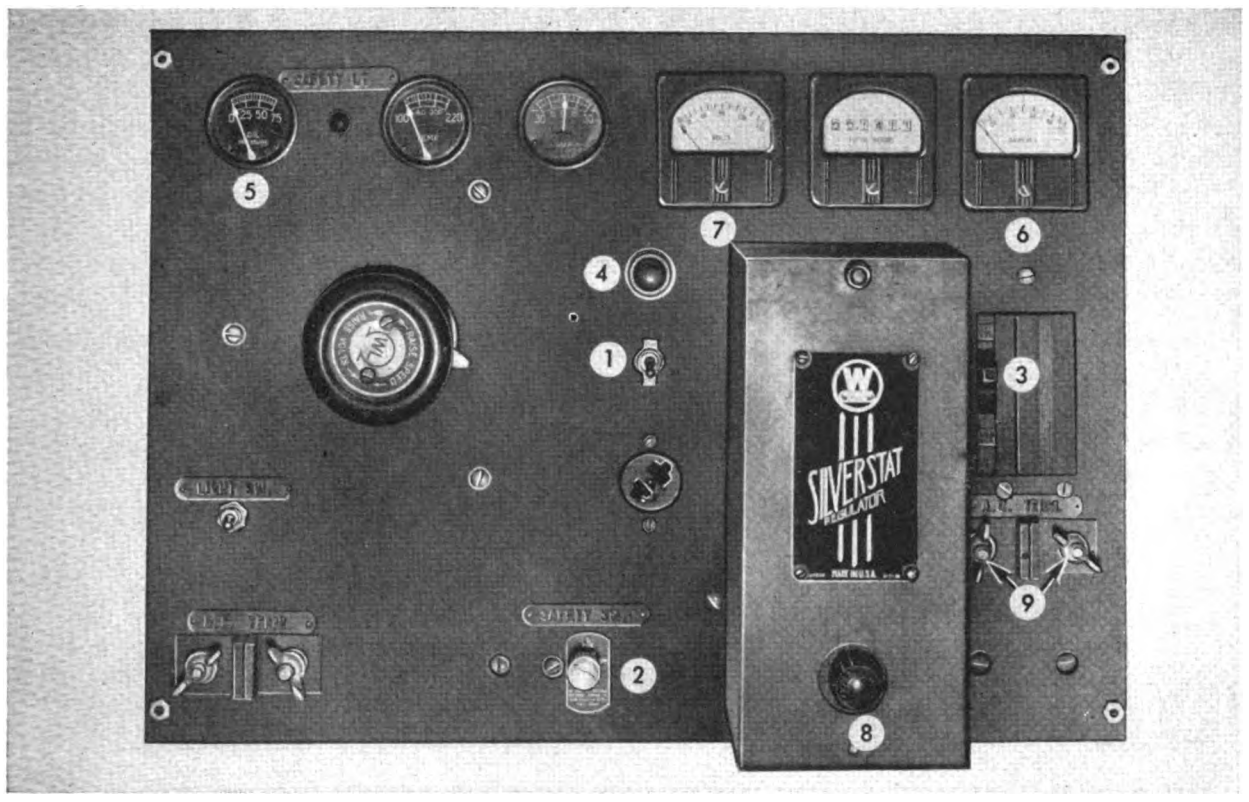


Figure 33. Power Unit PE–196–A controls.



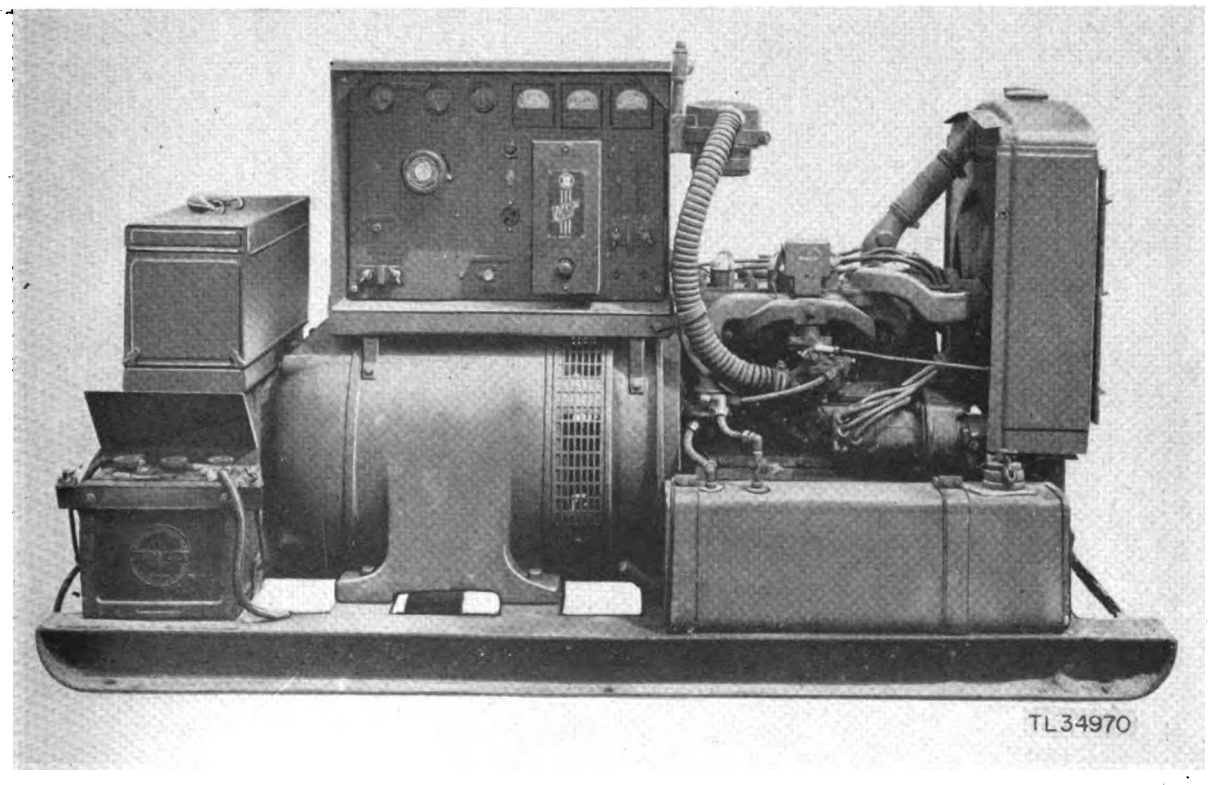


Figure 34. Power Unit PE–196–B controls.

nect it to the a-c terminals ⑨ on the control panel.

(9) Apply the load by throwing the CIRCUIT BREAKER ③ switch to the ON position and proceed with the regular starting procedure of the radar set itself.

(10) When the radar set has been shut down, turn the generator off by opening the CIRCUIT BREAKER ③ and, after a few minutes, turning the IGNITION switch ① to the OFF position.

c. **Power Unit PE–127–A (fig. 35).**

(1) Turn the FIELD RHEOSTAT ① to the AUTO position and turn the VOLTAGE REGULATOR switch ② to the ON position.

(2) Turn the IGNITION switch ③ to the ON position. When the engine starts and the oil pressure builds up to 12 pounds, this switch will be automatically thrown over to the RUN position.

(3) Pull the hand throttle button ④ to the first notch and pull the choke button ⑤ as necessary. If the engine is warm, it will not be necessary to use either throttle or choke.

(4) See that the CIRCUIT BREAKER ⑥ is in the OFF position.

(5) Press the MOTOR STARTING switch ⑦ until the engine fires.

(6) After the engine comes up to full speed, check that the OIL PRESSURE GAUGE ⑧ on the control panel indicates at least 15 pounds and that the 6-volt CHARGING AMMETER ⑨ is

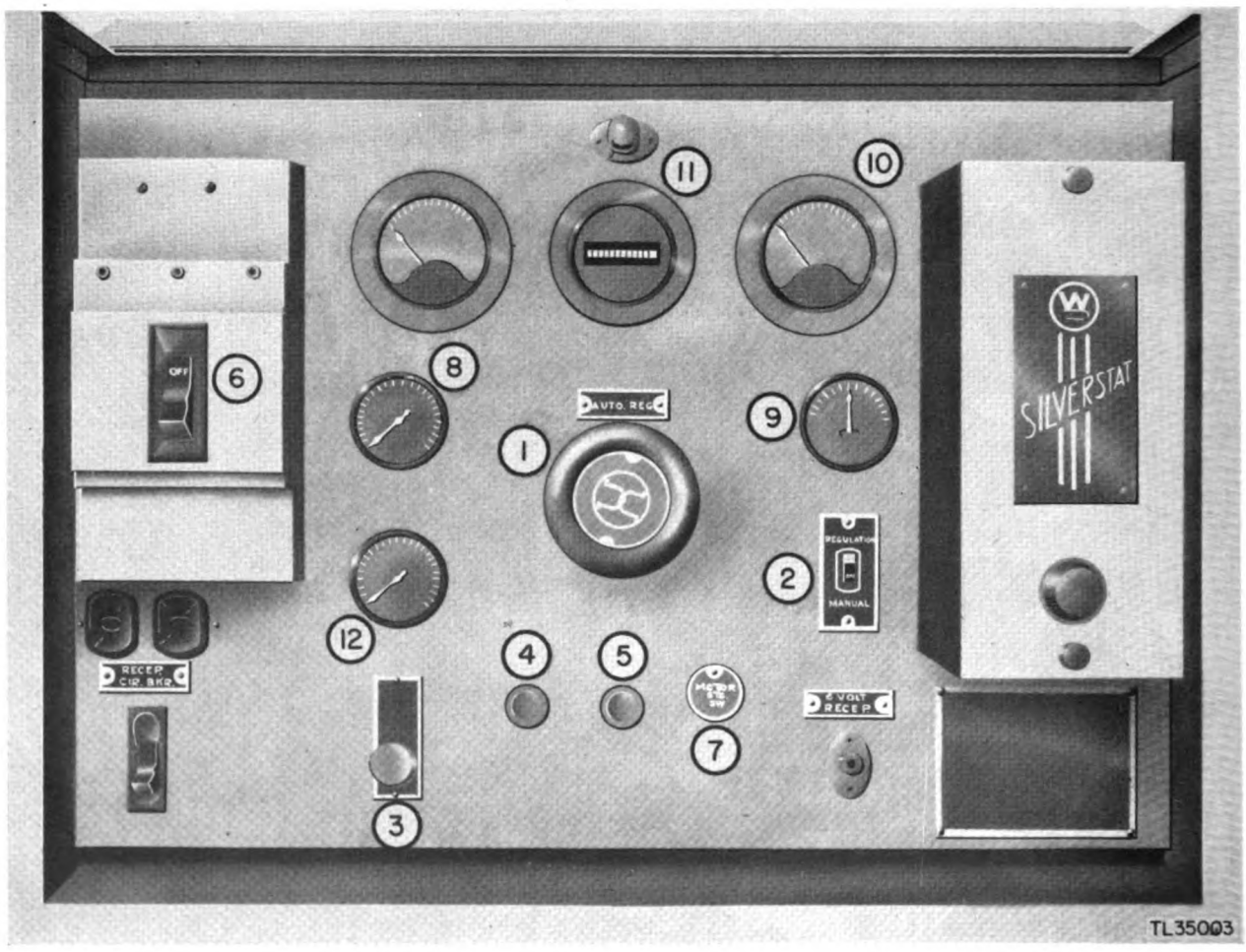


Figure 35. Power Unit PE–127–A controls.

registering charging current. This meter should show from 14 to 16 amperes at the start, and then drop to 2½ to 5 amperes, depending on the condition of the battery.

(7) As the engine warms up gradually, push in the throttle button ④ and the choke button ⑤. In very cold weather it may be necessary to keep the choke button pulled out slightly to obtain a constant speed.

(8) When the engine is warm, check the voltage and frequency on the VOLTMETER ⑩ and FREQUENCY METER ⑪ on the control panel. The frequency from no load to full load should remain between the limits of 60 and 62 cycles. The voltage may be adjusted by the rheostat on the voltage regulator cover.

(9) Apply the load by throwing the CIRCUIT BREAKER ⑥ to the ON position.

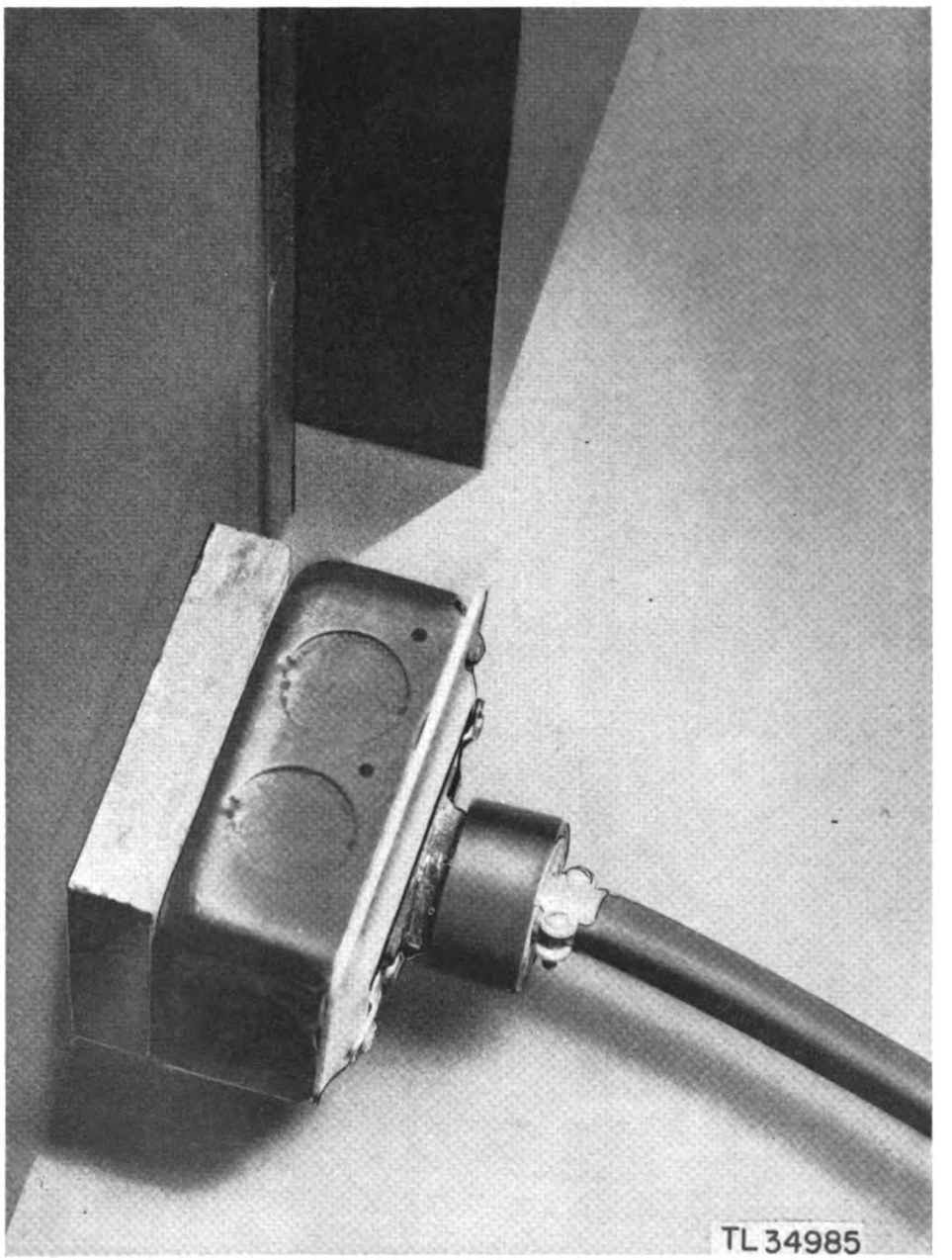


Figure 86. Power entering control cabinet.

(10) In stopping the generator, open the CIRCUIT BREAKER ⑥. After several minutes pull the hand throttle ④ all the way out and turn the ignition switch ③ to the OFF position.

33. Preliminary Check of Radar Set

Before the radar set can be turned on, the preliminary checks, as listed in this paragraph, must be made.

a. Be sure that the line to the primary power supply, figure 36, is plugged in.

b. Check that the antenna assembly is free to rotate.

c. Check that the automatic scan speed switch (A, fig. 37) is off.

d. Check that the modulator MAIN SWITCH (B, fig. 37) is on.

e. Check that the RADIATE switch on the transmitter cabinet (C, fig. 37) is off.

f. Check that the RADIATE switch in the control cabinet (D, fig. 37) is off.

g. Check that the TRANSMITTER (fig. 37) variac and the MAIN POWER (F, fig. 37) variac are turned fully counterclockwise.

34. Starting Radar Set

The detailed steps of the starting procedure for Radio Set SCR–582–(*) are presented below. They should be thoroughly mastered. For convenience refer to figures 38 to 44. The letters on the figures correspond exactly to the letters in the text.

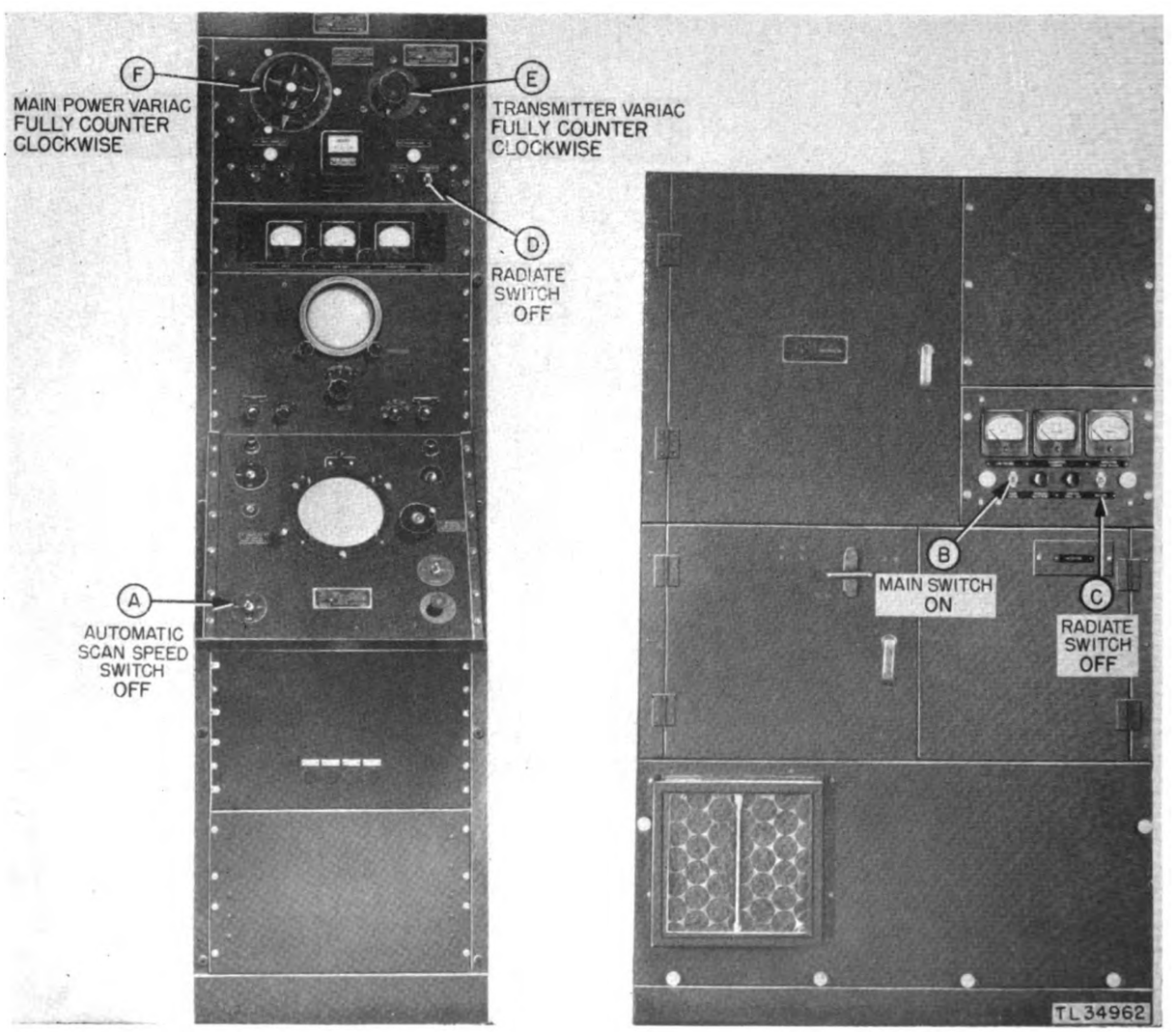


Figure 37. Position of controls prior to starting.

STEP NO. 1

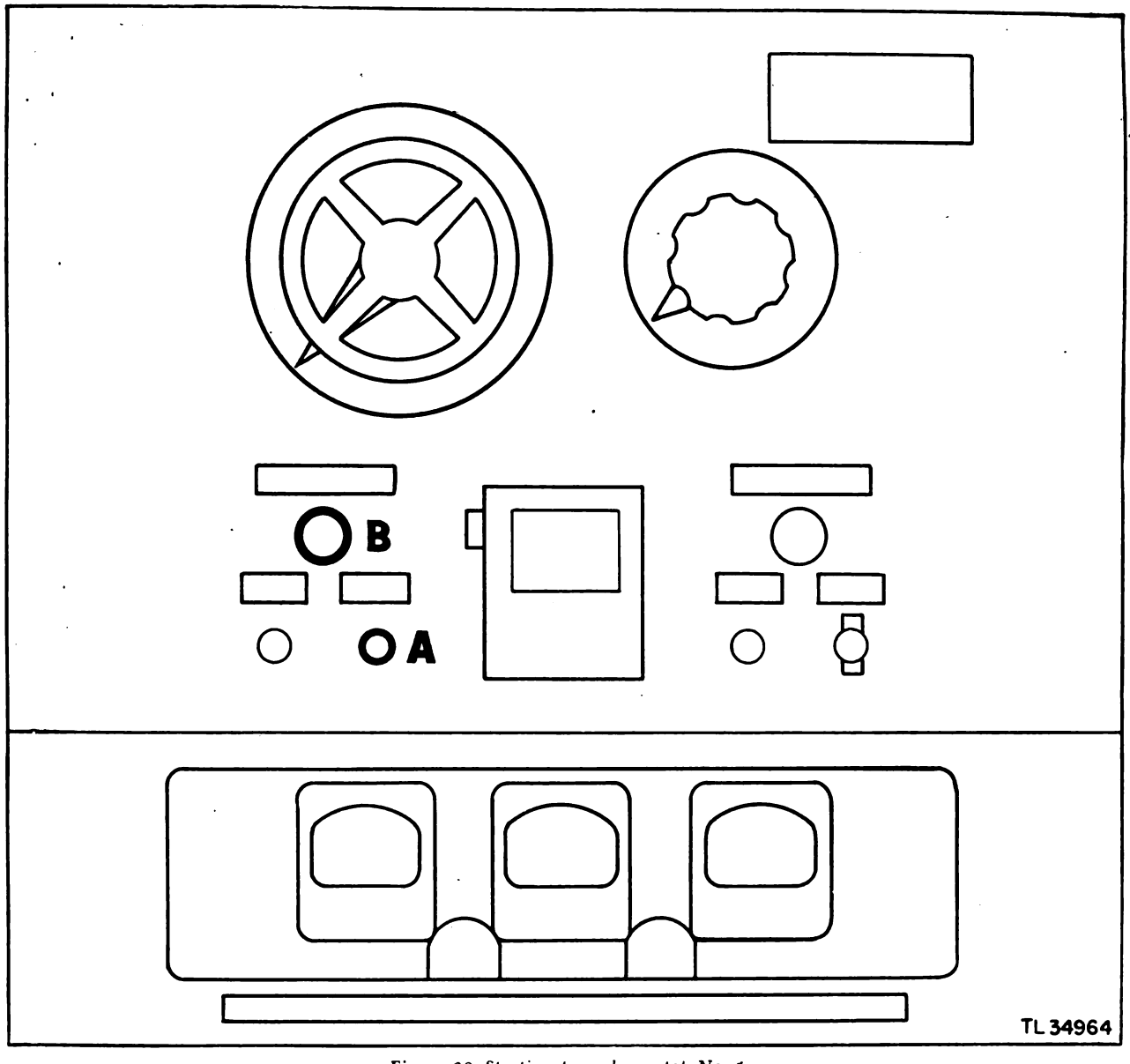


Figure 38. Starting procedure, step No. 1.

a. Push the MAIN POWER ON button (A) on the control panel (fig. 38). The green pilot light (B) should glow.

STEP NO. 2

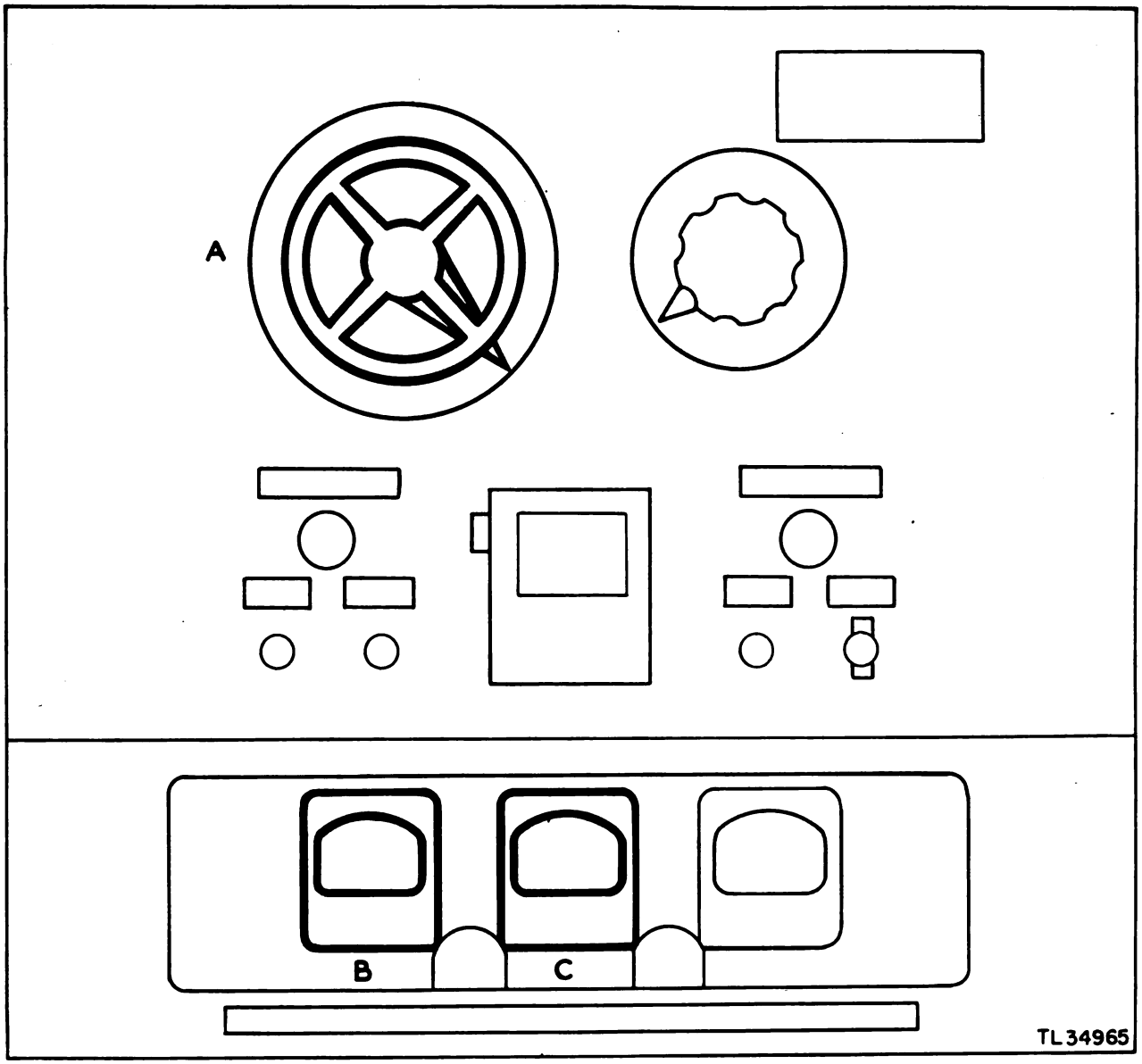


Figure 39. Starting procedure, step No. 2.

b. Turn up the MAIN POWER (A) variac on the control panel (fig. 39) until the INPUT voltmeter (B) reads 115 volts. At this point both the A and the PPI scopes will show their characteristic appearance. The DETECTOR meter (C) should read about 0.5 milliampere.

Note. Wait 2 minutes, or until a definite click from the modulator cabinet indicates that the time delay relay has kicked in, before performing step 3. The TRANSMITTER current meter (B), figure 41, will read approximately 5 milliamperes.

