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Colin Hinson
In the village of Blunham, Bedfordshire.

T.O. 12P5-3SCR718-21

(Formerly AN 16-40SCR718-21)

NAVY AN 16-40SCR718-21

HANDBOOK
OPERATING INSTRUCTIONS

RADIO SETS
SCR-718-D
SCR-718-E

(STEWART-WARNER ELECTRIC)

THIS PUBLICATION REPLACES T.O. 12P5—3SCR718-21
(FORMERLY AN 16—40SCR718-21) DATED 21 SEPTEMBER 1953

PUBLISHED UNDER THE AUTHORITY OF THE SECRETARY OF THE AIR FORCE
AND THE CHIEF OF THE BUREAU OF AERONAUTICS

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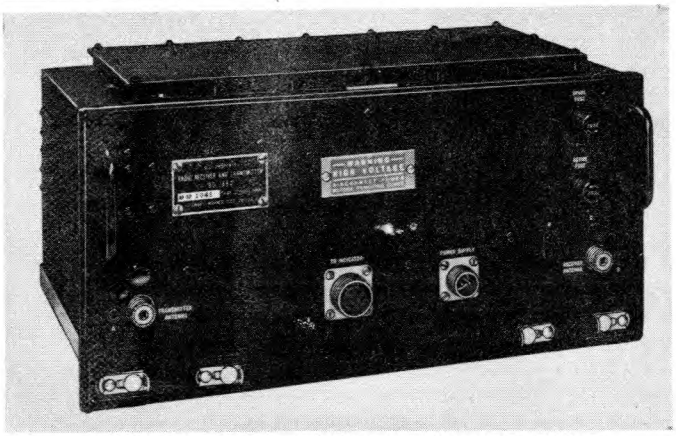

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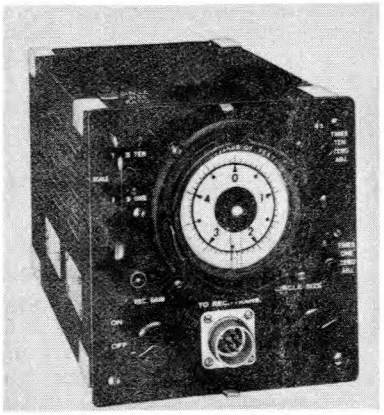

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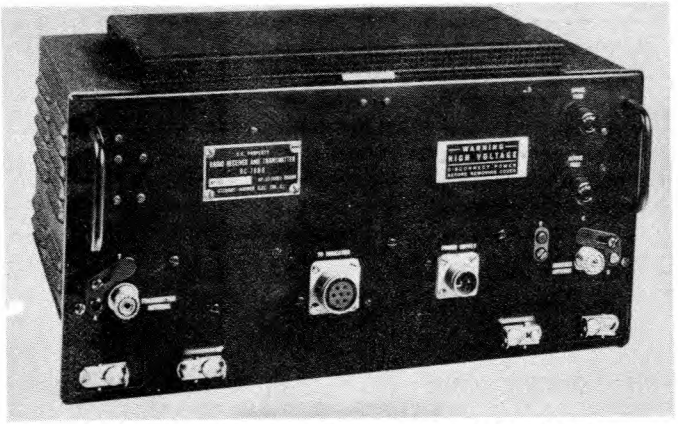

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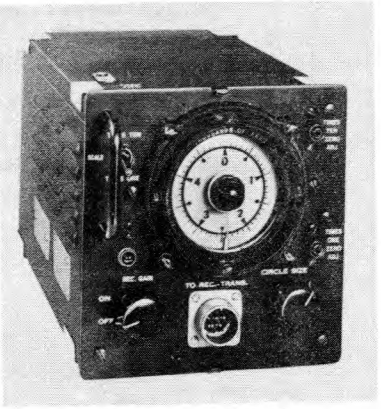

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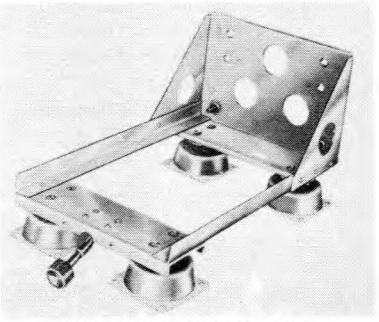

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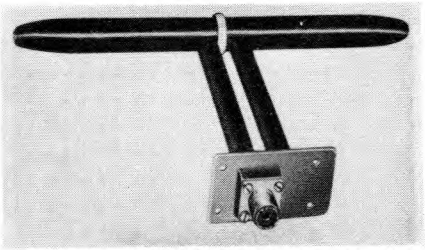

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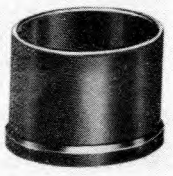
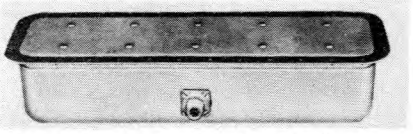


Visor M-387



Antenna Assembly AS-333/AP or Antenna AT-505/AP (4 Required)*

* Either Antenna AT-4/ARN-1, Antenna AT-4A/ARN-1, Antenna Assembly AS-333/AP, or Antenna AT-505/AP (not a combination) may be used, depending upon local installation.

Figure 1-1. Radio Set SCR-718-D or -E, Major Components

SECTION I

GENERAL DESCRIPTION

1-1. PURPOSE OF HANDBOOK.

1-2. This publication comprises operational instructions for Radio Set SCR-718-D and Radio Set SCR-718-E; manufactured by Stewart-Warner Electric, Chicago, Illinois.

1-3. IDENTIFICATION OF EQUIPMENT.

1-4. Both Radio Set SCR-718-D and Radio Set SCR-718-E are high altitude radio altimeters designed to mount in aircraft for the purpose of determining the absolute altitude of the aircraft above the terrain. Each, when installed in an aircraft, is an independent, complete equipment within itself, using the aircraft 400 cycle a.c. supply as the primary power source. Besides internal circuit parts which tend to improve the performance of SCR-718-E at higher altitudes and at the fringes of line power variations, the main differences between the two models are in the weights of their components, which are listed in Tables 1-1 and 1-2, and in one operating control, the SCALE switch, which is described later in paragraph 2-5. Both SCR-718-D and SCR-718-E operate on the same basic principles, and have the same capabilities and limitations for normal service purposes.

1-5. BASIC PRINCIPLES OF OPERATION.

1-6. The transmitter section of Radio Receiver and Transmitter BC-788-D or -E produces pulses of radio energy occurring at definite intervals. These pulses are then radiated earthward from a transmitting antenna. Each individual pulse, upon reaching the surface of the earth, is reflected back toward the aircraft. The reflected pulse is picked up by a receiving antenna and is fed into the receiver section of the radio receiver and transmitter, to be amplified and converted into a form usable by the indicator. The pulse is then applied to Indicator I-152-D or -E which presents this pulse in the form of a small lobe, on a circle, on the screen of the indicator. The location on the circle where the lobe occurs

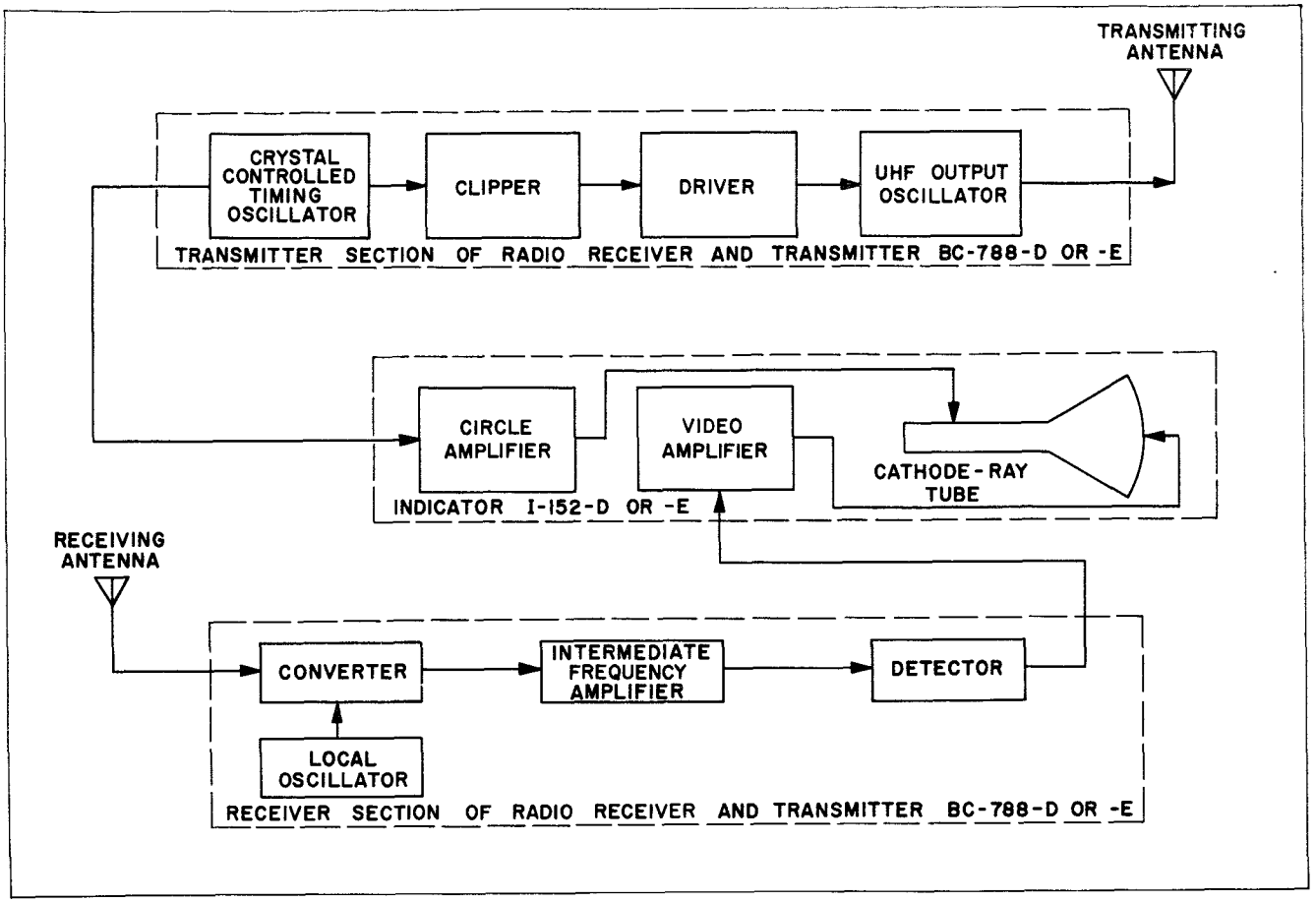


Figure 1-2. Simplified Functional Diagram of Radio Set SCR-718-D or -E

depends upon the length of time necessary for each pulse to travel from the transmitting antenna to the earth's surface and back to the receiving antenna. However, the screen of the indicator is calibrated so that all altitude readings are taken directly in feet, rather than in terms of pulse travel-time. A simplified functional block diagram of Radio Set SCR-718-D or -E is shown in figure 1-2.

