AC NO: [redacted]
DATE: September 24, 1976

CHANGE I

ADVISORY CIRCULAR

VISUAL APPROACH SLOPE INDICATOR (VASI) SYSTEMS

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Initiated by: AAP-550

CHANGE

AC NO: 150/5340-25 CHG 1

DATE: May 3, 1977

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: CHANGE 1 TO ADVISORY CIRCULAR 150/5340-25, VISUAL APPROACH SLOPE INDICATOR (VASI) SYSTEMS

1. PURPOSE. This change transmits page changes to Advisory Circular 150/5340-25.

2. EXPLANATION OF CHANGES. Reference 2/ of Figure 2 and paragraph 5a(1) have been rewritten to clarify optional use of SAVASI siting criteria for VASI-2 siting at utility airports. The tolerance setting of the tilt switch, Table 1, is changed. The use of asterisks denotes these changes.

3. HOW TO OBTAIN THIS CHANGE. Additional copies of Change 1 to AC 150/5340-25, Visual Approach Slope Indicator (VASI) Systems, may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D. C. 20590.

PAGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
1, 2, 11, 12, 17 and 18	9/24/76	1, 12 and 17	9/24/76
		2, 11 and 18	5/3/77

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Initiated by: AAP-550

AC NO: 150/5340-25

DATE: September 24, 1976

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: VISUAL APPROACH SLOPE INDICATOR (VASI) SYSTEMS

1. PURPOSE. This advisory circular describes standards for the design, installation, and maintenance of visual approach slope indicator (SAVASI, VASI-2, VASI-4, VASI-6) systems.

2. BACKGROUND. All references to visual approach slope indicators contained in AC 150/5340-14B, Economy Approach Lighting Aids, dated June 19, 1970, will be deleted in a forthcoming change.

3. REFERENCES. Advisory Circular (AC) 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations, updated triannually, contains the listing of all current issuances of advisory circulars and changes thereto. It explains the circular numbering system and gives instructions for ordering advisory circulars that are for sale as well as those distributed free of charge.

   a. The following free advisory circulars may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590:

      (1) Advisory Circular 00-2, Federal Register, Advisory Circular Checklist and Status of Federal Aviation Regulations.

      (2) Advisory Circular 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits.

      (3) Advisory Circular 150/5345-10, Specification for L-828 Constant Current Regulators.

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

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

(6) Advisory Circular 150/5345-28, Specification for L-851 Visual Approach Slope Indicators and Accessories.

(7) Advisory Circular 150/5345-47, Isolation Transformers for Airport Lighting Systems.

b. Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports, may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

4. HOW TO OBTAIN THIS CIRCULAR. Additional copies of this circular may be obtained, free of charge, from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

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1. INTRODUCTION. The visual approach slope indicator (VASI) system, when properly installed and oriented, will furnish the pilot visual approach slope information to provide descent guidance. The system is intended for use both day and night. This advisory circular discusses the following VASI configurations: the SAVASI and VASI-2 (2-box), VASI-4 (4-box) and VASI-6 (6-box). The configurations are shown in figure 1 and the systems layout is shown in figure 2. All light boxes are normally located on the left side of the runway (as viewed from the approach direction). However, where excessive costs, terrain, or cross runways, etc., make this impractical, they may be located on the right side of the runway. The VASI provides a definite red and white light projection along the desired descent path to the touchdown point. The light boxes are arranged in bars which are numbered. The light boxes in each bar are located on a line perpendicular to the runway centerline. The No. 1 bar is the nearest to the runway threshold with the light bar number increasing in order up the runway. Each light box projects a split beam of light, the upper segment being white and the lower red. The transition from red to white, or vice versa, occurs over a vertical angle of approximately 1/4 degree with the light in this area being pinkish in color. The system produces a well-defined corridor of light consisting of red and white beams. When on the proper glide path, the first bar appears white and the second red. If the approach is too high, both bars are seen as white while a low approach is indicated by both bars appearing red. In order to accommodate B747 or C5A aircraft, which are unable to use a standard 2-bar VASI because of their greater wheel-to-cockpit height, a third bar is added. This provides two VASI glide path zones; the upwind zone produced by bars 2 and 3 is for the use of all wide-body aircraft and the downwind zone produced by bars 1 and 2 is for the use of all other aircraft.

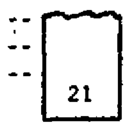
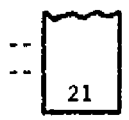
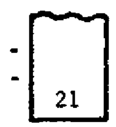
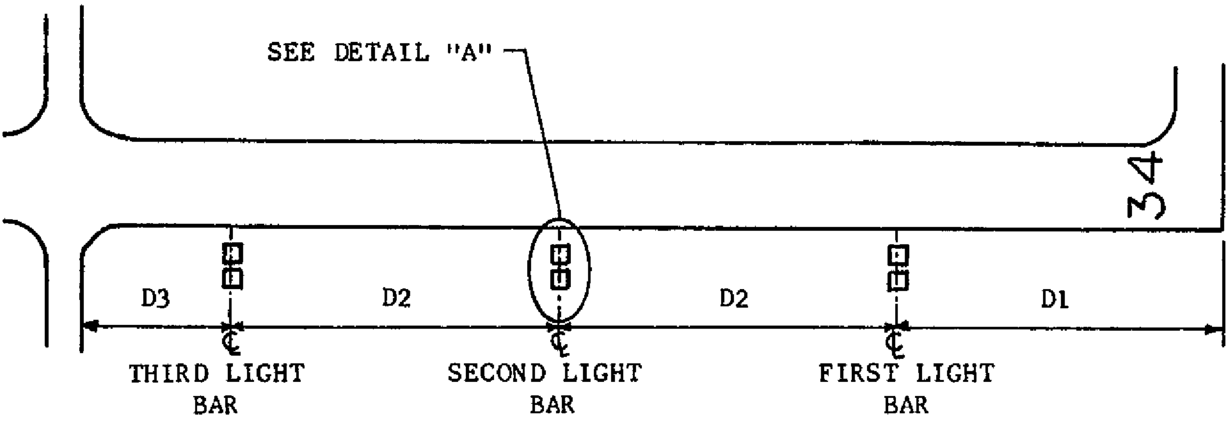
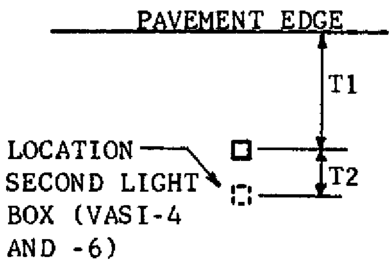
TYPE	SCHEMATIC	DAY VFR RANGE	COMMENTS
VASI-6		4 NAUTICAL MILES (7.4 KILOMETERS)	FOR RUNWAYS WITH B747 or C5A OPERATIONS. TWO VISUAL GLIDE PATHS TO SERVE ALL AIRCRAFT TYPES
VASI-4		4 NAUTICAL MILES (7.4 KILOMETERS)	NORMALLY INSTALLED ON PRIMARY RUNWAYS
VASI-2		3 NAUTICAL MILES (5.6 KILOMETERS)	NORMALLY INSTALLED ON SECONDARY AND UTILITY RUNWAYS.
SAVASI		1½ NAUTICAL MILES (2.8 KILOMETERS)	OPTION FOR VASI-2. FOR VFR BASIC UTILITY RUNWAYS ONLY.

