DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

LIGHTING SETS FOR ARMY AIRFIELD RUNWAYS AND HELIPORTS

HEADQUARTERS, DEPARTMENT OF THE ARMY
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LIGHTING SETS FOR ARMY AIRFIELD RUNWAYS AND HELICOPTERS

Headquarters, Department of the Army, Washington, DC
16 August 1977

REPORTING OF ERRORS

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Section I. GENERAL

1. Purpose. This bulletin provides information for the installation, operation, and maintenance of airfield lighting sets for use on Army airfield run-ways and heliports.

2. Scope. This bulletin describes the components and the installation, operation, and maintenance of the following lighting sets listed in the indicated supply manuals.97-CL-E01.

a. Light set, operational area, aircraft: 1-1/2 KW, airfield runway. SC 6210-97-CL-E03.

b. Supplementary equipment, aircraft operational area light set: airfield runway. SC 6210 97-CL-E02.

c. Light set, operational area, aircraft: 1/2 KW, heliport. SC 6210-97-CL-E04.

d. Supplementary equipment, aircraft operational area light set: heliport; portable. SC 6210-

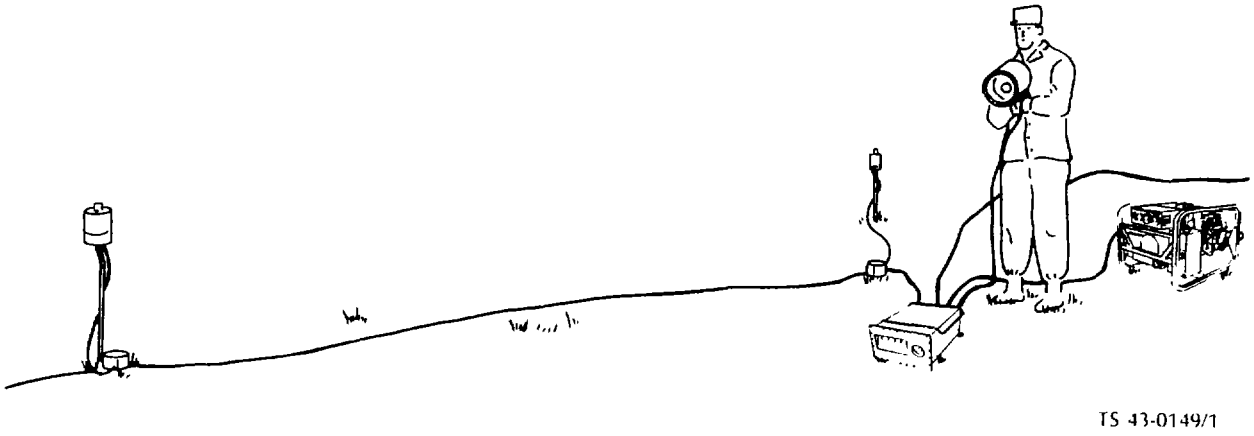

Figure 1. Runway lighting set installed - for operation in combat areas.

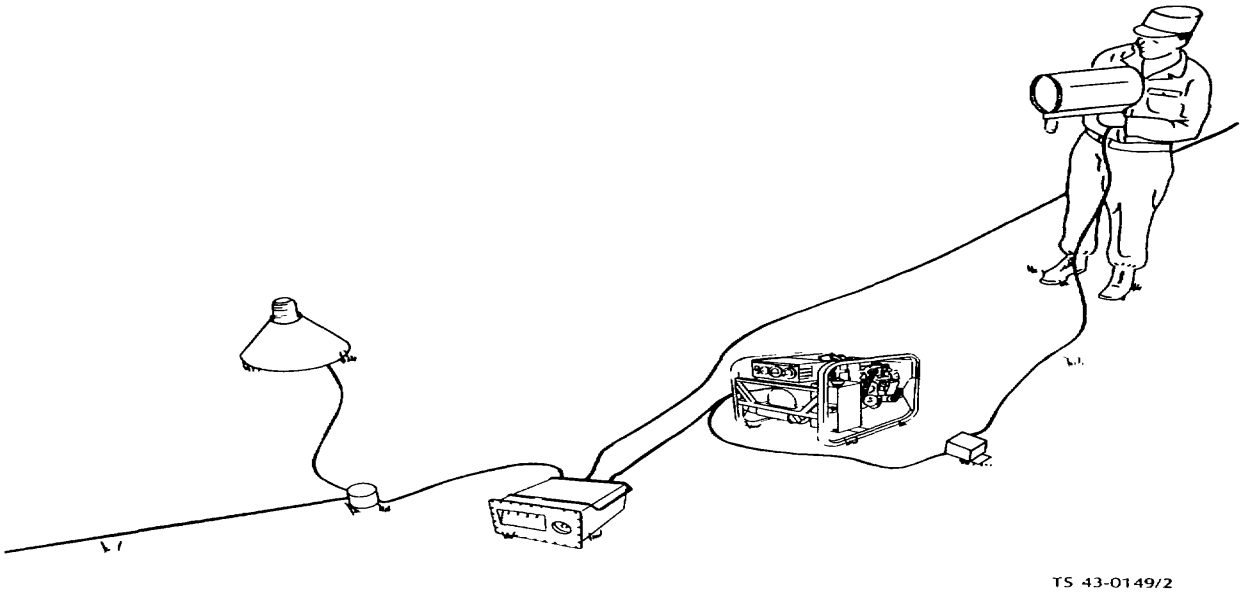

Figure 2. Runway lighting set installed - for operation in noncombat areas.

Section II. LIGHT SET, OPERATIONAL AREA, AIRCRAFT: 1-1/2 KW; SUPPLEMENTARY EQUIPMENT: AIRFIELD RUNWAY

3. Description.

a. Light Set, Operational Area, Aircraft: 1 1/2 KW.

(1)This set provides portable equipment for lighting a runway up to 2,000 feet (609.6 meters) i length for operation in combat and noncombat areas. It includes a 1-1/2 KW engine generator, a current regulator, marker lights, mounting stakes rubber covered transformers, hoods for use with th marker lights in combat areas, a glide angle approach light, and an aircraft traffic light. Figures and 2 show the set installed.

(2) The generator (figure 3) supplies power through the current regulator (figure 4) to the marker lights and the glide angle approach light. I combat areas, marker lights are mounted on stake (figure 5) for minimum visibility from the air. In noncombat areas and areas where stakes cannot be driven, the marker lights are mounted on cones ob tained from the supplementary set described in paragraph 4 b. below (figure 6) The marker lights are spaced at intervals of 200 feet (60.96 meters) along each side of the runway, and each light is fed from the power cable through an individual stepdown transformer (figure 7) In combat areas, 30 watt lamps are utilized in the marker lights. Hoods over the lights provide narrow beams of light for landing, takeoff, and taxiing. The hood is provided with a rotatable selector knob on its top which can be set to emit the desired light pattern. When properly set the light beam is visible to the pilot of an aircraft on an approach run, only when lined up with the runway and close to the ground. The selector may be set to emit sufficient light from the side opposite the approach end to define the limits of the runway to pilots of taxiing aircraft. Figures 8 and 9 illustrate the hood with selector knob and the light patterns obtainable from each setting.

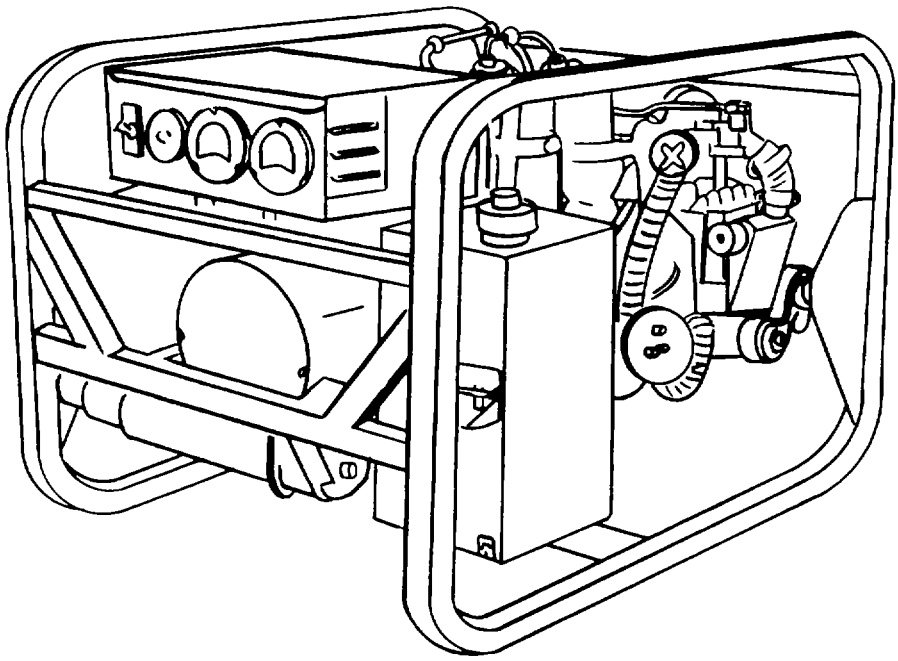

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Figure 3. 1-1/2 KW Engine generator.

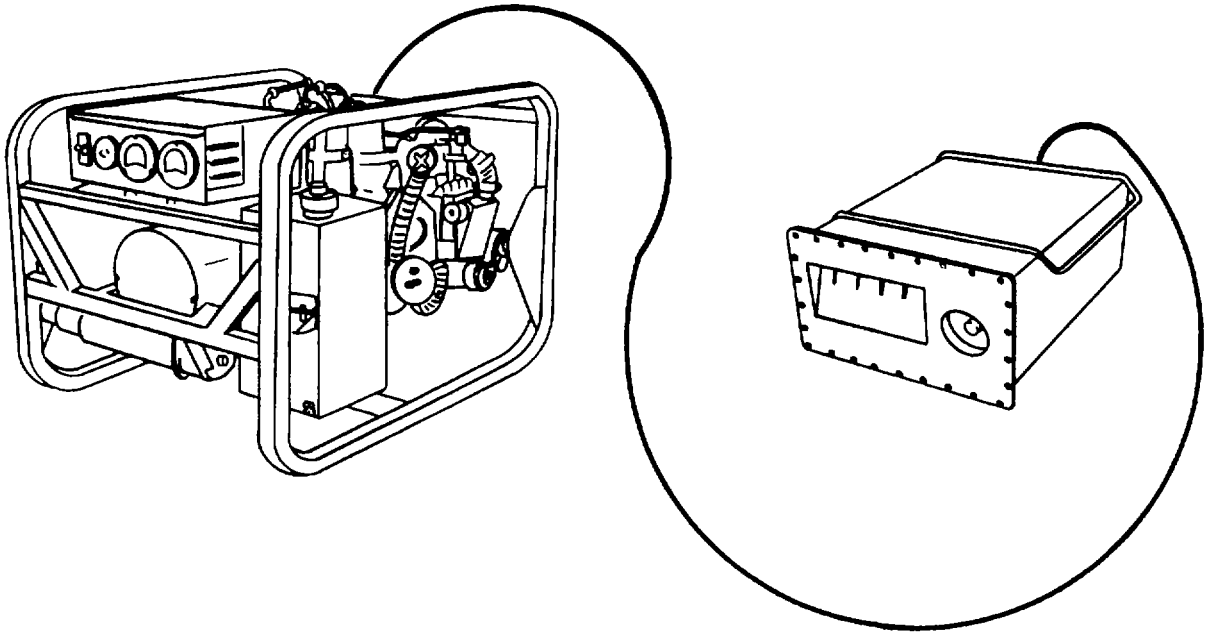

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Figure 4. Current regulator.

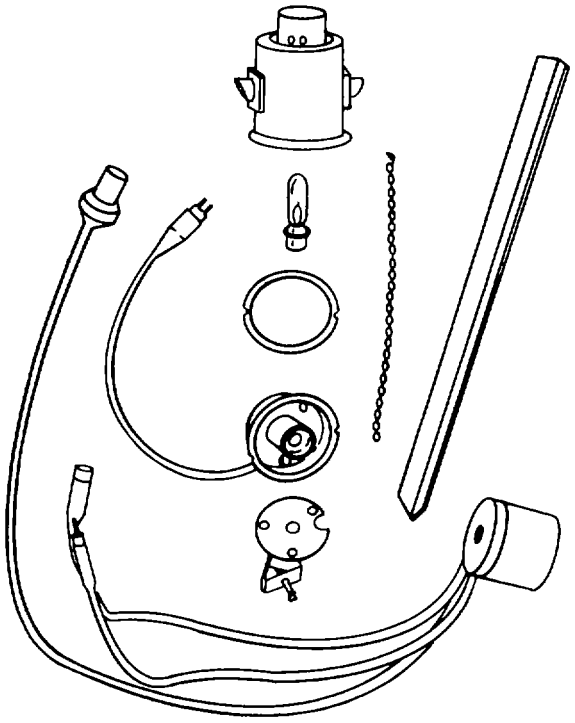

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Figure 5 . Exploded view of marker light assembly, s take mounted

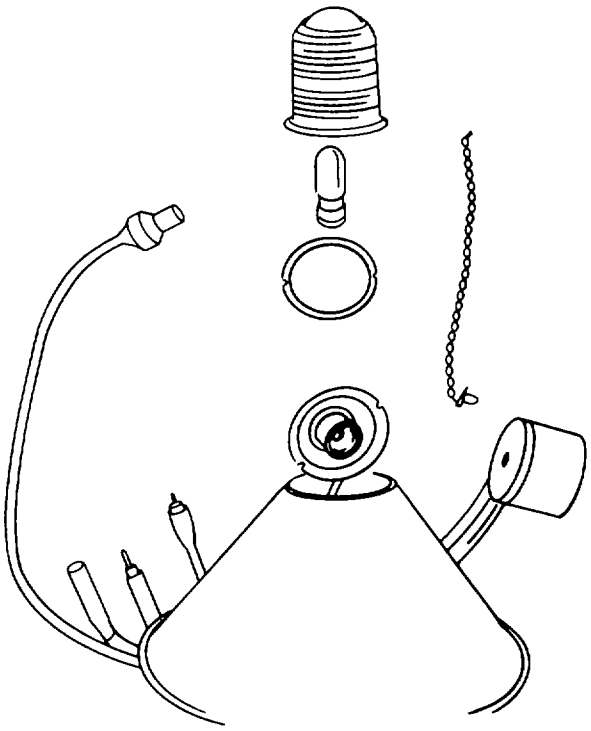

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Figure 6. Exploded view of marker light assembly, cone mounted.

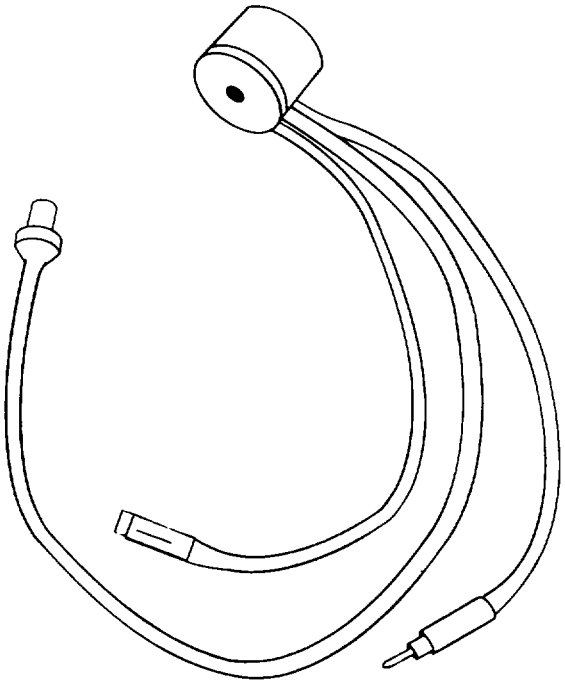

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Figure 7. Runway *lighting* transformer.

