These were hardbound at some point by a well-meaning Librarian, but I believe there are pages missing in the back. The acid paper is getting very brittle, in 20 years. You probably won't be able to handle them.

mitter is to transmit a series of pulses of ultra-high frequency energy to the track antenna. The transmitter is mounted in a large size Lindsay cabinet (fig. 81). The pipe running horizontally across the center of the figure is the transmission line to the antenna. The apparatus just above the transmission line and in front of the screen is the T-R box, the left side of which is arranged for connection to the track receiver. The device immediately below the T-R box is a monitoring arrangement for observing the character of the transmitted signals.

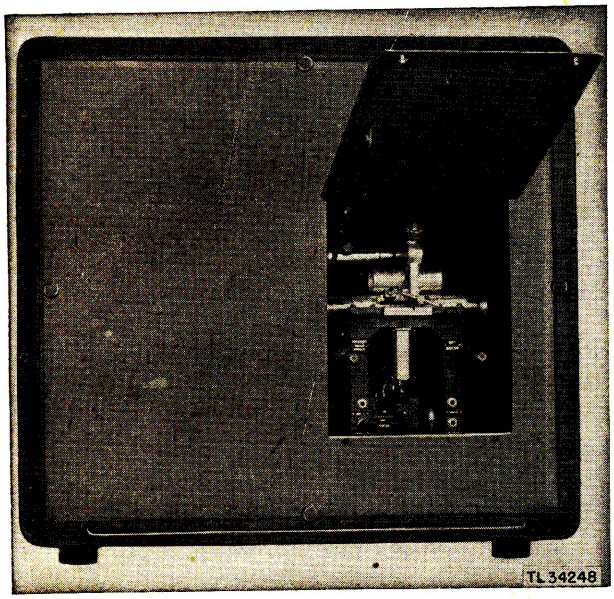


Figure 81. Track transmitter, front view.

b. TUNING ADJUSTMENTS. Two tuning adjustments are provided for the T-R box. A rack and pinion arrangement is shown for moving the T-R box to its correct position on the transmission line; where as the adjusting knob shown on top of the box is used for tuning the cavity of the box to resonance. A tuning knob for the monitoring arrangement may be seen at the lower end of the monitoring cylinder. Another adjustment is a line stretcher terminating in the side of the T-R box.

c. PERMANENT MAGNET. The strength of the field of the permanent magnet may be adjusted by moving a magnetic shunt or keeper bar (its control rod is located in front) below the transmission line. A crank handle is furnished for turning this rod. Another control rod used for rotating the synchronous spark-gap motor assembly around its horizontal axis, may be seen at the right of the monitor cylinder.

50. Track Receiver BC-1055-A (fig. 82)

The track receiver serves to detect and amplify the signals delivered to it by the track antenna. It is mounted in a Lindsay structure and has two sliding shelves or trays. The lower tray contains the power supply equipment while the upper tray contains the receiving equipment proper. The subpanels are located as in the search receiver where the lower tray has the test panel and the cable terminals are mounted in back of it. The upper tray contains the converter and heat oscillator units, and the I-F preamplifier and I-F amplifier circuits. At the rear of the tray is the filament transformer and distribution panel.

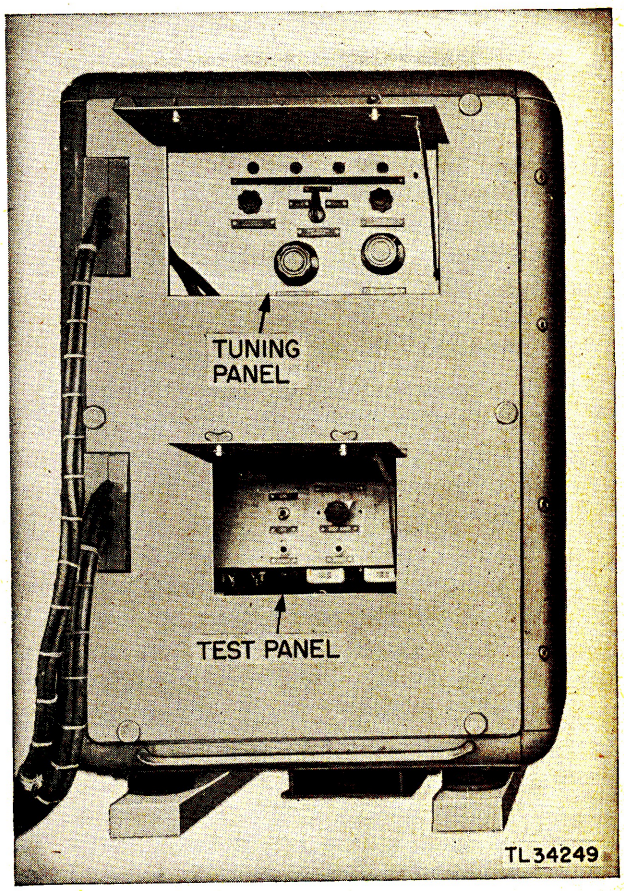


Figure 82. Track receiver, front view.

51. Track Receiver Remote Control Unit BC-1063-A (fig. 79)

This control unit is identical with the search receiver control unit and is mounted on the lower shelf in the trailer cab between the azimuth and elevation control units. It controls the gain and frequency of the track receiver in the same manner

that the search receiver control unit controls the search receiver.

52. Oscilloscope BC-1035-A (fig. 7)

As explained in paragraph 47, there are three identical oscilloscopes used in Radio Set SCR–545–A. Each contains two cathode-ray tubes, one for the search system and one for the track system. The description in paragraph 47 applies to the oscilloscopes for both systems.

Section V. RANGING-EQUIPMENT SYSTEM

53. General

Ranging equipment consists of two units mounted in a Lindsay structure (fig. 75). The upper chassis contains the range unit, the function of which is to produce a timing wave for determining the distance or slant range from the antenna to a target. The lower chassis contains the range converter which serves to translate slant range and angle of elevation into altitude.

54. Range Unit BC-1053-A

a. The equipment for the range unit proper is mounted directly behind the front panel. The power supply equipment for both units of the ranging equipment is mounted on the tray at the rear of the range unit.

b. The range dial and gearing is located at the front of the tray. Directly behind it is a gear box assembly, a reduction transformer, spinner motor, phase-shifter capacitor, and a temperature-controlled oven for the oscillator network of the range-marker circuit. A slewing motor is at the left of the gear box assembly. Attached to the front dial panel are three selsyns. A selenium rectifier is located at the rear left of the selsyns.

c. The slant-range potentiometer, which is about one foot in diameter, is mounted in a horizontal position below the front section of the range unit. The range dials are calibrated in yards and may be seen in figure 75. The dial on the left reads in thousands of yards; the dial on the right reads in tens of yards.

55. Range Converter BC-1102-A

The range converter is mounted on the lower chassis (fig. 75). It contains two subassemblies, one for the converter proper and one for the data unit. The converter proper contains the various oscillating, amplifying, and mixing stages. The data unit contains the altitude potentiometer, spinner motor, and synchronous transmitter. The latter two items are mounted on a circular casting which contains the altitude potentiometer. This potentiometer is provided with a scale (fig. 75) and is calibrated in yards from 300 to 10,000. Under certain conditions (controlled remotely from the trailer cab) the scale indicates slant range instead of altitude. The dial is illuminated by a lamp that may be turned on or off by the toggle switch shown just above the dial. The control knob above this switch is used to adjust the setting of a potentiometer when lining up the system. The OPERATE TEST and FREQUENCY TEST dials (fig. 75) are also used when lining up. They control respectively a two-position, phase-shifting switch and a five-position, frequency-selecting switch in the oscillator circuit.

56. Range Control Unit BC-1047-A

a. LOCATION. The range-control unit is mounted in the trailer cab below the range oscilloscope (fig. 15). This control unit, through a suitable amplifier, actuates the spinner or slewing motors in the range unit and thus controls the positions of the range potentiometer and phase-shift capacitor. These positions determine the range setting of the range unit. An indication of this setting appears on the dials on the left side of the panel of the control unit (fig. 12). The left dial is calibrated in thousands of yards and the right dial in tens of yards.

b. AID SWITCH. The range control unit is arranged for manual, aided manual, and automatic control of the range spinner motor. The unit is controlled manually by means of the handwheel on the front panel. Aided manual control is obtained by means of a motor which drives the gear trains associated with the handwheel at a speed determined by manual operation of the handwheel. The two switches on the left side of the panel are used to select the type of operation desired.

c. SLEW SWITCH. The rate of change of range can be greatly increased (to about 2,800 yards per second) by operation of the SLEW switch. When the SLEW switch is operated, the spinner motor in the range unit is disengaged from the driving mechanism and the slewing motor is engaged.

d. RANGE SWITCH. The toggle switch below the handwheel is used to operate a relay in the range converter to provide either slant range or altitude data to Director M-4 or M-7. When

operating with Director M-9 this switch is used to operate protective relays in the director.

Section VI. ANTENNA SYSTEM

57. General

Radio Set SCR–545–A is equipped with two antenna systems, one for searching and one for tracking. The search and track antennas are mounted as a unit on the pedestal and yoke (figs. 28 and 29). The entire antenna assembly can be rotated in azimuth and elevation by suitable control mechanism. The antennas are supplied with radio-frequency power from their respective transmitters through a common transmission line (par. 61).

58. Antenna AN-115-A

The entire antenna assembly is lowered to a horizontal position on top of the trailer when the equipment is in transit. The search reflector is provided with hinged end sections which are folded back in order not to exceed the required road clearance. The eight dipoles extending over the two hinged sections of the reflector are designed so that one arm of each dipole may be removed. Means are provided for positioning the antenna in azimuth and elevation before lowering and for holding it in a fixed position during transit (fig. 29).

59. Search Antenna System

a. General. The search antenna system, as the name implies, is intended for searching at long ranges with a relatively broad field pattern. Lobe switching to bracket the target is incorporated as an aid to accuracy in angle determinations. The search antenna system is composed of an antenna, harness (power feed system to the antenna), lobe switch, connector cables between harness and lobe switch, junction box, connector cables between lobe switch and junction box, and an impedance matching section between the junction box and transmission line.

b. Search Antenna. The search antenna consists of 16 horizontal half-wave dipoles mounted on the front of a flat perforated sheet steel reflector. They are grouped so that there are four points of power feed which are alternately phase-shifted to provide lobe switching in azimuth and elevation.

c. Dipole Assembly. Each dipole assembly consists of a horizontal dipole antenna spaced one-half wavelength apart and connected to a common feed point at the center through coaxial transmission lines. One half of the dipole is connected to the inner conductor of the coaxial transmission line, while the other half connects to the outer conductor of the coaxial transmission line. An outer tube extends from the center tee clamp to within approximately ½ inch of the dipoles and provides for a high impedance from each half dipole to the reflector or ground.

d. Telescoping Joint and Clamping Ring. A telescoping joint and clamping ring are incorporated in the left-hand half of each dipole antenna which permits the radiator to be lengthened or shortened depending upon the operating frequency.

e. Harness. Power from the coaxial transmission line is fed through the filter, the impedance matching section, and the antenna junction box. The junction box divides the total power into four circuits which connect to the lobe switch. The connector cables between the junction box and lobe switch are identical and of definite length. These four circuits, after looping through the lobe switch, connect to four feed points on the antenna.

f. Lobe Switch. The function of the search lobe switch is to shift the highly directional radiation pattern or *lobe* of the search antenna through a small angle away from the axis normal to the plane of the reflector. This is accomplished by using a variable air capacitor having one rotor section and four stator sections which are so arranged that the rotor always engages two of the stator sections. The rotor is driven by a 1/20-hp, 3,600-rpm synchronous motor. Each stator section is connected to the inner conductor of one of the coaxial transmission lines which connect between the junction box and one of the four feed points of the antenna.

g. Two-phase Generator. A two-phase sine-wave generator is mounted on one end of the lobe switch and is driven by the lobe-switch rotor shaft. This generator produces two 60-cycle voltages in quadrature for synchronizing associated equipment with the position of the antenna lobe.

60. Track Antenna System

a. Track Antenna. The reflector for the track antenna system is a paraboloid which is formed from a single sheet of steel. It is mounted in the center of the search antenna reflector (fig. 29). Provision is made for shifting the position

of the reflector horizontally for alignment purposes.

b. TRANSITION ASSEMBLY. The coaxial transmission line from the track transmitter is carried through the lower part of the search antenna to a coaxial-to-wave guide transition assembly directly in front of the track antenna reflector. The transition consists of a coaxial with its outer sheath terminated at right angles in the waveguide pipe, and with the inner conductor projecting into the guide as a probe of adjustable length. An adjustable piston closes the front end of the waveguide. These adjustments provide for matching the impedance of the coaxial to the impedance of the waveguide. The feed system is arranged for vertical polarization to prevent interference with the track system by the search antenna, since the search dipoles extend in a horizontal direction across the face of the paraboloid.

c. SCANNER ASSEMBLY. The transition assembly connects to a conical scanner and lobe switcher. In essence, the scanner is a short section of polystyrene-filled waveguide off-set at an angle of 23 degrees with respect to the geometric axis of the paraboloid and so arranged that the off-set section may be rotated on the axis of the paraboloid. The off-set section rotates on electrically shielded bearings in a metal cylinder, and the whole assembly is inclosed in a plexiglass tube which is anchored to the main antenna mount. The scanner is driven at 3,600-rpm through a plexiglass rod on the axis of the paraboloid by the same motor that drives the search antenna lobe switcher.

61. Transmission Lines

a. FILTER SYSTEM. Since the search and track antenna systems operate simultaneously, and since they must be coupled to an antenna structure which is movable in two planes, it is advantageous to use a common transmission line with rotary joints. To provide for the use of a common line, two filters are used to superimpose and then separate the two frequencies.

b. COAXIAL LINES. Coaxial transmission lines are used for the search and track systems. The two transmission lines emerge from the sides of their respective transmitters and are then carried through the trailer floor to the bottom of the pedestal and joined at a filter circuit under the left side of the trailer. From this point a common transmission line is used to carry both search and track frequencies through the center of the pedestal.

c. DISTRIBUTION. From the top of the pedestal the transmission line is brought through the yoke and up one side to the right trunnion (fig. 28). The line goes through the center of the trunnion and then out the rear of the antenna support to a filter just to the left of the rear center of the antenna. This filter separates the search and track frequencies; the former going to a junction box and lobe switcher, and the latter going down the back of the antenna and then out to the coaxial-to-waveguide transition in front of the track antenna reflector.

62. Pedestal FT-395-A (fig. 44)

a. PEDESTAL. The pedestal is mounted on the rear of the trailer and serves to support the yoke and antenna so that they can be rotated in azimuth. The pedestal is driven by a ½-hp, 3,450-rpm motor located at the left rear corner of the pedestal. When in operation this motor, which is known as the azimuth spinner motor, is cooled by an adjacent blower.

b. AZIMUTH DATA SYSTEM. Three synchronous transmitters are geared to the azimuth drive (fig. 44). One of these is mounted on the left side of the pedestal and transmits *coarse* azimuth data (6,400 mils per revolution) to the associated director. The other two are mounted on the right side of the pedestal. One transmits *fine* azimuth data (400 mils per revolution) to the director; the other forms a part of the azimuth-servo system. The azimuth potentiometer is mounted under the pedestal with its axis concentric with the axis of the pedestal and is used to transmit azimuth data to Director M-9.

c. YOKE. The antenna proper is mounted on the yoke by means of trunnions which permit the antenna to be tilted in elevation. The elevation spinner motor and gear assembly is mounted inside the casting shown at the left of the lobe switch and transmission line (fig. 29). The elevation potentiometer which transmits elevation data to Director M-9 is mounted on the opposite side of the yoke just below and to the left of the trunnion. A dial which indicates the elevation angle of the antenna is mounted just above the potentiometer (fig. 16).

d. ELEVATION DATA SYSTEM. Three synchronous transmitters are mounted on the casting located outside the left trunnion, (fig. 83). One of these sends *coarse* elevation data (6,400 mils per revolution) to the associated director. The other two transmit *fine* elevation data (400 mils per revolution), one to the director and one to the elevation control unit in the trailer cab for the

elevation servo system.

e. LEVELS. Sets of levels are mounted on the pedestal for use when adjusting the trailer and pedestal base to a horizontal plane. The coarse levels are mounted on the left side of the pedestal and the fine set on the right side. Each set consists of two levels mounted at right angles to each other. The two fine levels should be removed from their mounting and carried in a protecting case when the trailer is in motion.

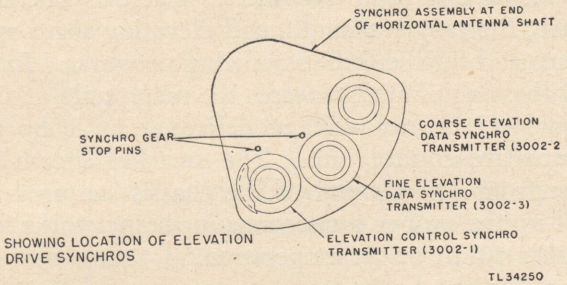


Figure 83. Elevation selsyns.

Section VII. ANTENNA CONTROL SYSTEM

63. General

In order to follow a moving aerial target, the antennas must be moved in azimuth (horizontally) and elevation (vertically). The antenna is power driven in both azimuth and elevation, but this power may be controlled manually or automatically by operation of suitable switches on the azimuth and elevation control units. The automatic feature is obtained by use of the automatic controller described in paragraph 66. The power required to move the antenna is obtained from two sets of amplifiers (fig. 84), one for driving the azimuth spinner motor and one for driving the elevation spinner motor. Each set consists of a low-level and a high-level amplifier; these are known as input servo amplifier and output servo amplifier, respectively.

64. Azimuth Control Unit BC-1067-B

The azimuth control unit controls the horizontal

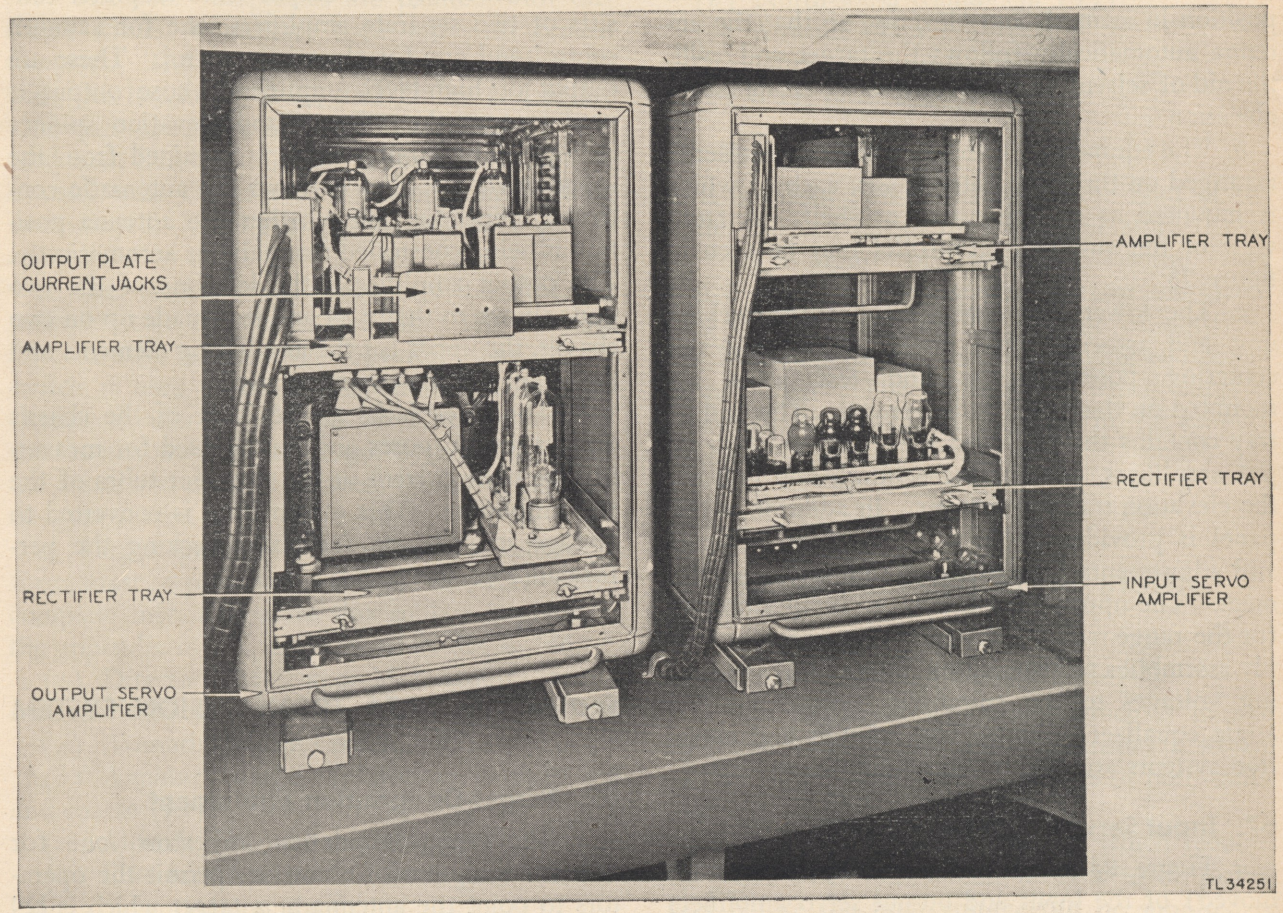


Figure 84. Input and output servo amplifiers, front view.

rotation of the antenna except during automatic operation of the system. The unit is mounted in the trailer cab below the azimuth oscilloscope. The physical appearance of the azimuth and range control units is very much the same. The differences are that no azimuth slewing facilities are provided and the azimuth control unit employs a variable linkage assembly instead of a gear train between the aid and the drive assembly. In addition, the dials are calibrated in mils instead of yards. An angular mil is defined as the angle subtended by 1 yard at a distance of 1,000 yards. There are 6,400 mils in 360°.

65. Elevation Control Unit BC-1049-B (fig. 8)

This unit controls the speed and direction of rotation of the elevation spinner motor, and is similar to the azimuth control unit just described. It is mounted immediately below the elevation oscilloscope in the trailer cab.

66. Automatic Controller BC-1059-A

a. The function of this unit is to control both the range unit so that it automatically gives a continuous indication of target range and the antenna position in azimuth and elevation so that the antenna automatically follows the target and, with the aid of selsyns, indicates angles of azimuth and elevation.

b. The equipment in the automatic controller is arranged on three separate chassis, each of which is mounted as a sliding tray or shelf. A front view of the automatic controller may be seen in figure 73.

c. The lower tray contains the range-tracking unit and associated test panel. Sensitivity and centering potentiometers and test jacks are mounted on this panel as illustrated. The middle tray contains the angle tracking unit and two input amplifiers, one for the azimuth and one for the elevation tracking systems. In addition, a test panel is provided for making the measurements and adjustments required for lining up the equipment. The upper tray contains an input amplifier for the range-tracking system and two power supply assemblies for furnishing the necessary operating voltages to the automatic controller. The angle equalizer units for the azimuth and elevation systems are also mounted on the top tray.

67. Input Servo Amplifier BC-1071-A

a. Figure 84 shows a front view (covers removed) of the input and output servo amplifiers with the input amplifier on the right.

b. The input amplifier has two separate chassis which are mounted as sliding trays in a Lindsay cabinet. The upper tray contains three separate input or low level amplifiers. There is one for each, the range, azimuth, and elevation servo systems and for the three stabilizing networks. Each of these amplifiers increases the magnitude of the low-level control voltage delivered to it by its respective control unit. The switches shown at the front (right) end of the chassis are used to set up the proper connections in the networks for either 50- or 60-cycle operation.

c. On the lower tray are power-supply assemblies for use with the amplifiers on the upper tray and a phase converter. The input and output of the phase converter are both 115 volts, 50 or 60 cycles, but there is a phase difference of 90 degrees between them. The converter starts as a split-phase induction motor; then it runs as a synchronous motor-generator. This unit also includes a starting relay and capacitor-transformer which are adjacent to the converter.

68. Output Servo Amplifier BC-1069-A

a. Functionally, the output servo amplifier consists of two separate amplifiers, one for azimuth control and one for elevation control. These are output or high-level amplifiers whose output is used to turn the azimuth and elevation spinner motors. The input voltage is obtained from the input servo amplifier or from the automatic controller, depending on whether the antenna position is being controlled manually or automatically. The output amplifier is the left one of the two units shown in figure 84 and it is made up on two chassis, the upper for the amplifying elements and the lower for the power supply.

b. The three jacks at the front of the chassis are for test purposes and can be used for measuring the plate current in the amplifier tubes of the two amplifiers. This information is converted to voltage in order to facilitate checking the performance of the unit.

Section VIII. DATA TRANSMISSION SYSTEM

69. Target-Designation Equipment

a. The target-designation indicators, one for azimuth and one for elevation, permit the operators to point the antenna at a target which is being tracked optically by the associated gun direc-

tor. They are mounted on the upper shelf above their respective control units as illustrated in figure 15.

b. The face panel equipment for these indicators is shown in figure 13 and consists of two synchro-repeater dials, an OFF-ON switch and a DIM rheostat for the dial lamp. The upper dial indicates the angular position of the director and the lower dial indicates the angular position of the antenna. The angular positions are the same when the dial readings coincide. Two normally covered access holes are provided for orienting the synchros.

70. Junction Box JB-65-A

a. The junction box, which is the terminating point for cables from the various gun directors, is mounted on the rear end of the trailer on the left side. It consists of the four cable terminals or receptacles, two switches (fig. 85), and seven terminal boards which are mounted inside the junction box. The cables between Radio Set SCR–545–A and the gun directors are supplied with the directors.

b. The four receptacles are painted with different colors to indicate their use with certain directors. The receptacles are also designated with the letters A, B, C, and D. A and B are used with Directors M-4 and M-7; A and C are used with Director M-9 and its optical tracker; D is used with Director M-9 when radar tracking is employed. Wiring diagrams may be found in appendix I.

c. The larger switch serves to transfer the potentiometer circuits in the radio set to either Director M-9 or the range converter. The smaller switch is used to connect excitation to the data synchro-circuits in the radio set. Under control of this switch the excitation can be obtained from the associated director or from the local 115-volt, 60-cycle source.

d. Target position information, in electrical form, must be provided to the gun directors. More complete information on this subject is given in the appendix of this manual and in FM 4–146.

(1) Directors M-4 and M-7 require selsyn data, as follows:

(*a*) Azimuth, fine and coarse (A_0).

(*b*) Angular height, (elevation angle) fine and coarse (E_0).

(*c*) Altitude (H_0) or slant range (D_0).

(2) Directors M-9 and M-10 require the following potentiometer data:

(*a*) East-west component (X_0).

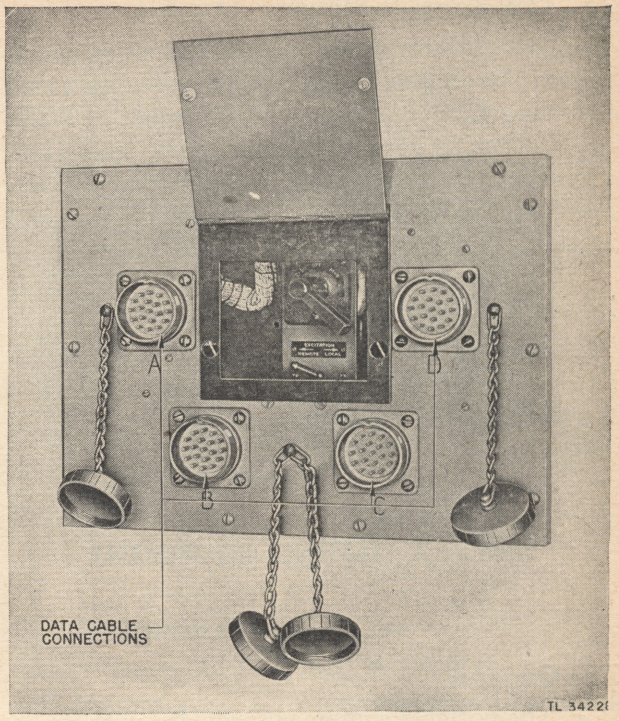


Figure 85. Data Junction Box JB–65–A.

(*b*) North-south component (Y_0).

(*c*) Altitude (H_0).

(*d*) Horizontal range (R_0).

(*e*) Slant range (D_0).

71. Range Switch

This is a foot switch located on the floor of the trailer cab in front of the range operator. It may be seen in figure 14. Operation of the range switch lights a lamp at the director associated with the radio set for the purpose of notifying the director personnel that the ranging equipment is *on target.* The transformer which supplies power for this circuit is mounted in the azimuth indicator.

Section IX. VENTILATING SYSTEM

72. High-Pressure Blower (fig. 30)

a. The high-pressure blower which is located under the rear of the trailer furnishes a stream of cool air to the transmitting tubes of both transmitters.

b. There is an interlock system which requires the H.P. BLOWER circuit breaker to be turned ON before the high voltage can be supplied to the transmitting system.