STEP NO. 3

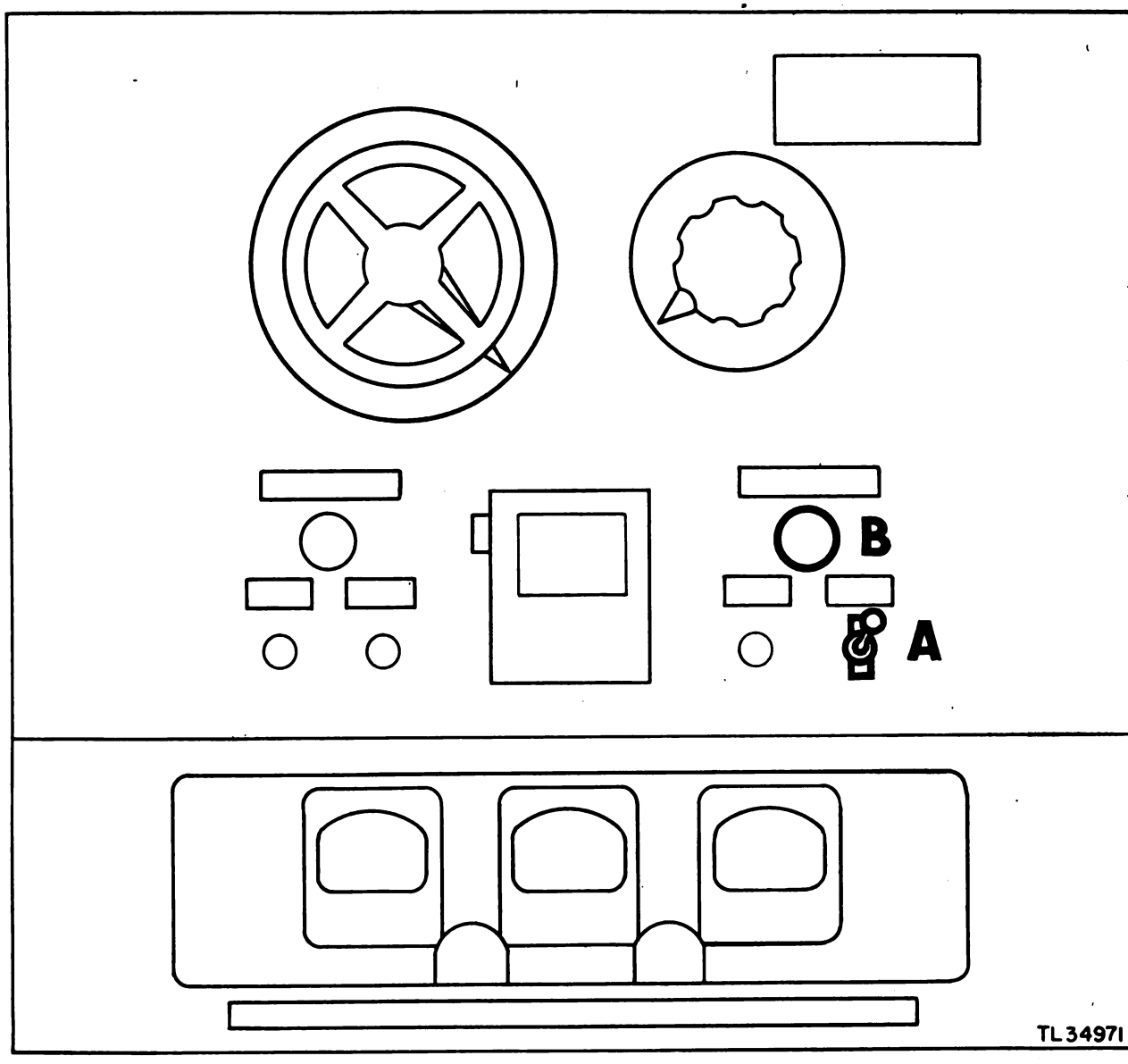


Figure 40. Starting procedure, step No. 3.

c. Turn the RADIATE switch (A) on the control panel (fig. 40) to ON. The red pilot light (B) will glow.

STEP NO. 4

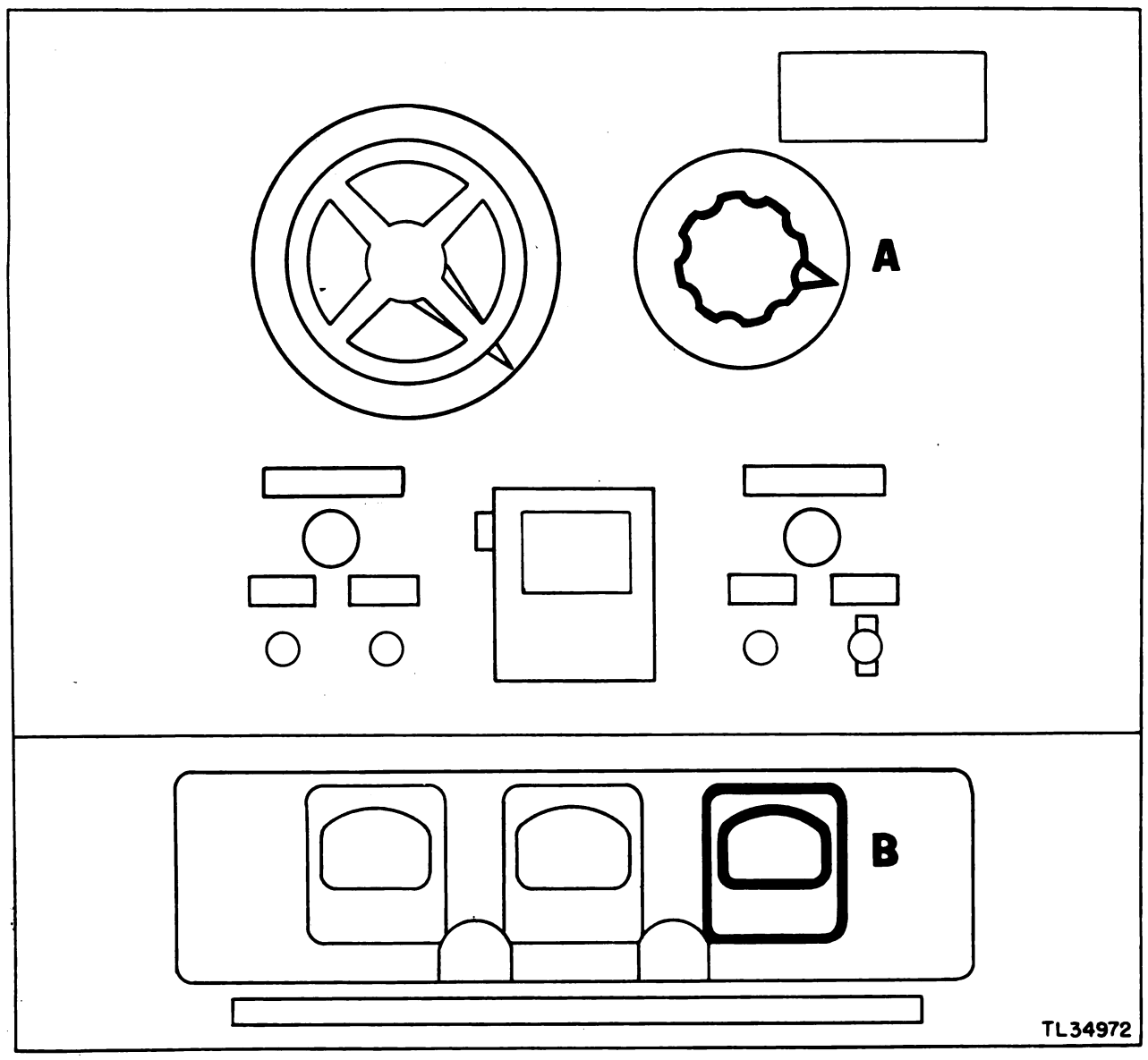


Figure 41. Starting procedure, step No. 4.

d. Turn up the TRANSMITTER variac (A) on the control panel (fig. 41) until the TRANSMITTER current meter (B) reads between 6 and 10 milliamperes.

Note. If the d-c overload relay kicks out during the above step, and the transmitter signal light on the transmitter cabinet meter panel (fig. 24) goes off, proceed as follows: Turn the TRANSMITTER variac all the way to the left; turn the RADIATE switch on the control cabinet to OFF; push the overload relay RESET button; turn the RADIATE switch on, and turn up the TRANSMITTER variac again until the transmitter current meter reads between 6 and 10 milliamperes. The transmitter signal light should now stay on.

STEP NO. 5

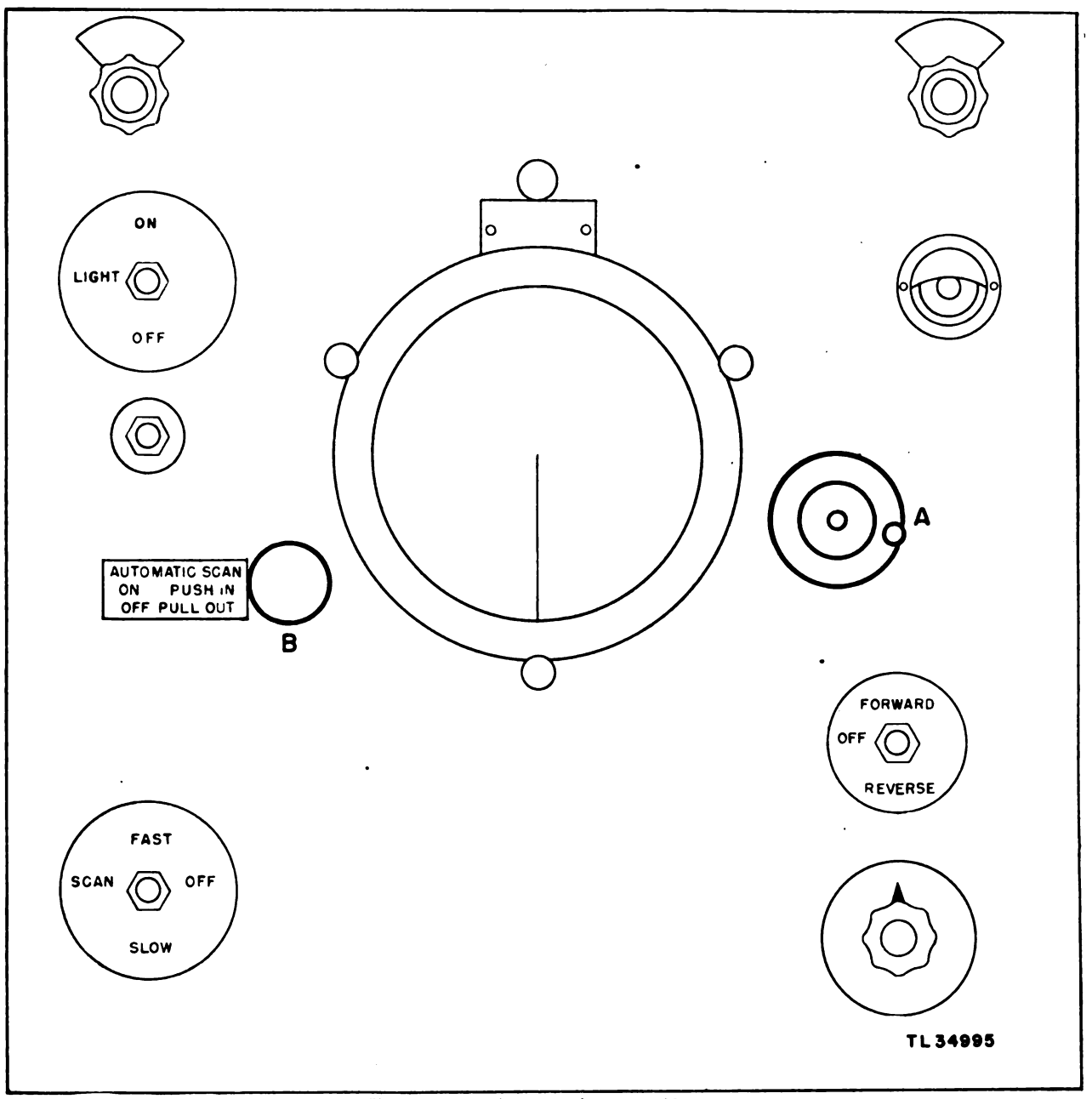


Figure 42. Starting procedure, step No. 5.

e. Check that the MANUAL SCAN handwheel (A, fig. 42) is pulled out, and push in the AUTOMATIC SCAN knob (B) so that the gears engage.

STEP NO. 6

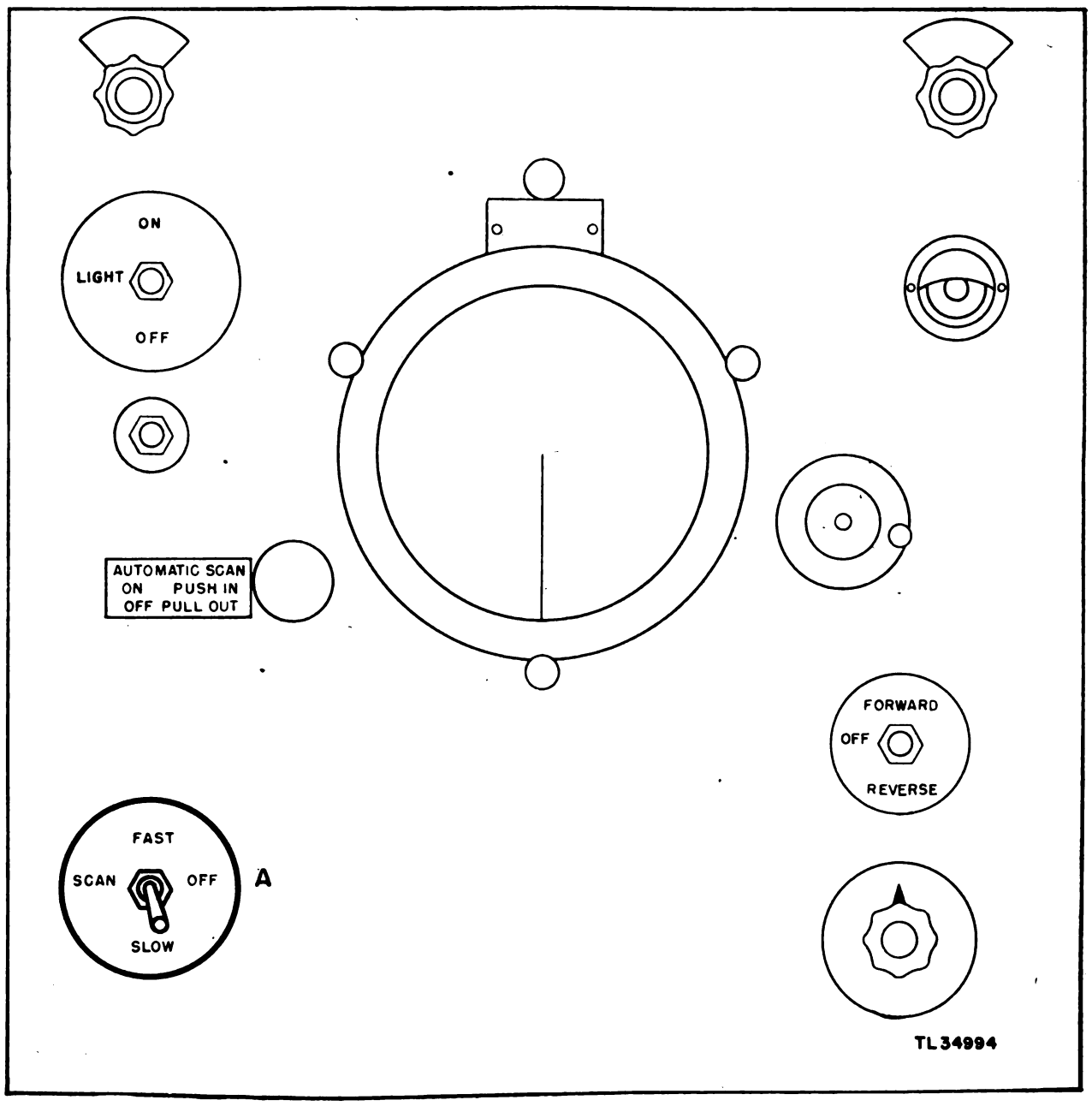


Figure 43. Starting procedure, step No. 6.

f. Turn the AUTOMATIC SCAN switch (A, fig. 43) to SLOW. The antenna assembly will begin to rotate now, and the PPI-scope sweep will rotate in unison with it.

STEP NO. 7

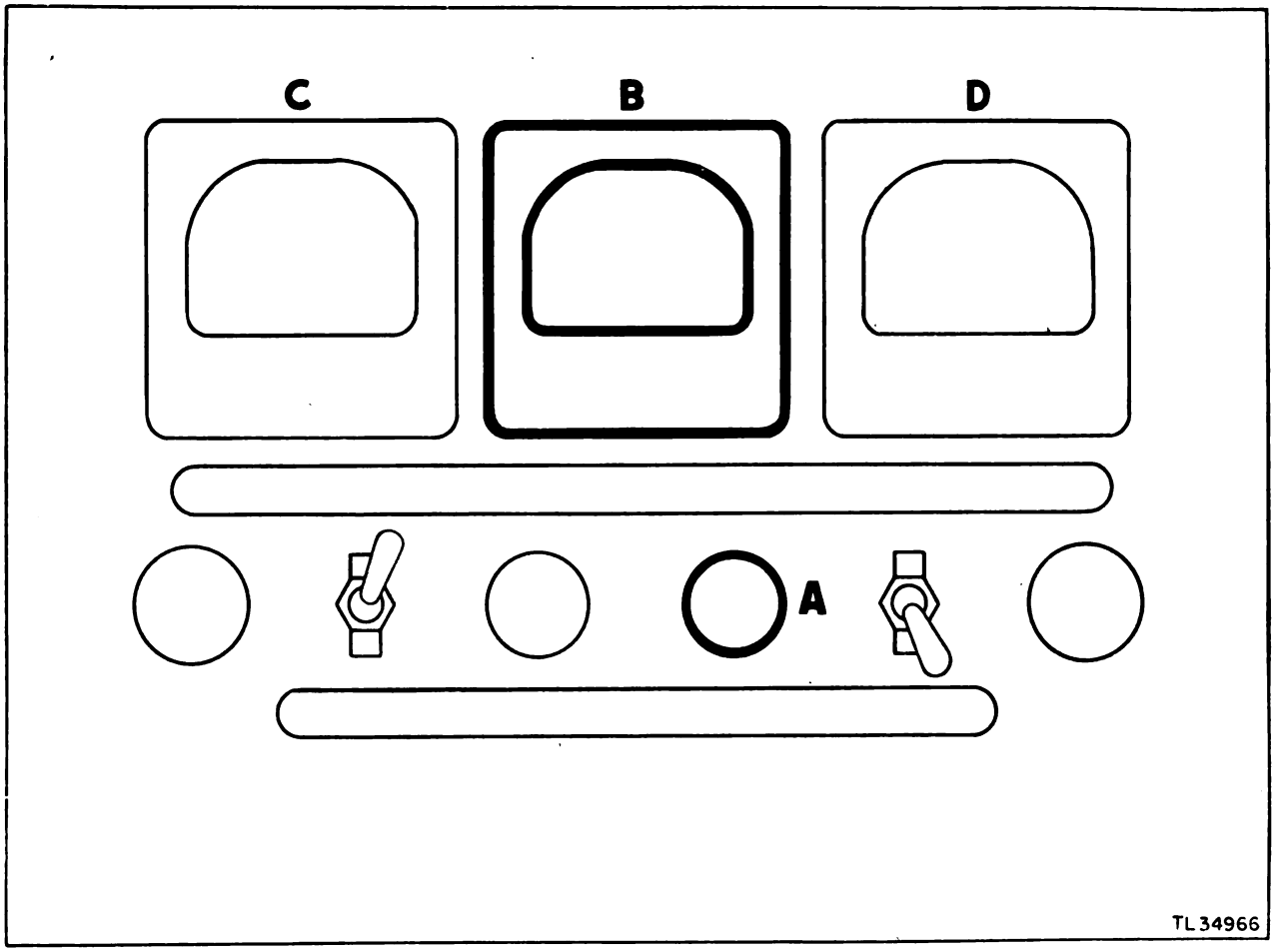


Figure 44. Starting procedure, step No. 7.

g. Press the PUSH FOR TOTAL D-C button (A, fig. 44). The TRANSMITTER CURRENT meter (B) should read 10 to 15 milliamperes. After the above check, see that the following meters read correctly:

INPUT voltmeter (B, fig. 39)	115 volts.
LINE VOLTAGE meter (C, fig. 44)	115 volts.
DETECTOR current meter (C, fig. 39)	0.2 to 0.6 ma.
MODULATOR PLATE VOLTAGE meter (D, fig. 44)	10 to 15 kv.
TRANSMITTER current meter (B, fig. 41)	6 to 10 ma.
TRANSMITTER CURRENT meter (B, fig. 44)	6 to 10 ma.

Section II. OPERATIONAL ADJUSTMENTS

35. Tuning Radar Set

From time to time it is necessary to tune the radar set. The following subparagraphs describe all the tuning adjustments which can be made by operating personnel.

a. **Setting Gain Control.** Although setting the gain control is not generally considered a tuning operation, it is taken up here because the gain control must be properly set before the tuning adjustments can be made. There exists a certain amount of electronic noise in the operation of the receiver which shows up on the A-scope as a fuzziness of the sweep line and on the PPI scope as a light "snow" covering the screen. If the gain of the receiver is too high, this noise on the screen tends to obscure weak signals. If the gain control is set too low, weak signals will not be observed. The RECEIVER GAIN control in the lower right-hand corner of the PPI-scope front panel should be set so that the noise level on the A-scope extends about ¼ inch from the baseline of the sweep. The snow on the PPI scope then will become barely noticeable.

b. **Tuning Local Oscillator.** For proper operation of the receiver the frequency of the transmitting oscillator and the local oscillator (or klystron) must be such that their difference is a certain definite value. Provision has been made for varying the frequency of the klystron readily. This is done by means of the RECEIVER TUNE control on the front panel of the PPI scope. Thus any variation in the frequency of operation of either the transmitter or the klystron can be compensated for by changing the tuning of the klystron so as to keep the difference frequency (to which the receiver proper is tuned) constant.

(1) Pull out the AUTOMATIC SCAN knob on the PPI-scope panel and push in the MANUAL SCAN handwheel. Rotate the handwheel until the A-scope shows one or more clear pips. They appear as vertical dips on the sweep trace. Leave the antenna fixed in this position.

(2) Flip the klystron tuning control switch, on the P-scope panel, up and down, until the depth of the signal pip is at a maximum as compared with the depth of the noise band. At the same time it will be noticed that changing the tuning of the receiver varies the thickness of a wedge-shaped shadow appearing on the tuning eye located on the front panel of the PPI scope. Proper tuning of the receiver is also indicated by minimum width of this shadow.

Note. When the klystron is tuned, as evidenced by best signals on the A-scope, the tuning eye may not entirely close. The TUNING EYE SENSITIVITY CONTROL (fig. 28) should then be adjusted so that the tuning eye closes. The sensitivity of the tuning eye will then be a maximum.

c. **Setting Transmitter Variac.** In placing the equipment in operation, the transmitter variac was set so that the transmitter current meter read between 6 and 10 milliamperes. The optimum setting of the transmitter variac is that which produces the strongest signal echo from any chosen target, as indicated by the depth of the corresponding pip on the A-scope. Leave the antenna aimed in the same direction as in the preceding step, with at least one clear signal pip showing on the A-scope. Turn the transmitter variac slowly back and forth until this pip is at its maximum depth, measured from the base of the sweep line. *The transmitter current must not exceed 10 milliamperes,* however, because this is the maximum current for good life of the transmitting oscillator.

36. Antihunt Adjustment

On automatic scan the antenna should turn smoothly and should not hunt. Hunting is vari-

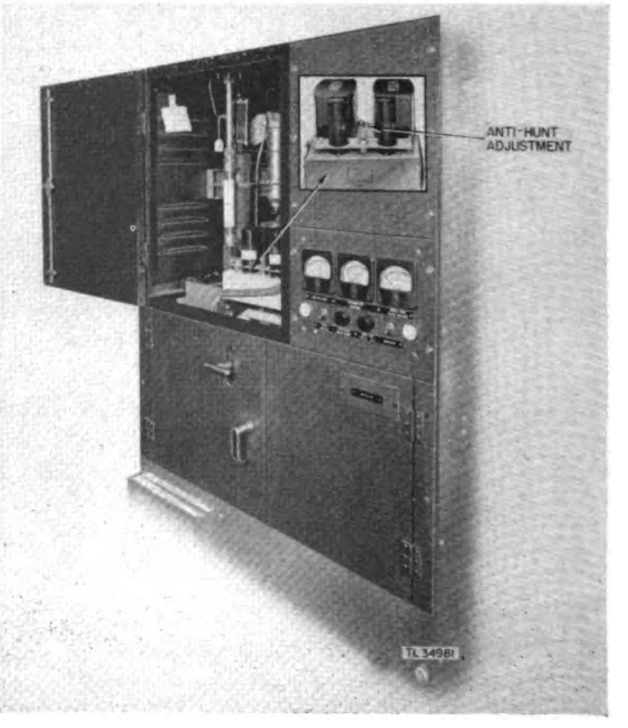


Figure 45. Anti-hunt adjustment.

ation of antenna speed on automatic scan. The acceleration and the deceleration may be violent enough to damage the equipment. Whenever hunting is observed, the AUTOMATIC SCAN switch must be shut off at once. An antihunt adjustment is provided to correct hunting. The control is a screwdriver adjustment and can be seen in figure 45. If the hunting is fairly violent, this control should be turned slightly counter clockwise. Then turn the automatic scan control to SLOW and check for any lessening of the hunting. Repeating this procedure stops the hunting so that the antenna assembly rotates smoothly. The antihunt control should be turned slightly in a clockwise direction and the adjustment repeated until the best setting is found.

Section III. TECHNICAL OPERATION

37. Searching

In order to keep the surrounding area under constant observation, push in the AUTOMATIC SCAN knob and throw the SCAN SPEED switch to SLOW. The RANGE switch should be turned to the 90,000-yard range. The RECEIVER GAIN control should be set so that about ¼ inch of noise appears on the A-scope. The SIGNAL selector switch is kept in the UNLIMITED position and, since range markers are not necessary during search, the RANGE MARKER switch should be placed in the OFF position.

38. Azimuth Reading

After a target has been detected, the azimuth is determined first. The RECEIVER GAIN is reduced until the echo on the PPI scope is just visible. The echo will then be of a size that permits the reading of azimuth (and range) with the greatest accuracy. Also, the RANGE switch should be turned to the shortest range which still allows the target to appear on the oscilloscope screen. For example, if the range of the target is between 10,000 and 30,000 yards, the RANGE switch should be turned to 30,000 yards. Either of the two following methods may now be used to determine the azimuth of the target:

a. In the first method of determining a target's azimuth, the PPI scope is used while the antenna is allowed to rotate in automatic scan. The face of the PPI scope is provided with a transparent shield or disc calibrated along its outer edge into 360 divisions of one degree each (fig. 46). On the surface of the shield is drawn a radial line extending outwards from the center. The shield can be rotated by means of the four small projections on its outer rim. In determining the azimuth of the target, the shield is rotated until the radial line passes exactly through the center of the target echo. The azimuth angle is read from the degree scale along the edge of the shield at the point directly beneath the marker. The marker is located on the frame vertically above the center of the oscilloscope. In figure 46, the azimuth reading for the target shown is 282°.

b. An alternate method for measuring the azimuth of a target using manual scanning and both oscilloscopes can be used. After a target has been detected and the RANGE switch has been turned to the proper position, the set is switched to manual scan. As the antenna is manually rotated, the PPI sweep trace rotates with it. The handwheel is turned so that the PPI sweep passes slowly through the target echo. It will be noticed that the signal also appears on the A-scope as a vertical dip of changing amplitude. At first the signal on the A-scope is very small, but as the antenna is turned, the signal increases in size until the PPI sweep passes through the center of the target. If the antenna is turned beyond this point, the signal once again begins to decrease in size. The handwheel is turned so that the signal on the A-scope is at a maximum. The shield on the PPI scope is then rotated until the radial line on it coincides with the stationary sweep trace.

39. Range Reading

The range of a target can be determined in either one of two ways. One method makes use of the PPI scope, while the other uses the A-scope.

a. **Using PPI Scope.** After the azimuth has been determined, without changing the position of any other controls, the RANGE MARKER switch is turned on. If the antenna is not rotating at this time, several bright spots will appear on the PPI sweep trace. If the antenna is turning, the sweep line rotates and the bright spots trace out concentric circles on the screen. In determining the

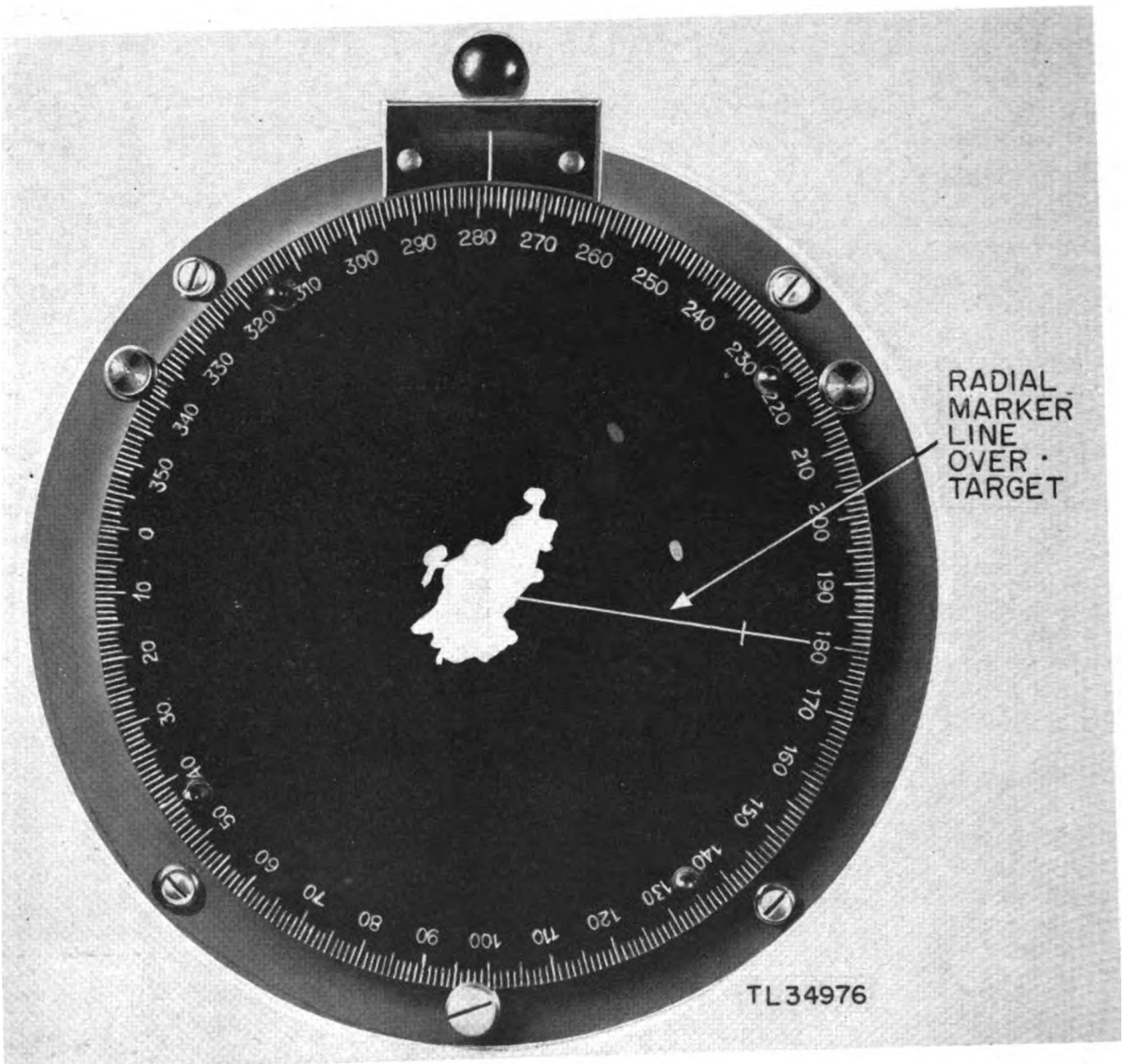


Figure 46. Reading azimuth on PPI scope.