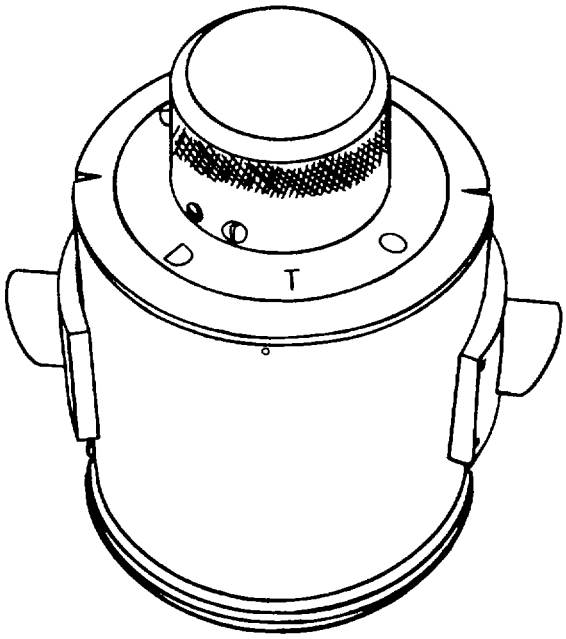

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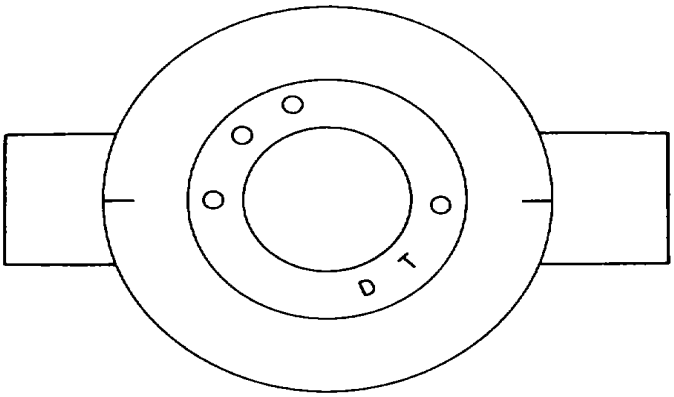
Figure 8. Hood for use in *combat area-showing selector knob.*



SETTINGS		PATTERNS	
RIGHT	LEFT	RIGHT	LEFT
O	O	OPEN	OPEN
T	O	DULL LIGHT (WHITE FILTER)	OPEN
D	O	CLOSED	OPEN

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Figure 9. Hood for use in combat area-light patterns available from each setting of the selector knob.

(3) glide angle approach light (figure 10) emits a narrow, tri-colored beam of light parallel to the runway centerline. It can be set for any desired approach angle up to 15 degrees from the horizontal by means of a protractor which is mounted on one side. When the approaching aircraft is in line with the runway, the pilot sees either the red, green, or amber portion of the beam, depending on whether his approach is too low, correct, or too high (figure 11). The glide angle approach light is stake-mounted and placed 200 feet (60.96 meters) from the approach end, on the left side of the runway as seen by an approaching pilot.

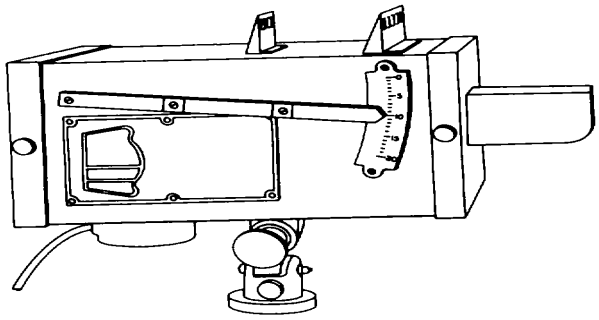

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Figure 10. Glide angle approach light.

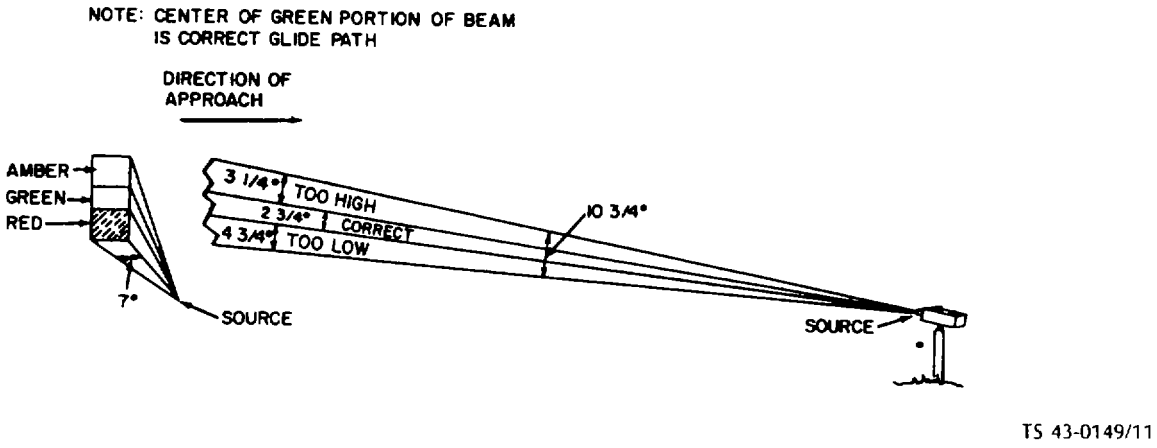


Figure 11. Light pattern of glide angle approach light.

(4) Also included in this set is a hand-held air- craft traffic light, operated by field personnel to direct air traffic as required. The light is connected through a 115/7 volt transformer to the generator control panel (figure 12). Red and green filters are supplied with the lamp.

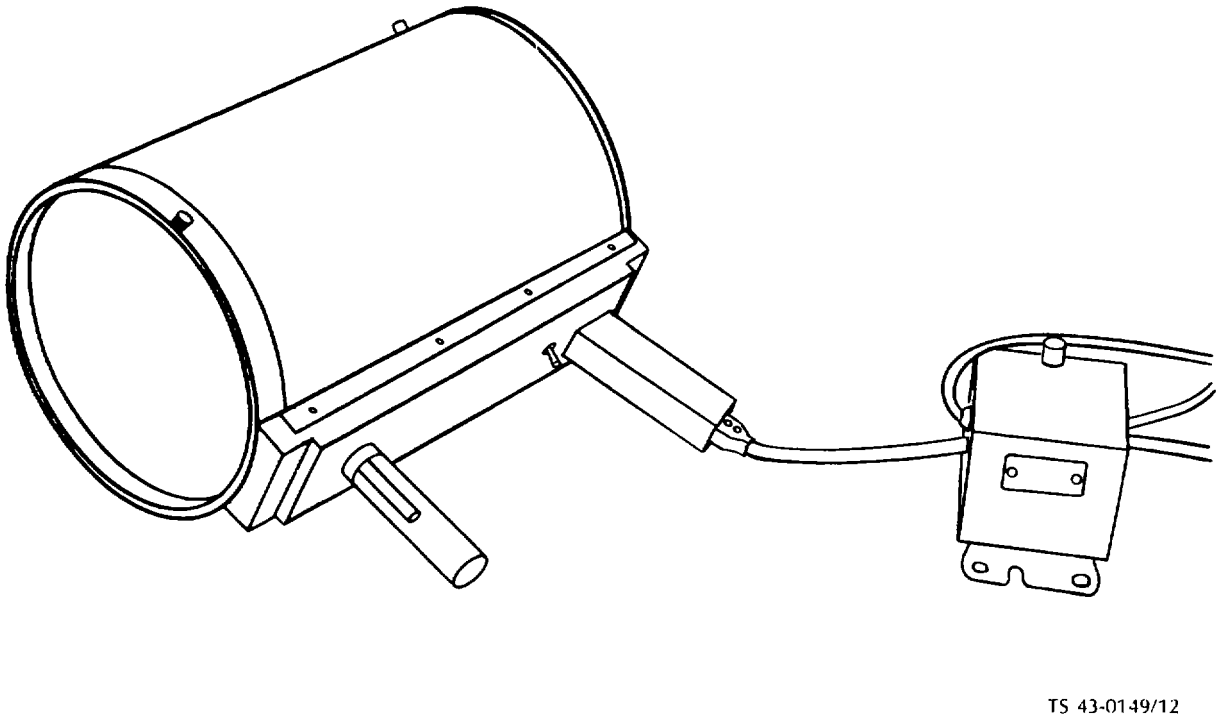
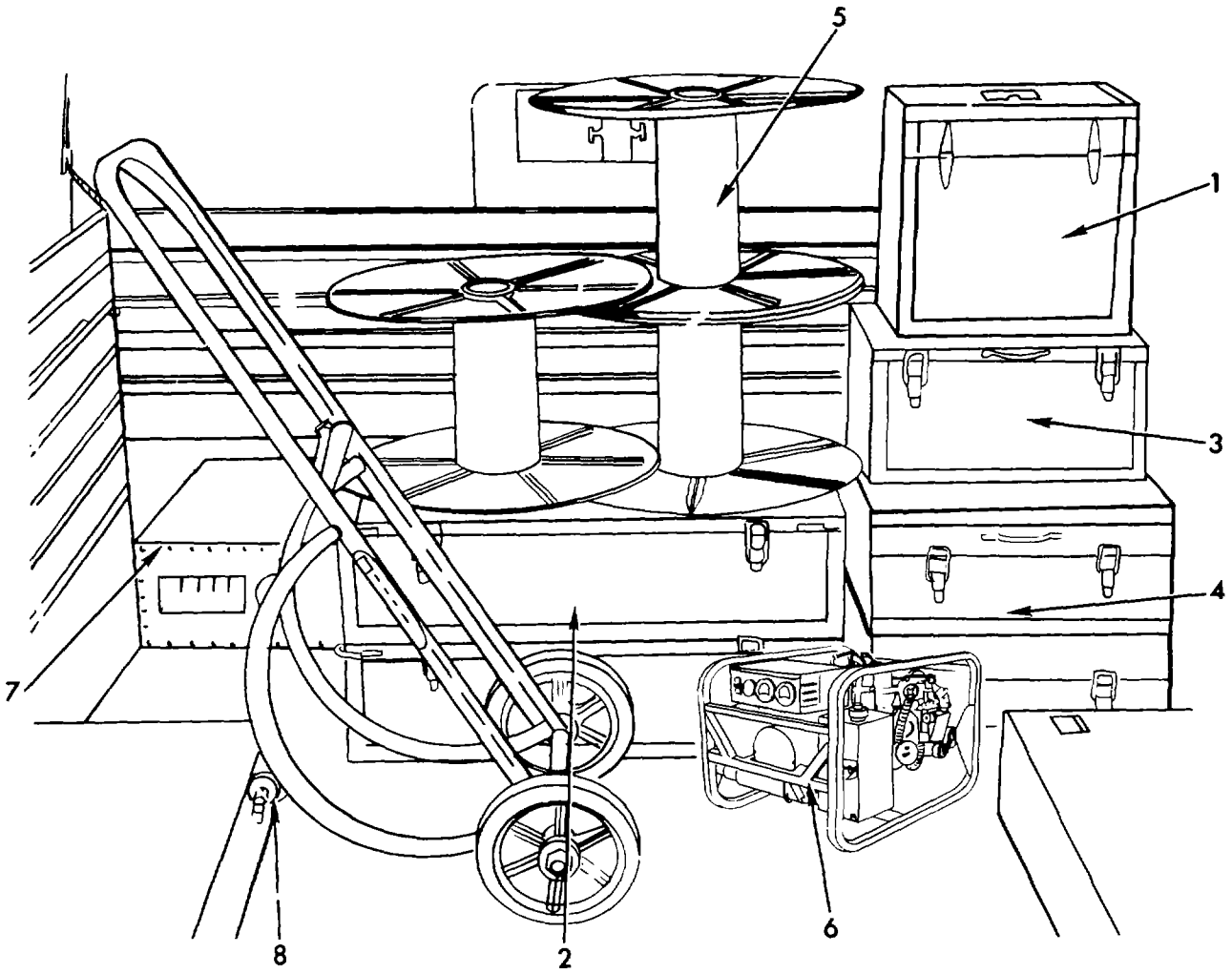


Figure 12. Aircraft traffic light.

(5) This lighting set can be installed on a 2,000-foot (609.6 meter) airfield runway by four men in 2 hours. Two men are required to monitor the operation of the set after installation. It can be removed by four men in 1 hour. The set can be transported in a 2-1/2 ton truck (figure 13).



1. Chest, air traffic control assembly
2. Chest, airport marker light
3. Chest, glide angle light
4. Chest, transformer
5. Reel, cable, single section
6. Generator set, 1-1/2 kw
7. Current regulator
8. Carriage, cable reel

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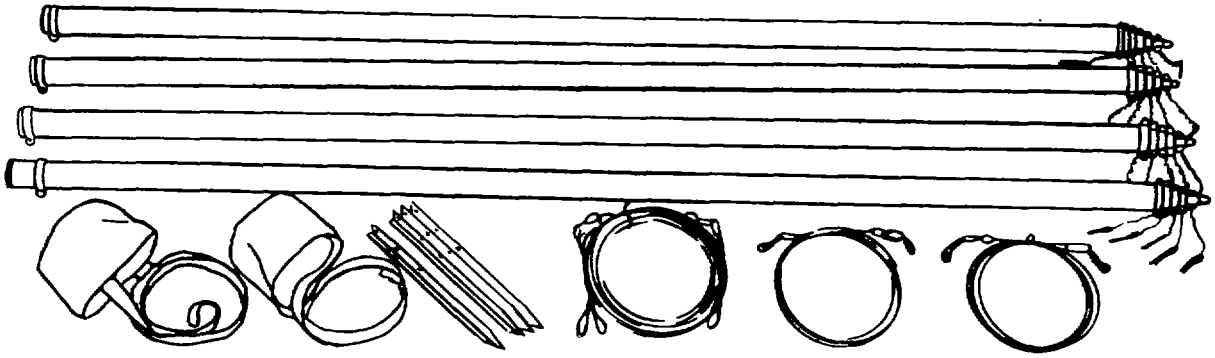
Figure 13. Runway light 8 lo*aded in 2-1/2 ton cargo truck.*

b. Supplementary Equipment, Aircraft Operational Area Light Set: Airfield Run way. This set supplements the basic runway se when used in noncombat areas. It includes lighting fixture, lenses, cones, a mast set, guy cables, stakes and rubber-covered transformers. Red lenses are provided for use on obstacle marker lights. Green lenses are provided for use on threshold lights. When the supplementary set is used, the glide angle approach light is not used. The cones (figure 6) used to support the marker lights, are painted yellow to add to their daylight visibility since this set is used

only in noncombat areas. Clear lenses, which increase the visibility of the marker lights, are provided for use in lieu of the combat hoods. The mast set (figure 14) is used (where required) to place obstacle lights at the proper height. In a noncombat area, 45-watt lamps are utilized in the marker lights. The set may be transported in a 2-1/2 ton cargo truck with the runway lighting set (figure 15).



1. Reel, cable, double section
2. Airport marker light cones w/rack
3. Chest, airport obstacle light
4. Chest, airport marker light lens
5. Mast set

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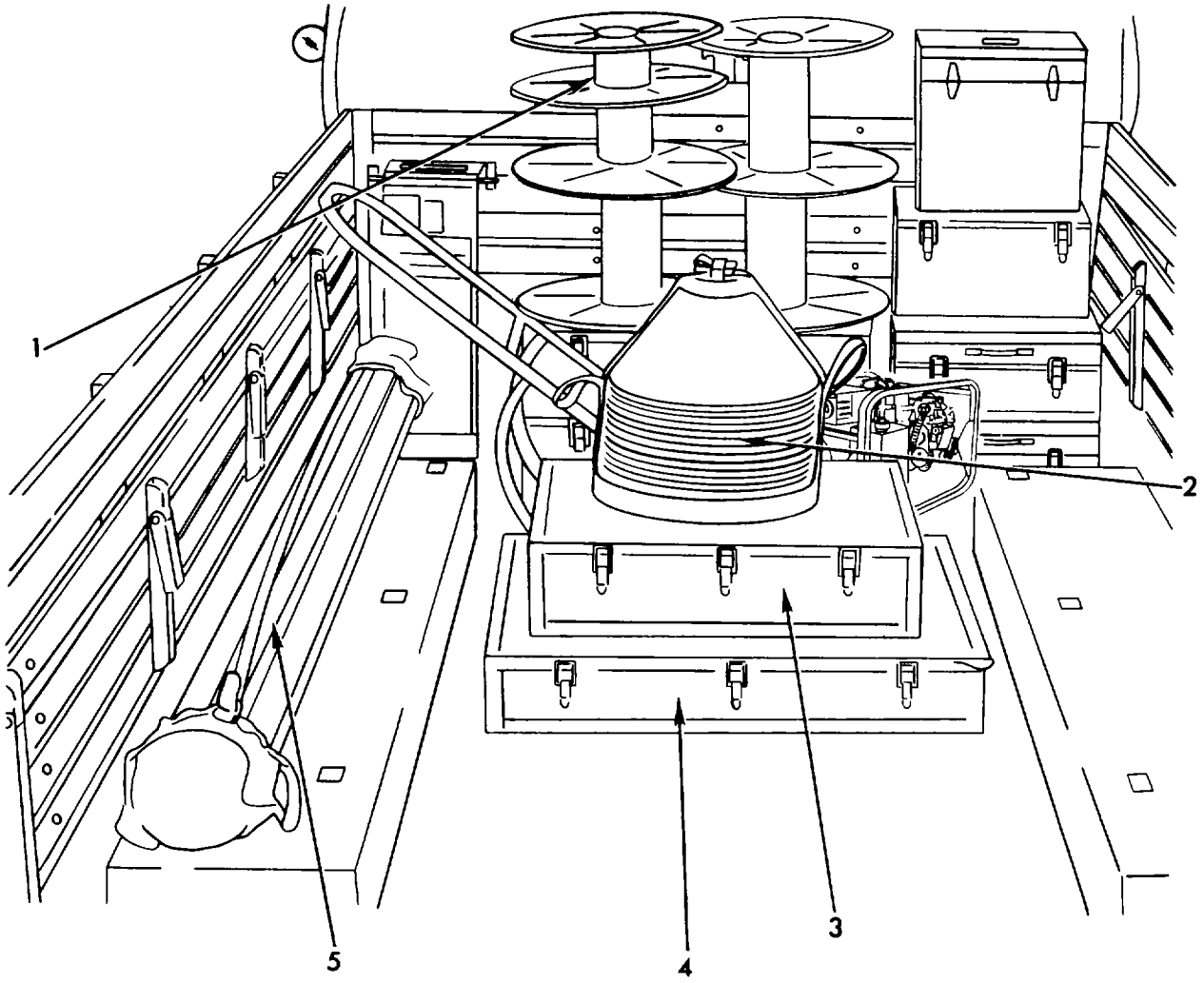
Figure 14. Mat set.