1-7. CAPABILITIES AND LIMITATIONS.

1-8. Radio Set SCR-718-D or -E is accurate to within 50 feet at all altitudes up to its nominal maximum range of 40,000 feet. By taking special precautions as mentioned in paragraph 3-17 of the Service Handbook for SCR-718-D or -E, T.O. 12P5-3SCR718-22, (or USAF T.O. 16-40SCR718-101), the equipment is capable of operating at an altitude of up to 60,000 feet.

CAUTION

When installed in non-pressurized cabins, the low-voltage power supply in this equipment may arc-over at altitudes greater than 40,000 feet if it has not been specially treated as noted above. Therefore, under these conditions, the set should be turned OFF above 40,000 feet altitude.

1-9. Pulse jitter occurs when flying over rough terrain. Pulse jitter is rapid variation in the amplitude of the altitude-indicating lobe and intermittent appearance of extra lobes. (See figure 2-8.) When this occurs, read the lowest altitude lobe, because it is this lobe which indicates the highest point of terrain over which the aircraft is flying.

1-10. Extreme dives, climbs and banks, may cause the altitude-indicating lobe to broaden considerably or even disappear momentarily. This condition corrects itself when normal flight is resumed.

1-11. A blind spot of approximately 250 feet occurs at an altitude of 5000 feet and all multiples of 5000 feet including zero. A blind spot is a point where altitude cannot be determined accurately. (See figure 2-9.)

1-12. EQUIPMENT MAJOR COMPONENTS.

1-13. Table 1-1 lists the equipment supplied as major components of Radio Set SCR-718-D. Table 1-2 lists the equipment supplied as major components of Radio Set SCR-718-E.

1-14. EQUIPMENT ACCESSORIES.

1-15. Table 1-3 lists the accessories required for use with both Radio Set SCR-718-D and Radio Set SCR-718-E, but not supplied as a part of either.

TABLE 1-1. EQUIPMENT SUPPLIED AS MAJOR COMPONENTS OF RADIO SET SCR-718-D

Qty.	Description	Type Designation	Overall Dimensions (Inches)	Weight (Lbs.)	Ref. Series
2	ANTENNA	AT-4/ARN-1	11-9/16 x 7-9/16 x 1 Base plate 3 x 1-23/32	1.4	
	OR				
2	ANTENNA	AT-4A/ARN-1	11-9/16 x 7-9/16 x 1 Base plate 3 x 1-23/32	1.4	
	OR				
4	ANTENNA	AT-505/AP	13 x 4-5/16 x 2-3/4	1.5	
	OR				
4	ANTENNA ASSEMBLY	AS-333/AP	13 x 4-5/16 x 2-3/4	1.25	
1	INDICATOR	I-152-D	6-17/32 x 6-1/2 x 12-5/8	10.6	200
1	MOUNTING	FT-445-A	6-13/16 x 5-7/8 x 12-3/8	1.65	500
1	MOUNTING BASE	MT-14/ARN-1	7-5/8 x 2-1/4 x 18-1/16	1.3	
1	RADIO RECEIVER AND TRANSMITTER	BC-788-D	8-11/16 x 7-25/32 x 15-1/2	13.2	100
1	VISOR	M-387	2-3/4 x 3-5/8 OD	0.15	

TABLE 1-2. EQUIPMENT SUPPLIED AS MAJOR COMPONENTS OF RADIO SET SCR-718-E

Qty.	Description	Type Designation	Overall Dimensions (Inches)	Weight (Lbs.)	Ref. Symbols Series
2	ANTENNA	AT-4/ARN-1	11-9/16 x 7-9/16 x 1 Base plate 3 x 1-23/32	1.4	
	OR				
2	ANTENNA	AT-4A/ARN-1	11-9/16 x 7-9/16 x 1 Base plate 3 x 1-23/32	1.4	
	OR				
4	ANTENNA	AT-505/AP	13 x 4-5/16 x 2-3/4	1.5	
	OR				
4	ANTENNA ASSEMBLY	AS-333/AP	13 x 4-5/16 x 2-3/4	1.25	
1	INDICATOR	I-152-E	6-17/32 x 6-1/2 x 12-5/8	9.7	200
1	MOUNTING	FT-445-A	6-13/16 x 5-7/8 x 12-3/8	1.65	500
1	MOUNTING BASE	MT-14/ARN-1	7-5/8 x 2-1/4 x 18-1/16	1.3	
1	RADIO RECEIVER AND TRANSMITTER	BC-788-E	8-11/16 x 7-25/32 x 15-1/2	11.9	100
1	VISOR	M-387	2-3/4 x 3-5/8 OD	0.15	

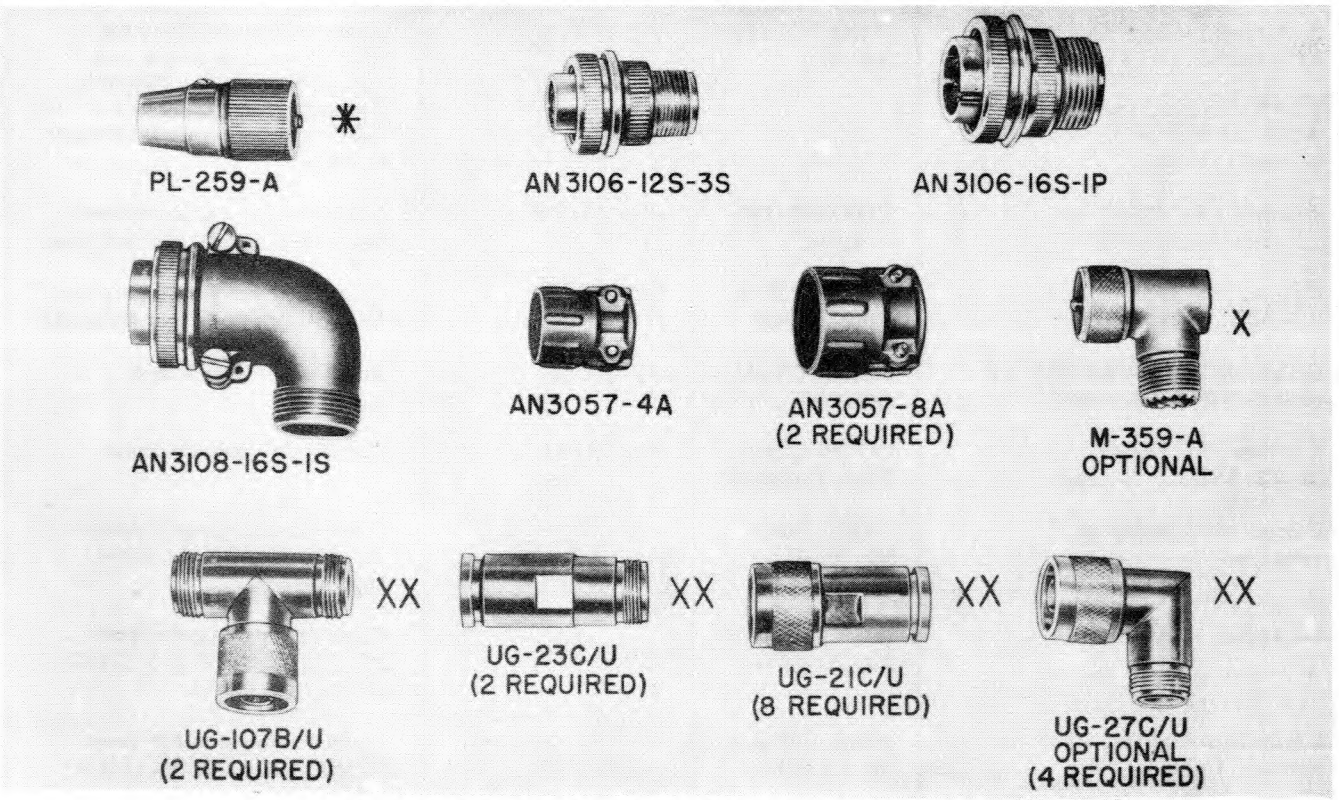


Figure 1-3. Radio Set SCR-718-D or -E Accessories

TABLE 1-3. ACCESSORIES REQUIRED BUT NOT SUPPLIED AS A PART OF RADIO SET SCR-718-D or -E

Qty.	Description	Type Designation	Function
2 Separate lengths totalling 50 ft. max	CABLE, RF	RG-9B/U	Connections from BC-788-D or -E to antennas
2 Separate lengths, Each max. of 150 ft.	CABLE, RF	RG-71/U	Connections in cable from BC-788-D or -E to I-152-D or -E
4 Separate 3/4-wave lengths (when AS-333/AP or AT-505/AP is used)	CABLE, RF	RG-11A/U	Antenna matching
2 (when AS-333/AP or AT-505/AP is used) 4 (when AT-4/ARN-1 or AT-4A/ARN-1 is used)	CONNECTOR, Plug (male)	PL-259-A	Connectors for antennas
1	CONNECTOR, Plug (female)	AN3106-12S-3S	POWER SUPPLY Connector located on BC-788-D or -E
1	CONNECTOR, Plug (male)	AN3106-16S-1P	TO INDICATOR Connector
1	CONNECTOR, Plug (female)	AN3108-16S-1S	TO TRANS-REC. Connector
1	CLAMP, Electrical	AN3057-4A	Adapter for AN3106-12S-3S
2	CLAMP, Electrical	AN3057-8A	Adapters for AN3106-16S-1P and AN3108-16S-1S
2-Optional (when AS-333/AP or AT-505/AP is used) 2 or 4-Optional (when AT-4/ARN-1 or AT-4A/ARN-1 is used)	CONNECTOR, Adapter	M-359-A	Adapters for RECEIVER ANTENNA connector and TRANSMITTER ANTENNA connector on BC-788-D or -E, and for connectors located on antennas
2 (when AS-333/AP or AT-505/AP is used)	CONNECTOR, Adapter	UG-107B/U	Adapters for cable between BC-788-D or -E and antennas
8 (when AS-333/AP or AT-505/AP is used)	CONNECTOR, Plug (male)	UG-21C/U	Connector for cable between BC-788-D or -E and antennas
4-Optional (when AS-333/AP or AT-505/AP is used)	CONNECTOR, Adapter	UG-27C/U	Adapters for antennas
2 (when AS-333/AP or AT-505/AP is used)	CONNECTOR, Plug (female)	UG-23C/U	Connectors for antennas
2 Separate lengths as required	WIRE, Hook-up No. 20 AWG		Connections in cable from BC-788-D or -E to Power Supply
1 Length, 150 ft. max.	WIRE, Hook-up No. 20 AWG		Connection in cable from BC-788-D or -E to I-152-D or -E
3 Separate lengths, Each max. of 150 ft.	WIRE, Hook-up No. 22 AWG		Connections in cable from BC-788-D or -E to I-152-D or -E