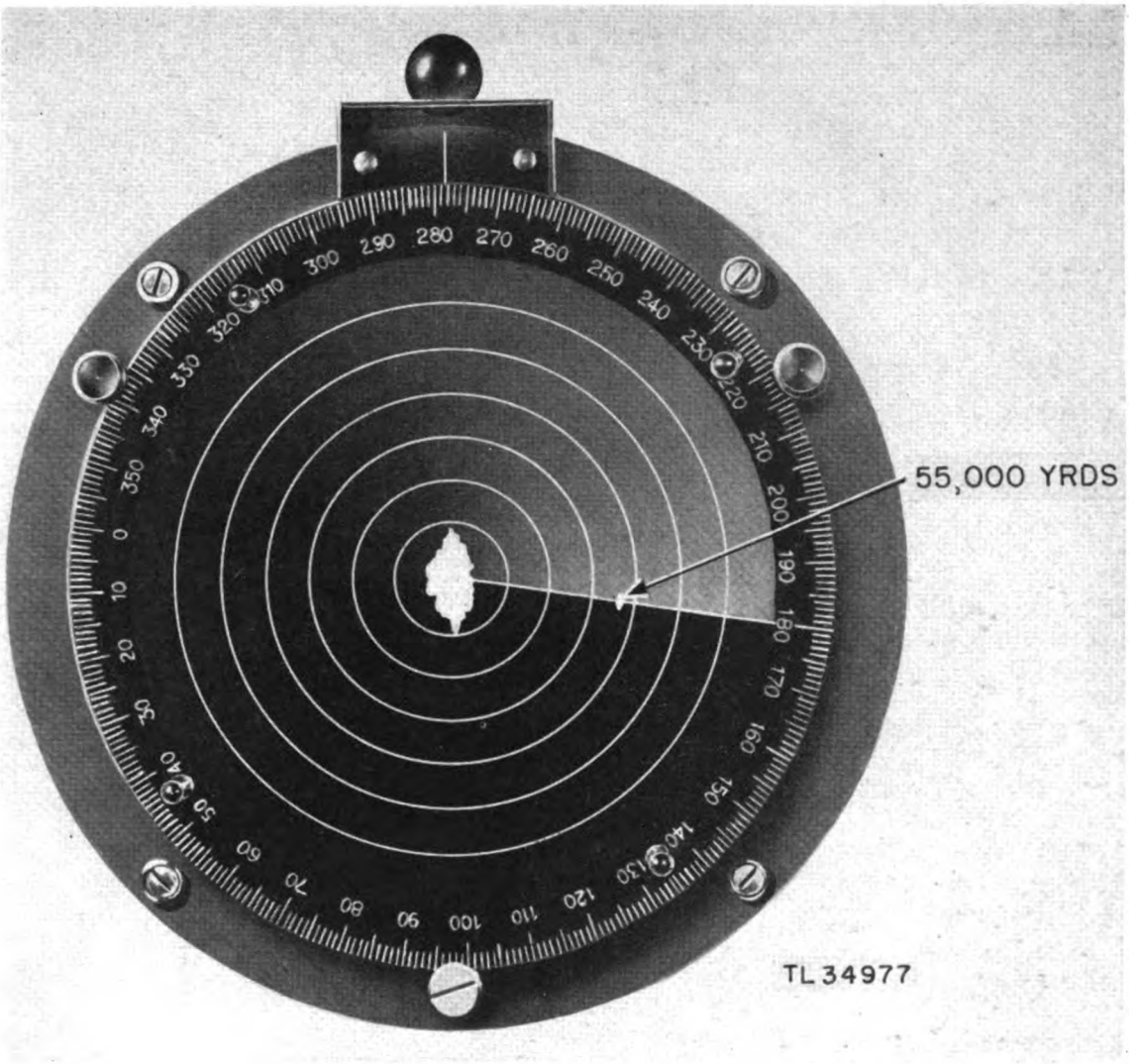


Figure 47. Measuring range on PPI scope.

range of the target on the PPI scope, the antenna is allowed to rotate so that the concentric circles appear (fig. 47). These circles are the range markers. The number of range markers and the intervals between them depend on the setting of the RANGE switch. For the 10,000-yard range there are five markers at intervals corresponding to 2,000 yards; for the 30,000-yard range there are six, at intervals corresponding to 5,000 yards and for the 90,000-yard range there are six, at intervals corresponding to 15,000 yards. The range of a target can be estimated with sufficient accuracy by noting the position of the center of the echo signal with respect to the two adjacent range markers. In figure 47 the PPI scope is shown on the 90,000-yard range. The target is between the 45,000- and the 60,000-yard markers. The range is 55,000 yards.

b. **Using A-Oscilloscope.** In determining the target range on the A-oscilloscope, the AUTOMATIC SCAN knob is pulled out, and the MANUAL SCAN handwheel rotated until the antenna is pointed directly toward the target. As previously explained, this condition is evidenced by a maximum target-signal strength on the A-scope. In order for the calibration marks to appear on the A-scope sweep trace, the RANGE MARKER switch must be turned on, and, in addition, the SIGNAL switch must be turned to the LIMITED position. When this is done, the calibration marks will appear as vertical pips extending upward at regular intervals along the trace, and the signal itself will appear inverted so

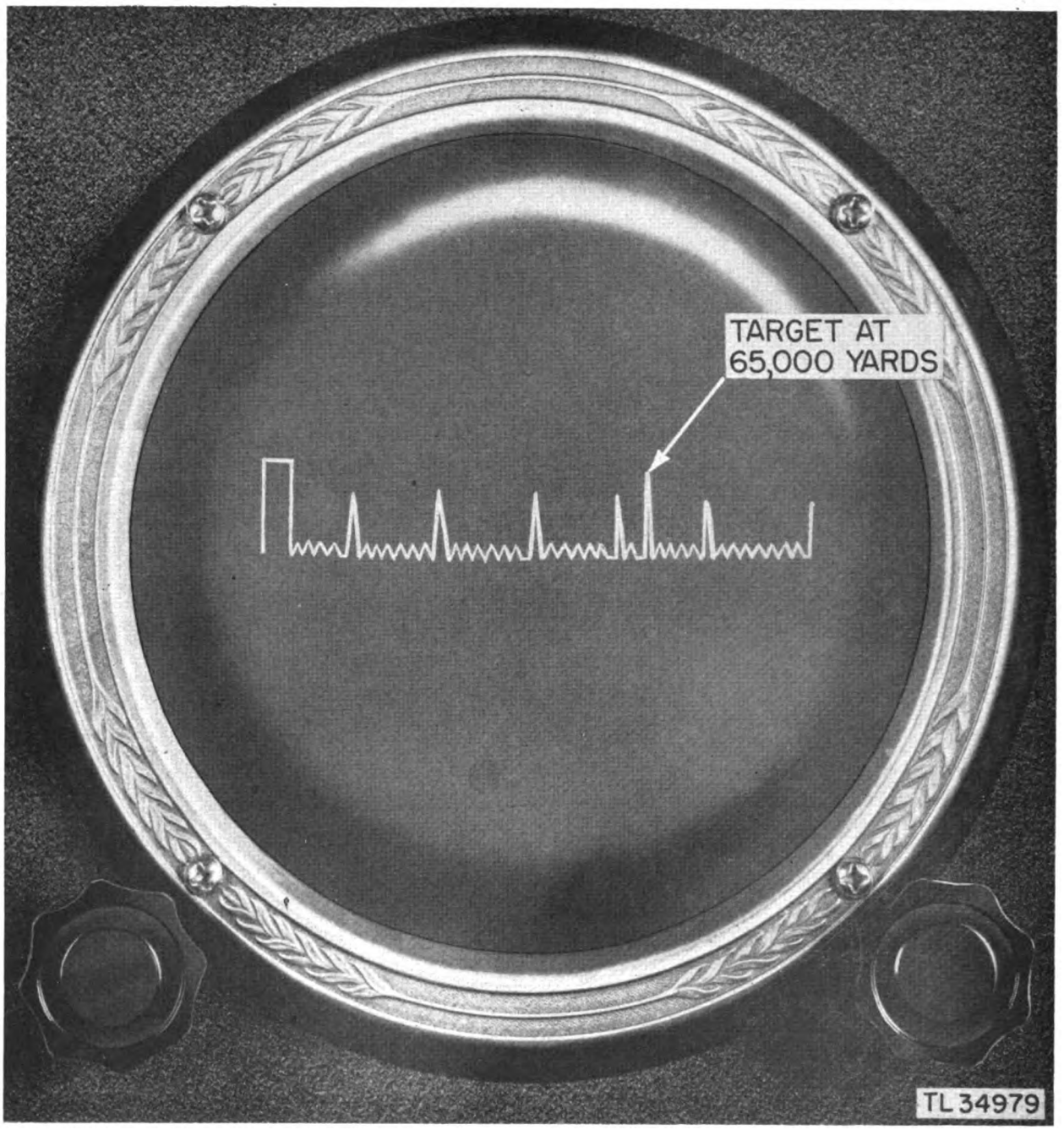


Figure 48. Measuring range on A-scope.

that it too points upward (fig. 48). The number of pips, and the intervals between them, correspond exactly for all three ranges to those on the PPI scope. The distance to the leading edge of the echo from the left end of the sweep line, as measured by the range markers, gives the range of the target. In figure 48, with the range set at 90,000 yards, the target is at 65,000 yards.

Section IV. STOPPING PROCEDURE

40. Complete Stopping Procedure

The following procedure is recommended for turning off the set. The sequence in which the steps are taken is most important in order to avoid injury to the equipment and to place all the controls in the proper position for starting the equipment.

a. Set the AUTOMATIC SCAN switch to the OFF position.

b. Disengage the MANUAL SCAN handwheel and the AUTOMATIC SCAN knob by pulling each out.

c. Turn the TRANSMITTER variac all the way to the left.

d. Turn the MAIN POWER variac all the way to the left.

e. Turn the RADIATE switch on the control cabinet to the OFF position. *Check that the RADIATE switch on the transmitter cabinet is also off.*

f. Push the main-power OFF button on the control cabinet.

41. Emergency Stopping Procedure

It may sometimes be desired to turn the equipment off in the shortest possible time. This may be the case, for example, if a short circuit in the equipment is observed as evidenced by smoke issuing from one of the cabinets. The set can be turned off, then, merely by pushing the OFF button on the control cabinet. Before the set is started again, however, it must be ascertained that all the controls are in the positions described in paragraph 33.

CHAPTER 4

DESCRIPTION, GROUPING, AND FUNCTIONING OF COMPONENTS

42. Control and Distribution of Power

Radio Set SCR–582–(*) requires 1,800 watts of 60-cycle 115 volt, a-c power. Power enters the set through a socket (fig. 36) at the bottom of the control cabinet. The power is carried from the input socket to the MAIN POWER switch on the control and meter panel of the control cabinet. From the MAIN POWER switch, line voltage is carried to the MAIN POWER variac where the voltage can be varied at the will of the operator. From the MAIN POWER variac, line voltage is distributed to the transmitter cabinet, the PPI-scope panel, and Power Unit PE–192–(*) at the bottom of the control cabinet.

a. From the MAIN POWER variac the line voltage going to the transmitter cabinet is taken to the MAIN SWITCH on the transmitter control and instrument panel and also to the selenium rectifier.

(1) From the MAIN SWITCH the line voltage goes to the blower motor of the fan in the transmitter cabinet. It also goes back to the TRANSMITTER variac in the control cabinet, where it is transformed up or down before returning to the modulator in the transmitter cabinet.

(2) From the selenium rectifier, line voltage goes to the amplidyne amplifier and to the amplidyne motor-generator set.

b. The line voltage from the MAIN POWER variac on the control cabinet also goes to the PPI-scope chassis. From the PPI scope the line voltage is distributed to the local oscillator tuning motor in the transmitter cabinet. The line voltage also goes from the PPI scope to Radio Receiver BC–952–(*) in the control cabinet. From the receiver the line voltage goes to the preamplifier in the transmitter cabinet.

43. Transmitter System

The transmitter system is the first of the five major systems into which Radio Set SCR–582–(*) can be functionally divided. The various components of the transmitter system create the pulses of radio-frequency energy that are sent out into space, bounce back from targets, and return to the radar set as target echoes.

a. The transmitter must send out r-f energy in short bursts so that the echoes returning from targets will not be masked by the transmitted energy. The firing of the transmitter is accomplished by the combined action of the driver, the modulator, and the transmitter oscillator. The driver receives a timing voltage from the control central in the control cabinet, gives the voltage the proper shape and amplitude, and by means of the modulator, turns the transmitter oscillator ON and OFF a certain number of times a second. Each time the transmitter oscillator is ON, a pulse goes out into space; each time it is OFF, the equipment is prepared to receive an echo returning from a target. The electrical energy required to develop a pulse of radio frequency energy of sufficient strength is furnished by the high-voltage rectifier. In addition a blower fan is furnished to cool the transmitter oscillator. Aside from some controls and meters located on the control cabinet, the entire transmitter system is located in the transmitter cabinet. Its components are shown in figure 49.

b. The various controls associated with the transmitter system are on the control panels of the transmitter cabinet and the control cabinet. In addition to the main line switches and voltmeters, and the main line and high-voltage variacs previously mentioned, these include the following:

(1) Two RADIATE toggle-type switches which operate a relay to apply high voltage to the modulator tubes. One of these switches is located on the transmitter cabinet and the other on the control cabinet. Because the two switches are connected in parallel, *both* switches must be in the OFF position to remove the high voltage, while only one has to be on to apply it.

(2) Two push-button type RESET switches, one of which is located on the control cabinet and the other on the transmitter cabinet. These reset the overload relay if it has been opened.

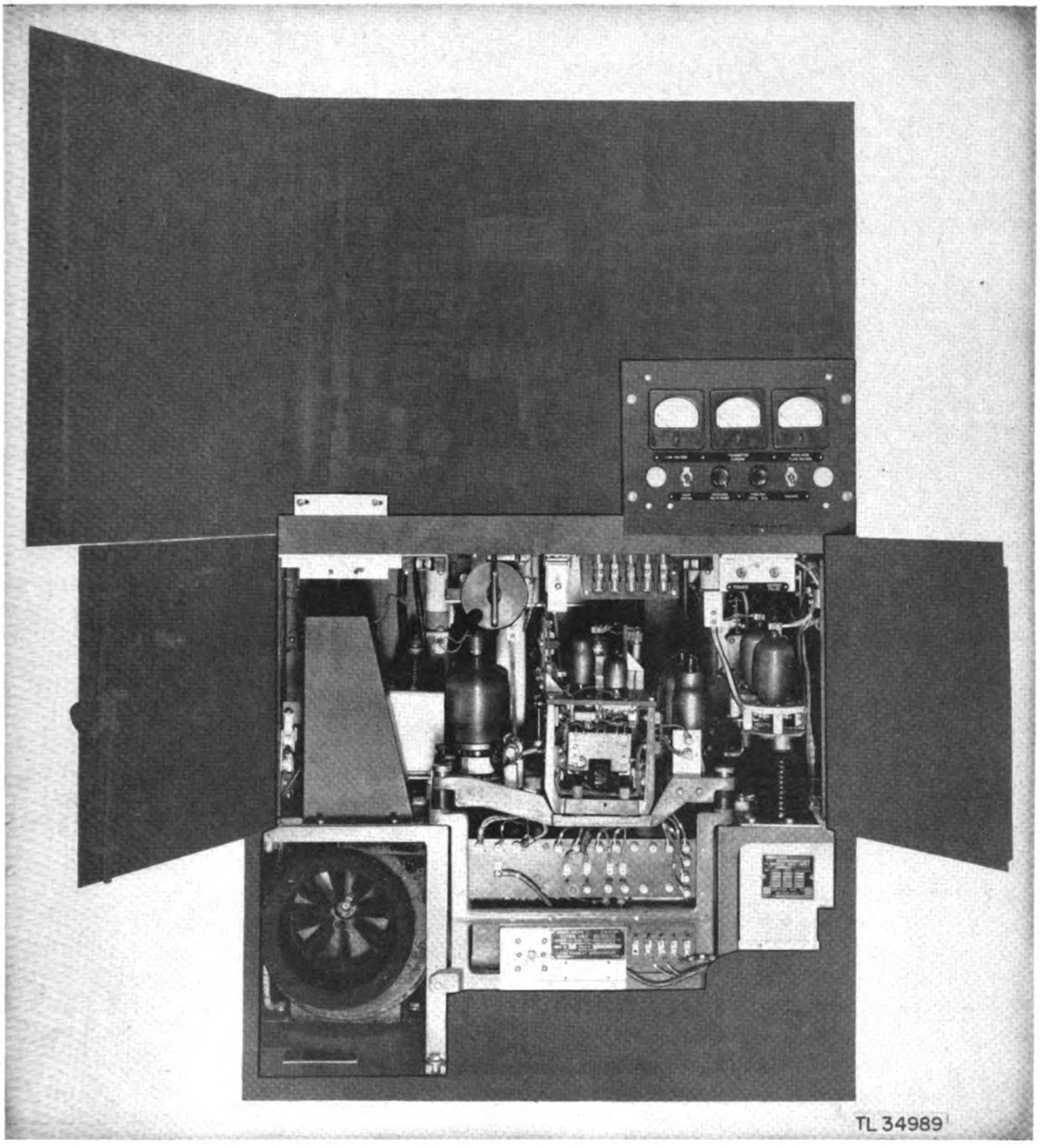


Figure 49. Transmitter system.

(3) Two red pilot lights (on the control cabinet and transmitter cabinet) which indicate when high voltage has been applied to the modulator.

(4) A 0–20 kilovolt d-c meter for reading the modulator plate voltage.

(5) A 0–25 and a 0–50 milliampere d-c meter to measure average transmitter oscillator current. The 0–25 milliampere meter is in the control cabinet, and the 0–50 milliampere meter is in the transmitter cabinet.

(6) A push-button type switch in the transmitter cabinet labeled PUSH FOR TOTAL D. C. which allows the 0–50 milliampere meter on the transmitter cabinet to perform another function, namely, to read total average current in the high-voltage system.

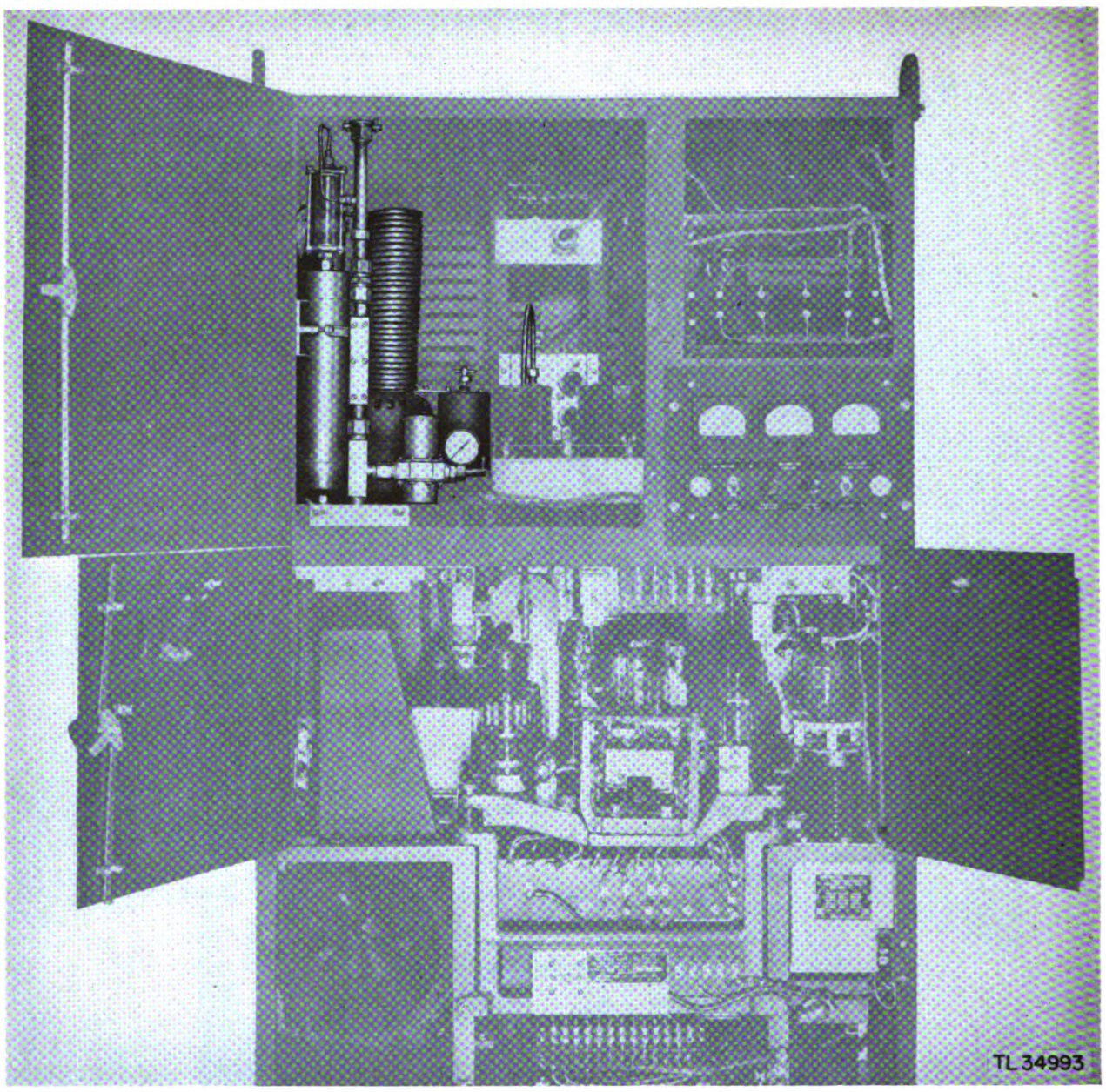


Figure 50. R-f system.

44. R-F System

The r-f system is the system through which the radio-frequency energy generated by the transmitter oscillator is projected into space and the returning or reflected energy is picked up and applied to the receiver.

a. The r-f system consists of various sections of r-f line, couplers, and right angle stubs (depending upon the particular installation), a transmit-receive (or T-R) box, an antenna assembly (consisting of a dipole radiating element, a parasitic reflector, and a parabolic reflector), and a dehydrator and compressor. The r-f line carries the energy from the transmitter oscillator to the antenna. The antenna is so designed that the energy is sent out in such a narrow beam that accurate azimuth determination is possible. The returning echo is carried by the same r-f line to the T-R box. When the transmitter goes ON, the T-R box rejects all but a small part of the transmitted energy and keeps the transmitter pulse from damaging the receiver. When the transmitter goes OFF, the T-R box accepts the returning echoes and passes them to the receiver. The entire r-f line is connected by means of a pressure fitting to the dehydrator and compressor. The pressure in

the r-f line is indicated by a pressure gauge and should be maintained at 5 to 10 pounds above atmospheric pressure. Keeping dry air under pressure in the line precludes the possibility of condensation short-circuiting the inner and outer conductors.

b. With the exception of the antenna and the r-f line between the antenna and the transmitter cabinet, the entire r-f system is located in the upper left-hand compartment of the transmitter cabinet (fig. 50).

45. Receiver System

The receiver system receives the target echoes. When echoes are received by the antenna and applied through the T-R box to the receiver, they are very weak. They are applied to the amplifying circuits of the receiver where they are given the necessary amplitude or strength for application to the indicating system. In addition to receiving the target echo, the receiver accepts a portion of each transmitted pulse, which is passed on to the indicating system, where it appears in the center of the PPI scope and on the left end of the A-scope trace.

a. The receiver is of superheterodyne design similar in many respects to the conventional receivers used at broadcast frequencies. It consists of a local oscillator, crystal mixer, preamplifier, the receiver proper (including several intermediate-frequency amplifiers, a detector, and several video amplifiers), a receiver-sensitivity circuit, and a tuning-indicator circuit. In addition, the power supply necessary for the operation of these circuits is included.

(1) The local oscillator is a klystron-type oscillator located in the upper left-hand compartment of the transmitter cabinet (fig. 51). Its function is to oscillate at a frequency close to that of the transmitter oscillator, and by mixing with it, to give a comparatively low difference or intermediate frequency. In operation, the frequency of the local oscillator can be varied, as will be shown in subparagraph 45 (2).

(2) The crystal mixer, together with the preamplifier, forms a subassembly located in the upper left-hand section of the transmitter cabinet (fig. 51). The mixer is a device for mixing the reflected target echo or the transmitted signal (both of which are at the transmitter oscillator

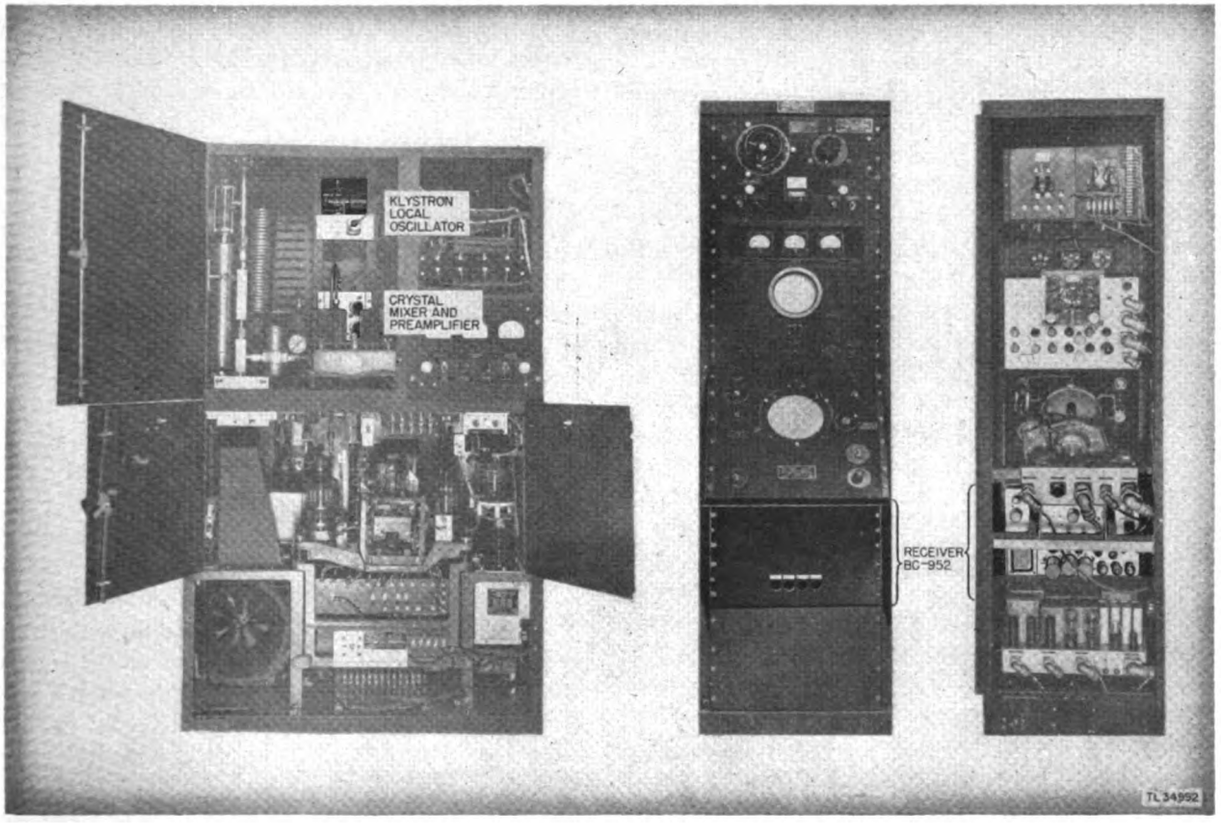


Figure 51. Receiver system.

frequency) with the local oscillator output to give the desired difference frequency. Its performance depends upon the correct adjustment of a variable control which is critical in its setting. This control is not accessible on the panel and all adjustments of the control must be made by the radar repairman or other authorized personnel.