1. Reel, cable, double section
2. Airport marker light cones w/rack
3. Chest, airport obstacle light
4. Chest, airport marker light
5. Mast set

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Figure 15. Supplementary equipment act for runway lighting act loaded in 2-1/2 ton cargo truck along with running lighting set

4. Preparation for Use. a. Prior to installing the lighting fixtures in the field, the marker light and mounting adapter base plate are assembled This is accomplished by aligning the three knockout holes in the fixture with the corresponding holes in the adapter (figure 16). The power cord o the fixture is then passed through the holes provided in the adapter base. -The assembly is then bolted together (figure 17). The bottom section of the adapter is then removed from the assembly by unscrewing the retaining ring (figure 18). The procedure for laying out the lighting circuits, as shown in figure 19, is as follows:

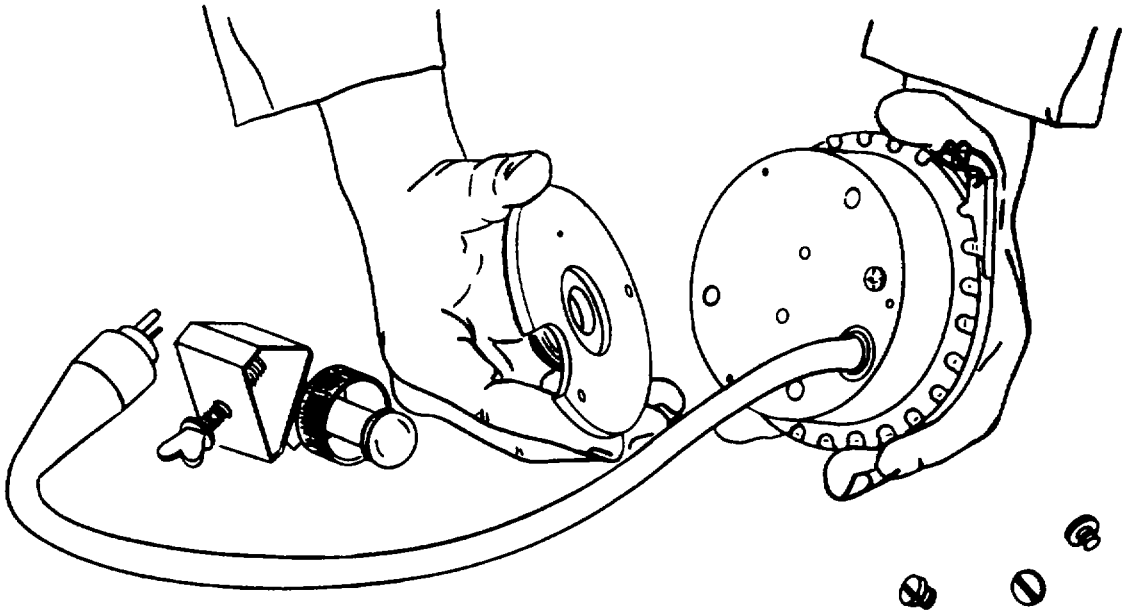

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Figure 16. Aligning knock out holes with corresponding holes in adapter.

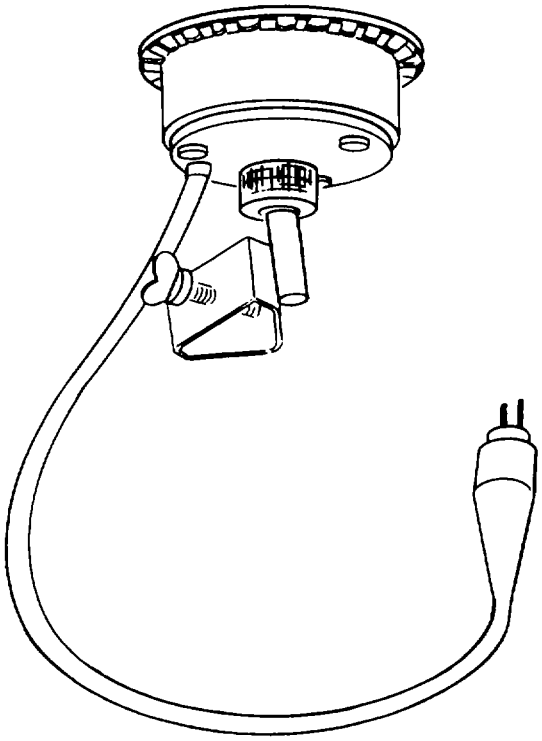

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Figure 17. Assembly bolted together with power cord in place.

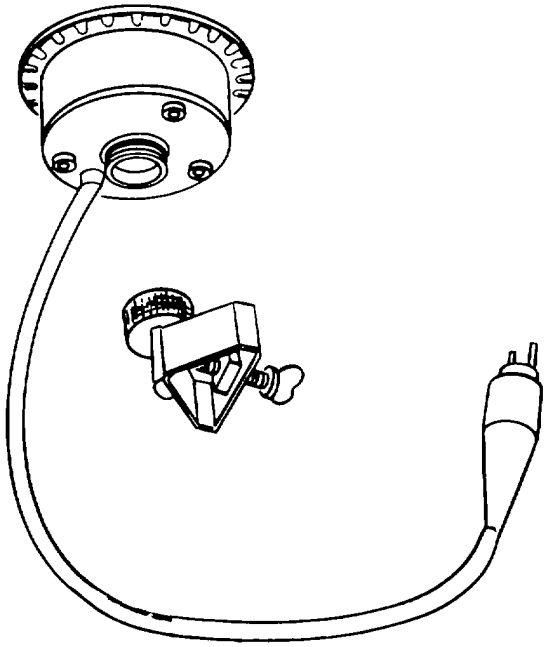

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Figure 18. Removal of bottom section of adapter.

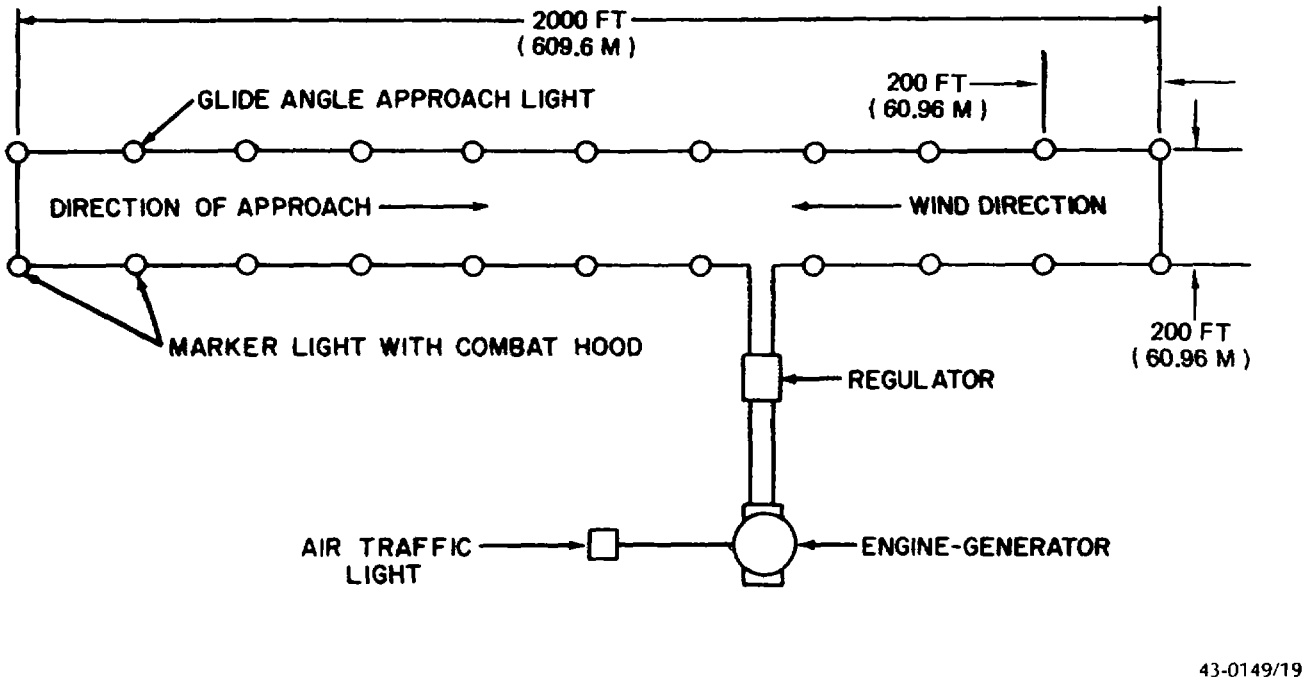

Figure 19. Circuit layout for *airfield* runway *in* a *combat* area.

(1) The 200-foot (60.96 meter) power cable are laid along each edge of runway to permit the runway lights to be mounted at 200-foot (60.96 meter) intervals and directly opposite each other across the runway. At the ends of the runway, either 50-foot (15.24 meter) or 200-foot (60.96 meter cables may be used to connect the threshold lights

(2) After the cables have been laid out, step down transformers for marker lights and for the glide angle indicator light are placed at their required locations. The primary leads of the tranformers are connected to the power cables (figure 20). If it is necessary to connect a transformer lea and a power cable, each of which has a female con nector, the circuit may be completed with a male adapter (figure 21); if 2 male ends meet, a female adapter is used (figure 22). After the generator has been sited, a single conductor cable is run from each of the two nearest marker lights to the current regulator (figure 19). When all the runway cables and transformers have been connected, stakes are driven at the proper locations and the lighting fixtures and glide angle approach light are placed, assembled, connected, and leveled. Lighting fixtures are installed by first placing the separated bottom half of the mounting adapter on a driven stake (figure 23).

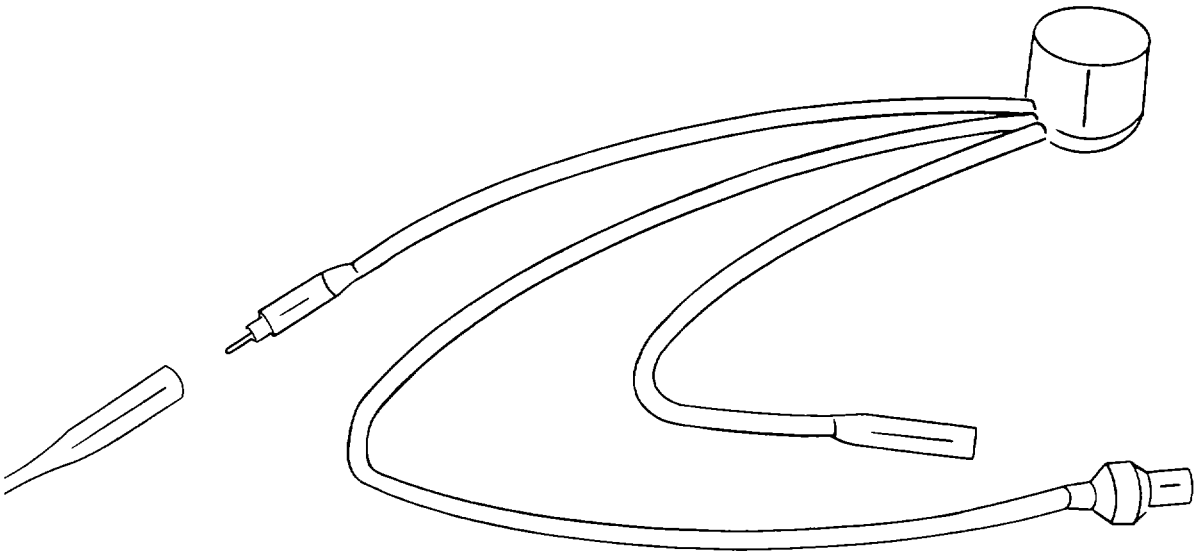

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Figure 20. Transformer connected to power cables - normal operation.

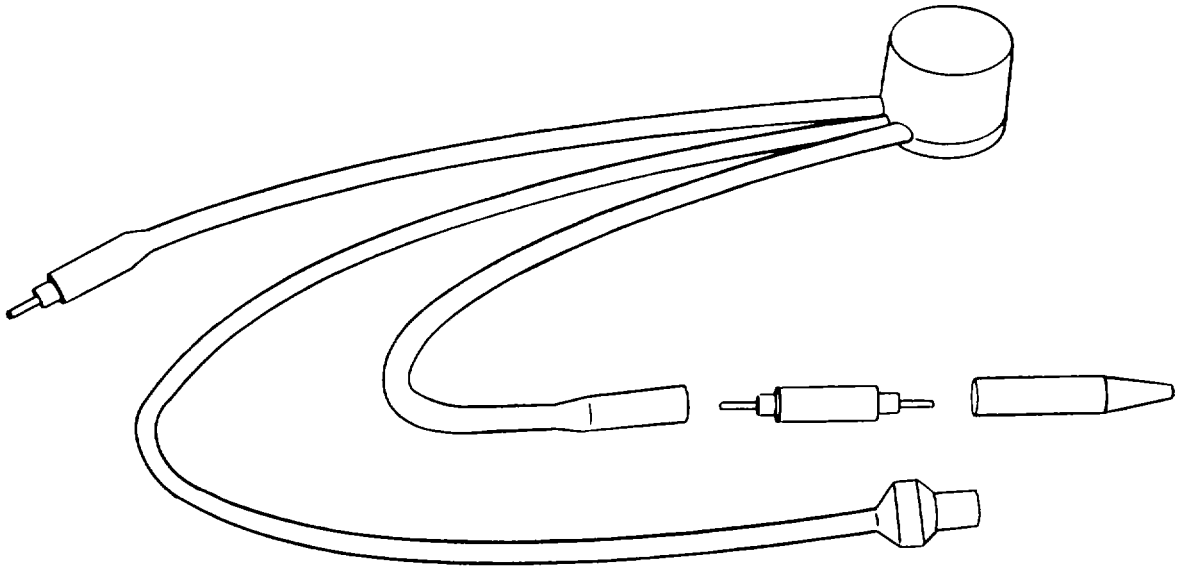

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Figure 21. Transformer connected to power cables - use of male adapter.

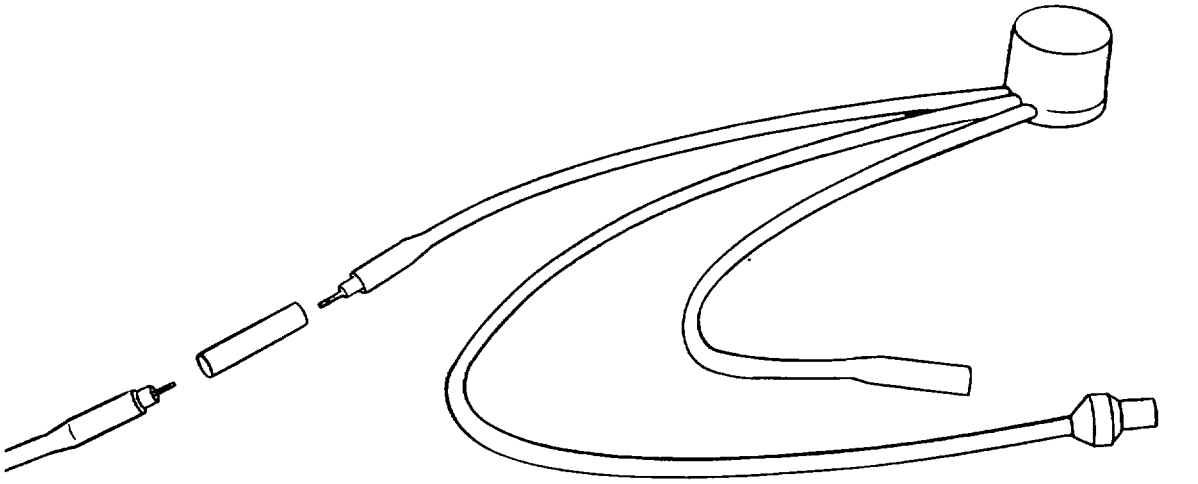

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Figure 22. Transformer connected to power cables - use of female adapter.