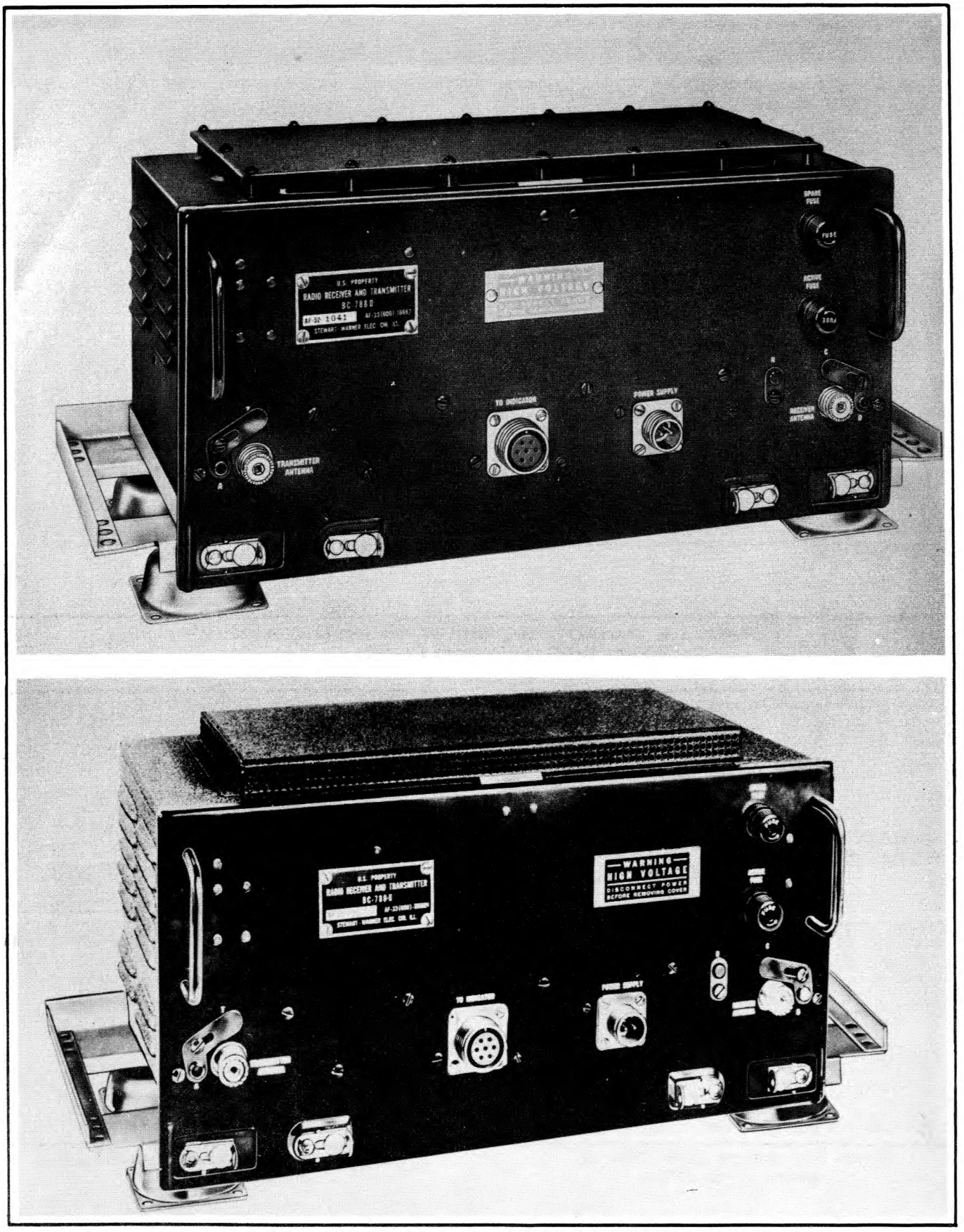


Figure 1-4. Radio Receiver and Transmitter BC-788-D (top) and Radio Receiver and Transmitter BC-788-E on Mounting Bases MT-14/ARN-1

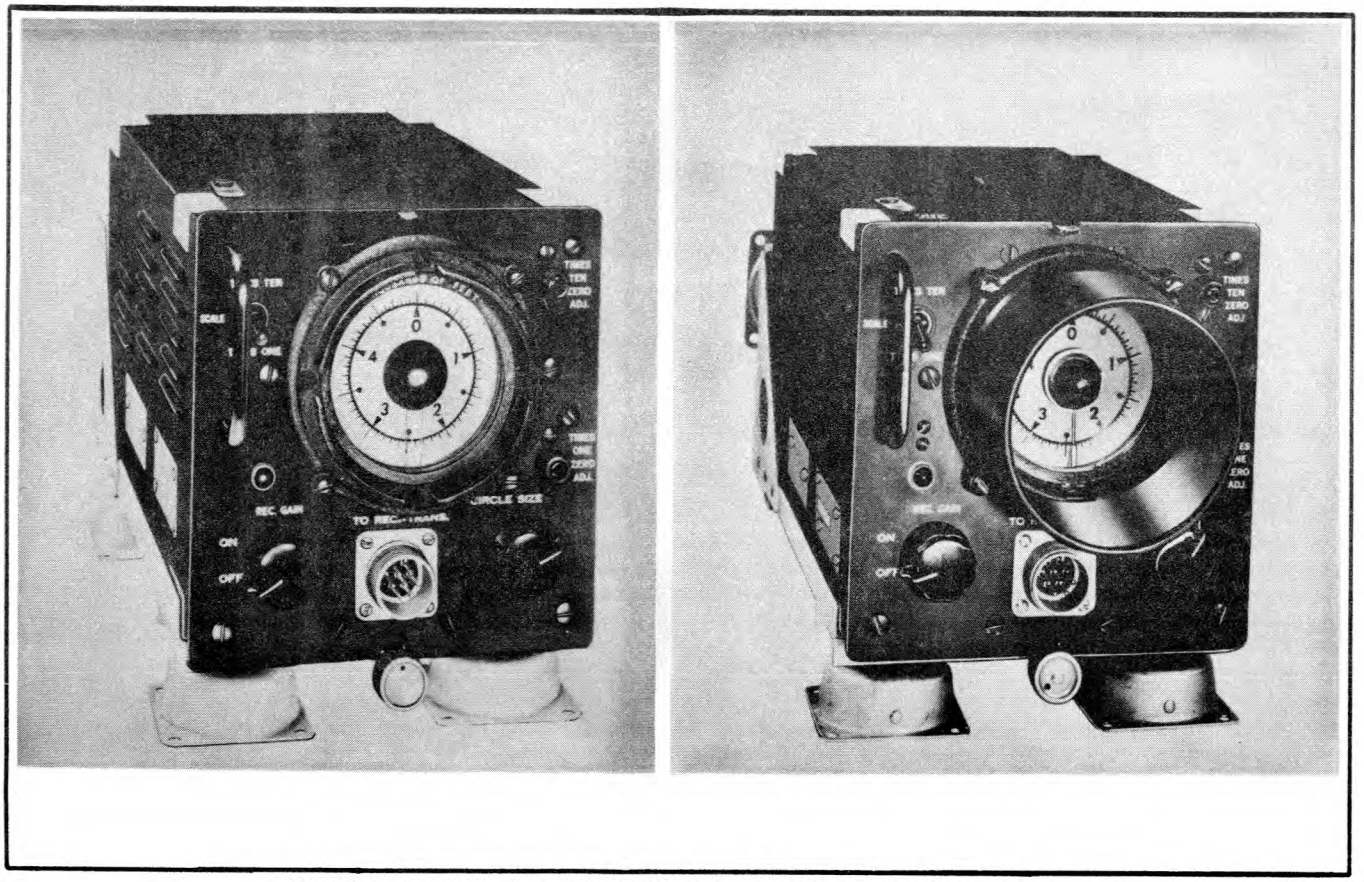


Figure 1-5. Indicator I-152-D (left) and Indicator I-152-E with Visor M-387 on Mountings FT-445A

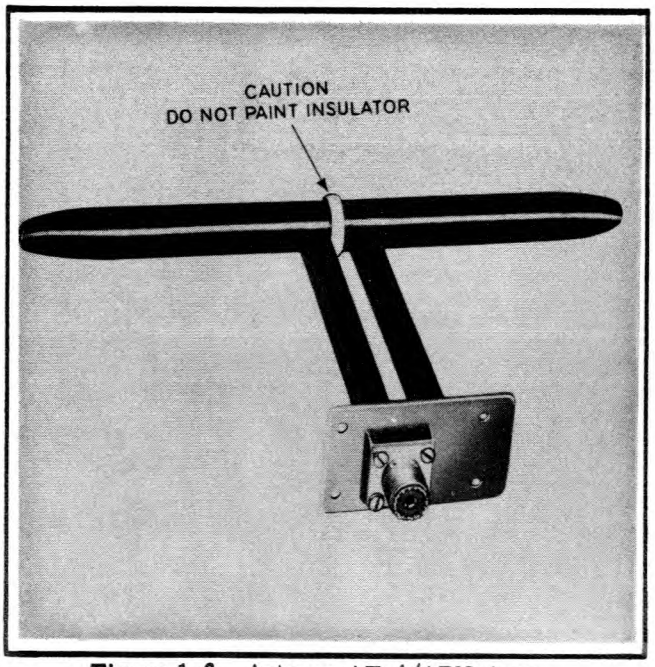


Figure 1-6. Antenna AT-4/ARN-1 or Antenna AT-4A/ARN-1

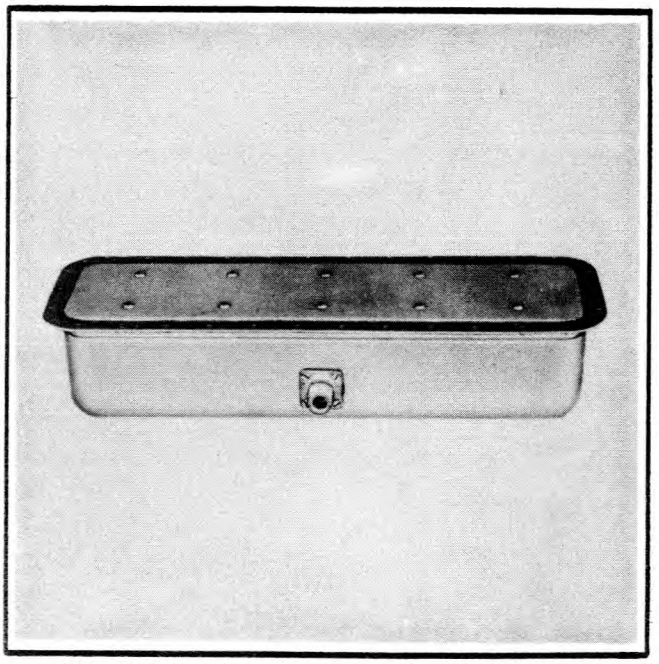


Figure 1-7. Antenna Assembly AS-333/AP or Antenna AT-505/AP

1-16. PHYSICAL DESCRIPTION OF MAJOR COMPONENTS.