73. Low-Pressure Blower (fig. 30)

The low-pressure blower which is located under the middle of the trailer supplies cool air to all the other Lindsay cabinets in the trailer and also to the three oscilloscope chassis in the trailer cab. There is a damper located to the left of the IFF equipment in the trailer cab which may be used to close off the duct to the cab.

74. Drive-Motor Blowers

The azimuth and elevation drive motors each have a blower to provide cool air for efficient operation of the drive motors (fig. 45).

Section X. TESTING EQUIPMENT

75. General

a. The portable equipment provided with Radio Set SCR–545–A consists of the items listed below. The equipment requiring power is operated from a 115-volt, 50- or 60-cycle supply. The input power for each unit is also listed.

(1) Test Oscillator I–185–A, 94 watts.
(2) Range Calibrator I–189–A, 92 watts.
(3) Synchronizing Unit I–187–A, 88 watts.
(4) Frequency Meter I–183–A, 45 watts.
(5) Standing-wave meter.
(6) Test Antenna AN–107–A (fig. 86) including:
(*a*) Search antenna.
(*b*) Track antenna.
(*c*) Tripod.
(*d*) Headset.
(*e*) Cable, 18-foot.
(7) Test Equipment RC–125–A, including:
(*a*) Tube checker.
(*b*) Analyzer (fig. 93).
(*c*) Oscilloscope (fig. 94).
(*d*) Microvolter.
(*e*) Record book.

b. All the testing equipment is normally carried in racks located in the trailer cab on each side of the power panel (figs. 23 and 24). Certain tests require the use of a long cable between the trailer and a remote testing point. For this purpose 1,000 feet of four-conductor, rubber-covered cable is provided. When not in use, it is kept coiled on a cable reel on the left side of the pedestal.

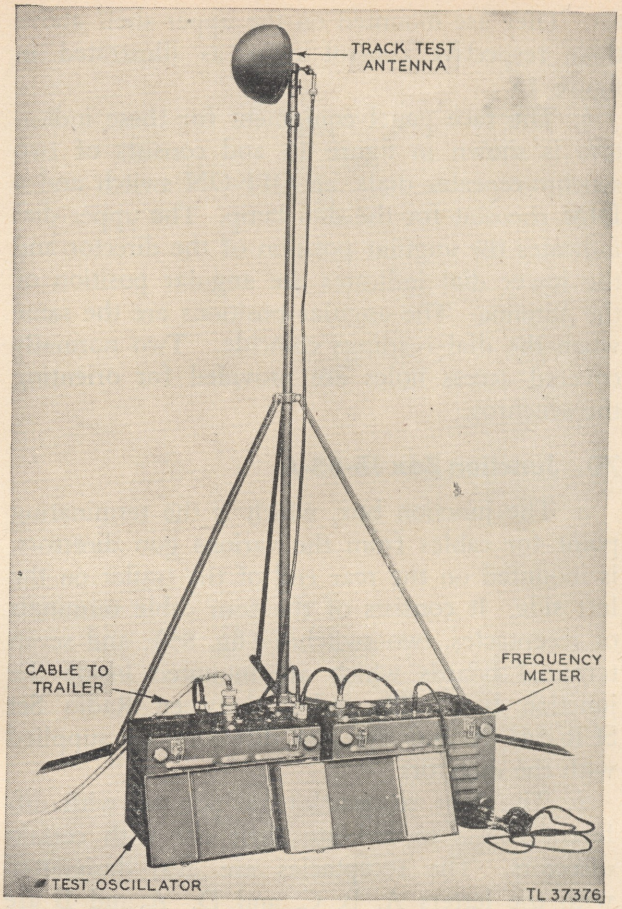


Figure 86. Test antenna set up for operation.

76. Test Oscillator I-185-A

The test oscillator is used in the field to provide pulsed signals at search or track frequencies for receiver alignment, antenna lobe-shape tests, and automatic-tracking equipment tests. The panel of the oscillator is shown in figure 87. The TRACK-SEARCH switch is located in the upper center portion. Below and to the left of this switch is located the SEARCH oscillator tuning control and two associated output jacks. Farther to the left is the track oscillator tuning control and its two associated output jacks. The cord box at the extreme left of the panel is used to store cord 23 for use in either of the FREQ METER jacks. At the upper right of the panel is the 115-volt receptacle used to provide power for the frequency meter. Just below is the four-pronged male POWER IN receptacle for terminating the female end of the 1,000-foot cable.

77. Range Calibrator I-189-A (fig. 88)

The range calibrator contains a precision crystal oscillator which is used to check the accuracy of

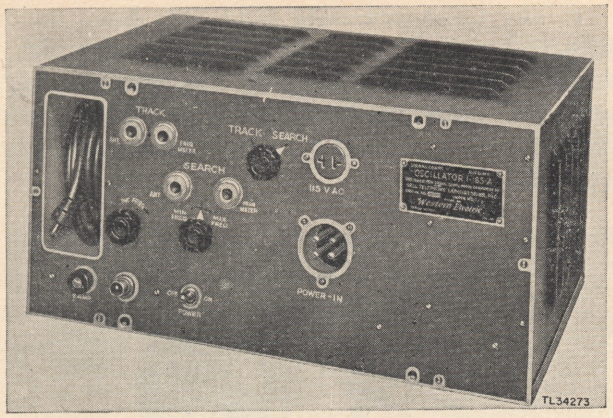


Figure 87. Test oscillator.

the range unit. As shown in figure 88, it has only one control knob on the panel designated PHASE ADJ, which is used to vary the position of the 500-yard markers with respect to the start of the sweep. Also on the panel are two output jacks (SYNC) and (MARKERS) which provide pulses for sweep start and 500-yard marker pips respectively. Connecting cords are stored in the cord box on the left side of the panel.

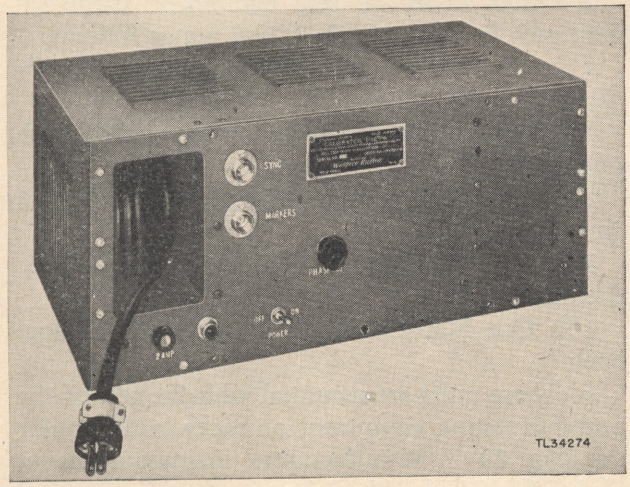


Figure 88. Range calibrator.

78. Synchronizing Unit I-187-A

The synchronizing unit serves as a connecting link between the test oscillator in the field and the operators' oscilloscopes in the trailer cab. As shown in figure 89, it has a single control knob on the front panel labeled PHASE ADJ. The SYNC jack at the right center of the panel provides an output of pulses for triggering the operators' oscilloscopes. The POWER OUT female receptacle at the left side of the panel has four terminals, two terminals for 60-cycle, a-c power and two for a 16.39 kc timing wave. The male plug end of the 1,000-foot cable is used to patch into this receptacle. The cords for 60-cycle power for this unit and for patching into the (SYNC) jack are stored in the cord box at the right side of the front panel.

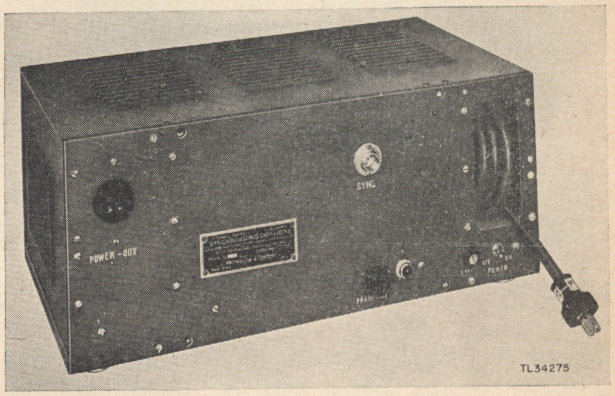


Figure 89. Synchronizing unit.

79. Frequency Meter I-183-A

The frequency meter is used to detect the presence and frequency of signals in the search or track frequency ranges. As shown in figure 90, it contains two adjustable quarter-wavelength cavities, one for TRACK and one for SEARCH, which may be tuned by the micrometers in the access hole at the right side of the front panel. The meter on the front panel indicates when either of the cavities is tuned to the incoming signal. The ZERO ADJ screwdriver control is located just to the right of the meter and is used for electrical balancing to permit the meter to read zero with no input. Below and to the right of the meter are the GAIN switch and GAIN ADJ control which permit optimum meter readings with varying amounts of high-frequency inputs. As in the test oscillator, there is a frequency switch to permit changing from SEARCH to TRACK located to the right of the GAIN ADJ control. Farther to the right is a jack for using headphones (carried in the antenna-test box) to supplement the meter as a tuning indicator. SEARCH and TRACK high-frequency input jacks are located in the upper-left front panel. A cord box for storing the power cord is located at the extreme left side of the panel.

80. Standing-Wave Detector (fig. 91)

This detector is used to measure the standing-wave ratio in the 1⅜ inch transmission line between the track transmitter and the antenna. The procedure for adjusting the antenna impedance for minimum standing-wave ratio is given in



Figure 90. Frequency meter.

chapter 5. A description of the removal and assembly of its parts will be found in TM 11–1527 (when published).

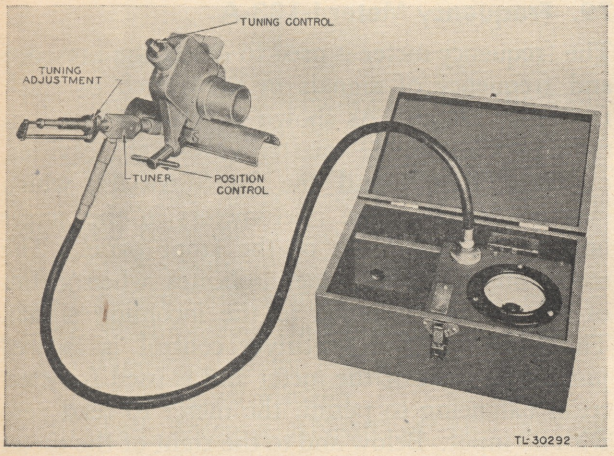


Figure 91. Standing-wave detector.

81. Test Antenna AN-107-A

a. The test antenna carrying case contains the following parts which are shown in figure 92:

(1) One track test antenna.
(2) One search test antenna.
(3) One pair high-impedance headphones.
(4) One 18-foot, low-loss cable (cord 22).

b. A folding antenna tripod with a screw thread at the top is used for mounting either the search or track test antenna. An arm and clamp device also permits using the tripod as a support for a shelf which has been partially removed from its Lindsay cabinet.

c. The headphones and attached cord and plug are for use with the frequency meter. The 18-foot cable (cord 22) is used to connect either of the test antennas to the frequency meter or the test oscillator.

d. The 1,000 foot cable (CD 717) has a male Russell and Stoll connector on one end which, when in use, is plugged into the synchronizing unit. The other end having a female Russell and Stoll connector, is plugged into the test oscillator (fig. 86).

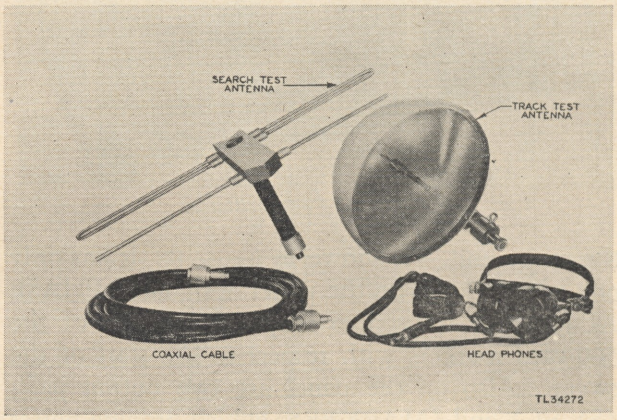


Figure 92. Test antennas.

82. Test Equipment RC-125-A

a. Other items of test equipment furnished with each Radio Set SCR–545–A are as follows:

(1) One Weston model 772 analyzer (volt-ohmmeter) (fig. 93).
(2) One DuMont model 224A oscillograph (fig. 94).
(3) One Ferris model 18F microvolter (signal generator).
(4) One Weston model 777 vacuum-tube checker.
(5) One National Book Co. (No. 38) ledger book.

b. These units are mounted with the rest of the portable testing equipment on racks in the trailer cab (fig. 24). Manufacturers' instruction manuals are furnished with each unit of equipment and these instructions will also be incorporated in TM 11–1527 (when published).

83. Location of Radar Equipment

The general location of the radar equipment is shown in figure 32. It will be observed that the indicating and control equipment is located in the trailer cab with the operating personnel. The actual transmitters, receivers, automatic controller, rectifier, etc., are located in the trailer body. The latter equipment is mounted in Lindsay cabinets (metal boxes) which are bolted in place and completely inclosed in the body of the trailer by the side covers.



Figure 93. Weston analyzer with socket selector.

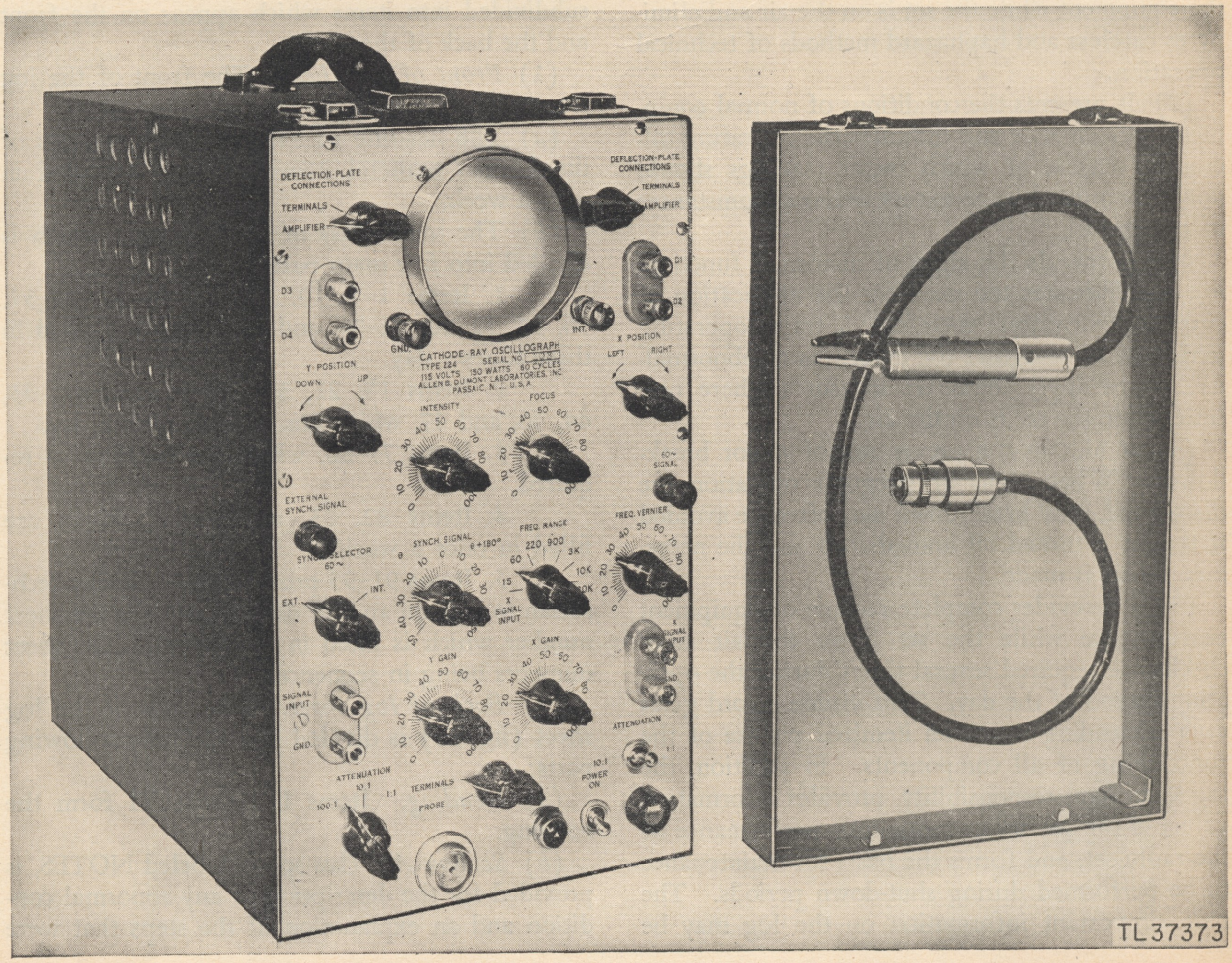


Figure 94. DuMont oscillograph.

CHAPTER 5

EQUIPMENT PERFORMANCE

Section I. GENERAL ASPECTS OF EQUIPMENT

84. Equipment Performance Log

a. GENERAL. An Equipment Performance Log has been developed to insure the most efficient technical operation of Radio Set SCR–545–A. The front and reverse sides of the log sheet are shown in figures 95 and 96 respectively. Regular and conscientious use of this *chart of technical operation* will assure the most efficient functioning of the radio set.

b. FUNCTIONS OF LOG SHEET. The Equipment Performance Log has several functions, as follows:

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

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

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

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

(5) It provides complete records of equipment performance 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 shut-down periods. The more important information on the log may be transferred each day to the Station Record Book where it can be studied when occasion demands.

85. 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 each log pad. Each sheet is divided into sections and subdivided into items which appear on the front and the back of the sheet.

(1) *Front of log sheet.* The front of the log sheet (fig. 95) contains the following items:

(*a*) The heading of the log which consists of the Roman numeral items I–VII to be filled in once a week.

(*b*) The main body of the log sheet which is divided into five main parts:

1. Items 1–7, 10, 12, 13, 16–20, 22–37, 56, 57, 59, 60, 64–73, and 76, which are filled in three times a day.

2. Items 15, 21, 38, 39, 40, 41, 42, 43, 44, 46, and 47, which are filled in once a day.

3. Items 77–80, which are filled in as required.

4. Items 82, 83, and 85–88, which are filled in once a week.

5. Items 91–95 provide space for the technician to sign on and off duty; item 96 is the sheet number which is filled in once weekly, the sheet numbers being in sequence.

(2) *Back of log sheet.* The back of the log sheet (fig. 96) is divided into the four following parts:

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

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

RESTRICTED WHEN BLANK
CONFIDENTIAL WHEN FILLED IN

EQUIPMENT PERFORMANCE LOG

I. Radio Set SCR-545A Serial No. _____ III. Organization _____

II. Frequency (Tr.) _____ Mc. (S.) _____ Mc. IV. Address _____ VI. Dates—From _____ through _____, 19____

V. Location _____ VII. Signature _____ (Person in charge)

Month: _____ Year: _____ Day:

Start first set of log entries 15 minutes after station goes on the air.

				Sunday			Monday			Tuesday			Wednesday			Thursday			Friday			Saturday		
				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	50%	(Abbrev.)																					
6	Gasoline in Drum Being Used	12 gal. min.	(Gallons)																					
7	**Power Unit PE-145-A Ser. ( )**																							
8																								
9																								
10	Engine Water Temperature	150–185	°F.																					
11																								
12	Engine Oil Pressure	20–40	(Pounds)																					
13	Battery Charging Current	1/2–9	(Amp.)																					
14																								
15	Engine Running Time		(Hours)																					
16	*Line Current*		(Amp.)																					
17	*Line Frequency*	59.5–60.5	(Cycles)																					
18	*Line Voltage*	120–124	(Volts)																					
19	Power Panel, Supply Voltage	115	(Volts)																					
20	Transtat Reading		(Div.)																					
21	Trans. Filament Hour Meter		(Hours)																					
22	Rectifier, DC Voltage	10.5–12.5	(Kv.)																					
23	DC Current	70–80	(Ma.)																					
24	Search Trans. Grid Current	2.5–4	(Ma.)																					
25	Track Rec. Beat Osc. Cath. Current	45–60	(μa.)																					
26	Converter Cathode Current	30–40	(μa.)																					
27	Search Rec. R. F. Amplifier Plate Current	55	(μa.)																					
28	Beat Osc. Plate Current	60	(μa.)																					
29	Converter Plate Current	18–23	(μa.)																					
30	**Auto. Controller Voltage, Test AC Az.**	20V. max.	(Volts)																					
31	Test AC Elevation	30V. max.	(Volts)																					
32	Test DC Azimuth	±1V. max.	(Volts)																					
33	Test DC Elevation	±1V. max.	(Volts)																					
34	**Output Amplifier Plate Current Test 1**	0.6–0.75	(Volts)																					
35	Test 2	0.6–0.75	(Volts)																					
36	Test 3	0.6–0.75	(Volts)																					
37	*Range Balance*		(OK–N*)																					
38	Standing Wave Ratio (Track)	2/1 max.	(Ratio)																					
39	Track Trans. Pulse Wave Shape		(OK–N*)																					
40	Track Rec. and Trans. Adjustment		(Inches)																					
41	Video and Notch Mon. Wave Shape (Track)		(OK–N*)																					
42	Search Rec. and Trans. Adjustment		(Inches)																					
43	Frequency (Search)	±2	(Mc.)																					
44	Video and Notch Mon. Wave Shape (Search)		(OK–N*)																					
45																								
46	Range Unit Zero Reference Number		(Yds.)																					
47	Blowers and Air Filters		(OK–N*)																					
48																								
49																								
50																								
51																								
52																								
53																								
54																								
55																								
56	Oscilloscopes (Ra., Az., El.)	Oper.Cond.	(OK–N*)																					
57	Control Units (Ra., Az., El.)	Oper.Cond.	(OK–N*)																					
58																								
59	Pedestal	Oper.Cond.	(OK–N*)																					
60	Antenna	Oper.Cond.	(OK–N*)																					
61																								
62																								
63																								
64	*Automatic Operation*		(OK–N*)																					
65	System Sensitivity (Track) (Az. R. S.)	80–100	(%)																					
66	System Sensitivity (Search) (Az. R. S.)	80–100	(%)																					
67	Signal-to-Noise Ratio (Track)	25%	(Ratio)																					
68	Signal-to-Noise Ratio (Search)	25%	(Ratio)																					
69	Orientation, Slant Range		(Yds.)																					
70	Orientation, Azimuth		(Mils.)																					
71	Orientation, Elevation		(Mils.)																					
72	Orientation, Altitude		(Yds.)																					
73	Max. Range of Planes/P. E.		(Yds.-Yds.)																					
74																								
75																								
76	Log Finishing Time		(Hr.-Min.)																					
77	Operating Time, On		(Hr.-Min.)																					
78	Operating Time, Off		(Hr.-Min.)																					
79	Operating Time, Total		(Hr.-Min.)																					
80	Break-down Time, Total		(Hr.-Min.)																					

81	WEEKLY SUMMARY	TOTAL
82	Hours of Operation	(Hr.-Min.)
83	Break-down Time	(Hr.-Min.)
84		( )
85	Engine Oil Added	(Quarts)
86	Gasoline Consumed	(Gallons)
87	Engine Running Time	(Hours)
88	Transmitter Filament Hours	(Hours)
89		

90	SIGNATURE OF PERSON KEEPING LOG				
91	SIGNATURE	92 RANK	93 DATE	94 ON	95 OFF

SIGNATURE OF PERSON KEEPING LOG				
SIGNATURE	RANK	DATE	ON	OFF

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

96. Sheet No. _____

W. D., S. C. Form No. 249

U. S. GOVERNMENT PRINTING OFFICE 16—38300-1

Figure 95. Front of log sheet.

I. RADIO SET SCR-545-A SER. NO. _____ III. ORGANIZATION _____ V. LOCATION _____

II. DISTANCE FROM SEA _____ IV. ADDRESS _____ VI. ELEVATION _____

Sections A, B, C, and D

SECTION B — COMPONENT RECORD

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

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

SECTION C — PART RECORD

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

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

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

SECTION D — REMARKS — RADAR OFFICER

SECTION A — NOTES — SECTION A

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

SEE TM 11-1327 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, N. J.

SHEET No. ____

U. S. GOVERNMENT PRINTING OFFICE 16—35300-1

Figure 96. Back of log sheet.

taken to correct that condition.

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

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

86. General Instructions For Filling In Log Sheet

Specific instructions for filling in the separate items and sections of the log sheet are given in section II of this chapter. However, the following general rules apply to filling 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 within the normal tolerance values. Keep the set operating between the points designated by the instructions.

c. HOW TO OBTAIN THE INFORMATION. Section II of this chapter contains the instructions for securing the pertinent data from which each item log entry is made.

d. LOG ENTRIES. Make the proper entries on the log sheet at the correct time intervals, according to the instructions given for each item. Use one log sheet for each week. The condition or the reading *seen* is the one to be recorded on the log sheet, 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 the 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) indicated 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, that is, any quick and radical departure from the average 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.

e. METHOD OF MAKING ENTRIES. Make all entries with ink or indelible pencil if either is available. If a mistake is made, *do not erase.* Cross out the incorrect entry and make a new one above it. Do not use ditto marks. Write as neatly as possible because the log sheet is a part of a permanent record. Accuracy is of primary importance and the entries must be legible enough to be used as a reference. Examples of the log entry and the entry under NOTES are given for each item in section II of this chapter.

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

g. OPTIMUM VALUES. Enter the optimum operating values (the meter indications that represent most officient operation) to the right of the brackets in the column of empty parentheses provided.

h. UNITS. Make all three-times-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. Following is a list of the log sheet item abbreviations and their full meaning:

Abbreviation	*Meaning*
Amp.	Ampere
Az.	Azimuth
Cath.	Cathode
Div.	Division indicated
El.	Elevation
°F	Degrees Fahrenheit
Hr.-Min.	Hour and minute
Kv.	Kilovolt
Ma.	Milliamperes
Max.	Maximum
Mc.	Megacycles
Ma	Microamperes
Mils.	6,400th part of a circle
Mon.	Monitor
N.	Note
Oper. Cond.	Operating condition
Osc.	Oscillator

Abbreviation	*Meaning*
%	Percentage
P. E.	Permanent echo
R. F.	Radio Frequency
R.	Range
Ra.	Range
Rec.	Receiver
S. (Mcs.)	Search
S.	Sensitivity
K-yds.	Thousands of yards
Tr.	Track
Trans.	Transmitter
Yds.	Yards

i. ITALICIZED ITEMS. Check the items printed in *italics* more often than every 2 hours. Keep the items under close watch; they tend to standardize operating conditions by providing a general check on the over-all efficiency of the equipment. Corrective measures are to be applied whenever necessary.

j. CHANGE OF WATCH PROCEDURE. If log entries are required when one technician relieves another, both technicians take the full set of readings together. The relieving technician makes the entries in the log. If log entries are not required when one technician relieves another, both technicians check the last set of log entries. After taking or checking a set of log entries, the relieving technician makes one of the following entries under NOTES:

(1) Time—Radio set normal—Initials.

(2) Time—Radio set abnormal—Abnormal items—Initials of both technicians.

Samples:

1612—Radio set normal—BG.

1850—Radio set abnormal—Items 26, 29, and 62—BG. WH.

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

l. REFERENCES. A group of open parentheses are provided for page, paragraph and manual numbers. The technician may use these parentheses if he wishes to make a reference to material in some other publication.

m. QUALITY OF WORK. Write as neatly and clearly as possible. This helps those responsible for analyzing the log sheet. Accuracy is also of utmost importance. Accurate entries will not only greatly assist the engineers in their work of improving the design and construction of the sets, but will also be of value to other agencies within the Army Air Forces and the Army Ground Forces.

n. BLANK ITEMS. These lines are provided for item entries directed by the person in charge.

87. 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.

88. 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 11–1427, entitled Preventive Maintenance. Every operator of Radio Set SCR–545–A should take all necessary steps to keep the unit and its contents 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. Repair cracked or broken meter cover glasses during the routine preventive maintenance period.

c. PILOT OR INDICATOR LIGHTS. Pilot lights are used on Radio Set SCR–545–A to indicate that certain elements are operating correctly. Consequently, if a pilot light is not glowing when it should be, an important fault may be present. On the other hand, the failure of a pilot light may indicate merely that the bulb has burned out. If a light goes out during operation and if its location is readily accessible, replace the bulb with a new one. If the new bulb does not light and the performance of the set seems satisfactory, make a note on the Work-To-Be-Done forms so that the repair will be made during the shut-down period. If the new bulb does not light and the equipment performance seems faulty, notify the person in charge immediately and ask for instructions regarding an immediate shut-down.

d. CRACKED OR BROKEN KNOBS AND SWITCH BUTTONS. Ordinarily, repair broken knobs and switch buttons during the routine maintenance period. However, a temporary repair sometimes can be made by using tape or similar material. In some cases, it may be possible to replace a broken knob while the equipment is running, but be careful to avoid any changes in equipment operation.

