

**DEPARTMENT OF TRANSPORTATION**  
**Federal Aviation Administration**  
**VFR PILOT EXAM-O-GRAM® NO. 40**

**VISUAL APPROACH SLOPE INDICATOR (VASI)**

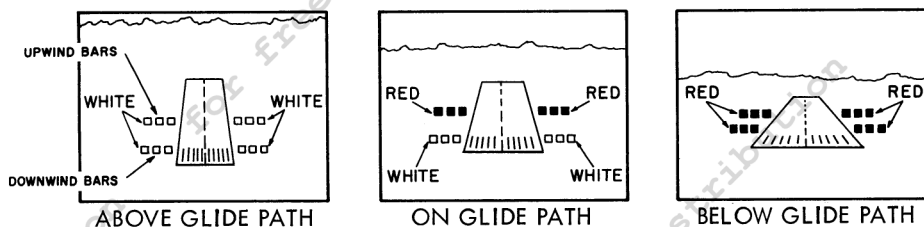


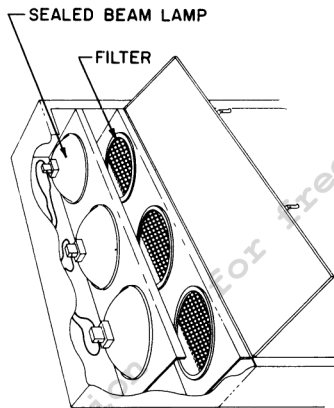
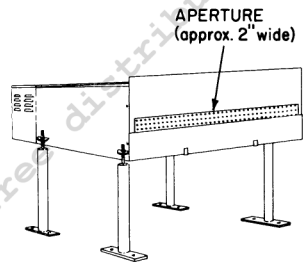
Within the National Airspace System, there are many airports equipped with the standard Visual Approach Slope Indicators, and some are equipped with Abbreviated Visual Approach Slopes. The abbreviated systems contain fewer light units which may be installed on one side of the runway only. It is apparent that misconceptions and a lack of knowledge concerning this aid exist among the general aviation public. To assist those who are not familiar with VASI, particularly those taking FAA written tests, this Exam-O-Gram briefly explains the system, and answers questions commonly asked regarding the purpose, availability, and use of the device.

**SYSTEM DESCRIPTION.** The Visual Approach Slope Indicator (VASI) is a ground device which uses lights to define a predetermined visual glide path during the approach to a runway. As soon as the VASI lights are visible on final approach--day or night--a pilot receives the same information by visual reference that the glide slope unit of the Instrument Landing System (ILS) provides electronically. Once the principles and color code of the lighting system are understood, flying the VASI is as simple as looking out through the windshield and establishing and maintaining the proper rate of descent to stay on the glide slope.

This facility emits a visual light path within the final approach zone, at a fixed plane inclined from a minimum of  $2\frac{1}{2}^\circ$  to a maximum of  $4^\circ$  from horizontal, which gives the pilot visual descent guidance during an approach to landing. The beam width is 15 degrees on each side of the extended runway centerline, but actual runway alignment is not provided by VASI. Course guidance to assure runway alignment should be obtained by reference to the runway lights, the runway itself, or by other approach aids.

Standard installation of the system requires twelve light-source boxes arranged in two split bars of light that straddle the runway. A set of 3 light units (boxes) is placed on each side of the runway approximately 600 feet from the threshold, and a second set of 3 is placed on each side at approximately the 1,300-foot point from the threshold. These light unit arrays are called the "downwind" and "upwind" light bars, respectively. The visual approach slope reference point is located midway between the upwind and downwind bars.