1-17. RADIO RECEIVER AND TRANSMITTER BC-788-D or -E. (See figure 1-4.) This component performs two separate functions which are: (1) it produces pulses, of proper shape and magnitude, for transmission, and (2) it takes pulses from the receiving antenna and prepares these pulses for introduction into Indicator I-152-D or -E.

1-18. The radio receiver and transmitter is housed in a black crackle finished metal case 15-1/2 inches long, 8-11/16 inches high and 7-25/32 inches wide. Louvers are provided on the sides of the case for ventilation of the equipment. Two fuses, one active and one spare, are accessible from the front panel. Four other fuses, one active and three spares, are accessible from the top side of the chassis. Five screwdriver adjustments are located on the front panel. However, these adjustments are for the use of maintenance personnel only. The radio receiver and transmitter contains no operating controls. Four external connectors are provided on the front panel which are marked TRANSMITTER ANTENNA, TO INDICATOR, POWER SUPPLY, and RECEIVER ANTENNA. These four connectors provide a means of connecting BC-788-D or -E to both antennas, the indicator, and the primary power source. Two handles are provided for ease of chassis removal from the case and for ease of handling the component.

1-19. MOUNTING BASE MT-14/ARN-1. (See figure 1-4.) The mounting base is principally metal strapping welded together and placed on four shock mounts. Each shock mount has four holes to accommodate screws or bolts for securing the mounting base. The mounting base is mounted horizontally and serves the purpose of helping to protect the radio receiver and transmitter from normal vibration and shock.

1-20. INDICATOR I-152-D or -E. (See figure 1-5.) The main function of the indicator is to provide an indication of altitude by presenting this indication on the calibrated face of the indicator cathode-ray tube. (Hereinafter, reference to the "face of the indicator cathode-ray tube" may appear as "cathode-ray tube screen" or "indicator screen.")

1-21. The indicator is housed in a black crackle finished metal case 12-5/8 inches long, 6-17/32 inches high, and 6-1/2 inches wide, with louvers provided for ventilation. The front panel contains all of the controls necessary for proper operation of the equipment. The front panel also contains the calibrated indicator screen which provides the visual indication of altitude. One external connector is located on the front panel to provide a means of connecting Radio Receiver and Transmitter BC-788-D or -E to the indicator. Five maintenance adjustments are accessible through four openings in the bottom of the case and one opening in the top of the case. Indicator I-152-D or -E is mounted in either the horizontal or vertical position, depending upon its local installation.

1-22. VISOR M-387. (See figure 1-5.) The visor is a cylindrical piece of rubber provided to minimize extraneous light falling on the face of the cathode-ray tube.

1-23. MOUNTING FT-445-A. (See figure 1-5.) This mounting is principally metal strapping welded together and placed on four shock mounts. It has the feature of being mountable in either the horizontal or vertical position; this is accomplished by having two of the shock mounts so that they can be changed in position. Like the mounting base for the BC-788-D or -E, Mounting FT-445-A serves the purpose of helping to protect the indicator from normal vibration and shock.

1-24. ANTENNA AT-4/ARN-1 or AT-4A/ARN-1. (See figure 1-6.) Two Antennas AT-4/ARN-1 or AT-4A/ARN-1 are required, one for pulse transmission and one for pulse reception. These two antennas are suitable for mounting on the underside of the wings, fuselage or horizontal stabilizer of the aircraft.

1-25. Each antenna is a half-wavelength dipole whose characteristic impedance is 50 ohms. The mounting bracket holds the antenna one-quarter wavelength from the surface of the aircraft. AT-4/ARN-1 and AT-4A/ARN-1 are identical except for the dielectric material at the center, between the dipoles.

1-26. ANTENNA ASSEMBLY AS-333/AP or ANTENNA AT-505/AP. (See figure 1-7.) Four Antenna Assemblies AS-333/AP or Antennas AT-505/AP may be used instead of two Antennas AT-4/ARN-1 or AT-4A/ARN-1. In this case, two units are used for pulse transmission and two for pulse reception. These antennas are of the flush mounted slot type, mounted parallel to each other, spaced one-half wavelength apart and fed through an RF Tee connector, with three-quarter wavelength sections of coaxial cable for matching purposes. AT-505/AP is especially designed to maintain the air seal when mounted in the skin of a pressurized cabin, while AS-333/AP incorporates no such precaution in its mounting.

1-27. INTERCONNECTING CABLES AND CONNECTORS. (See figure 1-3 and Table 1-3.) Four cables are required for installation of SCR-718-D or -E. One cable consists of four insulated open wires and two shielded wires. This cable connects Radio Receiver and Transmitter BC-788-D or -E to Indicator I-152-D or -E. Another cable consisting of two open wires is required for connecting BC-788-D or -E to its primary power source. The third and fourth cables required consist of one coaxial cable each and are for the purpose of connecting the BC-788-D or -E to the receiving and transmitting antennas. Connectors are used with each cable in accordance with Table 1-2.

SECTION II

OPERATING PROCEDURES

2-1. DESCRIPTION OF CONTROLS.

2-2. All controls necessary for proper operation of the equipment are located on the front panel of Indicator I-152-D or -E. (See figure 2-1.)

2-3. The REC. GAIN control, located in the lower left corner of the front panel, performs two functions. The first function is to act as an ON-OFF switch for the entire equipment. The second function is to act as a gain control, to vary the sensitivity of the receiver portion of Radio Receiver and Transmitter BC-788-D or -E. By varying the sensitivity of the receiver, the height of the lobe appearing on the indicator screen is controlled.

2-4. The CIRCLE SIZE control, located in the lower right corner of the front panel, varies the size of the circular trace appearing on the indicator screen.

2-5. The SCALE switch, located in the upper left corner of the front panel, is a two-position switch. In the SCR-718-E it returns automatically from the TIMES TEN position to the TIMES ONE position by spring action, while in the SCR-718-D it can be fixed in either position. The SCALE switch is placed in