89. Limits

The limits of permissible operation are given in section II. The range between the tolerances and limits indicate permissible operation of the set under emergency conditions and then only for an absolute minimum of time. Operation above or below the range indicated usually results in damage or complete failure of the radar set.

90. Fire Hazard

Electrical equipment and internal combustion engines always constitute a potential fire hazard. Do not smoke or light fires in the vicinity of gasoline. Remember that even an *empty* gasoline tank can be extremely dangerous; keep fire away. Locate the fire extinguisher in a convenient place away from the direct rays of the sun. When a gasoline engine is in operation, keep the fire extinguisher near the engine.

91. Reading Meters

Reading meters accurately is a matter of common sense plus carefulness (fig. 97). The following rules and cautions will help prevent errors:

a. SCALE NUMBERING. In reading a meter, observe how the scale is numbered; that is observe whether the numbering is 1-2-3, 2-4-6, 5-10-15, 10-20-30, 20-40-60, 25-50-75, 50-100-150, 100-200-300, 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 parts A, B, and C of figure 97.

c. SCALE-READING ACCURACY. In general, the construction of the pointer and the graduation of the scale is 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 SCALE. When reading a meter, observe whether or not the scale is linear; that is, whether or not the needle deflection is proportional to the quantity being measured. A-c ammeters and voltmeters have scales on which the graduations are crowded together at the lower end and possibly at the upper end also. Linear scales are usually found on d-c instruments.

f. NONLINEAR SCALES. One meter using 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 (fig. 97, F), the reading is not 2.5, but 2.55. During operation of the unit some fluctuations in the readings may occur, but the readings usually can be averaged mentally.

92. Adjusting Meters

a. CHECKING. Normally, both types of meters in the set should read zero when the unit is inoperative. Make an inspection of the zero setting of the meters during the shut-down period. The zero settings cannot be checked while the radio 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 will enable the needle to overcome the slight starting friction of the bearing which sometimes prevents an otherwise normal meter from coming to rest 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 (an hour or more). If on breaking the circuit, the pointer does not return at once to its original zero position, it will do so gradually. For this reason it is most important that the zero settings of meters be checked and readjusted *only after the unit has been off the air for some time.*

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

Section II. SPECIFIC LOG PROCEDURES AND SPECIFIC CORRECTIVE MEASURES

93. General

a. As already indicated, an abridged form of

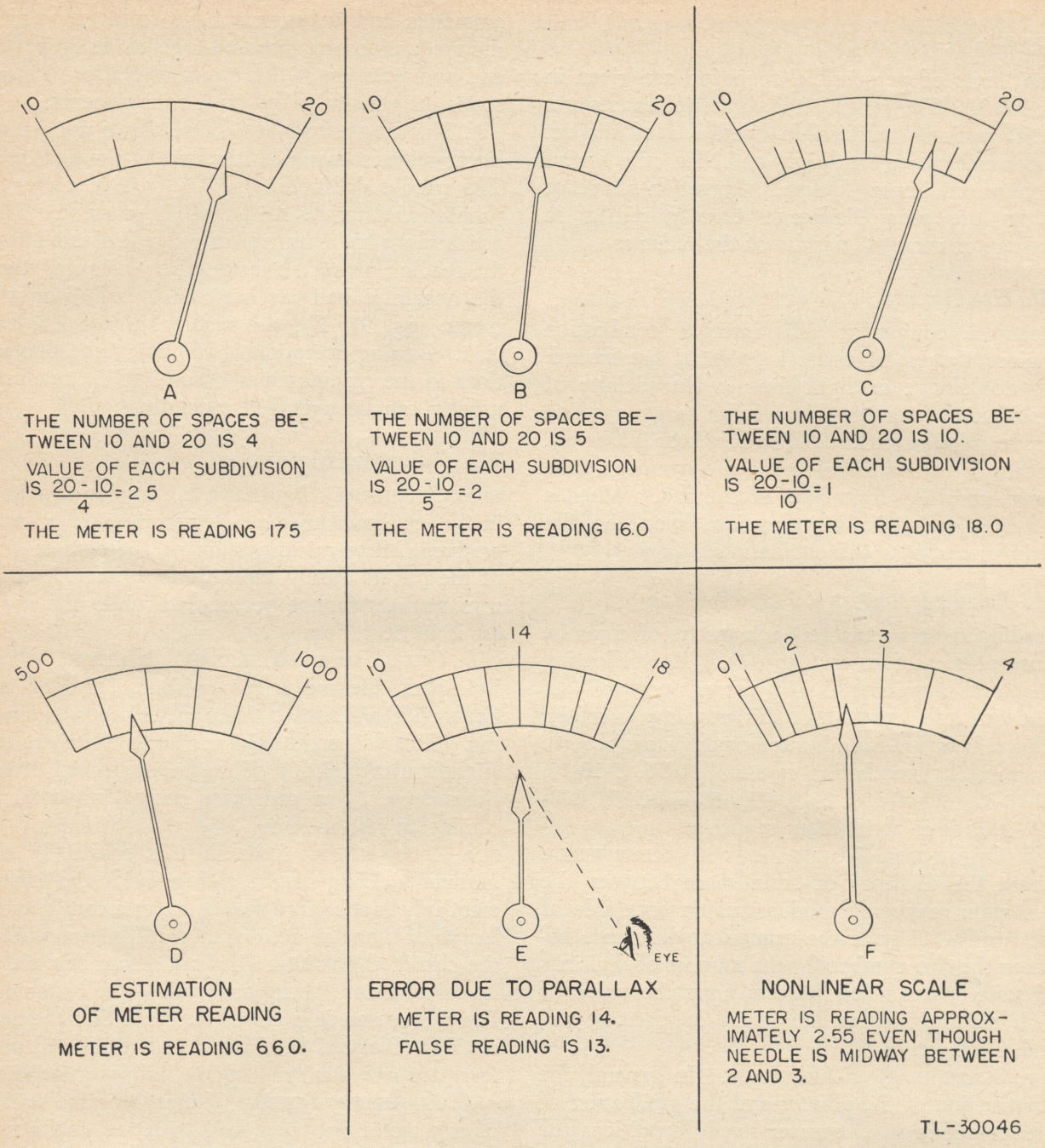


Figure 97. How to read a meter.

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, specific corrective measures, and sample entries for each of the principal items on the front of the log sheet are discussed. In most cases two sample entries are included; one is 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 space 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, instructions 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.

94. How to Fill in Front of Log

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

a. ITEM I, RADAR SET AND SERIAL NUMBER. Enter the *serial number* of the radar set. This number is found on the nameplate of the unit or on the invoice sent to the person in charge. The nameplate is located on the trailer mount.

Sample entry: I. Radio set *SCR–545–A,* Serial No. *30.*

b. ITEM II, ASSIGNED FREQUENCIES. Enter the assigned frequencies (in megacycles) at which the set operates. Obtain this information from the person in charge.

Sample entry: II. Frequency (Tr.) *FUB* Mcs (S.) *AR* Mcs.

c. ITEM III, ORGANIZATION. Enter the official designation of the company, platoon, battalion, regiment, or other organization charged with the operation of the unit.

Sample entry: III. Organization *Bat. Q–711th CA(AA) Bn.*

d. ITEM IV, ADDRESS. Enter the complete official mailing address of the organization. For oversea installations, use the Army Post Office number.

Sample entry: IV. Address *P.O. Box 23, Trenton, New Jersey.*

e. ITEM V, LOCATION. For installations within the continental United States, enter the geographic location. For oversea installations, the location data is not filled in.

Sample entry: V. Location *Belmar, New Jersey.*

f. ITEM VI, DATES. Enter the dates covered by the log sheet. Write the date in the following sequence: day, month, year.

Sample entry: VI. Dates *from 1 Aug. 1944 through 7 Aug. 1944.*

g. ITEM VII, SIGNATURE. After the log sheet has been completed, the officer or other person charged with the responsibility for operation of the radio set, writes his name and rank in this space.

Sample entry: VII. Signature *George G. Trott, M/Sgt.*
(Person in charge)

NOTE. Items 1 to 96 (Main Body of Log) are to be filled in as described in paragraph 85*b* (1) (*b*).

95. 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. 98).

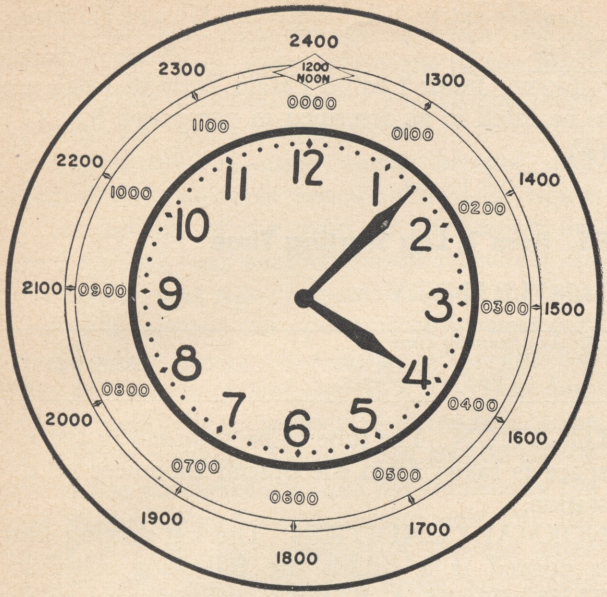
LOG ENTRY. Enter in the brackets to the right of the item title the suffix for the time zone in which the station is located. For instance, if the station is located in Italy, enter A. Obtain the *official time zone suffix* from the person in charge. Using the 24-hour system, enter in the log space to 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	2145—21	Sequence broken due to transmitter trouble. J. K.



24-HOUR TIME CLOCK

DESCRIPTION

The inner circle represents a standard 12-hour clock.

The middle section (white numerals) covers the A.M. period from midnight (0000) to noon (1200).

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

INSTRUCTIONS

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

Examples: At 7:00 A.M. write: 0700. At 11:17 A.M. write: 1117. Afternoon (P.M.) readings are shown in the outer section. They begin with 1201 and end with 2400 (midnight) which is the same as 0000.

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

CLOCK READING

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

Figure 98. Twenty-four hour clock.

96. Item 2, Weather Conditions

SAMPLE ENTRY.

2. Weather Conditions [ ] ( ) (Symbols)	

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

Rain	R	Mist	M	Clear	o
Snow	S	Fog	F	Cloudy	CLDY
Freezing rain	ZR	Hazy	H	Overcast	•
Sleet	E	Smoky	K	Thunderstorm	↘
Hail	AP	Dusty	D	Lightning visible	↘

REMARKS. In case of any unusual weather condition not covered by these abbreviations or symbols, place an asterisk (*) after the log entries, and explain under notes.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
2	0815	8 Feb 43	Strong aurora. No apparent effect on performance of set. G.G.T.

97. Item 3, Temperature Outside

SAMPLE ENTRY.

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

LOCATION. The outside thermometer is placed in a shady, well-protected spot out of doors.

LOG ENTRY. Record in the log space the temperature to the nearest degree Fahrenheit. If the reading on the thermometer is obviously wrong, place an asterisk (*) after the log entry.

CORRECTIVE MEASURES. If the thermometer reading apparently is incorrect, check for the following possible causes:

a. The thermometer may be located in the rays of the sun or exposed to the rain; if so, relocate the thermometer.

b. The thermometer may be damaged; if so, replace it with a new one.

c. The thermometer may be inaccurate. Check by comparing it with a thermometer of known accuracy. Replace the thermometer if it is inaccurate.

REMARKS.

a. Be sure the thermometer in use has a range sufficient for all local temperatures. In hot climates, shield the thermometer from the direct rays of the sun; otherwise, the thermometer may break.

b. The thermometer used with a mobile unit must be removed from its mounting and put in a safe place inside the van while the unit is being moved.

c. As soon as the thermometer indicates the approach of freezing temperatures, check antifreeze in all radiators. If the antifreeze is needed, but is not available, drain all radiators on engines that are not running continuously. When the

radiator of a truck is drained, mark RADIATOR DRAINED across the inside of the windshield of the truck so that the engine will not be started while the radiator is dry. When any 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	Time	Date	NOTES
3	1200	3 Feb 43	Abnormal reading caused by rays of sun striking thermometer. Relocated in shady spot. G.G.T.

98. Item 4, Temperature Inside

SAMPLE ENTRY.

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

LOCATION. The inside thermometer is located in the cab.

LOG ENTRY. Record in the log space the temperature to the nearest degree Fahrenheit.

REFERENCES.

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

99. Item 5, Humidity

SAMPLE ENTRY.

5. Humidity [50%] ( ) (Abbrev.).....	M	M	H*

HOW TO OBTAIN INFORMATION. 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. If clothing feels damp; if there is rain, fog, or haze (from water vapor); if sweat fails to evaporate; if moisture condenses copiously on cold surfaces; if the walls of the building sweat; if the air seems warm and close, damp or muggy; or if the wind is from the ocean, the humidity is probably high. If the skin and lips chap, if the wind is blowing toward the ocean, if the air is cold and crisp, if damp clothes dry quickly, if visibility is good, or if the nasal passages are drier than usual, the humidity is probably low.

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

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

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

REMARKS. 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, 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 line jack or wick. To measure relative humidity with the sling psychrometer, proceed as follows:

a. 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 1 minute.

b. Repeat the above operation until two identical readings of the wet-bulb thermometer are obtained. At the same time, 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. Refer to table II which gives the relative humidity of air temperature in comparison with the cooling of wet-bulb thermometer. It will be seen, for example, that the relative humidity is 55 percent when the air temperature is 70°F and the wet-bulb thermometer reads 10°F lower. For example:

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

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
5	1200	15 Jan 43	Humidity is high, walls of cabin are sweating. All fans and heaters turned on. M.B.

TABLE II. *Psychrometric table*

NOTE. 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

REFERENCES.

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

100. Item 6, Gasoline in Drum Being Used

SAMPLE ENTRY.

6. Gasoline in Drum Being Used [12 gals. Min.] ( ) (Gallons)...	50	40	30

LOCATION. The gasoline drum is connected to the power unit by means of a gas line.

SAFE LEVEL. The gasoline level is considered safe if the next set of readings can be made before sediment and water are picked up from the bottom of the drum. Eight inches (12 gallons) of gas is considered the minimum safe level under all conditions.

HOW TO OBTAIN THE INFORMATION. To measure for accuracy use a yardstick or calibrated dip stick; keep the drum level. To obtain a well-defined gas mark use a straight dip stick of soft, unvarnished, and unpolished wood. If a yardstick is used, multiply the height in inches by 1½ to compute the number of gallons (20 inches is equivalent to 30 gallons).

LOG ENTRY. Enter in the log space the gas level to the nearest gallon read on the dip stick. If the gasoline level is less than 12 gallons, enter an asterisk (*) after the entry.

CORRECTIVE MEASURES.

a. When the gas level goes below 8 inches (12 gallons), check the gasoline level at frequent intervals until the level is 4 inches. *Change the drum when the 4-inch mark is reached.* The frequency of the check depends on the gas left in the drum. With 8 inches in the drum, a check within the next 2 hours is sufficient; while, with only 5 inches in the drum, a check should be made at 20-minute intervals. When a drum is changed, make a note to this effect to complete the note made for the asterisk in the last log reading. Record in this note the time of the change-over and the levels of the old and new drums.

b. If the gasoline consumption rate is too high, look for a leak in the gasoline line. If necessary, make a note on the Work-To-Be-Done form for a check of the carbureter adjustment, timing adjustment, and cylinder compression during the shut-down period.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
6	1200	16 May 43	Gas level down to 8 gallons. Watched gas level closely until it reached 4 inches (6 gallons) and changed over to new drum containing 55 gallons at 1222. J.H.

101. Item 7, Power Unit PE-145-A

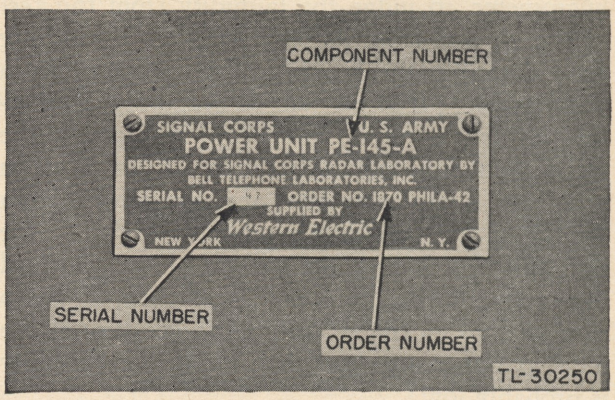


Figure 99. Nameplate (sample).

SAMPLE ENTRY.

7. Power Unit PE–145–A Ser. No. (30) [ ] ( ) ( )			

LOG ENTRY. The only entry to be made in this item is the serial number of the power unit (fig. 99).

102. Items 8 and 9 (Blank)

103. Item 10, Engine Water Temperature

SAMPLE ENTRY.

10. Engine Water Temperature [150–185] ( ) (°F).....	150	150	145*

LOCATION. The engine water thermometer (fig. 51) is located on the manifold.
NORMAL CONDITION. The engine water temperature is normal if it is between 150°F and 185°F.
LOG ENTRY. Record in the log space the engine water temperature to the nearest degree Fahrenheit. If the engine water temperature is below 150°F or above 185°F, place an asterisk (*) after the log entry.
CORRECTIVE MEASURES.

a. HIGH TEMPERATURE. If the engine water temperature is above 185°F, check the following:

(1) Radiator water level.

(2) Engine oil level should be at full mark on oil stick.

(3) Item 16, Line Current: the engine load may be excessive.

(4) Radiator grill: make sure the grill is not covered or obstructed.

(5) Engine water circulation: carefully remove the radiator cap on an overheated engine to avoid escaping steam. Notice whether the water is in motion. If the engine water temperature continues to rise above 185°F, notify the person in charge; continued operation of an overheated engine may damage it.

(6) Octane rating of gasoline: make sure the engine is using the proper grade of gasoline.

(7) Air circulation: Insure adequate air circulation around the engine and radiator by keeping the van doors open, especially in hot weather.

b. LOW TEMPERATURE. If the engine water temperature is too low, check the following:

(1) Radiator: the engine water temperature can be raised by placing a cardboard or canvas cover over the radiator grill. (See REMARKS.)

(2) Air circulation: the engine water temperature can be raised by closing the doors and windows of the engine room.

c. PERSON IN CHARGE. If unable to obtain normal water temperature, notify the person in charge.

REMARKS.

a. Low temperature causes more rapid sludge formation and interfere with engine performance.

b. Never use a canvass cover to shield more than three-fourths of the front of the radiator.

c. When the unit is operating in freezing temperatures, see table 1, chapter 4, TM 11–1427.

LIMITS. 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. Never allow the engine water temperature to reach the boiling point (212°F).

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
10	1200	8 Jan 43	Temperature too low. Made cardboard cover for radiator. Temperature at 1500: 170° F. C.H.

104. Item 11 (Blank)

105. Item 12, Engine Oil Pressure

SAMPLE ENTRY.

12. Engine Oil Pressure [20–40] ( ) (Pounds).....	32	33	52*

LOCATION. The engine oil pressure gauge (fig. 51) is located under the reserve gasoline tank.
NORMAL CONDITION. The engine oil pressure is normal if it is between 20 and 40 pounds.
LOG ENTRY. Record in the log space the engine oil pressure to the nearest pound (each pound equals one third of a division on the scale of the engine oil pressure gauge). If the engine oil pressure is below 20 or above 40 pounds, enter an asterisk (*) after the log entry.
CORRECTIVE MEASURES. Check engine oil level. Notify the person in charge if the engine oil pressure continues to be abnormal.
REMARKS.

a. The engine will shut off automatically when the oil pressure drops below 5 pounds. The red light under the oil gauge lights when the oil pressure is under 20 pounds.

b. When an engine is started, an abnormal oil pressure may be indicated until both the proper engine speed and engine water temperature are attained. If an all-weather oil is used, do not mix it with oil of any other grade.

LIMITS. The engine probably will operate with pressure as low as 6 pounds. *Do not operate an engine unless it shows an oil pressure.*

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
12	0815	8 Feb 43	Oil pressure high (52). Made note on Work-To-Be-Done Forms for a change to oil of lower viscosity. J.H.

106. Item 13, Battery-Charging Current

SAMPLE ENTRY.

13. Battery Charging Current [½–9] ( ) (Amp.).....	3	5	11*

LOCATION. The battery-charging meter (fig. 51) is located under the reserve gasoline tank.

NORMAL CONDITION. The normal battery-charging current is between ½ ampere and 9 amperes.

LOG ENTRY. Record in the log space the battery-charging current to the nearest ampere. Enter 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. Test each cell with an accurate hydrometer for specific gravity, which indicates the condition of battery charge.

b. The freezing point of an electrolyte depends on its specific gravity and the condition of battery charge. The following chart gives the freezing temperature of battery solution at various specific gravities:

Specific gravity	*Freezing temperature (°F.)*
1100	+ 18
1120	+ 14
1140	+ 8
1160	+ 2
1180	− 6
1200	− 17
1220	− 31
1240	− 51
1260	− 75
1280	− 92
1300	− 95

LIMITS. If the battery charging current falls to zero, the charging process has been interrupted. Notify the person in charge. Trouble may be caused by an open circuit between the battery and the generator, and may cause damage to the generator. If the charging rate exceeds 15 amperes, the battery may be injured by loosening of active material and buckling of the plates.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
13	1200	1 Jan 43	High-charging current. Corrected by adjusting charging rate control unit. J.H.

107. Item 14 (Blank)

108. Item 15, Engine Running Time

SAMPLE ENTRY.

15. Engine Running Time [ ] ( ) (Hours).....		129.9	

LOCATION. See figure 48.

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

LOG ENTRY. Enter the time on the log sheet to the nearest tenth of an hour as shown on the engine RUNNING-TIME meter. Enter an asterisk (*) in the log space if the meter is either inoperative or if the readings on the meter do not tally with the elapsed operating time as indicated by the official station timepiece.

CORRECTIVE MEASURES. If the meter is inoperative, record the condition on the Work-To-Be-Done form for repair or replacement during the next shut-down period.

REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
15	1200	4 Jan 43	After 4 hours of operation, engine total-hours meter registered only 2.8 hours. Made note on Work-To-Be-Done forms. Keeping record of engine running time by station clock. G.G.T.

109. Item 16, Line Current

SAMPLE ENTRY.

16. Line Current [ ] ( ) (Amp.)...	110	120	128*

LOCATION. See figure 48.
NORMAL CONDITION. The line current is normal if it is between 100 and 125 amperes.
LOG ENTRY. Enter the reading on the line-current meter to the nearest ampere. If the line current is greater than 125 amperes or less than 100 amperes, enter an asterisk (*) after the entry on the log sheet.
CORRECTIVE MEASURES.

a. Check the power unit and the radio set, and if there is evidence of overheating (smoke or the smell of burning insulation), immediately notify the person in charge.

b. Check appliances, such as heaters and fans, for connection to the line. Make allowance for the extra current drawn by any such appliances. To check the amount of current drawn by an appliance, disconnect it and note the resulting change in line current.

c. Check item 18, Line Voltage.

REMARKS. The ammeter must be level for accurate operation.
LIMITS. The safe full-load output of the power-unit generator is 156 amperes. Currents above 150 amperes will trip the circuit breaker on the power instrument panel.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
16	0815	7 Jan 43	High-line current due to use of electric heaters. J.H.

110. Item 17, Line Frequency

SAMPLE ENTRY.

17. Line Frequency [59.5–60.5] ( ) (Cycles).....	59.8	59.7	59.4*

LOCATION. See figure 48.
NORMAL CONDITION. The line frequency is normal if it is between 59.5 and 60.5 cycles. Best performances is obtained at exactly 60 cycles. Beside being within tolerance, the frequency should be steady to 0.1 cycle.
LOG ENTRY. Record on the log sheet the line frequency to the nearest 0.1 cycle. If the line frequency is below 59.5 cycles or above 60.5 cycles, or is unsteady more than 0.1 cycles, place an asterisk (*) after the log entry.
REMARKS.

Caution: While the unit is idle, do not make adjustments of any kind on the line frequency meter, regardless of what its setting may be. An off-scale setting is normal while the unit is idle. Be careful with the meter; it is a delicate instrument and easily damaged.

a. Since the engine running-time meter in the power unit contains a synchronous motor it will not read accurately, but will run correspondingly faster or slower if the line frequency is high or low.

b. The reading of the engine running time when checked against known elapsed time is, therefore, an index of the accuracy of the line-frequency meter.

c. The frequency meter must be level for accurate operation.

REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
17	1200	8 Jan 43	Frequency meter pointer is continually drifting in and out of tolerance. Everything checked normal. Suspect governor. Notified person in charge and recorded abnormality on the Work-To-Be-Done Forms. J.H.

111. Item 18, Line Voltage

SAMPLE ENTRY.

18. Line Voltage [120–124] ( ) (Volts).....	123	120	118*

LOCATION. See figure 48.
NORMAL CONDITION. Normal line voltage is 120 to 124 volts.
LOG ENTRY. Record in the log space the reading of the line voltmeter to the nearest volt. If the line voltage is above 124 or below 120 volts, place an asterisk (*) after the entry on the log sheet.
CORRECTIVE MEASURES.

a. If the line voltage is abnormal, and the power unit is the source of power make the following checks:

(1) Make sure the field rheostat (fig. 48) is in the maximum counterclockwise position.

(2) Adjust the Silverstat voltage regulator (fig. 48) to bring the line voltage within the tolerance range.

(3) Check item 16, Line Current.

(4) Check item 17, Line Frequency.

(5) If the accuracy of the line voltmeter on the generator instrument panel is questionable, disregard the reading as long as 115 volts can be obtained on the power-panel voltmeter.

b. If the line voltage is abnormal when commercial power is used, make the following checks and adjustments:

(1) Notify the person in charge so that the power company will be advised and the proper voltage furnished.

(2) By means of the Silverstat voltage regulator on the power unit, adjust the output voltage of the generator to the average voltage of the commercial line. This will minimize the number of adjustments to be made in the case of a *throw-over* to the power unit from the commercial power lines.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
18	1200	8 Feb 43	Line voltage low. Lack of regulation due to improper setting of field rheostat. Adjusted rheostat to extreme counterclockwise position. Readjusted Silverstat voltage regulator. Voltage now 123. D.M.S.

112. Item 19, Power Panel, Supply Voltage

SAMPLE ENTRY.

19. Power Panel, Supply Voltage [115] ( ) (Volts)....	115	115	114*

LOCATION. See figure 59.
NORMAL CONDITION. The normal reading of the supply voltage is 115 volts.
LOG ENTRY. Enter the reading of the supply-voltage meter to the nearest volt. Enter an asterisk (*) if the reading is not 115 volts.
CORRECTIVE MEASURES. Turn the handle on the line transtat (fig. 24) until the supply-voltage meter reads 115 volts.
REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
19	1200	7 Feb 43	Meter read 114. Turned transtat to bring it back to 115. D.M.S.

113. Item 20, Transtat Reading

SAMPLE ENTRY.

20. Transtat Reading [ ] ( ) (Div).....	32	31	31

LOCATION. See figure 24.
LOG ENTRY. Enter the reading of the line transtat to the nearest division.
REFERENCES.

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

114. Item 21, Trans. Filament Hour Meter

SAMPLE ENTRY.

21. Trans. Filament Hour Meter [ ] ( ) (Hours).....		2700	

LOCATION. The meter is located above the power panel.
LOG ENTRY. Enter the number of hours recorded on the meter.
REMARKS. The accuracy of the TRANS. FIL. meter depends on the accuracy of the line frequency. If the meter becomes inoperative or records incorrectly, make an entry on the Work-To-B-Done form so that a check will be made during shut-down period and keep time by the station clock until the meter is required.
REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
21	0815	6 Mar 43	Meter about 2-hours slow. Ordered to keep time on station clock until meter is replaced. Made note on Work-To-Be-Done forms. C.H.

115. Item 22, Rectifier D-C Voltage

SAMPLE ENTRY.

22. Rectifier d-c Voltage [10.5–12.5] ( ) (Kv).....	11.5	11.5	12.6*

LOCATION. See figure 61.
NORMAL CONDITION. The normal rectifier-output voltage is between 10.5 and 12.5 kilovolts. In most cases, the optimum voltage will be 11.5 kilovolts; however, instances have been known in which a voltage other than 11.5 was optimum.
LOG ENTRY. Enter in the log space the voltage to the nearest 0.1 kilovolt. Enter an asterisk (*) if the reading is not between 10.5 and 12.5 kilovolts.
CORRECTIVE MEASURES.

a. If the meter is not between 10.5 and 12.5 kilovolts, check the following items:

(1) Item 18, Line Voltage.

