INSTRUCTION BOOK

FOR

SIGNAL LAMP EQUIPMENT SE-8-T1

July 3, 1940

WAR DEPARTMENT

SIGNAL CORPS
LABORATORIES

FORT MONMOUTH
OCEANPORT, N. J.

INSTRUCTION BOOK

FOR

SIGNAL LAMP EQUIPMENT SE-8-T1

R E S T R I C T E D

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INSTRUCTION BOOK

FOR

SIGNAL LAMP EQUIPMENT SE-8-T1

SECTION I

GENERAL DESCRIPTION

1. Use. This equipment is intended for visual code signalling: (a) between points on land, (b) from shore to ship, and (c) from ground to airplane. Code signals are transmitted by keying an electrical circuit which operates a lamp in conformance with a dot and dash code system. Photograph SCL-485 shows the complete equipment and photograph SCL-482 shows the equipment packed for transportation.

2. Military Characteristics. The following are the military characteristics as recommended by the Signal Corps Technical Committee at Meeting No. 159 on March 14, 1938:

> "(3) Based upon the recommendations of the Chief of Coast Artillery, the Committee recommended that the following military characteristics be adopted for an all-purpose signal lamp for use by the Coast Artillery:
>
> "(a) Purpose. Communication between ship and shore; communication from ground to airplane; and communication between points on ground.
>
> "(b) Range. To be capable of transmitting a light signal readable with field glasses at a distance of 5 miles in bright sunlight under average conditions with a beam-spread of not less than 3 degrees.
>
> "(c) Light Characteristics.
>
> > "(1) To be equipped with a means of varying the beam-spread from a minimum of 3 degrees to a maximum of 8 degrees, the beam to be approximately circular in cross-section.
> >
> > "(2) Stray light to be a minimum consistent with beam-spread requirements. A red filter to be

furnished as an additional means of reducing stray light.

"(3) To be capable of transmitting code signals readable at the rate of five words per minute.

"(d) Mechanical Characteristics.

"(1) To be equipped with a tripod adjustable in height so that the lamp barrel may be set from 36 to 60 inches above the tripod base.

"(2) To be equipped with a lamp mounting capable of rapid traversing and elevating of the lamp barrel.

"(3) The lamp mounting to have a yoke which will hold the lamp barrel central over the tripod and which will permit a movement in elevation of not less than 17 degrees above or below the horizon.

"(4) To be equipped with a hand-operated key which may be connected through 100 feet of field wire without reduction in intensity of the light beam.

"(5) To be equipped with a gunstock type of mounting with trigger key and sub-machine gun grip, which may be used in place of the yoke mounting.

"(6) To be equipped with light weight, weather-proof carrying cases.

"(7) To be equipped with a telescope, mounted on the lamp barrel, and having approximately the same characteristics as the telescope on the EE-84-T4 equipment.

"(8) To be equipped with an open sight mounted on the lamp barrel.

"(e) Power Supply.

"(1) To use standard batteries which will permit eight hours of continuous signalling without reduction in the effective range of the light signal.

"(2) The battery case to be constructed so as to be corrosion proof.

"(3) A means to be provided for connecting lamp circuit to an external battery.

"(f) Bulk and Weight.

"(1) The equipment when packed for march order to be of convenient bulk for a one-man load.

"(2) The complete equipment to weigh not more than 30 pounds."

3. Optical Characteristics. Light from the lamp is projected from a parabolic reflector in a slightly divergent circular beam. The beam has a maximum, and nearly uniform, intensity over a central sector approximately 3 degrees wide. Outside of this central sector the beam intensity decreases to approximately 1/3 its maximum value at angles corresponding to a beam spread of 8 degrees. The range of the equipment in bright sunlight on a clear day is five miles in a 3-degree sector when field glasses are used. Over somewhat shorter ranges the beam is visible in a sector of 8 degrees. Reference is made to paragraph (3)(c)(1) of the Military Characteristics quoted in paragraph 2 above. The beam characteristics are such that auxiliary means of varying the beam spread are considered unnecessary. A hinged door with an opening covered by a red filter provides a means for decreasing the range and width of the light beam.