(3) The preamplifier consists of two amplifier stages tuned to the intermediate frequency (i.f.) whose function is to amplify the difference frequency before it is applied to the receiver proper.

(4) The receiver proper further amplifies the signal at the intermediate frequency and then by means of the detector and video amplifiers converts the signal to a form suitable for application to the indicating system. It is located, together with the sensitivity circuit, the tuning indicator circuit, and the receiver power supply, in the chassis of Radio Receiver BC–952–(*) in the control cabinet (fig. 51).

(5) The receiver sensitivity circuit gives control over the amount of amplification obtained in the receiver and, by so doing, controls the *size* of the signal finally applied to the indicating system.

(6) The tuning indicator circuit is provided to furnish a visual indication of the tuning of the local oscillator. Although the necessary circuits are located in the receiver chassis, the tuning eye itself is located on the panel of the PPI scope.

(7) The receiver power supply is located on the receiver chassis. It supplies all the necessary voltages for the entire receiver.

b. The receiver includes several controls and adjustments located on the crystal mixer and preamplifier subchassis, and also on the panel of the receiver, but these are not operating controls and are not to be used except by authorized servicing personnel. The receiver operational controls are located on the PPI-scope panel (fig. 23) and include the following:

(1) The klystron-tuning motor switch operates a reversible motor which turns an eccentric cam. The motor and cam vary the tuning of the klystron local oscillator and are located in the transmitter cabinet (fig. 51) directly below the klystron.

(2) The tuning eye gives a visual indication of the proper tuning of the local oscillator and is used in conjunction with the klystron-tuning motor switch. When the local oscillator is properly tuned, the wedge-shaped shadow on the tuning eye is at minimum width.

(3) The RECEIVER GAIN control in the sensitivity control circuit varies the sensitivity of the receiver and thus the strength of the signal applied to the indicating system from the receiver. This variation in signal strength appears on the PPI scope as a variation in target brilliance and on the A-scope as a change in the depth of the signal below the rest of the trace.

46. Presentation System

The presentation system presents the desired information regarding the range and azimuth of a target in a visual form. But it does more than this. It also provides the master timing voltages for the entire radar set. It determines the ON and OFF intervals in transmission, and, by so doing, synchronizes the action of the sweep traces on both oscilloscopes with that of the transmitting oscillator.

a. The component units that form the indicating system are the timer, the range calibrator, the A-scope, and the PPI scope. In addition, a power supply for these units is provided.

(1) The timer is the master clock for the entire set. It synchronizes the transmitting oscillator with both the A-scope and the PPI-scope sweep traces and also with the range calibrator. It is this synchronization which makes the transmitted signal appear at the beginning of each trace and makes possible an accurate determination of the range of a target. The timing circuits are located on the control central chassis in the control cabinet.

(2) The range calibrator is also located on the control central chassis. It furnishes short electrical pulses to *calibrate* the sweep traces on both scopes. That is, it makes it possible to say that a definite distance on the sweep trace represents a definite range. On the A-scope the calibration marks show up as vertical pips extending upward from the sweep trace. On the PPI scope they show up as concentric circles if the antenna is rotating and as a series of bright dots along the sweep if it is stationary. In both cases the distance between adjacent calibration marks represents a certain distance in space. If the equipment is operating on the 10,000-yard range, the distance between consecutive calibration marks represents a distance of 2,000 yards; if the equipment is on the 30,000-yard range, then successive calibration marks represent 5,000 yards; and on the 90,000-vard range, each calibration mark represents 15,000 yards.

(3) The A-scope, together with its sweep-voltage circuits, is located on the control central chas-

sis. Although it can be used to determine the range of a target, it gives no information regarding its azimuth. Its primary purpose is to aid in tuning the entire system for best reception.

(4) The PPI scope is located on the panel of Oscilloscope BC–954–(*), while the sweep circuits associated with it are in the control-central chassis. The PPI scope forms the major indicating device for the set. By furnishing a virtual map of the area surrounding the radar set, it provides the required information regarding the presence, range, and azimuth of targets within that area.

(5) All the power required for the operation of the indicating system is provided by Power Unit PE–192–(*) located in the control cabinet.

b. The following is a list of the panel controls associated with the indicating system:

(1) The RANGE control which selects the range at which the equipment is to operate.

(2) The SIGNAL circuit selector switch which is used to limit the amplitude of the signal and invert the picture on the A-scope.

(3) The RANGE MARKER switch which places the calibration markers on the PPI screen and on the A-scope. The calibration markers will appear on the A-scope only if the SIGNAL switch is in the LIMITED position.

(4) The HORIZONTAL CENTERING control which moves the A-scope trace to the left or right.

(5) The A-INTENSITY control which regulates the brightness of the image on the A-scope.

(6) The P-INTENSITY control which controls the brightness of the image on the PPI scope.

(7) "P" FOCUS, a screw driver-type adjustment, which regulates the fineness of the PPI sweep line.

(8) The calibrated transparent shield and the marker over the PPI scope used in obtaining azimuth readings.

(9) A dial light, light switch, and dial light control are provided to illuminate the marker and calibrated shield when there is not sufficient external light.

47. Antenna Positioning System

The antenna positioning system serves to synchronize the rotation of the antenna with the rotation of the radial sweep line on the PPI scope. It is thus possible to determine the azimuth of the target, since the direction of the target echo from the center of the screen represents the direction or azimuth of the target.

a. The antenna positioning system consists of two synchronous repeaters, an amplidyne amplifier, an amplidyne motor-generator, and two drive motors. The voltage transmitter, one of the synchronous repeaters, is associated with the rotation of the sweep trace and is located on the PPI-scope chassis (fig. 31). The other repeater, the voltage receiver, is associated with the position of the antenna system and is located on the base of the antenna assembly (fig. 8). A change in position of the rotor of the voltage transmitter shows up as a potential change in the voltage receiver output. This altered potential is applied to the amplidyne amplifier (fig. 45), which is located in the upper left-hand section of the transmitter cabinet, where it is amplified and then applied to the amplidyne motor-generator (fig. 7). The output of this generator is applied to the drive motor which serves to rotate the antenna in such a direction as to reduce the output voltage from the voltage receiver. This drive motor is also located on the antenna assembly. The effect of this action, then, is to maintain the antenna at all times in line with the sweep trace position. The other drive motor, located on the PPI-scope assembly, is used to rotate the PPI sweep trace when automatic azimuth scanning is desired.

b. The only controls provided for the operation of the antenna positioning system are located on the PPI-scope panel. These are the AUTOMATIC SCAN knob, the MANUAL SCAN handwheel, and the AUTOMATIC SCAN SPEED switch. The AUTOMATIC and MANUAL SCAN controls determine whether the azimuth scanning shall be controlled automatically or manually. If automatic scanning is desired, the AUTOMATIC SCAN knob is pushed in and the MANUAL SCAN handwheel is pulled out. If manual scanning is desired, the position of the two controls is reversed. *At no time are both knobs to be "in" simultaneously.* The AUTOMATIC SCAN SPEED switch determines the speed at which the antenna rotates when on automatic scan. With the switch in the SLOW position the antenna rotates at approximately 10 revolutions per minute, while with the switch in the FAST position, the antenna rotates at approximately 20 revolutions per minute.

Chapter 5

EQUIPMENT PERFORMANCE

Section I. GENERAL ASPECTS OF EQUIPMENT PERFORMANCE

48. Equipment Performance Log

a. **General.** An Equipment Performance Log has been developed to insure the most efficient technical operation of Radio Set SCR–582–(*). The front of the log sheet is shown in figure 65, and the reverse side is shown in figure 66. Regular and conscientious use of this *chart of technical operation* will assure the most efficient functioning of the radio set.

b. **Function of the Log Sheet.** The Equipment Performance Log has several functions, as follows:

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

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

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

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

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

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

b. **Log Sheets.** There are 35 regular log sheets, enough for 35 weeks of operation, in the SCR–582–(*) log pad. Each sheet is divided into sections. These sections are divided into items which appear on the front and the back of the sheet.

(1) *Front of log sheet.* The front of the log sheet contains the heading, which consists of Roman numeral items I–VII, and the main part of the log sheet, which consists of items 1–85. Items 1–85 may be grouped as indicated below:

(*a*) *Three-times-a-day Items.* Items 1–65 are to be filled in three times a day.

(*b*) *Weekly Summary Items.* Items 66–78 are to be filled in once a week.

(*c*) *Signature of Person Keeping Log.* Items 80–84 provide space for the technician to sign his name and log the time he comes on and goes off duty.

(*d*) *Numbering Log Sheets.* Item 85 provides a space for numbering the log sheet.

(*e*) *Blank Item Spaces.* These lines are provided for item entries directed by the person in charge.

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

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

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

(*c*) *Sections B and C.* These spaces are 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 the recording of any ideas, suggestions, recommendations, or remarks that the unit radar officer considers suitable for transmittal to higher authority.

50. General Instructions for Filling in the Log Sheet

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

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

b. **Normal Condition.** The condition of the equipment is considered to be normal if it is operating withing the normal tolerance values. Keep the set operating between the points designated by the instructions.

c. **Log Entries.** Make the proper entries on the log sheet at the correct time intervals and according to the instructions given for each item. Use one log sheet for each 7-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 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 to be considered abnormal if it is not within the range of values (tolerances) shown in the brackets to the right of the item title on the front of the log sheet. In addition, any sudden shift in a meter reading, even though it is still within the tolerance range, is to be regarded with suspicion, investigated thoroughly, and explained in section A on the back of the log sheet.

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

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

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

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

h. **Units.** Make all two-hourly and twice-daily 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 abbreviations are used in the units column of the log sheet:

Abbreviation	Equivalent	Abbreviation	Equivalent
Hr.	Hour	Ma.	Milliamperes
Min.	Minute	Kv.	Kilovolts
Sec.	Second	L or UL	Limited or Unlimited
Abbrev.	Abbreviations		
N	Note	Kyd.	Kiloyards (i.e., thousands of yards)
°F	Degrees Fahrenheit	C.P.S.	Cycles Per Second
Amp.	Amperes	F-S	Fast or Slow
F or L	Full or Low	Deg.	Degrees
Div.	Divisions	%	Percent
		Kwhr.	Kilowatt-hours

i. **Italicized Items.** Check the items printed in *italics* more often than three times a day. Keep these items under close watch; they tend to standardize operating conditions by providing a general check on the over-all efficiency of the equipment. Apply corrective measures whenever necessary.

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

k. **How to Obtain the Information.** Instructions for securing the pertinent data from which the log entry is made are given for each item in section II of this chapter.

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

51. Corrective Measures

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

52. General Corrective Steps

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

a. **General Cleanliness.** The routine cleaning of outside surfaces of the components of the set, including meter glasses, is covered in TM 11–1412, entitled Preventive Maintenance. Every operator of Radio Set SCR–582–(*) should take all necessary steps to keep the unit and its components clean at all times. The process of making the log entries and performing specific corrective measures, however, is not to be interrupted to permit cleaning.

b. **Broken Meter Cover Glasses.** Cracked or broken meter cover glasses are repaired or replaced during the routine preventive maintenance period.

c. **Pilot Lights.** Pilot Lights are used in Radio Set SCR–582–(*) to indicate that certain elements in the system are operating as required. Consequently, if a pilot light is not glowing when it should be, an important fault may be indicated thereby, or the pilot light bulb may be burned out. If a light goes out during operation, replace the bulb with a new one as the first and immediate step. If the new bulb does not light, and if equipment performance seems satisfactory, simply make a note so that a repair will be made during a shut-down period. If the new bulb does not light, and equipment performance is faulty, the person in charge should be informed immediately and asked for instructions relative to shut-down.

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

53. Reading Meters

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

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

b. **Obtaining Value of a Subdivision.** Count the divisions of scale space between the two main numbered graduations on each side of the needle. Divide the numerical difference between the two numbers by the number of divisions of scale space. This process gives the value of each subdivision, as illustrated in figure 52.

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

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

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

tional to the measured quantity. Linear scales are usually found on d-c instruments.

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

54. Adjusting Meters

a. **Checking.** Normally, all meters in the set should read zero when the unit is inoperative. Make an inspection of the zero setting of the

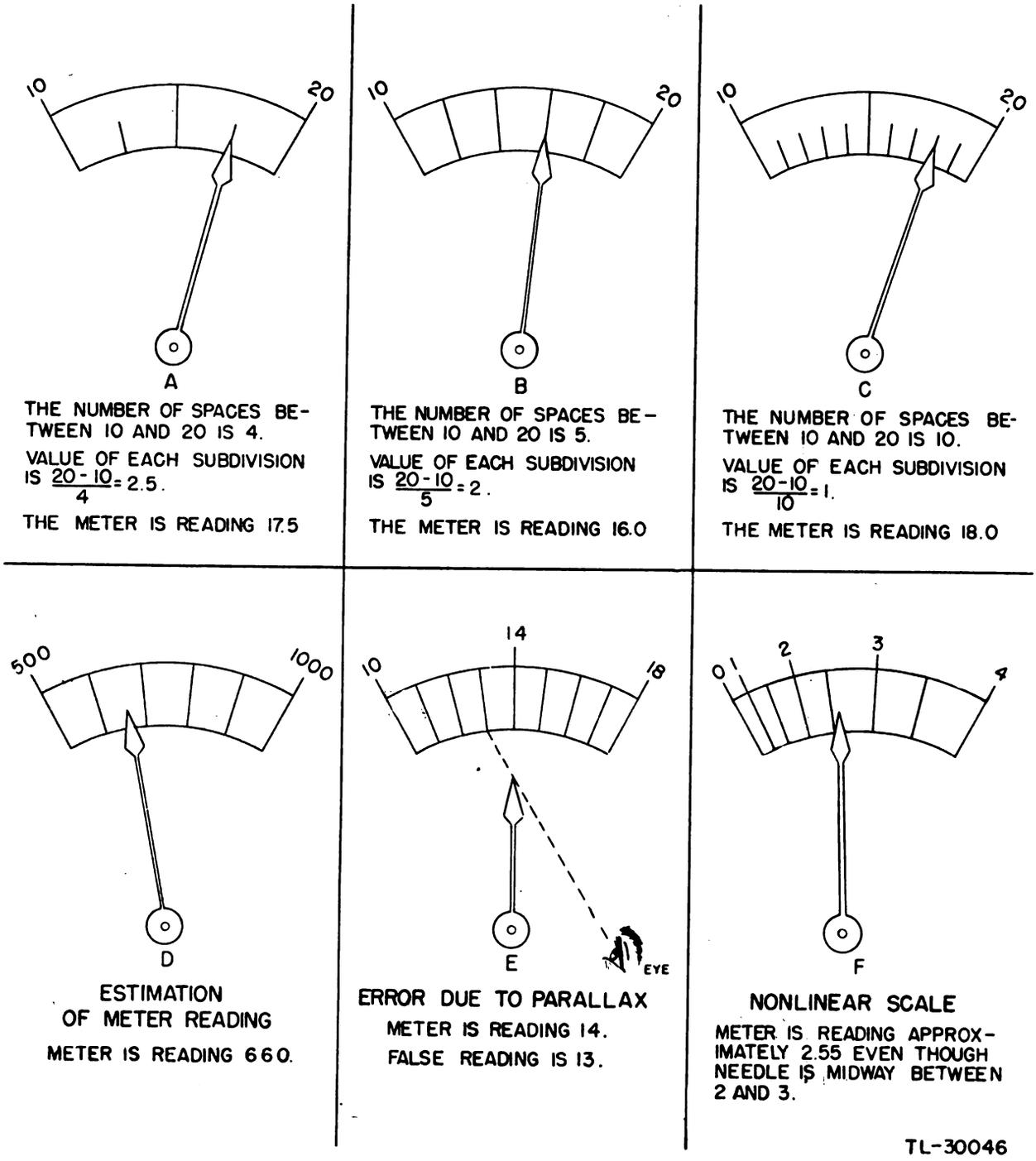


Figure 52. How to read a meter.

meters during the shut-down period. The zero settings cannot be checked while the radio set is in operation.

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

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

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

Section II. SPECIFIC LOG PROCEDURES AND SPECIFIC CORRECTIVE MEASURES

55. General

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

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

56. How to Fill in Front of Log

a. Fill in items I–VI at the beginning of each 7-day period. The person in charge examines the log sheet at the end of the period and signs his name in item VII.

b. Items 1–65. These items are filled in three times daily.

57. Method of Filling in Heading of Log Sheet

a. Item I, Radio Set SCR–582 Ser. No.

Enter the serial number of the radio set. The serial number is found on the nameplate located on the upper part of the control rack.

SAMPLE ENTRY.

I Radio Set SCR–582–A Ser. No. 3Z–SCRL–42.

b. Item II, blank.

c. Item III, Organization. Enter the name of the platoon, company, battalion, regiment, or the official name of the organization charged with the operation of the radio set.

SAMPLE ENTRY.

III Organization 608 Signal Battalion.

d. Item IV, Address. Enter the complete official mailing address of the organization.

SAMPLE ENTRY.

IV Address Godstone, New Jersey.

e. Item V, Location. Enter the geographical location of the radio station if within the continental limits of the U.S.A.; otherwise leave the space blank.

SAMPLE ENTRY.

V Location Twin Lights.

f. Item VI, Date. Enter the starting and finishing dates of the week covered by the log sheet. Write the dates in the following sequence: day, month, year.

SAMPLE ENTRY.

VI Date 9 June 1944.

g. Item VII, Signature. After the log sheet has been completed, the person in charge signs his name and indicates his rank.

SAMPLE ENTRY.

VII Signature Peter Woodman, 1st. Lt. / Person in charge

58. Item 1. Log Starting Time

SAMPLE ENTRY.

1 Log Starting Time [A] ( ) (Hr.-Min.)	0015	0815	2145*

LOCATION. The time to be recorded in the log space is taken from the official timepiece of the station.

NORMAL CONDITION. The log starting time is normal if it fulfills the following schedule: Three columns, A, B, and C, are provided on the log sheet for each day's operation. Begin the first set of log entries in column A about 15 minutes after starting the radio set. Fill in column C shortly before stopping the set. Ordinarily, if the operating time is 3 hours or less, fill in only columns A and C. If the operating time is longer than 3 hours, enter a set of readings in column B near the middle of the operating period.

HOW TO OBTAIN THE INFORMATION. Express the time according to the 24-hour system (fig. 53).

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 instance, if the station is located in Italy, enter A. Obtain the *official time zone suffix* from the person in charge. Using the 24-hour system, enter in the log space to the nearest minute the log starting time. Place an asterisk (*) after the log entry, if it is not made according to the schedule given under NORMAL CONDITION.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
1	2145A – 21	Sequence broken due to transmitter trouble. J. K.

59. Item 2. Weather Conditions

SAMPLE ENTRY.

2 Weather Conditions [ ] ( ) (Symbols)	K	O	O*

LOG ENTRY. Record the general condition of the weather in accordance with the following symbols and abbreviations:

Clear	O	Rain	R
Cloudy	CLDY	Snow	S
Overcast	●	Freezing Rain	ZR
Fog	F	Sleet	E
Hazy	H	Hail	AP
Smoky	K	Thunderstorm	↙
Dusty	D	Lightning Visible	↖
Misty	M		

In case of an unusual weather condition, such as aurora (northern lights), not covered by these abbreviations or symbols, place an asterisk (*) after the log entry and under NOTES give a description of the weather condition and any effects on equipment performance.

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
2	0410–18	Strong aurora. No apparent effect on performance of set. J.A.

60. Item 3. Temperature Outside

SAMPLE ENTRY.

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

24-HOUR TIME CLOCK

Description

The inner circle represents a standard 12 hour clock.

The middle section (white numerals) covers the A.M. period from midnight to noon (1200).

The outer section (black numerals) covers the P.M. period from noon (1200) to midnight (2400).

Instructions

Time readings on the 24-hour clock are identical to the standard 12-hour clock readings during the first twelve hours (A.M.) of the day, except that the recording does not show any minute notation.

Examples: At 7:00 A.M. write: 0700. At 11:17 write: 1117.

Afternoon (P.M.) readings are shown in the outer section. They begin with 1201 and end with 2400 (midnight) which is the same as 0000.

Examples: At 3:26 P.M. write: 1526. At 9:02 P. M. write: 2102.

Clock Reading

If A.M., the figure reads 0407. If P.M. the figure reads 1607.

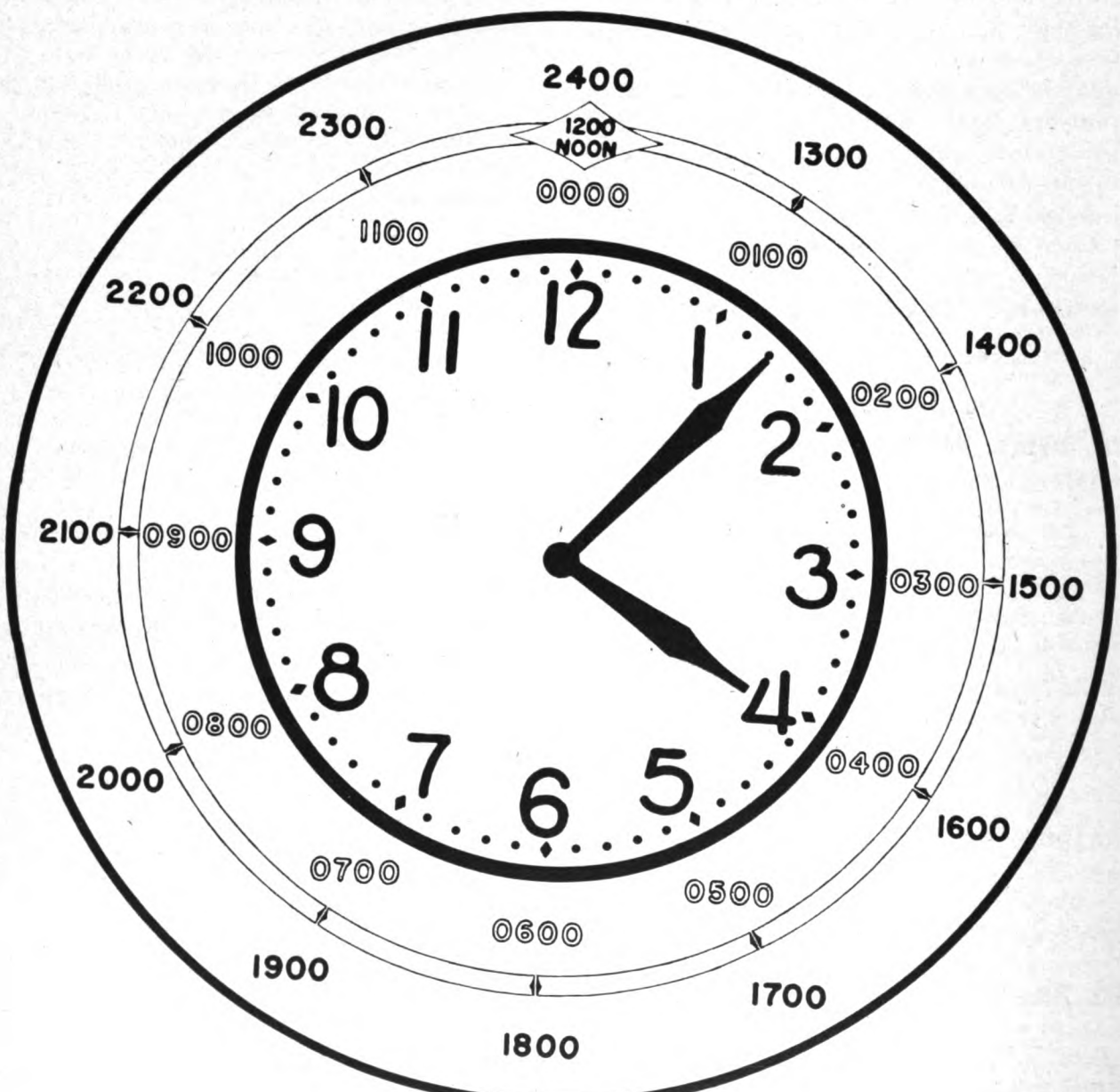


Figure 53. 24-hour time clock.

LOCATION. Place the outside thermometer in a shady, well-protected spot out of doors.

LOG ENTRY. Record in the log space to the nearest degree the outside temperature in degrees Fahrenheit. Place an asterisk (*) after the log entry if the reading of the thermometer is obviously in error.

CORRECTIVE MEASURES.

a. Relocate the thermometer if it is found in the rays of the sun or exposed to the rain.

b. If the thermometer is damaged, replace it with a new one.

c. If the accuracy of the thermometer is in doubt, check by placing it alongside another of known accuracy. Replace the thermometer if it is not reading correctly.

REMARKS.

a. Be sure the thermometer in use has a range sufficient for all local temperatures. Take care in hot climates to shield the thermometer from the direct rays of the sun; otherwise the thermometer may burst.

b. When the thermometer indicates the approach of freezing temperatures, check battery and radiator for antifreeze protection. If the antifreeze is needed and is not available, as an emergency measure drain all radiators on engines that are not running continuously. When the radiator of an engine is drained, place a sign reading RADIATOR DRAINED on the starter button so that the engine will not be started while the radiator is dry.

c. When a radiator is drained, make an entry to this effect on the reverse side of the Equipment Performance Log under NOTES.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
3	1403–7	Abnormal reading caused by rays of sun striking thermometer. Relocated in shady spot. J.S.

61. Item 4. Temperature Inside

SAMPLE ENTRY.

4 Temperature Inside [ ] ( ) (°F)	74	76	102*

LOCATION. The inside thermometer is located in a shady, well-protected spot inside the station.

LOG ENTRY. Record in the log space to the nearest degree the inside temperature in degrees Fahrenheit. Place an asterisk (*) after the log entry, if the reading of the thermometer is obviously in error.

CORRECTIVE MEASURES.

a. The thermometer may be located near hot equipment or in the rays of the sun. If so, relocate the thermometer.

b. If the thermometer is damaged or inaccurate, see corective measures, *b* and *c*, item 3.

REMARKS. In a hot climate shield the thermometer at all times from the direct rays of the sun; otherwise the thermometer may burst.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
4	1606–20	Found thermometer in sun. Relocated. C.S.

62. Item 5. Humidity

SAMPLE ENTRY.

5 Humidity [ ] ( ) (Abbrev.)	M	M	H*

HOW TO OBTAIN THE INFORMATION. In order 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 copiously on cold surfaces; the walls of the building sweat; the air seems warm and close, damp, or muggy; or when the wind is from the ocean. The humidity is probably low when the skin and lips chap, the wind is blowing toward the ocean, the air is cold and crisp, damp clothes dry quickly, visibility is good, or when the nasal passages are drier than usual.

LOG ENTRY. Enter on the log sheet 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

Place an asterisk (*) after the log entry when the humidity is high (above 50 percent as measured with a hygrometer).

CORRECTIVE MEASURES. When the humidity is high, turn on heaters and fans in order to keep the temperature above the dew point and to encourage evaporation.

REMARKS.

a. The relative humidity may be measured accurately if a hygrometer is available. One type of hygrometer is known as the sling psychrometer, which consists of two identical mercurial thermometers attached to a frame and provided with a handle so that it may be whirled rapidly. The bulb of one thermometer, referred to as the wet-bulb thermometer, is covered with a linen jacket or wick. To measure relative humidity with the sling psychrometer, proceed as follows:

(1) Saturate the wick-covered bulb thoroughly with water of the same temperature as that of the air to be measured. By a simple movement of the wrist, whirl the instrument for about one minute.

(2) Repeat this operation until two identical readings of the wet-bulb thermometer are obtained. At the same time, note and record the reading of the dry-bulb thermometer. The difference between the reading of the wet-bulb thermometer and the reading of the dry-bulb thermometer is roughly proportional to the amount of moisture in the air. (See table II).

b. Table II gives the relative humidity of air temperature in comparison with the cooling of the wet-bulb thermometer. It will be seen, for example, that the relative humidity is 55 percent when the air temperature is 70° and the wet-bulb thermometer reads 10° lower.

Table II. Psychrometric table.

(The relation between dry-bulb readings and cooling of the wet-bulb thermometer approximates relative humidity. Barometric pressure: 30 inches)

Air Temperature °F (dry-bulb reading)	Depression of wet-bulb thermometer under dry-bulb reading													
	1°	2°	3°	4°	6°	8°	10°	12°	14°	16°	18°	20°	25°	30°
0	67	33	1											
5	73	46	20											
10	78	56	34	13										
15	82	64	46	29										
20	85	70	55	40	12									
25	87	74	62	49	25	1								
30	89	78	67	56	36	16								
35	91	81	72	63	45	27	10							
40	92	83	75	68	52	37	22	7						
45	93	86	78	71	57	44	31	18	6					
50	93	87	80	74	61	49	38	27	16	5				
55	94	88	82	76	65	54	43	33	23	14	5			
60	94	89	83	78	68	58	48	39	30	21	13	5		
65	95	90	85	80	70	61	52	44	35	27	20	12		
70	95	90	86	81	72	64	55	48	40	33	25	19	3	
75	96	91	86	82	74	66	58	51	44	37	30	24	9	
80	96	91	87	83	75	68	61	54	47	41	35	29	15	3
85	96	92	88	84	76	70	63	56	50	44	38	32	20	8
90	96	92	89	85	78	71	65	58	52	47	41	36	24	13
95	96	93	89	86	79	72	66	60	54	49	44	38	27	17
100	96	93	89	86	80	73	68	62	56	51	46	41	30	21

EXAMPLE.

