Cancelled See 15A

Federal Aviation Agency

ADVISORY CIRCULAR

AC NO:	AC 150/5340-15
	AIRPORTS
EFFECTIVE:	11/18/65

SUBJECT: TAXIWAY LIGHTING SYSTEM

---

1. PURPOSE. This advisory circular describes standards for the design, installation, and maintenance of a taxiway lighting system. These standards are required for Federal-aid Airport Program projects.

2. APPLICABLE PUBLICATIONS. Technical publications listed under Bibliography, Appendix 1, provide further guidance and detailed information as may be required.

3. HOW TO GET THIS PUBLICATION. Obtain additional copies of this circular, AC 150/5340-15, Taxiway Lighting System, from Federal Aviation Agency, Printing Branch, HQ-438, Washington, D. C. 20553.

Cole Morrow, Director
Airports Service

TABLE OF CONTENTS

1. INTRODUCTION. A taxiway lighting system consists of omnidirectional blue lights which outline the usable limits of taxiing paths. The original concept of establishing aviation blue for taxiway lights took into account the very low transmission factor of blue filters. The purpose was to produce a de-emphasized light signal for closeup ground operations which could not be readily seen from the air or from great distances on the ground. This idea worked out well for simple taxiway layouts where not too many lights were used. However, at airports with complex and numerous taxiways, there developed an undesirable concentrated mass of blue lights. Shielding and brightness control have helped this condition.

2. CONFIGURATION.

   a. The basic design requirements for taxiway lighting layout are contained in Technical Standard Order N3b. Principal requirements are that the light fixtures be installed not more than ten feet off the full-strength pavement edge on each side and spaced longitudinally not more than 200 feet to define the lateral limits and direction of the taxiing paths. The longitudinal spacing is subject to the physical layout of the taxiways. On long, straight sections, the spacing should not exceed 200 feet. On short curves and at points of intersection with runways and other taxiways, special treatment of spacing is set forth in TSO-N3b. This special treatment provides close spacing on short sections, extra lights prior to entrance into curves and close spacing in the form of a lighted barrier where a taxiway intersects a runway but does not provide a crossover. This special treatment may be justified at large airports where it is desirable or needed to facilitate traffic movements in critical areas to avoid confusion and running off the taxiway. At small airports where traffic is normally not as heavy and movements not as hurried, the extra lights may be omitted unless traffic conditions warrant them. See Appendix 2, Figure 1 for a typical taxiway lighting configuration.

   b. Taxiway guidance signs, as a part of the system, are installed where an intersection of a taxiway with a runway is used as an entrance-exit point in order to clearly define the throat or entrance into the intersecting taxiing route. Where taxiway signs would interfere with aircraft operation, two taxiway lights should be used and spaced five feet apart on a line perpendicular to the centerline of the runway as shown on Figure 6 of TSO-N3b.

   c. The use of runways as taxiways should be avoided. However, where the existing airport layout requires the use of the runway as a taxiway path, separate taxiway fixtures and circuits, in addition to the runway lighting system, may be used.

3. DESIGN.

a. Light Installation. Either of two types of taxiway edge light installation is acceptable. The same fixture is used in both.

(1) Base Mounted. The fixture is mounted on a base described in AC 150/5345-6. This method provides access to transformer and primary cable connections in the base which is installed with a concrete backfill. This method is desirable from a maintenance standpoint and provides added protection of the equipment.

(2) Stake Mounted. The fixture is mounted on metal stakes with associated transformers, primary cables, and cable connectors buried in the ground adjacent to the stake. Stakes may require concrete anchors where soil is unstable. This method is economical and, since the transformers, cables, and connectors are designed for direct earth burial, should render many years of fault-free service if specified procedures are followed in the initial installation.

b. Power Supply.

(1) Series Systems. Taxiway lighting systems are normally supplied by a 4KW or 7½KW constant current regulator having a primary rating of 240 volts, single phase, 60 cycle and a secondary rating of 6.6 amperes. These regulators are designed for remote control with or without provisions for varying the output current to a lower value. The provision for varying the output current is referred to as brightness control and is used to obtain the desired intensity of light for different visibility conditions. Only two brightness steps, 6.6 amperes 100 percent and 5.5 amperes 30 percent are utilized on taxiway circuits. The KW size and the number of regulators for a specific 6.6 ampere series lighting circuit may be determined by the use of the curves of Appendix 2, Figure 2. All constant current regulators used for taxiway series lighting systems are designed with integral self-protecting devices as follows:

(a) Primary Fuses. Properly rated fuses are installed in the power supply leads preceding the primary contactor to isolate the regulator from the power supply system in the event of short circuit or other internal regulator malfunctioning.

(b) Open-Circuit Relay. This automatic open-circuit protective device is designed to prevent damage in the event an open circuit develops in the 6.6 ampere secondary. This protective device de-energizes the regulator in four to six cycles after secondary open circuit occurs and resets automatically when the control power is removed.

(c) Output Circuit Protection. Lightning arrestors are installed in the output series circuit to protect against dangerous over voltage of all kinds originating in the field which may be caused by lightning, switching surges, and other transients.

(2) Multiple Systems. Taxiway lighting systems utilizing 120/240-volt multiple circuits are supplied from the existing power supply or distribution transformer and are controlled through circuit breakers or individual safety switches. Multiple circuits are only recommended for short segments of taxiways close to the control distribution center. The reason for limiting the use of multiple circuits is the excessive voltage drop, depending on the circuit load, which increases as the distance separating the supply point from the multiple circuit load increases.

c. Cable for Primary Circuits.

(1) Series Circuits. The taxiway lighting system designed for a 6.6 ampere series circuit with a constant current regulator should use 3KV, No. 8 AWG, Type B, stranded, single conductor, direct burial cable. The reasons for using this cable are long life expectancy and mechanical strength.

(2) Multiple Circuits. Where a multiple circuit is utilized, the cable for the circuit should be 600-volt, No. 8 AWG, Type A, stranded, single conductor direct burial cable.

d. Lamp Load Supply Circuits.

(1) Series Systems.

(a) The lamp load is supplied through a 6.6/6.6 ampere individual insulating transformer. This means of connecting the taxiway lamp load into a 6.6 ampere primary circuit isolates the lamp from the high primary voltage of the series circuit. Also, in the event of a single lamp burnout in the taxiway series circuit, the continuity of the series circuit is not broken, thus maintaining operation of the rest of the lamps in the circuit.

(b) Additionally, but as a part of the taxiway lighting system, taxiway guidance sign lamp loads are supplied through 6.6/6.6 ampere individual insulating transformers.