VASI LIGHT UNIT

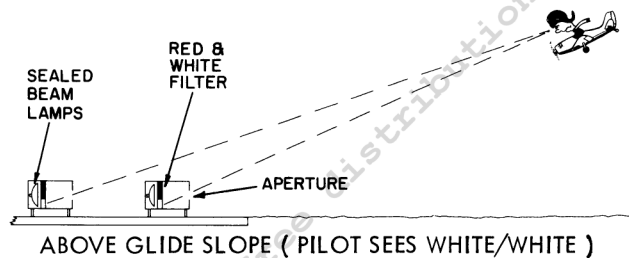
**LIGHT UNITS.** Each light unit consists of a metal box 4.5 feet square and about 1 foot thick, housing three high intensity sealed beam lamps. Immediately in front of the lamps is a color filter assembly, the upper two-thirds of which is red and the lower portion is clear. Across the front of the box at the focal point of the lamps is a 2-inch aperture that extends across the width of the box. The "lens" effect, thus achieved, causes the light to appear white when viewed from a high angle, red when viewed from a low angle, and pink when viewed from the horizontal center of the aperture. The light intensity of each light unit is approximately 40,000 candlepower in the white light zone.

**PRINCIPLE.** The basic principle of VASI is that of color differential between red and white. The VASI provides obstruction clearance in the final approach area only. It is especially effective during approaches over water or featureless terrain where other sources of visual reference are lacking or misleading.

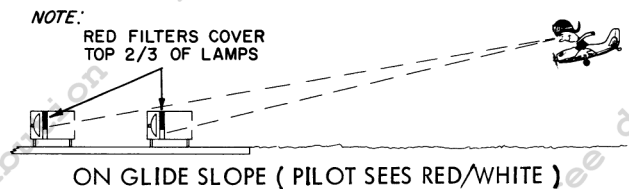


**HOW ARE THE VASI APPROACH LIGHTS USED?** For VFR conditions, proceed inbound maintaining normal traffic pattern altitude. When the downwind (near) bars transition from red through pink to white, commence descent. When on the proper approach path, the pilot is, in effect, overshooting the downwind bar light beam, and undershooting the upwind bar light beam. Thus, he sees the downwind bars as white and the upwind bars as red. When below the glide path, both bars are red; when high, both bars are white.

Departure from the glide path is indicated to the pilot by a transition in color of one of the light bars. If the departure is to the high side, the upwind bars will change from red through pink to white, leaving a completely white display. If the departure is to the low side, the downwind bar will change from white through pink to red, warning of a descent below the approach slope--by a completely red array of lights.



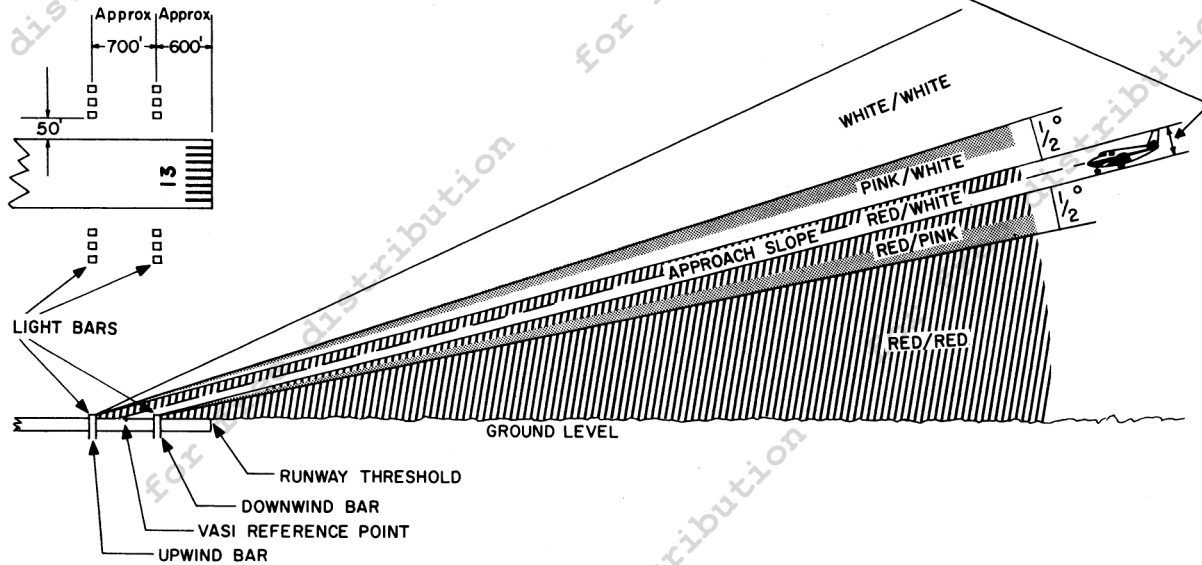
**NOTE:** Some deterioration of system guidance may occur as the pilot approaches the runway threshold due to the spread of light sources and narrowing of individual colors. However, the VASI will bring the pilot safely through a "gate" at the threshold where he may accomplish a normal flareout and landing. Since deterioration of system guidance occurs close in, the VASI is an approach aid rather than a landing aid.



