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CHANGE

AC NO: AC 150/5340-16B CHG 1

DATE: August 2, 1974



ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

SUBJECT: CHANGE 1 TO AC 150/5340-16B, MEDIUM INTENSITY RUNWAY LIGHTING
SYSTEM AND VISUAL APPROACH SLOPE INDICATORS FOR UTILITY AIRPORTS

1. **PURPOSE.** This change transmits revisions to the text and drawings of subject advisory circular.
2. **EXPLANATION OF CHANGES.** Medium intensity runway lights (MIRL) are used to outline the edges of a runway during periods of darkness and low visibility. This change adds the requirement for split red/green lens on the threshold lights and split white/yellow lens on edge lights in the caution zone. Minor editorial changes have been made. The use of asterisks denotes changed, added, or deleted portions of the text.
3. **HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION.** Additional copies of this Change 1 to AC 150/5340-16B, Medium Intensity Runway Lighting System and Visual Approach Slope Indicators for Utility Airports, may be obtained from the Department of Transportation, Publications and Forms Section, TAD-443.1, Washington, D.C. 20590.

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APPENDIX 2. BIBLIOGRAPHY

- * 1. The latest issuance of the following free publications may be obtained from the Department of Transportation, Publications and Forms Section, TAD-443.1, Washington, D.C. 20590. Advisory Circular 00-2, updated triannually, contains the listing of all current issuances of these circulars and changes thereto. *
- * a. AC 00-2, Federal Register, Advisory Circular Checklist and Status of Regulations. *
- b. AC 150/5340-9, Prefabricated Metal Housing for Electrical Equipment.
- * c. AC 150/5340-13, High Intensity Runway Lighting System. *
- * d. AC 150/5340-14, Economy Approach Lighting Aids. *
- * e. AC 150/5340-15, Taxiway Edge Lighting System. *
- f. AC 150/5340-17, Standby Power for Non-FAA Airport Lighting Systems.
- * g. AC 150/5345-3, Specification for L-821 Airport Lighting Panel for Remove Control of Airport Lighting. *
- h. AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits.
- i. AC 150/5345-11, Specification for L-812 Static Indoor Type Constant Current Regulator Assembly; 4KW and 7½KW; With Brightness Control for Remote Operation.
- j. AC 150/5345-13, Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits.
- k. 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.
- l. AC 150/5345-20, Specification for L-802 Runway and Strip Light.
- m. AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors.
- * n. AC 150/5345-28, Specification for L-851 Visual Approach Slope Indicators and Accessories. *
- * o. AC 150/5345-31, Specification for L-833 Individual Lamp Series-To-Series Type Insulating Transformer for 600-Volt or 5,000-Volt Series Circuits. *

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

* q. AC 150/5345-42, FAA Specification L-857, Airport Light Bases, Transformer Housings and Junction Boxes. *

r. OA P 8200.1, United States Standard Flight Inspection Manual.

* 2. Obtain copies of AC 150/5370-1A, Standard Specification for Construction of Airports, and AC 150/5300-4A, Utility Airports, from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20420. Send check or money order with your request made payable to the Superintendent of Documents in the amount of \$6.25 and \$3.15, respectively, for each copy. No. C.O.D. orders are accepted. *

3. Obtain copies of Rural Electrification Administration (REA) Bulletin 345-14, REA Specification for Fully Color-Coded, Polyethylene Insulated, Double Polyethylene-Jacketed Telephone Cable for Direct Burial, from the U.S. Department of Agriculture, Rural Electrification Administration, Information Services Division, Washington, D.C. 20250.

1. INTRODUCTION.

- * a. Medium intensity runway lights (MIRL) are used to outline the edges of a runway during periods of darkness and low visibility. The lights are elevated units with an asymmetrical lens. The fixtures outlining the lateral limits of the runway emit aviation white light except aviation yellow is substituted for white on the takeoff side on the last 2,000 feet of an instrument runway to indicate the caution zone. The fixtures marking the longitudinal limits of the runway utilize a split lens to emit red and green light. The red portion faces the runway to indicate end of runway to a departing aircraft; the green portion faces away from the runway to indicate the threshold to a landing aircraft. *
- b. The MIRL may be supplemented with SAVASI or 2-box visual approach slope indicators (VASI-2). Selection considerations are contained in paragraph 2.