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Figure 23. Installation of lighting fixture in combat area - mounting adapter on stake.

(3) The top half of the mounting adapter, with the fixture attached, is reassembled with the bottom half by placing the two together and tightening the retaining rings (figure' 24). The combat hood is then placed on the fixture and fastened with the clamping ring (figure 25). The fixture is then leveled by placing the circular level provided over the hood; loosening the retaining ring; and adjusting the fixture until level and oriented with the runway (figure 26). The ring is then tightened to lock the fixture securely. The fixture lead is then connected to the transformer secondary (figure 27). The glide angle indicator light is installed by attaching the glide angle approach light adapter to a driven stake, then attaching the light and leveling with the levels provided on the light. The generator, current regulator, and runway circuits are then connected. The current regulator is connected to the generator with two single conductor cables furnished with the regulator. When the lighting fixtures are to be mounted on cones in areas where stakes cannot be driven, the procedure described in paragraph 5b. (2) is followed except that combat hoods are utilized instead of lenses.

TS 43-0149/24

Figure 24. Installation of lighting fixture in combat area - reassemblying mounting adapter

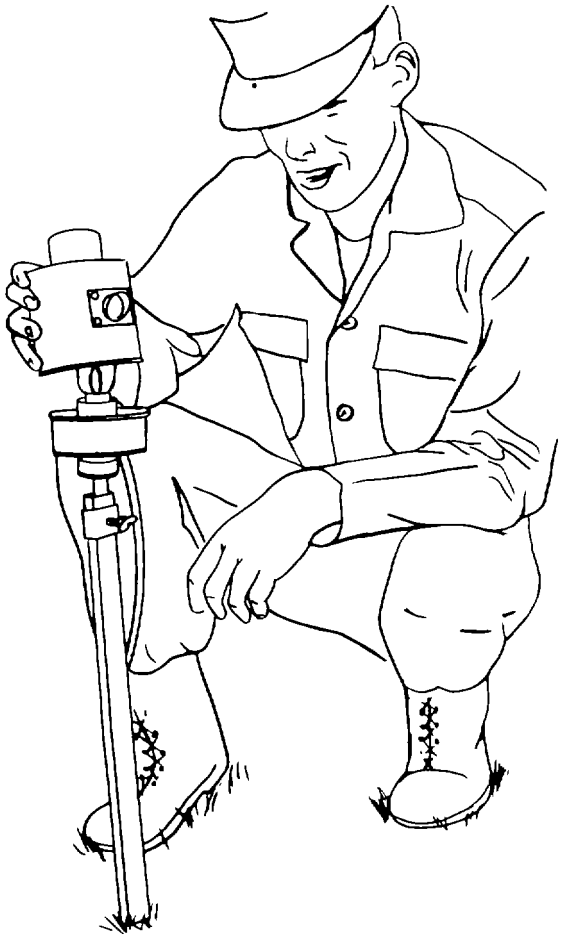

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Figure 25. Installation of lighting fixture in combat area - installing combat hood.

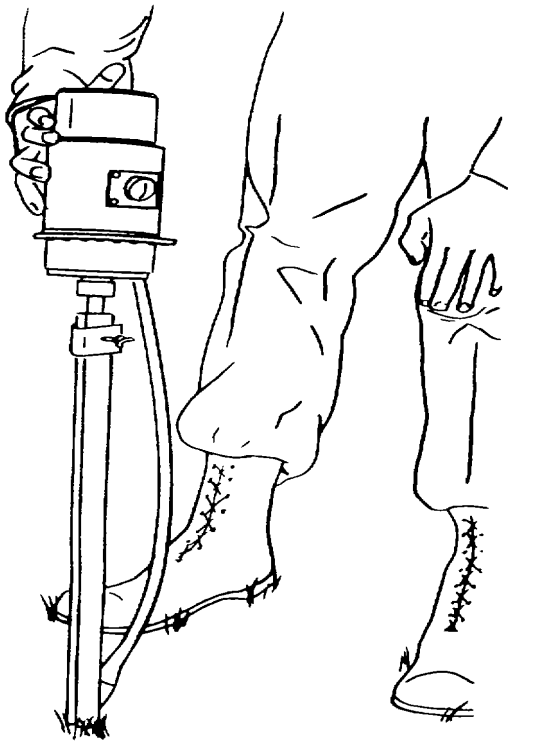

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Figure 26. leveling *Installation of lighting fixture in combat area* -leveling

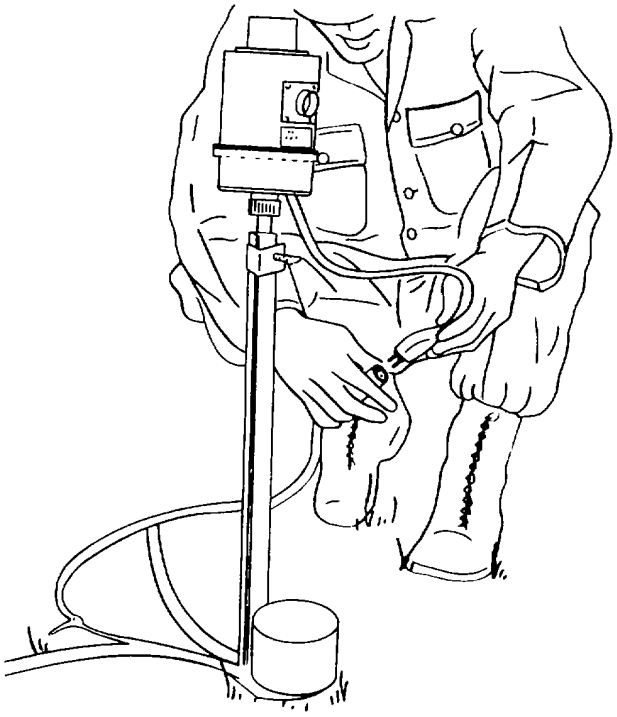

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Figure *27.* Installation of lighting fixture in combat area-*connecting fixture lead to transformer.*

(4) In combat areas the cables and transformers should be left on the surface of the runway shoulder to allow for hasty dismantling. The cables are designed to resist frost and heavy loads. Cables and transformers should be protected at traffic crossings.

(5) The direction of the runway light beams should be parallel to the runway. If the direction of approach is reversed, the hood selectors must be rotated 180 degrees to face the new direction of approach, and the glide angle indicator light must be moved to its proper position at the opposite end of the runway. M.)

b. The circuit layout for a noncombat area is shown in figure 28. The procedure for laying out the

lighting circuits is the same as that for a combat area, with the following modifications and additions.

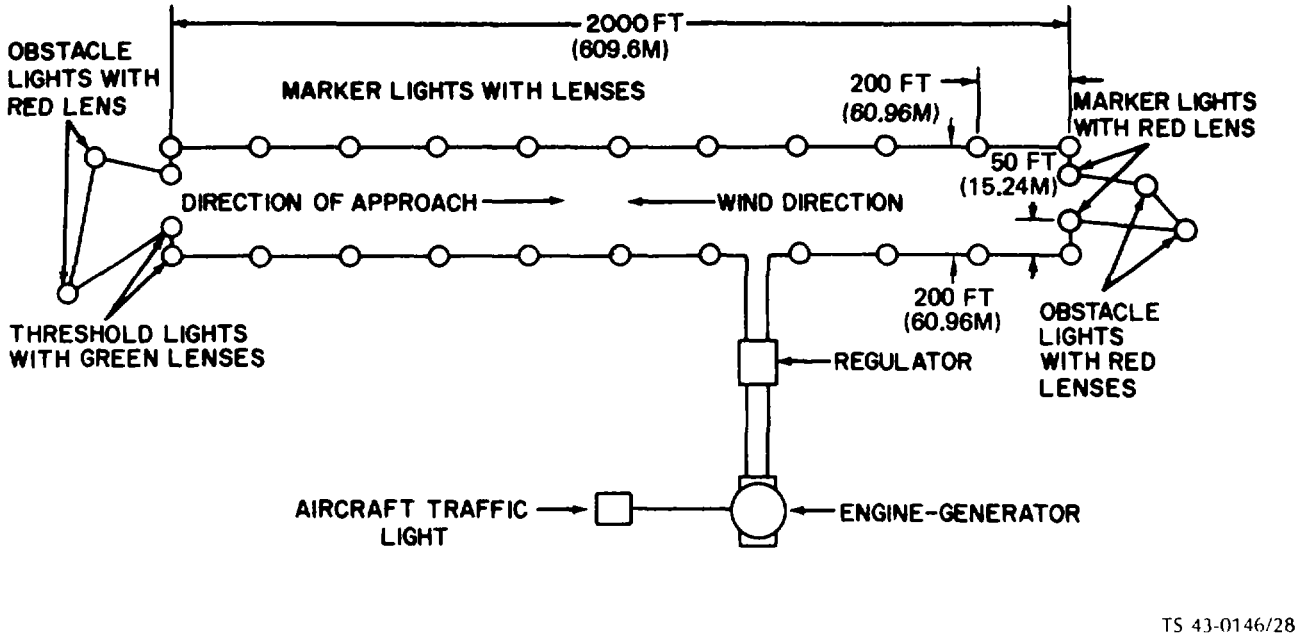

Figure 28. Circuit layout for airfield runway in a *noncombat* area.

(1) At each marker light at each end of the runway, lay a 50-foot (15.24 meter) power cable in ward toward the center line of the runway. The inner threshold lights are connected to these cable which are in turn connected to the runway light cables. If it is necessary to mark obstacles on or near the runway, obstacle lights are connected into the runway circuit at any power cable junction.

(2) all of the cables and transformer have been connected, the cones and lighting fixtures are placed, assembled, and connected. The lighting fixtures utilize lenses found in the supplementary set, instead of hoods. These lenses emit an equal amount of light in all directions. Lighting fixtures are installed by inserting the fixture lead through the opening in the top of the cone and lugging it into the secondary lead of the stepdown transformer (figure 29). The fixture is inserted and adjusted so that the notches on top of the cone correspond with the lugs in the fixture (figure 30). The fixture is then fastened to the cone with a clamping ring (figure 31). The cone is leveled by placing the level provided in the basic set across the top and adjusting the cone *as necessary* (figure 32). This is done after the lighting fixture is inserted and prior to the installation of the lens on the fixture.

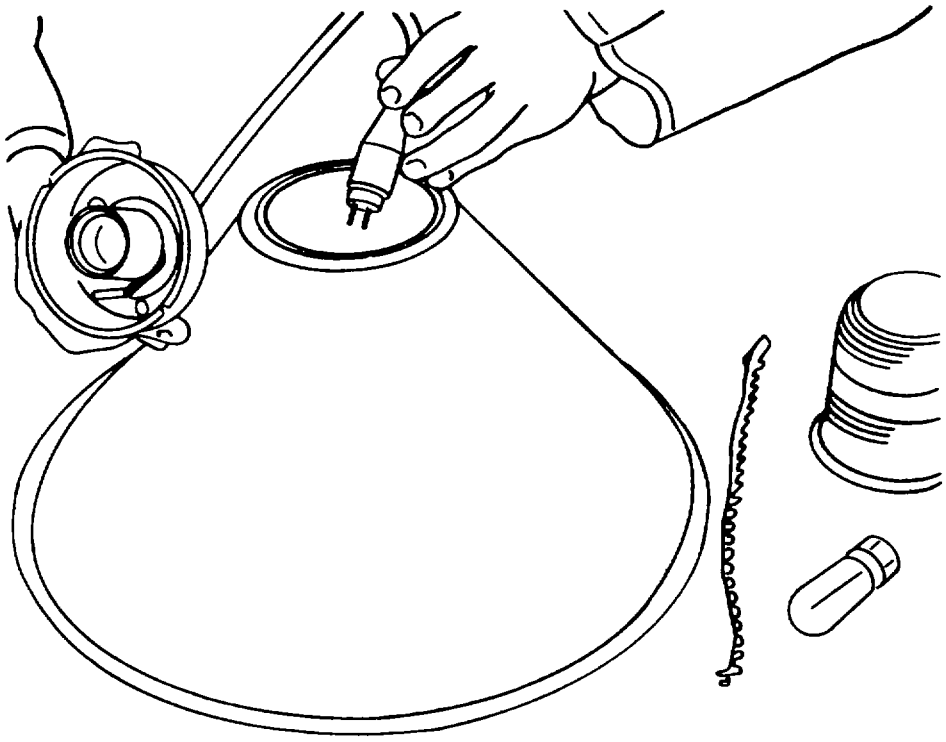

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Figure 29. Installation of lighting fixture in noncombat area - *inserting fixture lead through top of cone.*

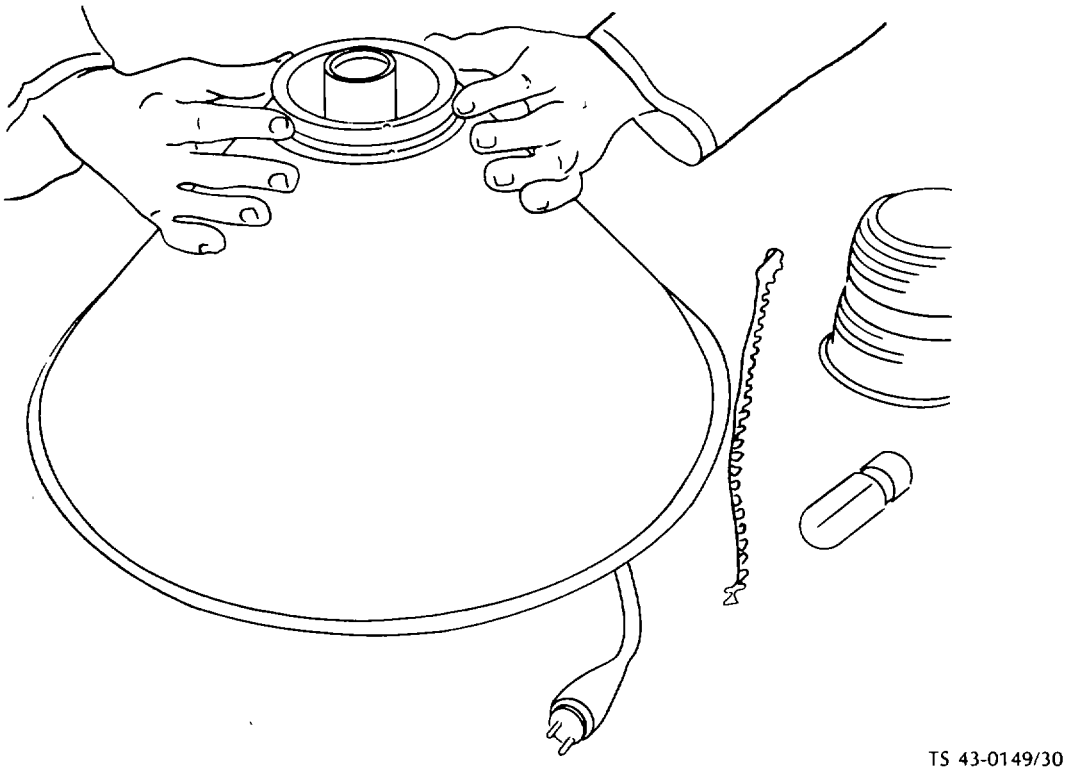

Figure 30. Installation of lighting fixture in noncombat area *- inserting and adjusting fixture.*

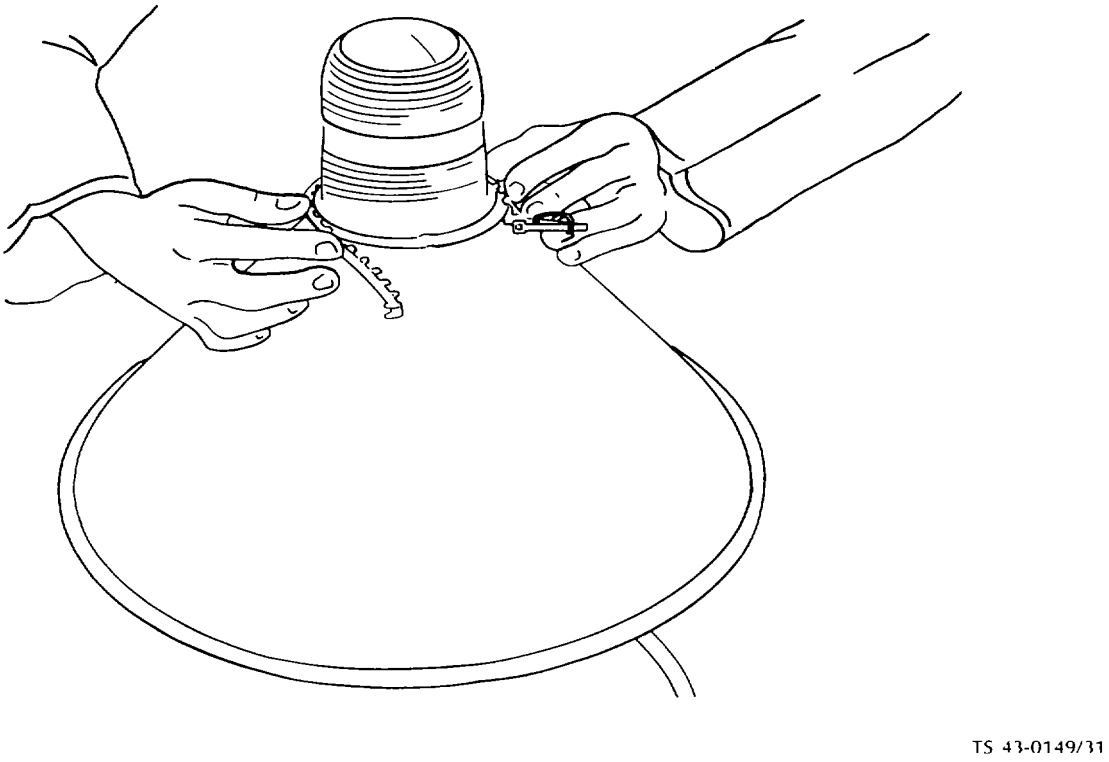

Figure 31. Installation of lighting fixture in noncombat area *- fastening fixture to cone.*