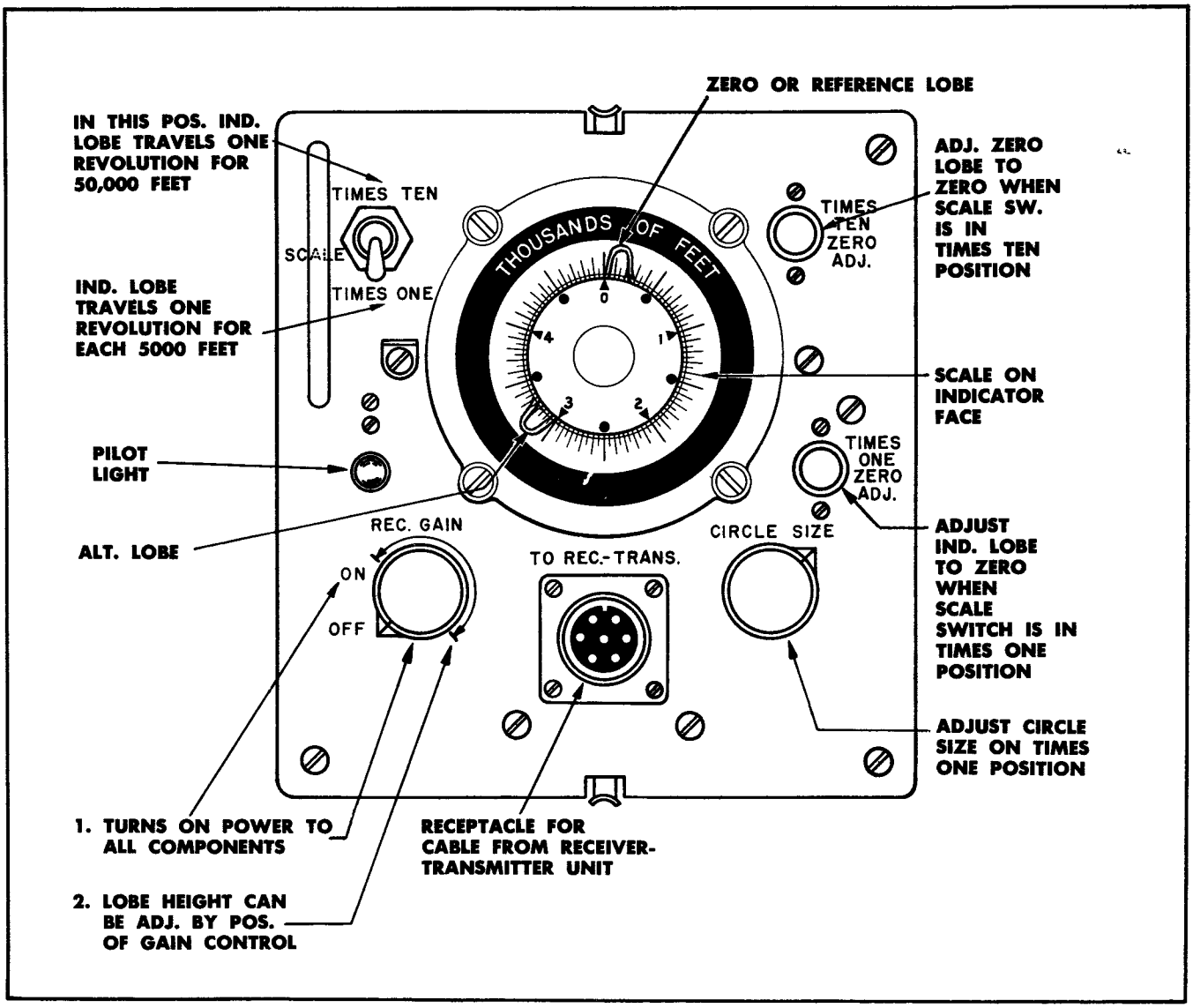


Figure 2-1. Indicator I-152-D or -E — Dials and Controls

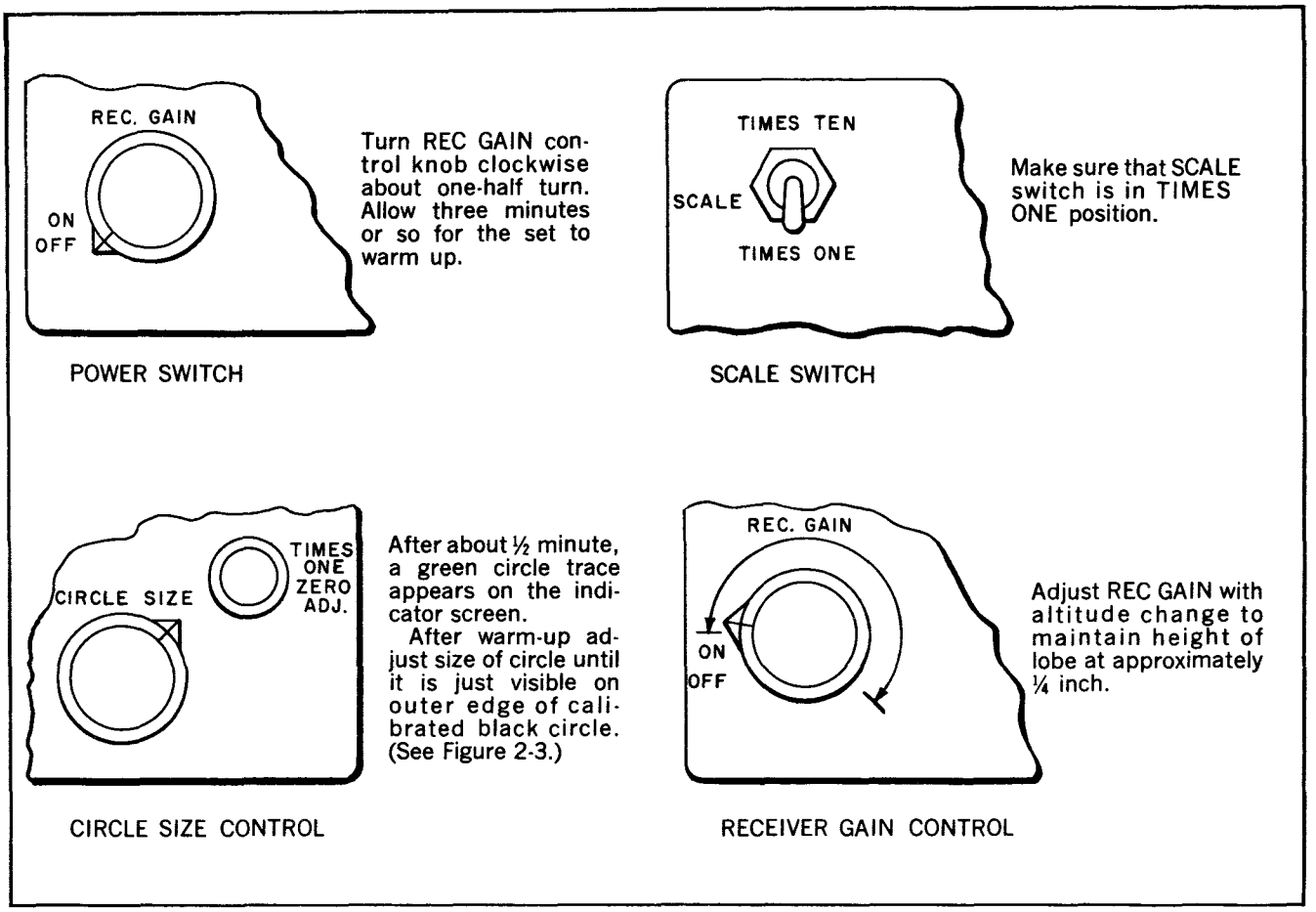


Figure 2-2. First Steps for Placing SCR-718-D or -E in Operation

the TIMES ONE position when flying at any altitude from 0 to 5000 feet. The SCALE switch is placed momentarily in the TIMES TEN position to make approximate readings when flying at any altitude above 5000 feet. In the TIMES ONE position, each division on the calibrated indicator screen represents 50 feet of altitude. In the TIMES TEN position, each division on the calibrated indicator screen represents 500 feet of altitude.

2-6. The TIMES ONE ZERO ADJ, located on the right side at the center of the front panel, controls the position of the reference lobe on the screen of the indicator, when the SCALE switch is in the TIMES ONE position. This control is used to adjust the reference lobe exactly to zero on the calibrated screen of the Indicator, during take-off.

2-7. The TIMES TEN ZERO ADJ, located in the upper right corner of the front panel, acts identically to the TIMES ONE ZERO ADJ, but is used only with the SCALE switch in the TIMES TEN position.

2-8. SEQUENCE OF OPERATION.

2-9. PRIOR TO TAKE-OFF. (See figure 2-2.)

a. Rotate the REC. GAIN approximately one-half turn clockwise. A green circular trace appears in approximately 30 seconds.

b. Allow the equipment to warm up for at least three minutes, so that the equipment reaches its proper operating temperature.

c. Place the SCALE switch in the TIMES ONE position.

d. Adjust the CIRCLE SIZE control so that the circular trace is just barely visible as a luminous ring

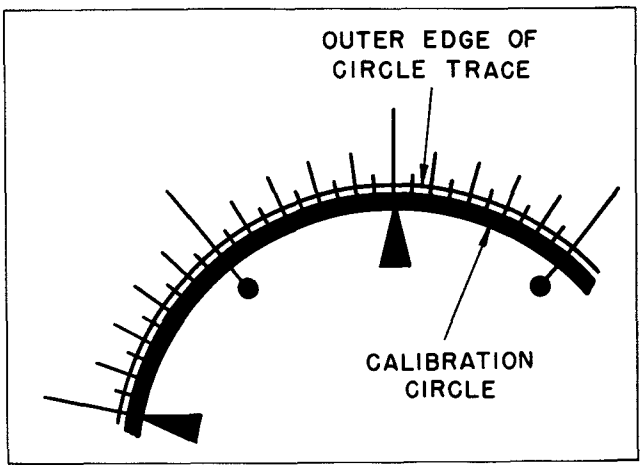


Figure 2-3. Circle Size

at the outer edge of the black calibrated scale. (See figure 2-3.)

e. Adjust the REC. GAIN control so that the lobe is one-quarter inch in height (approximately the height of the zero calibration mark).

f. Place the SCALE switch in the TIMES TEN position. The circular trace now appears one-quarter of an inch inside the black calibrated scale, and the lobe height is approximately 3/16 inch.

g. Keeping the SCALE switch in the TIMES TEN position, adjust the TIMES TEN ZERO ADJ. control so that the lobe appears exactly at zero on the calibrated scale. (See figure 2-4.)

h. Place the SCALE switch in the TIMES ONE position.

2-10. DURING TAKE-OFF.

a. As the aircraft begins the run for take-off, adjust the REC. GAIN control, if necessary, for a one-quarter-inch lobe height.

b. When the wheels are about to leave the ground, adjust the TIMES ONE ZERO ADJ, so that the counterclockwise edge of the lobe is set exactly at zero on the calibrated indicator screen. (See figure 2-4.)

NOTE

If this adjustment cannot be made during take-off and the control is adjusted during flight, an error of at least 25 feet will be introduced. (See paragraph 2-24.) Although this error becomes negligible at high altitudes, it is to be avoided if possible by moving the TIMES ONE ZERO ADJ. only while the aircraft is on the ground.

2-11. WHEN AIRBORNE. As the altitude of the aircraft increases, the lobe on the indicator screen moves clockwise around the circular trace and decreases in height. Adjust the REC. GAIN control, as necessary, so that the lobe is maintained approximately one-quarter inch in height.

2-12. As the REC. GAIN control is rotated clockwise, a second lobe appears at zero on the indicator screen, and remains in this position at all aircraft altitudes. This lobe is caused by a portion of the transmitted signal "feeding through" directly into the receiver. This second lobe is referred to as the reference lobe. While the aircraft is low, it is usually necessary to reduce the gain of the receiver so that the reference lobe does not obscure the main lobe; however, no attempt should be made to maintain its position exactly at zero by moving the TIMES ONE ZERO ADJ. (See paragraph 2-24.)

2-13. TURNING OFF. The equipment is shut down by rotating the REC. GAIN control counterclockwise to the OFF position.

2-14. READING ALTITUDE.

2-15. With the SCALE switch in the TIMES ONE position, the black circular scale on the indicator screen is calibrated from 0 to 5000 feet. Calibration marks are provided for every 50 feet of altitude, and are spaced widely enough so that readings can be estimated to the nearest 25 feet.

2-16. To determine altitude, read the point on the scale where the counterclockwise edge of the lobe intersects the green circular trace. For example, the indicator in figure 2-5 shows the altitude to be 3000 feet. When the aircraft reaches an altitude of 5000 feet, the lobe has progressed completely around the calibrated scale and is at zero. The lobe completes one further clockwise encirclement of the calibrated scale for each additional 5000 feet of altitude. Similarly, one complete counterclockwise encirclement takes place for each 5000-foot decrease in altitude.