2. SELECTION CONSIDERATIONS. The selection of a particular visual aid should be based on the operational needs of the runway. Apply the following guidelines when selecting MIRL, SAVASI, or VASI-2.

a. MIRL.

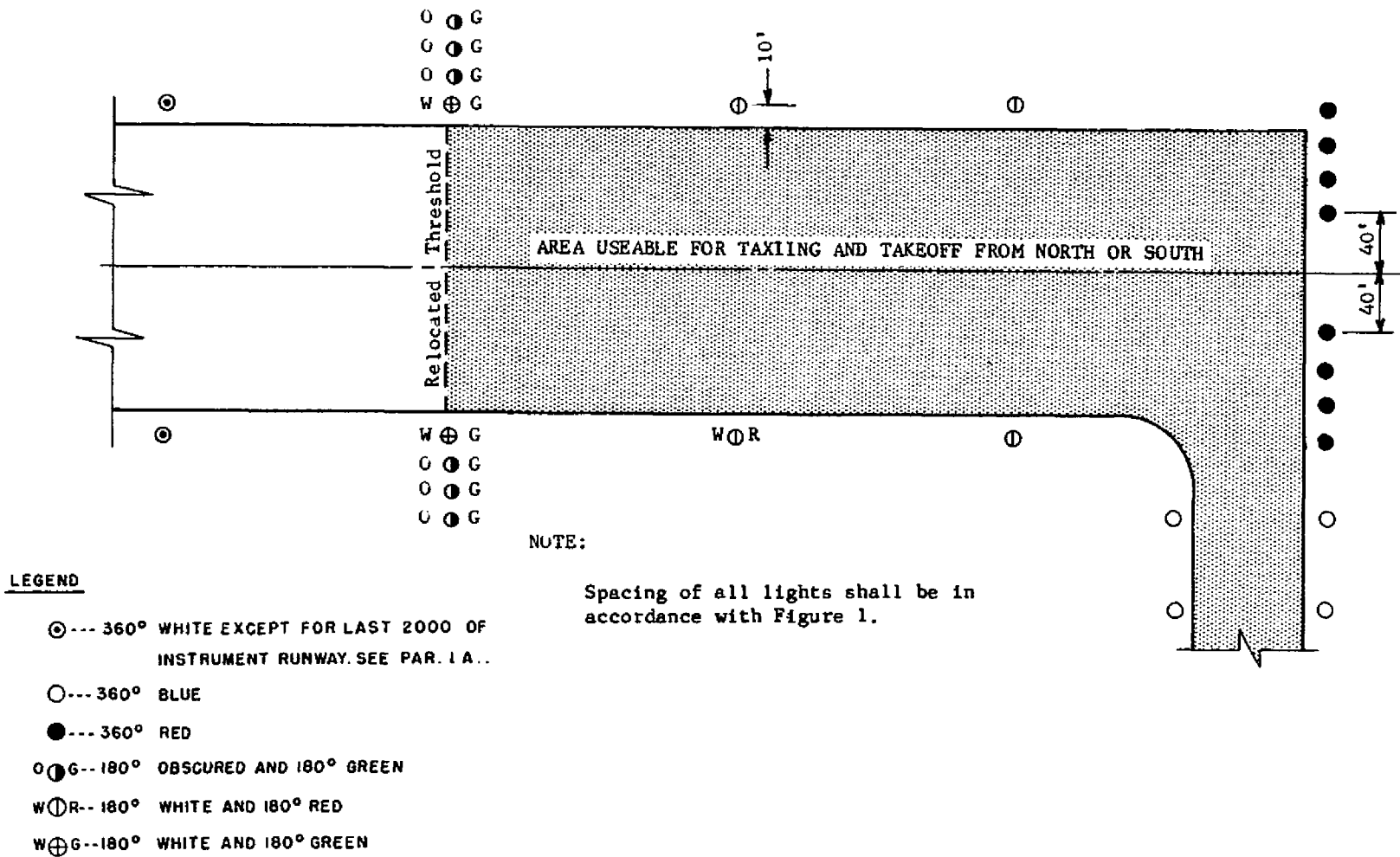
- (1) Select MIRL for runways with day and night visual flight rules (VFR) operating minimums.
- (2) Select MIRL for new locations with day and night instrument flight rules (IFR) operating minimums, unless runway visual range (RVR), or Category D aircraft are programmed within five years. In the latter cases, high intensity runway edge lights should be installed. See AC 150/5340-13 for details pertaining to high intensity runway edge lights.
- (3) MIRL, where currently installed and utilized in conjunction with an instrument landing system (ILS) and an approved approach light system, such as medium intensity approach lights with runway alignment indicator lights (MALSR), could provide visibility minimums as low as one-half mile for Categories A, B, and C aircraft. This includes two- and three-engine jets and the Lear 25 jet, and as low as three-fourths mile for Category D aircraft including four-engine jets.

b. SAVASI AND VASI-2.