(2) Multiple System. The lamp load is connected directly to the 120/240-volt multiple circuit, and no insulating transformer is necessary.

e. Control Systems.

(1) Taxiway lighting control systems are designed to employ simple switching circuits to energize, to control lamp brightness when used, and to de-energize the circuits. The design problem varies from that at a small airport, where all control equipment and circuitry may be self-contained in the power supply equipment to that at a very large airport, where a complex control system is needed. The two types of taxiway lighting control systems utilized are direct control and remote control.

(a) Direct Control. Direct control systems are controlled directly at their power supply by turning on the branch circuits supplying their power. This type control system is normally used for control of taxiway lighting systems at small airports. On small airports with 120/240-volt multiple taxiway lights auxiliary circuit breakers on an AC 150/5345-18 regulator may be used where the proposed taxiway loads do not exceed the design capacity of the circuit breakers. Also, a two pole, three wire, solid neutral safety switch and/or separate circuit breakers may be utilized. Automatic control may be obtained through the use of a photoelectric or an astronomic time switch with a method of switching from automatic to manual control incorporated in its circuiting. For typical applications of direct control for small airports utilizing 120/240-volt multiple taxiways, see Appendix 2, Figure 3.

(b) Remote Control. Remote control systems are controlled from a remote control panel which is located in the cab of the control tower or at some other location. The control panel recommended for this purpose should conform to AC 150/5345-3. This control panel contains switches and other devices which control operating relays located in the vault from which power is supplied through the relay contacts to the taxiway lighting regulators. The following two systems of control circuit voltages are used with remote control of taxiway circuits.

1 120 Volt AC. Where the distance between the remote control panel and the vault is not great enough to cause an excessive voltage drop in the control leads, the standard control panel switches may be used to operate the control relays directly. Operating relays supplying power to the taxiway regulators should have coils rated for 120 volts AC. No. 12 AWG multiple conductor control cable is used to connect the control panel to the power supply equipment in the vault. The maximum permissible separation between control point and vault can be calculated by determining the control circuit line loss. The operating characteristics of the electrical components to be used in the calculation are contained in AC 150/5340-2. Special pilot low burden auxiliary relays, having proper coil resistance to reduce control current, may be used to obtain additional separation distance with 120 volt AC control circuits. The use of these relays may be advantageous for expanding existing 120 volt AC control systems. For typical applications, see Appendix 2, Figures 4 and 5.

2 48 Volt DC. Where the distance between the control panel and the vault would cause excessive control voltage drop, a low voltage (48 volt DC) control system should be used. Sensitive pilot relays such as those specified in AC 150/5345-13 are activated by the remote control panel switches and, in turn, control the regulator relays through their contacts. Normally, a 25 pair, No. 19 AWG telephone cable can be used to connect the control panel to the pilot relays. The DC control system is adequate for up to 7900 feet separation between control point and vault. For typical application details, see Appendix 2, Figures 4 and 5 of this advisory circular and Advisory Circulars 150/5340-2 and 150/5345-3.

(2) Selector Switch. A selector switch is available for special application to select short segments of separate taxiway lighting series circuits supplied from the same regulator. This switch can be remotely controlled from separately installed circuit breakers or a control panel conforming to AC 150/5345-3.

(a) The selector switch described in AC 150/5345-35 is available in two types and is designed with contact ratings for 10 amperes at 600 volts.

1 Type I for control of single series circuit.

2 Type II for control of up to three series circuits.

(b) Where there are more than three series circuits to be remotely controlled, combinations of AC 150/5345-35, Type I and Type II circuit selector assemblies may be utilized to remotely control additional series circuits.

(c) Since the AC 150/5345-35 selector switch assembly is designed for a maximum of 600 volts, its use is limited on 6.6 ampere series circuits having a maximum 4KW load. For application of this selector switch, see Appendix 2, Figures 4 and 5 of this advisory circular and Advisory Circular 150/5340-2.

f. Duct and Conduit Systems.

(1) When designing a taxiway duct or conduit system, the exact location of the duct and conduit crossings under pavement should be determined so that connections for cable runs, where required, can be made through other transverse ducts and conduit crossings. This will require thorough study of the taxiway layout of the airport to assure providing the minimum number and length of ducts or conduits required for a specific airport. Provisions should also be made for providing a reasonable number of spare ducts or conduits in each bank for maintanance and future expansion of facilities. Studies should also be made of areas where future facilities are planned to avoid routing ducts or conduits through areas which may have to be excavated.

(2) Cable runs for taxiway underground power supply and control circuits should be installed in ducts or conduits in areas that are to be surfaced or stabilized. Ducts and conduits under these areas will provide ready access for maintenance, modification of circuits, and protection for cables during repairs of the surfaced or stabilized areas.

(3) Sizes of ducts or conduits should be determined by making sure that the sum of the cross-sectional areas of the individual conductors to be installled in each duct or conduit will not exceed the percentage of the interior cross-sectional area of the duct or conduit recommended by national, state, or local electrical codes.

g. Brightness Control, Shielding, and Lamp Masking. Utilization of brightness control, shielding, and lamp masking will help to eliminate the "sea-of-blue" effect when viewing blue lights at full intensity during good visibility. The use of brightness control

will also result in considerable increase of lamp life by the use of lower intensity settings. There are several methods to restrict the unwanted light that pilots may see from all positions on the airport. External hoods, lamp masking, or selective taxiway circuiting have been successful. Figure 6, Appendix 2 illustrates typical lamp masking. This figure shows how fixtures utilizing masked lamps are orientated and the extent of lamp masking recommended (See Paragraph 4c(3) for lamp designation). Orientation of fixtures utilizing masked lamps may be accomplished by rotating the fixture on its mounting for proper light pattern position before securing in place. Proper control circuiting, so that only those lights for proper taxiway guidance will be on, will help to eliminate the "sea-of-blue" effect.

4. EQUIPMENT AND MATERIAL.

a. General.

(1) Equipment and material covered by FAA specifications are specified by reference number and title, as noted under "Bibliography" in Appendix 1. Where L-108, L-110, L-114, and L-116 are mentioned in succeeding paragraphs, they refer to the lighting installation specification of AC 150/5370-1, Standard Specifications for Construction of Airports with Change 1, Supplement No. 2.

(2) The vault should be the type shown on the plans. Construction should be reinforced concrete, concrete masonry, or brick wall as specified. Distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of equipment not covered by FAA specifications are in conformance to the applicable rulings and standards of the electrical industry.

b. Light Fixtures. The taxiway lighting units conform to the requirements of AC 150/5345-23. Each lighting unit is furnished complete with an optical system, lamp, connecting leads, and a mounting assembly.

c. Lamps. One of the lamps specified below should be used for the taxiway fixture specified.