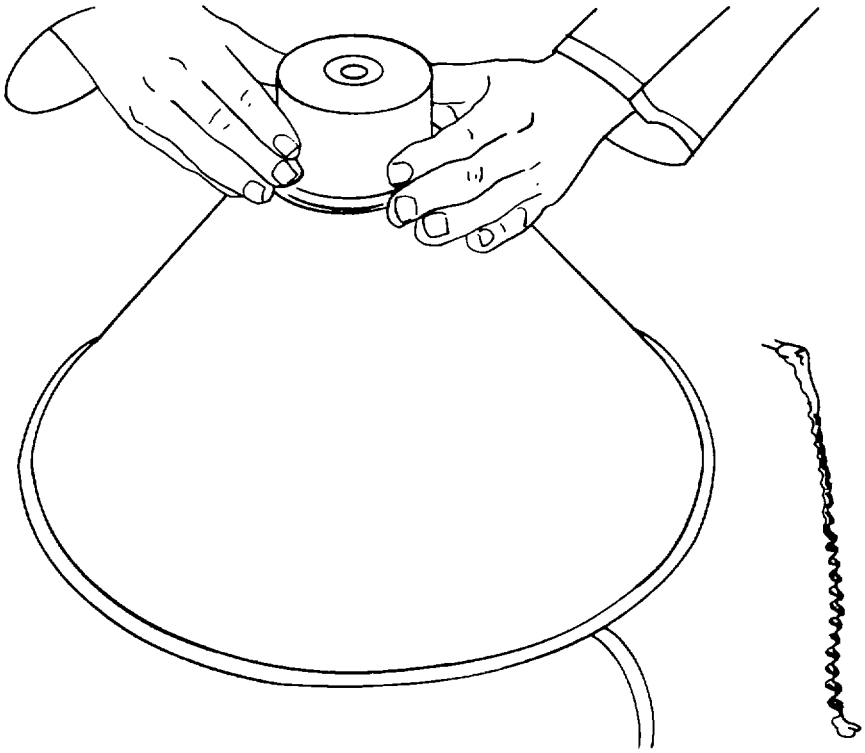

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Figure 32. Installation of lighting fixture in *noncombat* area - *leveling.*

(3) If burial is required, cables and transformers should be buried at least 18 inches (45.72 cm) deep, with the transformer secondary lead exposed. If burial is not required, the transformers should be placed beneath the mounting cones. In any event the base of the cone should be packed with earth to prevent it from being blown over by propeller blast (figure 33).

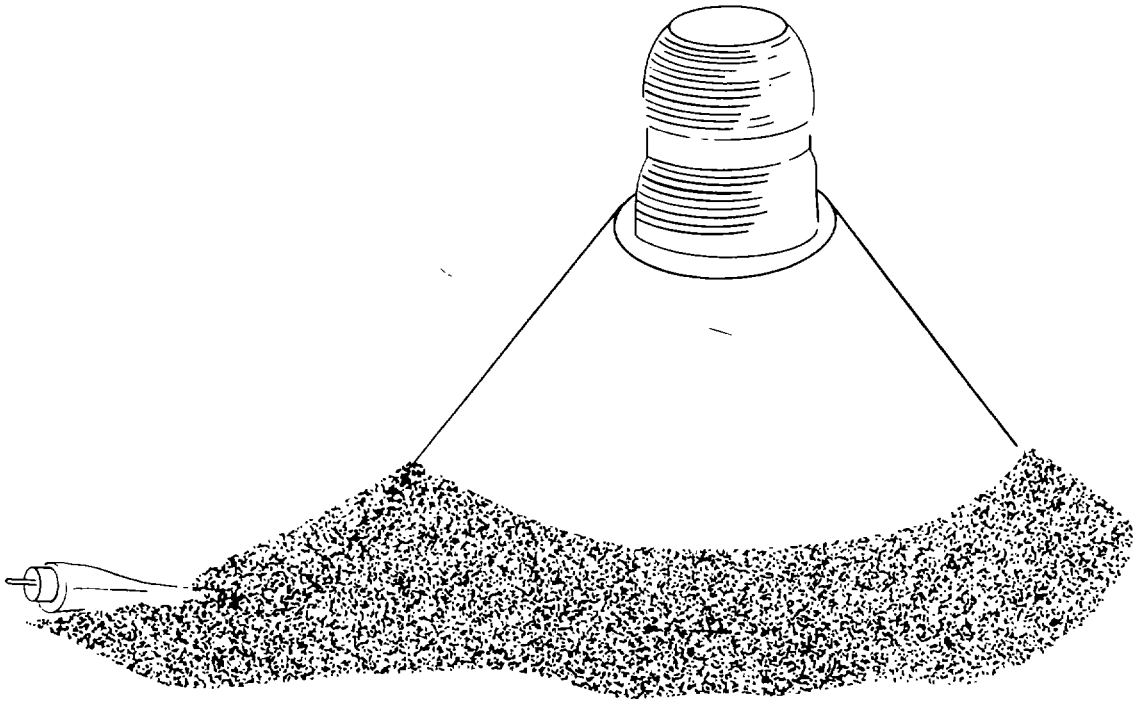

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Figure 33. Dirt Packed against base of cone.

(4) Obstacle Lights Installation.

(a) In noncombat areas where obstacle lights are needed near the ends of the runway, the must be above the elevation of the obstacle; TM 330, paragraph 12-20 discusses the subject of obstruction lighting. The mast set supplied in the supplementary set is used for this purpose. The mast set contains four telescoping masts, each of which 9 feet, 5 inches (2.87 meters) long, when telescope and 41 feet (12.5 meters) long when fully extended

(b) Where possible, the obstacle light should be mounted on top of the obstacle. Otherwise the mast should be as close to the obstacle as possible, and located so that the obstacle is between the mast and the runway (figure 34). If the mast cannot be placed immediately adjacent to the obstacle, it should be placed so that the top of the mast is above the obstacle, and a line drawn from the top of the mast to the highest point on the obstacle forms an angle with the horizontal which is no less than the maximum glide angle for the airfield. In addition, the line of sight drawn from the threshold lights to the obstacle light on the mast should clear the obstacle.

Figure 34. Position of obstacle light mast with respect to obstacle.

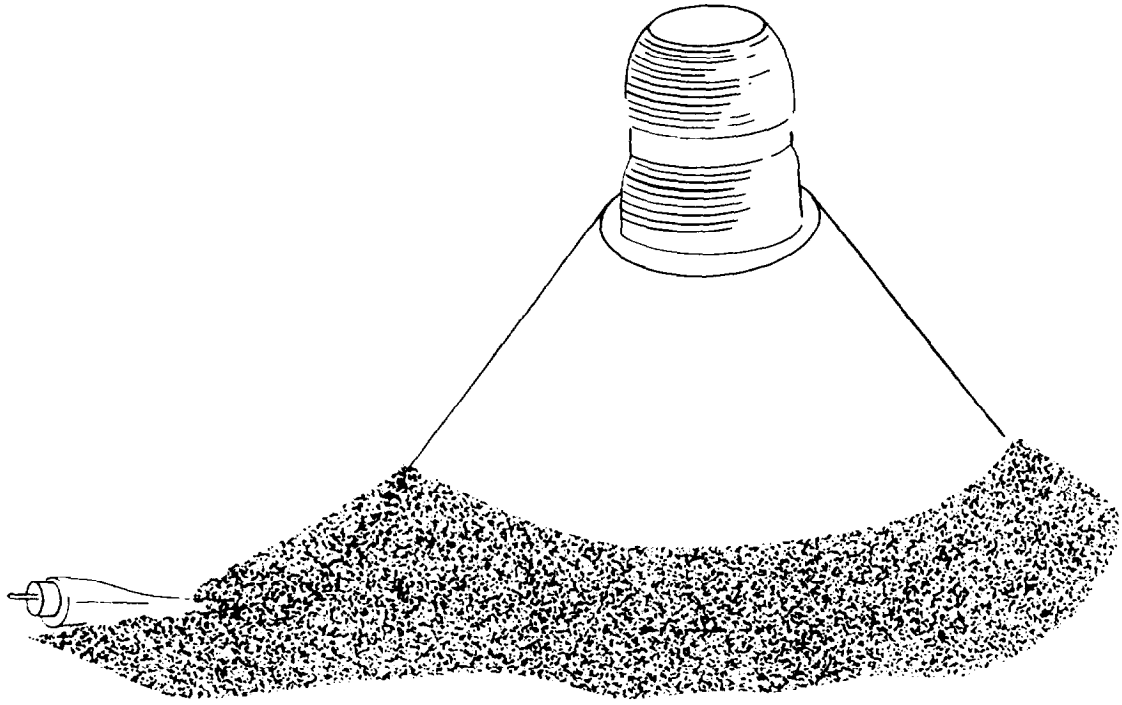

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Figure 33. Dirt packed against base of cone.

(4) Obstacle Lights Installation.

(a) In noncombat areas where obstacle lights are needed near the ends of the runway. they must be above the elevation of the obstacle; TM 5-330, paragraph 12-20 discusses the subject of obstruction lighting. The mast set supplied in the supplementary set is used for this purpose. The mast set contains four telescoping masts, each of which is 9 feet, 5 inches (2.87 meters) long, when telescoped. and 41 feet (12.5 meters) long when fully extended.

(b) Where possible, the obstacle light should be mounted on top of the obstacle. Otherwise the mast should be as close to the obstacle as possible, and located so that the obstacle is between the mast and the runway (figure 34). If the mast cannot be placed immediately adjacent to the obstacle, it should be placed so that the top of the mast is above the obstacle, and a line drawn from the top of the mast to the highest point on the obstacle forms an angle with the horizontal which is no less than the maximum glide angle for the airfield. In addition, the line of sight drawn from the threshold lights to the obstacle light on the mast should clear the obstacle.

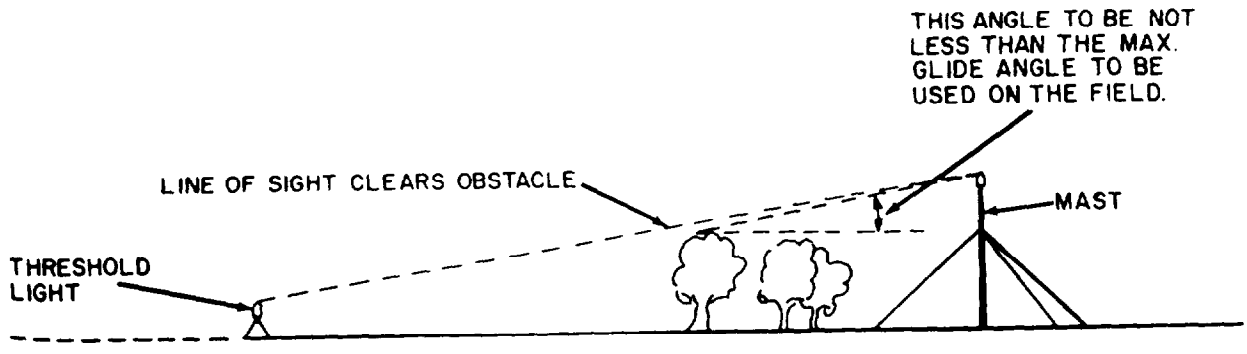

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Figure 34. Position of obstacle light mast with respect to obstacle.

(c) The base of the mast is placed at the point of erection and the mast oriented on the ground so that it will be raised against the wind. This is done so that the mast will not be blown over as it approaches the vertical. One stake (anchor stake) is driven near the point of erection. Another stake is placed 24 feet (7.32 meters) from the anchor stake in such a position that a line drawn from the anchor stake towards the second stake leads directly into the wind. Two more stakes are placed 24 feet (7.32 meters) from the anchor stake as shown in figure 35.

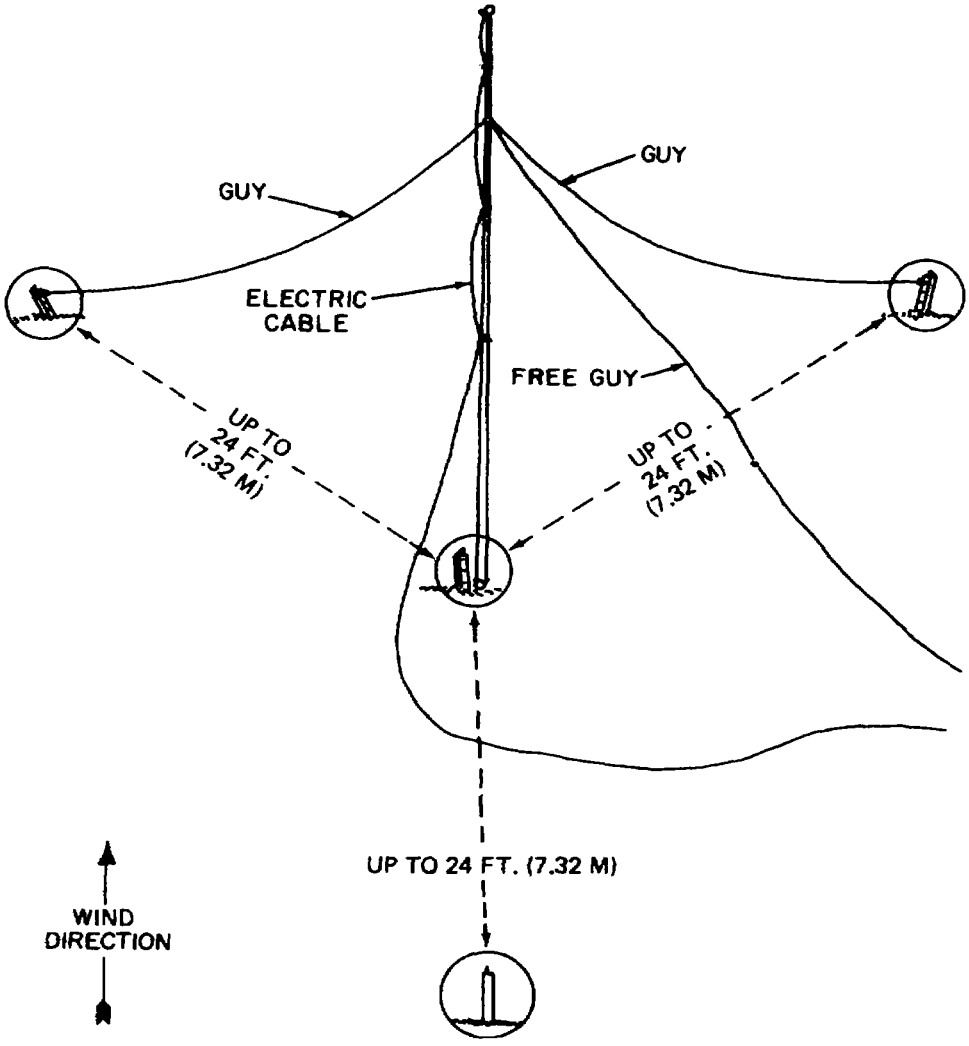


Figure 35. Layout of obstacle light lot on the ground, prior to erection.

(d) Before erection, the mast is extended t¢ the required length. In extending the mast, the outer tube is extended first and successive inner tubes thereafter (figure 36). Cotter pins are used to secure the sections in the extended position. The obstacle light fixture is always mounted on the top of the smallest tube.