**WHAT ARE THE USABLE DISTANCES OF VASI?** During daylight hours the VASI lights normally can be seen at distances of approximately 4 to 5 nautical miles. With bright sunlight or snow conditions the range is decreased. During the hours of darkness the lights may be seen at greater distances.

**CAN THE LIGHT INTENSITY OF VASI BE ADJUSTED?** Yes, the standard VASI system includes a light intensity control switch in the control tower. This remote control may be a two position "HIGH-LOW" switch or a three position "LOW-MEDIUM-HIGH" selector. If a pilot making a night VASI approach desired to have brightness of the lights turned down, he can request the controller in the tower to do so.

Glide path area approximately 97' in width at 4 nautical miles.



TYPICAL VASI COLOR INDICATION PROFILE

WHAT ARE SOME OF THE FACTORS THAT AFFECT A PILOT'S COLOR INTERPRETATION? Such factors as snow, dust, precipitation, and color of background terrain affect the pilot's color interpretation of the VASI. Atmospheric conditions may distort the color the pilot is actually seeing or preclude the determination of a well-defined glide path or transition area. However, there is no distortion in the Red/Red area. When all lights are solid red, the aircraft is definitely below the glide slope.

HOW DOES A PILOT DETERMINE IF AN AIRPORT IS EQUIPPED WITH VASI? By referring to the Airman's Information Manual (AIM) Airport/Facility Directory listing for that airport. Note in the excerpt to the right that the VASI is on Runway 29 only. There is no VASI information listed on WAC or Sectional Charts, however, it does appear on the Instrument Approach Procedure Charts.

PORTLAND MUNI IFR 2W FSS: PORTLAND on Fld  
 66 H50/11-29(2) (S-94, T-116, TT-) BL 5, 6, 8A, 9, 10 S5 F5,  
 JPI U2 VASI: Runwy 29 RVV: Runwy 11  
 Remarks: U.S. Customs Indg rgtis arpt. ILS apch zone  
 runwy 11 has unlightd trees protruding above 7:1  
 mum penetration of 27' lctd at the end  
 rgt cntrline.  
 Tower 120.9 122.5R 109.9 Gnd Con 121.9  
 App Con 120.9  
 ILS 109.9 I-PWM Apch Brg 12° BC unusable LOM: 394/PW

WHEN ARE THE VASI LIGHTS IN OPERATION? The VASI shall normally be operated, day or night, when the runway it serves is the landing runway -- or -- when requested by the pilot.

ARE THERE ANY REGULATIONS THAT DEAL WITH VASI? Yes, FAR 91.87 states in part: "(d) Minimum altitudes. When operating to an airport with an operating control tower, each pilot of -- . . . (3) an airplane approaching to land on a runway served by a visual approach slope indicator, shall maintain an altitude at or above the glide slope until a lower altitude is necessary for a safe landing." (NOTE: Regulations permit normal bracketing maneuvers above or below the glide slope that are conducted for the purpose of remaining on the glide slope.)

VASI provides unquestionable obstruction clearance in the approach area which is very comforting during night landings at strange airports. It reduces the chance of overshooting or undershooting, and it aids in making a landing in the first portion of the runway. VASI is also an effective noise abatement procedure where large airplanes and turbine-powered airplanes are concerned.

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