(2) Item 19, Power Panel, Supply Voltage.

b. If readings (1) and (2) are satisfactory, turn the voltage control on high-voltage rectifier (fig. 24) to bring the voltage into tolerance.

c. If the voltage cannot be corrected with the control, turn the high-voltage transtat on the power panel to bring the reading to the correct value. If this does not result in a correct value, notify the person in charge.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
22	0815	2 Feb 43	Meter reading too high. Line voltage and power panel supply voltage checked and found OK. Could not correct the voltage with transtats on power panel and H-V rectifier. Notified the person in charge. M.B.

116. Item 23, Rectifier D-C Current

SAMPLE ENTRY.

23. Rectifier DC Current [70–80] ( ) (Ma.).....	70	75	81*

LOCATION. See figure 61.
NORMAL CONDITION. The rectifier-output current is normal if it is between 70 and 80 milliamperes; 75 milliamperes is the optimum reading.
LOG ENTRY. In the log space enter the rectifier-output current to the nearest milliampere. Enter an asterisk (*) if the reading is not between 70 and 80 milliamperes.
CORRECTIVE MEASURES.

a. If the meter is not between 70 and 80 milliamperes, check the following items:

(1) Item 18, Line Voltage, and adjust if necessary. If commercial power is used, no adjustment can be made.

(2) Item 19, Power Panel, Supply Voltage, and adjust if necessary.

(3) Item 22, Rectifier d-c Voltage, and adjust within its tolerance to bring the rectifier d-c current into tolerance.

b. If readings (1), (2), and (3) are satisfactory, or if after adjustment the d-c current reading is still in error, notify the person in charge and make an entry on the Work-To-Be-Done form

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
23	1200	7 Feb 43	Rectifier current meter read too high. Line voltage and supply voltage correct and DC rectifier output voltage within limits. Varying rectifier voltage through its tolerance failed to bring current into tolerance. Notified person in charge and made an entry on the Work-To-Be-Done forms. J.H.

117. Item 24, Search Trans. Grid Current

SAMPLE ENTRY.

24. Search Trans. Grid Current [2.5–4] ( ) (Ma.)....	3	3.5	7*

LOCATION. The search-transmitter grid-current meter is located about 5 inches behind the copper screen of the search transmitter and cannot be seen unless the transmitter is turned on and the tubes are lighted (fig. 62).
NORMAL CONDITION. The normal reading of the search-transmitter grid current is 2.5 to 4.0 milliamperes.
LOG ENTRY. Enter the reading of the search-transmitter grid-current to the nearest tenth milli-

ampere. Enter an asterisk (*) if the reading is not between 2.5 and 4 milliamperes.
REMARKS. If the meter reads zero or very high, notify the person in charge.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
24	1545	2 Jan 43	Grid-current meter read 7 milliamperes. Diode 432 flashing badly. Notified person in charge who ordered the search system shut down. Operation continued with only the track system in operation. G.G.T.

118. Item 25, Track Rec. Beat Osc. Cath. Current

SAMPLE ENTRY.

25. Track Rec. Beat Osc. Cath. Current [45–60] ( ) (μa)....	58	58	62*

LOCATION. See figure 100.
NORMAL CONDITION. The normal reading of the beat-oscillator cathode current is 4.5 to 6 divisions on the 10-MA scale when the + 100-MICROAMPS jack of the Weston analyzer is used.

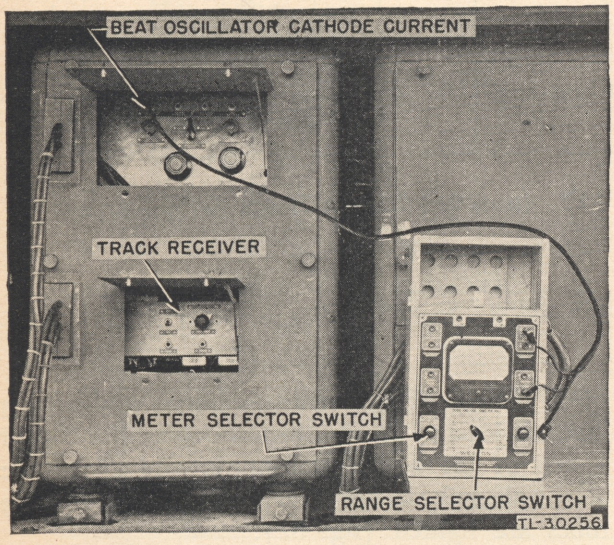


Figure 100. Beat-oscillator cathode current (track).

HOW TO OBTAIN INFORMATION.
a. Insert the black T-lead of the No. 12 cord into the + 100-MICROAMPS jack of the Weston analyzer; insert the red lead into the –d-c VOLTS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector switch to the 1,000-OHMS-PER-VOLT position.
b. Insert the plug of the No. 12 cord into the BEAT-OSCILLATOR CATHODE CURRENT jack of the track receiver.
LOG ENTRY. Take the reading on the 10-MA scale of the Weston analyzer to the nearest tenth of a division, multiply by ten and enter this figure on the log. Enter an asterisk (*) if the reading is not between 45 and 60 microamperes.
CORRECTIVE MEASURES.
a. Adjust the screw-driver control labeled BEAT OSCILLATOR CATHODE CURRENT until a reading within the tolerance is obtained.
b. If a reading within the tolerance cannot be obtained by adjustment, but if the set is operating efficiently, make an entry on the Work-To-Be-Done form for check during next shut-down.
c. If a reading within tolerance cannot be obtained by adjustment and the efficient operation of the set is prevented, notify the person in charge immediately.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
25	1545	1 June 43	Cathode current slightly higher than normal. Corrected it without difficulty. J.H.

119. Item 26, Converter Cathode Current

SAMPLE ENTRY.

26. Converter Cathode Current [30–40] ( ) (μa).....	39	40	41*

LOCATION. See figure 101.
NORMAL READING. The normal reading of the converter cathode current is 3 to 4 divisions on the 10-MA scale when the +100-MICROAMPS jack of the Weston analyzer is used.
HOW TO OBTAIN INFORMATION.
a. Insert the black T-lead of the No. 12 cord into the +100-MICROAMPS jack of the Weston analyzer; insert the red lead into the –d-c VOLTS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector

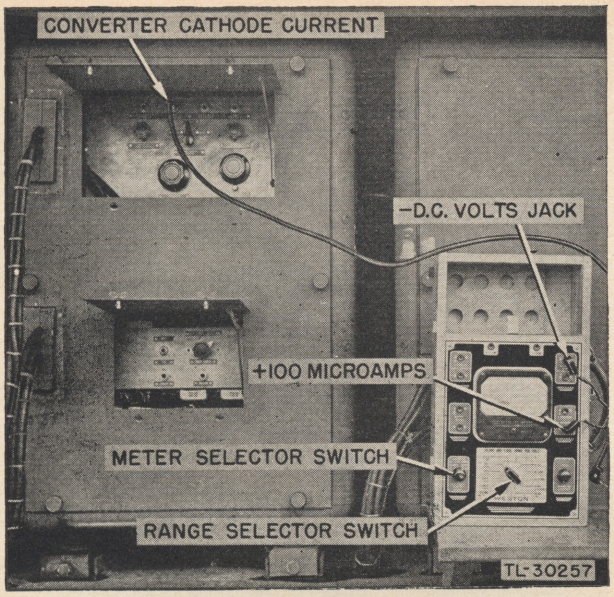


Figure 101. Converter cathode current (track).

switch to the 1,000-OHMS-PER-VOLT position.

b. Insert the plug of the No. 12 cord into the CONVERTER CATHODE CUR jack of the track receiver.

LOG ENTRY. Take the reading on the 10-MA scale of the Weston analyzer to the nearest tenth of a division, and multiply by ten and enter this figure on the log. Enter an asterisk (*) if the reading is not between 30 and 40 microamperes.

CORRECTIVE MEASURES.

a. Adjust the screwdriver control labeled CONVERTER CATHODE CURRENT until a reading within the tolerance is obtained.

b. If a reading within the tolerance cannot be obtained by adjustment, but the set is operating efficiently, make an entry on the Work-To-Be-Done form for check during the next shut-down.

c. If a reading within tolerance cannot be obtained by adjustment and the operation of the set is poor, notify the person in charge immediately.

REMARKS. The reading in microamperes is not the value of the plate current. The jack in the converter cathode circuit has a resistance network so arranged that the analyzer, when switched to the 100-MICROAMPERE scale, will be deflected full-scale when 40 milliamperes of direct current flow in the meter circuit. Accordingly, the actual plate current, when measured as described, is 12 to 16 milliamperes.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
26	1200	8 Apr 43	Meter read 41. Could not adjust. Set was operating with poor sensitivity. Notified person in charge. L.C.

120. Item 27, Search Rec. R. F. Amplifier Plate Current

SAMPLE ENTRY.

27. Search Rec. R. F. Amplifier Plate Current [55] ( ) (μa)...	55	55	56*

LOCATION. See figure 102.

NORMAL READING. The normal reading of the r-f amplifier plate current is 5.5 divisions on the 10-MA scale when the +100-MICROAMPS jack of the Weston analyzer is used.

HOW TO OBTAIN INFORMATION.

a. Insert the black T-lead of the No. 12 cord into the +100-MICROAMPS jack of the Weston analyzer; insert the red lead into the –d-c VOLTS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector switch to the 1,000-OHMS-PER-VOLT position.

b. Insert the plug of the No. 12 cord into the R. F. AMP. PLATE CUR. jack of the search receiver.

LOG ENTRY. Take the reading on the 10-MA

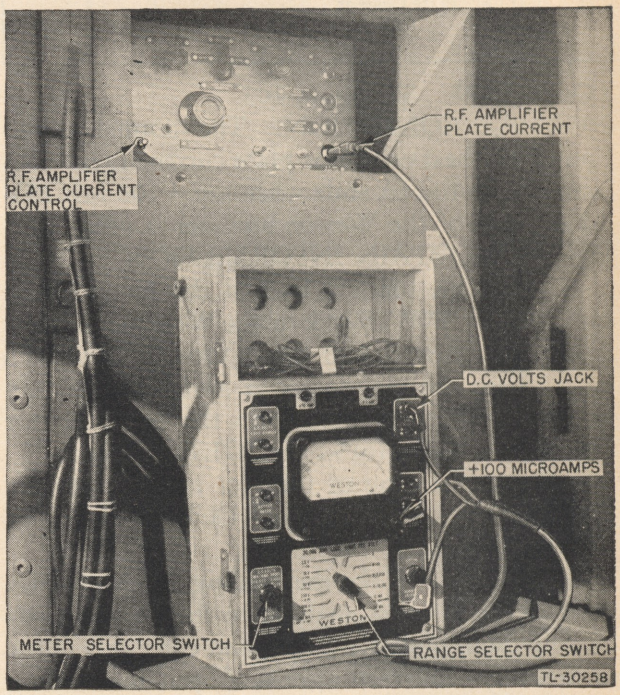


Figure 102. R-f amplifier plate current (search).

scale of the Weston analyzer to the nearest tenth of a division, and multiply by ten and enter this figure on the log. If a reading of 55 microamps is not obtained, place an asterisk (*) after the log entry.

CORRECTIVE MEASURES.

a. Adjust the screwdriver control labeled R. F. AMPLIFIER PLATE CURRENT CONTR. until the required reading is obtained.

b. If a reading within the tolerance cannot be obtained by adjusting, but the set is operating efficiently, make an entry on the Work-To-Be-Done form for check during next shut-down.

c. If a reading within tolerance cannot be obtained by adjustment and the operation of the set is inefficient, notify the person in charge immediately.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
27	2300	8 Feb 43	Meter read 56. Adjusted the screwdriver control until the meter read 55. J.C.

121. Item 28, Beat-Oscillator Plate Current

SAMPLE ENTRY.

28. Beat Osc. Plate Current [60] ( ) (μa).....	60	60	59*

LOCATION. See figure 103.

NORMAL CONDITION. The normal condition of the beat-oscillator plate current is six divisions on the 10-MA scale when the +100-MICROAMPS jack of the Weston analyzer is used.

HOW TO OBTAIN INFORMATION.

a. Insert the black T-lead of the No. 12 cord into the –d-c VOLTS jack of the Weston analyzer; insert the red lead into the +100-MICROAMPS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector switch to 1,000-OHMS-PER-VOLT position.

b. Insert the plug of the No. 12 cord into the BEAT OSCILLATOR PLATE CURRENT jack of the search receiver.

LOG ENTRY. Take the reading on the 10-MA scale of the Weston analyzer to the nearest tenth of a division, multiply by ten and enter this figure on the log. Enter an asterisk (*) if the reading is other than 60 microamperes.

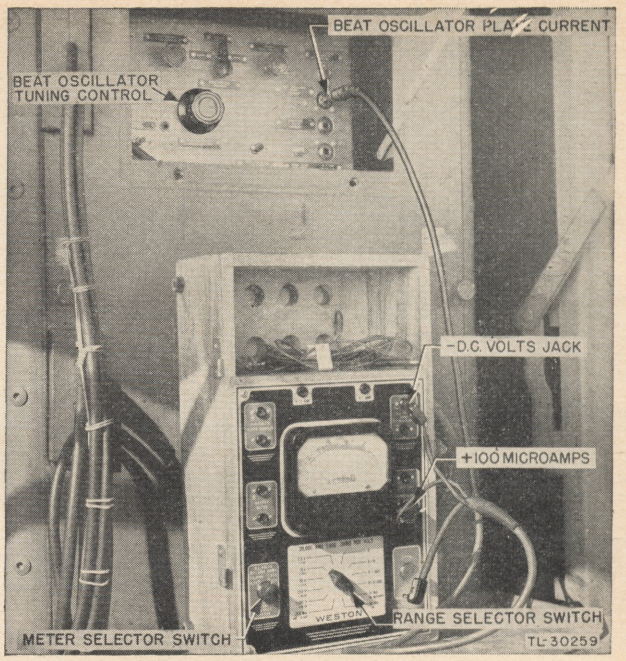


Figure 103. Beat-oscillator plate current (search).

CORRECTIVE MEASURES.

a. Adjust the screwdriver control labeled BEAT-OSC. PLATE-CUR. CONT. until the required reading is obtained.

b. If a reading within tolerance cannot be obtained by adjustment, but the set is operating efficiently, make an entry on the Work-To-Be-Done form for check during next shut-down.

c. If a reading within tolerance cannot be obtained by adjustment and the operation of the set is inefficient, notify the person in charge immediately.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
28	1200	7 June 43	Meter read 59. Adjusted the screwdriver control until meter read 60. J.H.

122. Item 29, Converter Plate Current

SAMPLE ENTRY.

29. Converter Plate Current [18–23] ( ) (μa).....	18	18	17*

LOCATION. See figure 104.

NORMAL READING. The normal reading of the converter plate current is 1.8 to 2.3 divisions

on the 10-MA scale when the +100-MICROAMPS jack on the Weston analyzer is used.

HOW TO OBTAIN INFORMATION.

a. Insert the black T-lead of the No. 12 cord into the –d-c VOLTS jack of the Weston analyzer; insert the red lead into the +100-MICROAMPS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector switch to the 1,000-OHMS-PER-VOLT position.

b. Insert the plug of the No. 12 cord into the CONVERTER PLATE CURRENT of the search receiver.

LOG ENTRY. Take the reading on the 10-MA scale of the Weston analyzer to the nearest tenth of a division, multiply by ten and enter this figure on the log. Enter an asterisk (*) if the reading is not between 18 and 23 microamperes.

CORRECTIVE MEASURES.

a. Adjust the screwdriver control labeled CONV. PLATE CUR. CONTROL until a reading within the tolerance is obtained.

b. If a reading within the tolerance cannot be obtained by adjustment, but the set is operating efficiently, make an entry on the Work-To-Be-Done form for check during next shut-down.

c. If a reading within tolerance cannot be obtained by adjustment and the operation of the set is inefficient, notify the person in charge immediately.

REMARKS. A long-blade, small-tip screw driver will be needed to adjust the converter plate current.

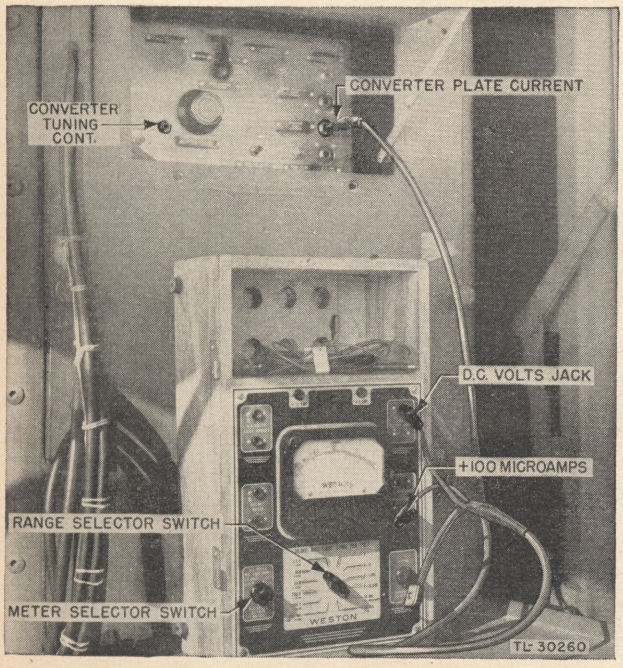


Figure 104. Converter-plate current (search).

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
29	0815	4 Feb 43	Meter read 17. Adjusted until meter read 18. G.G.T.

123. Item 30, Auto. Controller Voltage, Test AC AZ

SAMPLE ENTRY.

30. Auto. Controller Voltage, Test AC Az [20-v max.] ( ) (Volts).	20/18	18/18	22*/19

LOCATION. See figure 105.

NORMAL READING. The normal reading at the TEST AC jack of the AZIMUTH section is less than 20 volts alternating current. The setting must be at minimum.

HOW TO OBTAIN INFORMATION.

a. At the operator's range control unit, crank the notch to a position where there is no signal in the notch. Set all MANUAL-AUTO. switches on the operator's control units to AUTO.

b. Insert the black T-lead and the red lead of the No. 12 cord into the AC VOLTS jacks of the Weston analyzer. Set the range-selector switch to 250 volts, and the meter-selector switch to AC VOLTS.

c. Insert the plug of the No. 12 cord into the TEST AC jack of the AZIMUTH section of the automatic controller panel.

d. If the reading is less than 50-volts, change the analyzer range-selector switch to 50 volts, for greater accuracy.

e. Adjust the two controls on the AZIMUTH side of the panel marked AC BAL until a minimum reading is obtained.

LOG ENTRY. The log space is divided into two halves by a diagonal line. Enter the initial reading in the upper left-hand side; after adjustment, enter the reading for minimum in the lower right-hand side. Enter an asterisk (*) if either reading is above 20 volts alternating current.

REMARKS.

a. If an abnormal condition is encountered, make an entry on the Work-To-Be-Done form for check during the next shut-down for maintenance. After adjusting for minimum, the operator cannot make any further change with trouble-shooting procedure.

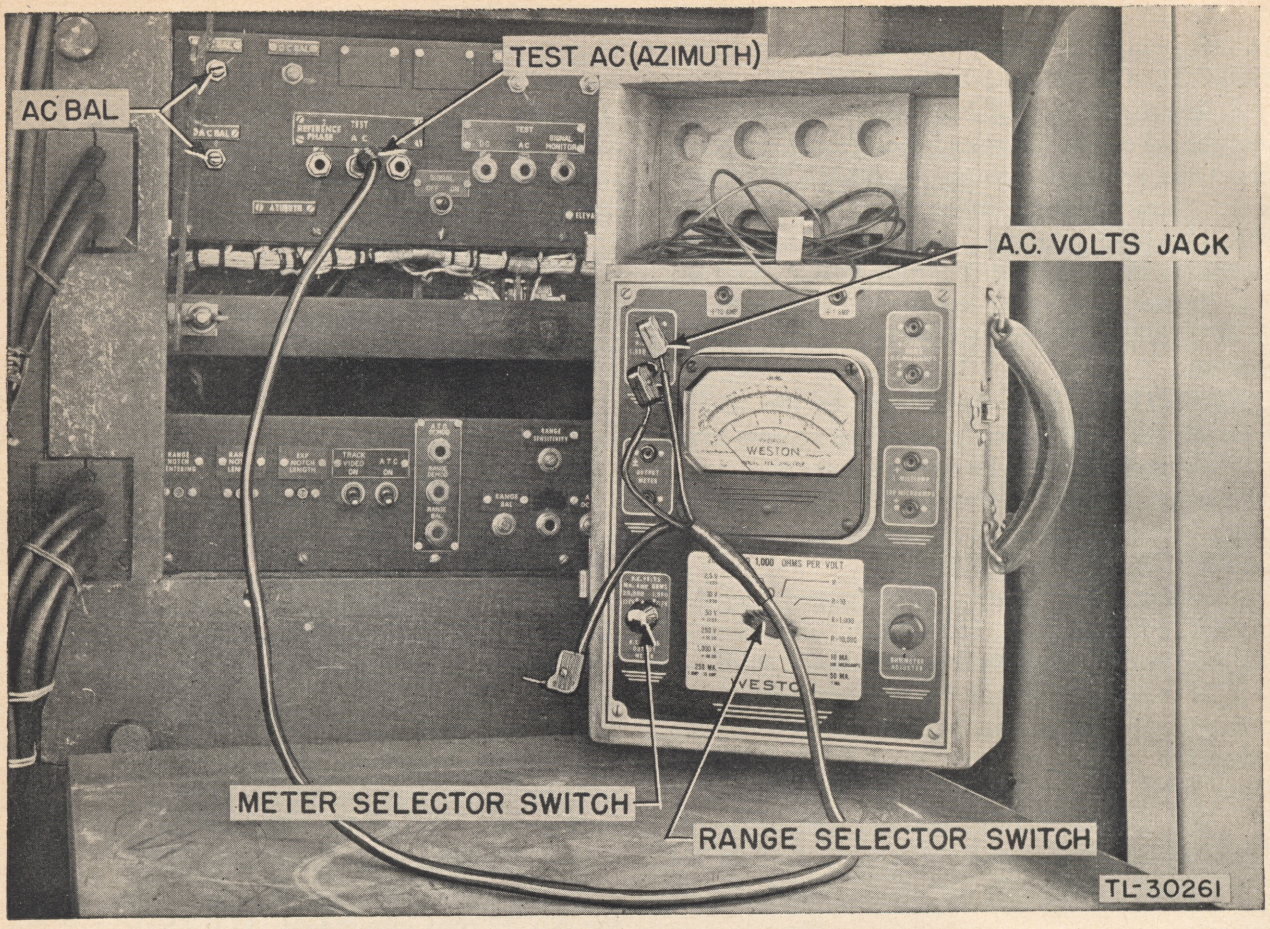


Figure 105. Azimuth AC test.

b. If the meter will not stay steady while the reading is being taken, check the frequency in the power truck. An unsteady frequency in the power unit will affect the automatic controller a-c circuits.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
30	1545	8 Apr 43	Meter read 22 before adjustment. Adjusted and made an entry on the Work-To-Be-Done forms. J.H.

124. Item 31, Test AC Elevation

SAMPLE ENTRY.

31. Test AC Elevation [30-v max.] ( ) (Volts).....	28/26	27/26	32*/26

LOCATION. See figure 106.

NORMAL READING. The normal reading for the TEST AC of the ELEVATION section must be less than 30 volts alternating current.

HOW TO OBTAIN INFORMATION.

a. At the operator's range control unit, crank notch to a position where there is no signal in the notch. Set all MANUAL-AUTO switches on the operator's control units to AUTO.

b. Insert the black T-lead and the red lead of the No. 12 cord into the AC VOLTS jacks of the Weston analyzer. Set the range-selector switch to 250V and the meter-selector switch to AC VOLTS.

c. Insert the plug of the No. 12 cord into the TEST AC jack of the ELEVATION section of the automatic controller panel.

d. If the reading is less than 50 volts, change the range-selector switch to 50V for greater accuracy.

e. Adjust the two controls on the ELEVATION side of the panel marked AC BAL until a minimum reading is obtained.

LOG ENTRY. The log space is divided into two halves by a diagonal line. Enter the initial

reading in the upper left-hand side; after adjustment, enter the reading for minimum in the lower right-hand side. Enter an asterisk (*) if either reading is above 30 volts alternating current.
REMARKS. See REMARKS, item 30 (par. 123).
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
31	1545	9 June 43	Meter read 31 before adjustment. Adjusted and made an entry on Work-To-Be-Done forms. C.H.

125. Item 32, Test DC Azimuth

SAMPLE ENTRY.

32. Test DC Azimuth [±1V max.] ( ) (Volts)....	1/0	1/0	3*/0

LOCATION. See figure 107.

NORMAL READING. The normal reading for the TEST DC of the azimuth section must be between — 1 and + 1 volt.
HOW TO OBTAIN INFORMATION.

a. At the operator's range control unit, crank the notch to a position where there is no signal in the notch. Set all MANUAL-AUTO switches on the operator's control unit to AUTO.

b. Insert the black T-lead of the No. 12 cord into the — DC VOLTS jack of the Weston analyzer; insert the red lead into the + DC VOLTS jack. Turn the range-selector switch to 10V position and the meter-selector switch to DC VOLTS, 1,000-OHMS-PER-VOLT position.

c. Insert the plug of the No. 12 cord into the TEST DC jack of the AZIMUTH section of the automatic controller panel.

d. If the reading is less than 2.5 volts, switch to the 2.5V position for greater accuracy.

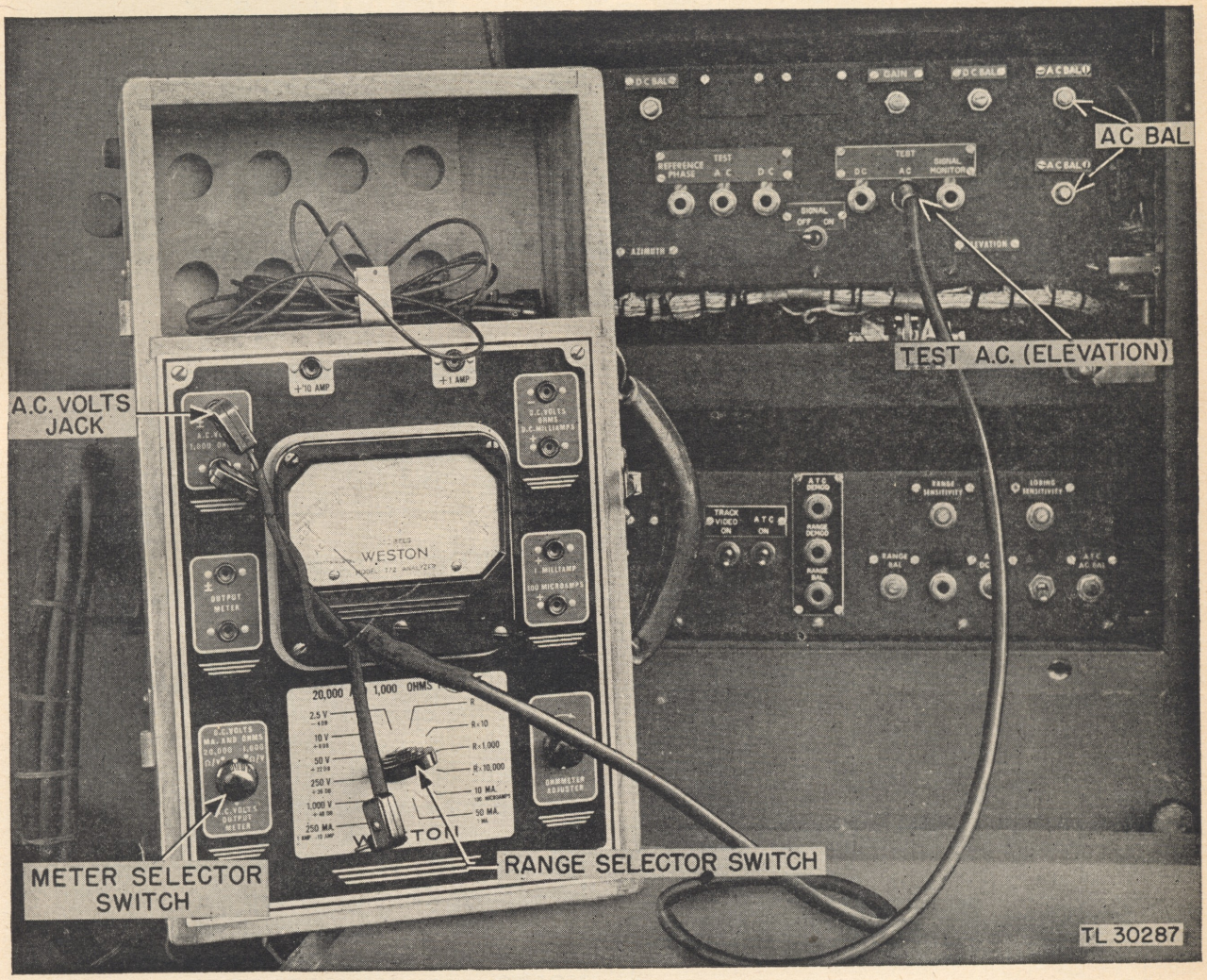


Figure 106. Elevation AC test.