SECTION II

DETAILED DESCRIPTION AND FUNCTION OF PARTS

4. Signal Lamp M-207-T1.

(a) Lamp Housing. The lamp housing is a tube 5 inches in diameter. On the front of the tube a ring has been provided which also forms part of the hinge for the filter door, in which is mounted a red filter. A ring on the opposite end of the tube serves to mount two knurled screws which are used to fasten the reflector cover in place. Open sights are mounted on each of the rings. Two bearings and one gear are mounted on a ring around the central portion of the tubing. On this ring are mounted also two terminals which are either short circuited or connected to a key on a gun stock. A lamp socket for a prefocussed lamp is mounted on three fins in the center of the tubing. A catch to hold the filter door and two lugs, one of which has a wing nut fastened to a gunstock, are mounted on the bottom of the lamp housing.

(b) Telescope. A telescope is mounted on the outside of the tubing and is aligned with the light beam as are the open sights. The telescope has two focussing adjustments: first, an eyepiece adjustment, obtained by rotating the rubber eyeguard, and second, an objective adjustment, obtained by turning the knurled knob.

(c) Reflector and Reflector Cover. The reflector is a parabolic reflector of one-inch focal length having a face diameter of 4-1/2 inches. It is mounted on a cover which is held in correct position on the lamp housing by means of two spring lugs riveted on the outside of the cover and the two knurled screws on the lamp housing. A button is placed on the reflector cover to help identify the top when replacing the cover in the dark.

(d) Short Circuiting Plug. A short-circuiting plug short-circuits the terminals on the lamp housing when the lamp is keyed by means of Key J-46 for land or shore-to-ship signalling. The same short-circuiting plug is used to short circuit the terminals marked "KEY" on Box BX-27 when the Signal Lamp M-207-T1 is used with the gun stock for ground to airplane signalling. As shown in Figure 1, the binding posts on Signal Lamp M-207-T1 are connected in series with the lamp. When the trigger key is used, it is connected in series with the lamp. The short-circuiting plug must then be placed in the terminals marked "KEY" on the battery box in order to operate the relay in the battery box which closes the circuit between the batteries and the lamp. When

the trigger key on the gun stock is not used the short-circuiting plug is plugged in the binding posts on the signal lamp to complete the circuit from the battery box to the lamp. Keying is accomplished by Key J-46 which closes a circuit on the coil of the relay, thus operating the contacts on the relay which are in series with the lamp and batteries.

(e) A cord with plugs attached to the lamp is provided for connecting the lamp to Box BX-27-T1.

5. Lamp Mounting FT-208-T1. Lamp Mounting FT-208-T1 is used to mount Signal Lamp M-207-T1 and provides a means of rotating and elevating the signal lamp. The lamp mounting is of the yoke type. On the top of each arm of the yoke are two bearing caps which are held in place by means of knurled screws for mounting and dismounting of the signal lamp. A gear cover is held to one arm of the yoke by means of a spring and covers the gear which meshes with the elevating gear of Signal Lamp M-207-T1. The traversing gears are housed in the base of the lamp mounting. These gears can be released by means of a lever if it is desired to rotate the lamp quickly. The lower support is clamped to the mount assembly on the tripod by means of a wing nut. The azimuth circle at the base of the lamp mounting is graduated in 100-mil divisions from 0 to 32 and repeated. The worm shaft has a dial at the left end graudated in mils from 0 to 100. Thus the azimuth can be set to one mil. A compass and a level are mounted on the base of the mounting.

6. Lamp LM-36-T1. Lamp LM-36-T1 is a 12-volt, 1-ampere lamp with a G-12 bulb, mounted on a prefocussed, single-contact base. The filament is a circular coil which is aligned with the axis of the base. The base of the lamp is so constructed that it will mount on the socket in Signal Lamp M-207-T1 in only one position. The socket is so arranged that the coil will hang down.

7. Box BX-27-T1. Box BX-27-T1, divided into two sections, is used to house the batteries, mount the relay and binding posts and is a part of the electrical circuit. Recessed metal connectors are provided on the bottom of the box in the battery section. The relay is mounted in the other section. The binding posts are mounted on the end. Two binding posts are marked "KEY," two other binding posts are marked "LAMP" and one of the latter and the fifth binding post are marked "EXTERNAL BATTERY."