(1) Series lamp, 30-watt, 6.6 ampere as specified in AC 150/5345-23.

(2) Multiple lamp, 40-watt, 115 volt as specified in AC 150/5345-23.

(3) Masked series lamps, 30 watts as indicated in Appendix 2, Figure 6. (To be used where shielding is desired on complex taxiways).

d. Cables. Primary cables conform to the requirements of AC 150/5345-7 of the type, AWG size, and voltage as specified on the plans.

e. Counterpoise Wire. Bare copper counterpoise wire conforms to the requirements of L-108, paragraphs 108-2.3 and 108-3.9.

f. Insulating Transformers. Taxiway light insulating transformers for use on series circuits conform to the requirements of AC 150/5345-31. Entrance-exit taxiway sign insulating transformers conform to the requirements of AC 150/5345-22.

g. Regulators. The regulators are constant current types of 4KW and 7½KW capacity. The regulators may be obtained with or without brightness control. The standard input voltage for the regulators is 240 volts, single phase, 60 cycle and the output is 6.6 amperes. These regulators conform to the requirements of AC 150/5345-11 and AC 150/5345-21. Regulator AC 150/5345-18 may be utilized to control short segments of 120/240-volt multiple taxiway circuits through the use of its auxiliary circuit breakers where this regulator is being utilized for runway service on small airports.

h. Bases. Where required, bases conform to the requirements of AC 150/5345-6.

i. Metal Stakes. Where required, metal stakes conform to the requirements of Figure 3 of AC 150/5345-23.

j. Junction Boxes. Junction boxes with tapped cover to receive the breakable coupling, where required, conform to the requirements of paragraph 7f(1)(d) of AC 150/5345-23.

k. Primary Cable Connectors. Primary cable connectors conform to the requirements of AC 150/5345-26.

l. Squeeze Connectors. Squeeze connectors, if specified, conform to the requirements of L-114, paragraph 114-2.8.

m. Ducts and Conduits. Ducts and conduits conform to the requirements of L-110, paragraph 110-2.2 through 110-2.7.

n. Concrete.

(1) Concrete Backfill. Concrete backfill conforms to the requirements of L-114, paragraph 114-2.6.

(2) Stake Anchoring Concrete. The stake anchoring concrete conforms to the requirements of L-116, paragraph 116-2.5.

o. Tape. Plastic electrical insulating tape conforms to the requirements of L-108, paragraph 108-2.4e.

p. Control Panel. Control panels conform to the requirements of AC 150/5345-3.

q. Auxiliary Relay Cabinet. The auxiliary relay cabinet assembly, where required, for 48-volt DC control conforms to the requirements of AC 150/5345-13.

r. Control Cables.

(1) Control cable containing multiple conductors having No. 12 AWG wires conforms to the requirements of AC 150/5345-7.

(2) Control cable containing No. 19 AWG wires is in accordance with Rural Electrification Administration (REA) Bulletin 345-14, REA Specification for Fully Color-Coded, Polyethylene Insulated, Double Polyethylene-Jacketed Telephone Cables for Direct Burial.

s. Circuit Selector. Circuit Selector Cabinet Assembly L-816 conforms to the requirements of AC 150/5345-35.

5. INSTALLATION.

a. General. The installation of vault equipment, conduit, cables, bus bars, grounds, and supports necessary to insure a complete and operable electrical distribution center for taxiway lighting systems should be as specified and shown on the plans. When specified, an emergency power supply and transfer switch should be provided and installed. The equipment installation and mounting should comply with the requirements of the National Electrical Code and local code agencies having jurisdiction. A typical vault layout for taxiway lighting equipment is shown in Appendix 2, Figure 1.

b. Installation Procedures. Following are the various installation procedures for elevated taxiway edge lighting units, for base mounted and/or stake mounted, for series and/or multiple circuits.

(1) Base Mounted. The series circuit base mounted installation consists of an AC 150/5345-23 taxiway light fixture mounted 14 inches above ground plane on an AC 150/5345-6 light base which is encased in concrete backfill at the locations indicated on the plans. See Appendix 2, Figure 1 for layout and installation details.

(2) Stake Mounted. The series and multiple circuit stake mounted installation consists of an AC 150/5345-23 taxiway light fixture mounted 14 inches above ground plane on a metal stake installed at a depth of 30 inches in an excavated hole 6 inches in diameter at the locations indicated on the plans. Where specified, the metal stake may be backfilled with concrete to form an anchor 6" x 6" x 12" or the anchor may be precast on the stake before installation. For the multiple circuit stake mounted installation, a junction box is attached to the top of the stake for making electrical connections. See Appendix 2, Figure 1 for layout and installation details.

(3) Frost Area Installation. In areas having extreme frost conditions, the following installation procedure should be followed:

(a) Where frost action is a known and a permanent problem, all taxiway lights should be mounted on AC 150/5345-6 bases which are installed in concrete backfill with conduit hubs sealed.

(b) Where base mounted units cannot be installed, it is recommended that stake mounted units be installed in the following manner:

1 Where the frost line depth exceeds the minimum cable installation depth specified in L-108, the installation depth for cable, transformers, and connectors should be increased to a maximum of two feet depth in the manner specified in the following paragraphs.

2 Connector clamps on the stakes should not be utilized.

3 Primary cable connectors, splices, and transformers should be installed at the same depth and in the same horizontal plane as the primary cable with adequate slack provided where possible.

4 Secondary leads from the transformer to the lamp socket should be placed in a loose spiral with excess slack at the bottom.

5 Concrete anchor, if specified, for the stake should be of the size adequate for the location.

6 Elimination of backfill material which will hold moisture and substituting permeable backfill material, such as sand, around the primary connectors, transformer, and secondary leads and then covering the top surface with impervious material to reduce moisture penetration will aid considerably.

c. Bases. The AC 150/5345-6 light bases are installed off the taxiway edge in concrete backfill (conforming to L-114, paragraph 114-3.2) at the locations indicated on the plans. See Appendix 2, Figure 1 for additional installation details.

d. Cable Installation.

(1) All primary cables and control cables may be installed by direct burial in trenches where the routing is under areas other than paved or stabilized.

(2) Trenching, the installation of cable, backfilling trenches, and the installation of cable markers conform to L-108.

(3) Installation of cables in ducts and conduits conforms to L-108, paragraph 108-3.2.