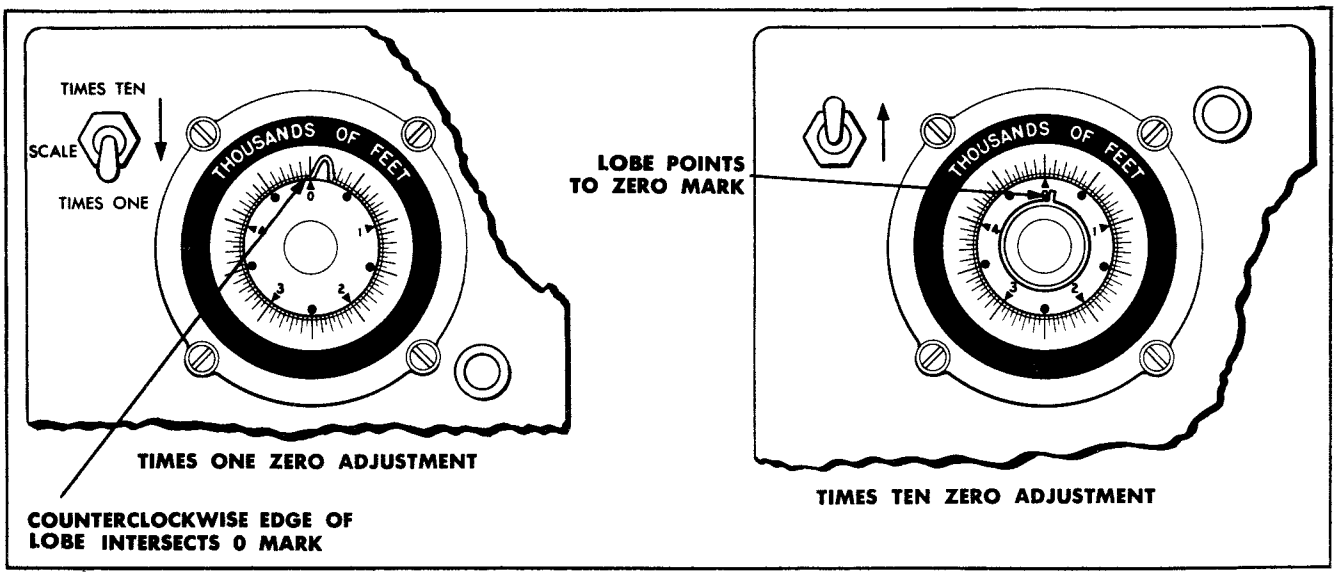


Figure 2-4. Zero Adjustment, Times One - Times Ten

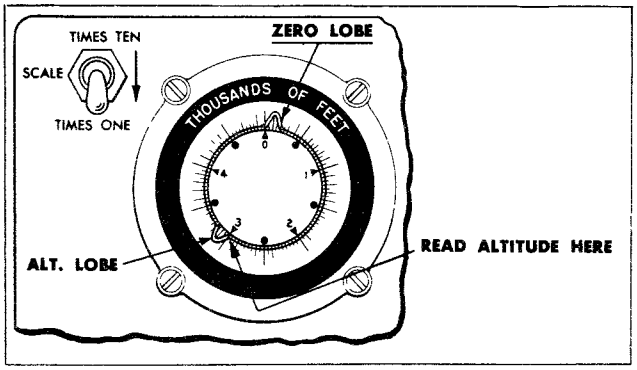


Figure 2-5. Reading Indicator, Times One Scale

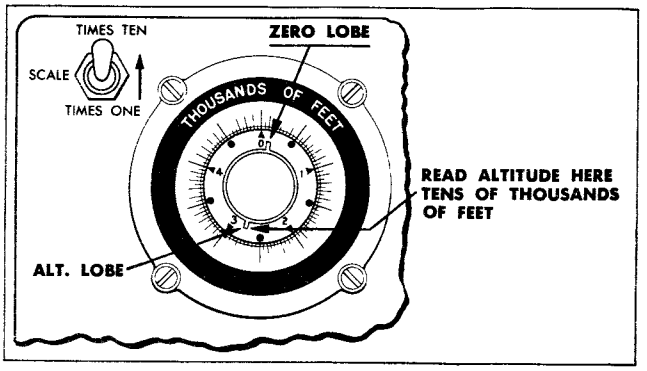


Figure 2-6. Reading Indicator, Times Ten Scale

To obtain the actual altitude above 5000 feet, add to the indication of the lobe, 5000 feet multiplied by the difference of the number of times the lobe has rotated around the scale in a clockwise direction since take-off, minus the number of times the lobe has rotated around the scale in a counterclockwise direction since take-off. Although the result of this process will be accurate, for altitudes above 5000 feet the following method is equally reliable, and much more convenient.

2-17. With the SCALE switch in the TIMES TEN position, the black circular scale on the indicator screen is calibrated from 0 to 50,000 feet. The calibration marks now provide reference marks for every 500 feet of altitude. Also, with the SCALE switch in the TIMES TEN position, the size of the circular trace decreases in size along with the size of the lobe. The lobe now acts as a pointer to indicate altitude. For example, the indicator in figure 2-6 shows the altitude to be between 25,000 and 30,000 feet. The switch should not be left in the TIMES TEN position, however, since this scale permits altitudes to be read only very approximately. To obtain the exact altitude of the aircraft, with the SCALE switch in the TIMES TEN

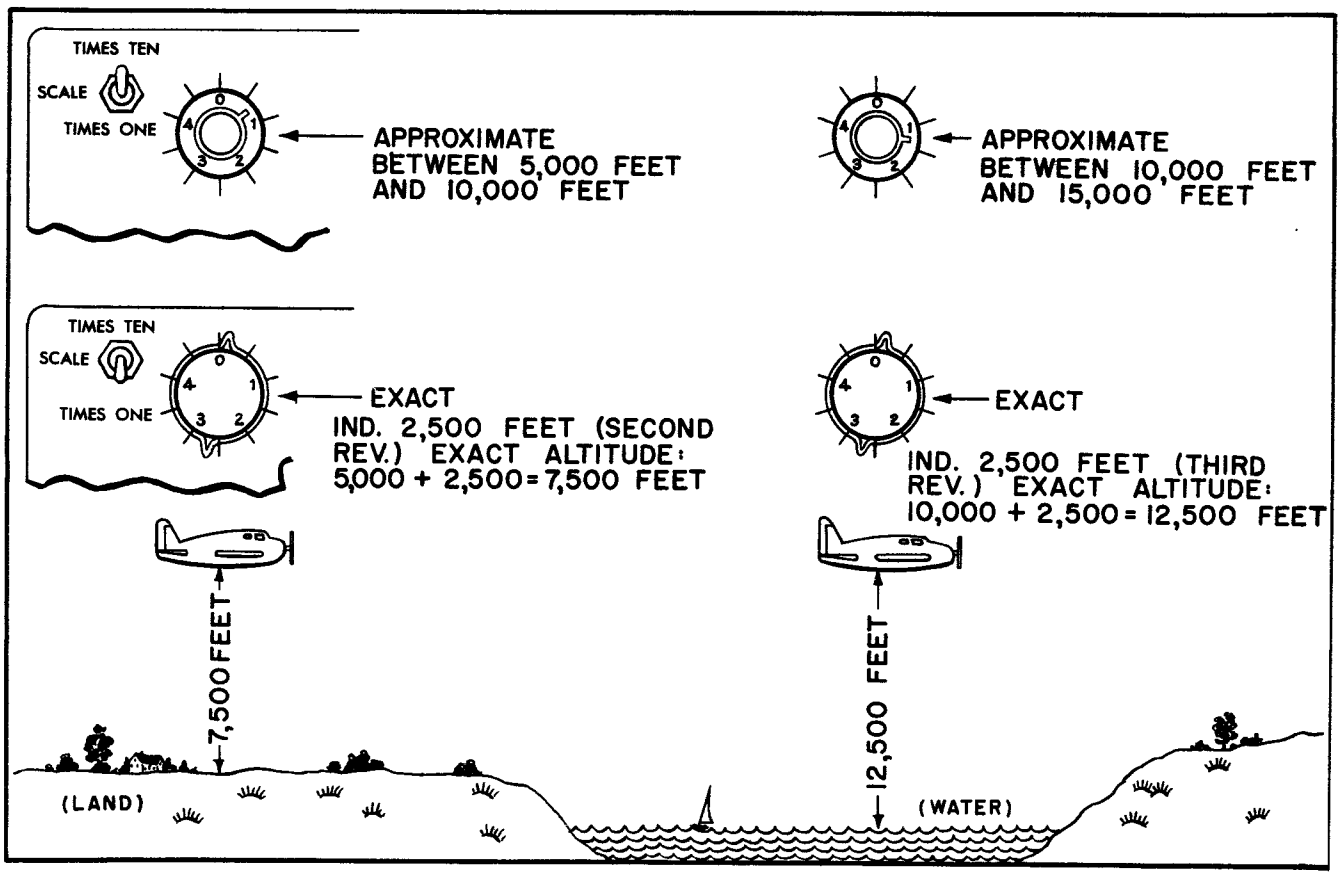
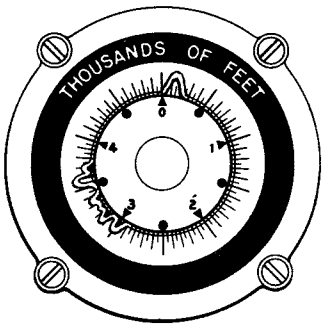
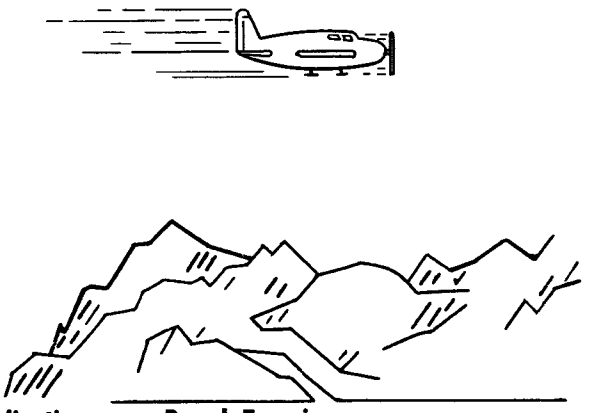


Figure 2-7. Reading in Flight



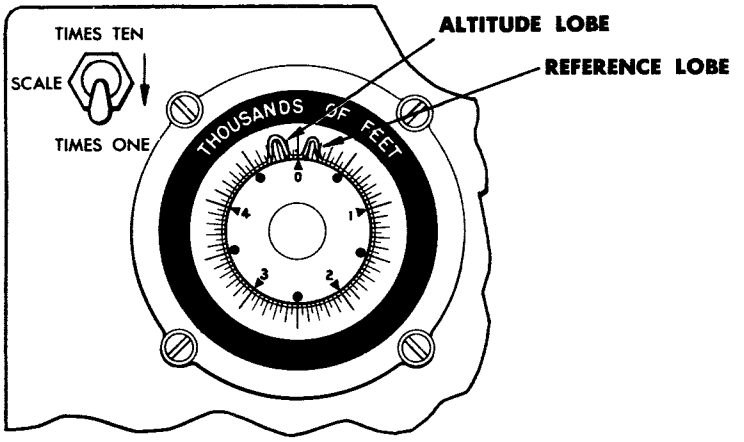


Indications over Rough Terrain

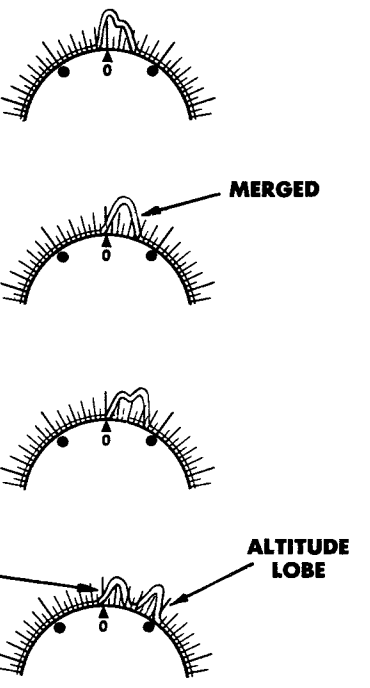
OVER HILLY OR MOUNTAINOUS TERRAIN SEVERAL ALTITUDE LOBES WILL APPEAR DUE TO NUMEROUS REFLECTIONS.