8. Key J-46 and Cord CD-332. Key J-46 and Cord CD-332 are identical with those used as part of Signal Lamp Equipment EE-84. One end of Cord CD-332 has Tips TM-39 which connect to Binding Posts TM-144 on the key. The plug on the other end of Cord CD-332 provides connection to the binding posts on Box BX-27-T1 which are marked "KEY."

9. Gun Stock. A metal gun stock, which is part of Signal Lamp Equipment SE-8-T1 is provided. Two slots are cut in the gun stock and are used to secure Signal Lamp M-207-T1. A trigger-type key is mounted on the gun stock, which carries also a cord for connecting the key to the binding posts on the signal lamp.

10. Tripod and Mount Assembly. The tripod and mount assembly are standard Ordnance Department equipment, as used with Aiming Circle 1916.

11. Bag BG-87-T1. This bag consists of two sections. In one section the Signal Lamp M-207-T1 and Lamp Mounting FT-208-T1 are carried. The filter door of the signal lamp fits into a recess in the wood bottom of the bag and the lamp mounting fits in the supporting blocks. Cord CD-332 and Key J-46 are also carried in this section. The other section is for 16 spare Batteries BA-15-A. A canvas pocket on the side of the main part of the bag provides a means of carrying the gun stock.

12. Bag BG-88-T1. The tripod and mount assembly are carried in the main section of this bag. The pocket on the side of the bag provides carrying space for Box BX-27-T1.

13. Goggles M-172. The frames of the goggles are made of rubber and are held to the head by means of a strap. The glass in the goggles is a filter which allows only red light to pass through.

SECTION III

EMPLOYMENT

14. Preparation for Use.

(a) For Use With Tripod. Operations should be followed in the order indicated. Remove the tripod and mount assembly from Bag BG-88-T1. Set up the tripod in the usual manner. Remove Signal Lamp M-207-T1 and Lamp Mounting FT-208-T1 from Bag BG-87-T1, place the lamp mounting on the mount assembly and clamp it by means of the wing nut on the lamp mounting, then level it by moving it about the ball joint in the mount assembly. If an orientation point is available, set the azimuth scale to the reading of the orientation point by turning the knurled knob on the lamp mounting and aim the signal lamp and lamp mounting at the orientation point by means of the knurled knob on the mount assembly so that the orientation point is seen in the center of the field of view of the telescope. If necessary, the signal lamp and telescope may be elevated by means of the knurled knob on the yoke of the lamp mounting. If no orientation point is available release the needle lock on the compass, and, after setting the magnetic variation on the azimuth scale, rotate the lamp mounting by means of the knurled knob on the mount assembly until the compass needle points to zero. Then lock the compass needle. Remove Box BX-27-T1 from Bag BG-88-T1 and insert 16 Batteries BA-15-A with the polarity indicated. The batteries should be inserted so that the terminals make contact with the springs on the bottom. Replace the cover on the box and close the trunk locks on the side. Connect the plug which is on the end of the cord attached to the signal lamp by inserting it into the binding posts on the battery box marked "LAMP." Connect Cord CD-332 to the binding posts on the battery box marked "KEY." Connect the tips on Cord CD-332 to the binding posts on Key J-46. The short-circuiting plug is normally left in the binding posts on the signal lamp. Open the filter cover and the Signal Equipment SE-8-T1 is now ready for operation as shown in photograph SCL-483.

(b) For Use With Gun Stock. Operations should be followed in the order indicated. Remove Signal Lamp M-207-T1, Lamp Mounting FT-208-T1 and the gun stock from Bag BG-87-T1, and Box BX-27-T1 from Bag BG-88-T1. Remove the gear cover and loosen the two knurled screws on the lamp mounting which hold the bearing caps in place. Remove the signal lamp from the lamp mounting and slide the gun stock forward under the wing nut on the signal lamp and then backward on the rear lug and tighten the knurled screw on the signal lamp which clamps it to the gun stock. Remove the short-circuiting plug from the binding

posts on the signal lamp and short-circuit the terminals marked "KEY" on the battery box. Connect the plug on the cord attached to the gun stock to the binding posts on the signal lamp and open the filter cover. The signal lamp is now ready for operation with the gun stock mounting as shown in photograph SCL-484.