(4) Bare counterpoise wire for lightning protection, if specified, should be installed in the same trench for the entire length of the insulated cable it is to protect as specified in L-108, paragraph 108-3.9.

e. Cable Connections.

(1) All methods of making in-line splices on the primary and secondary underground cables conform to L-108, L-114, and L-116; paragraphs 108-3.8, 114-3.6, and 116-3.6. Connectors conform to AC 150/5345-26. No splices should be permitted in ducts, conduits, or in circuits between taxiway light fixtures.

(2) Where crimp connectors or field attached plug-in connectors conforming to AC 150/5345-26 are employed, connections to primary cables should be made using crimping tools designed for the specific type connector so as to provide adequate crimps or detents meeting the necessary tensile strength.

f. Duct and Conduit. Trenching, installation of ducts and conduits, concrete backfilling, trench backfilling, installation of duct markers, testing of complete duct system, and the type of material to be used should be in conformance with L-108. A typical 4-way duct is shown in Appendix 2, Figure 1.

6. TESTING.

a. General.

(1) The installation and alignment of all lighting fixtures of the completed system should be checked to determine if the equipment has been installed in accordance with the design requirements.

(2) All electrical circuits should be checked and tested to determine the following:

(a) That all circuits are continuous and free of short circuits and unspecified grounds.

(b) That all circuits are properly connected in accordance with applicable wiring diagrams.

(c) That the resistance to ground of all ungrounded conductors in all circuits is not less than 10 megohms.

b. Primary and Control Cables. The primary and control cables should be tested as specified under the applicable sections of L-108.

c. Operational. The completed taxiway lighting system should be tested as specified under the applicable sections of L-108 and fully tested by continuous operation and functioning of each control as specified under the applicable sections of L-114 and L-116.

7. MAINTENANCE.

a. General.

(1) Taxiway lighting systems and auxiliary equipment normally operate with a minimum of attention. However, maintenance of taxiway lighting systems should be given a foremost place in the maintenance schedule of the airport.

(2) A systematic maintenance schedule should be adopted to insure maximum efficiency by detecting faults and avoiding deterioration of the system. If maintenance is not performed, the airport lighting system may become ineffective for many periods during the year.

(3) Proper maintenance should consist of a regular schedule of testing, cleaning, adjusting, repairing, and when necessary, replacing worn-out or damaged parts. Dirty equipment contributes greatly to operational failures; therefore, all equipment should be maintained free of dust, sand, surplus grease and oil, and other foreign material. Lamps must be replaced, glassware and reflectors must be cleaned, broken glassware replaced, and the insulation resistance of wires and cables must be maintained.

b. Personnel. The men entrusted with making periodic inspections of the lighting equipment and with the actual maintenance of the airport lighting system should be experienced and reliable electricians who have had experience with high voltage and series lighting circuits. An unexperienced man should not be assigned these duties because the high voltages that may be encountered on series circuits could be fatal to an untrained person with just one mistake.

c. Operational Check and Test. A daily check of the lighting system and test of equipment operation should be made at least one hour before sunset. The daily check of the lighting system should consist of a driving patrol to visually check for dimly burning lamps and for burned-out lamps which should be recorded for later maintenance check, and for replacement of defective and burned-out lamps. The daily operation test of equipment should be assigned to a reliable and competent person stationed at the airport during the evening hours and who has been fully checked out on procedures to follow. These procedures should consist of turning on all airport taxiway lighting circuits to determine that each circuit is functioning normally. If malfunctioning of any lighting circuit is noted, the maintenance electrician should be notified immediately.

d. Test Equipment, Material, and Instruction Material. To properly maintain and effect quick repairs on taxiway lighting systems and equipment, the following test equipment, material, and instruction material should be provided:

(1) The following test equipment is used for preventive maintenance and trouble shooting:

(a) Split-Core Type Ammeter

(b) Ohmmeter

(c) Voltmeter

(d) Potential Transformer

(e) Ammeter

(f) Current Transformer

(g) Cable Fault Test-Detecting Set

(h) Low Voltage Insulation Resistance Tester

(i) Station-Type Neon Glow Lamp

(2) Adequate supply of cable, lamps, glassware, cutouts, fuses, gaskets, and spare taxiway light fixtures.

(3) As-built taxiway lighting plans, showing location of all taxiway cable runs, control circuits, and wiring diagrams of each piece of equipment. Modifications or extensions made in connection with the above plans should be kept up to date by the chief electrician.

(4) Maintenance instruction book and descriptive parts list for each piece of installed equipment and test equipment.

(5) Storage space and work shop where the above material and information will always be available to maintenance personnel.

BIBLIOGRAPHY

1. Obtain copies of the following Federal Aviation Agency publications from the Federal Aviation Agency, Printing Branch, HQ-438, Washington, D.C. 20553.

   a. Technical Standard Order N3b, Taxiway Lighting.

   b. AC 150/5340-2, Airport Lighting Control

   c. AC 150/5345-1, Approved Airport Lighting Equipment.

   d. AC 150/5345-3, Specification for L-821 Airport Lighting Panel for Remote Control of Airport Lighting.

   e. AC 150/5345-4, Specification for L-829 Internally Lighted Airport Taxi Guidance Sign.

   f. AC 150/5345-6, Specification for L-809 Airport Light Base and Transformer Housing.

   g. AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits.

   h. AC 150/5345-11, Specification for L-812 Static Indoor Type Constant Current Regulator Assembly; 4KW and 7½KW; With Brightness Control for Remote Operation.

   i. AC 150/5345-13, Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits.

   j. AC 150/5345-18, Specification for L-811 Static Indoor Type Constant Current Regulator Assembly; 4KW With Brightness Control and Runway Selection for Direct Operation.

   k. AC 150/5345-21, Specification for L-813 Static Indoor Type Constant Current Regulator Assembly; 4KW and 7½KW; For Remote Operation of Taxiway Lights.

   l. AC 150/5345-22, Specification for L-834 Individual Lamp Series-To-Series Type Insulating Transformer for 5000 Volt Series Circuits.

m. AC 150/5345-23, Specification for L-822 Taxiway Edge Light.

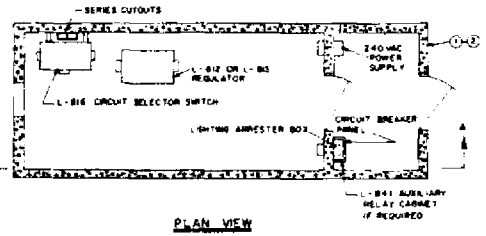
n. AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors.

o. AC 150/5345-31, Specification for L-833 Individual Lamp Series-To-Series Type Insulating Transformer for 600 Volt or 3,000 Volt Series Circuits.