FIGURE 1. VASI CONFIGURATIONS



ITEM	DIMENSIONS		
	PREFERRED	MINIMUM	MAXIMUM
D1	500'(150 m.)	125'(38 m.)1/	800'(240 m.)
D2	300'(90m.)2/ 700'(210 m.)	250'(75m.)2/ 500'(150 m.)	400'(120 m.)2/ 1000'(300 m.)
D3	--	50'(15 m.)	--
T1	50'(15 m.)	50'(15 m.)3/	60'(18 m.)
T2	16'(4.85 m.)	15.5'(4.7 m.)	16.5'(5.0 m.)

1/ See paragraph 3a.
* 2/ For SAVASI. May be used for siting VASI-2 on utility airports with space limitations and no plans for expansion to a VASI-4. *
3/ See paragraph 5a(1).



DETAIL "A"

NOTES

1. All light bars are located at the same distance from the runway edge.

2. The center of the optical aperture of all light boxes in a bar should be within ±1 foot (0.3 m.) of the runway crown elevation.

3. Longitudinal (D) minimum/maximum dimensions should be used only to avoid taxiways, cross runways, etc., or to achieve the desired unit height required by terrain conditions.

4. Transverse (T) minimum/maximum dimensions should be used only to avoid ditches, catch basins, manholes, etc.

FIGURE 2. VASI SYSTEMS LAYOUT

2. EXPLANATION OF TERMS.

a. Effective Visual Glide Path and Runway Reference Point. This path is the well-defined corridor of light that lies between the white indication of the first light bar and the red indication on the second light bar. Theoretically, the effective visual glide path intercepts the runway surface midway between the two light bars. This point is referred to as the runway reference point (RRP). This is illustrated in figure 3 for the SAVASI, VASI-2 and VASI-4 and in figure 4 for the downwind and upwind zones of the VASI-6. The visual glide path shall meet the following general criteria in addition to the obstacle clearance requirement of paragraph 3.

b. Threshold Crossing Height. The height that the effective visual glide path crosses above the runway centerline at the threshold is known as the threshold crossing height (TCH).

c. Aiming Angles. Aiming angles are as follows:

(1) 2-Bar VASI.

(a) Standard. No. 1 bar is set at 2.50° and No. 2 bar at 3.00° As the effective visual glide path is determined by the aiming angle of bar No. 2, the standard effective visual glide path becomes 3.00°.

(b) Variations.

1 No. 1 bar may be raised to 2.75° to avoid obstacles.

2 For a SAVASI or where a VASI-2 is installed on a utility runway, visual glide path angles greater than 3°, but not more than 4°, may be used to clear obstacles; provided the commissioned angle is specified in a NOTAM and also published in the Airman's Information Manual.

(2) 3-Bar VASI. No. 1 bar is set at 2.75°. No. 2 bar is set at 3.00°. No. 3 bar is set at 3.25°. This aiming provides two effective visual glide paths: an upwind zone of 3.25° for the wide-body aircraft and a downwind zone of 3.00° for all other aircraft.

3. DESIGN.

a. Location of First Light Bar. The first light bar should be located a minimum of 125 feet (38 m.), or 100 feet (30 m.) for SAVASI or where VASI-2 is installed on utility airports, and a maximum of 800 feet (240 m.) upwind from the threshold. The exact location of the first bar will be determined by one or more of the following limitations:

A = AIMING ANGLE, BAR #2

B = EFFECTIVE VISUAL GLIDE PATH ANGLE

C = AIMING ANGLE, BAR #1

A = B = C+½°

T = THRESHOLD CROSSING HEIGHT (TCH)