Reading of the dry bulb	60° F.
Reading of the wet bulb	54° F.
Difference	6° F.
Humidity in percentage	68%

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
5	1608–21	Humidity is high; walls of cabin are sweating. All fans and heaters turned on. D.H.

63. Item 6. Power Unit in Use

SAMPLE ENTRY.

6 Power Unit PE– ( ) [ ] ( ) (1 or 2)	1	1	2*

LOG ENTRY. In the parentheses to the right of the item title record the type of the power unit being used. In the log space, record which power unit (No. 1 or 2) is being used. The power units are designated by the numbers 1 and 2, which must be painted in conspicuous places on the units. When a change is made from one power unit to another, place an asterisk (*) after the log entry and explain under NOTES the reason for the change. Record under NOTES also the readings of the hour meters on both engines at the time of the change-over. If commercial power is used, make no entries in items 6–18.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
6	0600–1	Engine No. 1 developing bad knock. Changed to No. 2. Hour meters: No. 1–8496, No. 2–5837. R.D.

64. Item 7 (blank)

65. Item 8. Engine Oil Pressure

SAMPLE ENTRY.

8 Engine Oil Pressure [15–40 lb.] ( ) (Pounds)	32	33	42*

LOCATION. The engine oil-pressure gauge is located on the control-and-meter panel of the power unit as shown in figures 33, 34, and 35.

NORMAL CONDITION. The engine oil pressure is normal if between 15 and 40 pounds per square inch.

LOG ENTRY. Record in the log space the engine oil pressure to the nearest pound. If it is below 15 or above 40 pounds, place an asterisk (*) after the log entry.

CORRECTIVE MEASURES.

a. Check engine oil level.

b. Notify the person in charge if the engine oil pressure continues to be abnormal.

REMARKS.

a. When an engine is started, an abnormal oil pressure may be indicated until both the proper engine speed and the proper engine temperature are attained.

b. If an all-weather oil is used, do not mix with oil of any other grade.

LIMITS.

a. The engine probably will operate with oil pressures as low as 6 pounds per square inch.

b. The engine will be ruined if it is operated without oil pressure.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
8	0815–14	Found oil pressure high (42). Probably caused by cold engine. At 0830 oil pressure was 36. C.S.

66. Item 9. Engine Water Temperature

SAMPLE ENTRY.

9 Engine Water Temperature [160°–190°] ( ) (°F)	150	150	145*

LOCATION. The engine water thermometer is located on the control-and-meter panel of the power unit.

NORMAL CONDITION. The engine water temperature is normal if it is between 160° and 190° F.

LOG ENTRY. Record in the log space the engine water temperature to the nearest 5° F. Enter an asterisk (*) after the log entry if the engine water temperature is below 160° or above 190°.

CORRECTIVE MEASURES. Whenever necessary, the following corrective measures may be undertaken while the radar set is on the air:

a. Check radiator water level. Add water if necessary.

b. Check the octane rating of the gasoline being used. Make sure it is the proper grade.

c. If the engine water temperature is too low, raise it by placing a cardboard or canvas shield on the radiator grill. Never cover more than three-fourths of the radiator grill (fig. 54). If the temperature is too high, make sure the grill is not shielded or obstructed. The engine water temperature can be raised or lowered also by opening or closing the van door. (See Caution under Remarks.)

d. If water circulation is suspected of being poor, remove the radiator cap to see if the water is in motion. Be careful when removing the radiator cap from an overheated engine. Serious scalding may result from contact with escaping steam.

e. Check item 18, line current, and item 16, line voltage, to see whether an overload exists. If it does, immediately notify the person in charge.

REMARKS.

CAUTION: DEATH WILL RESULT FROM BREATHING CARBON MONOXIDE WHICH MAY FILL THE VAN IF THERE IS A LEAK IN THE ENGINE EXHAUST SYSTEM. CARBON MONOXIDE IS ODORLESS AND GIVES NO WARNING OF ITS PRESENCE, BUT IT KILLS!

Temperatures that are too low shorten the life of an internal-combustion engine by causing early sludge formation.

LIMITS.

a. Pure water freezes at 32° F. and boils at 212° F. As long as the engine is running in a closed van with the radiator covered, the engine water temperature will exceed 32° F. and probably will be easy to keep above the normal minimum temperature (150° F.) even in coldest weather.

b. The water will boil away if allowed to reach 212° F. Never allow the engine water temperature to reach the boiling point.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
9	1408–4	Temperature too low. Made cardboard cover for radiator. Temperature at 1500: 170°F. J.S.

67. Item 10. Battery Charging Rate

SAMPLE ENTRY.

10 Battery Charging Rate [½–9 amp.] ( ) (Amp.)	3.5	5.5	11*

LOCATION. The battery charging meter is located on the meter-and-control panel of the power unit as shown in figures 33, 34, and 35.

NORMAL CONDITION. The normal battery charging rate is between ½ and 9 amperes.

LOG ENTRY. Record in the log space the bat-

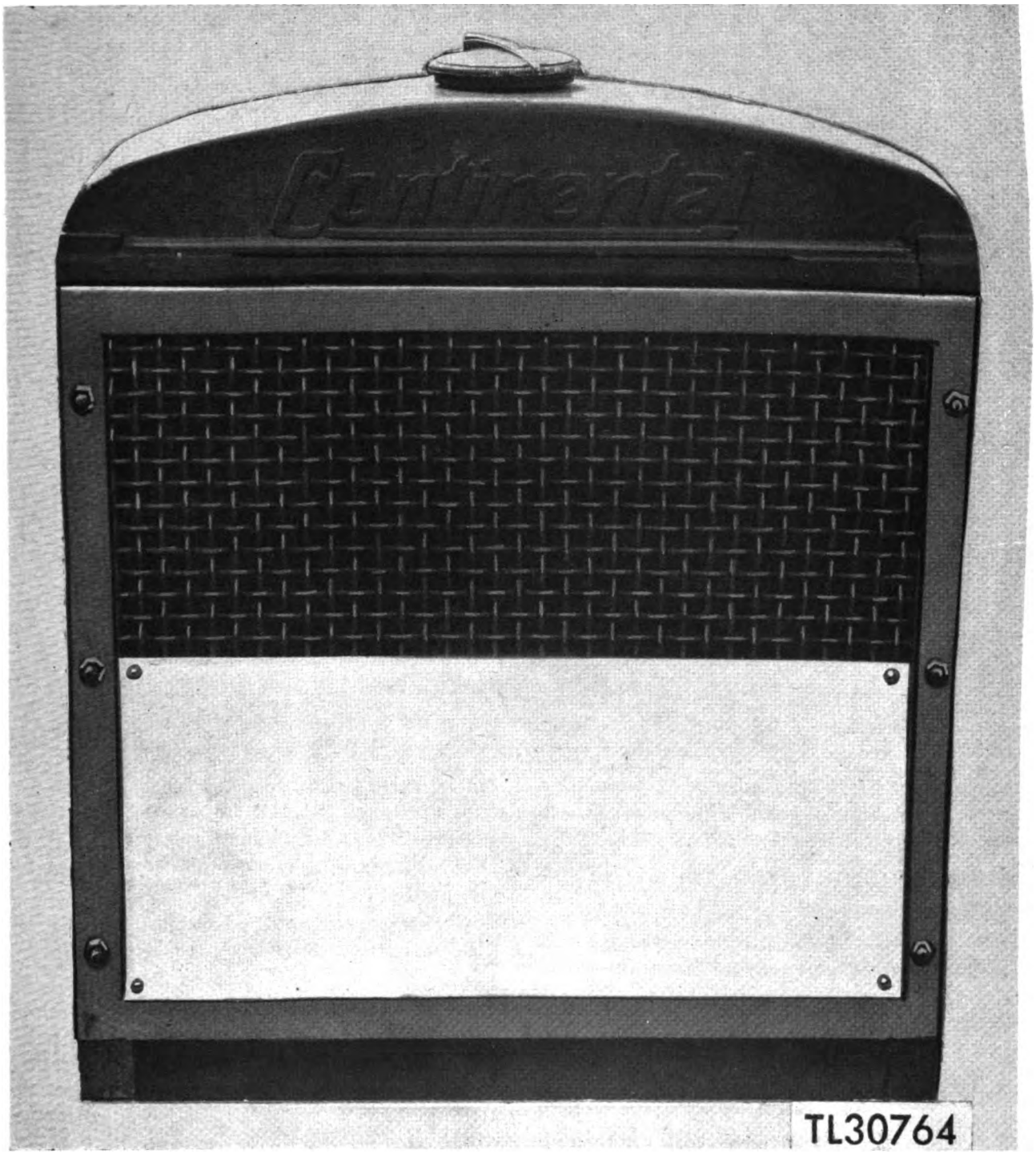


Figure 54. Radiator with cardboard protector.

tery charging rate to the nearest ½ ampere. Place an asterisk (*) after the log entry if it is below ½ ampere or above 9 amperes.

REMARKS.

a. The fact that the ammeter stays at or near the zero point does not necessarily indicate that the battery is fully charged. In order to determine the state of battery charge, measure with a hydrometer the specific gravity of each cell.

b. The freezing point of an electrolyte depends upon its specific gravity. Table III, following, gives the freezing temperature of battery solution at various specific gravities.

Table III.

Specific gravity	Freezing temperature (degrees Fahrenheit)
1,100	+18
1,120	+14
1,140	+ 8
1,160	+ 2
1,180	− 6
1,200	−17
1,220	−13
1,240	−51
1,260	−75
1,280	−92
1,300	−95

LIMITS.

a. If the battery charging current falls to zero, the charging process has been interrupted. Notify the person in charge. This trouble may be caused by an open circuit between the battery and the generator and may result in damage to the generator.

b. The battery may be damaged by loosening of active material and buckling of the plates if the charging rate exceeds 15 amperes.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
10	0450–11	High charging rate found due to internally shorted cell. Battery replaced. J.S.

68. Items 11, 12, 13, 14, and 15 (blanks)

69. Item 16. Line Voltage

SAMPLE ENTRY.

16 *Line Voltage*	[110–120 V.] ( ) (Volts)	115	115	110*

LOCATION. The line voltmeter is located on the meter-and-control panel of the power unit as shown in figures 33, 34, and 35.

NORMAL CONDITION. The normal line voltage is between 110 and 120 volts.

LOG ENTRY. Record in the log space to the nearest volt the reading of the line voltmeter of the power unit. Place an asterisk (*) after the log entry if the reading is not between 110 and 120 volts.

CORRECTIVE MEASURES.

a. If the output voltage of the power unit is abnormal, adjust the voltage regulator of the unit to 115 volts (under load).

b. Power Units PE–196–B and PE–127–A make use of Silverstat regulators. The voltage can be corrected by adjusting the knob on the regulator (fig. 34 and 35). In Power Unit PE–196–A adjust the voltage as follows:

(1) Place the voltage-regulator switch in the ON position.

(2) Adjust the voltage-regulator rheostat for 115-volt output under load.

LIMITS. The line variac probably will be damaged if the equipment is operated with line voltages above 135 volts for an extended period of time. At line voltages lower than 95 volts, the performance of the equipment becomes ineffective and some of the tubes may slowly deteriorate.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
16	0615–15	Sudden drop in line voltage. Set readjusted; operation OK. Made note in W.T.B.D. form for checkup on voltage governor. V.L.

76

70. Item 17. Engine Hour Meter

SAMPLE ENTRY.

17 Engine Hour Meter [ ] ( ) (Hours)	1026.2	1034.1	1035.1*

LOCATION. The engine hour meter is located on the meter-and-control panel of the power unit as shown in figures 33 and 34. Note that the PE–127–A has no hour meter. If the PE–127–A is used omit this item.

HOW TO OBTAIN THE INFORMATION. Read the engine meter exactly as an automobile mileage meter is read. From right to left the counters register tenths, units, tens, hundreds, thousands, and ten thousands of hours.

LOG ENTRY. Enter in the log space to the nearest 1/10 hour the time as shown on the engine hour meter. Place an asterisk (*) after the log entry if the meter is inoperative, or if the readings on the meter do not tally with elapsed operating time as indicated by the official station timepiece.

CORRECTIVE MEASURES. If the hour meter is inoperative or inaccurate, make an appropriate entry on the Work-To-Be-Done form for repairs or replacement during the shut-down period.

REMARKS. Since the hour meter is essentially a synchronous electric clock, deviation in the average line frequency from the standard 60-cycles per second will introduce a corresponding error in the readings of the engine hour meter. Any such error, of course, is not to be construed as a fault of the hour meter.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
17	0400–21	After 8 hours of operation, engine hour meter registered only 1.0 hours. Made note on W.T.B.D. form. Keeping record of engine running time by station clock. I.A.

71. Item 18. Line Current

SAMPLE ENTRY.

18 Line Current [15to 20 Amp.] ( ) (Amp.)	18	20	23*

LOCATION. The line current meter is located on the meter-and-control panel of the power unit as shown in figures 33, 34, and 35.

NORMAL CONDITION. The normal line current is between 15 and 20 amperes if the only load is the radar set.

LOG ENTRY. Record in the log space the line current to the nearest ampere as indicated by the line ammeter. If the line current is greater than 20 amperes or less than 15 amperes, place an asterisk (*) after the log entry.

CORRECTIVE MEASURES.

a. If there is evidence of overheating such as smoke or the smell of hot or burning insulation, notify the person in charge immediately for quick action.

b. See if any appliances such as heaters and fans have been connected to the line. Make allowance for the extra current drawn by any such appliances. The amount of current drawn by an appliance can be checked by disconnecting it and noting the resulting change in the line circuit.

LIMITS. The generator of the power unit may be damaged if the line current is allowed to exceed 50 amperes.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
18	0420	High line current caused by use of electric heaters. J.S.

72. Items 19 and 20 (blanks)

73. Item 21. Control Rack

This item is not to be filled in. It is a heading for items 22–34.

74. Item 22. Input Voltage

SAMPLE ENTRY.

22 *Input Voltage*	[110–120 V.]	( ) (Volts)	117	115	108*

LOCATION. The input voltage is read from the left meter of the meter panel (fig. 56).

NORMAL CONDITION. The input voltage is normal if:

a. It is between 110 and 120 volts.

b. It is within plus or minus 1 volt of the optimum set by the person in charge. Optimum input voltage probably will be found to lie between 115 and 118 volts.

b. Notify the person in charge if these steps do not restore normal control-rack input voltage.

c. If the accuracy of the input voltmeter is in doubt, compare the reading with that of the line voltmeter (item 16), making due allowance for any change in the setting of the line variac (1 volt for each division of the variac scale). Normally, the difference between the readings of these two meters (items 16 and 22) will be the same from day to day *for any given setting of the line variac.* Check item 36, line voltage (transmitter cabinet).

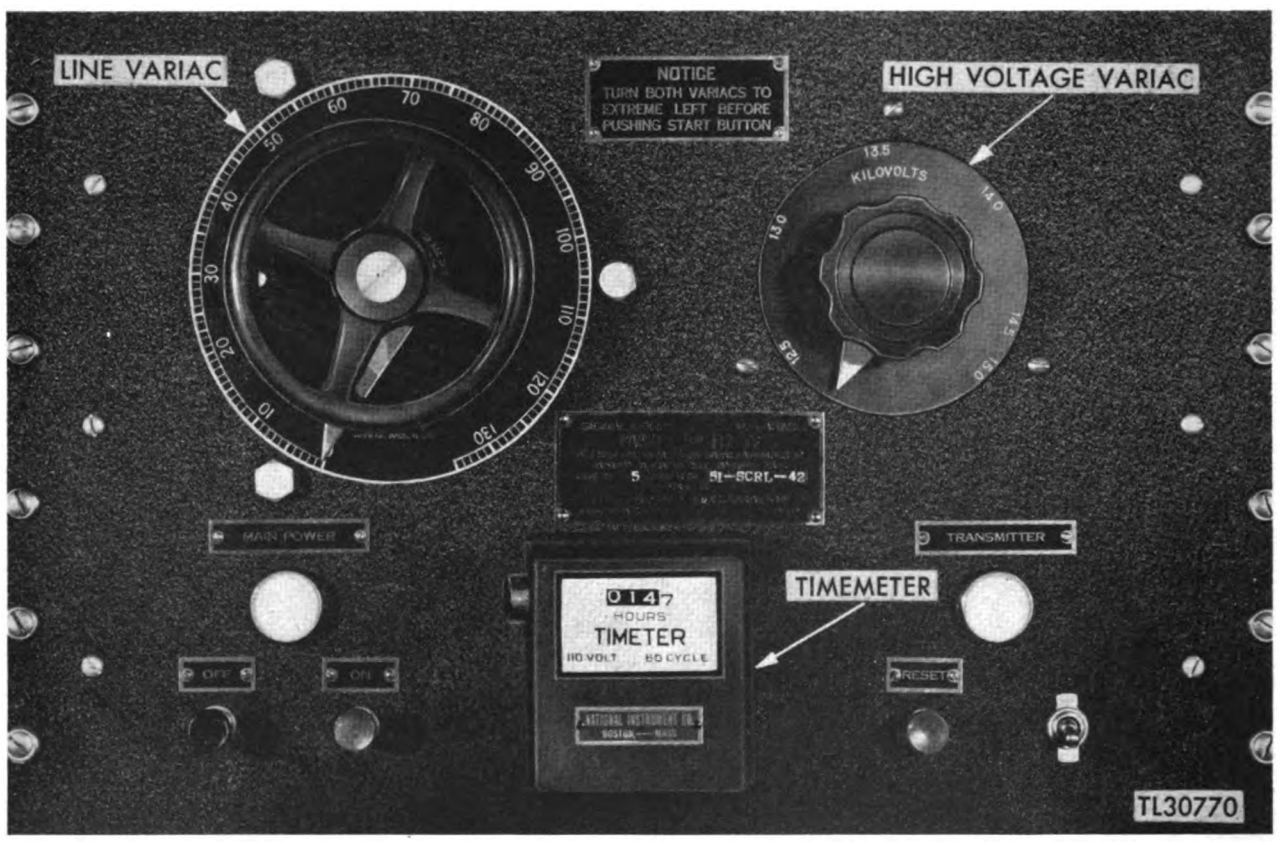


Figure 55. Control cabinet power control panel.

LOG ENTRY. Record in the log space the reading of the input voltmeter to the nearest volt. Place an asterisk (*) after the reading if the input voltage is not normal.

CORRECTIVE MEASURES.

a. If the input voltage of the control rack is not within 1 volt of the optimum value, check item 16, line voltage of the power unit. Adjust the line variac (fig. 55) for the optimum input voltage.

LIMITS.

a. Input voltage below 105 volts will reduce filament emission below a usable value and the tubes may slowly deteriorate.

b. Operation with input voltage above 125 volts will shorten tube life and cause damage to the equipment from overheating.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
22	1200–3	Had to turn the variac to 130 to obtain normal input voltage. Power company notified. J.S.

75. Item 23 (blank)

76. Item 24. Timeter

SAMPLE ENTRY.

24 Timeter	[ ] ( ) (Hours)	034.7	042.7	042.7*

LOCATION. The Timeter is centered on the lower half of the power control panel (fig. 55).

LOG ENTRY. Enter in the log space to the nearest 1/10 hour the reading shown on the Timeter. Place an asterisk (*) after the reading on the log sheet if the period of time between readings of the Timeter does not tally with the elapsed operating time (item 63) as indicated by the official station timepiece.

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
24	0606–21	Timeter not working. Made note on W.T.B.D. form. J.O.

CORRECTIVE MEASURES. If the Timeter is not operating properly, make a note on the Work-To-Be-Done form for repair or replacement during the next shut-down period.

REFERENCES.

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

77. Item 25. Transmitter current

SAMPLE ENTRY.

25 *Transmitter Current*	[5–15 Ma.] ( ) (Ma.)	8.5	9.0	8.5*

LOCATION. The transmitter current is read from the right-hand meter of the control cabinet meter panel (fig. 56).

NORMAL CONDITION. The transmitter current is normal if:

a. The reading is between 5 and 15 milliamperes.

b. The reading is within plus or minus 4 milliamperes of the optimum value of current for the particular transmitter tube in use.

c. The meter reading is steady.

LOG ENTRY. Record in the log space the reading of the transmitter current meter to the nearest ½ milliampere. Place an asterisk (*) after the reading entered on the log sheet when the transmitter current is not normal.

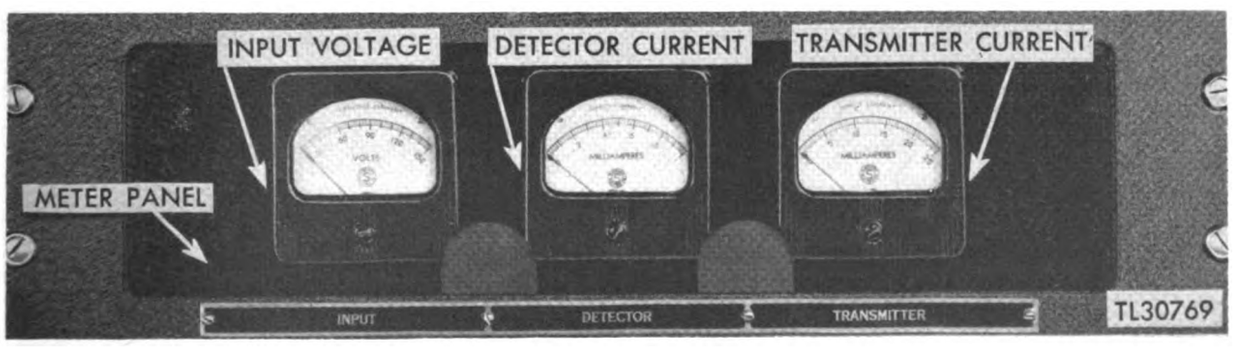


Figure 56. Control panel meter panel.

CORRECTIVE MEASURES.

a. and *b.* If the transmitter current is abnormal:

(1) Check item 22, input voltage.

(2) Check item 39, modulator plate voltage.

(3) Check item 43, color of modulator tubes.

(4) Check item 38, total direct current.

(5) Check item 37, transmitter current. If the two transmitter current meters (items 25 and 37) do not read the same, one or both of the meters or their associated circuits are defective.

(6) Check item 18, line current.

c. If the transmitter current is erratic:

(1) Examine the sweep lines on both oscilloscopes for unsteadiness or any other abnormality. Instability of the baseline calls for trouble shooting in the control central during shut-down.

(2) If the sweeps are not jumpy, turn the recurrence frequency switch and the range marker switch back and forth a couple of times and notice whether this step restores steady transmitter current. It is possible that a speck of dust has prevented normal contact in the switch.

(3) Check item 39, modulator plate voltage, for unsteadiness of meter reading. Look and listen for arcing in the high-frequency, high-potential circuits. Arcing within the transmission line will make a 500-cycle, metallic, hissing sound. If arcing is detected, notify the person in charge immediately.

(4) Pick up a reference target and slightly vary the high-voltage variac (item 26) for maximum target response on the A-oscilloscope. Note whether or not the transmitter current instability has been remedied.

(5) Stop the spinner and observe whether or not the transmitter current is steady. Rotate the spinner and note at what position or positions the transmitter current becomes unsteady. During the next shut-down period, measure the standing-wave ratio at this position of the spinner.

(6) Check item 38, total direct current.

(7) If unable to obtain normal transmitter current by the steps above, make a note on the Work-To-Be-Done form for synchroscope checks of the trigger and input pulses during the shut-down period. If the waveform is abnormal or if the synchroscope pattern is unstable, check the thyratron action in the modulator. The thyratron bias may need adjusting. See figure 64 for the location of the thyratron bias control. If unable to obtain normal transmitter current, notify the person in charge.

REMARKS. The person in charge will designate what current between 5 and 15 milliamperes will be considered the optimum current for the particular transmitter tube in use.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
25	1010–15	Transmitter current erratic on automatic scan, especially in position 255°. Made note in W.T.B.D. form for standing-wave measurement. C.W.

78. Item 26. High-Voltage Variac

SAMPLE ENTRY.

26 High Voltage Variac [ ] ( ) (Kv.)	12.5	13.0	15.0*

LOCATION. The high-voltage variac is located in the upper right-hand part of the control cabinet power control panel (fig. 55).

NORMAL CONDITION. The high-voltage variac is normal if:

a. Enough leeway exists on each side of the setting to make possible a check for a maximum on the A-scope.

b. The mechanical and electrical action of the variac is smooth.

c. The knob is tight.

LOG ENTRY. Record in the log space the setting of the high-voltage variac to the nearest 1/10 kilovolt. Place an asterisk (*) after the log entry if the high-voltage variac is abnormal.

CORRECTIVE MEASURES.

a. If the input voltage (item 22) is normal, and if insufficient leeway exists on each side of the setting of the high-voltage variac to make possible a check for a maximum on the A-scope, notify the person in charge.

b. When the high-voltage variac is turned, if

its action is not smooth mechanically, or if the electrical action as indicated by the modulator plate voltmeter does not correspond correctly to the turning of the variac (clockwise for increase), make a note on the Work-To-Be-Done form for cleaning and smoothing the variac during the shut-down period.

c. If the knob is loose on the shaft, tighten the two setscrews carefully with a small screw driver.

REMARKS. Only under certain conditions of load and power-line voltage will the setting of the high-voltage variac (in kilovolts) correspond exactly with the modulator plate voltage (item 39).

LIMITS. The setting of the high-voltage variac is limited only by the voltage requirements of the modulator and transmitter.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
26	0820–4	Variac knob loose; tightened setscrews. J.S.

79. Item 27. Detector Current

SAMPLE ENTRY.

27 Detector Current [0.2–0.6 Ma.] ( ) (Ma.)	0.3	0.2	0.05*

LOCATION. The detector current meter is located in the center of the meter panel as shown in figure 56.

NORMAL CONDITION. The detector current is normal if between 0.2 and 0.6 of a milliampere.

LOG ENTRY. Record to the nearest 1/100 milliampere the reading of the detector current meter. Place an asterisk (*) after the log entry if the detector current is less than 0.2 or more than 0.6 of a milliampere.

CORRECTIVE MEASURES.

a. Check item 22, input voltage.

b. Pick up a fixed reference target and maximize the signal on the A-scope by tuning the receiver (see item 52, system sensitivity).

c. Slightly readjust the local oscillator voltages in the receiver tuning panel, beginning with the anode voltage (fig. 28). If still unable to obtain a satisfactory value of detector current, notify the person in charge. The local-oscillator capacity input to the mixer may have to be adjusted.

LIMITS.

a. At some value of detector current below 0.2 milliampere the signal response begins to drop off.

b. Detector currents greater than 0.6 of a milliampere are unnecessary. Currents above 0.8 of a milliampere may damage the crystal.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
27	1410–3	Detector-current meter reading 0.05 ma. Raised current to 0.5 ma. with adjustment of local oscillator input to mixer. M.S.

80. Item 28. A-Oscilloscope

SAMPLE ENTRY.

28 A Oscilloscope [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The A-oscilloscope is located a little above center on the A-scope panel, as shown in figure 5.

NORMAL CONDITION. The A-scope is normal if:

a. The screen images are bright and clear.

b. There are no burned spots or marks on the screen.

c. The sweep line is straight, horizontal, correctly centered, and of uniform intensity throughout.

LOG ENTRY. Enter OK in the log space if the A-scope is operating normally; if not, enter N*.

CORRECTIVE MEASURES.

a. Make a note on the Work-To-Be-Done form for any corrections required during the shut-down period.

b. Adjust the A-INTENSITY control and the RECEIVER GAIN control if the screen images are not bright and clear. If the screen images are hazy, adjust the A-focus during shut-down.

SAMPLE ENTRY UNDER NOTES.

c. Check the A-scope screen for burns by turning down the A-INTENSITY control and the RECEIVER GAIN control to minimum positions and turning the HORIZONTAL CENTERING control (located just to the right of the A-scope) all the way to the left. Any mark remaining on the screen constitutes a burn. Return the three controls to their normal positions.

d. If the sweep line is not straight, horizontal, properly centered (vertically), and of uniform intensity throughout, correct these conditions during the shut-down period.

REFERENCES.

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

Item No.	Time and Date	NOTES
28	0415–31	Sweep line too high on A-scope. Made note on W.T.B.D. form. V.L.

81. Item 29. A-Intensity Control

SAMPLE ENTRY.

29 A Intensity Control [0–⅝] ( ) (Setting)	½	½	½*

LOCATION. The A-INTENSITY control is located on the A-scope panel at the lower-left edge of the A-scope screen (fig. 23).

NORMAL CONDITION. The A-INTENSITY control is normal if:

a. It does not require more than ⅝ of a turn from the extreme counter-clockwise position to obtain normal brightness of the A-scope images.

b. The action of the control is smooth mechanically and electrically.

HOW TO OBTAIN THE INFORMATION. Since there is no scale on this control, estimate the fraction of a turn as accurately as possible. Initially, in order to simplify this step, place white paint marks on the knob and on the panel as shown in figure 57.

LOG ENTRY. Record as a fraction of a complete turn the setting of the A-INTENSITY control required to give normal intensity on the A-scope. Place an asterisk (*) after the log entry if the setting is not normal.

SAMPLE ENTRY UNDER NOTES.

CORRECTIVE MEASURES.

a. Make an appropriate note on the Work-To-Be-Done form if an abnormal condition is found which requires correction during shut-down.

b. If an abnormal setting of the A-scope intensity control is required in order to get satisfactory brilliance on the A-scope screen, during shut-down make a point-to-point check of voltages in the control central circuits associated with the A-scope.

REFERENCES.

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

Item No.	Time and Date	NOTES
29	2215–28	Action of control is not smooth. Images on screen flutter badly whenever control is touched. Made note on W.T.B.D. form. G.L.

82. Item 30. Horizontal Centering Control

SAMPLE ENTRY.