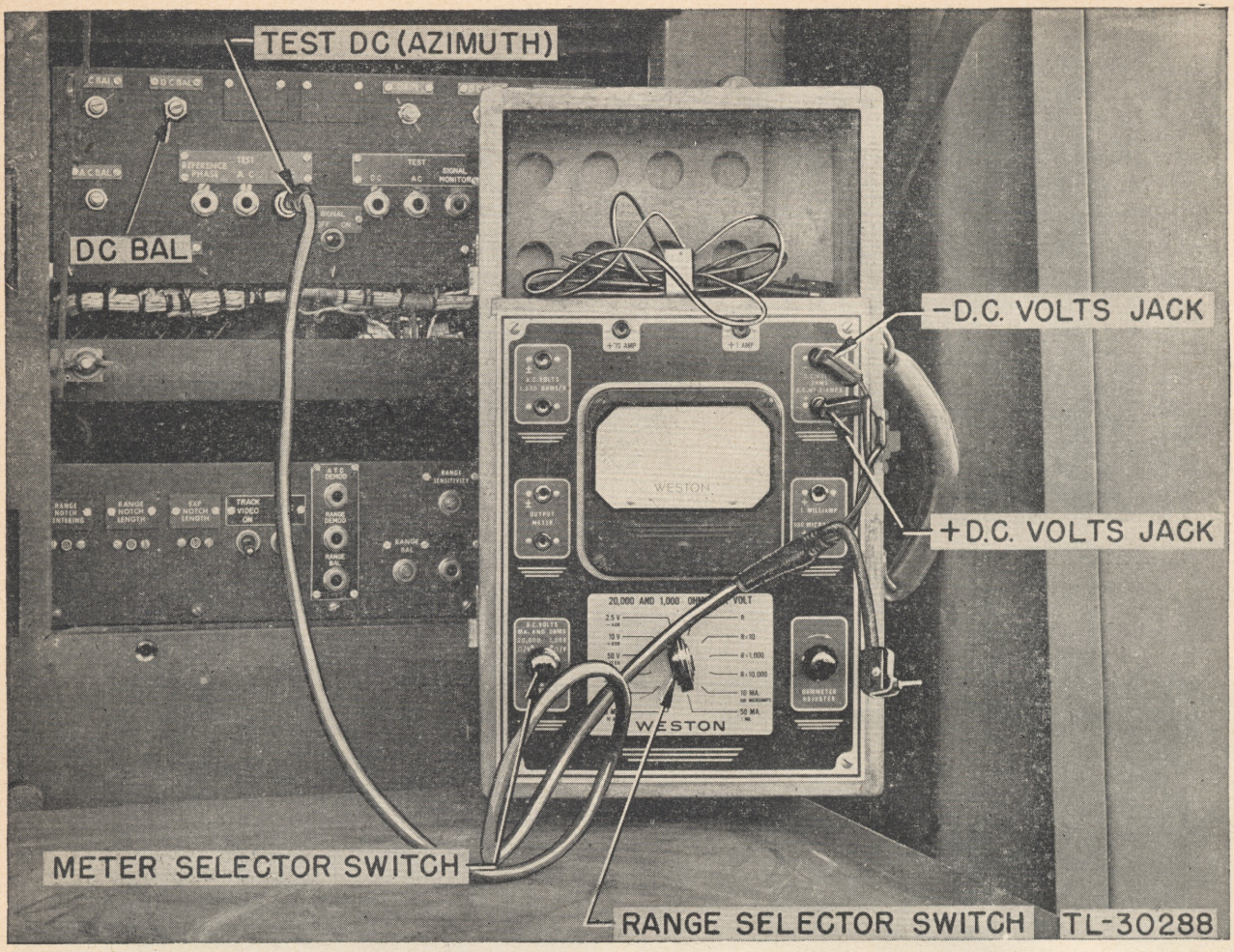


Figure 107. Azimuth DC test.

e. Adjust the control labeled DC BAL on the AZIMUTH side of the panel for minimum reading on the analyzer; then enter the minimum obtained.

LOG ENTRY. The log space is divided into two halves by a diagonal line. Enter the initial reading in the upper left-hand side; after adjustment, enter the reading for minimum in the lower right-hand side. Enter an asterisk (*) if the reading is more than 1 volt.

REMARKS. See REMARKS, item 30 (par. 123).

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
32	2300	4 Aug 43	Meter read 3 volts before adjustment. Made an entry on the Work-To-Be-Done forms. J.H.

126. Item 33, Test DC Elevation

SAMPLE ENTRY.

33. Test DC Elevation [±1V max.] ( ) (Volts)....	1/0	1/0	2*/0

LOCATION. See figure 108.

NORMAL READING. The normal reading for the TEST DC of the ELEVATION section must be between — 1 and + 1 volt.

HOW TO OBTAIN INFORMATION.

a. At the operator's range control unit, crank the notch to a position where there is no signal in the notch. Set all MANUAL-AUTO switches on the operator's control units to AUTO.

b. Insert the black T-lead of the No. 12 cord into the – DC VOLTS jack of the Weston analyzer; insert the red lead into the + DC VOLTS jack. Turn the range-selector switch to the 10V position and the meter-selector switch to DC VOLTS, 1,000-OHMS-PER-VOLT position.

c. Insert the plug of the No. 12 cord into the TEST DC jack of the ELEVATION section of the automatic-controller panel.

d. If the reading is less than 2.5 volts, switch to the 2.5V position for greater accuracy.

e. Adjust the control labeled DC BAL on the AZIMUTH side of the panel. Enter the minimum reading obtained.

LOG ENTRY. The log space is divided into halves by a diagonal line. Enter the initial reading in the upper left-hand side and, after adjustment for minimum, enter the reading in the lower right-hand side. Enter an asterisk (*) if the reading is more than 1 volt.

REMARKS. See REMARKS, item 30 (par. 123).

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
33	2300	4 Aug 43	Meter read 2 volts before adjustment. Made an entry on the Work-To-Be-Done forms. M.B.

127. Items 34, 35, and 36, Output Amplifier Plate Current

SAMPLE ENTRIES.

34. Output Amplifier Plate Current, Test 1 [0.6–0.75] ( ) (Volts)...	0.6	0.7	0.8*
35. Test 2 [0.6–0.75] ( ) (Volts)....	0.7	0.6	0.5*
36. Test 3 [0.6–0.75] ( ) (Volts)....	0.6	0.6	0.3*

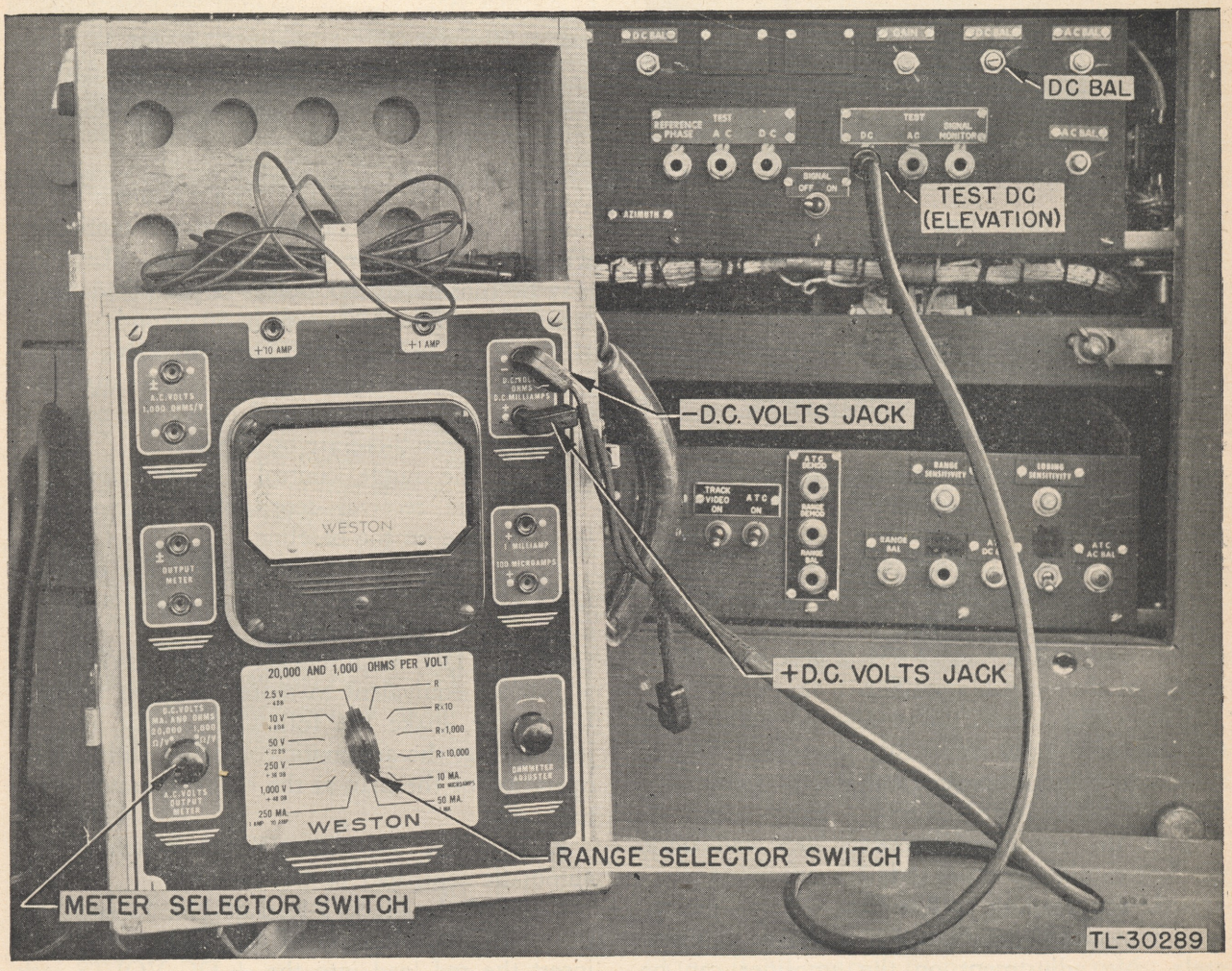


Figure 108. Elevation DC test.

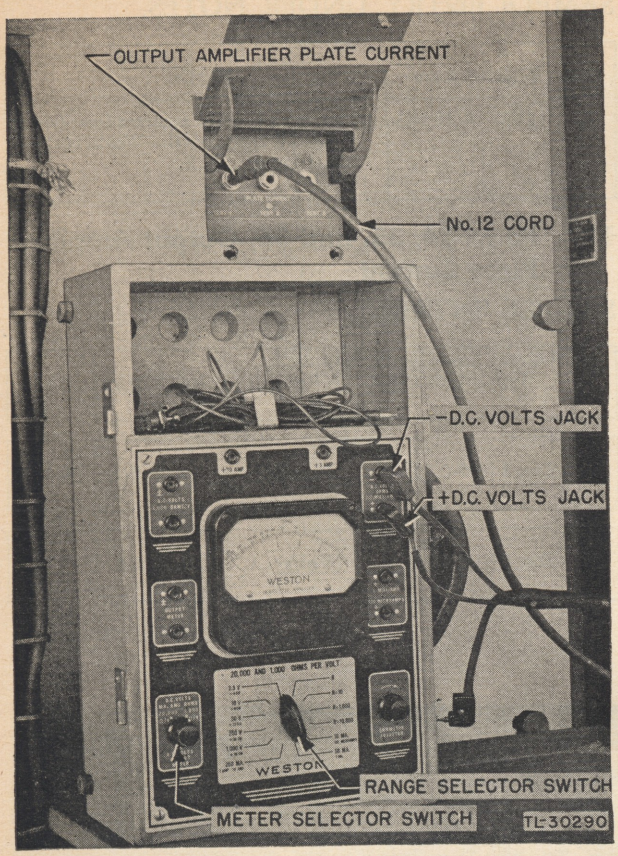


Figure 109. Output servo amplifier plate current.

LOCATION. See figure 109.
NORMAL CONDITION. The reading of the output amplifier-plate current is normal if it is between 0.6 and 0.75 volts when the 2.5-volt scale of the Weston analyzer is used for the measurement.
HOW TO OBTAIN INFORMATION.

a. Insert the black T-lead of the No. 12 cord into the – DC VOLTS jack of the Weston analyzer; insert the red lead into the + DC VOLTS jack. Turn the range-selector switch to the 2.5V position and the meter-selector switch to DC VOLTS, 1,000-OHMS-PER-VOLT position.

b. Insert the plug of the No. 12 cord consecutively into TEST 1 jack, TEST 2 jack, and TEST 3 jack of the output amplifier.

LOG ENTRY. Enter the reading of the analyzer to the nearest 1/20-volt. Add an asterisk (*) if the reading is not between 0.6 and 0.75 volts.
CORRECTIVE MEASURES.

a. If the reading is between 0.5 and 0.85, check item 59. (See par. 143.)

b. If the reading is less than 0.5, or greater than 0.85, notify the person in charge immediately. No adjustment on the amplifier can be made by the operator.

REMARKS.

The reading is made in volts rather than amperes because the test circuit associated with the amplifier-plate current is adapted to use with the 2.5-volt scale of the Weston analyzer.

REFERENCES.

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

SAMPLE ENTRIES UNDER NOTES.

Item	Time	Date	NOTES
34, 35, 36	2300	8 Feb 43	Item 35 read low. Notified person in charge. Made an entry on the Work-To-Be-Done forms and put a check after item 62 on the log sheet. J.H.

128. Item 37, Range Balance

SAMPLE ENTRY.

37. Range Balance [ ] ( ) (OK–N*).....	OK	OK	N*

LOCATION. (See figure 110.) The range-balance check is made at the operator's range control unit. Corrective measures are made at the automatic controller.
NORMAL CONDITION. The condition of the range balance is normal if the notch is motionless when the controls are set to automatic. The notch may be considered motionless if there is a movement of less than 100 yards in 30 seconds.
HOW TO OBTAIN INFORMATION.

a. Set the control on the operator's range control unit to MANUAL, and crank the notch to a region where there are no echoes.

b. Set the range control to AUTOMATIC.

c. Set the receiver sensitivity to give about 1/8-inch noise on the baseline.

d. Note the rate of movement of the notch.

LOG ENTRY. Enter OK if the condition is normal; if not, enter N*.
CORRECTIVE MEASURES. If the notch moves a distance equivalent to more than 100 yards in 1/2 minute, make the following checks and adjustments at the automatic controller with the cooperation of the man at the range operator's control unit.

a. Turn the TRACK VIDEO switch on the automatic controller to OFF.

b. Insert the black T-lead of No. 12 cord into the – DC VOLTS jack of the Weston analyzer; insert the red lead into the + DC VOLTS jack. Turn the range-selector switch to the 250V posi-

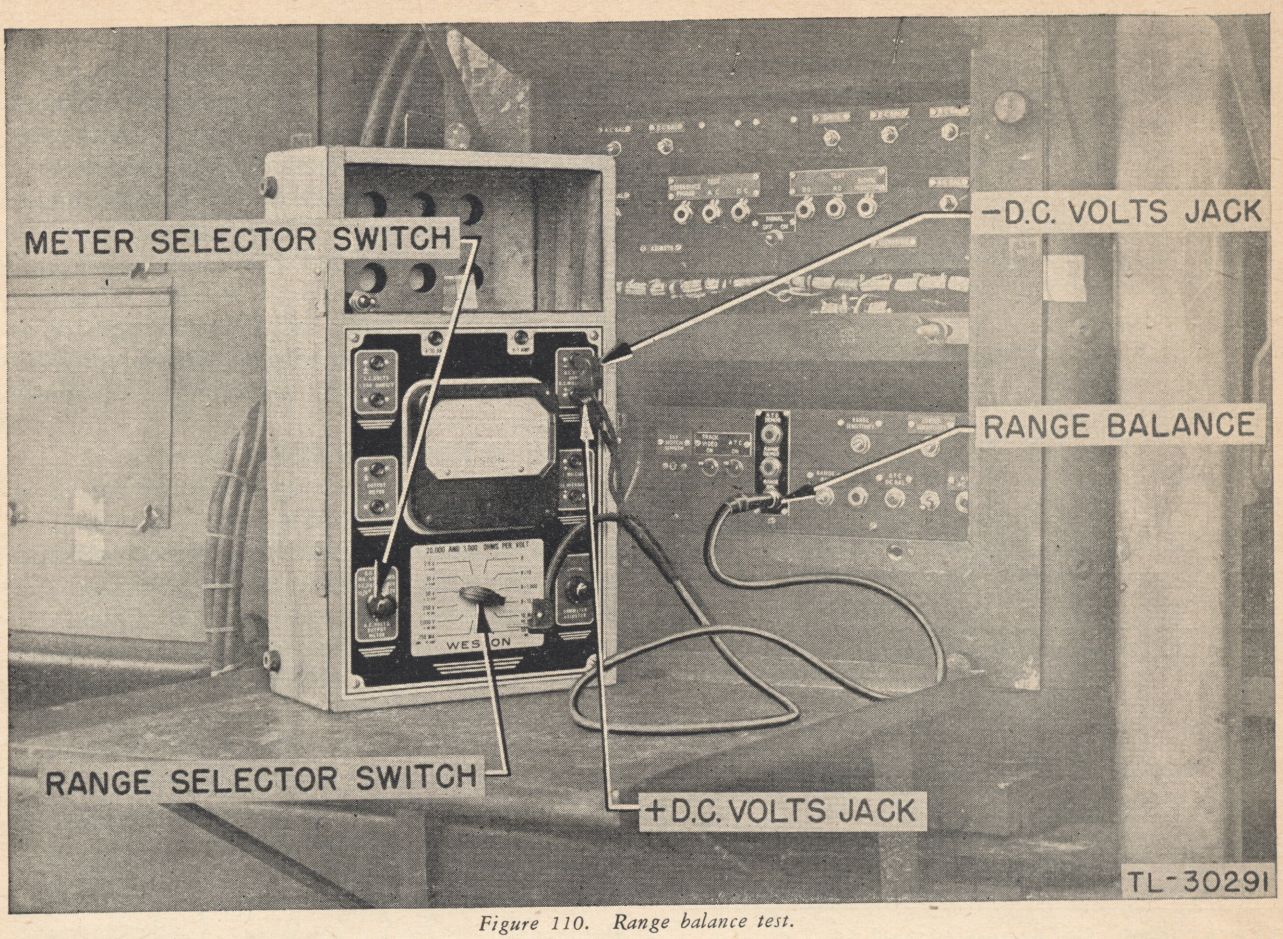


Figure 110. Range balance test.

tion and the meter-selector switch to DC VOLTS, 1,000-OHMS-PER-VOLT position. Insert the plug of No. 12 cord into the RANGE BAL jack of the automatic-controller panel.

c. Turn the TRACK VIDEO switch to ON.

d. At the operator's control unit in the cab, adjust the control to MANUAL and crank a signal into the center of the notch; then switch the control to AUTOMATIC.

e. The Weston analyzer reading should now be very close to zero; if not, adjust the RANGE BAL control to bring it as close as possible to zero and switch to the 10V scale. If the reading is less than 2.5 volts, switch to the 2.5V scale. Adjust the range-balance control again for a zero reading on the analyzer.

REFERENCES.

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

Item	Time	Date	NOTES
37	0815	3 Apr 43	Notch moved about 300 yards in ½ minute. Plugged Weston analyzer in RANGE BAL jack and adjusted range balance control for zero reading on the analyzer. G.G.T.

129. Item 38, Standing-Wave Ratio (Track)

SAMPLE ENTRY.

38. Standing Wave Ratio (Track) [2/1 max.] ( ) (Ratio).....		180/95	

LOCATION. See figure 91.

NORMAL CONDITION. The standing-wave ratio is normal if it is less than 2/1.

HOW TO OBTAIN INFORMATION.

a. Plug the tuner of the standing-wave detector, with its cable and meter attached, into the jack on the front of the T-R box and adjust the tuner for maximum reading on the meter.

b. Move the T-R box along the line by turning the POSITION CONTROL for a further maximum on the meter (detuning the tuner to the detector, if necessary), to prevent the meter from going off-scale.

c. Note the maximum reading; then move the T-R box to the position giving minimum meter deflection. The ratio of the maximum reading to the minimum reading is the standing-wave ratio.
LOG ENTRY. Enter as a ratio the exact readings on the meter provided with the standing-wave detector when the T-R box is at its position of maximum and position of minimum, respectively. Enter an asterisk (*) after the entry if this ratio is greater than 2/1.
REMARKS. If the standing-wave ratio is greater than 2/1, notify the person in charge.
REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
38	1200	2 Aug 43	Standing-wave ratio slightly greater than 2/1. Notified person in charge. J.H.

130. Item 39, Track Trans. Pulse Waveshape

SAMPLE ENTRY.

39. Track Trans. Pulse Wave Shape [ ] ( ) (OK–N*).....		OK	

LOCATION. See figures 63 and 64.
NORMAL CONDITION. The normal shape of the pulse is seen in figure 63A. Notice that the secondary pulses have an average value of zero. Two abnormal waveshapes are also shown (fig. 63).
HOW TO OBTAIN INFORMATION.
a. Connect the SWEEP jack of the track-receiver test panel to the X-POSITION jacks of the test scope with test cord No. 8.
b. Connect the UNBLANK jack of the track-receiver test panel to INT. MOD. terminals on the test scope with test cord No. 10.
c. Set SWEEP LENGTH switch on receiver test panel to position 1.
d. Connect the DELAY jack of the transmitter to the Y-POSITION terminals of the test scope with test cord No. 9.
e. Connect plug 544–1 of the transmitter into the TRANS 1 jack (plug 544–1 is a red test plug primarily for this check and will be found close to the TRANS 1 jack).
f. Adjust the X– and Y–DEFLECTION-PLATE CONNECTIONS switches on the scope to the position TERMINALS.
g. Adjust the horizontal-gain control so that the sweep trace just fits on the scope screen. Adjust the horizontal-positioning control to center the sweep horizontally. Adjust the vertical-positioning control so that the sweep is about one-quarter of the distance from the top to the bottom. Adjust the vertical-gain control so that the image just fits on the scope screen.
h. Disconnect plug 544–1 when the waveshape has been observed.
LOG ENTRY. Enter OK if the waveshape is close to the normal condition, shown as waveshape A. Enter N* if the waveshape is obviously shown in B or C.
CORRECTIVE MEASURES.
a. If no pulse is present, notify the person in charge immediately.
b. If the pulse is present but incorrect in shape, secure permission of the person in charge and adjust the rectifier output voltage (item 22) within tolerance until the correct pulse is obtained.
c. If the rectifier output voltage is varied through the tolerance and the correct pulse shape is not secured, set the rectifier output voltage at the value which gives the best pulse and crank the magnet field control to secure the correct pulse.
REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
39	2300	8 Apr 43	Pulse waveshape distorted. Secondary pulse predominantly below axis. Rectifier DC output voltage OK. Suspected the magnetic field was too high. Was able to secure correct pulse by varying rectifier voltage to 10.8. J.H.

131. Item 40, Track Rec. and Track Trans. Adjustment

SAMPLE ENTRY.

40. Track Rec. and Trans. Adjustment [1 min.] ( ) (Inches).....		1¼	

LOCATION. See figure 65.
NORMAL CONDITION. The receiver and transmitter adjustments are set correctly if the height of the received signal, as seen on the test scope, is above the height designated by the person in charge when the controls of the receiver and the controls of the scope have been set as designated.

HOW TO OBTAIN INFORMATION.

a. Connect the SWEEP jack of the track-receiver test panel to the X-POSITION jacks of the test scope with test cord No. 8.

b. Connect the UNBLANK jack of the track-receiver test panel to INT. MOD. terminals on the test scope with test cord No. 10.

c. Set the SWEEP LENGTH switch on the receiver test panel to position 4.

d. Connect the Y-SIGNAL INPUT and GND terminals of the oscillograph to the VIDEO MON OUTPUT jack of the receiver, using test cord No. 9.

e. Turn on the test oscilloscope. Set the vertical and horizontal controls to center the trace both vertically and horizontally. Turn the vertical-gain control to the mark which has been arbitrarily chosen by the person in charge. Set the attenuation switch to the designated value. Set the X-DEFLECTION PLATE switch to TERMINALS. Set the Y-DEFLECTION PLATE switch to AMPLIFIERS.

f. Turn the gain-selector switch to MAN, and set the MANUAL GAIN CONTROL to a position arbitrarily chosen by the person in charge.

g. Direct the antenna toward the designated target. Turn the knurled knob on the T-R box for maximum height of signal on the scope.

LOG ENTRY. Enter the height of the received signal. If the height is below the value designated by the person in charge, enter it with an asterisk (*).

CORRECTIVE MEASURES. If the signal is not above the designated height, adjust the controls in the components listed below, to obtain maximum signal.

a. RECEIVER. In the receiver, adiust the following:

(1) BEAT OSCILLATOR TUNING control.

(2) CONVERTER TUNING control.

b. TRANSMITTER. In the transmitter, adjust the following:

(1) T-R box tuning.

(2) T-R box position.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
40	1200	8 Feb 43	Height of signal only one-half of assigned height. Adjusted for max. signal. J.H.

132. Item 41, Video and Notch Mon. Waveshape (Track)

SAMPLE ENTRY.

41. Video and Notch Mon. Wave Shape, (Track) [ ] ( ) (OK–N*).....		OK	

LOCATION. See figure 111. For item 41, plug into the VIDEO AND NOTCH MON. OUTPUT JACK.

NORMAL CONDITION. The waveshape shown in figure 111 should be obtained at this jack.

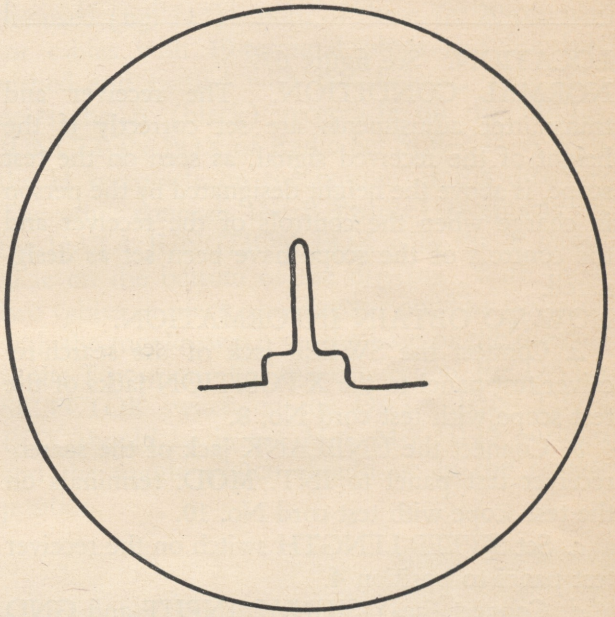


Figure 111. Waveshape at video and notch monitor output jack (track).

HOW TO OBTAIN INFORMATION. Set up as in item 40, but put cord No. 9 into the VIDEO and NOTCH MON. OUTPUT jack.

LOG ENTRY. Enter OK if the correct waveshape is obtained from the VIDEO and NOTCH MON. OUTPUT jack. Enter N* if the waveshape is materially different.

REMARKS. Make an entry on the Work-To-Be-Done form for a check during shut-down if the waveshape is materially different from that of figure 111.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
41	0815	3 Sept 43	Notch barely shows. Made entry on the Work-To-Be-Done forms. J.C.

133. Item 42, Search Rec. and Trans. Adjustment

SAMPLE ENTRY.

42. Search Rec. and Trans. Adjustment [1½ min.] ( ) (Inches).....	2	

LOCATION. See figure 67.

NORMAL CONDITION. The receiver and transmitter adjustments are set correctly if the height of the received signal, as seen on the test scope, is above the height designated by the person in charge when the controls of the receiver and the controls of the scope have been set as designated.

HOW TO OBTAIN INFORMATION.

a. Connect the SWEEP jack of the search-receiver test panel to the X-POSITION jacks of the test scope with test cord No. 8.

b. Connect the UNBLANK jack of the search-receiver test panel to INT. MOD. terminals on the test scope with test cord No. 10.

c. Set SWEEP LENGTH switch on the receiver test panel to position 4.

d. Connect the Y-SIGNAL INPUT and GND terminals of the oscillograph to the VIDEO MON OUTPUT jack of the receiver, using test cord No. 9.

e. Turn on the test oscilloscope. Set the vertical and horizontal controls in order to center the trace both vertically and horizontally. Turn the vertical-gain control to the mark which has been arbitrarily chosen by the person in charge. Set the attenuation switch to the designated value. Set the X-DEFLECTION PLATE switch to TERMINALS. Set the Y-DEFLECTION PLATE switch to AMPLIFIERS.

f. Turn the gain-selector switch to MAN, and set the MANUAL GAIN CONTROL to a position arbitrarily chosen by the person in charge.

g. Direct the antenna toward the designated target. The signal observed should be above the height designated by the person in charge.