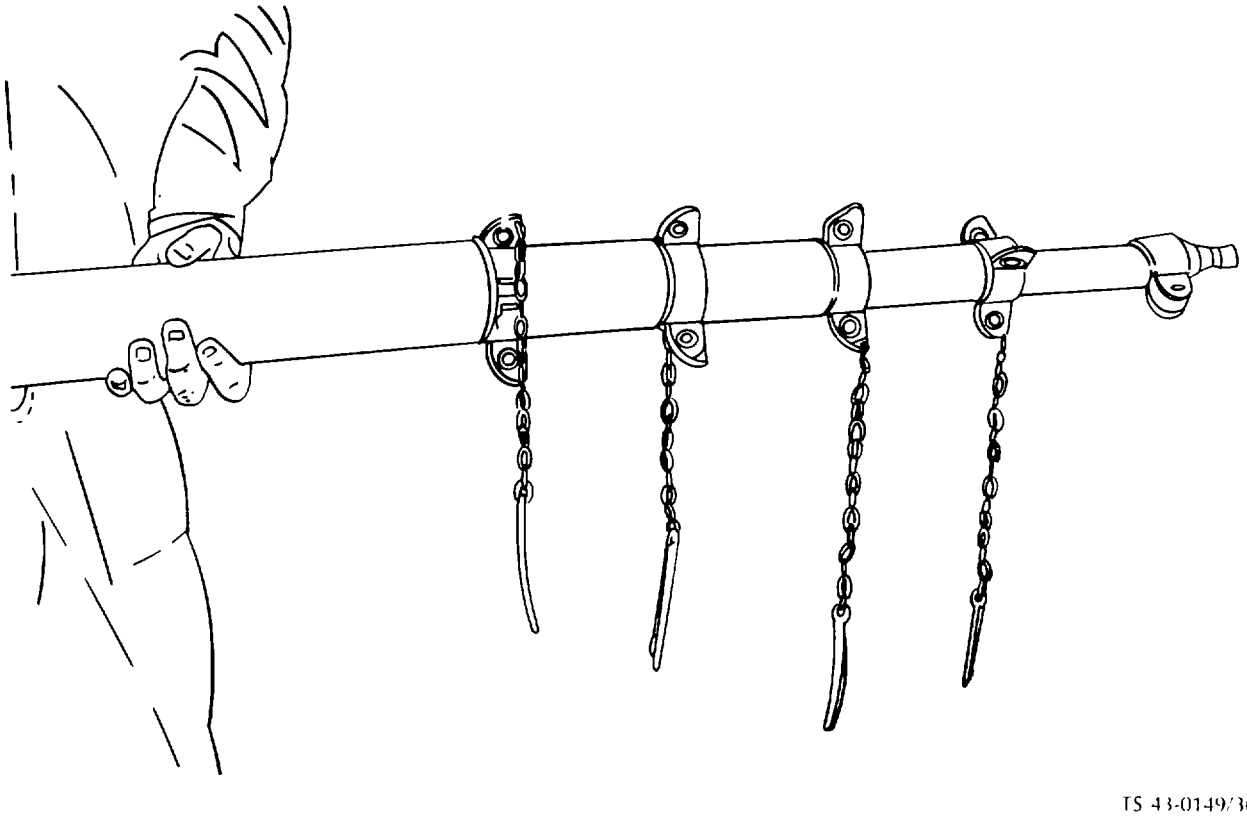


Figure 36. Extending the mast

(e) One end of each of 3 guy cables is attached to the top of the mast when 3 or less sections are used (figure 37). When more than 3 sections a used, the ends of the guy cables are attached to the top of the third section. They should not be attached to the fourth or fifth sections, since any unbalance in the tension of the guy cables may cause the ma

to bend. The free ends of 2 of the guy cables are looped through guy clamps, and attached to the 2 stakes which were placed last. The free end of the third guy cable is looped through a guy clamp but left free to be used as an aid in raising the mast against the wind.

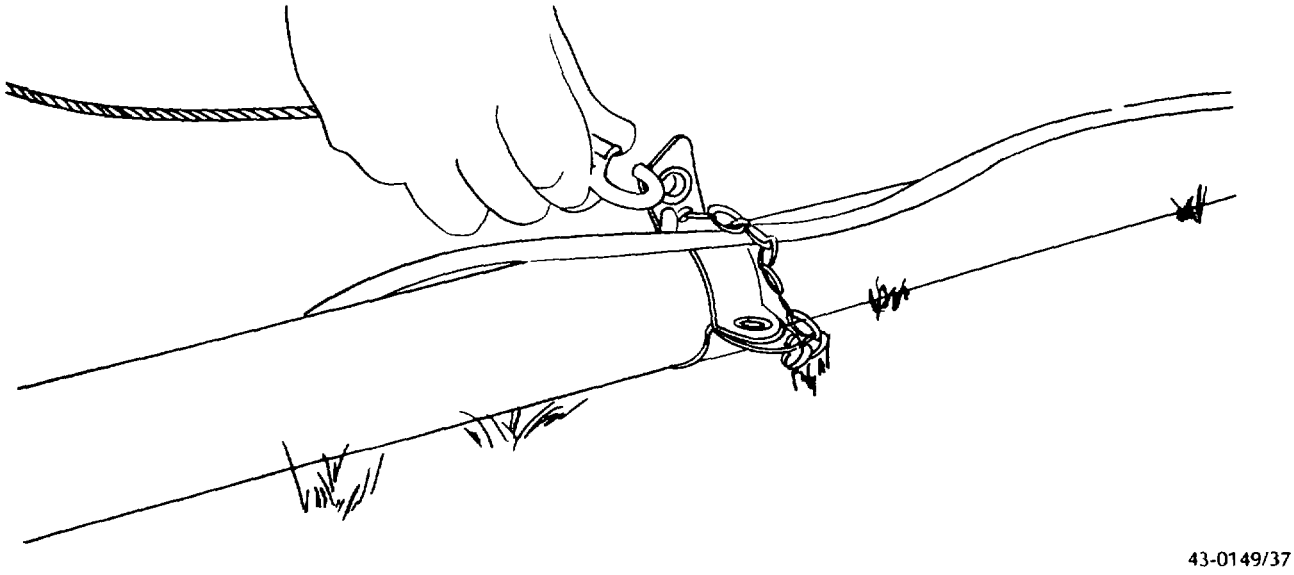


Figure 37. Method of attaching guy cable to mast.

(f) The obstacle light fixture is then attached to the mast and secured with the thumbscrew (figure 38). One end of a 50-foot (15.24 meter) 2-conductor power cable is extended along the mast from the base to the top through the loops formed by the cotter pin chains.

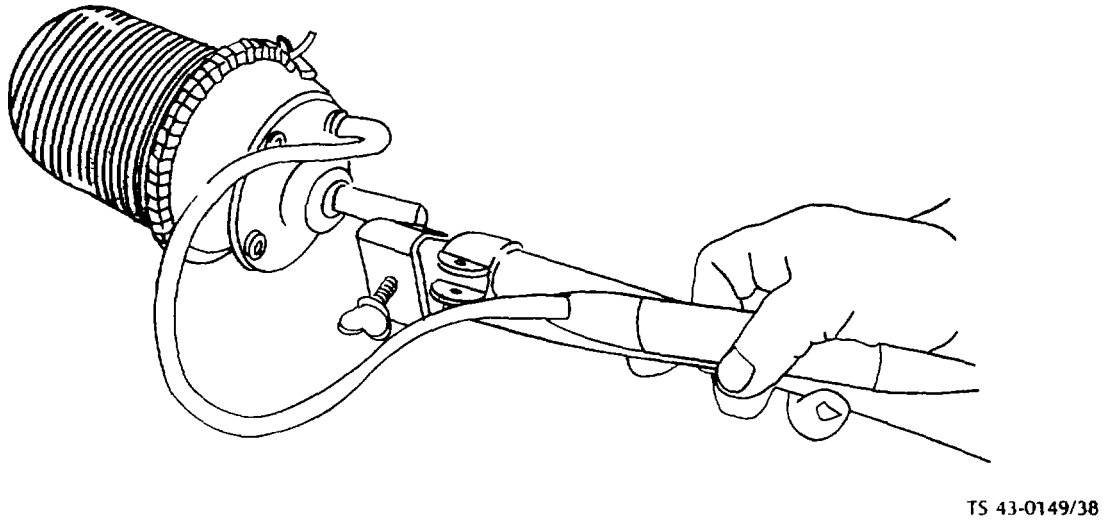
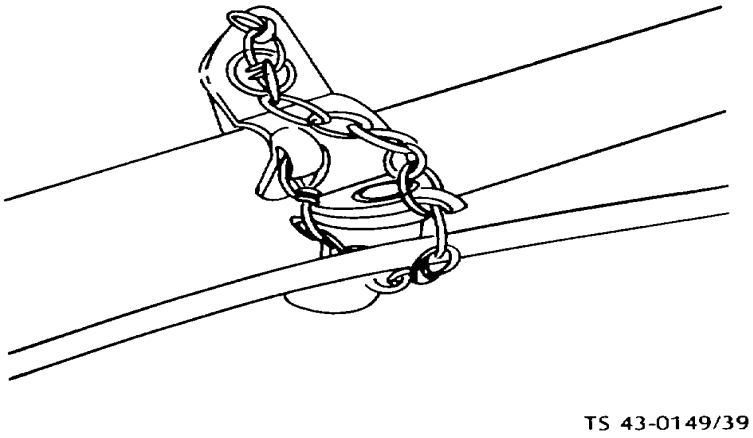


Figure 38. Obstacle light fixture attached to top of smallest tube of mast.

(g) The female connector of the cable i placed above the clevis at the top of the mast and secured with a cotter pin. The obstacle light lead is plugged into this connector (figure 39). The length of the 2 guy cables previously attached to the ground stakes are adjusted to approximately the length required when the mast is erected. The mast can now be raised.

(h) With one man located at a point of the mast near the center and another man in position to pull and guide the mast is raised, the free guy cable is attached to its stake (figure 42), and all guy cables are adjusted and tightened until the mast is plumb (figure 43). Two turns of the short anchor cable are made around the base of the mast and the ends are attached to the anchor stake (figure 44).

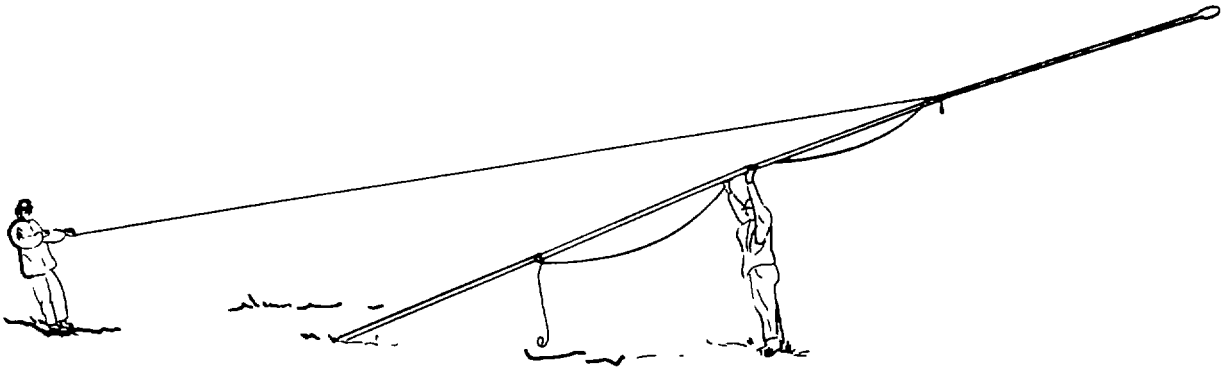


TS 43-0149/39

Figure 39. Installation of power cable for mast mounted obstance light.

TS 43-0149/40

Figure 40. Method of raising mast *- two men in position.*



TS 43-0149/41

Figure 41. Method of raising mast - mast partially raised

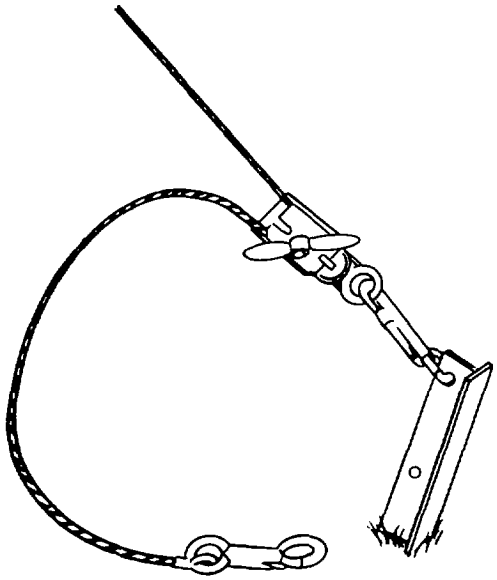


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Figure 42. Method of raising mast - guy cable connection.

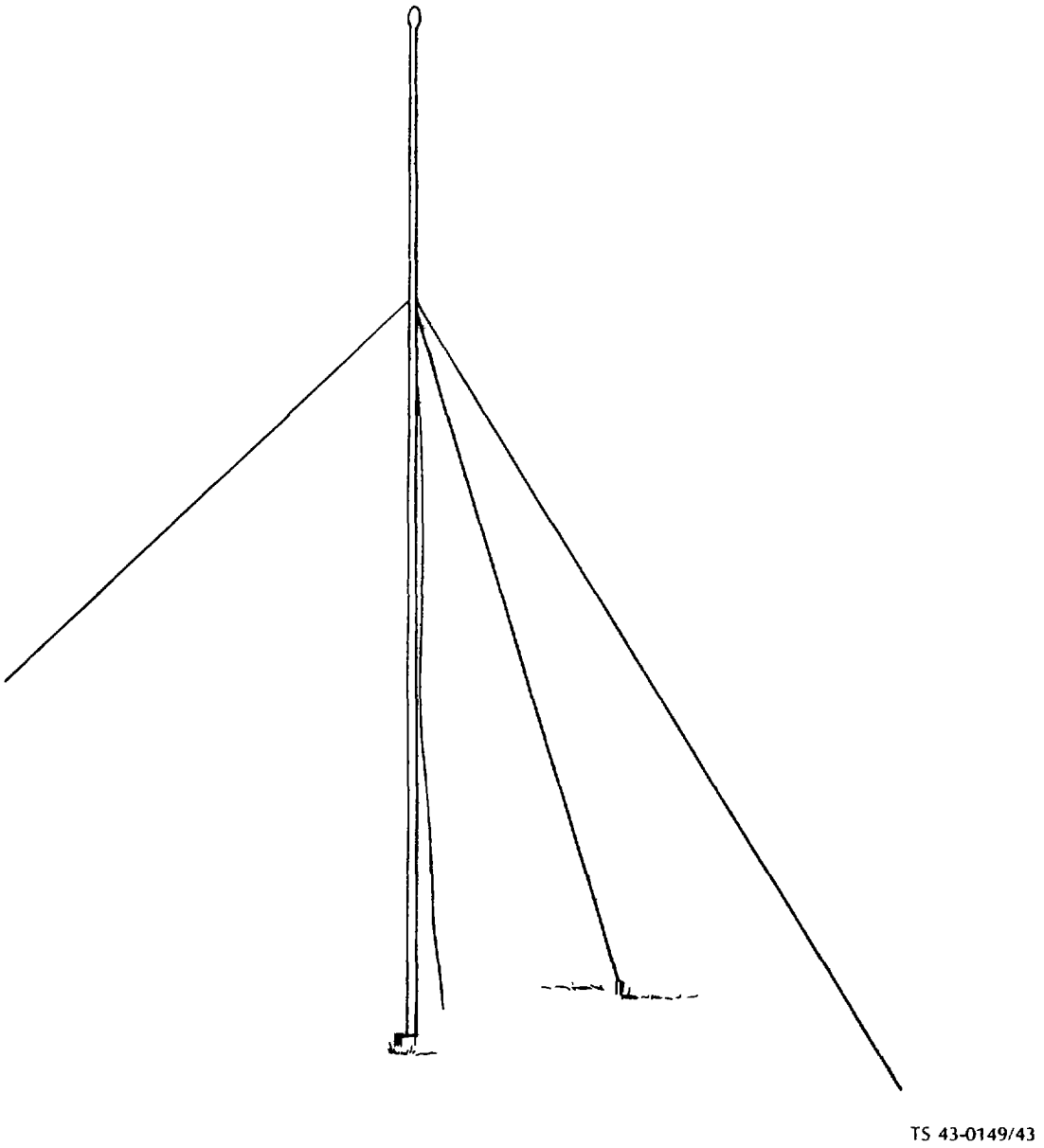

Figure 43. Method of raising mast-mast in raised position with guy cables connected.