15. Operation. When the Signal Lamp Equipment SE-8-T1 is ready for operation, the receiving station may be called. Key J-46 is used when the signal lamp is mounted on the tripod, and the trigger key is used when the signal lamp is mounted on the gun stock. Keying should be done at the rate of approximately 5 words per minute. The dots and dashes should be sent with a "heavy" hand; that is, the dots and dashes should be disproportionately long, and the spaces between the dots and dashes within a letter should be clipped. If the signals are very bright at the receiving station the filter door may be closed, so as to decrease the range of the lamp. The red filter also increases security in daylight signalling. The background brightness which reduces the visibility of the signal lamp in daylight is composed largely of blue light from the sky and green light from foliage. The use of Goggles M-172 (which have red filters) by the receiving operator increases the "contrast ratio" or visibility of signals by reducing the background brightness more than the signal beam. The goggles and the red filter on the signal lamp both pass red light and therefore can be used simultaneously.

16. Cleaning. The red filter in the filter door should be kept clean. The reflector should not require cleaning. Dust may be removed from the reflector by brushing lightly with a camel's hair brush or cleansing tissue (Kleenex). Care should be taken not to scratch the reflector with dust particles.

17. Lamps. To replace burned-out lamps, loosen the knurled screws on the ring which is on the rear of the lamp housing and remove the reflector cover by first rotating and then withdrawing it. The lamp may be removed from the socket by rotating and withdrawing it. Substitute a new Lamp LM-36-T1 and replace the reflector cover. The small button on the outside of the reflector cover indicates the top of the cover. While the reflector cover is removed from the signal lamp, care should be taken that the reflector is not scratched. Two spare Lamps LM-36-T1 are included with the equipment.

18. Batteries.

(a) The life of the 16 Batteries BA-15-A is approximately 8 hours of continuous signalling at the rate of 5 words per minute.

(b) The batteries should be removed when the signal equipment is not in use. When in use, the batteries in Box BX-27-T1 should be inspected daily to determine if there is any indication of swelling or

bulging which might result in leakage of the battery electrolyte. Batteries which show such a tendency should be replaced at once.

(c) An external 12-volt battery may be connected to the terminals marked "EXT.BAT." on Box BX-27-T1. Remove Batteries BA-15-A from the battery box before connecting an external battery. Be sure that the polarity of the external battery is connected as marked over the terminals.