LOG ENTRY. Enter the height of the received signal. If the signal is below the height designated by the person in charge, enter it with an asterisk (*).

CORRECTIVE MEASURES. If the signal is not above the designated height, adjust the controls in the components listed below, to obtain maximum signal.

a. Receiver. In the receiver, adjust the following:

(1) BEAT OSCILLATOR TUNING control.
(2) CONVERTER TUNING control.

b. Transmitter. In the transmitter, adjust the following:

(1) T-R box tuning.
(2) Trombone.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
42	1545	1 Oct 43	Signal weak. Adjusted controls and succeeded in bringing signal up to normal height. D.M.S.

134. Item 43, Frequency (Search)

SAMPLE ENTRY.

43. Frequency (Search) [±2] ( ) (Mc).....	Enter measured frequency

LOCATION. The wavemeter MON. jack (fig. 62) is used to measure the search frequency.

NORMAL CONDITION. The search-receiver frequency is normal if it is within 2 megacycles of the frequency designated by the person in charge.

HOW TO OBTAIN INFORMATION.

a. Insert the black T-lead of the No. 12 cord into the – DC VOLTS jack of the Weston analyzer; then insert the red lead into the + 100-MICROAMPS jack. Turn the range-selector switch to the 100-MICROAMPS position. Turn the meter-selector switch to the 1,000-OHMS-PER-VOLT.

b. Turn the wavemeter switch ON.

c. Place the plug of the No. 12 cord in the MON. jack of the wavemeter. Tune the wavemeter for maximum reading on the Weston analyzer. Compare the wavemeter reading with the chart on the door of the search transmitter. Then read the frequency on the chart.

LOG ENTRY. Record the search frequency as measured to the nearest megacycle. If it is more than 2 megacycles off the assigned frequency, enter with an asterisk (*).

REMARKS. Notify the person in charge if the frequency is out of tolerance.

REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
43	1545	9 Jan 43	Frequency high. Made an entry on the Work-To-Be-Done forms. M.B.

135. Item 44, Video and Notch Mon. Waveshape (Search)

SAMPLE ENTRY.

44. Video and Notch Mon. Waveshape (Search) [ ] ( ) (OK–N*).....	OK	OK	N*

LOCATION. See figure 67. For item 41, plug into the VIDEO and NOTCH MON. OUTPUT jack.
NORMAL CONDITION. The waveshape shown in figure 111 should be obtained at this jack.
HOW TO OBTAIN INFORMATION. Set up as in item 42, but plug into the VIDEO and NOTCH MON. OUTPUT jack.
LOG ENTRY. Enter OK if the correct waveshape appears at the VIDEO and NOTCH MONITOR OUTPUT jack. Enter N* if the waveshape is materially different.
REMARKS. Make an entry on the Work-To-Be-Done form for a check during shutdown if the waveshape is materially different from that shown in figure 111.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
44	1200	8 Jan 43	Notch barely shows. Made an entry on Work-To-Be-Done forms. J.H.

136. Item 45 (Blank)

137. Item 46, Range-Unit Zero-Reference Number

SAMPLE ENTRY.

46. Range Unit Zero Reference Number [ ] ( ) (Yds.).....	350	350	340*

LOCATION. (See figure 75.) The range-unit zero-reference number will be found on the range-unit dial which is on the upper panel of the ranging equipment.
NORMAL CONDITION. The range-unit zero-reference number is correct if it is within 10 yards of the number designated by the person in charge.
HOW TO OBTAIN INFORMATION.
a. Crank the operator's range-control-unit handwheel to a reading of zero yards on the dials.
b. Observe the reading on the range-unit dial. This reading is the range-unit reference number.
LOG ENTRY. Enter the reading of the range-unit dial to the nearest yard, adding an asterisk (*) if it is not within 10 yards of the number assigned by the person in charge.
CORRECTIVE MEASURES. If the zero reference number that is read is not within 10 yards of the assigned zero reference, take the following steps to correct it:
a. Crank the range-unit handwheel until the range unit reads the designated zero reference number.
b. Loosen the wingnuts that hold the window protecting the dials on the range operator's control unit; remove the knob from the shaft and set it back on the shaft so that the dials read exactly zero.
c. Loosen the knurled knob on the fine dial; remove the knob from the shaft and set it back on the shaft so that the dials read exactly zero.
d. Set the window back in place.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
46	1200	8 Sept 43	Zero reference number was 15 yards off when the operator's dials read zero. Set the range unit dial on the designated zero reference number and corrected operator's range dial. J. C.

138. Item 47, Blowers and Air Filters

SAMPLE ENTRY.

47. Blowers and air Filters [ ] ( ) (OK-N*)...		OK	

LOCATION. The low-pressure and high-pressure blowers (fig. 30) are located under the trailer. The azimuth-spinner motor blower is on the rear of the trailer under the rear cover of the pedestal casting (fig. 45).
NORMAL CONDITION. The low-pressure and high-pressure blowers are in good condition if

there is a current of air blowing through the filter strong enough to hold a sheet of paper against the under side of the filter chamber. The azimuth-spinner motor blower is normal if it can be seen operating.

HOW TO OBTAIN INFORMATION.

a. For the low-pressure and high-pressure blowers simply hold a sheet of paper against the under side of the filter chamber. If the paper sticks firmly against the under side, the blowers are OK.

b. For the azimuth-spinner motor blower, remove the screws holding the cover of the chamber on the rear top of the pedestal. The fan will be seen turning if the azimuth-spinner motor blower is operating.

LOG ENTRY. Enter OK if all three of the blowers are in good operating condition; enter N* if any one of the three is operating poorly.

CORRECTIVE MEASURES. Notify the person in charge immediately if any one of the three blowers or the filters are not in normal condition. Make an entry on the Work-To-Be-Done form for replacement of the filter elements during maintenance period if the suction through the filter chamber is weak. For description of replacement or filter elements, see TM 11–1427.

REMARKS. The set will be seriously damaged in a short time if the blowers and filters are in poor condition or if any of the blowers stop running

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Date	Time	NOTES
47	1545	6 Sept 43	Found that the stream of air through the H. P. and L. P. blowers was too weak to support a sheet of paper against the under side of the filter chamber. Notified the person in charge, who ordered the set shut down at once. J. H.

139. Items 48 to 55 (Blank)

140. Item 56, Oscilloscopes (Ra., Az., El.).

SAMPLE ENTRY.

56. Oscilloscopes (Ra., Az., El.) [Oper. Cond.] ( ) (OK–N*)	OK	OK	N*

LOCATION. See figures 7 and 15.

NORMAL CONDITION. The operating condition of the oscilloscopes is normal if—

a. The controls are not damaged or loose and turn smoothly.

b. The functions activated by the controls respond correctly.

c. There is a single notch on the oscilloscopes when the IMAGE SPACING is OFF and two notches when the IMAGE SPACING is ON.

d. There is no skip in the range notch when it is cranked completely across the range-oscilloscope screen nor any corresponding skip in the azimuth and elevation scopes.

e. The range notch remains steady in position and brightness when the handwheel and the intensity controls are not moved.

f. The traces on the oscilloscopes can be focused into thin, clean lines.

g. The signal appears in the notches of the SEARCH and TRACK sections of the range scope at the same time.

h. The signal appears in the notches of the azimuth and elevation oscilloscopes at the same time that it appears in the notch of the range scope.

i. All signals become attenuated when a signal drops into the notch with the gain control on AUTOMATIC.

LOG ENTRY. Enter OK if all the conditions listed above are fulfilled; enter N* if any are not fulfilled.

CORRECTIVE MEASURES.

a. If double notches appear near zero range with the IMAGE SPACING control turned to OFF, try closing the doors of the cab. If this does not eliminate the double notches, notify the person in charge.

b. If the oscilloscope patterns under NORMAL CONDITION are defective, notify the person in charge; then describe the condition in detail on the Work-To-Be-Done form. None of the faults causing these troubles can be attended to without extensive service procedure, but an accurate and thorough description will be of assistance to the service man.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
56	1200	7 Apr 43	Focusing control on range scope loose on shaft. Could not focus. Could not tighten readily so notified person in charge. J. H.

141. Item 57, Control Units (Ra., Az., El.).

SAMPLE ENTRY.

57. Control Units (Ra., Az., El.) [Oper. Cond.] ( ) (OK–N*)	OK	OK	N*

LOCATION. See figure 15.

NORMAL CONDITION. The control units are in normal operating condition when—

a. All dial lights operate.

b. The handwheels move freely and the dials respond to the handwheels.

c. The AUTO MAN and the AID OFF-ON-AID FIXED selector switches work smoothly.

d. The light on the elevation control unit goes on when the dials read zero or 1600 mils.

LOG ENTRY. Enter OK if the conditions listed above are satisfactory; enter N* if not.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
57	1545	9 Aug 43	Could not throw elevation-control selector switch to automatic. Notified person in charge, who ordered operation to continue, using manual control for elevation. Made an entry on Work-To-Be-Done forms for check during next shut-down period. L. C.

142. Item 58 (Blank)

143. Item 59, Pedestal

SAMPLE ENTRY.

59. Pedestal (Oper. Cond.] ( ) (OK–N*)	OK	OK	N*

LOCATION. See figures 28 and 29.

NORMAL CONDITION. The operation of the pedestal is normal when the antenna yoke is stiff when pushed against with the hand and when it follows the azimuth and elevation controls without lagging or overshooting.

HOW TO OBTAIN INFORMATION.

a. Stand on the top of the cab and try to rotate the yoke in azimuth while the operator holds the control handwheel stationary. The antenna should be very stiff. Do the same for elevation. The rotation in elevation should be equally difficult.

b. Rotate the elevation handwheel as fast as possible and bring it to a sudden stop, noticing whether the antenna stops equally suddenly. There should be no trace of overshooting.

c. The check for lag and overshooting in azimuth takes two men because one man cannot turn the handwheel and observe the antenna at the same time. For this check it will be necessary for one man to turn the handwheel and the other man to station himself outside the cab where he endeavors to compare the motions of the handwheel and antenna. The antenna should follow the handwheel with no trace of lag.

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

CORRECTIVE MEASURES.

a. If the antenna is not correct in azimuth, check item 35, Output Amplifier Plate Current, Test 2.

b. If the antenna is not correct in elevation, check item 36, Output Amplifier Plate Current, Test 3.

c. Notify the person in charge and make an entry on the Work-To-Be-Done form that operation is not satisfactory.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
59	1200	5 Sept 43	Antenna was not stiff in elevation. Lag and overshooting were also present. Input amplifier plate current very low. Notified person in charge. Made entry on Work-To-Be-Done forms. C. H.

144. Item 60, Antenna

SAMPLE ENTRY.

60. Antenna [Oper. Cond.] ( ) (OK–N*)	OK	OK	N*

LOCATION. See figures 28 and 29.

NORMAL CONDITION. The operating condition of the antenna is normal if:

a. The antenna is not damaged.

b. The track scanner assembly rotates at normal speed and shows no evidence of excessive vibration and noise.

c. The dipoles are intact, firm, and tight, and are of the correct length for the frequency in operation.

d. All the tools are in their correct places on the yoke.

e. There is no excessive vibration or jitter in the antenna.

f. The telescope is in operating condition.

g. The telephone connection is in operating condition.

LOG ENTRY. Enter OK if the general condition of the items listed above is satisfactory; enter N* if not.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
60	1200	5 Sept 43	One of the dipoles appeared loose. Notified the person in charge immediately. J. H.

145. Items 61, 62, and 63 (Blank)

146. Item 64, Automatic Operation

SAMPLE ENTRY.

64. Automatic Operations [ ] ( ) (OK–N*)	OK	OK	N*

LOCATION. Check for automatic operation on the operator's oscilloscopes and controls. (See figure 49.)

NORMAL CONDITION. The automatic operation is normal if, in the range oscilloscope, the signal pulls from the edge of the notch to the center of the notch after going past the center only once and then remains steady in the center of the notch, and if in the azimuth and elevation oscilloscopes the two signals pull to equality in height after overshooting just once.

HOW TO OBTAIN INFORMATION.

a. ON THE RANGE OSCILLOSCOPE. Train the antenna on a fixed target giving a good signal on the track screen of the range operator's oscilloscope. With the lobe switch off, elevate the antenna until the signal is approximately equal to noise. Check that the TRACK VIDEO switch on the range-tracking unit is ON. If the red light on the range-control unit is on, turn the AUTOMATIC TRACKING switch to the TRACK position, extinguishing the light. Place one edge of the range notch under the signal and switch to automatic range. The notch should immediately center itself under the signal after going once past the center and then coming to rest.

b. ON THE AZIMUTH OSCILLOSCOPE. In the cab, operate the controls to select a weak signal from a fixed target. With the azimuth control, direct the antenna so that the peaks on the track screen of the azimuth oscilloscope are unequal in height; then switch the MANUAL-AUTO control to AUTO, and the two peaks should become equal in height after becoming unequal once in the opposite sense.

c. ON THE ELEVATION OSCILLOSCOPE. In the cab, operate the controls to select a weak signal from a fixed target, and, with the elevation control, direct the antenna so that the peaks on the track screen of the elevation oscilloscope are unequal in height. Switch the MANUAL-AUTO control to AUTO; then two peaks should become equal in height after becoming unequal once in the opposite sense.

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

CORRECTIVE MEASURES.

a. RANGE. Check item 37, Range Balance.

b. AZIMUTH. Check item 30, Test AC Azimuth and item 32, Test DC Azimuth. Lower the gain on the receiver-control unit.

c. ELEVATION. Check item 31, Test AC Elevation and item 33, Test DC Elevation. Lower the gain on the receiver-control unit.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
64	1200	5 June 43	Signal on the range scope failed to remain in center. Checked item 37, Range Balance. Now OK. G. G. T.

147. Item 65, System Sensitivity (Track)

SAMPLE ENTRY.

65. System Sensitivity (Track) (Az. R. S.) [80–100] ( ) (%)	90	95	50*

LOCATION. The sensitivity of the track system is indicated by the height of the oscilloscope echo from a fixed-reference target with a given setting of the MANUAL GAIN CONTROL (figs. 49 and 79).

NORMAL CONDITION. The system sensitivity is normal of the scope-image height is above the designated value.

HOW TO OBTAIN INFORMATION. To get sensitivity reading, pick up the reference target at the correct azimuth and range. With the GAIN CONTROL SELECTOR switch set to

MAN and the MANUAL GAIN CONTROL exactly at the designated setting, maximize the signal response by tuning the BEAT OSCILLATOR TUNING CONTROL. Measure the height of the oscilloscope image on the screen. Initially, the person in charge will decide upon and designate the following:

a. The fixed-reference target to be used in this measurement.

b. The gain-control setting to be used. Scratch a mark on the panel and control knob to locate the position of the setting.

c. The normal height of the oscilloscope image.

LOG ENTRY. Record in the parentheses to the right of the item title the azimuth and range of the reference target. The sensitivity reading may be noted by a + or — sign to signify comparative sensitivity with optimum. Enter in the log space the height of the scope image to the nearest 1/8 inch. Add an asterisk (*) if the image height is below the designated height.

CORRECTIVE MEASURES. If, after rechecking the steps under HOW TO OBTAIN INFORMATION, the system sensitivity is abnormal, check the following factors and take whatever corrective measures are necessary as given under the respective items.

a. Item 22 (Rectifier d-c voltage).

b. Item 25 (Track Rec. Beat Osc. Cat. Current).

c. Item 26 (Converter Cathode Current).

d. Item 40 (Track Rec. and Trans. Adjustment).

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
65	1200	9 June 43	Sensitivity down. Made all possible checks of items affecting sensitivity. Made a note on the Work-To-Be-Done forms requesting check of receiver. G.G.T.

148. Item 66, System Sensitivity (Search)

SAMPLE ENTRY.

66. System Sensitivity (Search) (Az. R. S.) [80–100] ( ) (%)	80	95	65*

LOCATION. The sensitivity of the search system is indicated by the height of the oscilloscope echo from a fixed-reference target with a given setting of the MANUAL GAIN CONTROL (figs. 49 and 79).

NORMAL CONDITION. The system sensitivity is normal if the oscilloscope-image height is above the designated value.

HOW TO OBTAIN INFORMATION. To get a sensitivity reading, pick up the reference target at the correct azimuth range. With the GAIN CONTROL SELECTOR set to MAN and the MANUAL GAIN CONTROL set exactly at the designated setting, maximize the signal response by adjusting the BEAT OSCILLATOR TUNING CONTROL. Measure the height of the oscilloscope image on the screen. Initially, the person in charge will decide upon and designate the following:

a. The fixed-reference target to be used in this measurement.

b. The gain-control setting to be used. Scratch a mark on the panel and control knob to locate the position of the setting.

c. The normal height of the scope image.

LOG ENTRY. Record in the parentheses to the right of the item title the azimuth and range of the reference target. The sensitivity reading may be noted by a plus (+) or minus (—) sign, to signify comparative sensitivity with optimum. Enter in the log space the height of the oscilloscope image to the nearest 1/8 inch. Enter an asterisk (*) if the image height is below the designated height.

CORRECTIVE MEASURES. If, after rechecking the steps under how to obtain the information, the system sensitivity is abnormal, check the following factors and take whatever corrective measures are necessary as given under the respective items:

a. Item 22, Rectifier, DC Voltage.

b. Item 24, Search Trans. Grid Current.

c. Item 27, Search Rec. R. F. Amplifier Plate Current.

d. Item 28, Beat Osc. Plate Current.

e. Item 29, Converter Plate Current.

f. Item 42, Search Rec. and Trans. Adjustment.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
66	1545	6 Mar 43	Sensitivity down. Made all possible checks of items affecting sensitivity. Made a note on the Work-To-Be-Done forms requesting check of receiver. J.H.

149. Item 67, Signal-to-Noise-Ratio (Track)

SAMPLE ENTRY.

67. Signal-To-Noise Ratio (Track) [25%] ( ) (Ratio)...	5–1	8–1	3–1*

LOCATION. Determine the signal-to-noise ratio visually from the TRACK screen of the range oscilloscope (fig. 49).

NORMAL CONDITION. The signal-to-noise ratio is normal if above the designated ratio.

HOW TO OBTAIN INFORMATION. Turn the antenna to the fixed-reference target used for item 65, System Sensitivity (Track), and with the MAN. GAIN CONTROL (fig. 79) adjusted to give the designated echo height, compare the height of the fixed echo on the range oscilloscope to the height of the noise, or "grass". Make the estimation carefully and express it as a ratio. The person in charge will decide upon the normal signal-to-noise ratio for the reference target.

LOG ENTRY. Enter in the log sheet the measured ratio of the echo to the noise level. Add an asterisk (*) if the measured ratio is more than 25 percent below the designated ratio.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
67	1545	9 Mar 43	Signal-to-noise ratio low. System sensitivity poor. Made note on Work-To-Be-Done forms for retuning during shut-down period. D. M. S.

150. Item 68, Signal-to-Noise Ratio (Search)

SAMPLE ENTRY.

68. Signal-To-Noise Ratio (Search) [25%] ( ) (Ratio)...	3–1	3–1	1–1*

LOCATION. Determine the signal-to-noise ratio visually from the SEARCH screen of the range oscilloscope (fig. 49).

NORMAL CONDITION. The signal-to-noise ratio is normal if above the designated ratio.

HOW TO OBTAIN INFORMATION. Turn the antenna to the fixed-reference target, and with the MAN. GAIN CONTROL (fig. 79) adjusted to give the designated echo height, compare the height of the fixed echo on the range oscilloscope to the height of the noise or "grass". Make the estimation carefully and express it as a ratio. The person in charge will decide upon the normal signal-to-noise ratio for the target.

LOG ENTRY. Enter in the log sheet the measured value of the signal-to-noise ratio. Enter an asterisk (*) if the measured ratio is more than 25 percent below the designated ratio.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
68	1200	6 Feb 43	Signal-to-noise ratio low. System sensitivity poor. Made note on Work-To-Be-Done forms for retuning during shut-down period. M. B.

151. Item 69, Orientation, Slant Range

SAMPLE ENTRY.

69. Orientation, Slant Range [5000] ( ) (Yds.)...	5001	4998	5020*

LOCATION. Use the operator's range-control unit and the range unit for this check (figs. 49 and 75).

NORMAL CONDITION. The range operator's dial reading is normal if it is within 10 yards of the known distance to the designated target; the range-unit dial reading is normal if, after the range-unit zero-reference number is added, the sum is within 10 yards of the known distance of the designated target.

HOW TO OBTAIN INFORMATION.

a. Choose a target whose range and azimuth are known accurately.

b. Set the MAN-AUTO switch on the control unit to MANUAL and crank the antenna to the azimuth and elevation of the fixed target used in the sensitivity check; then crank the signal into the notch.

c. Throw the controls to AUTOMATIC.

LOG ENTRY. Enter to the right of the item title the known distance in yards of the designated target. Enter in the log space the reading of the range operator's control-unit dial.

CORRECTIVE MEASURES. If the range operator's control-unit reading is in error, loosen the four wingnuts on the window covering the dials and remove the window. The fine dial may now be set to the correct value by loosening the knurled hub of the dial, removing the dial, and putting it back on the shaft so that it reads correctly.

REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
69	1200	6 Apr 43	Operator's control-unit dial was 20 yards off. Removed dial from shaft and set it back on so that it gave correct reading. J. H.

152. Item 70, Orientation, Azimuth

SAMPLE ENTRY.

70. Orientation, Azimuth [639] ( ) (Mils.)..	640	639	635*

LOCATION. Use the azimuth dial to check the orientation in azimuth (fig. 8).
NORMAL CONDITION. The azimuth operator's dial reading is normal if it is within 3 mils of the known azimuth of the designated target.
HOW TO OBTAIN INFORMATION.

a. Set the control-unit switch to MANUAL and crank the antenna to the azimuth and elevation of the fixed target used in the slant-range orientation check; then crank the signal into the notch.

b. Throw the controls to AUTOMATIC.

LOG ENTRY. Enter in the log space the reading of the azimuth operator's control-unit dial. Enter an asterisk (*) if the reading is not within 3 mils of the known azimuth.
CORRECTIVE MEASURES. If the azimuth operator's control-unit reading is in error, loosen the four wingnuts on the window covering the dials, and remove the window. The fine dial may now be set to the correct value by loosening the knurled hub of the dial, removing the dial, and putting it back on the shaft so that it reads correctly.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
70	1545	1 June 43	Operator's control-unit dial was 4 mils off. Removed dial from shaft and set it back on so that it gave correct reading. L. C.

153. Item 71, Orientation, Elevation

SAMPLE ENTRY.

71. Orientation, Elevation [0] ( ) (Mils.)..	2	1	4*

LOCATION. Use for this check the elevation dial on the antenna yoke (figs. 8 and 16), and the operator's elevation-control-unit dials.
NORMAL CONDITION. The orientation in elevation is normal if the operator's elevation-control-unit dials read within 3 mils of zero when the elevation dials on the antenna have been set to zero.
HOW TO OBTAIN INFORMATION. Lower the antenna by means of the crank on the operator's elevation-control unit until the elevation dial on the antenna reads zero, using the telephone intercommunication system if desired. The operator reads his dials when the man on the elevation dials on the yoke reports a reading of exactly zero.
LOG ENTRY. Enter in the log space the reading of the operator's elevation-control-unit dials. Enter an asterisk (*) if the reading is not within 3 mils of zero.
CORRECTIVE MEASURES. If the range operator's control-unit reading is in error, loosen the four wingnuts on the window covering the dials and remove the window. The fine dial may now be set to the correct value by loosening the knurled hub of the dial, removing the dial, and putting it back on the shaft so that it reads correctly.
REFERENCES.
Page ( ) ( ) ( ) ( )
Paragraph ( ) ( ) ( ) ( )
TM 11– ( ) ( ) ( ) ( )
SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
71	1200	9 Sept 43	Operator's dials showed a reading of 4 mils when the antenna had been set to zero elevation. Removed dial from shaft of control unit and set it to zero. J. H.

154. Item 72, Orientation, Altitude

SAMPLE ENTRY.

72. Orientation, Altitude [5,000] ( ) (Yds.)..	4,990	4,995	5,015*

LOCATION. Use for this check the operator's range-control-unit dials, the operator's elevation-

control-unit dials, and the range-converter dial (figs. 8, 12, and 75).

NORMAL CONDITION. The orientation is normal in altitude if the range-converter dial reads between 4,990 and 5,010 yards when the operator's range-control-unit dial reads 10,000 yards and the operator's control-unit dial reads 533 mils.

HOW TO OBTAIN INFORMATION.

a. Crank the operator's range-control-unit dials to a reading of 10,000 yards.

b. Crank the operator's elevation-control-unit dials to a reading of 533 mils.

c. Read the range-converter dial.

LOG ENTRY. Enter the reading of the range-converter dial to the nearest yard. Enter an asterisk (*) if the reading is not between 4,990 and 5,010 yards.

CORRECTIVE MEASURES. If the range-converter dial does not read between 4,990 and 5,010 yards, adjust the HT. CALIB. ADJ. for a reading of 5,000 yards.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
72	1545	7 June 43	Range-converter dial reads 5,015. Adjusted the HT. CALIB. ADJ. for a reading of 5,000 yards. G. G. T.

155. Item 73, Maximum Range of Planes/P.E.

SAMPLE ENTRY.

73. Maximum Range of Planes/P.E. [ ] ( ) (K-Yds.).....	22./1.5	44./2.	66.9/3.6

LOG ENTRY. Enter in the left of the log space the number of thousands of yards the maximum range a plane was detected during the past log period. Enter in the right of the log space the number of thousands of yards the farthest identified permanent echo received during the past log period. At certain times, known permanent echoes will not show up in the scopes. It will be up to the person in charge to determine whether that instance is due to atmospheric conditions or to trouble in the set.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
73	1545	25 Dec 44	Picked up unidentified plane at 35,650 Yds. Reported same to C.O. G. G. T.

156. Items 74 and 75 (Blank)

157. Item 76, Log Finishing Time

SAMPLE ENTRY.

76. Log Finishing Time [ ] ( ) (Hr.-Min.)..	0015	0225	*

HOW TO OBTAIN INFORMATION. Read the time from the official timepiece of the station when all the items in the 2-hour check period are completed. Convert the time to conform with the 24-hour time system.

LOG ENTRY. Record in the log space the log finishing time to the nearest minute. If for any reason it is impossible to finish the log, place an asterisk (*) in the log space.

REMARKS. This item is not intended as an attempt to check up on the person keeping the log. The sole purpose is to obtain general information which may be of assistance in improving set performance. Accuracy in filling out the log is the most important consideration.

REFERENCES.

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

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
76	1200	6 June 43	Rectifier unit inoperative. Cannot repair the defect within the check period. J. H.

158. Items 77, 78, and 79, Operating Time On, Off, Total

SAMPLE ENTRIES.

77	Operating Time, ON....	(Hr.-Min.)	8:00	10:20	15:00
78	Operating Time, OFF...	(Hr.-Min.)	10:00	14:00	16:00
79	Operating Time, TOTAL	(Hr.-Min.)	2:00	3:40	1:00

a. ITEM 77, OPERATING TIME, ON.

LOG ENTRY. Enter the time the equipment is put into operation after every shut-down, using the 24-hour system. Use the official station clock as a standard.

b. ITEM 78, OPERATING TIME, OFF.

LOG ENTRY. Enter the time the equipment is shut down, using the 24-hour system (fig. 98).

There should be an entry for each shut-down. If the radar set is shut down as a result of a break-down, place an asterisk (*) after the log entry.

c. ITEM 79, OPERATING TIME, TOTAL.

LOG ENTRY. Subtract the entry for item 77 from the entry for item 78 and enter the difference as the total operating time.

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
78	1000	16 May 43	Set shut-down by order of M/Sgt. Trott because of slewing in antenna when control is switched from AUTO to MANUAL. No fault was found and set was ordered on air at 1020. Its operation was normal. D. M. S.
78	1400	16 May 43	Antenna began slewing again. Shut down by order of M/Sgt. Trott and found potentiometer in auto. controller with intermittent short. Replaced and on air again at 1500. D. M. S.

159. Item 80, Break-Down, Time Total

SAMPLE ENTRY.

Break-down Time, Total (Hr.-Min.)..	2000	2100	1 hr.

LOG ENTRY. When maintenance is done following a shut-down, enter in column A the time such work was started, and in B the time the work was completed. Record in column C, in hours and minutes, the length of time spent on the work. Whenever there is more than one maintenance period in one day, place an asterisk (*) after the TOTALS entry in column C and give additional ON, OFF, and TOTAL times under NOTES.

SAMPLE ENTRY UNDER NOTES.

Item	Time	Date	NOTES
80	2300	16 May 43	Second maintenance period, ON 1400, OFF 1500, total 1 hour. D.M.S.