RRP = RUNWAY REFERENCE POINT

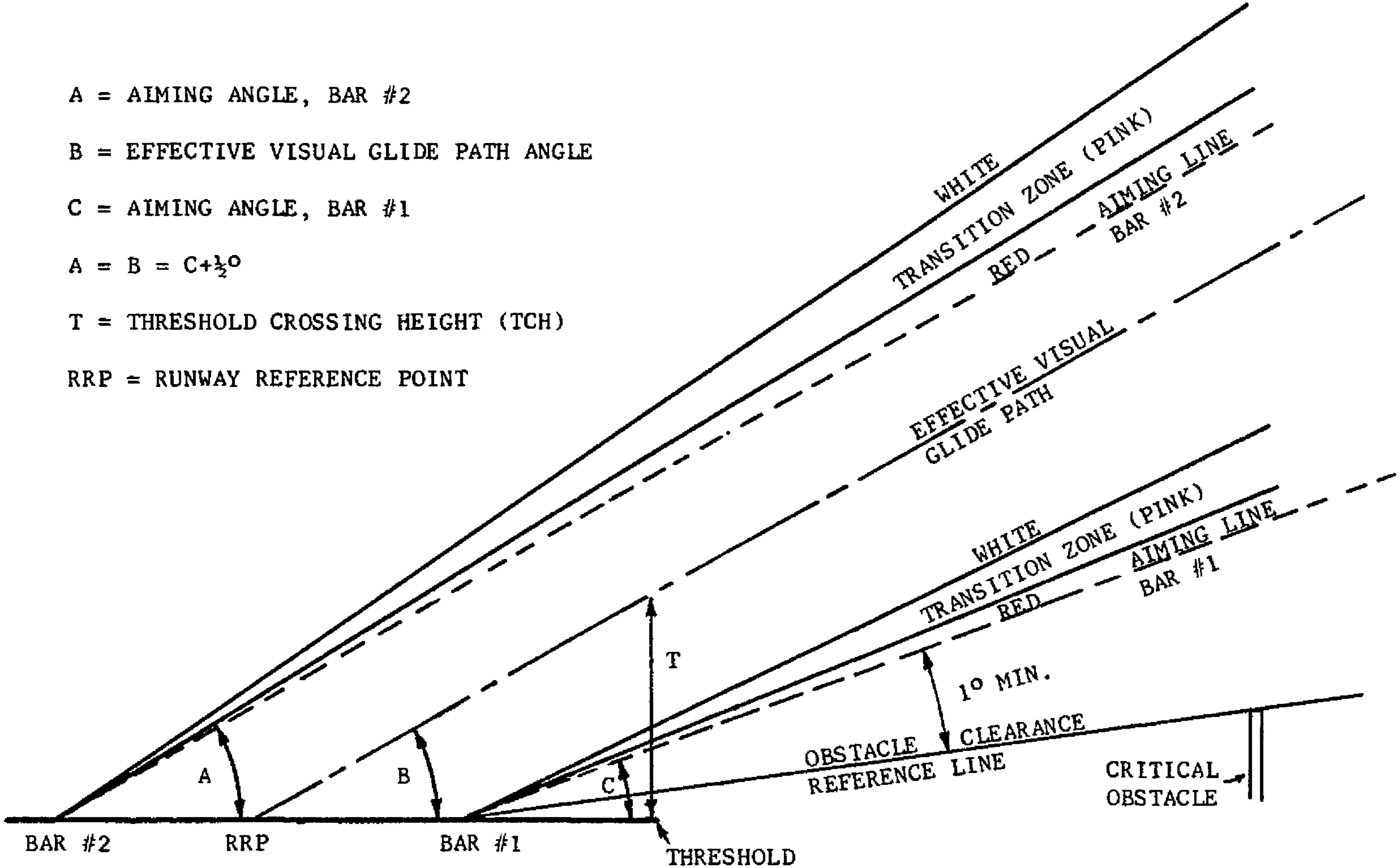


FIGURE 3. AIMING AND OBSTACLE CLEARANCE DIAGRAM FOR A 2-BAR VASI

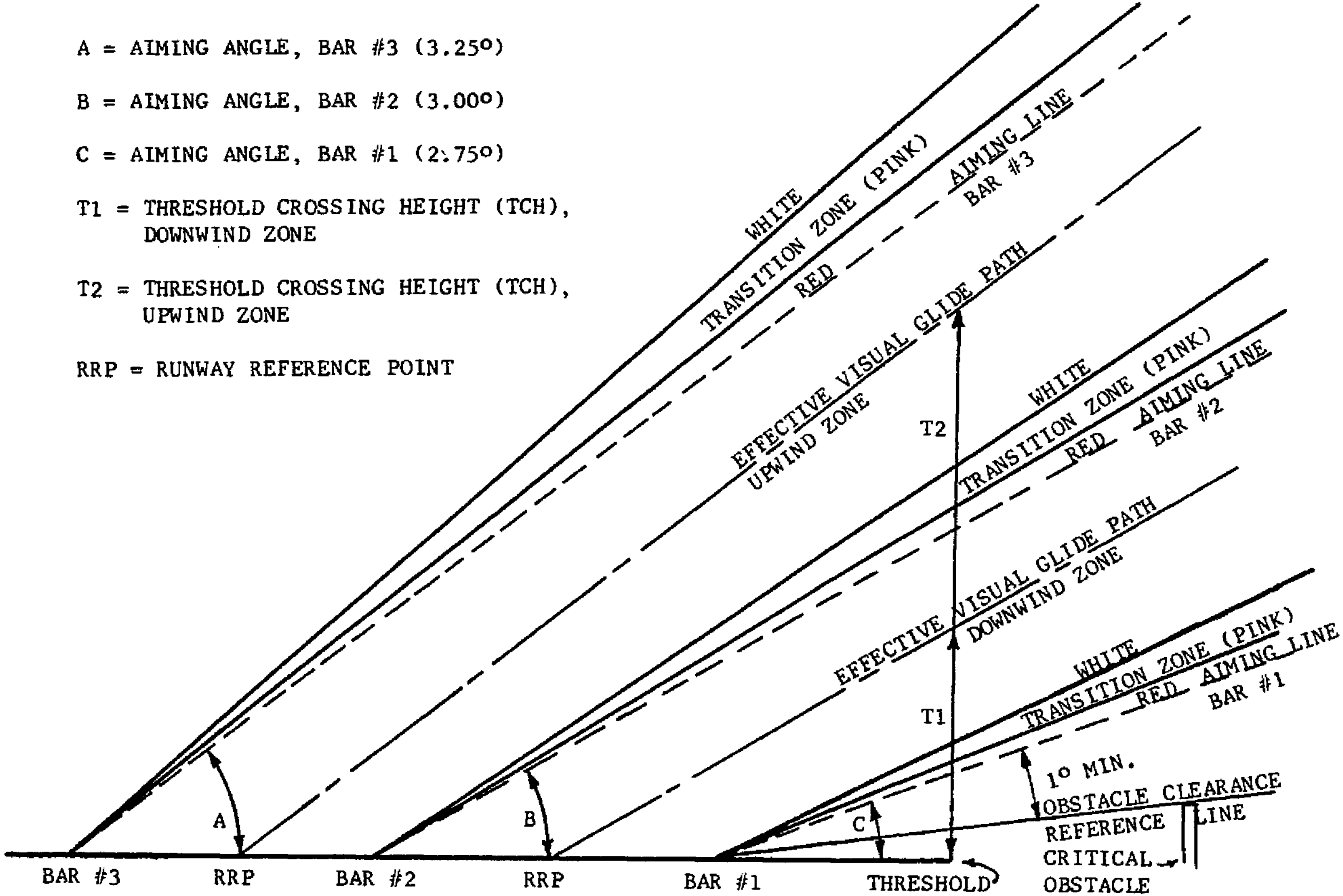


FIGURE 4. AIMING AND OBSTACLE CLEARANCE DIAGRAM FOR A 3-BAR VASI

(1) Obstacles in the Runway Visual Approach Surface. To determine the location of bar No. 1, it is necessary to identify the location and height of critical objects in the runway visual approach surface (see figure 5). Surveys should be made to identify obstacles at those locations where the necessary information is not available. With all obstacles in this area plotted on a profile map, a line should be drawn from the proposed location of bar No. 1 at an angle which will clear the highest obstacle by not less than 1°. This line will then determine the minimum aiming angle of bar No. 1. In addition, this minimum angle shall be within the glide path limitations of paragraph 2c. The effective visual glide path angle of the VASI system (which is also the aiming angle of bar No. 2) is $1/2^\circ$ greater than the aiming angle of bar No. 1 for 2-bar VASIs. To reduce the effective glide path angle, if required to meet the prescribed glide path limitations, it will be necessary to move bar No. 1 farther from the threshold and recompute the minimum aiming angle. Where this solution is impractical because of the extent or nature of the obstacle, one or a combination of the following variations may provide a satisfactory solution:

(a) The nominal separation of $1/2^\circ$ between VASI bars may be reduced to $1/4^\circ$ separation by raising the angle of the box(es) of bar No. 1.

(b) The overall lateral beam width of 18° may be reduced as much as 6° by baffling of the light boxes.

(c) The VASI boxes may be rotated off line, parallel to the runway centerline, by not more than $\pm 5^\circ$ to avoid restricted flight areas.

Where any of the above variations is used, a flight check of the VASI installation will be required to verify that obstacle clearance has been achieved and the system meets the flyability requirements.