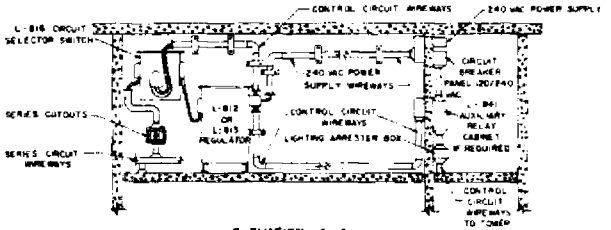
p. AC 150/5345-35, Specification for L-816 Circuit Selector Cabinet Assembly for 600 Volt Series Circuits.

2. Obtain copies of AC 150/5370-1, Standard Specifications for Construction of Airports with Change 1, Supplement No. 2, from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Send check or money order with your request made payable to the Superintendent of Documents in the amount of $3.10 for each copy. No c.o.d. orders accepted.

3. Obtain copies of Rural Electrification Administration (REA) Bulletin 345-14, REA Specification for Fully Color-Coded, Polyethylene Insulated, Double Polyethylene-Jacketed Telephone Cables for Direct Burial from the U.S. Department of Agriculture, Rural Electrification Administration, Information Services Division, Washington, D.C.

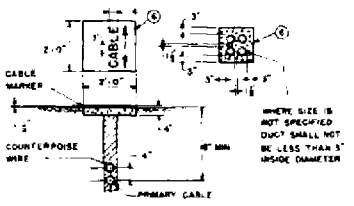


PLAN VIEW

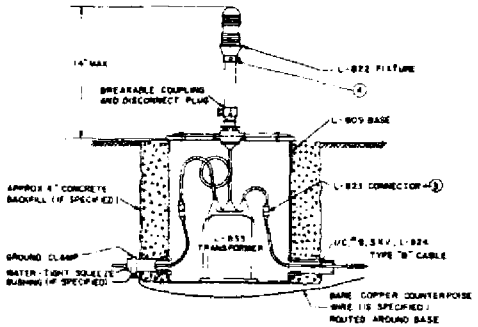


ELEVATION A-A

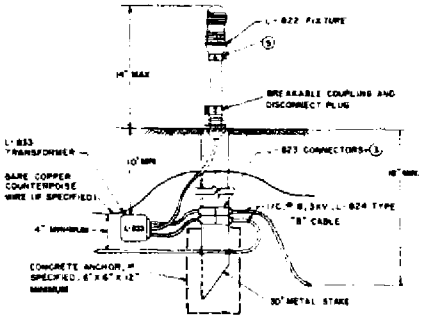
TYPICAL VAULT LAYOUT FOR TAXIWAY LIGHTING EQUIPMENT



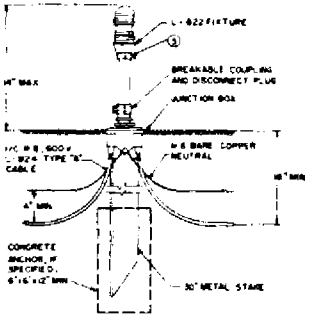
TYPICAL CABLE MARKER DETAILS AND FOUR WAY DUCT



6.6 AMPERE SERIES CIRCUIT
BASE MOUNTED



6.6 AMPERE SERIES CIRCUIT
STAKE MOUNTED

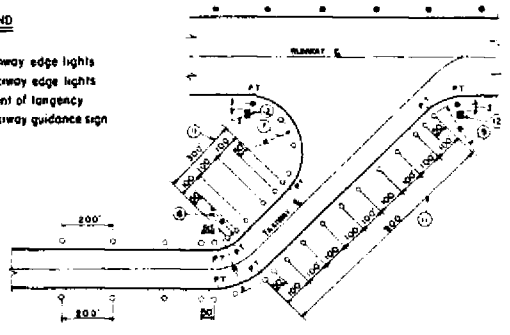


120 VOLT MULTIPLE CIRCUIT
JUNCTION BOX MOUNTED

TYPICAL TAXIWAY FIXTURE INSTALLATIONS

LEGEND

- ● Runway edge lights
- ○ Taxiway edge lights
- PT Point of tangency
- ■ Taxiway guidance sign



TYPICAL TAXIWAY LIGHTING CONFIGURATION
(HIGH DENSITY TRAFFIC AIRPORTS)

NOTES

(1) Vault construction and equipment installation are in accordance with the National Electrical Code, local codes, Item L-108 of FAA Standard Specifications for Construction of Airports.

(2) An adequate number of lighting fixtures and electrical outlets are provided in the vault.

(3) Primary cable splices are made as specified in Item 108 of FAA Standard Specifications for Construction of Airports.

(4) The L-822 fixture and the L-809 base are installed as specified in FAA Standard Specifications for Construction of Airports, Item 114.

(5) The L-822 fixture and stake or junction box are installed as specified in FAA Standard Specifications for Construction of Airports, Item 116.

(6) The underground electrical ducts and duct markers are as specified in the plans. The installations of the ducts and markers are in accordance with Item 110 of FAA Standard Specifications for Construction of Airports.