SECTION IV

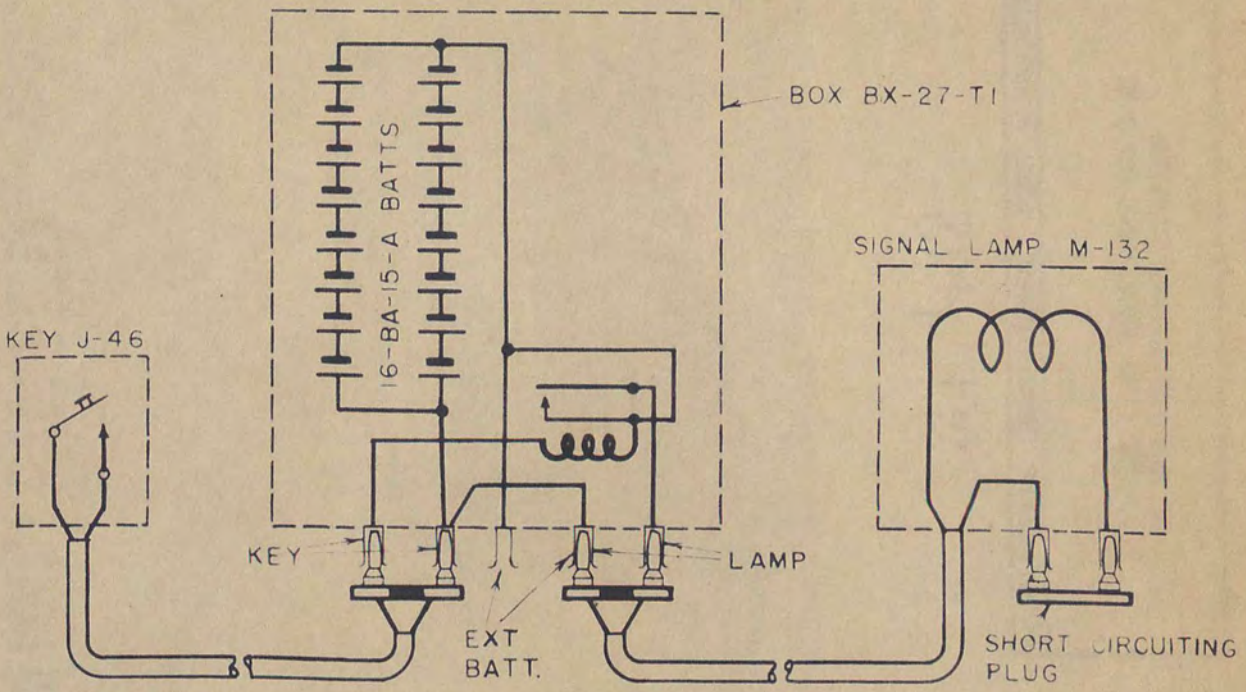
SUPPLEMENTARY DATA

19. List of Parts for Signal Lamp Equipment SE-8-T1.

Quantity	Nomenclature
1	Bag BG-87-T1
1	Bag BG-88-T1
32	Battery BA-15-A (16 in use, 16 spare)
3	Book, Instruction, for Signal Lamp Equipment SE-8-T1
1	Brush, Camel's Hair
1	Cord CD-332
1	Goggles M-172
1	Gun Stock
1	Key J-46
3	Lamp LM-36-T1 (1 in use, 2 spare)
1	Lamp Mounting FT-208-T1
1	Mount Assembly, Ordnance Department, for Aiming Circle Type M-1916 and M-1916-M1
1	Plug, Short Circuiting
1	Signal Lamp M-207-T1
1	Tripod, Ordnance Department Type M

The complete equipment as listed above weighs approximately 64 pounds.