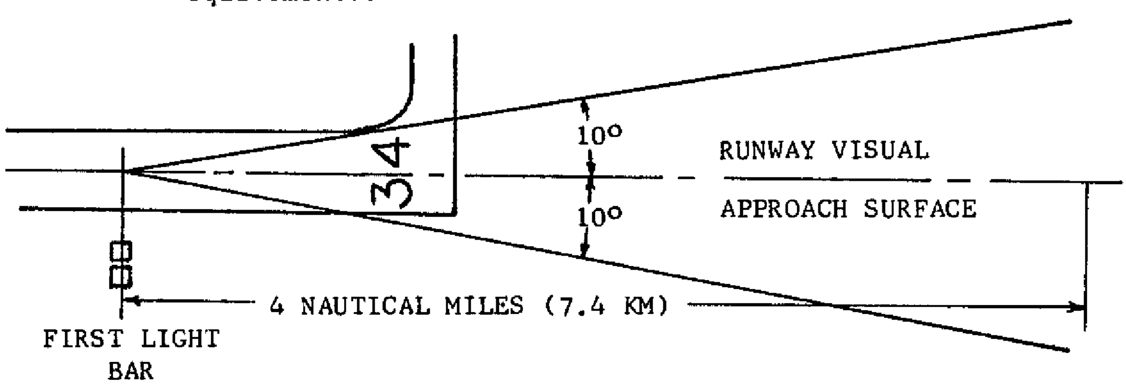


FIGURE 5. RUNWAY VISUAL APPROACH SURFACE

(2) Required Threshold Crossing Height (TCH) (See Figures 3 & 4).

(a) For a 2-bar VASI, the TCH shall be between 25 feet (7.5 m.) and 60 feet (18 m.). For SAVASI, or VASI-2 installations on utility airports, the TCH can be reduced to 20 feet (6 m.) when required by runway length limitations. For a 3-bar VASI, the TCH of the downwind zone shall be 40 feet (12 m.) and the upwind TCH normally 83 feet (25 m.).

(b) Where the distance between the pilot's eyes and the lowest portion of the aircraft in landing attitude exceeds 10 feet (3 m.), the minimum threshold crossing height of 25 feet (7.5 m.) shall be increased by an amount equal to that in excess of the 10 feet (3 m.). This distance shall be based on the most critical aircraft which will normally operate on the runway. For example, where an aircraft operating at a specific airport has a distance of 20 feet (6 m.) between the pilot's eyes and lowest portion of the aircraft, then the minimum crossing height will be 35 feet (10.5 m.). The following are pilot-eye-to-wheel distances of some of the large aircraft in landing attitude:

AIRCRAFT	DISTANCE	
	FEET	METERS
DC-8-63	23	6.9
DC-9-40	19	5.7
DC-10-40	35	10.5
L-1011	37	11.1
707/720	22	6.6

AIRCRAFT	DISTANCE	
	FEET	METERS
707-320B	23	6.9
727-100	22	6.6
727-200	23	6.9
737-200	19	5.7
747-200	45	13.5

(c) The TCH is computed as follows: Multiply the distance from the runway threshold to the RRP by the tangent of the effective visual glide path angle. To this product, add (or subtract as appropriate) the difference in elevation between the runway centerline at the threshold and the RRP. The result is the TCH.

(3) Location of the Runway Reference Point (RRP) (See Figures 3 & 4). A 3-bar VASI is not to be installed on a runway with an ILS. At locations where a 2-bar VASI is installed, the point of intersection of the effective visual glide path with the runway (RRP) shall be within plus or minus 50 feet (15 m.) of the point on the runway where the projected straight line path of the ILS glide path touches the runway centerline. The vertical aiming angle of the upwind bar shall be the same as the ILS glide path angle and the downwind bar shall be aimed $1/2^{\circ}$ lower. Obstructions in the runway visual approach surface shall be analyzed in accordance with the criteria specified in paragraph 3a(1) to insure that no conflict exists in aiming the VASI system to coincide with the ILS glide path.

(4) Site Characteristics.

(a) Where the terrain drops off rapidly near the approach threshold and severe turbulence is experienced, it would be desirable to locate the first light bar at its maximum permissible distance from the threshold in order to keep aircraft at the maximum permissible threshold crossing height.

(b) On short runways, it will be desirable to have the first light bar at its minimum permissible distance from the threshold to provide the maximum amount of runway for landings.

c. Location of the Second Light Bar. For SAVASI, or VASI-2 on utility airports, the second bar shall be located 300 feet (90 m.), plus 100 feet (30 m.) or minus 50 feet (15 m.) from the first light bar. For VASI-2, 4, or 6, the second bar shall be located 700 feet (210 m.), plus 300 feet (90 m.) or minus 200 feet (60 m.) from the first bar. These tolerances are to be used to avoid interference with cross runways, taxiways, etc., or where critical runway lengths make it desirable to have a touchdown as close to the threshold as possible, consistent with threshold crossing height and obstacle clearance requirements.

d. Location of the Third Light Bar. The third bar shall be located as shown in figure 2. Although not a requirement, the spacing between the three bars should be as nearly equal as possible.

4. EQUIPMENT AND MATERIALS. Select appropriate L-851 equipment and connect the light units in accordance with the manufacturer's instructions. Those items not covered in specification L-851 are provided by the installation contractor. The following sections of Advisory Circular 150/5370-10 shall govern installation under this paragraph:

Item L-108, Installation of Underground Cable for Airports.
Item L-109, Installation of Airport Transformer Vault and Vault Equipment.
Item L-110, Installation of Airport Underground Electrical Duct.

a. Controls. It is desirable to be able to control VASIs independently for each runway end. This allows energy conservation when the runway is inactive. Control can be provided by:

(1) Remote Controls. Provide an on-off switch as shown in figure 6 at an aircraft control tower or other remote control stations. Use this switch to control a properly sized auxiliary relay at the power source for the VASI installation.