30 Horizontal Centering Control [⅛–⅝] ( ) (Setting)	½	⅝	¾*

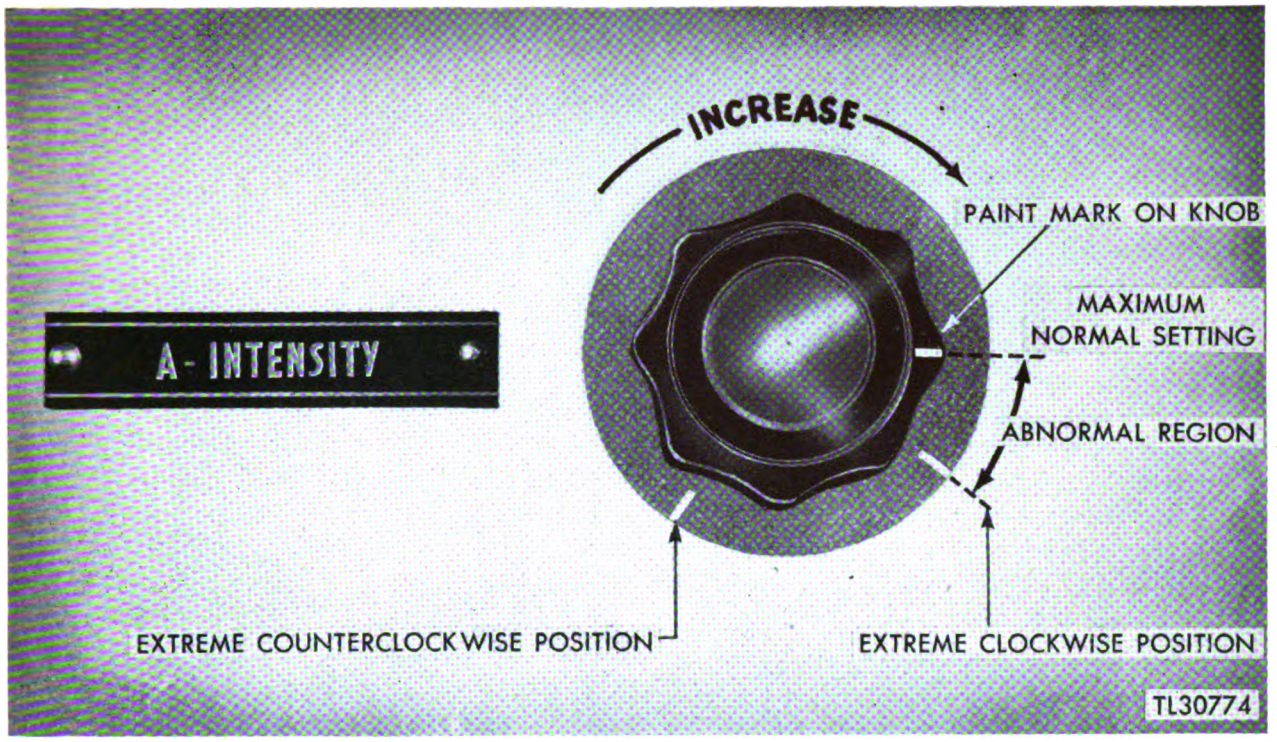


Figure 57. A-Intensity control.

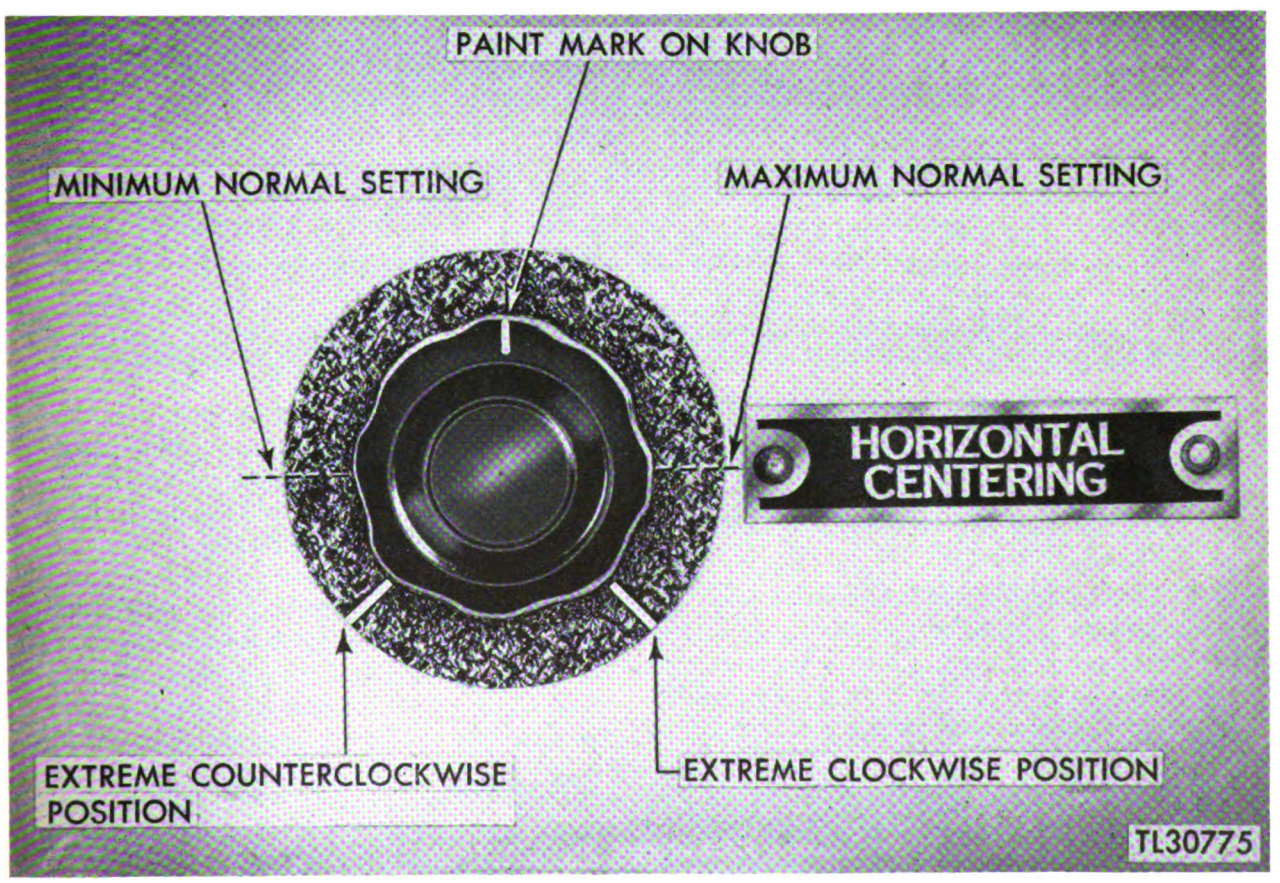


Figure 58. Horizontal centering control.

LOCATION. The HORIZONTAL CENTERING control is located on the A-scope panel at the lower right edge of the A-scope screen (fig. 23).

NORMAL CONDITION. The HORIZONTAL CENTERING control is normal if:

a. It does not require less than 1/8 nor more than 5/8 of a turn from the extreme counterclockwise position in order to give correct centering of the sweep line on the A-scope.

b. The action of the control is smooth mechanically and electrically.

HOW TO OBTAIN THE INFORMATION. Since there is no scale on this control, estimate the fraction of a turn as accurately as possible. In order to simplify this step, place white paint marks on the knob and on the panel as shown in figure 58.

LOG ENTRY. Record as a fraction of a complete turn the setting of the HORIZONTAL CENTERING control required to give normal centering. Place an asterisk (*) after the log entry if the setting is not normal.

CORRECTIVE MEASURES.

a. Make a note on the Work-To-Be-Done form for any corrections required during the shut-down period.

b. If an abnormal setting of the A-scope HORIZONTAL CENTERING control is required in order to get satisfactory horizontal centering, during shut-down make a point-to-point check of voltages in the control-central circuits associated with the A-scope.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
30	1445–8	Impossible to get correct centering on A-scope with any position of the centering control (now in maximum clockwise position). Made a note on the W.T.B.D. form for trouble shooting. V.L.

83. Item 31. P-Intensity Control

SAMPLE ENTRY.

31 P Intensity Control [0–5/8] ( ) (Setting)	5/8	1/2	3/4*

LOCATION. The P-INTENSITY control is the second knob from the left on the bottom of the A-scope panel of the control rack (fig. 23).

NORMAL CONDITION. The P-INTENSITY control is normal if:

a. It does not require more than 5/8 of a complete turn from the extreme counterclockwise position to obtain normal brightness of the PPI scope.

b. The action of the control is smooth mechanically and electrically.

HOW TO OBTAIN THE INFORMATION. Since there are no markings on the control, estimate the fraction of a turn as accurately as possible. In order to simplify this step, place white paint marks on the knob and on the panel as shown in figure 59.

LOG ENTRY. Record as a fraction of a complete turn the setting of the P-INTENSITY control required in order to give normal intensity on the PPI scope. Place an asterisk (*) after the log entry if the P-INTENSITY control is set more than 5/8 of a complete turn from the extreme counterclockwise position, or if its action is not smooth mechanically and electrically.

CORRECTIVE MEASURES. For any corrections required during the shut-down period, make an appropriate note on the Work-To-Be-Done form. If an abnormal setting of the PPI scope intensity control is required in order to get satisfactory brilliance on the PPI scope screen, during shut-down make a point-to-point check of voltages in the control-central circuits associated with the PPI scope. If the extreme clockwise position of the knob does not give a sufficiently bright sweep line to enable the use of the PPI scope, immediately notify the person in charge.

REFERENCES.

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

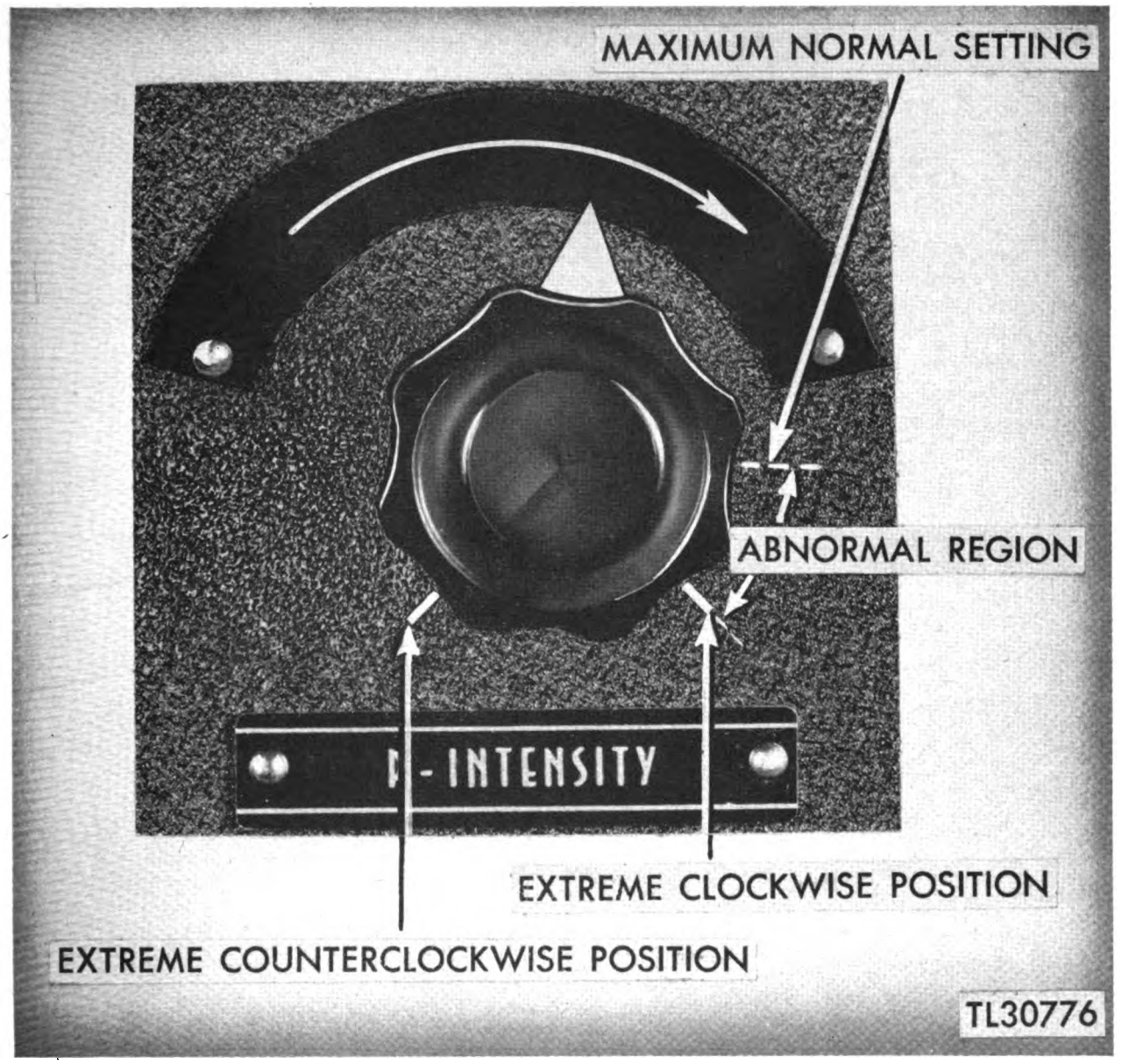


Figure 59. P-Intensity control.

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
31	1025–23	PPI scope intensity normal with control in maximum clockwise position. Made note on W.T.B.D. form. R.D.

84. Item 32. P-Oscilloscope

SAMPLE ENTRY.

32 P Oscilloscope [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The PPI oscilloscope is centered in the upper part of the PPI scope panel (fig. 23).

NORMAL CONDITION. The PPI scope is normal if:

a. The "main bang" at the center of the scope describes a circle of 1/32- to 1/8-inch diameter.

b. The sweep line is of uniform intensity throughout.

c. The screen pattern fills the entire screen and is correctly centered.

d. The screen is free from "owl's eyes" (a name given to spots of unwarranted illumination, a defect of the screen).

e. The screen is free from burned spots.

f. The images on the screen are clear and bright.

g. The range markers are concentric circles.

h. The sweep line is stable.

i. There is no "spoke effect".

j. The sweep line is straight.

LOG ENTRY. If these requirements are satisfied, enter OK in the log space; if not, enter N*.

CORRECTIVE MEASURES.

a. Make an appropriate entry on the Work-To-Be-Done form for any corrections required during shut-down.

b. Adjust the PPI sweep centering during shut-down if the main bang describes a circle not having a diameter between 1/32 and 1/8 inch.

c. Any nonlinearity of the sweep voltage will cause the intensity to be nonuniform and will introduce an error in range calibration. Check the sweep and saw-tooth oscillator circuits during the next shut-down period if the sweep line is not of uniform intensity.

d. Adjust the PPI sweep length or the focus yoke during shut-down if the screen pattern does not fill the entire screen or if it is not correctly centered.

e. Replace the PPI scope during maintenance time if the screen has owl's eyes or a burned spot which is serious enough to interfere with tactical operations. A small burned spot at the center of the screen is not sufficient cause for removal of the tube.

f. When the patterns on the screen are not clear and bright:

(1) Adjust the receiver tuning.

(2) Adjust the receiver gain.

(3) Adjust the PPI scope focus during the shut-down period.

g. If the range markers are not concentric circles, adjust during shut-down according to instructions in TM 11-1512 (when published).

h. Check the operation of the control central during shut-down, if the sweep line is unstable and this abnormality is not caused by jamming. Jamming by another unit may cause patterns which resemble lightning to appear on the oscilloscope. Microphonic tubes in the receiver, a poor tube-socket contact, or loose connection will also cause instability.

i. To remedy a crooked sweep line:

(1) Try adjusting the intensity control.

(2) Check the voltage on the focusing and accelerating anodes of the scope during the next shut-down period.

j. Notify the person in charge if any uncorrectable abnormality of the PPI scope interferes with the fullest tactical use of the radar set. The PPI scope may need to be replaced.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
32	0400–26	Made W.T.B.D. note for check on PPI scope focus. R.D.

85. Item 33 (blank)

86. Item 34. Receiver Gain

SAMPLE ENTRY.

34 Receiver Gain [1–9 Div.] ( ) (Div.)	8	9	10*

LOCATION. The RECEIVER GAIN control is located near the bottom right corner of the PPI scope panel (fig. 23).

NORMAL CONDITION. The normal RECEIVER GAIN setting is between 1 and 9 on the receiver scale.

LOG ENTRY. Enter in the log space the setting to the nearest scale division. Place an asterisk (*) after the log entry if the setting is not normal.

CORRECTIVE MEASURES. If an abnormal setting of the RECEIVER GAIN control is necessary in order to obtain the correct output:

a. Check item 22, input voltage.

b. Make sure that the knob is not slipping on its shaft.

c. Observe whether or not the noise level on

the A-scope is normal for the RECEIVER GAIN setting used. If it is normal for that setting, the trouble is external to the receiver. The transmitter output may not be normal or atmospheric conditions may be adverse. Consult item 52, system sensitivity.

d. Check the adjustment of the local oscillator by means of the receiver tuning control (located immediately above the gain control). Be sure that the receiver tuning, as indicated by the height of the signals on the A-scope, is correct.

e. Check the position of the local-oscillator tuning cam. If the cam is at or near (say within 30° of) the maximum or the minimum position, make a note on the Work-To-Be-Done form for a coarse readjustment of the local-oscillator cavity during the next shut-down period.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
34	1030	Receiver gain satisfactory with gain control wide open. Made a note on the W.T.B.D. form for receiver-tube check. R.D.

87. Item 35. Transmitter Cabinet

This item is not to be filled in. It is a heading for items 36–46.

88. Item 36. Line Voltage

SAMPLE ENTRY.

36 *Line Voltage* [110–120 V.] ( ) (Volts)	115	115	108•

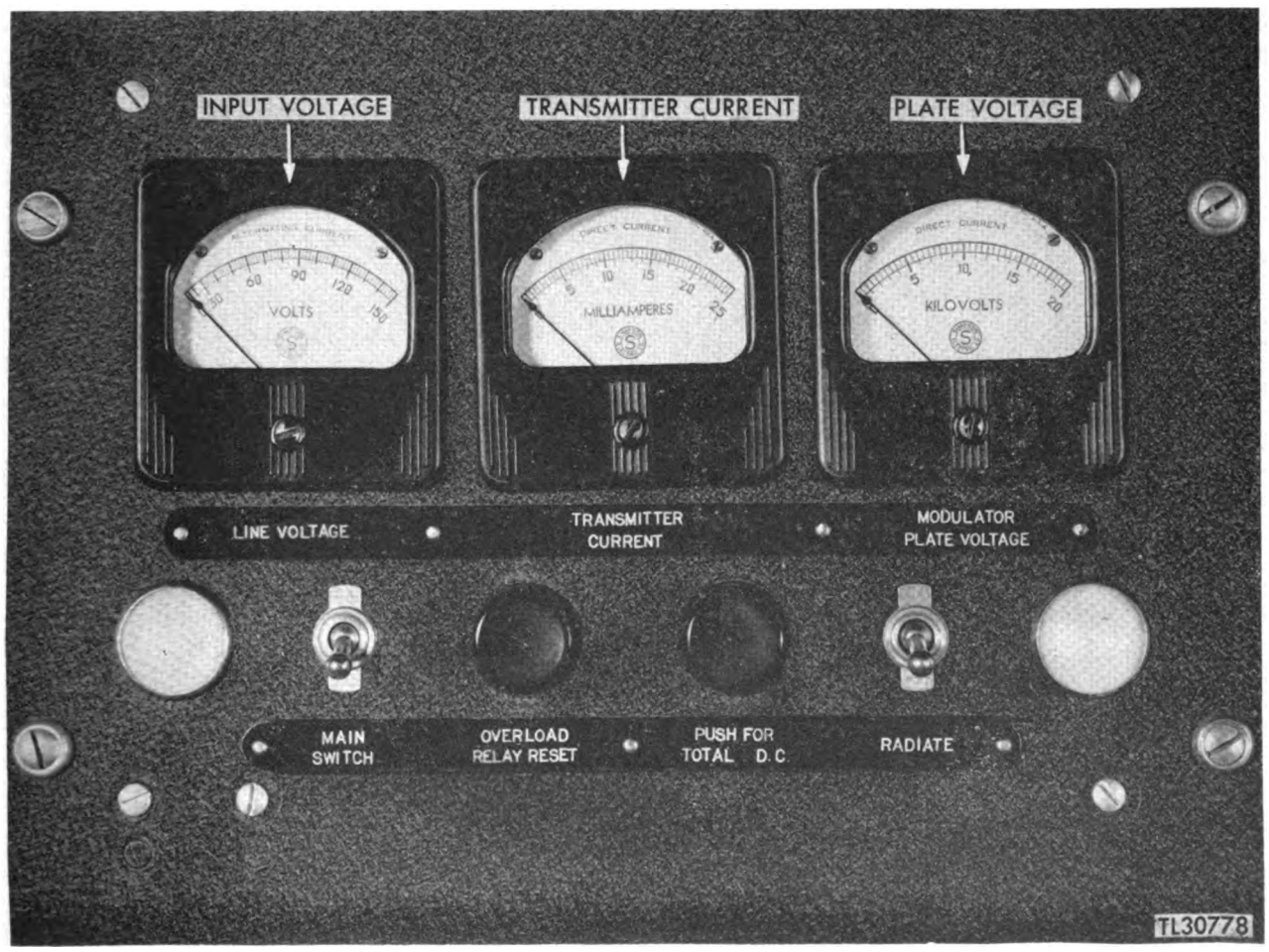


Figure 60. Transmitter cabinet control panel.

LOCATION. The line voltmeter is located on the meter-and-control panel of the transmitter cabinet as shown in figure 60.

NORMAL CONDITION. The input voltage is normal if:

a. It is between 110 and 120 volts.

b. It is within plus or minus 1 volt of the optimum set by the person in charge. Optimum input voltage probably will be found to lie between 115 and 118 volts.

LOG ENTRY. Enter in the log space to the nearest volt the reading of the line voltmeter. Place an asterisk (*) after the log entry if the reading is not normal.

CORRECTIVE MEASURES.

a. If the line voltmeter reading is below 110 or above 120 volts:

(1) Check item 16, line voltage.
(2) Check item 22, input voltage.
(3) Readjust the main line variac.

b. If the abnormal condition is not corrected by these measures, notify the person in charge.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
36	0640–16	Line voltage very unsteady and requires continual readjustment of the line variac. Notified O.C. J.S.

89. Item 37. Transmitter Current

LOCATION. The transmitter current milliammeter is the meter in the upper center of the control-and-meter panel of the transmitter cabinet as shown in figure 60. This meter is in series with the transmitter current meter on the control rack and normally will read the same. (See item 25).

90. Item 38. Total Direct Current

SAMPLE ENTRY.

38 Total Direct Current [7–20 Ma] ( ) (Ma)	13.5	13.5	21*

LOCATION. The total direct-current output of the high-voltage power supply is read on the transmitter current meter when the TOTAL D.C. button is pushed (fig. 60).

NORMAL CONDITION. The total direct current from the high-voltage rectifier is normal if:

a. It is between 7 and 20 milliamperes.

b. It is 2 to 5 milliamperes more than the transmitter plate current (item 37).

LOG ENTRY. Record in the log space the total direct current to the nearest ½ milliampere. Place an asterisk (*) after the log entry if the reading is not normal.

CORRECTIVE MEASURES. If the reading is abnormal:

a. Check item 39, modulator plate voltage.

b. Check item 25, transmitter current.

c. Check item 43, color of modulator tubes.

d. Make a note on the Work-To-Be-Done form suggesting a check on the wave-form of the transmitter pulse.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
38	0915–17	Total dc high. Made W.T.B.D. note for a wave-form check up. J.H.

91. Item 39. Modulator Plate Voltage

SAMPLE ENTRY.

39 Modulator Plate Voltage [10–15 Kv.] ( ) (Kv.)	12	11.5	12.5*

LOCATION. The modulator plate voltage is read on the right-hand meter of the meter-and-control panel of the transmitter cabinet as shown in figure 60.

NORMAL CONDITION. The modulator plate voltage is normal if:

a. It is between 10 and 15 kilovolts.

b. The reading is steady.

c. It is not necessary to vary the modulator plate voltage radically in order to obtain optimum system sensitivity.

LOG ENTRY. Record to the nearest 1/10 kilovolt the reading of the modulator plate voltmeter. Place an asterisk (*) after the log entry if the reading is not normal.

CORRECTIVE MEASURES.

a. Check the line voltage, items 16, 22, and 36.

b. Check the transmitter current, items 25 and 37.

c. Check item 38, total direct current.

d. By turning the high-voltage variac (item 26), adjust the modulator plate voltage for maximum signal response on the A-scope. Use a fixed target. If a radical change is necessary in order to obtain optimum sensitivity or if the meter is fluctuating, make a note on the Work-To-Be-Done form suggesting trouble shooting during the next shut-down period.

e. If normal set performance cannot be obtained, notify the person in charge.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
39	1220–1	Modulator plate voltage very unsteady. Set performance otherwise normal; line voltage and transmitter plate current are steady. Made note on W.T.B.D. form suggesting check-up on meter resistor. A.L.

92. Item 40. Dehydrator

SAMPLE ENTRY.

40 Dehydrator (Oper. Cond.) ( ) (OK–N*)	OK	OK	N*

LOCATION. The silica-gel color indicator is located above the dehydrating cylinder of the dehydrator assembly (figs. 61 and 30).

NORMAL CONDITION. The normal color of the dehydrator indicator is blue, the same as the color of the paint on the indicator glass.

HOW TO OBTAIN THE INFORMATION. Open the upper left door of the transmitter cabinet and note the color of the silica gel.

LOG ENTRY. Enter OK if the dehydrator indicator is blue; enter N* if it is white or pink.

CORRECTIVE MEASURES. When the blue particles of silica gel in the indicator glass begin to turn white or pink, the indication is that the dehydrating cylinder has been used up and should be replaced. Replacement is accomplished by removing the supporting clamp and the two flare-fitting nuts at the top and bottom of the cylinder unit. Clamp the spare cylinder in place and tighten the nuts.

NOTE: IF THE SILICA-GEL INDICATOR BEGINS TO TURN WHITE OR PINK AND NO REPLACEMENT IS AVAILABLE, OBTAIN PERMISSION FROM THE PERSON IN CHARGE TO SHUT DOWN AND DISCONNECT THE A-C LINE TO THE DEHYDRATOR PUMP MOTOR. OTHERWISE, WATER MAY BE PUMPED INTO THE TRANSMISSION LINE. IT IS FAR BETTER TO OPERATE WITH NO DEHYDRATOR AT ALL THAN TO ATTEMPT TO OPERATE WITH A DEHYDRATING CYLINDER THAT HAS BEEN USED UP.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
40	1230–30	Dehydrator indicator turning write. Made note on W.T.B.D. form for change of dehydrator cylinder. I.F.

93. Item 41 (blank)

94. Item 42. Transmission Line Pressure

SAMPLE ENTRY.

42 Transmission Line Pressure [5–10 lb] ( ) (Pounds)	10	10	11*

LOCATION. The transmission-line air pressure gauge is located in the dehydrator assembly (fig. 30).

NORMAL CONDITION. The transmission-line pump assembly is normal if the pump works automatically to keep the line under pressure continuously and if it shuts off when the pressure reaches some point between 5 and 10 pounds per square inch.

HOW TO OBTAIN THE INFORMATION. Wait until the dehydrator pump starts. Read the pressure meter immediately after the pump automatically shuts off.

LOG ENTRY. Enter to the nearest pound per square inch the pressure at which the dehydrator pump automatically shuts off, as indicated by the transmission-line air pressure meter. Place an asterisk (*) after the log entry if the pressure is not normal.

CORRECTIVE MEASURES. Make a slight change in the pressure adjustment located on the top of the automatic pressure switch (fig. 30). Note the change in the automatic shut-off pressure. Continue to adjust until the pump automatically shuts off at some pressure between 5 and 10 pounds.

REMARKS. The purpose of the dehydrator pump is to keep dry air under pressure in the transmission line at all times in order to exclude moisture, insects, dust, and other foreign matter.