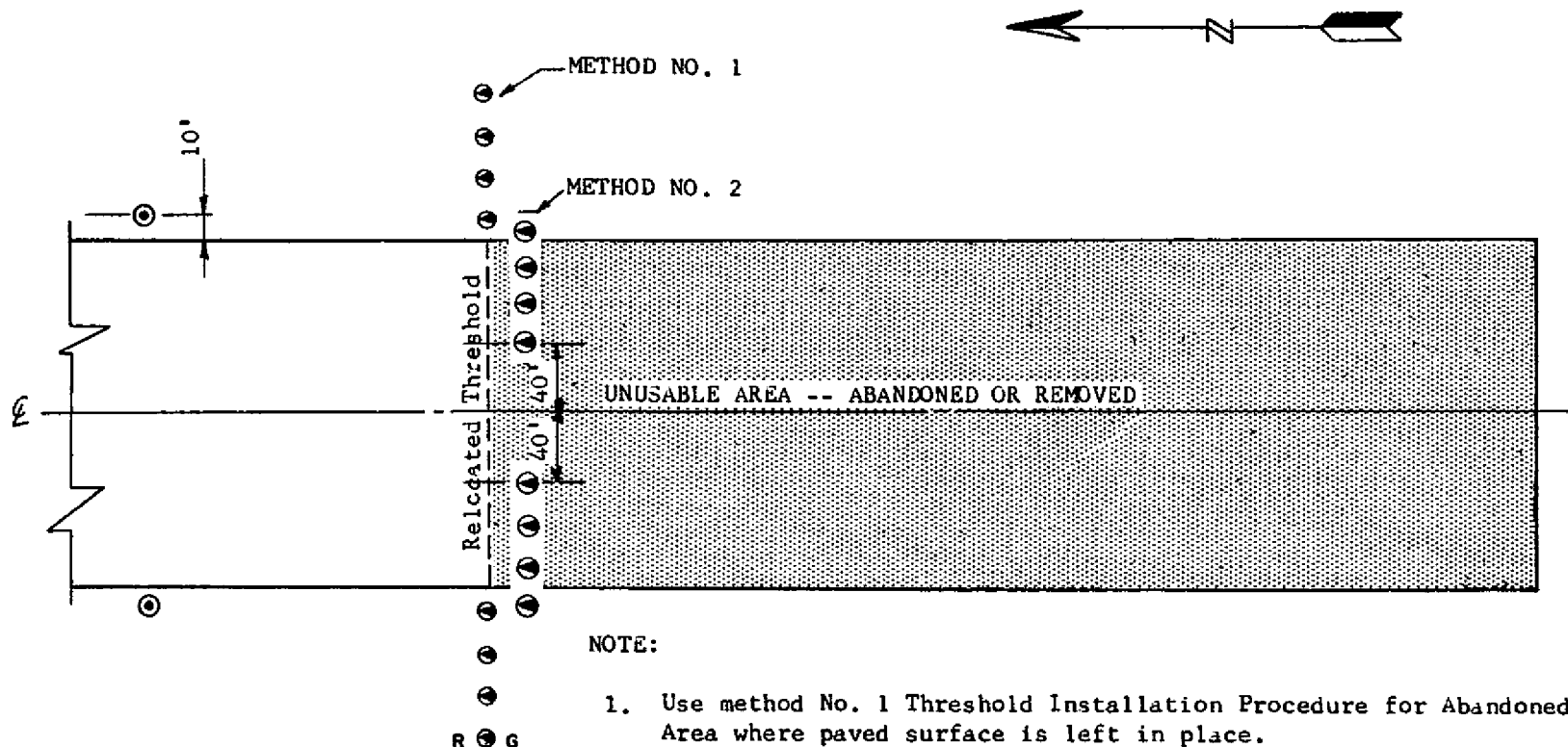
- (1) The SAVASI, with a single lamp in each unit, is required at utility airports where there is a need to limit the load in the lighting circuit. The VASI-2 with three lamps in each unit must be selected if electrical capacity is not a problem, since

it has growth potential to the four-box VASI (VASI-4). The VASI-2 is required if electrical capacity is not a problem. See AC 150/5340-14B for details pertaining to VASI-2 and VASI-4.