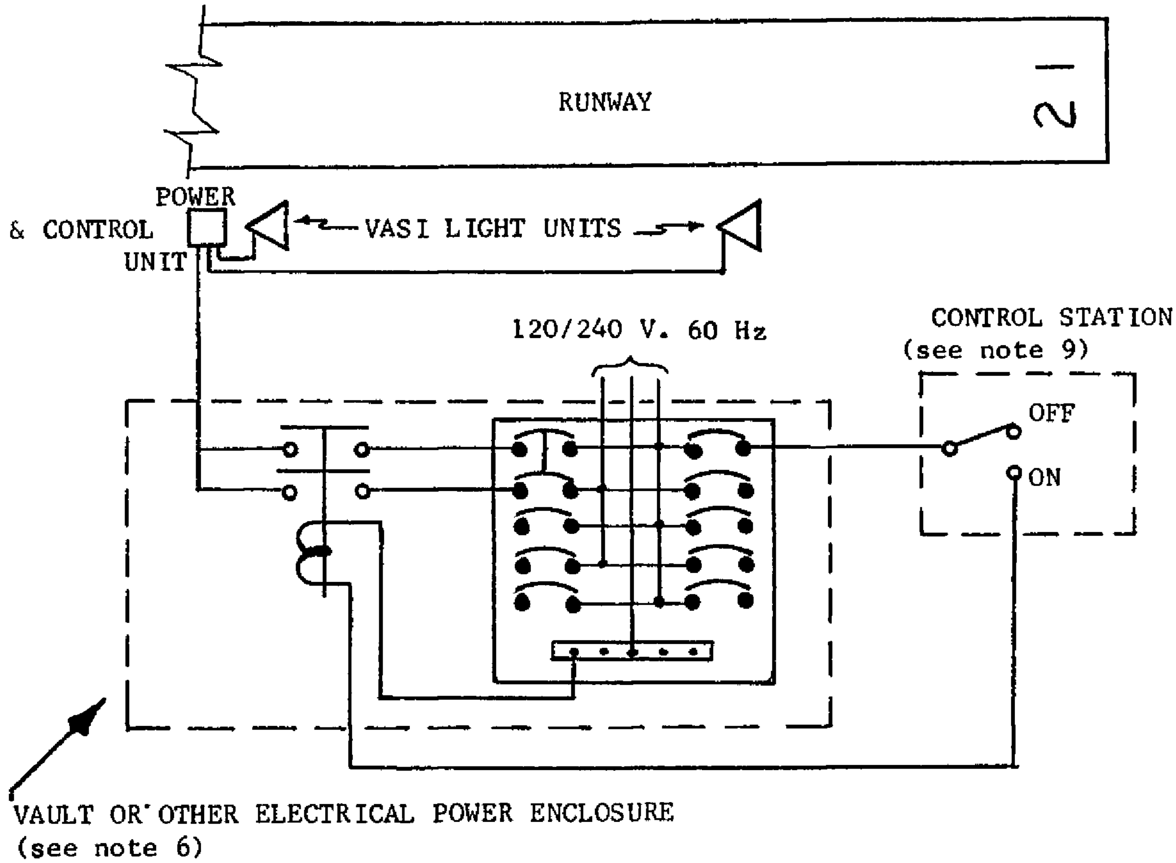
(2) Radio Controls. The L-854 receiver can provide remote control of the VASI from either an approach aircraft or a land control station.

(3) Interlock Relay. During hours of darkness, it is desirable that the VASI be on only when the runway lights are on. To insure this, an interlock relay can be installed in series with the normally open contacts of the photocell relay which are closed, by the photocell action, during hours of darkness. The normally open contacts of the interlock relay are closed only when the relay senses current in the runway circuit. This feature prevents energizing the VASI during hours of darkness unless the runway lights are on. It will not affect daytime operation of the VASI. Figure 7 shows suggested electrical connections.

b. Power Supplies and Wiring. Provide a power source capable of producing the rated voltage and current requirements of the VASI equipment being installed. This source will generally be available from the electrical vault supplying power for the other airfield lighting.

(1) Multiple Circuits. Calculate the wire size needed to deliver rated voltage and current to the VASI power and control unit(s). This wire is to meet FAA Specification L-824, insulated for at least 600 volts. Figures 6 and 8 show typical multiple circuit details.

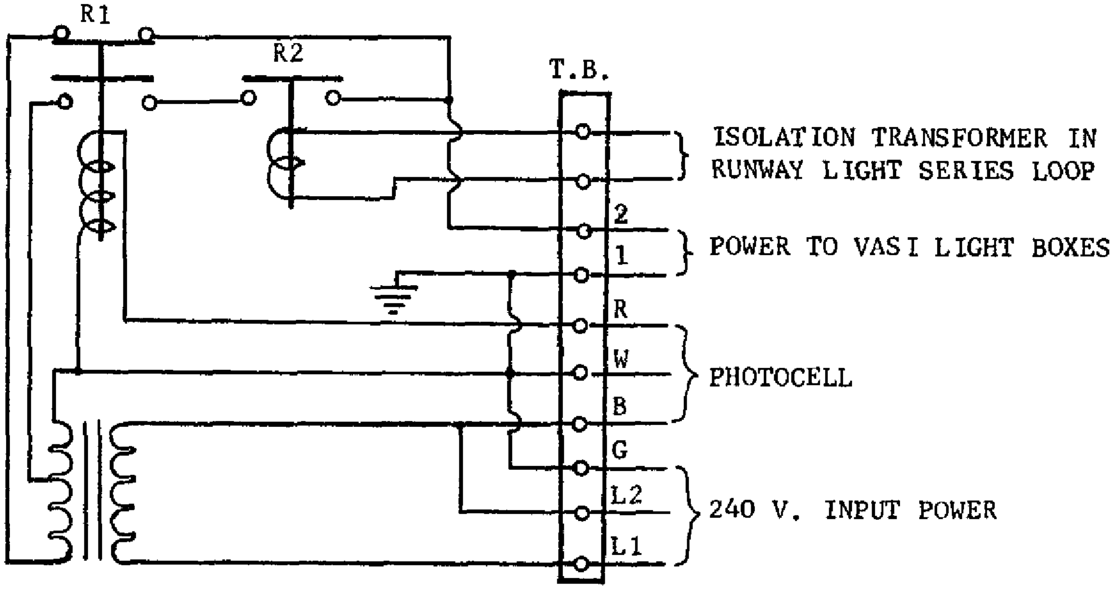
(2) Series Circuits. VASIs may be operated from L-811, 812, or 828 constant current regulators with appropriate L-830 isolation transformers to provide 6.6 amperes of current to the VASI lamps for daylight hours. Also, provide a photoelectric control for the constant current regulator to reduce the current to 4.8 amperes when the ambient lighting decreases to 30 ±5 footcandles (322 ±54 lux). The photoelectric control shall switch the regulator back to the daylight mode (6.6 amperes) when the ambient lighting reaches 55 ±5 footcandles (592 ±54 lux). The photoelectric control shall have a time delay of between 10 to 30 seconds to prevent false switching due to light from vehicles, lightning, or intermittent cloud conditions. Figure 9 shows typical series circuits for VASI 2, VASI-4, and VASI-6 using a constant current regulator.



NOTES

1. The installation should conform to the applicable sections of the National Electrical Code and local codes.
2. Lightning arresters for power and control lines should be installed as required.
3. Fuses and circuit breakers should be in accordance with equipment ratings.
4. Ground each unit of the VASI system.
5. Local control of the VASI is available if required for construction.
6. No enclosure is required if the equipment shown in the housing is designed for outdoor service.
7. The light units and power and control unit are in accordance with Specification L-851.
8. Calculate wire size to accommodate no more than the allowable voltage drop between power source and VASI equipment. Use of a step-up transformer may be desirable for economic reasons.
9. The control station may be a remote controlled switch in the airport control tower or other control station or from an L-854 radio controller.

FIGURE 6. TYPICAL MULTIPLE WIRING OF A VASI SYSTEM



R1 - PHOTOCELL RELAY (existing)
R2 - INTERLOCK RELAY (to be installed)
T.B. - TERMINAL BOARD (existing)

FIGURE 7. VASI INTERLOCK WITH RUNWAY LIGHTS.