LIMITS. The transmission line will be protected adequately as long as a slight positive pressure of dry air in the line is maintained. Pressures above 10 pounds per square inch are unnecessary, and pressures above 15 pounds per square inch endanger the polystyrene bulb surrounding the antenna.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

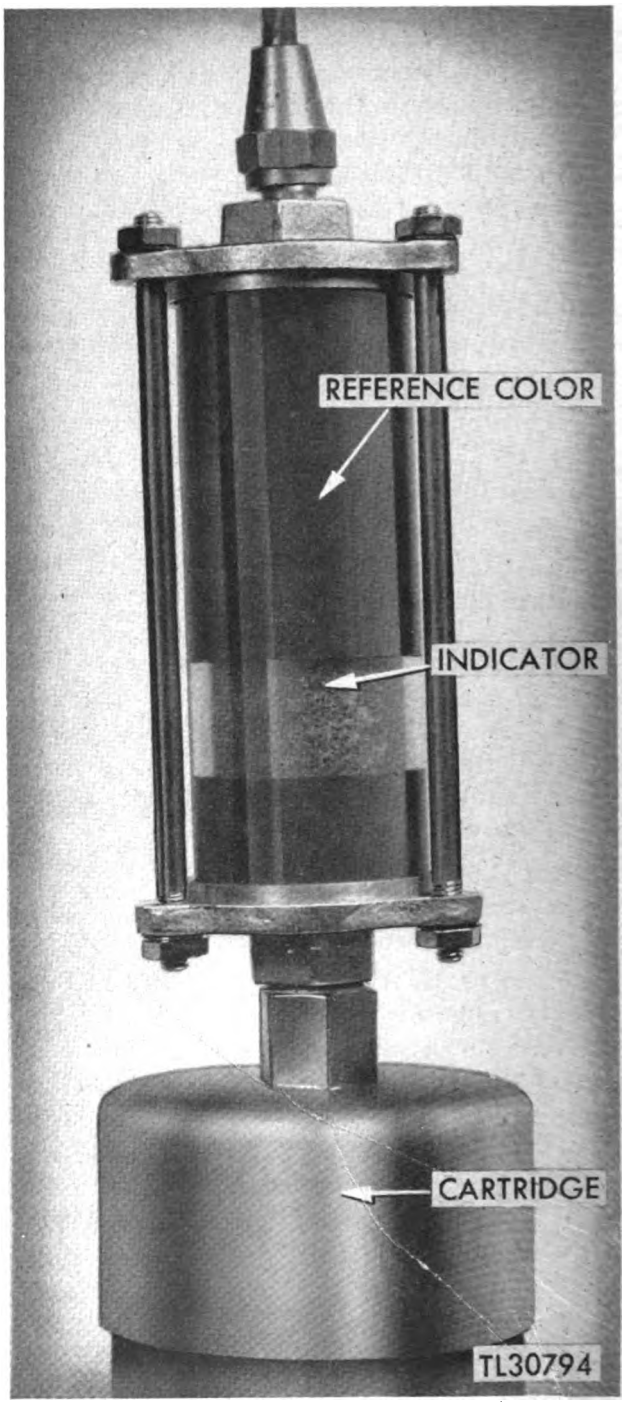


Figure 61. Dehydrator indicator cell.

Item No.	Time and Date	NOTES
42	2015–19	Transmission-line pressure high. Readjusted. Shut-off pressure now 8 pounds. J.C.

95. Item 43. Color of Modulator Tubes

SAMPLE ENTRY.

43 Color of Modulator Tubes [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The tubes of the modulator unit are located in the lower half of the transmitter cabinet and are shown in figures 49 and 62.

NORMAL CONDITION. The color of the tubes in the modulator is normal if:

a. The filaments are bright.

b. The plates are not red hot.

c. The thyratron shows its characteristic steady purple-blue color.

HOW TO OBTAIN THE INFORMATION. Open the upper left door of the transmitter cabinet. Make the necessary inspection by looking through this door, downward to the right . Figure 62 shows the modulator tubes.

CAUTION: THE TRANSMITTER CABINET CONTAINS HIGH-VOLTAGE CIRCUITS. CARELESSNESS MAY CAUSE DEATH.

LOG ENTRY. Enter OK in the log space if the color of the modulator tubes is normal; if not, enter N*.

CORRECTIVE MEASURES.

a. Check item 52, system sensitivity, if the filaments are not bright. Be on the alert for smoke or the odor of overheated equipment. If these symptoms are detected, notify the person in charge immediately.

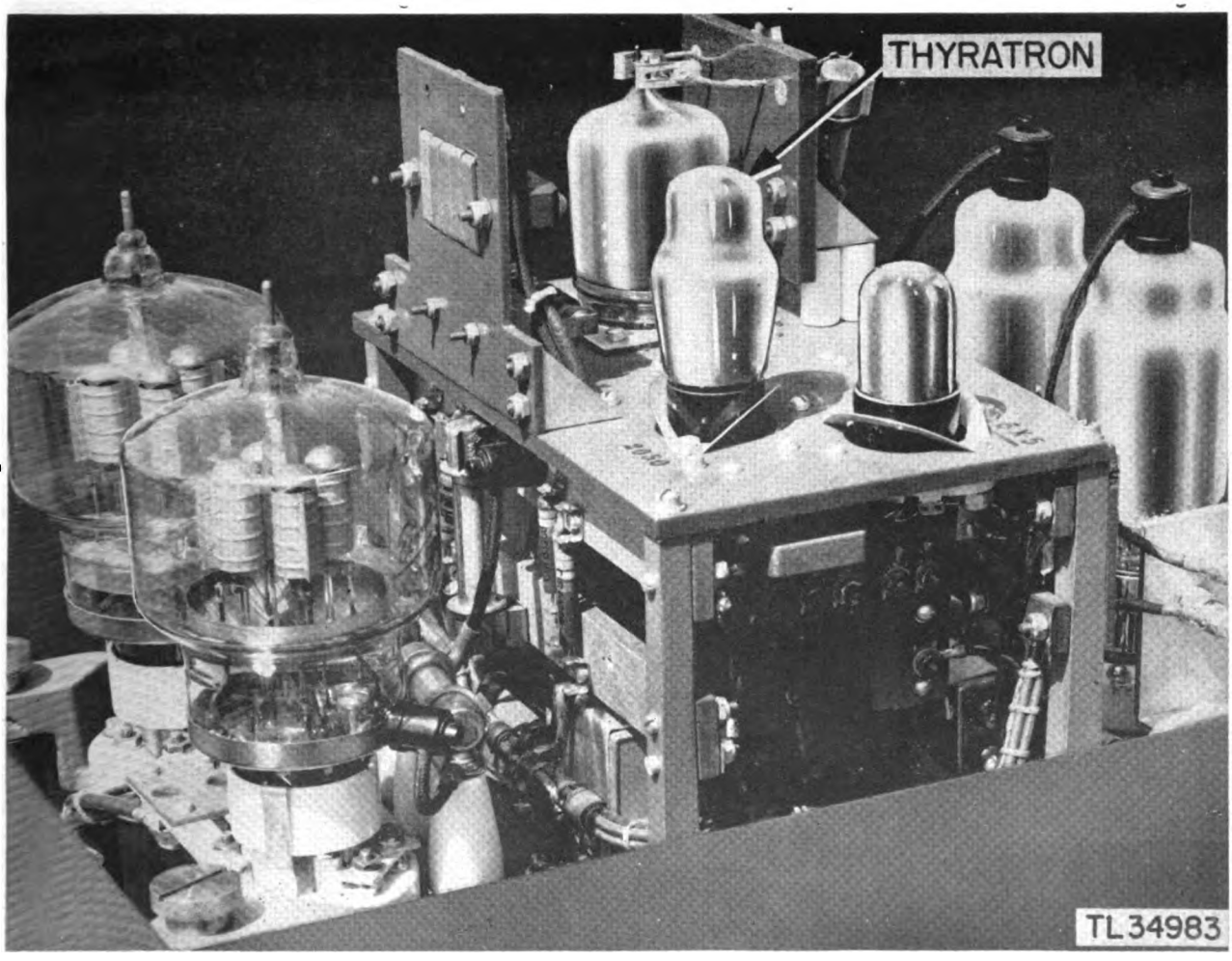


Figure 62. Modulator tubes.

b. If the modulator tube plates are red hot, check items 37 and 38, transmitter current and total direct current, and immediately notify the person in charge.

c. Check item 52, system sensitivity, if the thyratron color is abnormal.

d. If the sensitivity is satisfactory while the color of the modulator tubes is abnormal, make a note on the Work-To-Be-Done form for a check of trigger and input pulse waveforms with the synchroscope during the next shut-down period. A readjustment of the thyratron bias control may be advisable.

e. Notify the person in charge if the sensitivity is unsatisfactory. The thyratron may need to be replaced.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
43	0230–18	Thyratron flickering. Lieut. Nicholson adjusted thyratron bias, restoring stability. J.C.

96. Item 44. Amplidyne Amplifier

SAMPLE ENTRY.

44 Amplidyne Amplifier [ ] ( ) (OK–N*)	OK	OK	N*

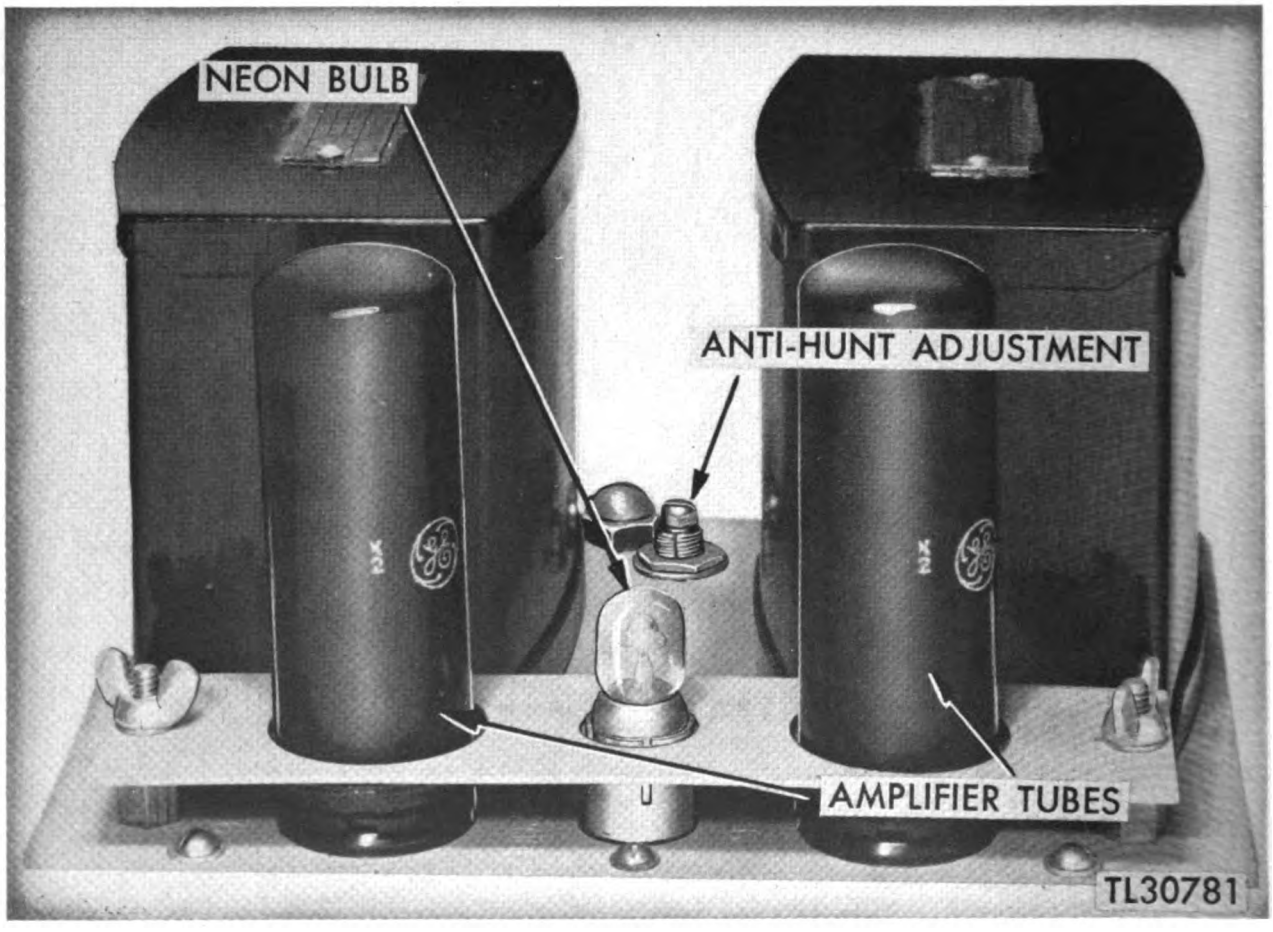


Figure 63. Amplidyne amplifier.

LOCATION. The amplidyne amplifier is located in the upper left compartment of the transmitter cabinet.

NORMAL CONDITION. The condition of the amplidyne amplifier (fig. 63) is normal if:

a. The position of the two tubes has been interchanged since last week.

b. The temperature of the transformers is the same as usual.

c. The neon bulb lights only intermittently and then only when the spinner direction or speed of rotation is changed.

HOW TO OBTAIN THE INFORMATION. Open the upper left door of the transmitter cabinet and make the necessary inspection. Feel the transformers with the hand.

LOG ENTRY. Enter OK in the log if the amplidyne amplifier is in normal operating condition; if not, enter N*.

CORRECTIVE MEASURES.

a. The two tubes will be interchanged periodically as part of the program of preventive maintenance. If this measure is not being taken, make a note of the fact on the Work-To-Be-Done form.

b. If the transformers are not operating at the usual temperatures (make due allowance for weather variations), set the controls for manual scanning and try turning the spinner in both directions. Notify the person in charge if the response is not normal.

c. If the neon bulb lights abnormally, check item 48, spinner, and be on the alert for signs of "hunting." If the spinner hunts, notify the person in charge, who may authorize readjustment of the anti-hunt control.

CAUTION: THIS ADJUSTMENT SHOULD NOT BE ATTEMPTED BY ANYONE WHO HAS NOT BEEN TRAINED IN THE PROPER PROCEDURE. OTHERWISE, DAMAGE TO THE SPINNER MAY RESULT.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
44	2215–18	Neon light in amplidyne amplifier lighting more than usual. Made W.T.B.D. note for check-up. J.C.

97. Item 45. Fan Operation

SAMPLE ENTRY.

45 Fan Operation [ ] ( ) (OK–N*)	OK	OK	N*

LOG ENTRY. Enter OK in the log if the motor and blower are operating normally; if not, enter N*.

LOCATION. The motor blower for cooling the transmitter tube is located in the lower left side of the transmitter cabinet (fig. 49).

NORMAL CONDITION. The fan is operating normally if:

a. There is no odor of hot oil or overheated insulation.

b. The sound of the motor blower is normal and unchanged.

c. There is a normal blast of air around the transmitter tube.

HOW TO OBTAIN THE INFORMATION. Open the upper left door of the transmitter cabinet and make the necessary observations. Initially, *during a shut-down period,* tie a short piece of string or a small strip of cloth in the air stream above the transmitter tube so that a failure of the air blast during operation will be indicated.

CAUTION: DO NOT GET NEAR THE TRANSMITTER TUBE FILAMENT OR ASSOCIATED CIRCUITS DURING OPERATION. DEATH MAY RESULT.

CORRECTIVE MEASURES.

a. Notify the person in charge at once if there is an odor of hot oil or overheated insulation.

b. If the sound of the motor blower is not normal or is different from the usual sound, check item 22, input voltage.

c. If the stream of air around the transmitter tube is not normally strong, check item 46, air filter.

REFERENCES.

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

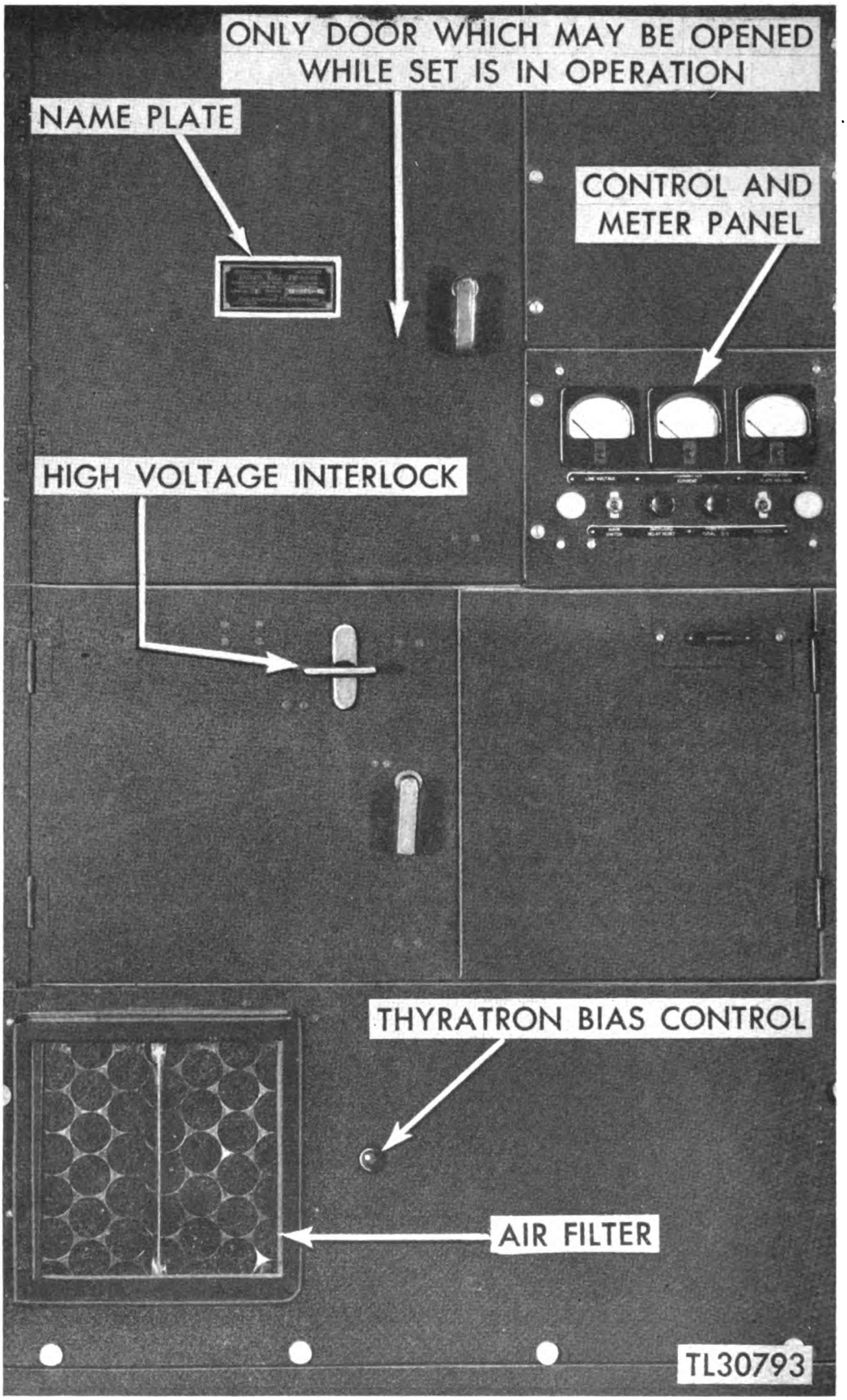


Figure 64. Transmitter cabinet.

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
45	1815–7	Air blast around the transmitter tube is not as strong as usual. Made a note on W.T.B.D. form for filter to be replaced. C.S.

98. Item 46. Air Filter

SAMPLE ENTRY.

46 Air Filter [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The air filter is located on the front of the transmitter cabinet at the bottom left corner (fig. 64).

NORMAL CONDITION. The air filter is normal if it is filtering air sufficient for normal fan operation.

HOW TO OBTAIN THE INFORMATION. Hold a piece of paper or cardboard several inches from the filter and observe whether the suction indicates a normal draft of air through the filter. To make sure there is a normal draft, remove the filter during shut-down and hold it up to the sunlight. The amount of light which passes through the filter will show roughly the amount of clogging.

LOG ENTRY. Enter OK if the air filter is functioning properly; otherwise, enter N*.

REMARKS. It is better to operate with no filter at all rather than to try to operate with a clogged one. In order to minimize the amount of dirt picked up by the draft of air, the air filters should be replaced only during the shut-down period. Before putting in a new filter, wipe the holder clean with a moist cloth wrung out as dry as possible.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
46	0215–17	Air filter needs to be replaced. Made W.T.B.D. note. I.F.

99. Item 47. Amplidyne Generator

SAMPLE ENTRY.

47 Amplidyne Generator [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The amplidyne generator is connected to the transmitter cabinet by means of a cable. It may be located in any convenient spot within the reach of the cable.

NORMAL CONDITION. The amplidyne generator (fig. 7) is normal if:

(1) The bearings are not overheated.

(2) The body of the machine is not overheated.

(3) There is no smoke or smell of burning insulation.

(4) It runs smoothly and as quietly as usual.

HOW TO OBTAIN THE INFORMATION. In order to judge temperature, place the hand on the body of the amplidyne generator and on the ends (bearings).

LOG ENTRY. Enter OK in the log space if the amplidyne generator is operating normally; if not, enter N*.

CORRECTIVE MEASURES.

a. If one bearing is hot, feel the other bearing to see whether it is at the same temperature. Remove the grease plugs and immediately lubricate the hot bearing (s) with the regular grease. If this is not handy, use oil or any other lubricant. The important thing is to lubricate the bearing as quickly as possible in order to prevent "freezing." *Do not stop the machine while the bearing is hot.* Notify the person in charge. The bearing housing should be drained, flushed, and refilled as soon as the bearing is cool.

b. If the body of the machine is overheated, check item 18, line current. If the heat is caused by the weather, try opening the brush-access plates to increase the dissipation of heat (fig. 7). An electric fan also may be used to increase cooling.

c. Notify the person in charge immediately if there is smoke or the smell of burning insulation. Check item 18, line current.

d. The amplidyne generator runs constantly while the radar set is in operation and makes a sound similar to that of an ordinary electric motor or generator. When the spinner is being rotated, this sound normally changes to a high-pitched whine. This high-pitched note should be constant when automatic scanning is in use. Make a note on the Work-To-Be-Done form for a check-up of the antihunt adjustment if the sound is not constant. The technician should become accustomed to these characteristic sounds and should always remain alert to any change. Notify the person in charge if there is a change.

REMARKS. A REGULAR SCHEDULE OF LUBRICATION AND INSPECTION AS PART OF THE PROGRAM OF PREVENTIVE MAINTENANCE WILL PREVENT HOT BEARINGS AND RESULTANT DAMAGE TO COSTLY EQUIPMENT.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
47	1400–26	Both bearings and body of amplidyne running much warmer than usual. Lubrication checked and found to be normal. Believe condition due to weather (cabin temperature 98°). Opened amplidyne brush-access plate to increase cooling. M.S.

100. Item 48. Spinner

SAMPLE ENTRY.

48 Spinner [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. The spinner (fig. 8) is located inside the blister.

NORMAL CONDITION. The spinner is normal if:

a. It is correctly lubricated and makes the usual sound during rotation.

b. It has not been damaged by gunfire.

c. There is no smoke or odor of overheated parts.

d. The dipole is horizontal. For dipole location see figure 8.

HOW TO OBTAIN THE INFORMATION. Open the door of the blister and inspect the spinner with the aid of a flashlight. Do not enter the blister while the set is in operation or while there is a possibility of its being turned on. The spinner turns with force sufficient to cause injury to personnel.

LOG ENTRY. When the spinner is in normal condition, enter OK in the log space; otherwise, enter N*.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
48	0445–12	Checked grease from the ring gear and found it slightly gritty. Made a note on the W.T.B.D. form. J.S.

101. Items 49 and 50 (blanks)

102. Item 51. Orientation

SAMPLE ENTRY.

51 *Orientation* (Az. R.) [ ] ( ) (Deg.–Kyd.)	187/28.5	187/28.5	187/29*

NORMAL CONDITION. The orientation of the radar set is normal if the azimuth and range indication from a fixed reference target are correct.

HOW TO OBTAIN THE INFORMATION. Place the range setting switch on the lowest range which will include the reference target; for example, if the target can be picked up on all three ranges, use the 10,000-yard range. Using the manual scan control, turn the spinner until maximum response on the A-scope is obtained from the reference target. Note the azimuth of the target from the scale on the PPI-scope. Turn on the range markers and note the range of the target on A-scope.

LOG ENTRY. Enter in the open parentheses immediately to the right of the item title the correct azimuth and range of the fixed target which has been selected for this check by the person in charge. Enter in the log space the azimuth and range of the reference target as measured by the radar set at the time of the log entry. If the measured azimuth or range does not agree with the known azimuth and range of the reference target, place an asterisk (*) after the log entry.

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
51	1515–1	Range indication in error. Made note on W.T.B.D. form. B.W.

CORRECTIVE MEASURES.

a. If the azimuth indication is incorrect:

(1) The screw which holds the pointer of the PPI scope azimuth scale may be loose. Tighten if necessary.

(2) The ring gear or selsyn worm gear may have jumped a tooth or two. The PPI scope yoke gear may have slipped a cog. Consult the person in charge.

b. If the range indication is incorrect, make a note on the Work-To-Be-Done form suggesting trouble shooting in the range marker circuits of the control central during the next shut-down period. If the range indication is in error by more than 400 yards at ranges up to 10,000 yards, or by more than 1,500 yards at ranges beyond 10,000 yards, notify the person in charge.

REMARKS. For details on orientation of Radio Set SCR–582–(*), see Field Manual FM 4–96.

REFERENCES.

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

103. Item 52. System Sensitivity

SAMPLE ENTRY.

52 *System Sensitivity* (Gain Set) [80%] ( ) (%)	90	80	45*

LOCATION. The over-all system sensitivity of the radar set is judged from the response on the A-scope.

NORMAL CONDITION. The sensitivity of the radar set is normal if within 80 percent of the designated optimum value or par.

HOW TO OBTAIN THE INFORMATION.

a. Initially, the person in charge will decide and designate the following:

(1) The fixed reference target to be employed; the target used in the signal-to-noise ratio measurement is recommended.

(2) The setting of the receiver gain to be used.

(3) The maximum echo height, or par, to be expected from the target selected. Enter this height in the empty parentheses provided for optimum values.

EXAMPLE: (1½"). See sample entry above.

b. Place the range-setting switch on the lowest range which will include the target; for example, if the target can be picked up on both the 30,000-yard and the 10,000-yard range, use the 10,000-yard range.

c. As an aid to this measurement, it is recommended that two short, fine lines be drawn on the face of the oscilloscope. Place one line so that it coincides with the sweep line; this line should be used also whenever adjusting the vertical-sweep control which is located on the A-scope subpanel. Place the other line to correspond with the optimum value of the echo height from the reference target. If paint and a small artist's brush are available, they may be used for making the marks on the screen. The marks should

be small so that they will not interfere with the tactical employment of the radar scopes.

d. Turn the signal limiter switch to the UNLIMITED position. By use of the manual scan control, turn the antenna for maximum echo response from the reference target, as judged from the height of the signal on the A-scope. Turn the high-voltage variac (item 26) slightly to each side of the optimum adjustment in order to check for maximum echo height on the A-scope. Check the receiver tuning by use of the local-oscillator tuning control. Express the height as a percentage of the optimum value.

LOG ENTRY. Record in the parentheses immediately to the right of the item title the receiver gain setting to be used in this measurement. Enter in the log space the estimated height of the echo as a percentage of the optimum.

CORRECTIVE MEASURES.

a. If the system sensitivity is not normal:

(1) Maximize the signal response on the A-scope by tuning the receiver.

(2) Check the line voltage, items 16, 22, and 36.

(3) Check item 25, transmitter current.

(4) Check item 27, detector current.

(5) Check item 53, signal-to-noise ratio.

b. If the sensitivity cannot be brought up to normal by these steps, notify the person in charge.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
52	1045–14	Sensitivity down. Made all reasonable checks of factors affecting sensitivity. Made note on W.T.B.D. form suggesting check of receiver tubes and i-f tuning. M.S.

104. Item 53. Signal-to-Noise Ratio

SAMPLE ENTRY.

53 *Signal-to-Noise Ratio* [25%] ( ) (Ratio)	3/1	3/1	2/1•

LOCATION. The signal-to-noise ratio is estimated from the signals on the A-scope.

NORMAL CONDITION. Normal variations will not exceed 25 percent.

HOW TO OBTAIN THE INFORMATION.

a. Place the range setting switch on the lowest range which will include the target; that is, if the target can be picked up on both the 30,000-yard and the 10,000-yard ranges, use the 10,000-yard range. Throw the signal limiter switch to the UNLIMITED position. Using the manual scan control, turn the antenna to the fixed reference target; use the same target for successive readings. Tune for maximum system sensitivity (item 52). Turn up the receiver gain until the "grass" is about ¼-inch high on the A-scope. Compare the height of the fixed echo to the height of the "grass." Make the estimation carefully and express it as a fraction using number *1* as the denominator.

b. Initially, the person in charge will decide upon and designate the following:

(1) The fixed reference target to be used, specifying the range and azimuth.

(2) The maximum ratio to be expected from the target selected. Enter this ratio in the empty parentheses provided for optimum values.

LOG ENTRY. Record to the right of the item title the azimuth, in degrees, and the range, in kiloyards, of the fixed reference target which is used for the signal-to-noise measurement. Enter in the log space the estimated ratio between the height of the signal and the level of the noise or "grass."

CORRECTIVE MEASURES. If the signal-to-noise ratio is abnormal, check item 52, system sensitivity.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
53	1245–6	Sig.-to-noise ratio low. System sensitivity poor. Field strength apparently normal. Local-oscillator anode voltage, modulator plate voltage, and receiver tuning all checked and readjusted. No improvement. Weather fair. Made note on W.T.B.D. form for further check-up. R.W.

105. Item 54. Maximum Range of Ships Permanent Echoes

SAMPLE ENTRY.

54 *Max. Range of Ships/P.E.* [ ] ( ) (Kyd.–Kyd.)	31	36	—	36	17	25*

NORMAL CONDITION. The effective range of the set is normal if the scope screens show the usual "permanent echoes" from known fixed targets.

LOG ENTRY. Enter the range of the most distant ship target observed since the last set of log entries was made. If no ship target has been observed, draw a line through the log space. Also, record the range of the most distant fixed target which returned a permanent echo since the last set of log entries was made. Place an asterisk after the second entry if the scope screens are not showing the usual permanent echoes from known fixed targets, making due allowance for diurnal variations and variations which are caused by the weather.

CORRECTIVE MEASURES.

a. Check item 52, system sensitivity.

b. Check item 53, signal-to-noise ratio.

c. Note whether or not the set is discriminating against fixed targets in any sector. During the next shut-down period, measure the standing-wave ratio with the spinner pointed toward that sector.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
54	0825–16	No echoes being received from quadrant, 220–310 degrees (approximately). Made W.T.B.D. note for s-w measurement. G.R.

106. Items 55 and 56 (blanks)

107. Item 57. Ground Clutter Range

SAMPLE ENTRY.