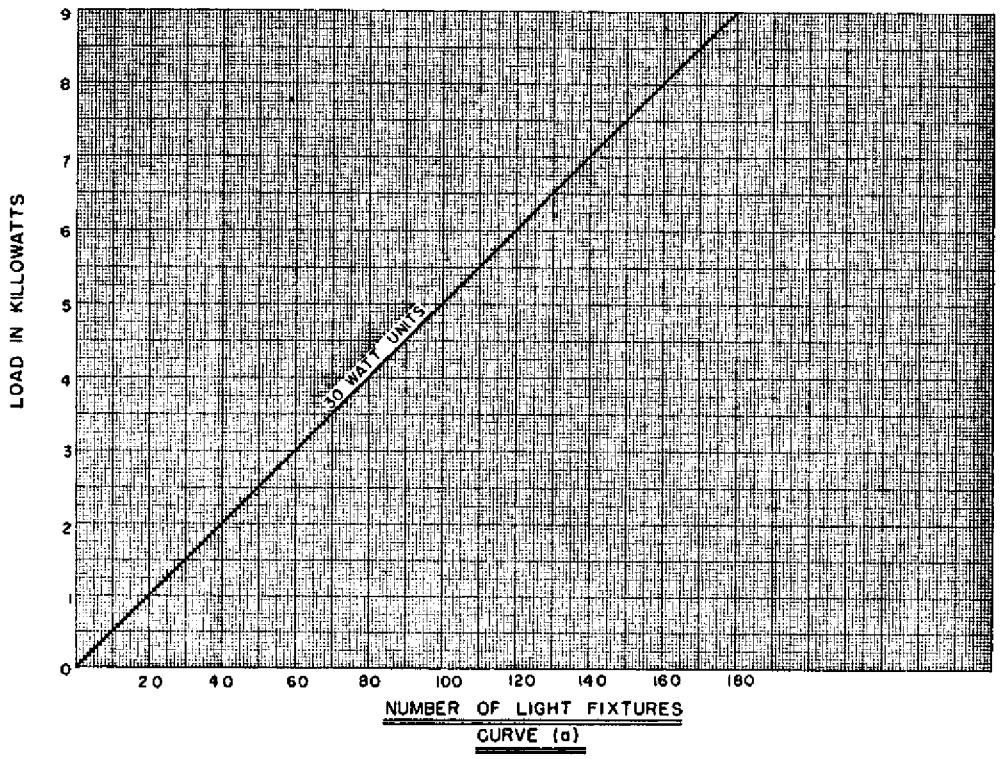
(7)(8)(9) Spacing of lights on taxiway curved edges are as shown in Figure 5 of TSO-N3b.

(10) On long straight sections of taxiways, the longitudinal spacing of lights may approach but shall not exceed 200 feet.

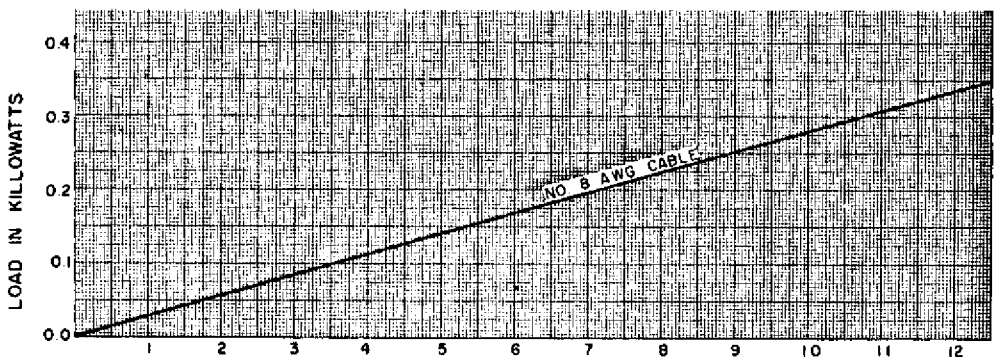
(11) Spacing of lights on short straight sections are as shown in Figure 1 of TSO-N3b. See Figures 2, 3 and 4 of TSO-N3b for typical examples for other short straight sections of taxiway.

(12) Taxiway guidance signs are installed as shown in Figure 7 of TSO-N3b. Where entrance-exit taxiway lights are to be installed in lieu of the signs, see Figure 6 of TSO-N3b for installation locations.

FIGURE 1. TYPICAL VAULT, FIXTURE AND DUCT DETAILS



CURVE (a)

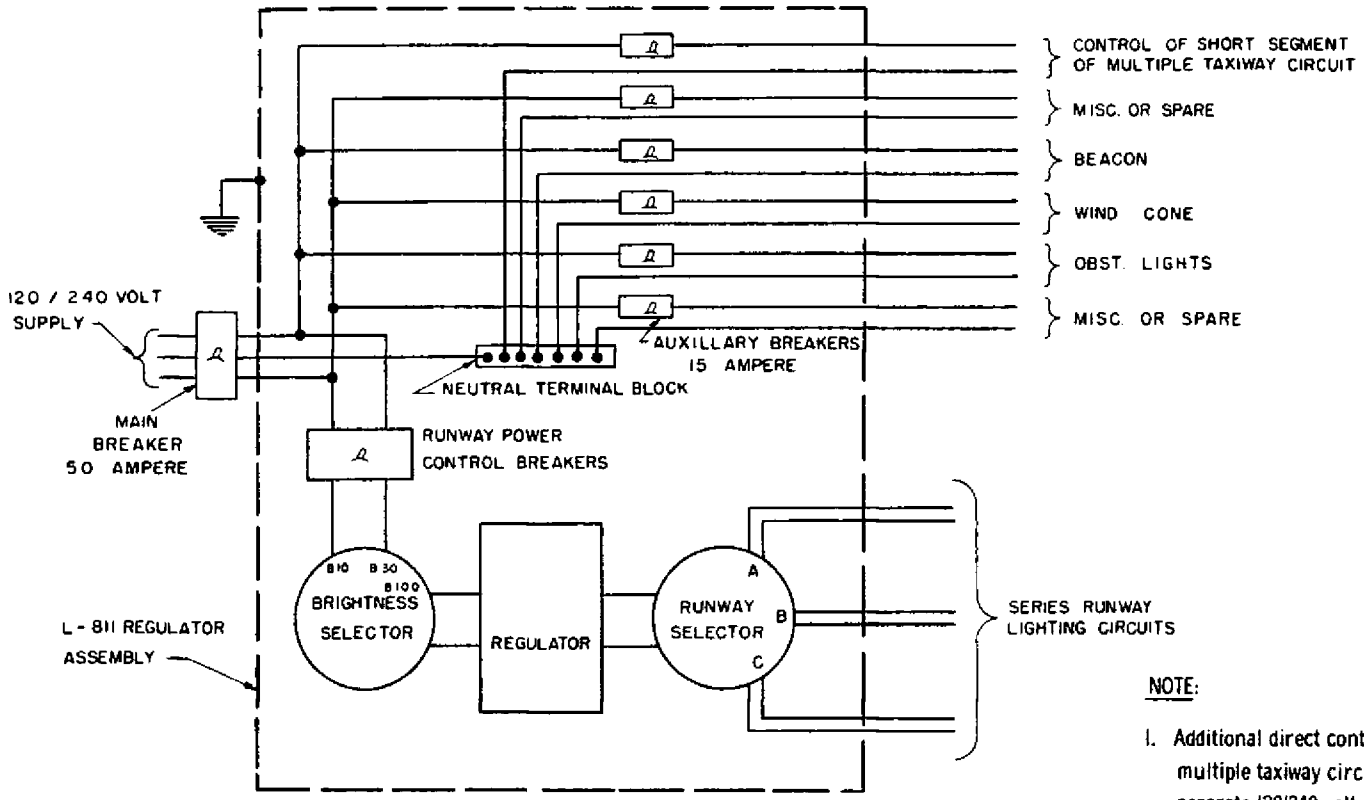


CURVE (b)

NOTES:

1. Computations based on actual circuit load tests.
2. In curve (a) figure KW load using total number of 30 watt fixtures in circuit.
3. Basis for computing load in curve (a)
   30/45 watt transformer with 30 watt lamp----- 40.4 watts
   Cable loss, lamp tolerance etc. ---------- 9.6 watts
   Total estimated load per 30 watt unit---------50.0 watts
4. Basis for computing load per 1,000' of no. 8 AWG cable in curve (b) $I^2R = (6.6A)^2 \times 0.6405$ ohms/1,000' = 27.9 watts
5. Obtain total KW load per runway circuit by adding KW load obtained from curves (a) and (b).