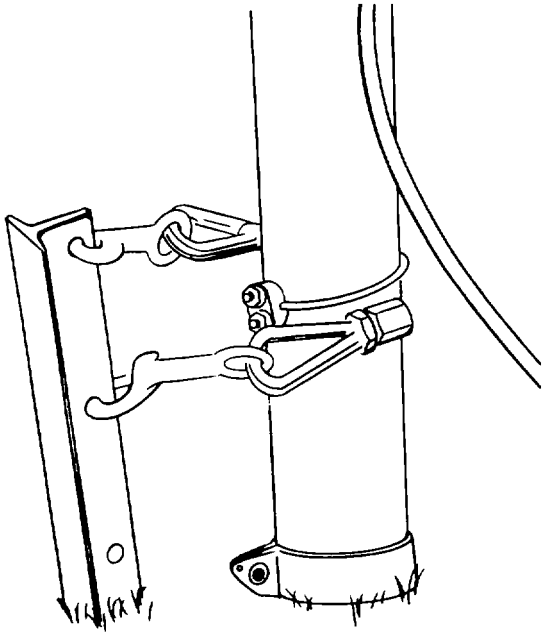

Figure 44. Method of raising mast-anchor cable attached to stake

(i) The other end of the power cable extended along the mast is connected to the secondary lead of a stepdown transformer placed at the bottom of the mast. Two single conductor power cables are connected to the 2 primary leads of the stepdown transformer (figure 45). These cables are then connected to the primary leads of other obstacle light transformers or to the inner threshold light transformers. If burial is required, obstacle light transformers and connecting cables are buried at least 18 inches (45.72 cm) deep, with the transformer secondary lead exposed.

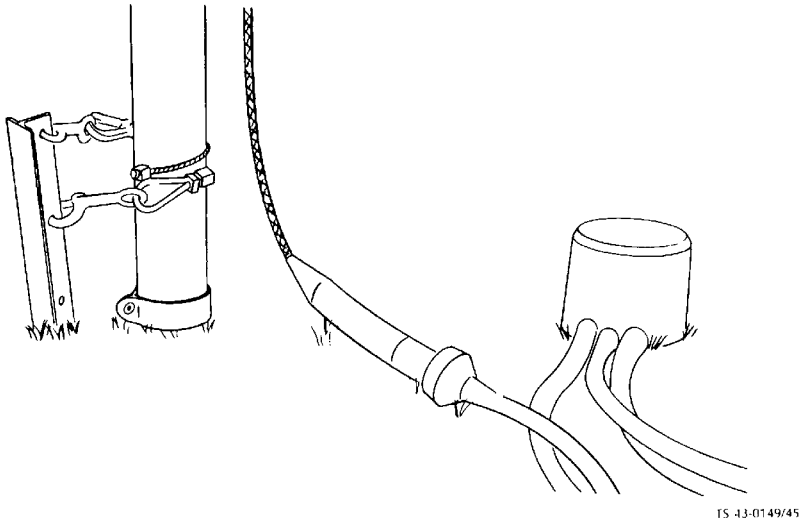

Figure 45. Connection of obstacle light power cable to transformer

(5) Drive ground rod and connect grounding cable to grounding lug on generator.

5. Operating Procedure. After the lighting circuit has been completed and checked, the light se may be put into operation. The procedure of putting the lighting set into operation is as follows:

a. Turn the control switch on the current regulator to the Off position.

b. Start the generator (see Appendix A and/o DA Pamp. 310-4 for appropriate generator TM)

c. Turn the control switch on the current regulator from the Off position to a point which give the lamp brightness desired, depending upon security restrictions and atmospheric conditions. In combat area, if conditions are such that the pilot cannot align himself with the beam of the glide angle approach light, the marker light intensity may be temporarily increased, using the regulator controls until the pilot receives the proper guidance, then reduced to normal.

6. Maintenance. After installation, the lighting equipment should be inspected weekly to keep the lights operating properly. Lenses, lamps, hoods, cones, approach light, and fixture assemblies should be cleaned monthly. Lenses, hoods, fixture assemblies, cones, and clamping rings are not repairable, and must be replaced if damaged. Appendix B contains troubleshooting instructions.

Section III. LIGHT SET, OPERATIONAL AREA, AIRCRAFT: 1/2 KW SUPPLEMENTARY EQUIPMENT ,HELIPORT: PORTABLE

7. Description.

a. Light Set, Operational Area, Aircraft: 1/ KW.

(1)This set provides portable equipment for lighting a heliport in combat and noncombat areas It includes a 1/2 KW engine generator, a control panel, marker floodlights, mounting stakes, rubber covered transformers, hoods for use with the marker floodlights, a glide angle approach light and an aircraft traffic light. The mounting stake' transformers, glide angle approach light, and ail craft traffic light are identical to those furnished i the runway light set.

(2) The generator (figure 46) supplies power to the lights through the control panel. The panel has 4 output terminals, two of which supply power to the marker floodlight and the glide angle approach light circuits. The voltage outputs of these two terminals may be varied independently. A third output terminal supplies power at the generator voltage to the transformer serving the aircraft traffic light.

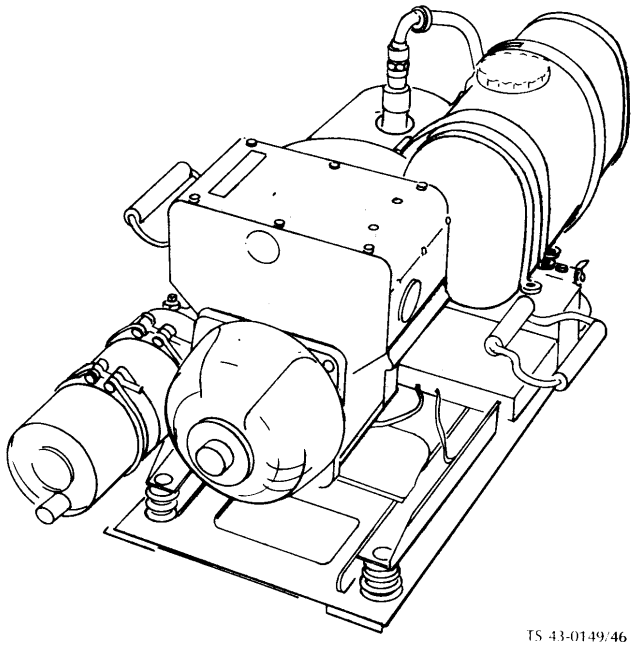

Figure 46. ½ KW engine generator

(3) The two 100-watt marker floodlights provide horizontal, fan-shaped beams of light on the landing area (figures 47 and 48). The glide angle approach light in this set does not use a separate transformer as does the approach light used for fixed-wing airfields, but is connected directly to one of the variable-output receptacles on the control panel. Its purpose and method of operation are identical with the approach light used for fixed-wing airfields. The air traffic control light is used as or fixed-wing airfields (paragraph 4a. (4)) except that the 115/7 volt transformer may be connected to the generator voltage output terminal either on the control panel or on the generator.

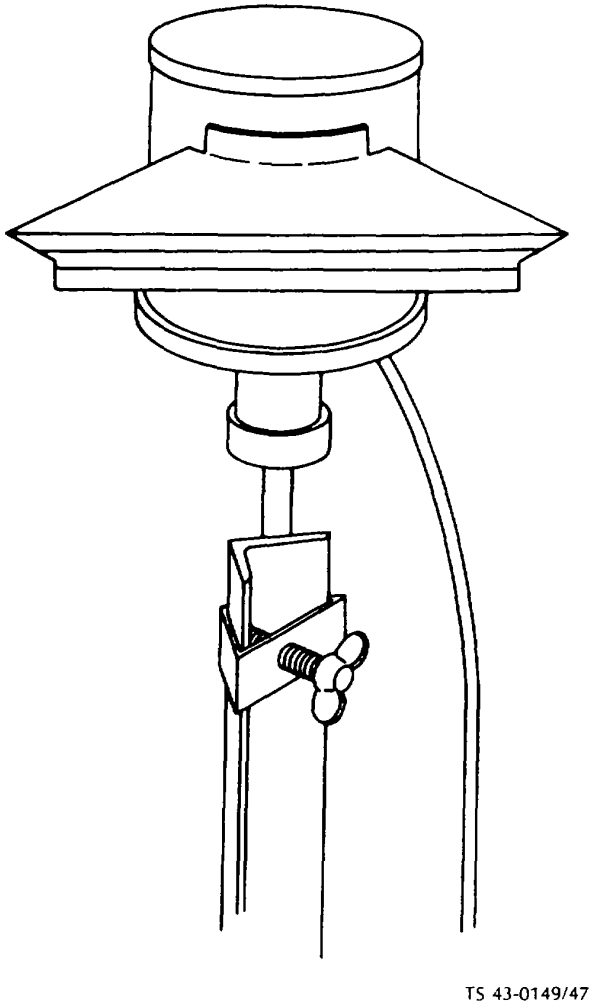

Figure 47. Marker floodlight with hood-stake mounted

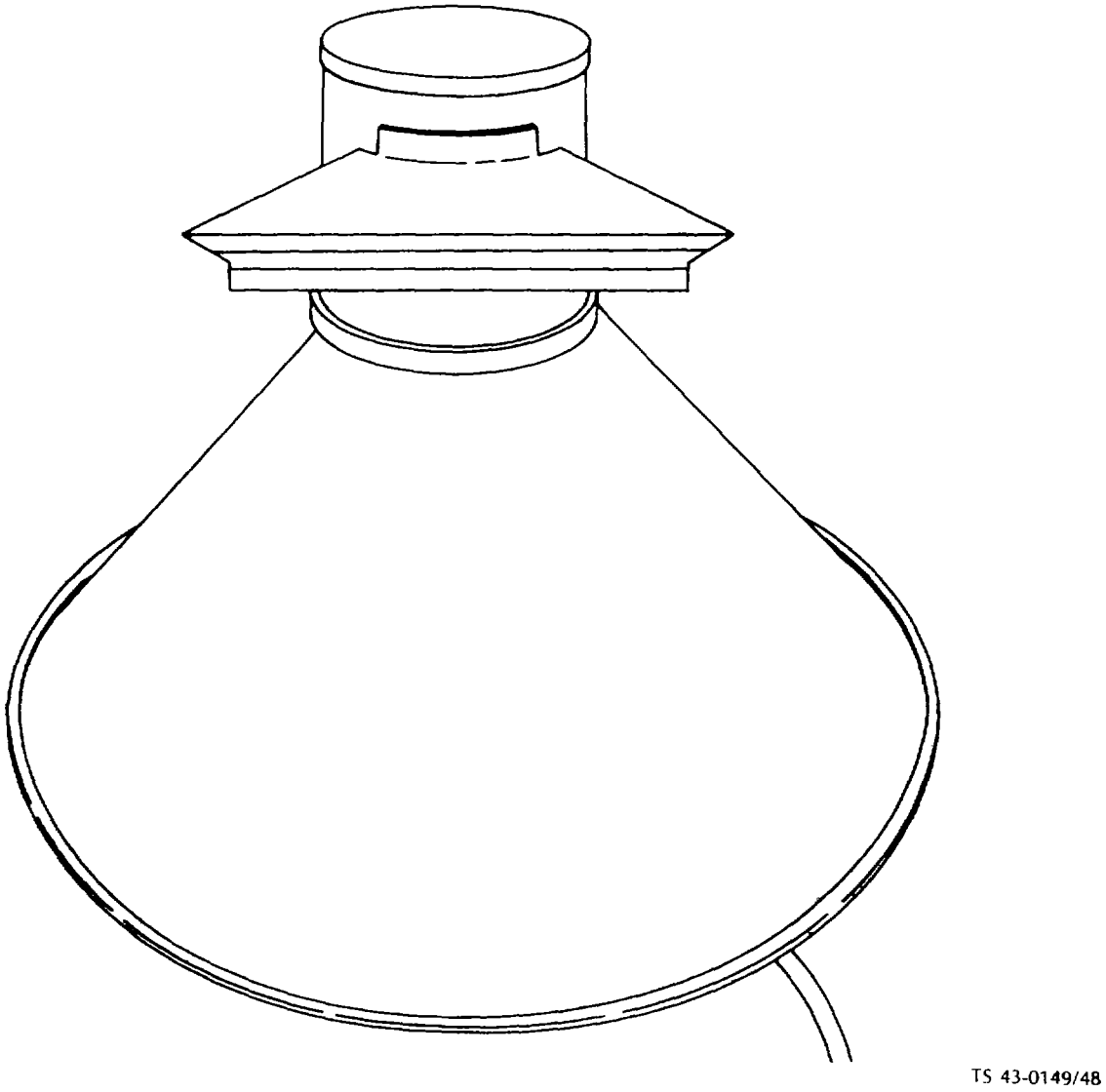

Figure 48. Marker floodlight with hood - cone mounted.

(4) This lighting set can be installed by two men in 3 hours and removed by two men in 2 hours. One man is required to monitor the operation of the set after installation. The set can be transported in a 2-1/2 ton truck (figure 49).

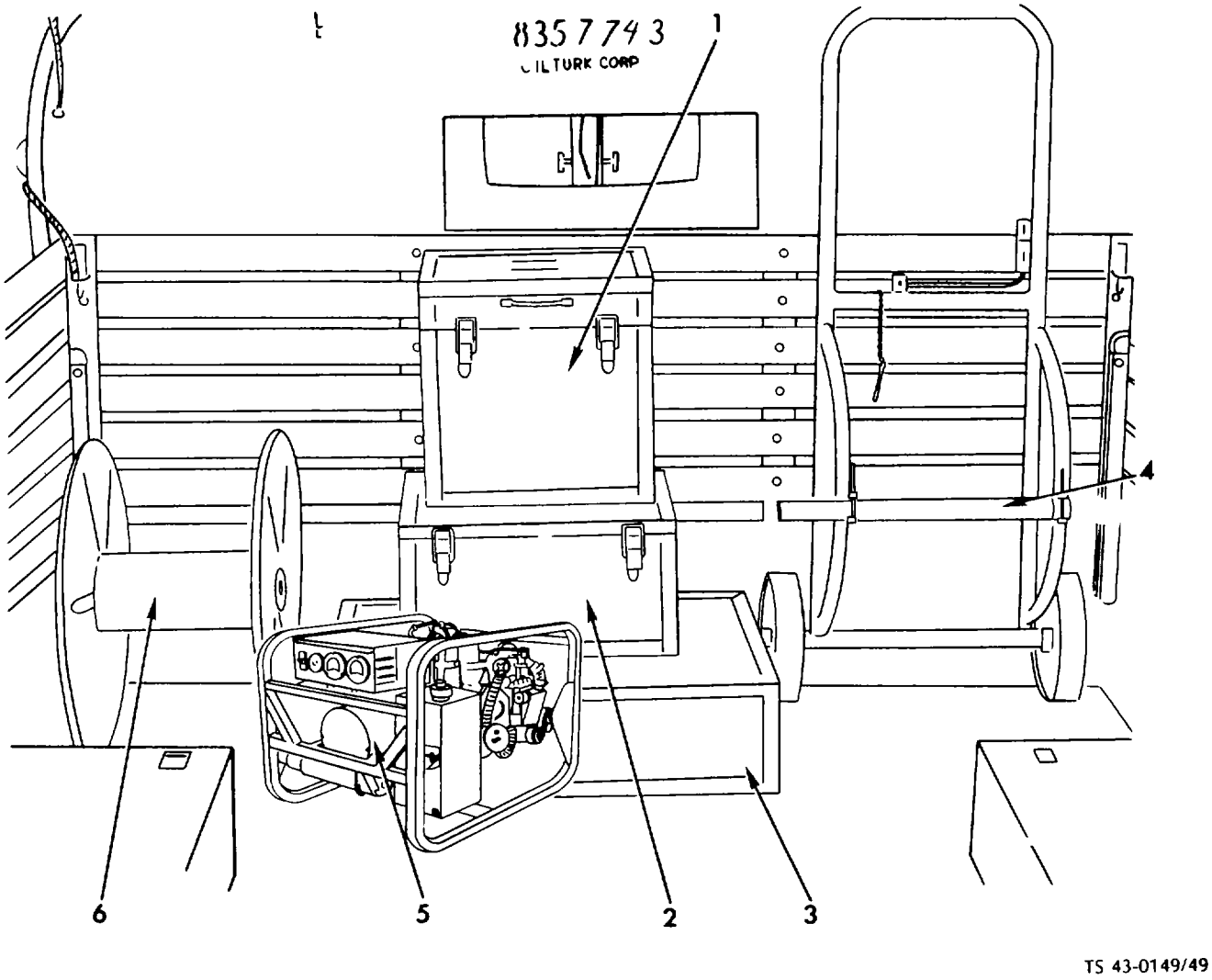

Figure 49. Heliport lighting set loaded in 2-1/2 ton cargo truck.

1. Chest, air traffic control assembly
2. Chest, glide angle light
3. Chest, air marker light
4. Carriage, cable reel
5. Generator set, 1/2 kw
6. Reel, cable, single section

b. Supplementary Equipment, Aircraft Operational Area Light Set: Heliport; Portable. This set supplements the basic heliport set when used in noncombat zones. It includes lighting fixtures, lenses, lamps, cones, cables, and adapters *loaded in 2-1/2 ton cargo truck.* The lighting fixture assemblies and lenses are used to install the corner location lights which mark the 4 corners of the heliport in noncombat zones. The set may be transported in a 2-1/2 ton cargo truck with the heliport lighting set (figure 50).