- (2) Select VASI-2 or SAVASI for installation as a training aid for student pilots. Use information in paragraph (1) above to obtain guidelines.
3. CONFIGURATION. Use the following basic requirements for MIRL and visual approach slope indicators.
 - a. Edge Lights. Install the edge lights along the full length of each side of the runway equidistant from and parallel to the runway centerline. Locate the light fixtures 10 feet maximum, (lateral spacing) from the full strength pavement designated for runway use. Space the edge lights 200 feet maximum in a longitudinal direction. Locate each light on one side of the runway with respect to its companion light on the opposite side so that a line joining the two will be at right angles to the runway centerline. Uniformly space the elevated lights within the individual sections of the runway resulting from consecutive intersection and runway ends and intersections. Add single elevated lights to avoid large gaps where the matching of lights on opposite sides of the runway cannot be accomplished. A gap in excess of 400 feet is considered large. If large gaps cannot be prevented, install the single lights as close as permitted to the intersecting pavement. See Figure 1 for typical configurations.
 - b. Threshold Lights.
 - (1) Locate the threshold lights on a line 2 feet, plus eight feet, minus zero feet, from the designated threshold of the runway. If a situation exists that makes the installation of the lights between the specified limits impractical, install the threshold lights not more than 50 feet from the designated threshold of the runway. The designated threshold is the end of the pavement useful for aircraft operations.
 - (2) Use two groups of lights located symmetrically about the runway centerline. Each group contains not less than four lights uniformly spaced if the runway width is 100 feet or greater. In this case, provide an optimum and minimum 80-foot gap between the two groups of lights. If the runway width is less than 100 feet, provide in each group, not less than three lights uniformly spaced. Use an optimum and minimum gap of 40 feet between the two groups of lights when the runway width is less than 100 feet. In either of the above cases, the outermost threshold light in each group is located in line with the rows of runway edge lights.