160. Item 81, Weekly Summary Items (Items 82 to 89)

SAMPLE ENTRIES.

81	WEEKLY SUMMARY	Totals
82	Hours of Operation (Hr.-Min.)	53:40
83	Break-down Time (Hr.-Min.)	2:20
84		
85	Engine Oil Added (Quarts)	8
86	Gasoline Consumed (Gallons)	367
87	En. Rn. Time (Hours)	56
88	Transmitter Fila. Hrs. (Hours)	54
89		

WEEKLY SUMMARY is a title for items 82-89. Make no entry on the log sheet for item 81. The summary items are to be filled in once a week. The person in charge during the last watch of the week is to fill in items 81-89.

a. ITEM 82, HOURS OF OPERATION. Add up the totals in item 79 for the entire week and enter this sum as Weekly Total.

b. ITEM 83, BREAK-DOWN TIME.

SAMPLE ENTRY.

Break-down Time (Hr.-Min.).....	1:20	....	.....

Obtain total interruption time from items 77 and 78. Locate the entries for item 78 that are followed by an asterisk (*). Subtract each of these from the following entry for item 77.

Sample calculation (using sample entry for items 77, 78, and 79 as an example):

:20
1:00
1:20

c. ITEM 84. (Blank)

d. ITEM 85, ENGINE OIL ADDED. Consult section D, NOTES, on the rear of the log sheet to find the number of quarts of oil added during the week. Enter the number.

e. ITEM 86, GASOLINE CONSUMED. Enter the amount, in gallons, of gasoline consumed in the week just ending. To get this figure, add the last item 6 entry from last week's log to the quantity of gas contained in any fresh drums opened during the week. From this sum, subtract the last item 6 entry from this week's log. From the remainder, subtract any gasoline in the bottom of old drums when replaced with fresh drums. This remainder is the quantity consumed by the engine.

Sample calculation:

Last item 6 entry of last week	48
Two fresh drums opened	110
	158
This week's last item 6 entry	24
	134
Gallons of gasoline discarded with used drums	12
Gallons gasoline consumed	122

f. ITEM 87, ENGINE RUNNING TIME. Enter the total number of hours of running time of the engine for the present week. To get this figure subtract the last item 15 entry on last week's log

sheet from the last item 15 entry on this week's log sheet.

Example:

Last item 15 entry on this week's log sheet 448.4
Last item 15 entry on last week's log sheet 400.4
Total engine hours for this week ... 48.0

g. ITEM 88, TRANSMITTER FILAMENT HOURS. Enter the total operating time of the trans. filament meter for the present week. To set this figure, subtract the last item 21 entry in last week's log sheet from the last item 21 entry in this week's log sheet.

Example:

Last item 21 entry on this week's log sheet 1048
Last item 21 entry on last week's log sheet 1000
Total trans. filament hours for this week 48

h. ITEM 89. (Blank)

161. Item 90, Signature of Person Keeping Log (Items 91-95)

SAMPLE ENTRIES. (Items 90, 91, 92, 93, 94, and 95.)

90 SIGNATURE OF PERSON KEEPING LOG				
91 Signature	92 Rank	93 Date	94 On	95 Off
Lawrence Clark.....	Sgt.	1 Aug. 43	8:00	16:00
Clarkie Hunter.....	Cpl.	2 Aug. 43	8:00	16:00
Marc Brown.....	T/5	3 Aug. 43	8:00	16:00
David Scott.....	T/5	4 Aug. 43	8:00	16:00
J. L. Hunter.....	Cpl.	5 Aug. 43	8:00	16:00
George G. Trott.....	M/Sgt.	6 Aug. 43	8:00	16:00
James Clarke.....	Cpl.	7 Aug. 43	8:00	16:00

Make no entries. Item 90, *Signature of Person Keeping Log,* is the heading for items 91 to 95 which are to be filled in each time a technician goes on or off duty.

a. ITEM 91, SIGNATURE. The technician keeping the log is to sign his name in this space when he reports for duty. He enters an asterisk (*) if not satisfied with the condition of the station. He and the technician relieved must both initial the corresponding note on the back of the log sheet.

b. ITEM 92, RANK. Enter the rank of the technician keeping the log.

c. ITEM 93, DATE. Enter the date the technician goes on duty.

d. ITEM 94, ON. Enter the time (using the 24-hour system) the technician goes on duty.

e. ITEM 95, OFF. Enter the time (using the 24-hour system) the technician is relieved.

162. Item 96, Sheet Numbers

Enter the number of log sheets in order (1, 2, 3, 4, etc.) as they are used, one sheet for each week.

163. How to fill in Back of Log

a. HEADING. The heading of the back of the log consists of Roman numeral items I–VI. Fill them in whether or not any entries are made on the back of the log.

(1) For all items except numbers IV and V, obtain the information from the heading on the front of the log sheet.

(2) In item IV, record (in feet or miles) the distance the station is located from the shore.

Example: DISTANCE FROM SEA 10 miles.

(3) In item V, record (in feet) the elevation of the station above sea level.

Example: ELEVATION 236 feet.

(4) See the sample log sheet in figure 96.

b. HOW TO DETERMINE ELEVATION AT SITE. If no topographical map is available, elevation may be calculated roughly by using a barometer for determining atmospheric pressure and converting the pressure into elevation. The procedure is as follows:

(1) Select a time (if possible) when the wind velocity at a point of known altitude and at the station is almost zero.

(2) At the time of zero wind velocity, measure the barometric pressure (in inches) at the station and at the point of known altitude. The two readings must be taken at the same instant.

(3) If the station reading is less than that of the known elevation, add 100 feet for every 1/10-inch difference to determine the station elevation.

(4) If the station reading is higher than that of the known elevation, subtract 100 feet for every 1/10-inch difference.

NOTE. The barometers used for the above calculations must be accurate and preferably of the mercury type. The aneroid type is not calibrated with the same degree of accuracy as that of the mercury glass tube. However, the mercury type is more easily broken than the aneroid.

c. SECTION A, NOTES. When an asterisk (*) has been used on the front of the log sheet to indicate an abnormal condition, record and initial the following information under NOTES in section A (fig. 96).

(1) The item number.

(2) The time the abnormal condition was first observed.

(3) A description of the condition and its cause.

(4) A statement of what was done to correct the condition.

(5) Initials of the technician making the notes.

d. 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: transmitter, control panel, power unit, and oscilloscope.

(2) *Columns 1 to 4.* Record the *name, type, serial,* and *order* numbers of the component TAKEN OUT and the component PUT IN. Find the *name, type, serial,* and *order* number on the nameplate of the component.

(3) *Column 5.* SERVICE DATES, "IN." In column 5 enter the date that the component TAKEN OUT was originally installed. Find the date of the original installation in the station records. In 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 transmitter filament 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 transmitter filament hour meter reading at the time the installation is made.

(6) *Column 8.* HOUR METER READINGS, "OUT." In column 8 enter the transmitter filament hour meter reading at the time the component is TAKEN OUT. This reading is usually the same as that entered in the PUT IN space in column 7.

(7) *Column 9.* HOUR METER READINGS, "TOTAL." In column 9 record the total time the component TAKEN OUT has been in use. To get this figure, subtract the time in column 7 from the time in column 8. Enter the difference in column 9.

(8) *Column 10.* REASON FOR REMOVING COMPONENT. In this space explain briefly *why* the component was removed. For example, it may have failed, it may have been running below optimum performance, or it may have been removed for inspection or servicing.

(9) *Column 11.* DISPOSITION OF REMOVED COMPONENT. In this space explain exactly what was done with the component after it was removed.

(10) *Column 12.* WORK DONE BY. This space is provided for the signature of the technician who removed or installed the component.

e. SECTION C, PART RECORD. (1) *General.* Fill in section C whenever a part or tube is *removed* or *installed.* In addition, enter all repairs made on spare equipment. No entries are required in spaces blanked out by diagonal rulings. Entries for a part or tube which has been *removed* are to be made on one of the three lines marked TAKEN OUT—A, B, and C. Entries for a part or tube *installed* are to be made on one of the three lines marked PUT IN—A, B, and C. The description of a part or tube entered on line A, B, or C in columns 1 through 10 must be continued on the corresponding line in columns 11 through 22.

(2) *Columns 1 to 4.* Record the *name, type, serial,* and *order* number of the component from which the part or tube was removed, or in which the part or tube was installed. Find this information on the nameplate of the component or in the Station Record Book.

(3) *Column 5.* SCHEMATIC PART NUMBER. In column 5 write down the schematic part number of the part or tube PUT IN or TAKEN OUT. Find this number from the schematic drawing of the component concerned, or on the part itself.

(4) *Column 6.* NAME OF PART. In this space record the name of the part PUT IN or TAKEN OUT. Find the name of the part on the schematic of the component concerned.

(5) *Column 7.* DESCRIPTION OF PART. In this space give a brief description of the part PUT IN or TAKEN OUT. Some of this information may be obtained from the parts list. Additional information may be found on the part itself. In this description of the part, the name of the manufacturer, the manufacturer's type or catalogue number, the electrical rating of the part, its size, etc., must be included.

(6) *Column 8.* FUNCTION OF PARTS 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: first i-f plate-load resistor, bypass capacitor in first r-f, etc.

(7) *Column 9.* NEW OR USED. Tell whether the part or tube which has been PUT IN is new or used.

(8) *Column 10.* DISPOSITION OF PART TAKEN OUT. Tell exactly what was done with the part or tube after it was removed.

(9) *Column 11.* SERVICE 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 DATES, "OUT." In this space record the date on which the part or tube is TAKEN OUT.

(11) *Column 13.* HOUR METER READINGS, "IN." In this space enter the transmitter filament hour meter reading at the time the part or tube TAKEN OUT was *originally* placed in service. Find this reading in the Station Record Book. In the case of a part or tube being PUT IN, simply enter the transmitter filament hour meter reading at the time the installation is made.

(12) *Column 14.* HOUR METER READINGS, "OUT." In column 14 enter the transmitter filament hour meter reading at the time the part or tube is taken out.

(13) *Column 15.* HOUR METER READINGS, "TOTAL." Under TOTAL in column 15, record the total time the part or tube TAKEN OUT has been in use. To get this figure, subtract the time in column 13 from the time in column 14. Enter the difference in column 15.

(14) *Column 16.* SPARES AT SET. In column 16 give the number of spares of the part or tube PUT IN that are on hand at the set after the installation is made.

(15) *Column 17.* WHERE DID YOU GET THE PART? Answer this question as clearly as possible. Find out where the part PUT IN came from and explain in the space provided. Examples of entries 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. By symptoms are meant first evidences of trouble. Symptoms 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. Some examples of vacuum-tube faults are: open filament, low emission, shorted elements, gassy tube, microphonic tube; examples of electrical faults are: dielectric leak, dielectric break-down, insulation break-down, open circuit, short circuit, arcing, and sticking contacts; and examples of mechanical faults are: a broken, bent, or cracked part; frayed leads; frozen bearings; and stripped threads. This column refers only to a part or tube that has been TAKEN OUT.

(18) *Column 20.* WHAT CAUSED THE FAULT? In column 20 explain what caused the fault to occur, using additional space in section A if necessary. Describe any external condition which may have contributed to the fault. Indicate the 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 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.

f. SECTION D, REMARKS. (1) The daily operation of radar equipments is of significant interest to numerous agencies. The interested personnel include engineers in the devlopmnt laboratories, manufacturers of equipments, 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.

(2) Being 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 they are considered suitable and proper authority so directs, the radar officer can make the necessary entries in the space provided in section D.

(3) 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.

NOTE. Number the page in the space provided at the bottom right-hand corner of the log sheet. This number will be the same as that on the front of the log.

CHAPTER 6

CONVERSION FOR TRAVEL

164. General

When the order to prepare for travel is given, the information outlined below should be followed as closely as is practicable. The first seven steps MUST be performed first and in the order given. The sequence of the remaining steps is not so imperative and may be followed according to the judgment of the person in charge. FM 4–146 describes the tactical procedure and may be used as a guide for performing the action.

165. Procedure

The following are the steps to be taken in disassembling Radio Set SCR–545–A for travel:

a. PRELIMINARY STEPS. (1) Turn OFF all the branch circuit breakers in the cab, except the low- and high-pressure blowers (fig. 30).

(2) One minute later, turn OFF the low- and high-pressure blower switches (fig. 55).

(3) Turn OFF the main circuit breaker (fig. 53).

(4) Shut down the power generator in the power truck (if used) (fig. 34).

(5) Remove the section of transmission line at the antenna by reversing the procedure outlined in chapter 2, paragraph 16*d*(1).

(6) Remove the section of transmission line at the track transmitter by reversing the procedure outlined in chapter 2, paragraph 16*d*(2).

(7) Remove the section of transmission line at the search transmitter by reversing the procedure outlined in chapter 2, paragraph 16*d*(3).

b. PREPARING TRAILER FOR TRAVEL. (1) Place the removable section of the antenna transmission line in the dipole box on top of the trailer (fig. 29).

(2) Remove the outer dipole ends from each side of the search antenna and place them in the dipole box (fig. 112).

NOTE. In removing the *right-hand* dipole ends from the antenna, take out the *assemblies,* thus leaving end-length adjustments intact.

(3) Loosen the TUNING PISTON on the track antenna and push it all the way in. Tighten the lockscrew.

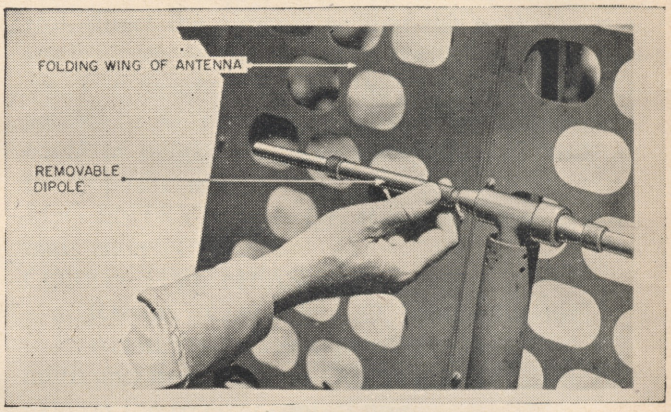


Figure 112. Assembly and disassembly of search dipoles.

(4) Turn the front of the antenna around to face the rear of the trailer. Remove the observer's seat and place it in the traveling position.

(5) Fasten the azimuth turnbuckle locks (fig. 113).

(6) Unloosen all the pedestal bolts (fig. 113).

(7) Lower the antenna with the crank handle until the antenna is ¾ down.

(8) Unfasten the two wing braces (fig. 113).

(9) Fasten the wings in traveling position and also the latch holding chain.

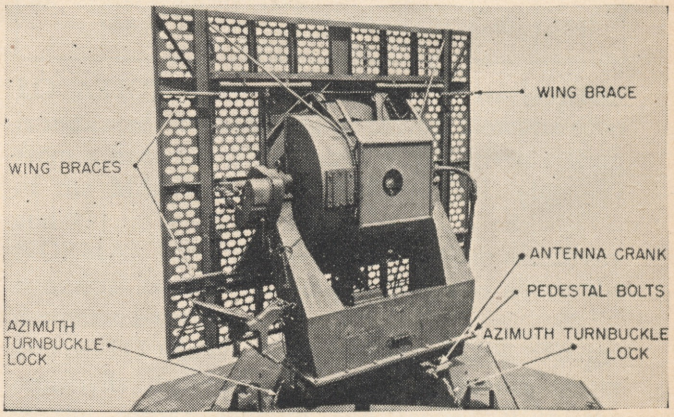


Figure 113. Antenna fastenings.

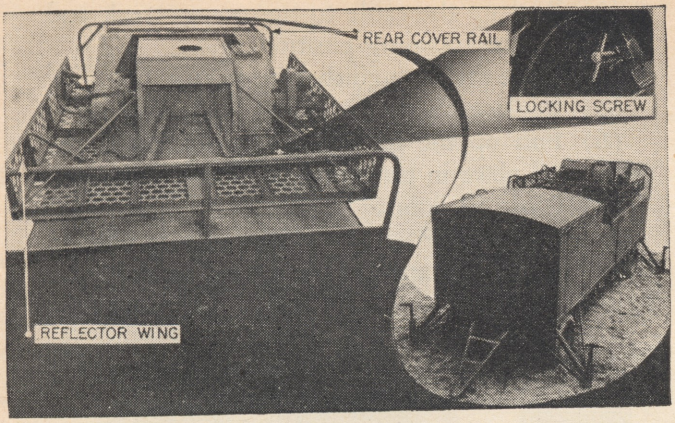


Figure 114. Antenna in traveling position.

(10) Lower the antenna the rest of the way down and fasten it to the four shock mounts.

(11) Swing the rear cover rail up and fasten the chains (fig. 114).

(12) Disconnect the power cable and telephone lines at the front of the trailer.

(13) Remove the fine level vials and place them in the case in the trailer cab. Replace the hatch cover, if necessary.

(14) Reel the telephone cable and signal cable and place in the proper compartment.

(15) Obtain the jack handles from the rack in the trailer cab and insert them in the jacks.

(16) Working in unison, lower the trailer until all the weight is off the jacks.

(17) Unbolt all the outrigger braces and place them in the racks under the sides of the trailer.

(18) Swing up all four outriggers and lock them in traveling position.

(19) Place the front jack pads in their racks at the front of the trailer.

(20) Place the rear jack pads in the rack at the rear of the trailer.

(21) Replace all test equipment, jack-handles, tripod, and field telephones in their racks in the trailer (figs. 15, 23, and 24).

(22) Pull up the ground stake and disconnect the cable. Place the stake in its rack in the trailer cab.

(23) Place the fire extinguisher in its rack in the rear compartment.

(24) Fasten the canvas cover in its place on top of the trailer.

(25) Close all the cabinet doors and compartment doors.

(26) Fasten the operators' chairs in traveling position.

(27) Stow all loose items which are not standard equipment in secure places for travel.

(28) Pack up all tools and place the tool box in its place in the cab.

(29) Close the air filter box doors.

(30) Close the cab doors and lock the ladder in traveling position (fig. 115).

c. PREPARING POWER TRUCK FOR TRAVEL. (1) Disconnect the power cable at Junction Box JB–67–A.

(2) Disconnect the electric cable from generator panel to work truck.

(3) Reel the cable up and place the reel in traveling position.

(4) Remove the muffler from the power engine and place it in traveling position.

(5) Close the hatch cover and fasten it for traveling.

(6) Pull up the ground stake, disconnect cable, and place in traveling rack.

(7) Place the fire extinguisher in its rack.

(8) Close all the gasoline valves.

(9) Disconnect the gas lines and stow for traveling.

(10) Replace all the tools in the proper places in tool box.

(11) Close all the spare parts cabinets and boxes.

(12) Close all doors (fig. 33).

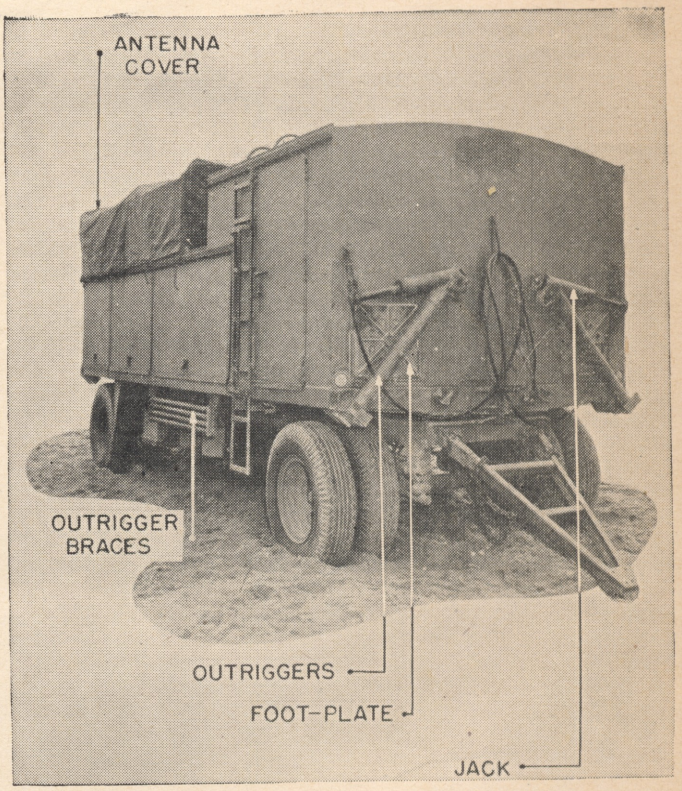


Figure 115. Trailer in traveling position.

d. COUPLING POWER TRUCK TO TRAILER. (1) Lift up the drawbar.

(2) Back the truck up to the drawbar.

(3) Connect the drawbar and the safety chains.

(4) Connect all the air hoses and the electric cables.

(5) Release the emergency hand brake on the trailer.

e. PREPARING THE WORK TRUCK FOR TRAVEL. (1) Coil up the electric cable and stow it in traveling position.

(2) Replace all the tools in the proper places.

(3) Stow all the spare parts in secure places.

(4) Fasten all the spare components in the proper places.

(5) Remove the hoist and stow it in the proper place.

(6) Place the fire extinguisher in its rack.

(7) Close all doors.

f. PREPARING THE CONVERTER TRUCK FOR TRAVEL *(if used)*. (1) Shut OFF all the switches on the power panel.

(2) Disconnect all the cables.

(3) Reel up the cable to the power truck and place it in the traveling position.

(4) Place fire extinguisher in its rack.

(5) Replace all the tools, etc. in tool box.

(6) Pull up the ground stake, disconnect the cable, and place in traveling position.

(7) Close all doors.

g. TRAVELING POSITION. The unit is now in traveling position and should appear as shown in figure 116.

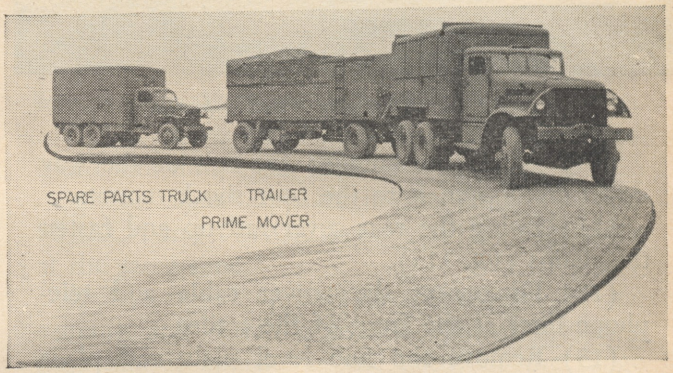


Figure 116. The Radio Set SCR–545–A.

APPENDIX I

ORIENTATION AND SYNCHRONIZATION WITH GUN DIRECTORS

1. Purpose of Appendix

Information is given in this appendix on cable connections to gun directors, on adjusting the telescope on the antenna pedestal to the electrical axis of the antenna of Radio Set SCR–545–A, on aligning the azimuth and elevation indicator dials with predetermined lines or planes of reference, and on orienting and synchronizing the radar unit with various gun directors. All of the material is primarily related to the tactical employment of the radar equipment. Nevertheless, it is included in this technical manual for the benefit of personnel who are being trained as radar repairmen. It is necessary to bear in mind that the final authority on the tactical employment of Radio Set SCR–545–A rests with the using arm. Therefore, the correct procedures to follow in aligning and orienting the equipment will be found in the latest field manual on the subject.

2. Connection to Gun Director

a. CABLE RECEPTACLE. The data provided by Radio Set SCR–545–A terminate in all their forms at a DATA JUNCTION BOX at the rear of the trailer (fig. 27). All data cables must be provided by the director, since none are carried with Radio Set SCR–545–A. The four data receptacles accommodate standard 19 conductor plugs on a 20-conductor cable. The DATA JUNCTION BOX includes two 2-position switches. Figure 85 shows the DATA SELECTOR switch which has a position marked M-9 in which the voltage data system is energized from Director M-9. In its other position marked M-4, M-7, T-20 the RANGE CONVERTER supplies altitude as synchronous repeater data at receptacle B. At the bottom of the box is a toggle switch which has two positions, *local* and *remote*. This switch controls the energy supply to the synchronous repeater fields and is used in the *remote* position for all cases where synchronous data are sent to or received from other equipment.

b. EXTERNAL DATA CABLING. (1) *With Director M-4 or M-7.* When using Radio Set SCR–545–A with Director M-4 or M-7, two data cables are used (fig. 117). Both of these are 20-conductor cables with 19-terminal plugs and are furnished and carried with the director. One connects the A (black) receptacle on the DATA JUNCTION BOX of Radio Set SCR–545–A with the H receptacle on the bottom of the director. The other connects the B (white) receptacle on the DATA JUNCTION BOX with the T receptacle on the bottom of the director. With these two cables in place, the director must be operated with the toggle switch on the base of the director in the T position. For this connection, the DATA SELECTOR switch on the DATA JUNCTION BOX should be in the M-4, M-7, T-20 position and the toggle switch should be in the *remote* position.

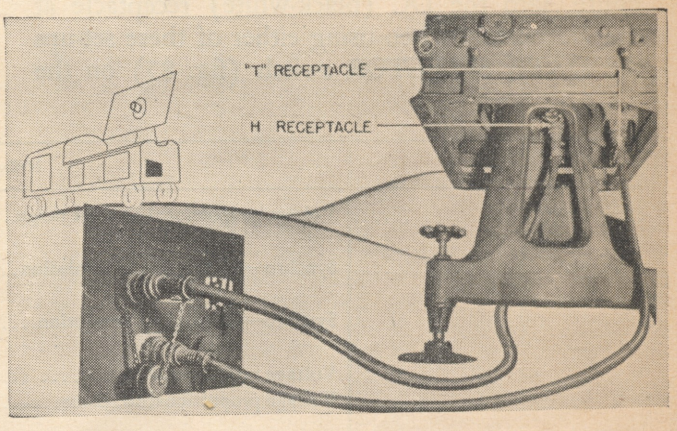


Figure 117. Cabling with Directors M–4 and M–7.

(2) *With Director M-9.* (*a*) Figure 118 shows the recommended cabling set-up for Radio Set SCR–545–A with Director M-9. The A (black) receptacle on the radar connects to the HF (black) receptacle on the tracker of the director. The B (white) receptacle on the radar connects to the RAD (white) receptacle on the tracker of the director. The C (blue) receptacle on the radar connects to the RF (blue) receptacle on the computer of the director. The D (black-

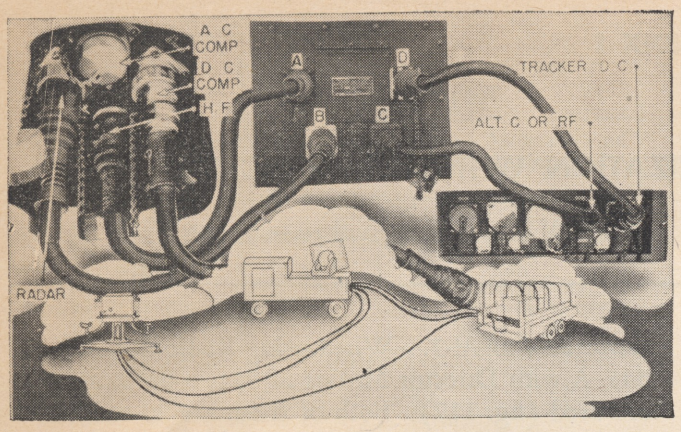


Figure 118. Cabling with Director M–9.

white) receptacle on the radar connects to the DC (black-white) receptacle on the computer of the director. A fifth cable is run out between the tracker and the computer as indicated in the figure. This cable is plugged into the DC COMP (black-white) receptacle at the tracker and the other end is left loose beside the DC (black-white) receptacle at the computer. With this cabling arrangement, the director may be used easily for either optical or radar tracking. For radar tracking, plug the loose cable, instead of the D cable from the radar set as shown in the figure, into the DC (black-white) receptacle at the computer. When using either of these set-ups the DATA SELECTOR switch (fig. 85) on the DATA JUNCTION BOX must be set at M-9 and the toggle switch (fig. 85) at REMOTE. The toggle switch on the base of the tracker of the director may be in either the HF or RADAR position for either set-up.

(*b*) It is possible to receive complete data at the director without setting up and connecting the tracker. This would be accomplished by merely connecting cable D (black-white) from the DATA JUNCTION BOX to the DC (black-white) receptacle on the computer (fig. 119) setting the DATA SELECTOR switch (fig. 85) at M-9 and the toggle switch (fig. 85) at LOCAL. Under normal conditions, however, the complete cabling shown in figure 118 is used.

(*c*) The recommended method in (*a*) above is merely a combination of method I and method II shown in figures 119 and 120 which are described in FM 4–138, and is more flexible than either one separately.