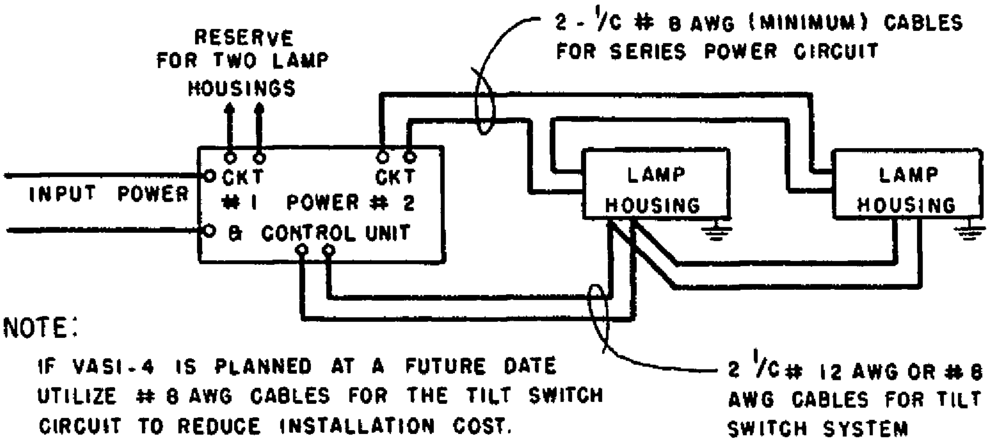
5. INSTALLATION.

a. Light Boxes.

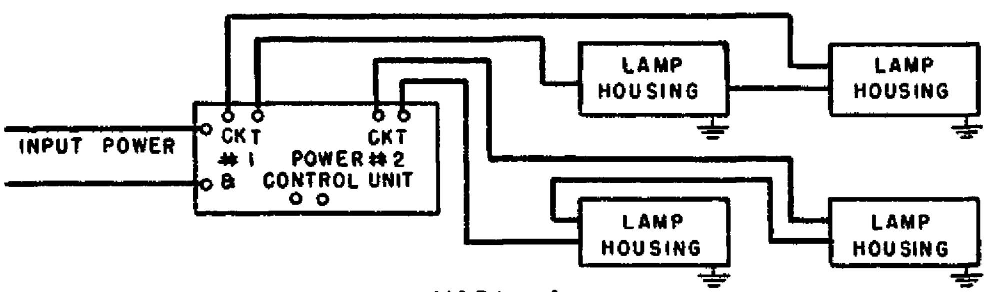
(1) The centerline of the inboard light box in each bar shall be located 50 feet (15 m.) from the runway edge. In order to avoid ditches, catch basins, manholes, etc., this dimension may be increased up to 60 feet (18 m.) for VASI or decreased to 30 feet (9 m.) for SAVASI. The reduced dimension may also be used for VASI-2 installations on utility airports with site limitations and no plans for an extension of the VASI-2 to a VASI-4.

(2) The centerline spacing between light boxes of a 2-box bar shall be 16 ±0.5 feet (4.8 ±0.15 m.).

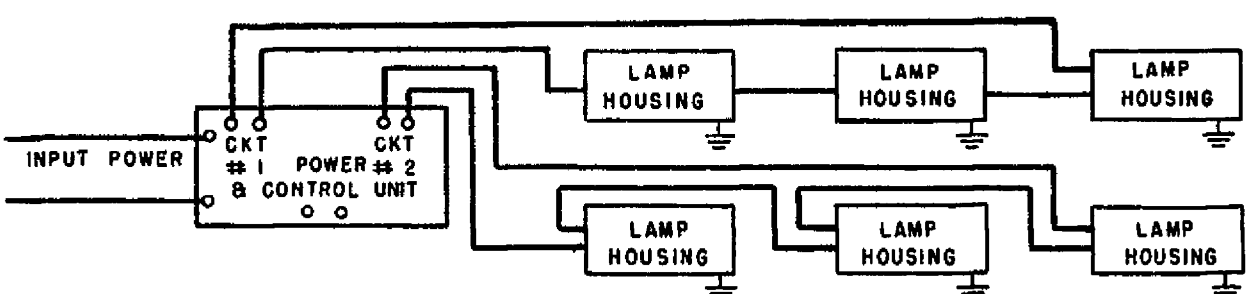
(3) The light beam apertures of all light boxes constituting a bar shall be in a horizontal plane within a tolerance of ±1 inch



SAVASI OR VASI-2



VASI - 4



VASI-6

FIGURE 8. TYPICAL CONNECTIONS OF VASI EQUIPMENT TO POWER AND CONTROL UNITS.