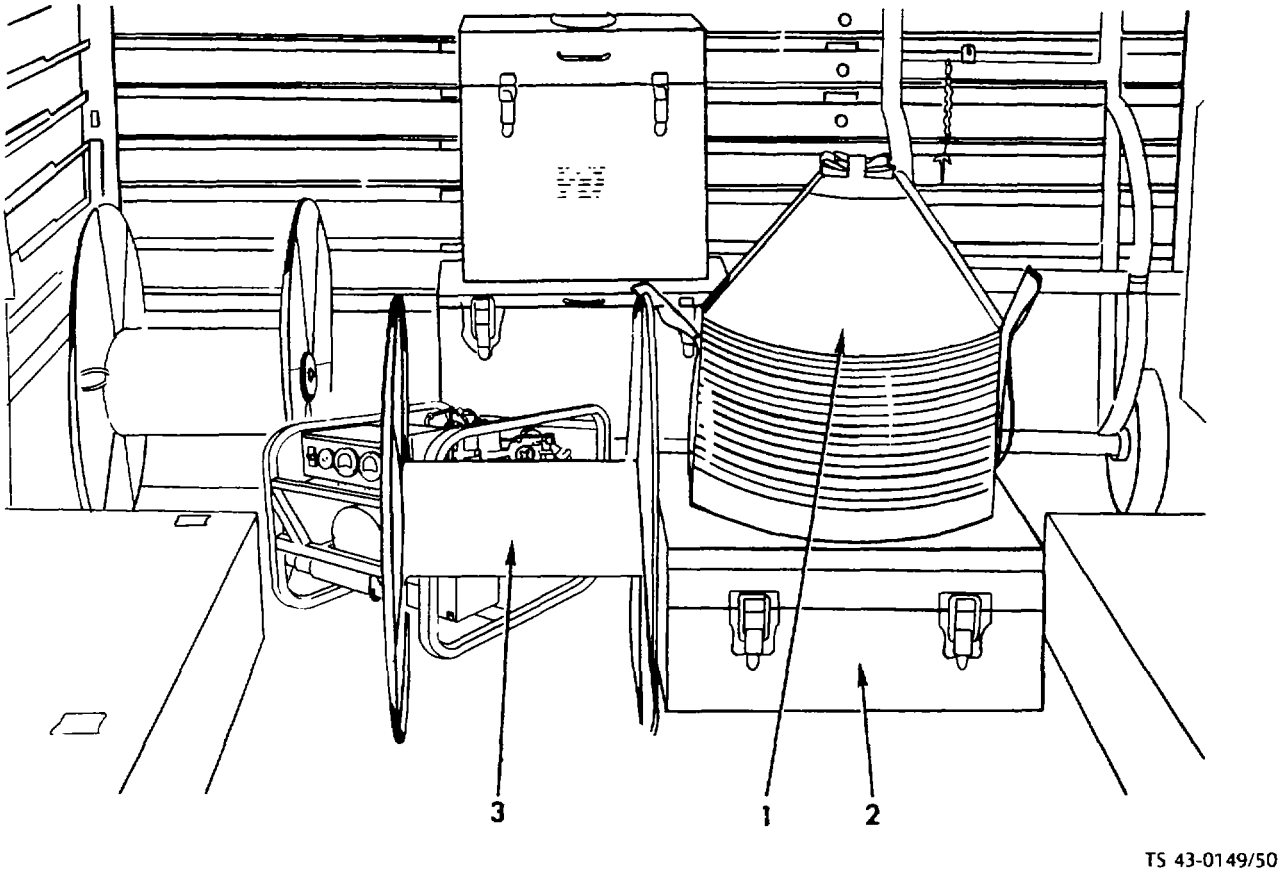

Figure 50. Supplementary set for heliport lighting

1. Airport marker light cones w/rack
2. Chest, airport marker light
3. Reel, cable, single section

8. Preparation for Use. a. *Combat Area.* The circuit layout for a combat area is shown in figure 51. The procedure for laying out the lighting circuits is as follows:

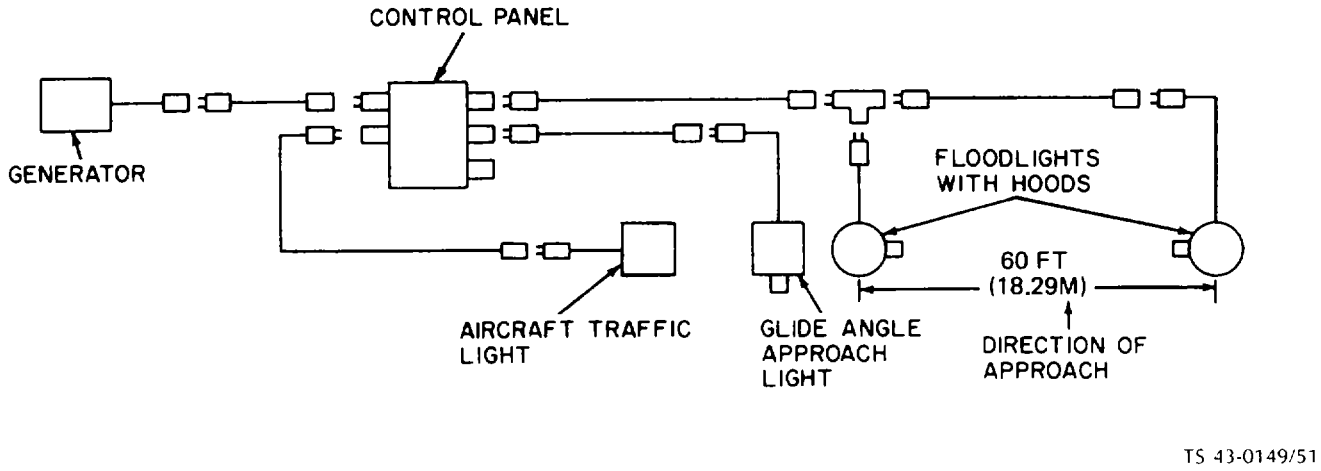

Figure 51. Circuit layout heliport in combat area.

(1) The power cables are laid out as indicated in figure 51. At the points where the floodlights are to be located, stakes are driven into the ground. The marker floodlight fixtures are mounted on the stakes using the mounting adapters (figure 5) and the fixture leads connected in parallel by means of adapter connectors to the floodlight power cable. These fixtures are identical to those used in the runway lighting set. The floodlight hood is then fastened to the mounting adapter in the same manner as described in paragraph 5a (2). The glide angle approach light is placed to the left of the left floodlight as seen from the direction of approach. The approach light is leveled and connected to the approach light power cable from the control panel. Shifting of approach light due to rotor downwash is prevented by attaching 3 guy cables to the mounting stake adapter and securing each cable to one of 3 stakes spaced evenly in a circle around the approach light. The air traffic control light is connected through the 115/7 volt transformer to the control panel.

(2) If the direction of approach is reversed, the glide angle approach light is moved to a similar position on the opposite side of the landing area and placed so that it faces the new direction approach.

B .Noncombat Area. The circuit layout for a noncombat area is shown in figure 52. The procedure for laying out the lighting circuits is the same as that for a combat area with the following modifications:

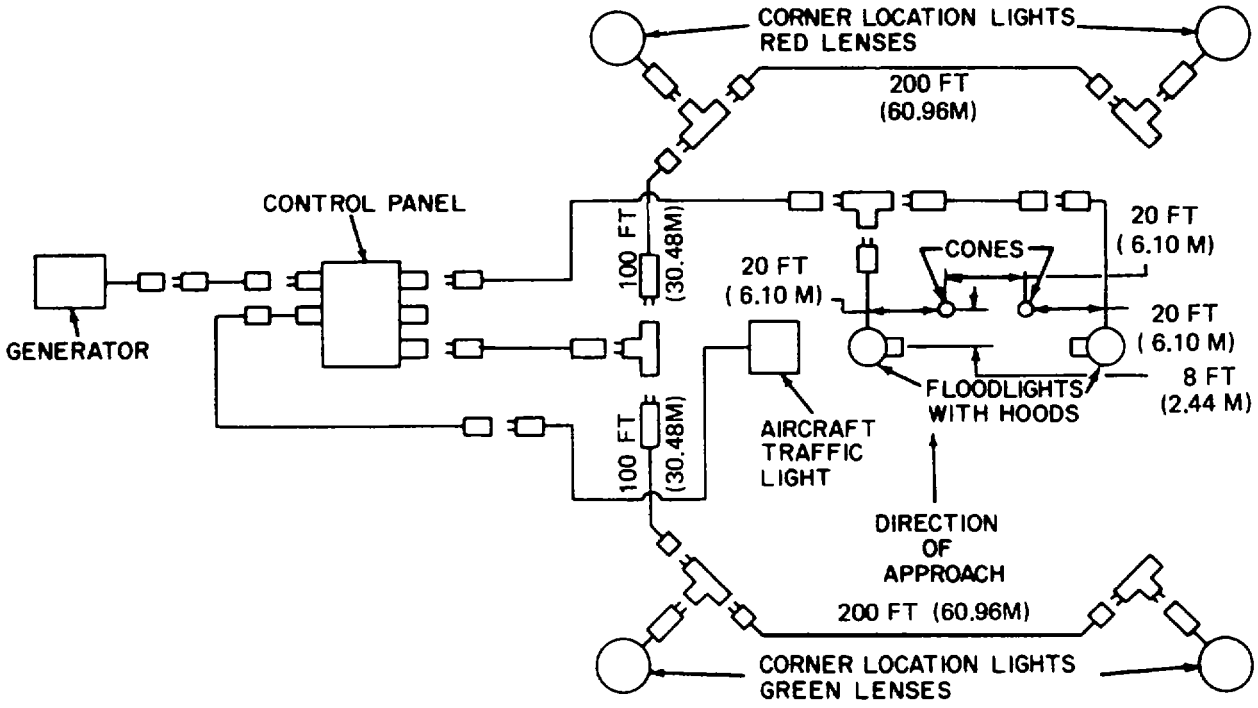

Figure 52. Circuit layout for heliport in noncombat area

(1) The power cables are laid out as shown in figure 52. The 40-watt corner location lights are cone-mounted. The yellow cones, placed to the rear to the floodlights increase the daylight visibility of the landing area and reflect the floodlight beams at night. The floodlight and corner location light cones are placed directly over the power cable connectors. All cones are secured by packing earth around their bases to protect against disturbance from rotor downwash. Cones are leveled by placing the level provided in the basic set across the top and adjusting the cones. When mounting the floodlights, care should be taken to keep the light beam horizontal, so that the pilot sees the reflected light and not the direct floodlight beam. The traffic control light is installed as described in paragraph 9a. (1), and operated as described in paragraph 4a. (4).

(2) Drive ground rod and connect grounding cable to grounding lug on generator.

9. Operating Procedure. The generator and control panel are located as shown in figures 51 and 52. The generator lead is attached to the output terminal of the generator and to the feeder cable from the control panel. The following checklist should be used to place the light set into operation.

a. Turn the master switch on the control panel to the Off position.

b. Set the variable output controls to zero.

c. Start the generator. See TM 5-6115-329.

d. Turn the master switch on the control panel to the On position.

e. Turn the variable output controls up until the illumination of all lights, including the approach light is sufficient.

f. In a combat area if conditions are such that the pilot cannot align himself with the beam of the glide angle approach light, the floodlight intensity should be temporarily increased until the pilot receives the proper guidance, then reduced to normal.

10. Maintenance. After installation, the lighting equipment should be inspected weekly to keep the lights operating properly. Lenses, lamps, hoods, cones, approach light, and fixture assemblies should v be cleaned smoothly. Lenses, hoods, fixture assemblies, cones, and clamping rings are not repairable, and must be replaced if damaged. Appendix C contains troubleshooting instructions

APPENDIX A

REFERENCES

TM 5-330	Planning and Design of Roads, Airbases and Heliports in the Theater of Operations
TM 5-760	Interior Wiring
TM 5-766	Electric Power Generator in the Field
TM 5-803-4	Planning of Army Aviation Facilities
TM 5-823-2	Army Airfields and Pavements: Airfield-Heliport Flexible Pavement Design
TM 5-823-3	Army Airfields and Heliport Rigid and Overlay Pavement Design
TM 5-823-4	Army Airfield - Heliport Operational and Maintenance Facilities
TM 5-824-2	Airfield Flexible Pavements - Air Force
TM 5-6115-323	Generator Set, Electric, Portable, Gasoline-Driven, Skid Mounted, 1-1/2 KW, 115 Volt, 1 Phase, 60 HZ
TM 5-6115-329	Generator Set, Electric, Portable, Gasoline-Driven, Skid Mounted, Air Cooled, 1/2 KW, 120 Volt, 1 Phase, 60 HZ

APPENDIX B

TROUBLESHOOTING, AIRFIELD RUNWAY SETS

TROUBLE	PROBABLE CAUSE	REMEDY
1.One light burns dim, or does not burn at all.	1. Loose connection be tween fixture lead and transformer second- ary lead.	1. Tighten connection.
	2. Loose lamp.	2. Tighten lamp.
	3. Burned out lamp.	3. Replace lamp.
	4. Faulty transformer.	4. Replace transformer.
	5. Faulty fixture lead.	5. Replace fixture.
2. All lights burn dim or do not burn at all .	1.Power supply.	1. Turn the voltage regulator control on the generator to the position for maximum volt-. age and check the voltmeter reading. It should be approximately 120 volts. If the voltmeter reads below this value, refer to the appropriate generator technical manual for generator troubleshooting instruction. A correct reading on the voltmeter indicates that the current regulator may be at fault. To check the regulator, turn the regulator control switch to the OFF position. Disconnect the output connectors from the lighting circuit and connects an alternating current ammeter of proper range directly across the output. Refer to the appropriate generator technical manual for ammeter access instructions. Adjust the regulator for full brightness. If the ammeter reads approximately 6.6 amperes, the regulator is operating satisfactorily and the probable cause will be found in item number 2 below. If the ammeter reads low or high or fails to read at all, check the leads from the generator for damage and tighten all connections. If the ammeter still reads an incorrect value, check the appropriate current regulator manual for troubleshooting instructions
	2. Open circuit caused by one of the following :	2. Inspect the entire circuit for loose connec- tions, faulty connectors, faulty transformers, and/or damaged cables.
	a. Loose connector. ***b***. Faulty connector. ***c***. Faulty transformer. ***d.*** Damaged cable.	**WARNING** The open circuit voltage of the regulator and at the ends of a broken cable can be in excess *'j* of 300 volts. Handle and repair portions of the series circuit proper in the voltage off condition only.

APPENDIX B

TROUBLESHOOTING, AIRFIELD RUNWAY SETS (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
		If the break or open connection is not located by the above method, each section will have to be checked. A length of cable known to be good is used for checking the various lengths of cable in the circuit. The length of test cable is laid on the ground and connected into the circuit in place of each of the cables being checked. Checks should be made from lamp to lamp as the good, then the primary leads of the transformers may be easily disconnected from the lighting circuit and connected to the length of test cable. The first sections to be checked should be those where there is considerable traffic or where vehicles may have dragged the cable over rocks, etc. If the section being checked is found to be good, then the primary leads to the transformer at one end of the section are disconnected from the length of test cable and the adjacent power cable, and the latter two are connected. If successive cable lengths are checked, all included transformers can then be checked. If the system works properly after the length of test cable and the adjacent power cables are connected, then the transformer was faulty and a new one is put in place and connected. The original power cable section being checked is reconnected into the circuit. If the system still does not work then the transformer and original cable section are reconnected into the circuit and the next section of the power cable is checked, and so on. **WARNING** If a test on a circuit component reveals that the fault lies elsewhere, turn the regulator control switch to the OFF position before handling the circuit.

APPENDIX C
TROUBLESHOOTING, HELIPORT SETS

TROUBLE	PROBABLE CAUSE	REMEDY
1. One light does not burn.	1. Loose connection between fixture lead and adapter connector.	1. Tighten connection.
	2. Loose lamp.	2. Tighten lamp.
	3. Burned out lamp.	3. Replace lamp.
	4. Faulty fixture lead.	4. Replace fixture.
	5. Damaged cable or	5. The power cables from the control panel for loose connection. the approach light or traffic control light, if either is not working, should be inspected for breaks. Check all connections for these cables. Check the floodlight power cables, if the floodlights do not work, for breaks and proper connections. Check the corner location light power cables for breaks and proper connections.
2. No lights burn.	1. Open circuit.	1. Check the cable between the generator and control panel for a break or loose connection.
	2. Power supply.	2. Turn the voltage regulator control on the generator to the position for maximum voltage and check the voltmeter reading. It should be approximately 120 volts. If the voltmeter reads low, refer to the appropriate generator technical manual for generator troubleshooting instructions. If the voltmeter shows a correct value, check the protective device inside the control panel. Be sure to shut down the generator first. If the circuit between the generator and control panel has been opened by the protective device, check all power cables for damage causing a short circuit. Use a multimeter and check voltage.

By Order of the Secretary of the Army:

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