CIRCUIT USING KEY J-46



CIRCUIT USING TRIGGER KEY

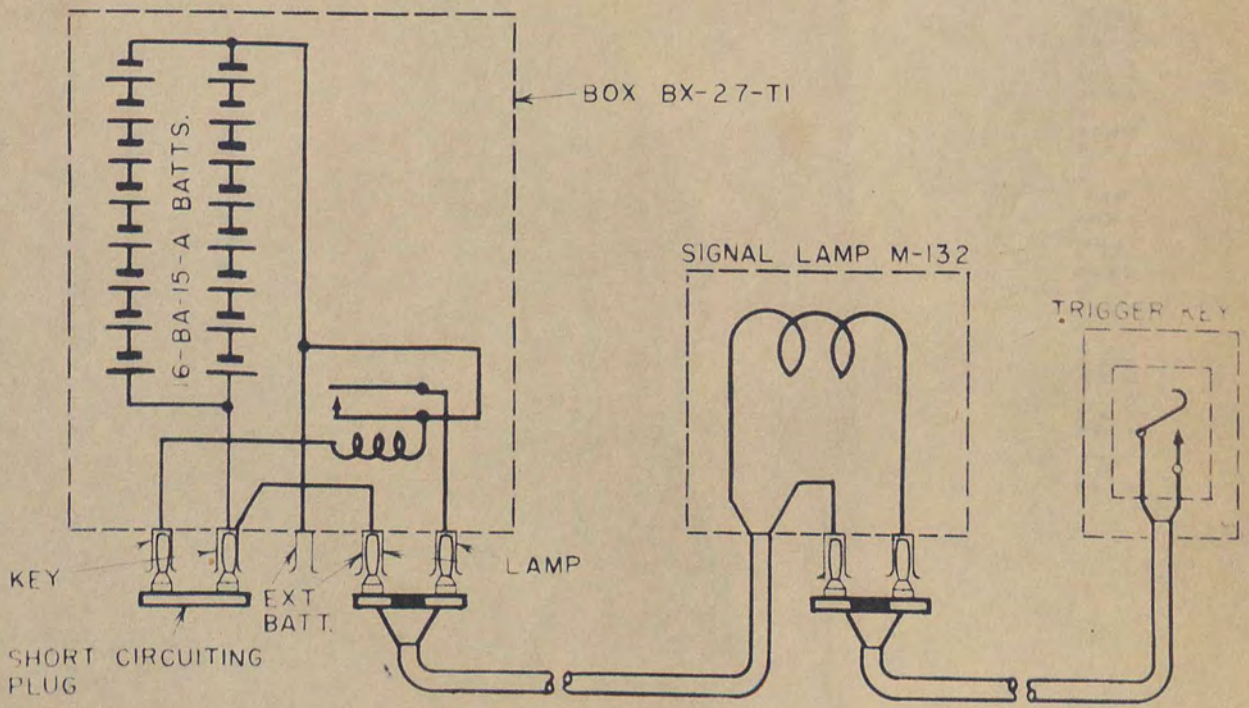


FIG-1

SCL 1034

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SL 482

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SIGNAL LAMP EQUIPMENT SE-8-T1
PACKED FOR TRANSPORTATION

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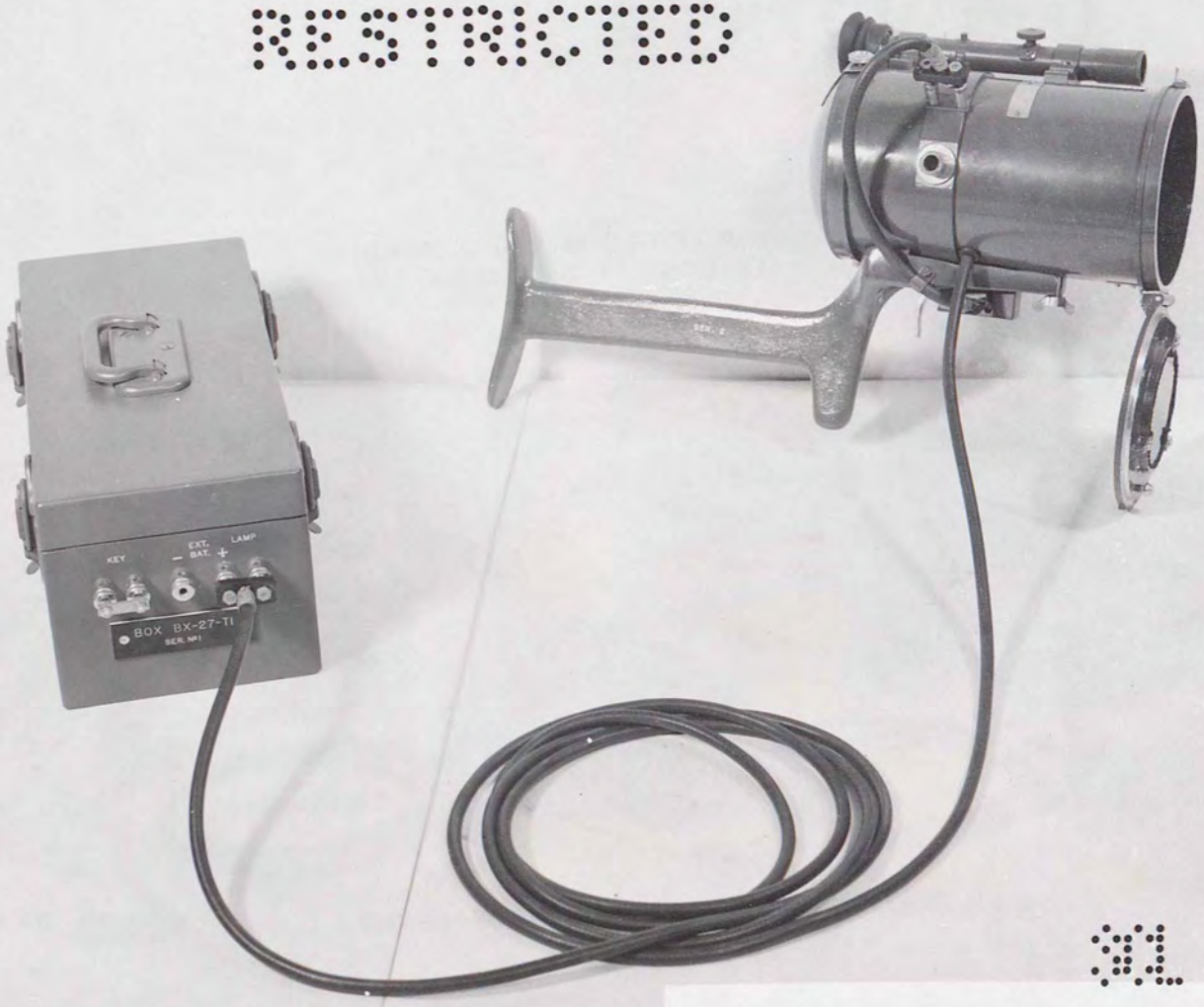
SL 483

RESTRICTED

SIGNAL CORPS LABORATORIES, FORT MONMOUTH, N. J.