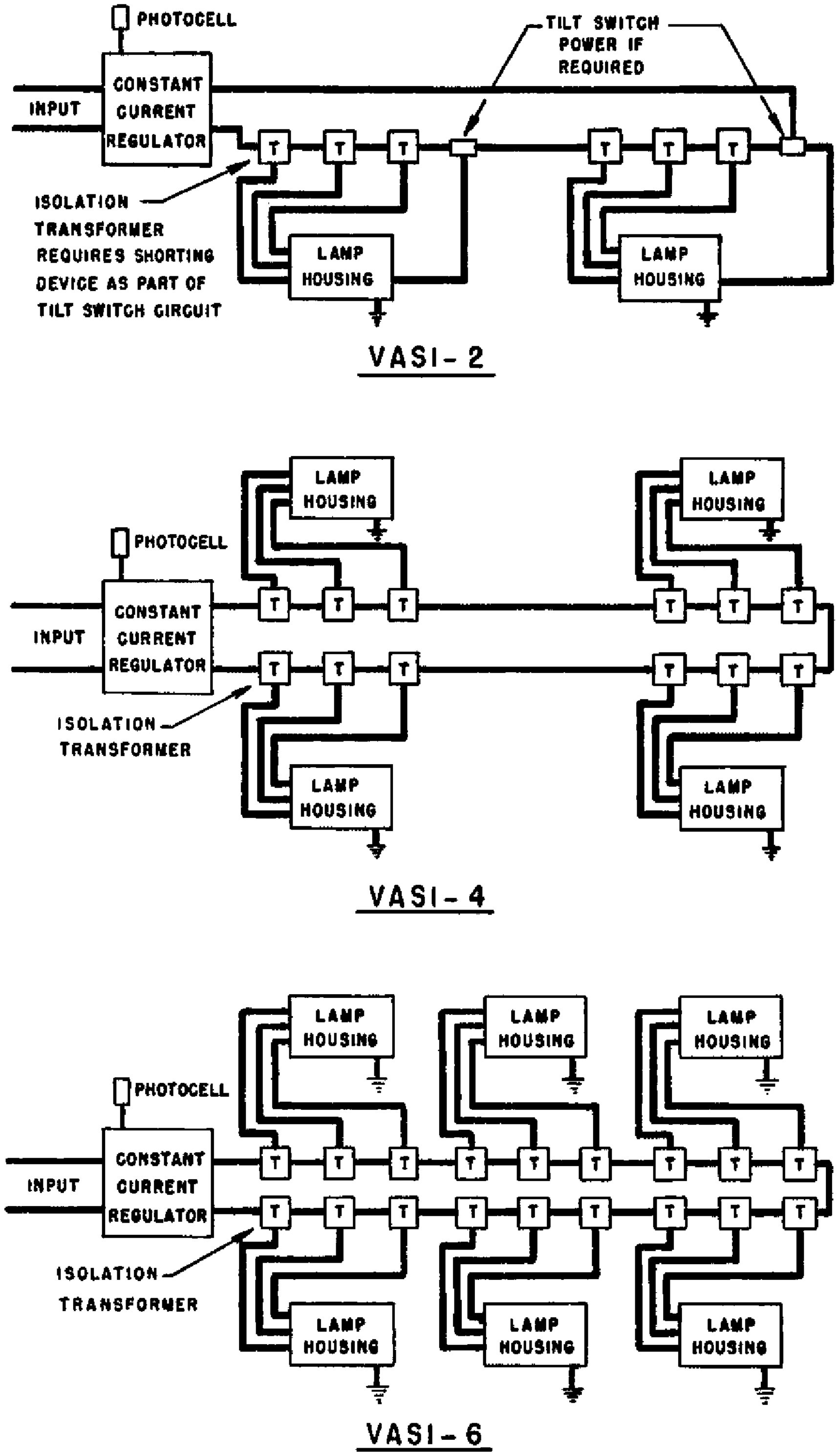


FIGURE 9. TYPICAL CONNECTIONS OF VASI EQUIPMENT TO CONSTANT CURRENT REGULATORS.

(2.5 cm.). This plane will normally be within ±1 foot (0.3 m.) of the runway crown elevation. This tolerance is waived for snow conditions.

(4) At locations where snowfall is likely to obscure the light aperture, the light boxes may be installed up to a maximum height of 6 feet (1.8 m.) above ground level. If this is done, consideration should be given to locating (within specified tolerances) the light boxes farther from the runway edge to insure adequate clearance for the largest type of aircraft expected to use the runway. Since raising the light boxes also raises the effective visual glide path, the first and second light bars should be relocated downwind a distance sufficient to compensate for this. The distance the bars shall be moved is determined from the following formula:

$$d = \frac{h}{\tan \theta}$$ where

d = distance in feet (meters) both bars should be moved toward the threshold

θ = visual glide path angle

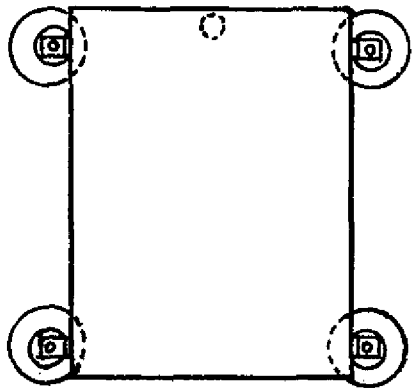
h = the difference between the average elevation of the second and first bars from the elevation of the RRP

(5) Each light box shall be aligned outward into the approach zone on a line parallel to the runway centerline within a tolerance of plus or minus 1/2°.

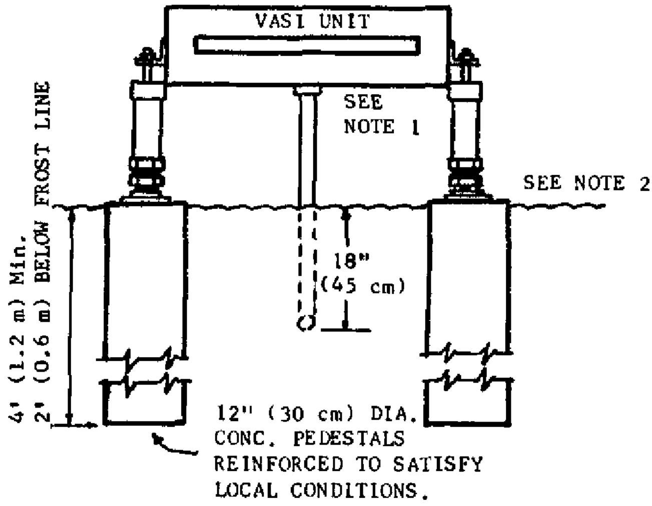
(6) No light box may be located closer than 50 feet (15 m.) to the edge of a cross runway, taxiway, or warmup apron.

(7) Foundations for mounting light boxes are to be designed to prevent frost heave or other displacement. The foundation or surface stabilization should extend at least 1 foot (0.3 m.) beyond light boxes to minimize damage from mowers. See figure 10 or the manufacturer's instruction book for suggested foundations. All light boxes shall be frangibly mounted to the foundation.

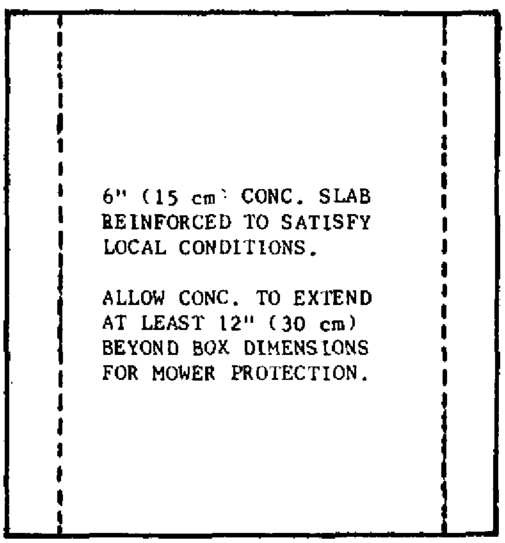
(8) Since the effectiveness of the VASI system is dependent upon seeing a definite red and/or white signal from the light units only, care should be taken to assure that no other lights are located close enough to the system to confuse the pilot.



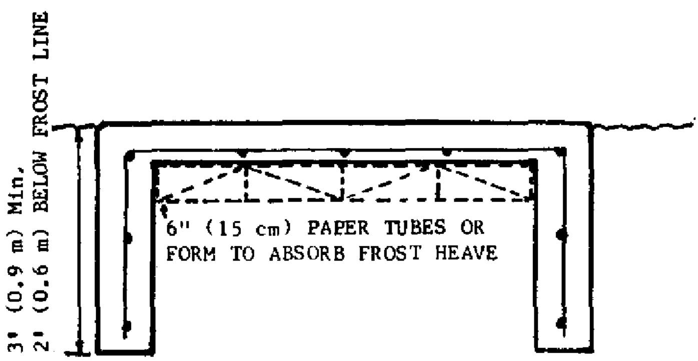
PLAN VIEW



FRONT ELEVATION



ALTERNATE FOUNDATION



NOTES

1. DO NOT MAKE A RIGID CONNECTION WITH THE VASI LIGHT BOX. MOVEMENT OF BOX REQUIRED IN AIMING.
2. PROVIDE FRANGIBLE MOUNTS FOR ALL SUPPORTING LEGS.
3. GROUND ALL POWER ASSEMBLIES AND VASI BOXES.