FIGURE 2. CURVES FOR ESTIMATING LOAD FOR TAXIWAY CIRCUITS



NOTE:

1. Additional direct control of short sections of multiple taxiway circuits may be obtained from separate 120/240 volt circuit breaker distribution panel and/or from a two pole, three - wire, solid neutral safety switch.

FIGURE 3. TYPICAL MULTIPLE TAXIWAY SYSTEM DIRECT CONTROL

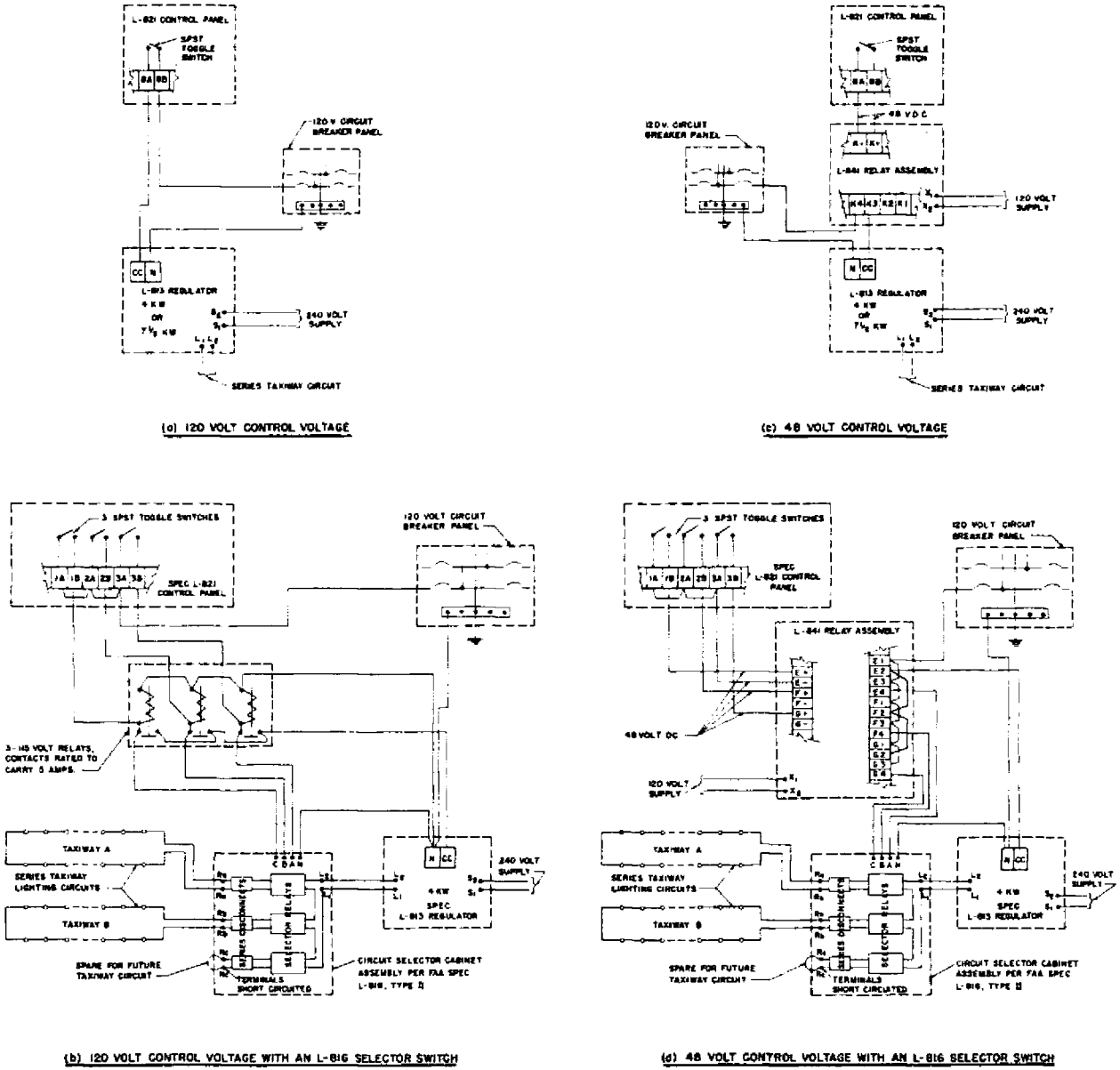
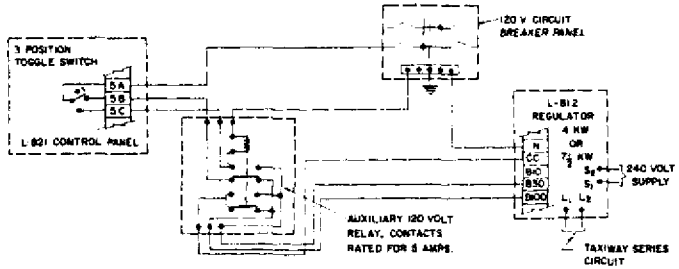
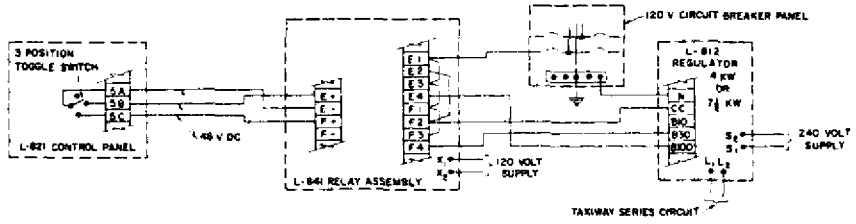