READ LOWEST ALTITUDE LOBE.

Figure 2-8. Indications, Rough Terrain



THE ALTITUDE LOBE AND REFERENCE PULSE WILL MERGE AT 5,000, 10,000, 15,000, 20,000, ETC. (NOTICE. THIS IS TRUE ONLY WHEN THE SCALE SWITCH IS IN THE TIMES ONE POSITION.)



Merging of Lobes

Figure 2-9. Blind Spots

position read the 5000-foot marker (a circular or triangular dot on the indicator scale) next below the position of the lobe. Next, place the SCALE switch in the TIMES ONE position, and take the reading of the exact altitude indicated. The sum of these two altitude readings is equal to the exact radar height of the aircraft.

2-18. Example: With the SCALE switch in the TIMES TEN position, the altitude reading is approximately 26,000 feet. The closest (lower) 5000-foot indication is 25,000 feet. With the SCALE switch in the TIMES ONE position, the altitude indication is 1275 feet. Therefore, the exact height of the aircraft is equal to the sum of the two readings (25,000 + 1275) or 26,275 feet. Other examples appear in figure 2-7.

NOTE

This equipment is not an instrument landing device.

2-19. PRECAUTIONS TO BE OBSERVED.

2-20. EFFECT OF TERRAIN. (See figure 2-8.) Do not confuse a fluctuating lobe on the indicator screen with intermittent or improper operation. The steadiness of the lobe is determined by the type of terrain over which the aircraft is flying. A steady lobe appears when flying over water or level terrain. When flying over mountainous terrain, the lobe will change rapidly in amplitude and may even disappear momentarily. More than one altitude-indicating lobe may also appear intermittently. In this case only the lowest should be read.

2-21. BLIND SPOTS. (See figure 2-9.) With the SCALE switch in the TIMES ONE position, the lobe occupies the same position as the reference lobe at altitudes of 5000 feet, and all multiples of 5000 feet except zero. Therefore, the two lobes appear to merge and cause a space of approximately 250 feet in width in which the altitude cannot be read accurately. These "blind spots" do not occur with the SCALE switch in the TIMES TEN position.

2-22. ACCURACY. When the equipment is operating properly, the error in the indication from the exact height above the ground is not more than 50 feet at any altitude. When improper operation causes the error to become greater than this, the circular trace generally becomes oval in shape. However, this assured degree of accuracy extends only up to the equipment's nominal maximum range of 40,000 feet. By taking the special precautions mentioned above in paragraph 1-8, the equipment is capable of operating at an altitude up to 60,000 feet with minimum reduction in accuracy.

CAUTION

When installed in non-pressurized cabins, the high-voltage power supply in this equipment may arc-over at altitudes greater than 40,000 feet if it has not been specially treated as noted above. Therefore, under these conditions, the set should be turned OFF above 40,000 feet.

2-23. OBSERVABLE DEFECTS. Inaccurate readings result from:

a. A circle trace which is not truly circular. (See figure 3-2.)

b. A circle trace which is off center. (See figure 3-2.)

c. Shifting of the reference lobe.

d. Receiver gain too high. (See figure 3-1.)

2-24. The shifting of the reference lobe a short distance to the left of zero just after take-off is not due to any defect in the equipment, and will not affect the accuracy of readings, provided the zero adjustment knobs are not moved in an attempt to maintain the reference lobe exactly on zero. This effect is caused by the fact that at low altitudes the distance between antennas is comparable to the distance travelled by the reflected signal.

SECTION III

OPERATING CHECKS AND ADJUSTMENTS

3-1. OPERATING CHECKS AND ADJUSTMENTS. (See figure 2-1 for operator's maintenance adjustments.)

3-2. PRIOR TO TAKE-OFF.

a. Turn the equipment on and allow it to warm up for at least three minutes.

b. Adjust the CIRCLE SIZE control so that the green circular trace is just barely visible around the edge of the black circle of the calibrated scale.

c. If the circular trace fails to appear on the indicator screen within one minute after the equipment is turned on, adjust the BRIL. and FOCUS controls located on the underside of Indicator I-152-D or -E, then recheck the CIRCLE SIZE control. If the circular trace still fails to appear, refer to Section IV.

d. If the circular trace is not centered properly on the indicator screen, adjust the HORIZ. and VERT. CENTERING controls located on the underside of Indicator I-152-D or -E until the circular trace is properly centered. If the circular trace cannot be properly centered, notify maintenance personnel.

e. If the circular trace appears to be blurred or fuzzy, reduce the REC. GAIN to minimum before adjusting the FOCUS and BRIL. controls. The gain of the receiver is reduced to minimum because the blurred fuzzy appearance may be caused by noise, or "grass", on the circular trace, if the equipment is sufficiently sensitive.

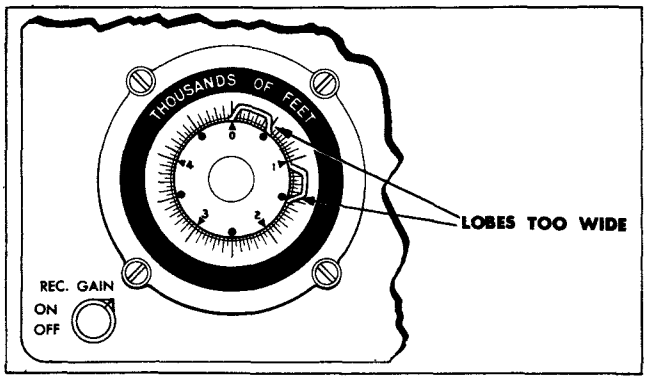


Figure 3-1. Receiver Gain Too High

f. Advance the REC. GAIN control until the lobe is one-quarter inch in height. If this height cannot be attained with REC. GAIN control set near its maximum clockwise position, the equipment does not have sufficient sensitivity and maintenance personnel should be notified. The width of the lobe should be 250 feet. If greater than 300 feet wide at the base, maintenance personnel should be notified.

g. With a normal lobe on the indicator screen, rotate the TIMES ONE ZERO ADJ. to check that the lobe can be moved to the left and to the right of zero by at least 150 feet without appreciable change in the circle size.

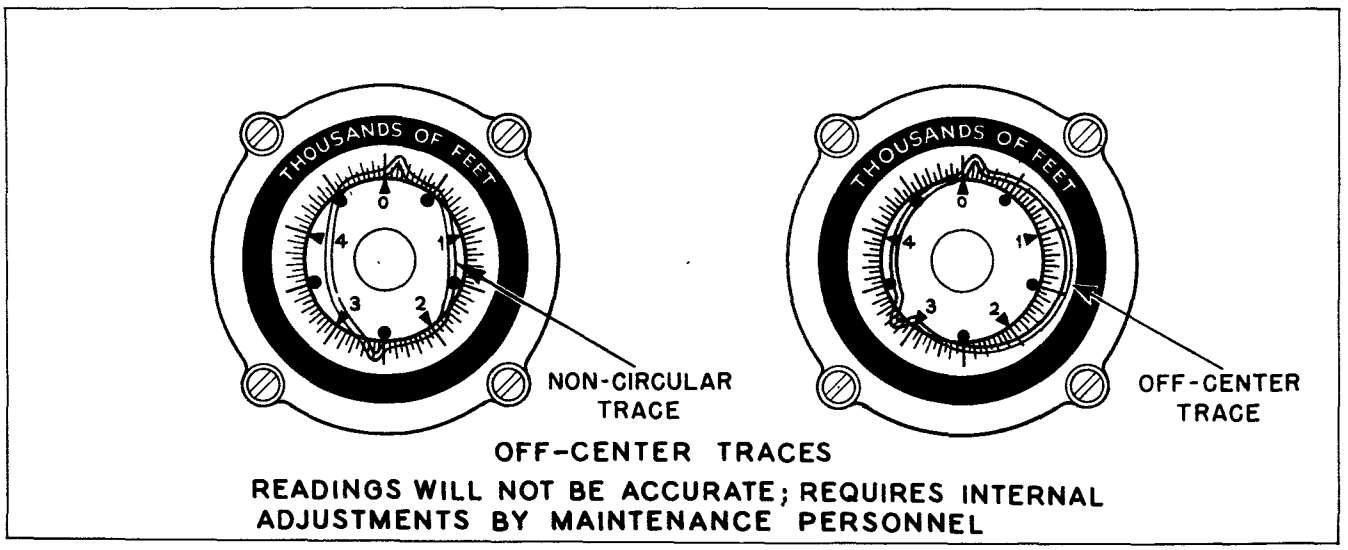


Figure 3-2. Circle Shape

h. Place the SCALE switch in the TIMES TEN position. The lobe becomes very narrow and somewhat shorter. The circle decreases in size so that it is located about 1/4 inch inside the scale circle. The size of the circle may be adjusted if necessary, by the CIRCLE SIZE control. Since this changes the size of both circles, however, it will also be necessary to return the SCALE switch to the TIMES ONE position and use a screwdriver to rotate the CIRCLE SIZE RATIO control, located on the top of the indicator, until the trace is just visible around the edge of the scale circle. Rechecking the TIMES TEN circle will probably show need for further change of the adjustments, and the whole process may have to be repeated several times to obtain the exact circle sizes desired.

3-3. DURING FLIGHT. No operating checks or adjustments are necessary during flight except for the REC. GAIN control, which must be adjusted occasionally to maintain a constant lobe height of one-quarter inch. When the set is operating at extreme temperatures, it may also be necessary to adjust the CIRCLE SIZE control during flight.

SECTION IV

EMERGENCY OPERATION AND REPAIR

4-1. EMERGENCY OPERATION.

4-2. In the event that no circular trace appears when the SCALE switch is placed in the TIMES TEN position, return the SCALE switch to the TIMES ONE position. Altitudes must then be read as explained in paragraph 2-16 until such time that repair can be accomplished.

4-3. EMERGENCY REPAIR.

4-4. Before assuming that the equipment is not operating properly, refer to paragraphs 2-20 to 2-23. The following procedures should be followed once it is determined that the equipment is not operating properly. Figures 4-1 and 4-2 show the tube and fuse locations.