* FIGURE 3b. RELOCATED THRESHOLD--AREA USEABLE FOR TAXIING AND TAKEOFF FROM NORTH OR SOUTH *



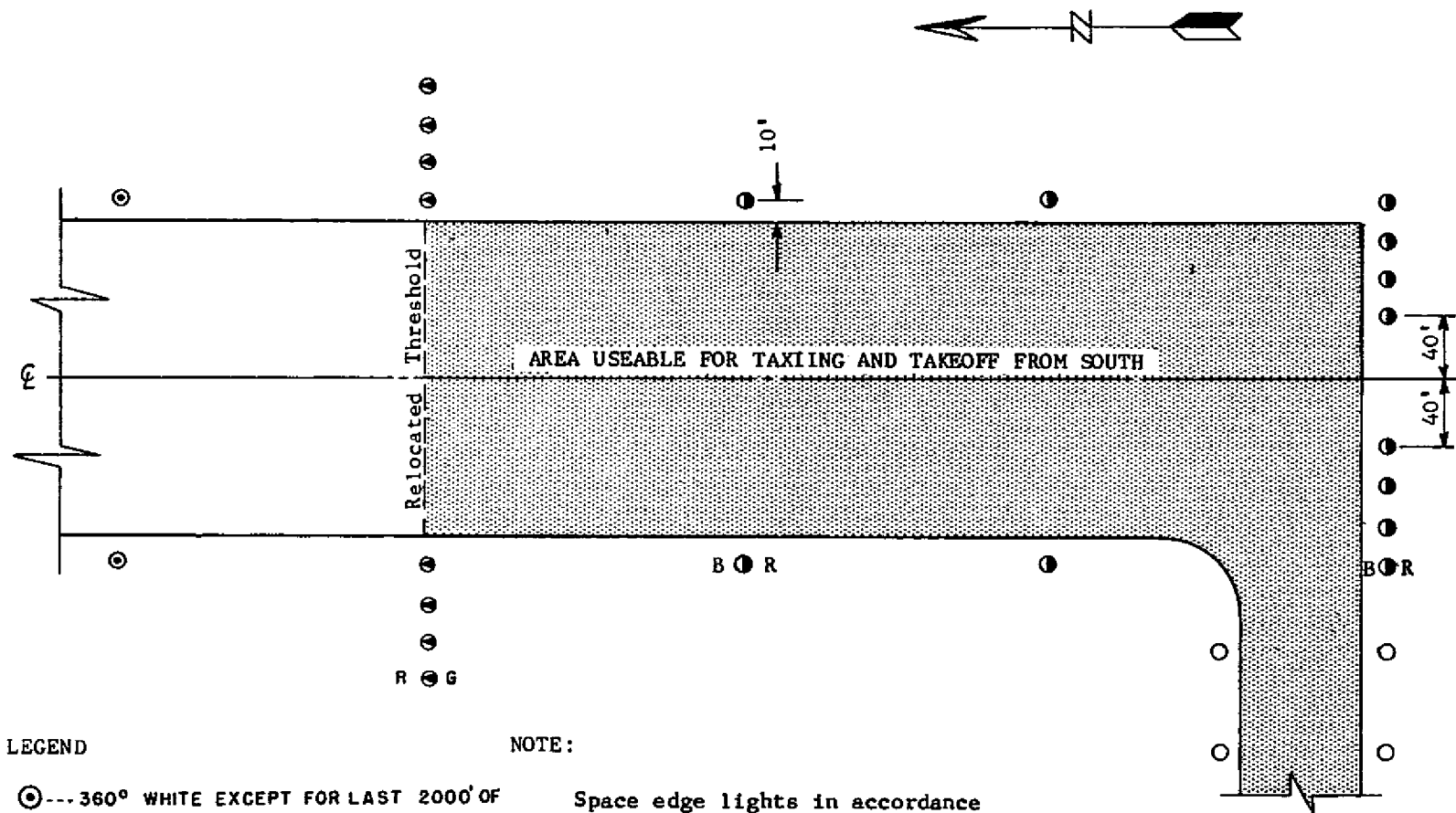
NOTE:

1. Use method No. 1 Threshold Installation Procedure for Abandoned Area where paved surface is left in place.
2. Use Method No. 2 Threshold Installation Procedure for Abandoned Area where paved surface has been removed.
3. Space edge lights in accordance with Figure 1.

LEGEND

- ⊙ --- 360° WHITE EXCEPT FOR LAST 2000' OF INSTRUMENT RUNWAY. SEE PAR. 1 A..
- ⊙ --- 180° RED, 180° GREEN.

* FIGURE 2. RELOCATED THRESHOLD--UNUSABLE AREA ABANDONED OR REMOVED *



LEGEND

- ⊙ --- 360° WHITE EXCEPT FOR LAST 2000' OF INSTRUMENT RUNWAY. SEE PAR. 1 A..
- --- 360° BLUE
- B ⊙ R -- 180° BLUE AND 180° RED
- R ⊙ G -- 180° RED AND 180° GREEN

NOTE:

Space edge lights in accordance with Figure 1 and AC 150/5340-15A.