SIGNAL LAMP EQUIPMENT SE-8-T1
(WITH TRIPOD)

RESTRICTED



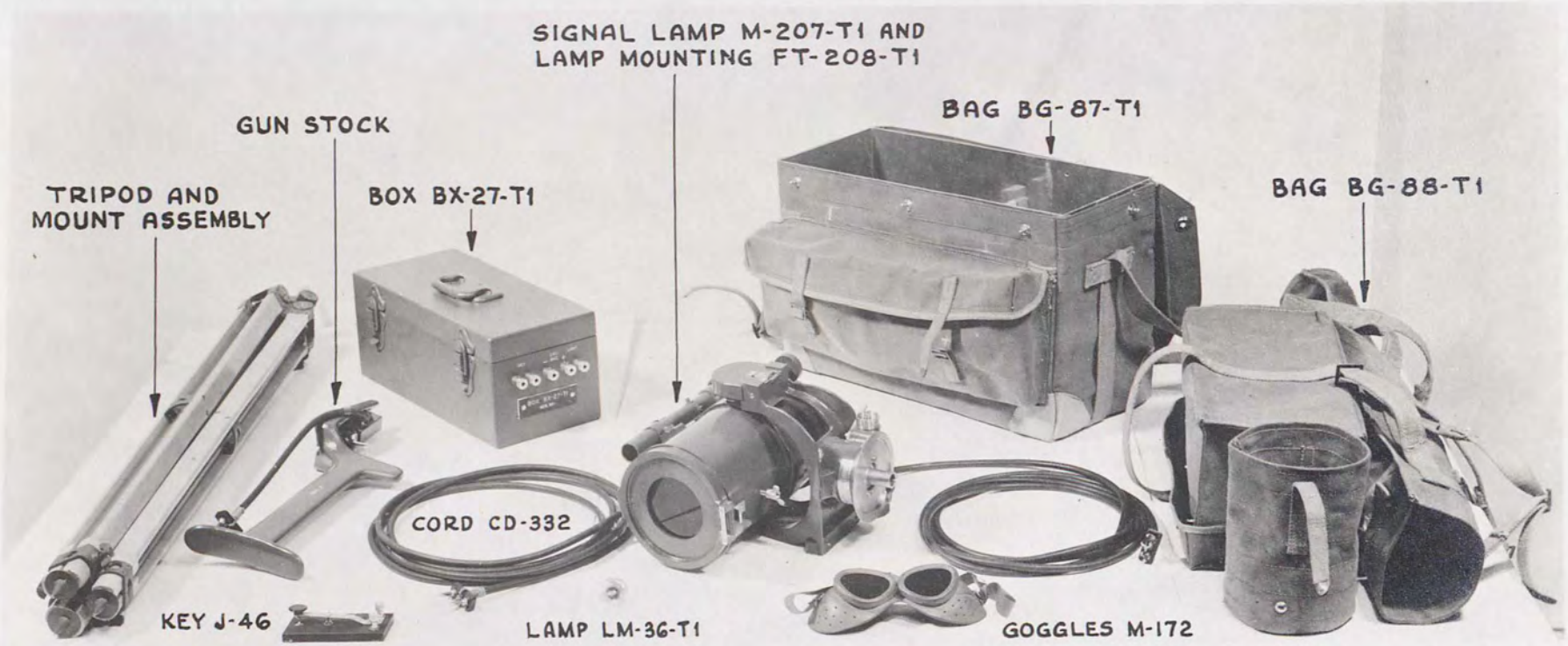
SL 484

RESTRICTED

SIGNAL CORPS LABORATORIES, FORT MONMOUTH, N J

SIGNAL LAMP EQUIPMENT SE-8-T1
(WITH GUN STOCK)

RESTRICTED



SL 465

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SIGNAL LAMP EQUIPMENT
SE-8-T1 COMPONENTS