4-5. TRACE DISAPPEARS FROM SCREEN.

a. Check the ACTIVE FUSE (F101) on the front panel of Radio Receiver and Transmitter BC-788-D or -E and replace if defective. This fuse may be replaced with power ON. (See paragraph 4-6 for fuse replacement.)

WARNING

Operation of this equipment involves the use of high voltages which are dangerous. Before performing any of the following emergency repair procedures, shut off the equipment.

b. If the ACTIVE FUSE in step a. is not defective, check the active fuse (F104) on the chassis of BC-788-D or -E, and replace if defective. (See paragraph 4-7 for chassis removal.)

c. Check all external connections to make sure that they have not become loose.

d. Check all cables for damage.

e. If either of the fuses is replaced in steps a. and b. and the new fuse blows immediately, then the equipment should be referred to the attention of service technicians.

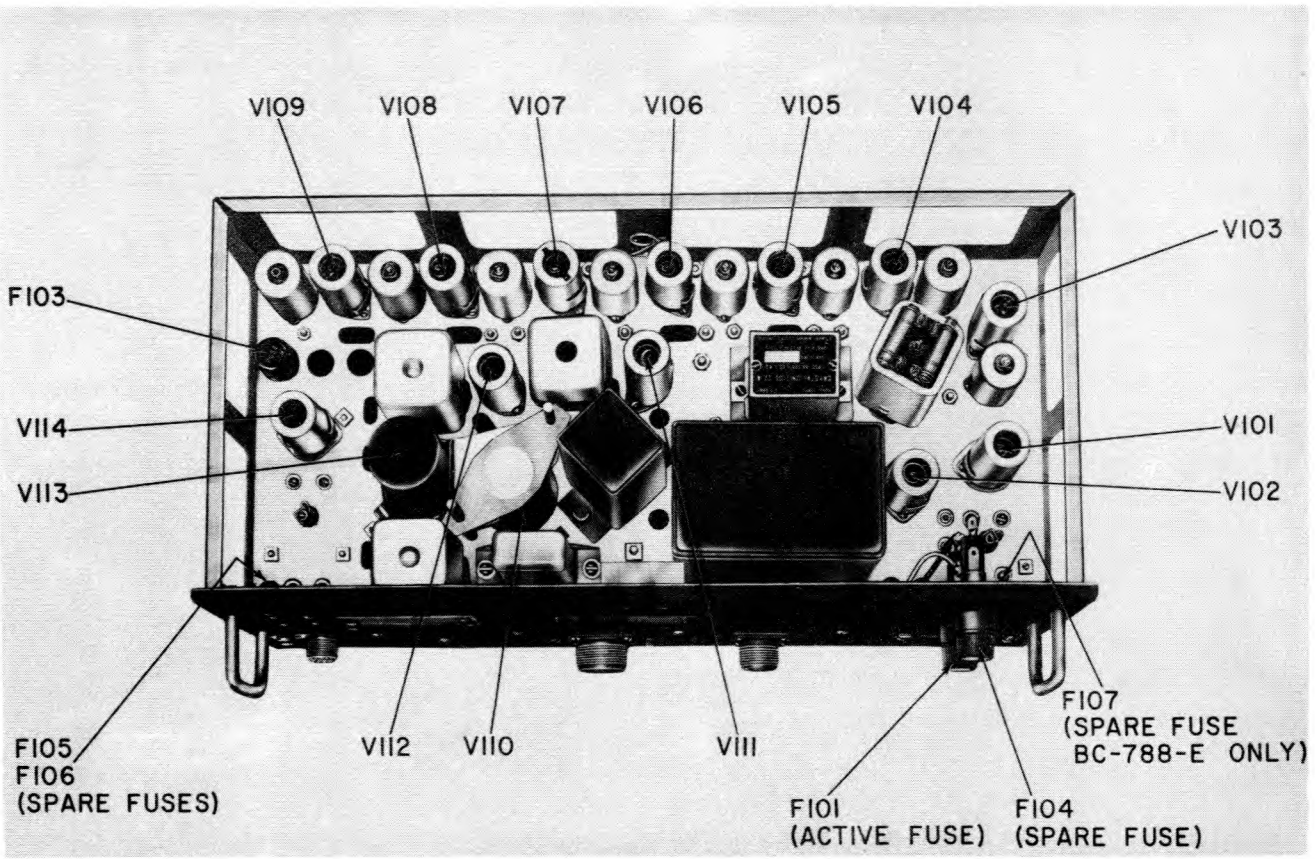


Figure 4-1. Radio Receiver and Transmitter BC-788-D or -E Fuse and Electron Tube Location

4-6. FUSE REPLACEMENT. Radio Set SCR-718-D or -E contains two active fuses, F101 and F103, and three spare fuses, F104, F105, and F106. One additional spare fuse, F107, is provided in SCR-718-E. The active line fuse, F101, is located on the front panel of Radio Receiver and Transmitter BC-788-D or -E. The other active fuse, F103, which protects the B+ lead of the low-voltage power supply, is located on the BC-788-D or -E chassis. To replace this fuse, removal of the chassis is necessary. If at any time the equipment fails, the operator should check the two active fuses.

a. Of the two fuse holders located on the front panel of BC-788-D or -E, the lower fuse is the active fuse.

b. Remove the active fuse by rotating the cap one-quarter turn counterclockwise and slipping the cap straight out.

c. Replace this fuse (if blown) with the spare fuse, F104, located in the upper fuse holder. The additional spare line fuse, F107, is located in SCR-718-E on the back side of the front panel next to F101 and F104. Power must be OFF before removing F107.

d. Replacement of the active fuse on the chassis of BC-788-D or -E is identical to the replacement of the line fuse, with the exception of the spare fuse holder. Two spare fuses, F105 and F106, are located on the back side of the front panel. Power must be OFF before replacing this fuse.

4-7. CHASSIS REMOVAL OF RADIO RECEIVER AND TRANSMITTER BC-788-D OR -E.

a. Shut off the equipment.

b. If BC-788-D or -E must be removed from its mounting base to make it accessible for the following steps, slide the two outer snap clips at the bottom of the front panel toward each other, then pull the cabinet forward an inch to disengage the locating pins on the mounting base.

c. Slide the two inner snap clips at the bottom of the front panel toward each other; rotate the dzus fastener on the back of the cabinet one-quarter turn counterclockwise; then slide the chassis forward out of the cabinet.

d. Reverse the above procedure to reassemble.

4-8. CHASSIS REMOVAL OF INDICATOR I-152-D OR -E.

a. Shut off the equipment.

b. Unscrew the knurled clamp knob at the bottom of the front panel and pull the indicator forward off its mounting.

c. Rotate the dzus fastener on the back of the cabinet one-quarter turn counterclockwise, then slide the chassis forward out of the cabinet.

d. Reverse the above procedure to reassemble.

4-9. Other defects of SCR-718-D or -E are of such a nature that they do not fall within the scope of this handbook. Further servicing procedures are found in Service Handbook AN 16-40SCR718-22.

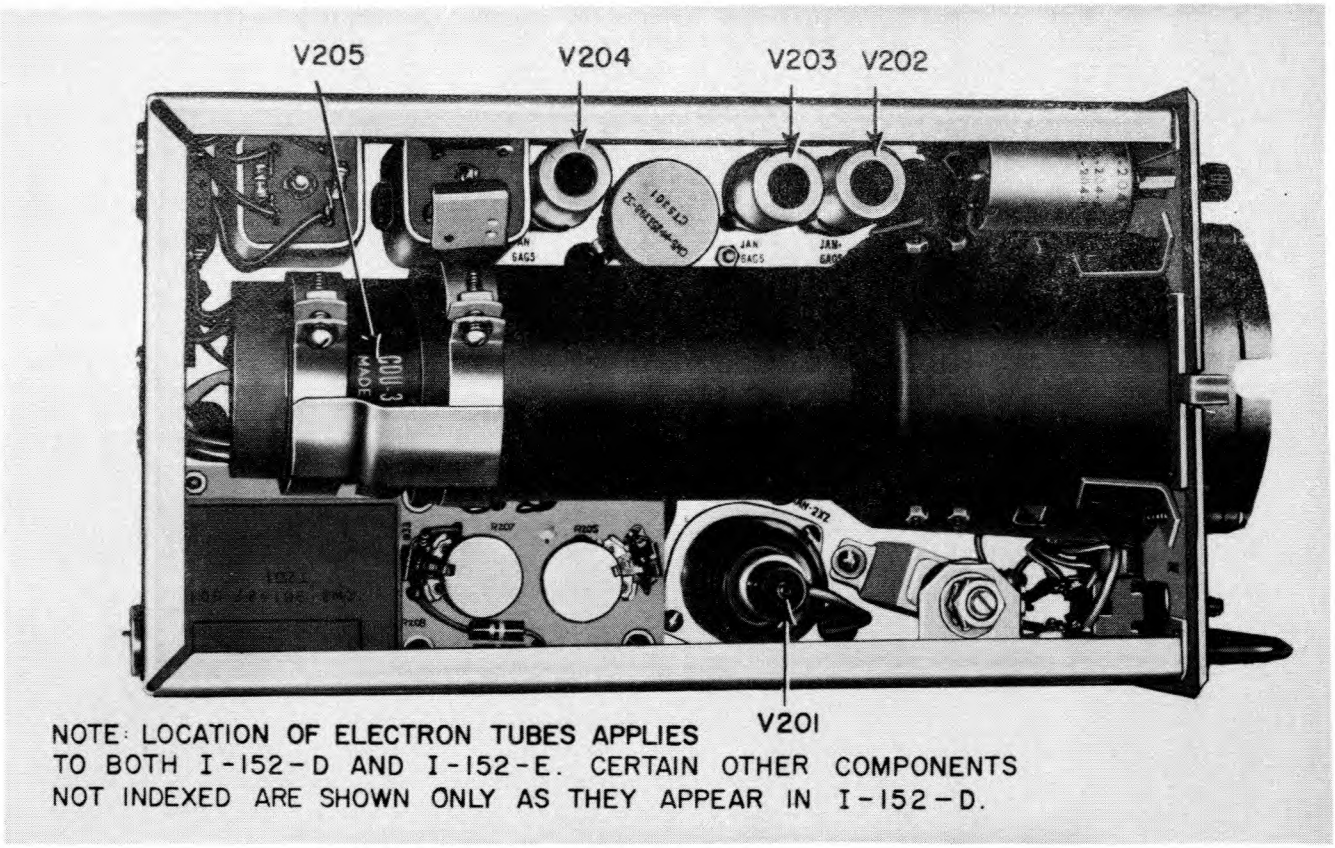


Figure 4-2. Indicator I-152-D or -E Electron Tube Location