FIGURE 10. TYPICAL INSTALLATION DETAILS OF A VASI LIGHT UNIT.

b. Aiming Light Bars. In a 2-bar system, the second bar is aimed at the desired glide path angle and the first bar is normally aimed 1/2° lower. A separation of 1/4° can be used for obstacle clearance purposes. The vertical aiming of all light boxes shall be initially set within plus or minus 2 minutes of the established aiming angles. Figure 3 illustrates the effective visual glide angle and threshold crossing height. For 3-bar VASI installations, the aiming angles of the light bars have been fixed at 2.75° for the first bar, 3° for the second bar, and 3.25° for the third bar. Figure 4 illustrates the effective visual glide path relationships for a typical 3-bar VASI installation. After aiming has been completed, it is recommended that the aiming angle used be stenciled on each light box.

c. Power and Control Unit. The power and control unit shall be located so that it will not form an obstruction or hazard to aircraft. If it is installed in a safety area of an airport operations surface, it must be installed on frangible supports. It generally is installed adjacent to a lamp housing. In this case, the mounted height of the unit should not exceed 3 feet (0.9 m.) nor be closer to the full strength pavement edge than as described in paragraph 5a(1). Some lamp housings may have provisions for mounting the power and control unit on them. If the power and control unit is heavy, due to transformers, it is recommended that it be located outside the runway or taxiway safety area.

6. INSPECTION.

a. Light Box. Inspect each light box to determine that it has been installed at the proper location, height, orientation and aiming.

b. Wiring and Components. Check all wiring and electrical components (fuses, circuits breakers, transformers, switches, etc.) to determine that ratings are correct and the components are installed in accordance with national and local electrical code requirements.

c. Lamps. Check the voltage at the power and control unit to determine if the supply voltage is within the manufacturer's specified tolerance. If a voltage in excess of rated voltage is impressed, the life of the lamps will be reduced. If voltage is too low, relays and other components may fail to function properly. Check the current level of the lamps in daylight and darkness modes with the ammeter in the power and control unit. Current readings for the daylight mode should be 6.4 to 6.6 amperes and 4.5 to 4.8 amperes for the darkness mode. A setting above 6.6 amperes, for the daylight mode, will considerably shorten lamp life.

d. Securing Hardware. Check all nuts, bolts, and other hardware to determine if the components are secure, and of correct size, type, and finish.

e. Installation. Check the system installation to determine conformance with environmental requirements. Check equipment to insure it meets project specification requirements. Check all equipment to determine that it has been assembled and placed in accordance with the manufacturer's instructions.

7. TESTS.

a. Operational. Operate each system not less than 1/2 hour. In addition, operate each control not less than 10 times.

b. Cables. Test the circuit cables in accordance with the applicable sections of AC 150/5370-10, item L-108, except that a 10 megohm insulation resistance to ground test requirement is substituted for 600-volt cable.

8. MAINTENANCE, STANDARDS AND TOLERANCES. Establish a preventive maintenance program for VASI installations at airports to insure proper equipment operation and reliable service. The preventive maintenance program should be of such excellence as to assure that the standards and tolerances of Table 1 are not violated. Paragraphs 8a. through 8g. present a maintenance guide that, if followed, should provide this assurance. An improperly maintained system may cause equipment failure, a false signal, or rapid deterioration of the systems effectiveness.

TABLE 1 STANDARDS AND TOLERANCES

PARAMETER	TOLERANCE/LIMIT	
	INITIAL/STANDARD	OPERATING
1. Light box lamps.	All on.	A minimum of two lights burning/box.
2. SAVASI and VASI-2 angular elevations.		
a. Bar No. 1	½ degree ±2 minutes below established glide path.	±6 minutes.
b. Bar No. 2	Glide path angle ±2 minutes.	±6 minutes.
3. 3-Bar VASI angular elevations.		
a. Bar No. 1	2.75 degrees ±2 minutes	±6 minutes.
b. Bar No. 2	3.00 degrees ±2 minutes	±6 minutes.
c. Bar No. 3	3.25 degrees ±2 minutes	±6 minutes.
4. Light box horizontal alignment.	Parallel to runway centerline ±½ degree	Same as initial.
5. Light bar boxes.	2 minutes of each other.	Within 2 minutes of each other.
* 6. Tilt switch.	Level ±2 minutes.	±6 minutes. *
7. Photoelectric.	High, 55 ±5 ft. cd. Low, 30 ±5 ft. cd.	Same as initial. Same as initial.
8. 2-Step brightness lamp intensity.	High, 100% +0%, -5% Low, 10% +5%, -0%	Same as initial. Same as initial.
9. Obstructions.	No obstructions.	No obstructions.

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a. Daily Checks. Make daily checks of lamps and the aiming of the initial VASI installation to insure stabilization of the system. After stabilization is assured, the aiming of the light units should be checked weekly. The aiming device furnished by the equipment manufacturer or a transit can be used for these checks. Keep a record of all angular settings made to the VASI system together with dates such settings were made. Check all control equipment including tilt switches on SAVASI or VASI-2 for proper operation. Malfunction of the tilt switch circuit could result in an unsafe condition if one of the lamp boxes gets misaligned.

b. Weekly Checks. Make inspections of mechanical parts for cleanliness and structural defects such as chipping, cracking, bending, or jet blast damage.

c. Monthly Checks. Make voltage and/or current checks to determine if they are within design limits.

d. Annual Checks. Check electrical parts for cracking, corrosion, or shorting. Replace parts having such defects.

e. Unscheduled Checks. Remove growth in the vicinity of the equipment that might interfere with proper operation of the lighting systems. The use of a herbicide around the light boxes could reduce the possibility of accidental mower strikes. If the light units are accidentally or purposely removed from the mounting legs, the aiming of the reinstalled systems should be checked. Make additional periodic inspections and checks recommended by the equipment manufacturer.

f. Calibration Bar Checks. The calibration bar that accompanies the aiming bar is a precision instrument, factory calibrated, with a laboratory standard and should be handled and stored with care to retain its accuracy. With careful handling, it is unlikely that the instrument will be out of adjustment; however, the device can be checked for accuracy by method specified by the manufacturer.

g. Lamp Life. Tests indicate that prefocused, quartz-iodine lamps will operate satisfactorily for approximately 2,000 hours with approximately 16 percent having blackened with filaments still burning. On the basis of these tests, a group replacement of all lamps at the end of an equivalent 2,000 hours burning at top brightness is recommended. Good lamps removed at this time can be used for interim replacements.

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