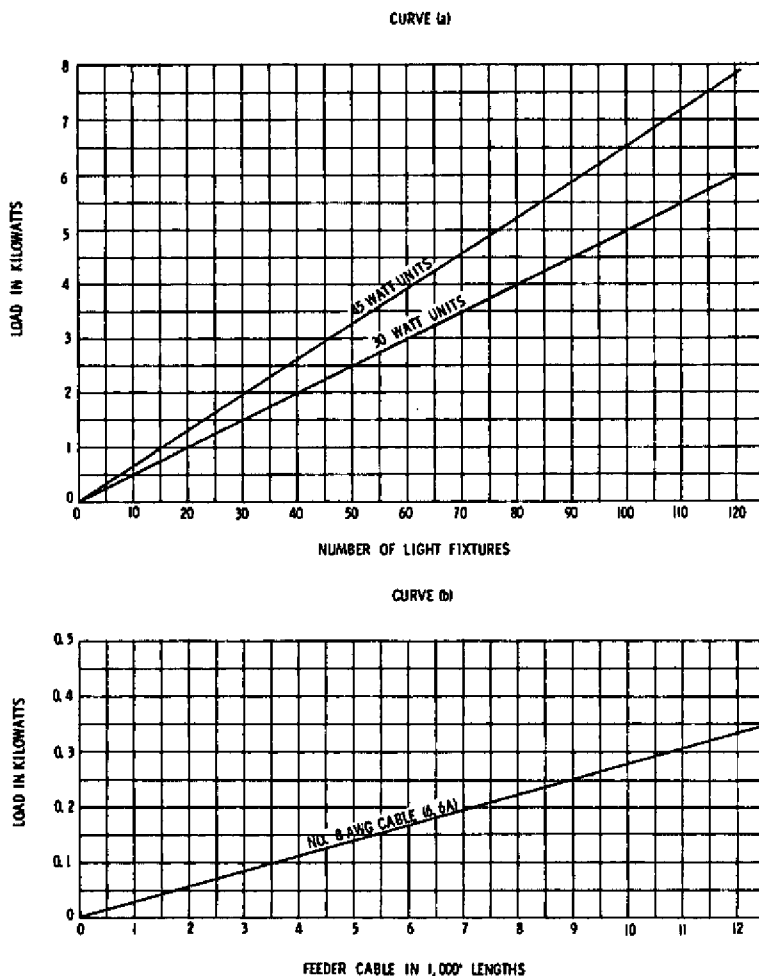
* FIGURE 3a. RELOCATED THRESHOLD--AREA USABLE FOR TAXIING AND TAKEOFF FROM SOUTH *

4. DESIGN.

a. MIRL.

*

- (1) Runway and Threshold Fixtures. The fixtures may be either base mounted or stake (angle iron) mounted; the same optical system is used for both methods. The runway edge lights use a clear lens and a split clear/yellow lens in the caution zone. The threshold lights use a split red/green lens. See Figure 5.*
 - (a) Base Mounted. Mount the fixture on an approved light base and transformer housing design for off traffic use. This method provides access to transformer connectors and primary cable connectors located in the base. Provide a concrete backfill for the base. The base mounted installation is advantageous from a maintenance standpoint and provides added protection for the equipment, however, the initial installation cost is higher than that for a stake mounted fixture described in paragraph (b) below.
 - (b) Stake Mounted. Mount the light fixtures in accordance with the equipment manufacturer's instructions. Bury the associated transformers, primary cables, and cable connectors adjacent to the stake. Select a similar location for buried components at each light to facilitate the location and maintenance of the underground system. Stakes may require concrete anchors where soil is unstable. This method of design, in comparison with base mounted fixtures, costs less to install. Since the transformers, cables, and connectors are designed for direct earth burial, the underground system should provide years of fault-free service if specific instructions are followed during the initial installation. Bases may be used at selected stations in lieu of stakes to simplify maintenance; however, the initial cost of the system will increase by the amount of the base installation.
- (2) Power Supply Equipment. Provide a 4KW (Specification L-811 or L-812) or 7½KW (Specification L-812) constant current regulator with taps for nominal input voltages of 208, 220, 230, 240, and 250. The Specification L-811 and L-812 regulators have three brightness settings that represent 100 percent, 30 percent, and 10 percent of runway light intensity for the respective current setting of 6.6 amperes, 5.5 amperes, and 4.8 amperes. The Specification L-811 regulators are direct controlled; whereas, the Specification L-812 regulators are remotely controlled. Use Figure 6 to estimate the KW size of the regulator.



NOTES:

1. Computations based on actual circuit load tests.
2. In Curve (a) figure K, W, load using total number of 45 watt or 30 watt fixtures connected in circuit.
3. Basis for computing unit loads in Curve (a):

30/45 watt transformer with 45 watt lamp	54.7 watts
Cable loss, lamp tolerance, etc.	<u>10.3 watts</u>
Total estimated load per 45 watt unit	65.0 watts
30/45 watt transformer with 30 watt lamp	40.4 watts
Cable loss, lamp tolerance, etc.	<u>9.6 watts</u>
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):
 $I^2R = (6.6A)^2 \times 0.6405 \text{ ohms/1,000'} = 27.9 \text{ watts/1,000'}$
5. Obtain total K, W, load per runway circuit by adding K, W, loads obtained from Curves (a) and (b).
6. Add 225 watts for each Simple AVASI light unit

FIGURE 6. CURVES FOR ESTIMATING KILOWATT LOADS FOR MEDIUM INTENSITY RUNWAY LIGHTING CIRCUITS

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