(*d*) When switching from optical to radar tracking as outlined in subparagraph (*a*) above, be sure to compensate for the parallax change. For optical tracking parallax is figured *director from guns.* For radar tracking parallax is figured *radar from guns.*

c. TABULAR PRESENTATION OF METHODS OF DATA TRANSMISSION. The following table shows the methods of transmission and cables used for several types of directors and various types of data:

Data	Method of transmission	Director	Data cable
Slant range	Voltage proportional to slant range	M-9	C or D
Azimuth	Synchro—6,400 mils per revolution	M-4, M-7	B
	Synchro—400 mils per revolution	M-4, M-7	B
	Voltage proportional to sine	M-9	D
	Voltage proportional to cosine	M-9	D
Elevation	Synchro—6,400 mils per revolution	M-4, M-7	B
	Synchro—400 mils per revolution	M-4, M-7	B
	Voltage proportional to sine	M-9	D
	Voltage proportional to cosine	M-9	D
Altitude	Synchro—10,000 yards per revolution	M-4, M-7	B
	NOTE: This synchro may also be switched to slant range at 10,000 yards per revolution.		
Target designation, azimuth	Synchro—6,400 mils per revolution	M-4, M-7	A
Target designation, elevation	Synchro—1,800 mils per 1/3 revolution of dial	M-4, M-7	A

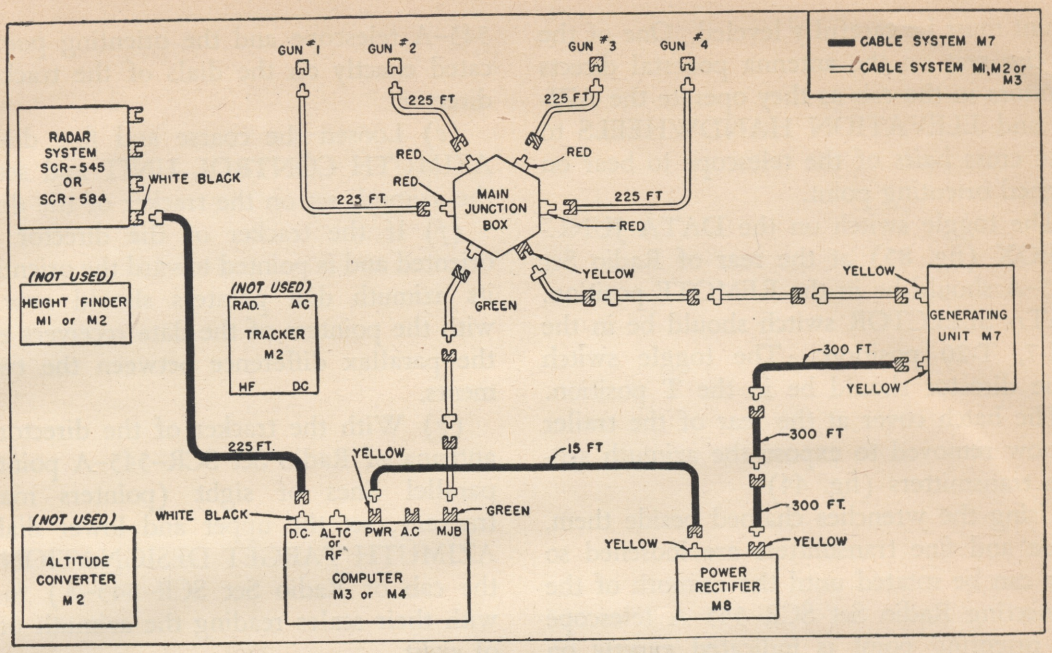


Figure 119. Method II, cabling with Director M–9.

3. Orientation and Synchronization Procedure, Fixed-Point Method

a. ADJUSTING THE TELESCOPE TO ELECTRICAL AXIS OF REFLECTOR. The telescope on the reflector is used in sighting and must be adjusted so that its axis agrees with the electrical axis of the reflector which is the axis of the antenna beam. Track a visible target automatically. If the average position of target, when observed through the telescope, is on the intersection of the center cross hairs, the telescope is properly adjusted. If the average position is on either side of the vertical cross hair, horizontal adjustment is necessary; if the position is above or below the horizontal cross hair, vertical adjustment is necessary. See TM 11–1527 (when published) for instructions on this adjustment.

b. ORIENTATION AND SYNCHRONIZATION IN AZIMUTH. (1) *Directors M-4 and M-7.* (*a*)

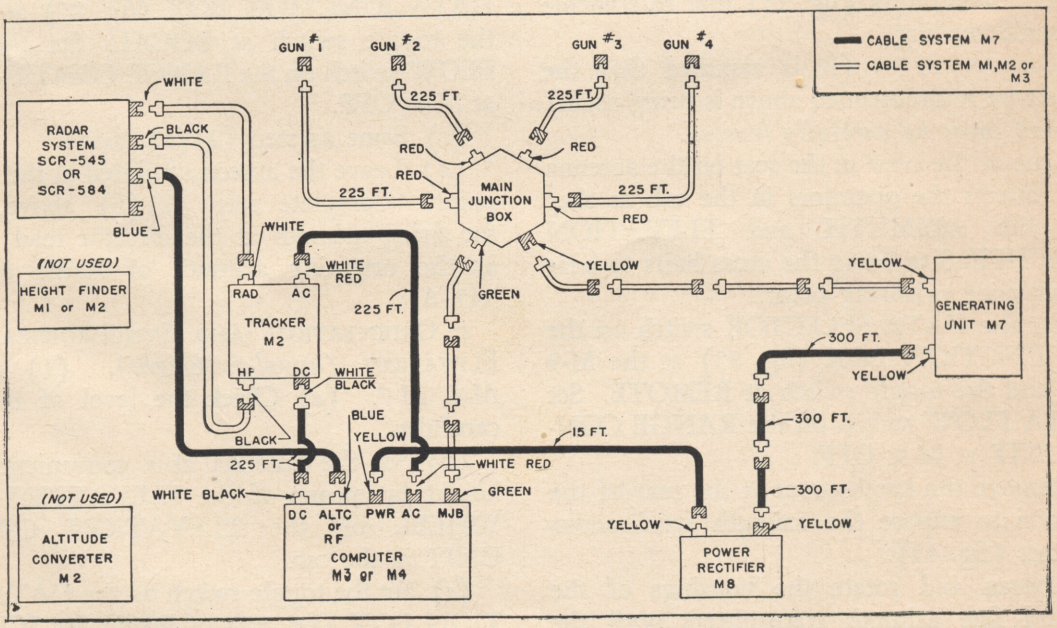


Figure 120. Method I, cabling with Director M–9.

The mount must be carefully leveled. One of the crew in the seat on the antenna pedestal directs the operators in the cab as they operate the AZIMUTH and ELEVATION HANDWHEELS to bring the cross hairs of the telescope to bear on the assigned orienting point.

(*b*) The toggle switch on the DATA JUNCTION BOX (fig. 85) at the rear of Radio Set SCR–545–A should be in the REMOTE position. The DATA SELECTOR switch should be in the M-4, M-7, T-20 position. The toggle switch under the director should be in the T position.

(*c*) The hatch cover at the rear of the trailer roof is now removed to expose the azimuth synchronous transmitters (fig. 44).

(*d*) Using the wrenches chained beside them, the coarse and fine transmitters are loosened so that they can be rotated until the azimuth of the line connecting Radio Set SCR–545–A telescope and the orienting point is indicated exactly on the dials of the director.

(*e*) Loosen the coarse and fine dials of the AZIMUTH CONTROL UNIT (fig. 8) and set them to the azimuth set on the director.

(*f*) If the director has been oriented and is now pointed toward the orienting point, its azimuth dial pointers should now coincide with the pointers of the data receivers except for the parallax difference.

(*g*) Traverse the director of Radio Set SCR–545–A until the azimuth scales of the set and the director indicate identical readings. Set the upper and lower dials of the AZIMUTH TARGET DESIGNATION (fig. 13) unit to coincide at this same reading.

(2) *Director M-9.* (It is assumed that the cabling set-up recommended above is being used.) *The mount must be carefully leveled.*

(*a*) One of the crew in the seat on the antenna pedestal directs the operators in the cab as they operate the AZIMUTH and ELEVATION HANDWHEELS to bring the cross hairs to bear on the assigned orienting point.

(*b*) Set the DATA SELECTOR switch on the DATA JUNCTION BOX (fig. 85) at the M-9 position and the toggle switch at REMOTE. Set the DATA FLOW switch on the RANGE CONTROL UNIT at M-9, OFF.

(*c*) Remove the hatch cover at the rear of the trailer roof to expose the azimuth synchronous transmitters (fig. 44).

(*d*) Loosen and rotate the housings of the coarse and fine azimuth transmitters until the azimuth of the line connecting Radio Set SCR–545–A telescope and the orienting point is indicated exactly on the dials of the tracker of the director.

(*e*) Loosen the coarse and fine dials of the AZIMUTH CONTROL UNIT and set them to the azimuth set on the tracker of the director.

(*f*) If the tracker of the director has been oriented and is pointed toward the orienting point, its azimuth dial pointers should now coincide with the pointers of the data receivers except for the parallax difference between the two instruments.

(*g*) With the tracker of the director and the antenna of Radio Set SCR–545–A pointed along parallel lines of sight (pointers matched at tracker), set the upper and lower dials of the AZIMUTH TARGET DESIGNATION unit (in the cab of Radio Set SCR–545–A) to coincide with their scales reading the azimuth of the line of sight.

(*h*) Leave the antenna of Radio Set SCR–545–A at the position set in step (*g*) above. Set the DATA FLOW switch on the RANGE CONTROL UNIT at M-9, ON. Set the computer of the director for TRACKER TEST. Operate the azimuth potentiometer ORIENTING CRANK on Radio Set SCR–545–A until the firing azimuth indicated on the computer agrees with the azimuth setting of the antenna as set in step (*g*).

(3) *Director M-9 without tracker.* The following steps apply when the tracker is not used:

(*a*) Same as step (2) (*a*) above.

(*b*) Set the DATA SELECTOR switch on the DATA JUNCTION BOX (fig. 85) at M-9 and the toggle switch at LOCAL. Set the DATA FLOW switch on the RANGE CONTROL UNIT at M-9, OFF.

(*c*) Same as step (2) (*e*) above.

(*d*) Leave the antenna pointed at the orienting point. Complete step (2) (*h*) above, making the firing azimuth at the director read the same as the orienting azimuth of Radio Set SCR–545–A.

c. ORIENTATION AND SYNCHRONIZATION IN ELEVATION *(angular height).* (1) *Directors M-4, M-7.* (*a*) Check the level of the mount carefully.

(*b*) Set the antenna at a convenient angular height by means of the ELEVATION HANDWHEEL on the ELEVATION CONTROL UNIT in the cab.

(*c*) Set the toggle switch on the DATA JUNCTION BOX (fig. 85) of Radio Set SCR–545–A at REMOTE and the DATA SELECTOR switch

at M-4, M-7, T-20. The toggle switch on the base of the director must be set at the T position.

(*d*) Loosen the coarse and fine synchronous transmitter cases on the pedestal trunnion nearest the seat on the pedestal (fig. 83). Rotate the transmitters until the dials on the director indicate the same elevation as the scale (fig. 16) on the right trunnion arm of the antenna.

(*e*) Check and, if necessary, reset the dials on the ELEVATION (angular height) CONTROL UNIT to agree with the reading of the scale (fig. 16).

(*f*) Adjust the ELEVATION (angular height) TARGET DESIGNATION unit in the trailer cab, as follows:

1. By means of the screw driver adjustment, rotate the upper synchronous receiver housing to make the upper dial read the same as the scale setting (step (*e*)) on any one of its three sectors.

2. By similar means set an identical reading on the lower dial.

(2) *Director M-9.* (It is assumed that the cabling set-up recommended above is being used.)

(*a*) Same as step (1) (*a*) above.

(*b*) Same as step (1) (*b*) above.

(*c*) Set the DATA FLOW switch on the RANGE CONTROL UNIT at M-9, OFF. Set the toggle switch on the DATA JUNCTION BOX (fig. 85) at REMOTE and the DATA SELECTOR switch at M-9. The toggle switch on the base of the tracker may be in either the HF or RAD position.

(*d*) Same as step (1) (*d*) above; the receivers are located at the tracker.

(*e*) Same as step (1) (*e*) above.

(*f*) Same as step (1) (*f*) above.

(*g*) Set the DATA FLOW switch on the RANGE CONTROL UNIT at M-9, ON. With the computer of the director set for TRACKER TEST, the reading on the QUADRANT ELEVATION dial at the computer should agree with the reading on the angular-height scale (fig. 16) on the antenna trunnion. If the readings do not agree, refer to TM 11–1527 (when published) for adjustment procedure on the elevation potentiometer.

(3) *Director M-9 without tracker.* If Director M-9 is used without its tracker, the steps of (2) above referring to the tracker may be eliminated.

d. SYNCHRONIZATION IN ALTITUDE FOR DIRECTORS M-4 AND M-7. Turn the synchronization adjustment (fig. 75) to rotate the synchronous transmitter until the altitude corresponding to the setting of angular height and slant range is registered on the altitude dial of the director. This is accomplished by setting the proper altitude opposite the index on the director dial and rotating the synchronous transmitter at Radio Set SCR–545–A until the AA pointers are matched.

e. SYNCHRONIZATION IN SLANT RANGE. Range calibration is assumed to be completed. Synchronization with Director M-9 is automatic, but when using Director M-9 without the "tracker" be sure to set the toggle switch on the DATA JUNCTION BOX (fig. 85) of Radio Set SCR–545–A at LOCAL. The DATA SELECTOR switch on the DATA JUNCTION BOX should be set to conform with the director in use. If using a director which does not receive slant range as synchronous-repeater data, the coarse and fine dials on the RANGE CONTROL unit may be properly set by loosening the dials and setting them.

4. Orientation and Synchronization Procedure, Backsight Method

a. GENERAL. (1) The operations of orienting and synchronizing Radio Set SCR–545–A in azimuth and elevation by backsighting are most easily performed simultaneously and for purposes of clarity are discussed together. The method is quick and easily performed in the field as it requires no special instruments or special terrain conditions.

(2) In order to minimize the variable parallax error that exists when transmitting slant range to a director, the distance between the director (or tracker of M-9 or M-10) and the radar set should not exceed 30 yards. Because of the necessity for dispersion and the limit to which the antenna can be depressed to sight on the director, the distance should be at least 25 yards. This means that the radar set and the director should be located between 25 and 30 yards apart.

(3) Orientation and synchronization are greatly simplified if telephone connections between the radar set and the director have been made.

(4) This discussion covers only azimuth and elevation adjustments. Other necessary adjustments are discussed in paragraph 3 above.

b. ORIENTING AND SYNCHRONIZING WITH DIRECTOR M-4 OR M-7. (1) Perform the following checks:

(*a*) Check the telescope on the antenna frequently and adjust it if necessary, so that its axis coincides with the electrical axis of the antenna

as outlined in paragraph 3*a*.

(*b*) Check with the chief of range section to see that the director has been properly oriented in azimuth and angular height.

(*c*) Check the level of Radio Set SCR–545–A.

(2) Close all switches on the main power panel, with the exception of the HIGH VOLTAGE-START. Proceed as follows:

(*a*) Set the MANUAL-AUTOMATIC switches on all operator control units at MANUAL.

(*b*) By means of the AZIMUTH and ELEVATION HANDWHEELS, direct the antenna accurately at the center of the azimuth telescope of the director as observed through the telescope on the antenna of Radio Set SCR–545–A. When observing with the telescope, be sure to place the eye so that the cross hairs appear in the center of the field of view.

(*c*) At the same time, direct the azimuth telescope of the director at the center of the telescope on the antenna of Radio Set SCR–545–A. If the azimuth scope has no horizontal hairline, use the elevation scope to position the azimuth scope in elevation. Be sure the hairlines are in the center of the field of view.

(*d*) Remove the cover from the rear hatch (fig. 44) to expose the coarse and fine azimuth synchronous transmitters. Loosen the clamping ring on the coarse transmitter and turn it by hand until the inner and outer coarse azimuth pointers of the director differ by 3,200 mils. Tighten the clamping ring.

(*e*) Loosen the clamping ring on the fine azimuth transmitter and turn it by hand until the inner and outer fine azimuth pointers of the director are accurately matched. Tighten the clamping ring.

(*f*) Note that when the two sights are pointed at each other, one is depressed and the other elevated. If Radio Set SCR–545–A is depressed, the negative angular height as indicated by the innermost dial at Director M-7 must be exactly the same as the positive angular height indicated by the outermost dial. If the coarse and fine indicators are not correct, remove the cover over the angular-height synchronous transmitters (fig. 121) and adjust the proper transmitter to obtain the desired reading.

(*g*) Remove the cover from the azimuth dials and loosen the coarse and fine dials. Set these dials to read exactly the same as the inner azimuth pointers at the director.

(*h*) Remove the cover from the elevation dials and loosen the coarse and fine dials. Set these dials to read exactly the same as the inner elevation pointers at the director.

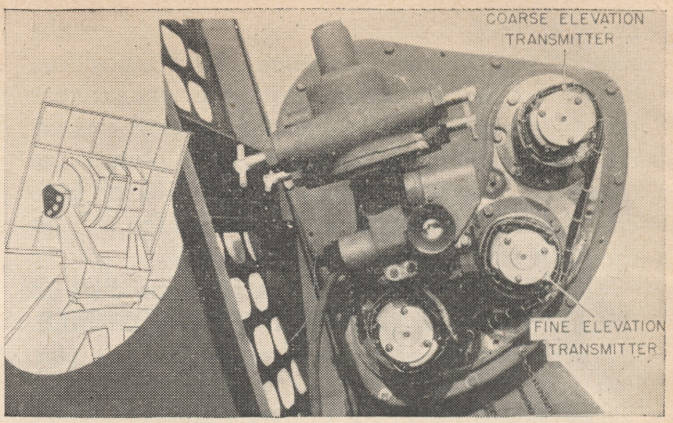


Figure 121. Angular-height selsyns.

(*i*) Traverse the antenna by means of the AZIMUTH and ELEVATION HANDWHEELS until the innermost and outermost pointers at the director are matched.

(*j*) Turn the upper and lower adjusting screws on the azimuth TARGET DESIGNATION UNIT until the upper and lower dials each read the azimuth indicated by the coarse azimuth dial on the AZIMUTH CONTROL UNIT.

(*k*) Turn the upper and lower adjusting screws on the elevation TARGET DESIGNATION UNIT until the upper and lower dials each read the elevation indicated by the coarse elevation dial on the ELEVATION CONTROL UNIT.

c. ORIENTING AND SYNCHRONIZING WITH DIRECTOR M-9 OR M-10. The backsighting method applies, in the case of Directors M-9 and M-10, only when the tracker is being used. The steps in orienting and synchronizing with the tracker are exactly the same as the steps for orienting and synchronizing with Director M-4 or M-7 outlined in subparagraph (*b*) above. If the tracker is not being used, the process of orienting and synchronizing is covered in paragraph 3 above.

5. Data Limits

a. DIRECTORS M-4 AND M-7. (1) The following data is furnished *to the director by the Radio Set SCR–545–A:*

(*a*) *Altitude.* Altitude is transmitted by a coarse synchronous-repeater system between limits of 300 and 10,000 yards. The same limits apply when the altitude-transmission system is used for slant range in the case of low-angle targets (HOR. FIRE).

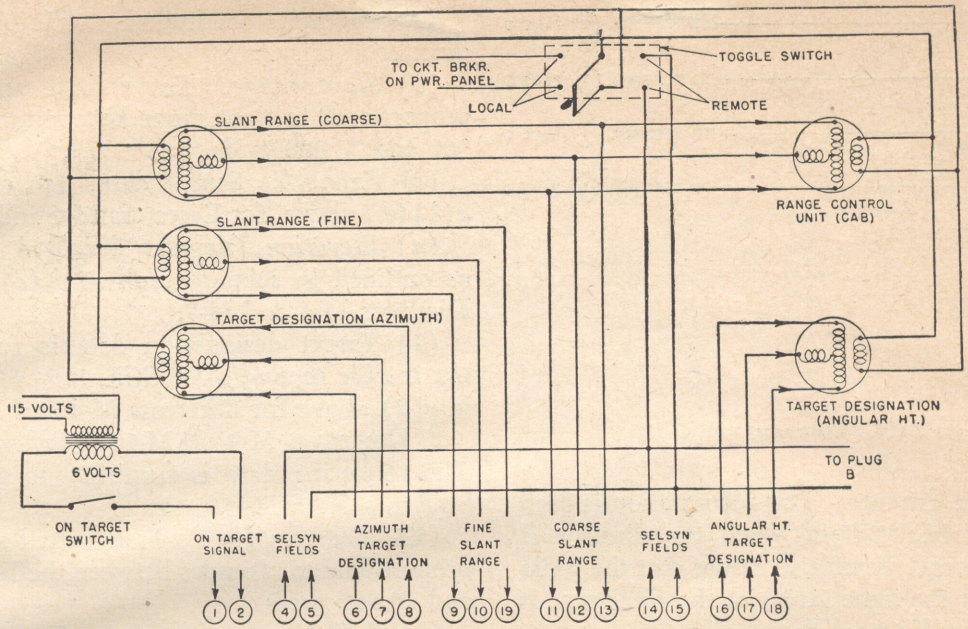


Figure 122. Data receptacle A.

(*b*) *Azimuth.* Transmitted by coarse and fine synchronous-repeater system without limits. The coarse transmitter makes one revolution per 6,400-mil traverse of the antenna pedestal. The fine transmitter makes one revolution per 400-mil traverse of the antenna pedestal. This information is used by the director in following unseen targets.

(*c*) *Elevation (angular height).* Transmitted by fine and coarse synchronous-repeater system between limits of –200 mils and +1,600 mils. The coarse transmitter revolves at the rate of 6,400-mil change in angular height (of antenna) per revolution. The fine transmitter makes a revolution for each 400-mil change in angular height of the antenna. This information is used by the director in following unseen targets.

(2) The following data is furnished *to Radio Set SCR–545–A by Director M-4 or M-7.* (*a*) Azimuth. Transmitted by a coarse synchronous-repeater system without limits. The transmitter makes one revolution per 6,400-mil change in

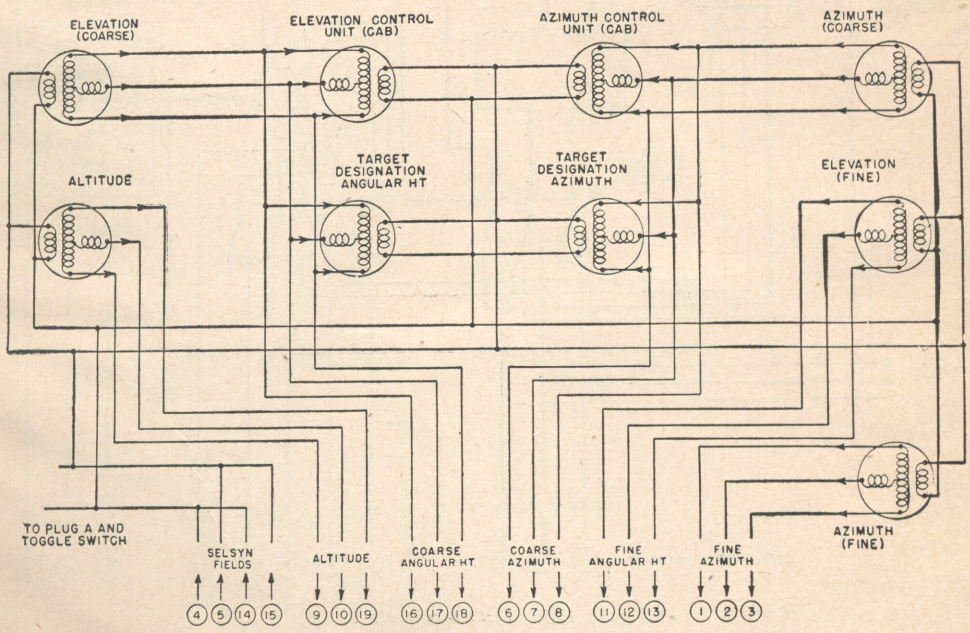


Figure 123. Data receptacle B.

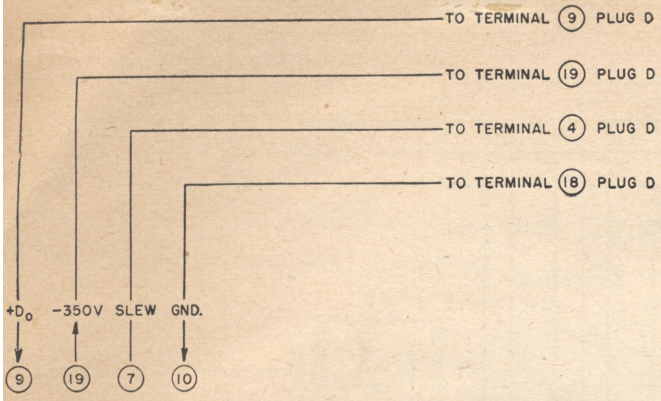


Figure 124. Data receptacle C.

azimuth of the director. This information is used at Radio Set SCR–545–A when the director is tracking the target visually to assure that the radio set is tracking the same target as the director. It is called *azimuth target designation.*

(*b*) *Elevation (angular height).* Transmitted by a coarse synchronous-repeater system between limits of –175 and +1,600 mils. The transmitter revolves at the rate of a 6,400-mil change in angular height of the director telescopes per revolution. It is used for target designation at Radio Set SCR–545–A.

b. DIRECTOR M-9 OR M-10 *(tracker used).* (1) The following data is furnished to the director by Radio Set SCR–545–A:

(*a*) *Altitude.* Altitude is not furnished to the director in this case.

(*b*) *Slant range.* Transmitted as a voltage proportional to slant range between the limits of 300 and 28,000 yards.

(*c*) *Azimuth.* Same data as outlined in *a*(1)(*b*) above, for Directors M-4 and M-7.

(*d*) *Elevation (angular height).* Same data as outlined in subparagraph *a*(1)(*c*) above for Directors M-4 and M-7.

(2) Target designation data is furnished *by the tracker to Radio Set SCR–545–A* as outlined in *a*(2) above for Directors M-4 and M-7.

c. DIRECTOR M-9 OR M-10 *(tracker not used).* The following data is furnished to the director by Radio Set SCR–545–A:

(1) *Altitude (Ho).* Transmitted as a voltage proportional to altitudes between the limits of 300 and 28,000 yards.

(2) *E-W Component (Xo).* Transmitted as a voltage proportional to Xo between the limits of 300 and 28,000 yards.

(3) *N-S Component (Yo).* Transmitted as a voltage proportional to Yo between the limits of 300 and 28,000 yards.

(4) The accompanying diagrams (figs. 122, 123, 124, and 125) show the use of the various conductors in the four data receptacles. Numbers between 1 and 19 which do not appear in the diagrams are spares.

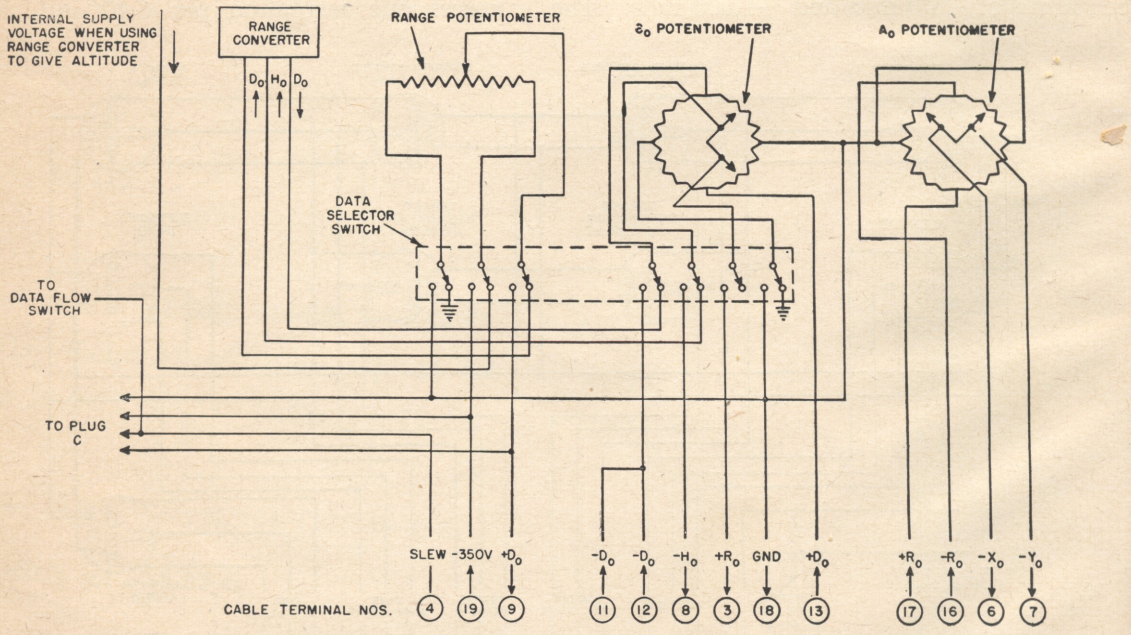


Figure 125. Data receptacle D.

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