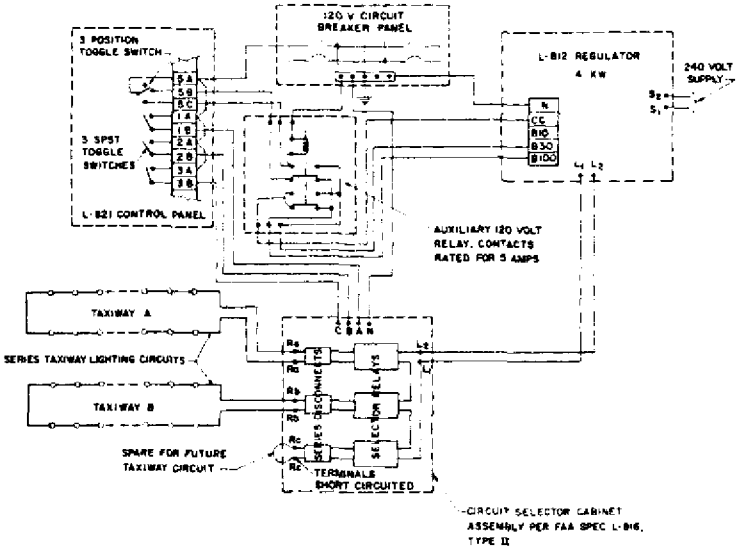
FIGURE 4. TYPICAL 120 VOLT AC AND 48 VOLT DC REMOTE CONTROL FOR AC 150/5345-21 REGULATORS



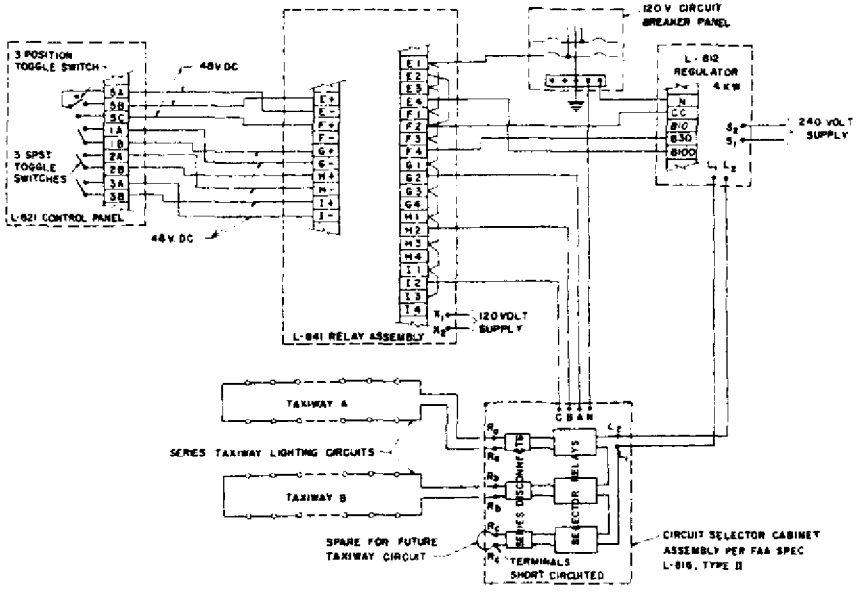
(a) 120 VOLT CONTROL VOLTAGE



(c) 48 VOLT CONTROL VOLTAGE

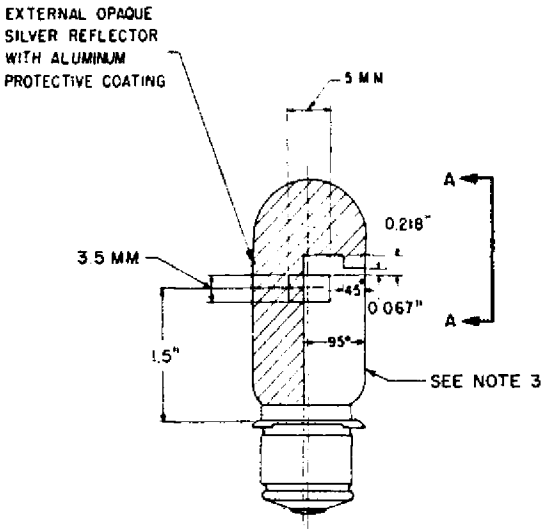


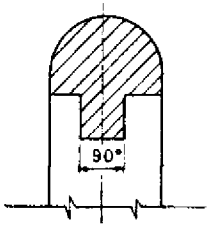
(b) 120 VOLT CONTROL VOLTAGE WITH AN L-816 SELECTOR SWITCH



(d) 48 VOLT CONTROL VOLTAGE WITH AN L-816 SELECTOR SWITCH

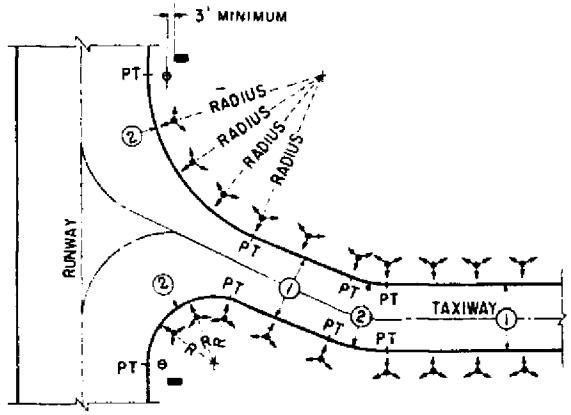
FIGURE 5. TYPICAL 120 VOLT AC AND 48 VOLT DC REMOTE CONTROL FOR AC 150/5345-11 REGULATORS





VIEW A-A

TYPICAL LAMP MASKING



ORIENTATION OF TAXIWAY LIGHTS USING MASKED LAMPS

LEGEND

- ① Runway light fixture
- PT Point of tangency
- ■ Taxiway guidance sign
- ⅄ Taxiway light fixture

NOTES

1. Taxiway light fixtures on straight sections of taxiways should be oriented so the center of the light pattern will be perpendicular to the edge of the taxiway.
2. Taxiway light fixtures on curved sections of taxiways should be oriented so the center of the light pattern will fall on the extended radius of curve through the fixture location. See Figure 5 of TSO-N3b for spacing of lights on curved edges and for straight sections, see Figures 1, 2, 3 and 4 of TSO-N3b.
3. The lamp shown above is a 30-watt series lamp in accordance with the requirments of Advisory Circular 150/5345-23.

FIGURE 6. LAMP MASKING, LIGHT PATTERN AND ORIENTATION OF TAXIWAY LIGHTS UTILIZING MASKED LAMPS