57 *Ground Clutter Range* [2.5–12] ( ) (OK–N*)	OK	OK	N*

NORMAL CONDITION. The person in charge will decide what limits of ground clutter range are to be considered normal.

LOG ENTRY. In the brackets to the right of the item title, enter to the nearest ½ kiloyard the minimum and maximum limits of the normal ground clutter as displayed on the PPI scope. Enter OK in the log space if the pattern is normal; if any unusual change is observed, enter N* and explain under NOTES. This explanation should contain the new limits of the ground clutter, the azimuth of the minimum and maximum limits, the time of the change, and its duration.

CORRECTIVE MEASURES.

Check item 52, system sensitivity.

Check item 53, signal-to-noise ratio.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
57	0415–21	Ground clutter pattern change began at 0345. New boundaries have maximum extent of 6 kiloyards at azimuth of 180° and minimum of 1 kiloyard at 236°. H.J.

108. Item 58. Standing Wave Ratio

SAMPLE ENTRY.

58 *Standing Wave Ratio* [ ] (Max. 1.5) ( ) (Ratio)	1.02	1.3	1.6*

NORMAL CONDITION. The standing-wave ratio is normal if it is 1.5 (to 1) or less.

HOW TO OBTAIN THE INFORMATION. To check standing-wave ratio refer to detailed instruction in paragraph 27.

LOG ENTRY. Enter in the log space a fraction which represents the measured standing-wave ratio. Place an asterisk (*) after the log entry and make a note in section D if the ratio of the maximum to the minimum readings of the microammeter of the type-H amplifier is greater than 2.25/1.

CORRECTIVE MEASURES.

a. Abnormal standing-wave ratios are caused by reflections from impedance mismatches along the transmission line. The cause of these reflections must be eliminated if the standing-wave ratio exceeds 1.5/1.

b. Notify the person in charge if the standing-wave ratio is abnormal. Listen for an arcing noise along the transmission line and feel all joints in the line for signs of heating. The high standing-wave ratio will probably be found to be caused by one of the following:

(1) Loose-fitting bullet.
(2) Loose line joint.
(3) Loose or defective rotating joint.
(4) Slipped or broken lead.

REMARKS.

a. The person in charge will specify the time and designate the conditions under which standing-wave measurements are made, in order to preclude any interference with tactical operations.

b. The unattainable ideal is a standing-wave ratio of 1/1. Standing-wave ratios above 1.5/1 bring the risk of flash-overs or of break-down to the polystyrene beads in the transmission line.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
58	1230–11	High standing-wave ratio following near miss by enemy action. Made W.T.B.D. note for inspection of rotary joint during shut-down period. H.J.

109. Item 59 (blank)

110. Item 60. Log Finishing Time

SAMPLE ENTRY.

60 Log Finishing Time [ ] ( ) (Hr.–Min.)	0015	0225	*

HOW TO OBTAIN THE INFORMATION. Read the time of day from the official timepiece of the station when all the items are completed. Convert the time to conform to the 24-hour time system (fig. 53).

LOG ENTRY. Record in the log space to the nearest minute the time at which the entries for items 1–60 are completed. If for any reason it is impossible to finish the set of entries after it is once started, place an asterisk (*) in the log space.

REMARKS. This item is not intended as a check on the person keeping the log. The sole purpose is to obtain general information which may be of assistance in improving the performance of the set. Accuracy in filling out the log is the most important consideration.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item No.	Time and Date	NOTES
60	0420	Unidentified target located. Log unfinished. J.S.

111. Item 61. Operating Time—On

Enter the time (using the 24-hour system) that the station goes *on the air* after each shut-down period. If the station is on the air at midnight, enter 0000 in column A for the following day.

112. Item 62. Operating Time—Off

Enter the time (using the 24-hour system) the station goes *off the air*. The time of each shut-down, whatever the cause, should be entered. If the station continues in operation until midnight, enter 2400 in the last column used. If the station goes off the air because of a break-down or some accidental cause, place an asterisk (*) after the time entry and make a complete explanation under NOTES in section A.

113. Item 63. Operating Time—Total

Enter the length of time of each period *on the air*. To get the length of time, subtract the ON entry from the OFF entry (item 62 minus item 61). For example, if the station begins operation at 1415 and shuts down at 1445, the TOTAL operating time is 1445 minus 1415, which equals 0030. When the *minutes* of the ON time exceeds the *minutes* of the OFF time, it is necessary to transform the last hour of the OFF time into minutes before subtracting. For example, 2400 will become 2360, since 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

114. Item 64 (blank)

115. Item 65. Break-Down Time—Total

Enter the total time spent in repairing each break-down. Normally, the break-down time is found by subtracting the item 62 entry from the succeeding item 61 entry. If more than three break-downs occur during the day, record the additional break-down period (s) under NOTES.

116. Item 66. Summary (Items 66-78)

66	WEEKLY SUMMARY		Totals
67	Hours of Operation	(Hr.–Min.)	
68	Break-down Time	(Hr.–Min.)	
69		( )	
70		( )	
71	Engine Oil Added	(Quarts)	
72	Gasoline Consumed	(Gallons)	
73		( )	
74	Engine Generator Hours	(Hours)	
75	Timeter Hours	(Hours)	
76		( )	
77		( )	
78		( )	

WEEKLY SUMMARY is the title for items 67–78. Make no entry on the log sheet for item 66. The technician in charge during the last watch of the weekly period fills in the summary items.

a. ITEM 67. HOURS OF OPERATION.

SAMPLE ENTRY.

67 Hours of Operation	(Hr.–Min.)	120:40

LOG ENTRY. Enter the total number of hours and minutes that the station is *on the air* during the weekly period. Find this total for the week by adding all of the entries in item 63. Check section A, NOTES, for any operating periods which were not entered on the front of the log because of lack of space.

b. **Item 68. Break-Down Time.**

SAMPLE ENTRY.

68 Break-down Time	(Hr.–Min.)	01:42

LOG ENTRY. Enter the total number of hours and minutes that the station is *off the air* during the weekly period *because of a break-down or some other accidental cause.* Do not include the time the set is off for the purpose of routine preventive maintenance. Refer to item 62, Operating Time—Off, for any entries followed by an asterisk (*). Check the corresponding NOTE in section A to find out whether the set was shut down because of a break-down or some other accidental cause, and whether all of the following period off the air was spent in trouble shooting and repair. Find the sum of all the break-down periods (item 65) for the week, and enter this total in item 68.

c. **Items 69 and 70 (blanks).**

d. **Item 71. Engine Oil Added.**

SAMPLE ENTRY.

71 Engine Oil Added	(Quarts)	1

LOG ENTRY. Enter the total number of quarts of oil added during the week. If an abnormal amount of oil has been added, place an asterisk (*) after the entry and make a note in section A on the reverse side of the log sheet. Consult with the person in charge regarding engine overhauling.

e. **Item 72. Gasoline Consumed.**

SAMPLE ENTRY.

72 Gasoline Consumed	(Gallons)	15

LOG ENTRY. Enter the total number of gallons of gasoline consumed during the week. If an abnormal amount of gasoline has been consumed, place an asterisk (*) after the entry and make a note in section A on the reverse side of the log sheet.

f. **Item 73 (blank).**

g. **Item 74. Engine Generator Hours.**

SAMPLE ENTRY.

74 Engine Generator Hours	(Hours)	132.4

LOG ENTRY. Enter the total number of hours the engine has operated during the weekly period. To obtain this number, subtract the last item 17 entry on last week's log sheet from the last item 17 entry on this week's log sheet. If both engines have been used during the week, add the total running time of both engines. To find the readings of the engine hour meters at the time of a change-over, refer to the item 6 entries under NOTES on the back of the log sheet. (See item 6.)

h. **Item 75. Timeter Hours.**

SAMPLE ENTRY.

75 Timeter Hours	(Hours)	145.2

LOG ENTRY. Enter to the nearest 1/10 hour the total number of hours the Timeter has registered during the weekly period. To obtain this number, subtract the last item 24 entry of last week's log from the last item 24 entry of this week's log.

i. **Items 76, 77, and 78 (blanks).**

117. Item 79. Signature of Person Keeping Log (Items 79-84)

SAMPLE ENTRY.

79 SIGNATURE OF PERSON KEEPING LOG				
80 Signature	81 RANK	82 DATE	83 ON	84 OFF
John Doe	Sergeant		1200	2000
Henry Smith	Sergeant		0800	1600

Signature of person keeping log is the title for items 80–84.

a. **Item 80. Signature.** When the incoming technician signs his name in this space, he accepts the responsibility for the operation of the station during his watch. If he is not satisfied with the condition in which the station is being turned over to him, he is to place an asterisk after his name. A full explanation must be made under NOTES. Both technicians (the one going off duty and the one coming on duty) must initial this note.

b. **Item 81. Rank.** Enter the rank of the technician signing the log.

c. **Item 82. Date.** Enter the date the technician goes on duty.

d. **Item 83. On.** Enter the time the technician goes on duty.

e. **Item 84. Off.** Enter the time the technician goes off duty.

118. Item 85. Sheet Number

SAMPLE ENTRY.

85 Sheet No.	283

LOG ENTRY. Number the log sheets in order as they are used — 1, 2, 3, 4, etc. — one sheet for each week. When one pad of log sheets is used up, begin the next pad where the previous pad left off.

119. How to Fill in the Back of the Log

a. **Heading, I-VI.** Fill in the heading at the start of each new log sheet.

(1) *I-III-IV-V.* Fill in these items by following the instructions for the corresponding items on the front of the log sheet.

(2) *II, DISTANCE FROM SEA.* Record the distance in feet or miles, indicating the number as well as the unit of distance used.

(3) *VI, ELEVATION.* Enter the elevation of the equipment, above sea level, in feet.

b. **Section A, Notes.** When an asterisk is used on the front of the log sheet, indicating an abnormal condition, give the following information under NOTES in section A:

(1) The item number.

(2) The time and date the abnormal condition was found.

(3) A description of the condition together with the cause.

(4) What was done about it.

(5) Initials of the technician making the note.

c. **Section B, Component Record.**

(1) *General.* Fill in section B whenever a *component* is removed and whenever a *component* is installed. No entries are required in spaces blanked out by diagonal rulings. Entries for the component removed are to be made on one of the three lines marked TAKEN OUT — A, B, and C. Entries for the components installed are to be made on one of the three lines marked PUT IN — A, B, and C. Some examples of components are: control unit, indicator, and power supply.

(2) *Columns 1–4.* Record the *name, type,* and *serial* and *order* numbers of each component — the component TAKEN OUT and component PUT IN. Find the *name, type,* and *serial* and *order* numbers on the nameplate of the component.

(3) *Column 5. Service dates, "In."* In column 5 enter the date that the component

RESTRICTED WHEN BLANK
CONFIDENTIAL WHEN FILLED IN

EQUIPMENT PERFORMANCE LOG

III Organization _____

I Radio Set SCR-582 Ser. No. _____ IV Address _____ VI Dates—From _____ through _____, 19__

II _____ V Location _____ VII Signature _____
(Person in charge)

Month: _____ Year: _____ Day:		Sunday			Monday			Tuesday			Wednesday			Thursday			Friday			Saturday		
Start first set of log entries 15 minutes after station goes on the air.		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1 Log Starting Time	(Hr.-Min.)																					
2 Weather Conditions	(Symbols)																					
3 Temperature Outside	(°F)																					
4 Temperature Inside	(°F)																					
5 Humidity	(Abbrev.)																					
6 Power Unit in Use PE( )	(1 or 2)																					
7	( )																					
8 Engine Oil Pressure [15–40 Lb.]	(Pounds)																					
9 Engine Water Temperature [160°–190°]	(°F)																					
10 Battery Charging Rate [½–9 Amp.]	(Amp.)																					
11	( )																					
12	( )																					
13	( )																					
14	( )																					
15	( )																					
16 *Line Voltage* [110–120 V.]	(Volts)																					
17 Engine Hour Meter	(Hours)																					
18 Line Current [15–20 Amp.]	(Amp.)																					
19	( )																					
20	( )																					
21 Control Rack Ser. ( )	( )																					
22* *Input Voltage* [110–120 V.]	(Volts)																					
23	( )																					
24 Timeter [ ]	(Hours)																					
25 *Transmitter Current* [5–15 Ma.]	(Ma.)																					
26 High Voltage Variac [ ]	(Kv.)																					
27 Detector Current [0.2–0.6 Ma.]	(Ma.)																					
28 **A** Oscilloscope [ ]	(OK-N*)																					
29 **A** Intensity Control [0–¾]	(Setting)																					
30 Horizontal Centering Control [¾–¾]	(Setting)																					
31 **P** Intensity Control [0–¾]	(Setting)																					
32 **P** Oscilloscope [ ]	(OK-N*)																					
33	( )																					
34 Receiver Gain [1–9 Div]	(Div.)																					
35 Transmitter Cabinet Ser.( )	( )																					
36 *Line Voltage* [110–120 V.]	(Volts)																					
37 *Transmitter Current* [5–15 Ma.]	(Ma.)																					
38 Total Direct Current [7–20 Ma.]	(Ma.)																					
39 Modulator Plate Voltage [10–15 Kv.]	(Kv.)																					
40 Dehydrator [Oper. Cond.]	(OK-N*)																					
41	( )																					
42 Transmission Line Pressure [5–10 Lb.]	(Pounds)																					
43 Color of Modulator Tubes [ ]	(OK-N*)																					
44 Amplidyne Amplifier [ ]	(OK-N*)																					
45 Fan Operation [ ]	(OK-N*)																					
46 Air Filter [ ]	(OK-N*)																					
47 Amplidyne Generator [ ]	(OK-N*)																					
48 Spinner [ ]	(OK-N*)																					
49	( )																					
50	( )																					
51 *Orientation* (Az. Ra.) [ ]	(Deg.-Kyd.)																					
52 *System Sensitivity* (Gain Set.) [80–100%]	(%)																					
53 *Signal-to-Noise Ratio* [25%]	(Ratio)																					
54 *Max. Range of Ships/P. F.* [ ]	(Kyd.-Kyd.)																					
55	( )																					
56	( )																					
57 *Ground Clutter Range* [ ]	(Kyd.)																					
58 *Standing Wave Ratio* [Max. 1.5]	(Ratio)																					
59	( )																					
60 Log Finishing Time [ ]	(Hr.-Min.)																					
61 Operating Time—ON	(Hr.-Min.)																					
62 Operating Time—OFF	(Hr.-Min.)																					
63 Operating Time—TOTAL	(Hr.-Min.)																					
64	( )																					
65 Break-down Time—TOTAL	(Hr.-Min.)																					

66 WEEKLY SUMMARY		Totals
67 Hours of Operation	(Hr.-Min.)	
68 Break-down Time	(Hr.-Min.)	
69	( )	
70	( )	
71 Engine Oil Added	(Quarts)	
72 Gasoline Consumed	(Gallons)	
73	( )	
74 Engine Generator Hours	(Hours)	
75 Timeter Hours	(Hours)	
76	( )	
77	( )	
78	( )	

79 SIGNATURE OF PERSON KEEPING LOG					SIGNATURE OF PERSON KEEPING LOG				
80 Signature	81 Rank	82 Date	83 On	84 Off	Signature	Rank	Date	On	Off

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

W.D., S. C. Form No. 582

85 Sheet No. ____

Figure 65. Front of log sheet.

I. RADIO SET SCR-582 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

		1	2	3	4	5	6	7	8	9	10	11	12
COMPONENT		NAME OF COMPONENT	NAMEPLATE TYPE No.	NAMEPLATE SER. No.	NAMEPLATE ORDER No.	SERVICE DATES IN	SERVICE DATES OUT	HOUR METER READINGS IN	HOUR METER READINGS OUT	HOUR METER READINGS TOTAL	REASON FOR REMOVING COMPONENT	DISPOSITION OF REMOVED COMPONENT	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

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

		11	12	13	14	15	16	17	18	19	20	21	22
PART		SERVICE DATES IN	SERVICE DATES OUT	HOUR METER READINGS IN	HOUR METER READINGS OUT	HOUR METER READINGS TOTAL	SPARES AT SET	WHERE DID YOU GET THE PART?	SYMPTOM OF FAILURE	FAULT	WHAT CAUSED THE FAULT?	ACTION TAKEN AND RESULTS	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 11-1312 FOR SAMPLE ENTRIES AND FOR DETAILED EXPLANATION OF DATA WANTED.

WHEN COMPLETED SEND LOG SHEET TO UNIT RADAR OFFICER.

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

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

SHEET No. ____

Figure 66. Rear of log sheet.

TAKEN OUT was originally installed. Find the date of the original installation in the station records. In the case of a component PUT IN, simply enter the date on which the installation is made.

(4) *Column 6. Service dates, "Out".* In this space record the date that the component is taken out.

(5) *Column 7. Hour meter readings, "In."* In this space enter the hour meter reading at the time the component TAKEN OUT was originally placed in service. Get the information from the Station Record Book. In the case of a component being PUT IN, simply enter the hour meter reading at the time the installation is made.

(6) *Column 8. Hour meter readings, "Out."* In column 8 enter the hour meter reading at the time the component is TAKEN OUT. This reading is usually the same as that entered in the PUT-IN space in column 7.

(7) *Column 9. Hour meter readings ,"Total."* In column 9, record the total time the component TAKEN OUT has been in use. To get this figure, subtract the time recorded in the TAKEN-OUT space 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 or it may have been running below optimum performance, or it may have been removed for inspecting or servicing.

(9) *Column 11. Disposition of removed component.* In this space explain exactly what was done with the component after it was removed.

(10) *Column 12. Work done by.* This space is provided for the signature of the technician who removed or installed the component.

d. **Section C, Part Record.** (1) *General.* Fill in section C whenever a part or tube is *removed* or *installed.* In addition enter all repairs made on spare equipment. No entries are required in spaces blanked out by diagonal rulings. Entries for a part or tube which has been *removed* are to be made on one of the three lines marked TAKEN OUT – A, B, and C. Entries for a part or tube *installed* are to be made on one of the three lines marked PUT IN – A, B, and C. The description of a part or tube entered on line A, B, or C in column 1 through 10 must be continued on the corresponding line in column 11 through 22.

(2) *Columns 1–4.* Record the *name, type,* and *serial* and *order* numbers of the component from which the part or tube was removed or in which the part or tube was installed. Find this information on the nameplate of the component or in the Station Record Book.

(3) *Column 5. Schematic part number.* In column 5 write down the schematic part number of the part or tube PUT IN or TAKEN OUT. Find this number from the schematic drawing of the component concerned or on the part itself.

(4) *Column 6. Name of part.* In this space record the name of the part PUT IN or TAKEN OUT. Find the name of the part on the schematic of the component concerned.

(5) *Column 7. Description of part.* In this space give a brief description of the part PUT IN or TAKEN OUT. Some of this information may be obtained from the parts list. Additional information can be found on the part itself. In this description of the part, the name of the manufacturer, the manufacturer's type and catalogue number, the electrical rating of the part, its size, etc., must be included.

(6) *Column 8. Function of part and location from schematic.* In this column enter the function of the part 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: 1st i-f plate-load resistor, bypass capacitor in 1st r-f.

(7) *Column 9. New, used, or rebuilt.* Tell whether the part or tube which has been put in is new, used, or rebuilt.

(8) *Column 10. Disposition of part taken out.* Tell exactly what was done with the part or tube after it was removed. Examples: part destroyed, returned to depot, repair for spare.

(9) *Column 11. Service date, "In."* In column 11 enter the date that the part or tube TAKEN OUT was originally installed. Find the date of the original installation in the Station Record Book. In the case of a part or tube being PUT IN, simply enter the date on which the installation is made.

(10) *Column 12. Service date, "Out."* In this space record the date on which the part or tube is TAKEN OUT.

(11) *Column 13. Hour meter readings, "In."* In this space enter the Timeter reading at the time the part or tube TAKEN OUT was *originally* placed in service. Find this reading in the Station Record Book. In the case of a part or

tube being PUT IN, simply enter the Timeter reading at the time the installation is made.

(12) *Column 14. Hour meter readings, "Out."* In column 14 enter the Timeter reading at the time the part or tube is taken out.

(13) *Column 15. Hour meter readings, "Total."* Under Total in column 15, record the total time the part or tube TAKEN OUT has been in use. To get this figure, subtract the time in column 13 from the time in column 14. Enter the difference in column 15.

(14) *Column 16. Spares at set.* In column 16 give the number of spares of the part or tube PUT IN that are on hand at the set after the installation is made.

(15) *Column 17. Where did you get the part?* Answer this question as clearly as possible. Find out where the part PUT IN came from and explain in the space provided. Examples of entries that might be made are: had part here at set; from Lexington Signal Depot; from another set in this area.

(16) *Column 18. Symptom of failure.* In the case of a part or tube failure, describe the first indications that the part or tube was faulty. Symptoms are first evidences of trouble and usually can be detected through the senses of sight, smell, hearing, or touch. Some examples are: abnormal meter reading, the odor of burning insulation, smoke, the hissing noise of an arc, and the heat of an overloaded part.

(17) *Column 19. Fault.* In this space describe exactly what fault developed in the part or tube that was removed. Examples of vacuum tube faults are: open filament, low emission, shorted elements, gassy tube, microphonic tube. Examples of electrical faults are: dielectric defective, dielectric break-down, insulation breakdown, open circuit, short circuit, arcing, sticking contacts, etc. Some mechanical faults are: a broken, bent, or cracked part, frayed leads, frozen bearings, stripped threads. This column refers only to a part or tube that has been TAKEN OUT.

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

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

(20) *Column 22. Work done by —.* The technician who performed the repair or replacement will sign his name in this column.

e. **Section D, Remarks.** The daily operation of radar equipment is of significant interest to numerous agencies. The interested personnel include engineers in the development laboratories, manufacturers of equipment, and those associated with the actual use of the apparatus. Few of these personnel, however, have the opportunity of continuous observation or operation of the equipments under field conditions. Those closest to the apparatus are the men actually in the field. Since they are in daily contact with equipment, operators and maintenance men cannot help but discover weaknesses in equipment design and inconveniences in operation. Such information is of no value unless it reaches the proper agencies which can initiate the necessary steps for correction. No suggestion or idea is considered too trivial. These ideas or suggestions should be submitted to the unit radar officer. If these are considered suitable, and proper authority so directs, the radar officer can make necessary entries in the space provided in section D. If a component or part is found to be faulty because of damage in transit, handling at the station, or defective manufacture, enter this information as a REMARK in section D.

f. **Sheet Numbers.** Enter the sheet number at the bottom right-hand corner. This number must be the same as the number on the front of the log.

APPENDIX

LIGHTNING PROTECTION

1. General Considerations

Radio Set SCR–582–(*) can be damaged by lightning discharges unless adequate precautions are taken. This equipment will be given adequate protection by the use of a well designed lightning rod system. The following factors are important in the installation of such a system.

a. The point of the rod which receives the lightning discharge should be placed high enough to minimize the danger of fire.

b. There should be no sharp bends across which the lightning can jump.

c. Ground connections should be placed in a symmetrical pattern around the structure.

d. Since little preventive maintenance is planned on the lightning protection system the original installation must be made of sound construction.

2. Lightning Rod

Use the following information in the choice of a lightning rod.

a. The best conductors to use for the rod, in order of preference, are copper, aluminum, and galvanized iron. The rod can be solid or tubular, and should be at least ½ inch in diameter.

b. Choose a rod whose flexibility is sufficient to withstand the winds characteristic of the particular location. Use 2 x 4 boards and angle irons in securing the rod to the tower.

c. The required length of the rod depends upon its distance from the antenna blister. A length of 8 feet is acceptable for a rod placed 3 feet from the outside of the blister. For every distance increase of 1 foot, add ½ foot to the length of the rod.

d. Attach the rod to the landward side of the tower, and for further protection connect the base of the antenna assembly to the tower with a low-resistance cable.

3. Lightning Conductor

A conductor of very low resistance is required between the rod and ground.

a. If the antenna is installed on a metal tower whose interconnecting sections are good conductors, use the tower itself as the conductor to ground. In this case, connect the rod and tower together with at least 3 square inches of surface contact. The tower must be grounded according to the procedure in paragraph 4. Figure 67 shows an installation of this type.

b. When the tower itself will not serve as the lightning conductor, use the following specifications in selecting a suitable conductor. (Use fasteners of the same material as the conductor.)

Lightning Conductor Specifications

Conductor used	Minimum weight per 1,000 ft.	Minimum AWG	Minimum diameter of solid conductor, or wall thickness in the case of tube or strip	Cross-sectional area
Copper cable	187.5	No. 17 for each wire in the cable	0.045″ or 0.114 circular mil for each wire in the cable	0.05 sq. in.
Copper tube	187.5	Thickness of the wall: No. 20	0.0032″ or 0.081 circular mil	0.05 sq. in.
Copper solid section	187.5		0.248″	0.05 sq. in.
Copper clad steel strip		Thickness of the strip: No. 16	0.051″ or 1.29 circular mil	0.05 sq. in.
Galvanized steel tube, web, or ribbon with zinc coating of 2 oz per square foot	320	(No. 17 U.S.S.S.G.)	0.056″ or 0.143 circular mil	0.1 sq. in.
Steel wire cable before galvanizing		Steel wire gauge: No. 14 for each wire of the cable	0.080″ or 0.203 circular mil for each wire in the cable	0.1 sq. in.

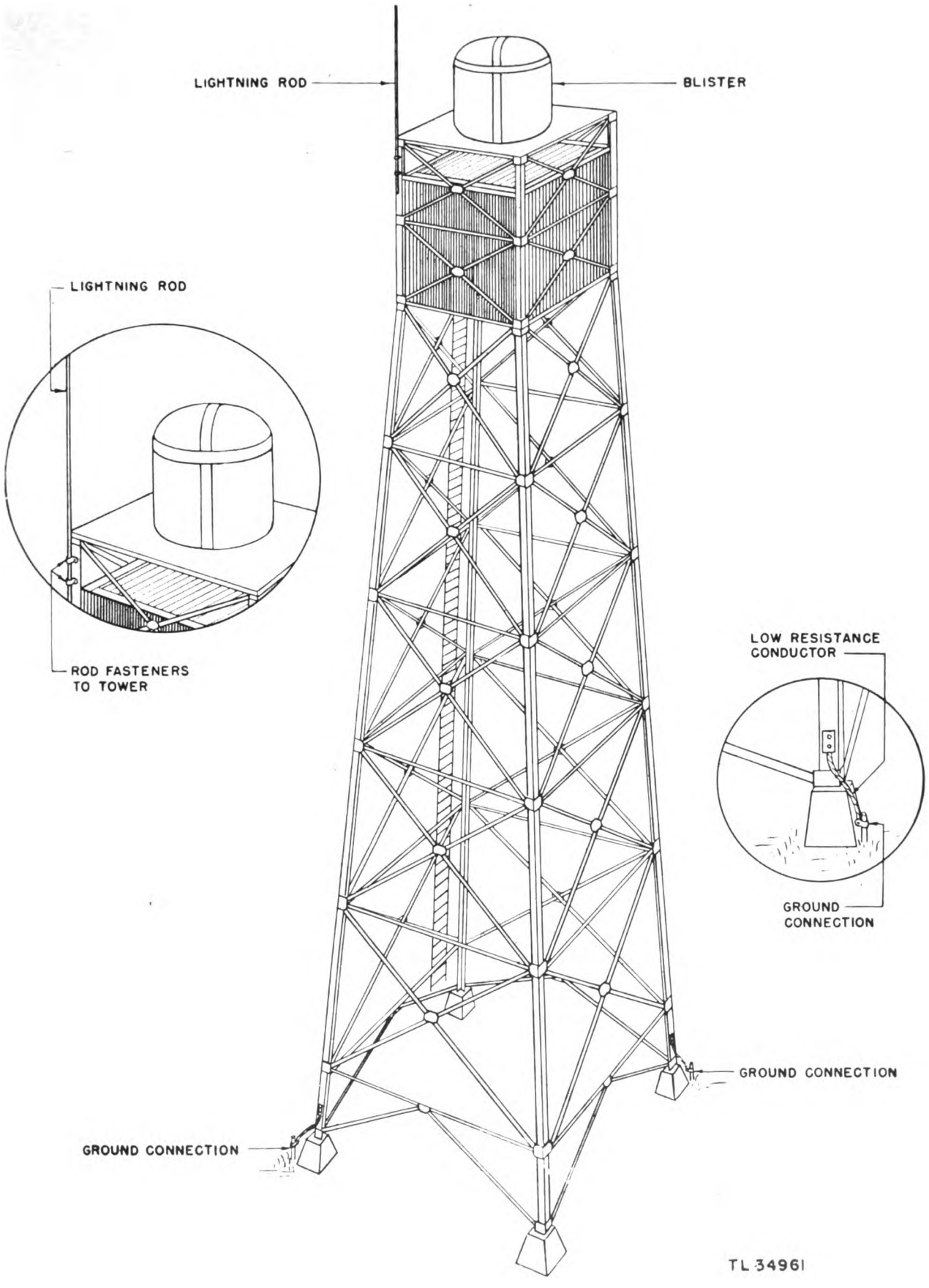


Figure 67. Lightning rod installation.

4. Ground System

Make all connections to ground permanent and place them around the building at uniform intervals. Where there are underground structures, such as water pipes, they should be used as ground points.

a. In areas having soil with high resistivity use grounding rods of at least 10 feet in length. Drive the rods into the ground and mark the length of each rod on its top.

b. Where the bedrock is near the surface, dig trenches 12 feet in length and 3 feet in depth. Dig the trenches radially from the structure, and bury the lower ends of the down conductors lengthwise in them. In more extreme cases of high electrical resistivity of the soil, bury metal strips, plates, or lengths of conductors in trenches, and connect all the pieces of the grounding system together.

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