

aerodynamically compensated pitot-static probe mounted on the nose of the aircraft, refer to Figure 2-36. This source drives the standby barometric altimeter, standby Mach/airspeed indicator, standby vertical speed indicator, SADS, and other miscellaneous equipment. This information is then provided by the SADS to the DEU. The DEU will in turn use the information for the displays and provide it to the ADR via the mux bus.

**2.20.1.1 PITOT HEAT Switch.** The PITOT HEAT switch is a two position toggle switch located on right side of the main instrument panel.

HEAT	Probe heater is on. 28VDC Essential Services Bus power is provided to heat the probe.
OFF	Probe heat is off.

**2.20.2 Standby Barometric Altimeter.** The standby barometric altimeter is a counter drum-pointer type. The counter drum indicates altitude in thousands of feet from 00 to 99. The long pointer indicates altitude in 50 foot increments with one full revolution each 1,000 feet. A knob and window permit setting the altimeter to the desired barometric pressure setting. The barometric setting set on the front cockpit standby barometric altimeter is sent to the DEU. The pressure setting is displayed on the MANT display, see Figure 2-52. The standby altimeter operates directly off the static pressure; however, the internal vibrator is powered by the 28 VDC generator bus.

**2.20.3 Standby Airspeed Indicator.** The standby airspeed indicator displays airspeed from 60 to 850 knots indicated airspeed. It operates directly off the pitot/static system.

**2.20.4 Standby Vertical Speed Indicator.** The AVU-29/A vertical speed indicator senses rates of change in the static atmospheric pressure to give a visual presentation of ascent or descent from 0 to 6,000 feet per minute. A zero adjustment screw is accessible on the lower left corner of the instrument case.

**2.20.5 Standby Attitude Indicator.** The standby attitude indicator is a self-contained electrically driven gyro-horizon type instrument. The gyro is powered by the 28VDC Essential Services Bus. An OFF flag appears whenever power is lost or the unit is caged. The gyro cages to 0 degrees pitch and roll regardless of aircraft attitude. Power should be applied for at least 1 minute before caging. The indicator displays roll through 360 degrees. The pitch display is limited by mechanical stops at approximately 92 degree climb and 78 degree dive. The caging knob on the lower right hand corner, besides being pulled for caging, is used to adjust the pitch of the miniature aircraft. A pitch-trim scale measures displacement of the miniature aircraft. Pulling the caging knob and rotating fully clockwise to the detent locks the inner gimbal of the gyro. This position is for storage and transport, and should never be used during flight. A minimum of 9 minutes of reliable attitude information (error less than 6 degree) is available after power loss, even though the OFF flag is in view.

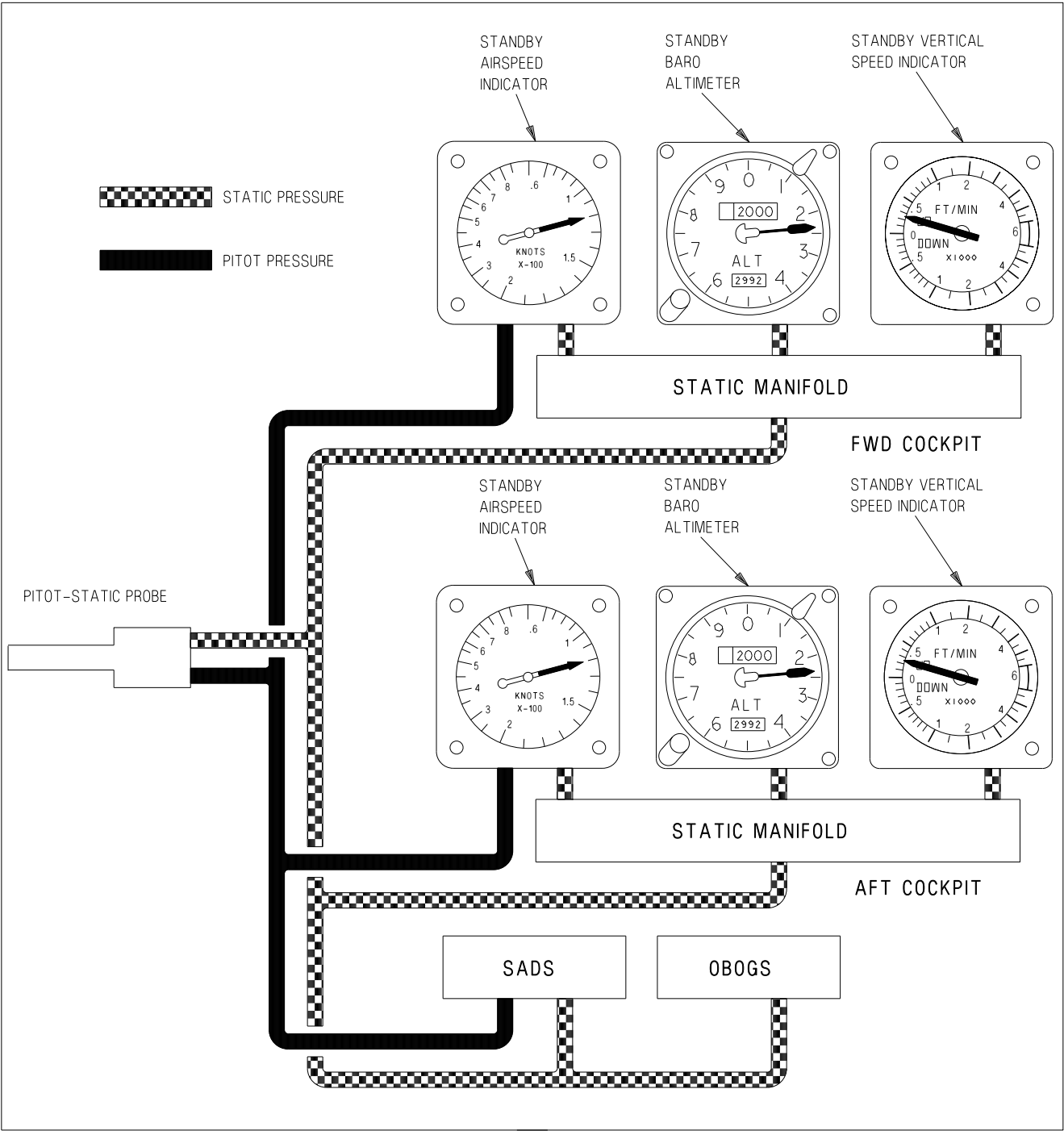
**2.20.6 Standby Turn and Slip Indicator.** The turn and slip indicator contains a scale, turn pointer, power warning flag and inclinometer ball. A 2 minute turn is indicated with the needle over the index to the left and right of center. A 4 minute turn is indicated with the needle half way between the center and the right or left index. The gyro is driven by an inverter, which is powered from the 28VDC Essential Services Bus. An OFF flag is provided to indicate loss of power.

**2.20.7 Standby Magnetic Compass.** The AQU-14/A standby magnetic compass is a conventional, self contained unit mounted on the canopy bow.

**2.20.8 Clock.** A standard eight day clock is installed in each cockpit next to the TAKEOFF checklist.

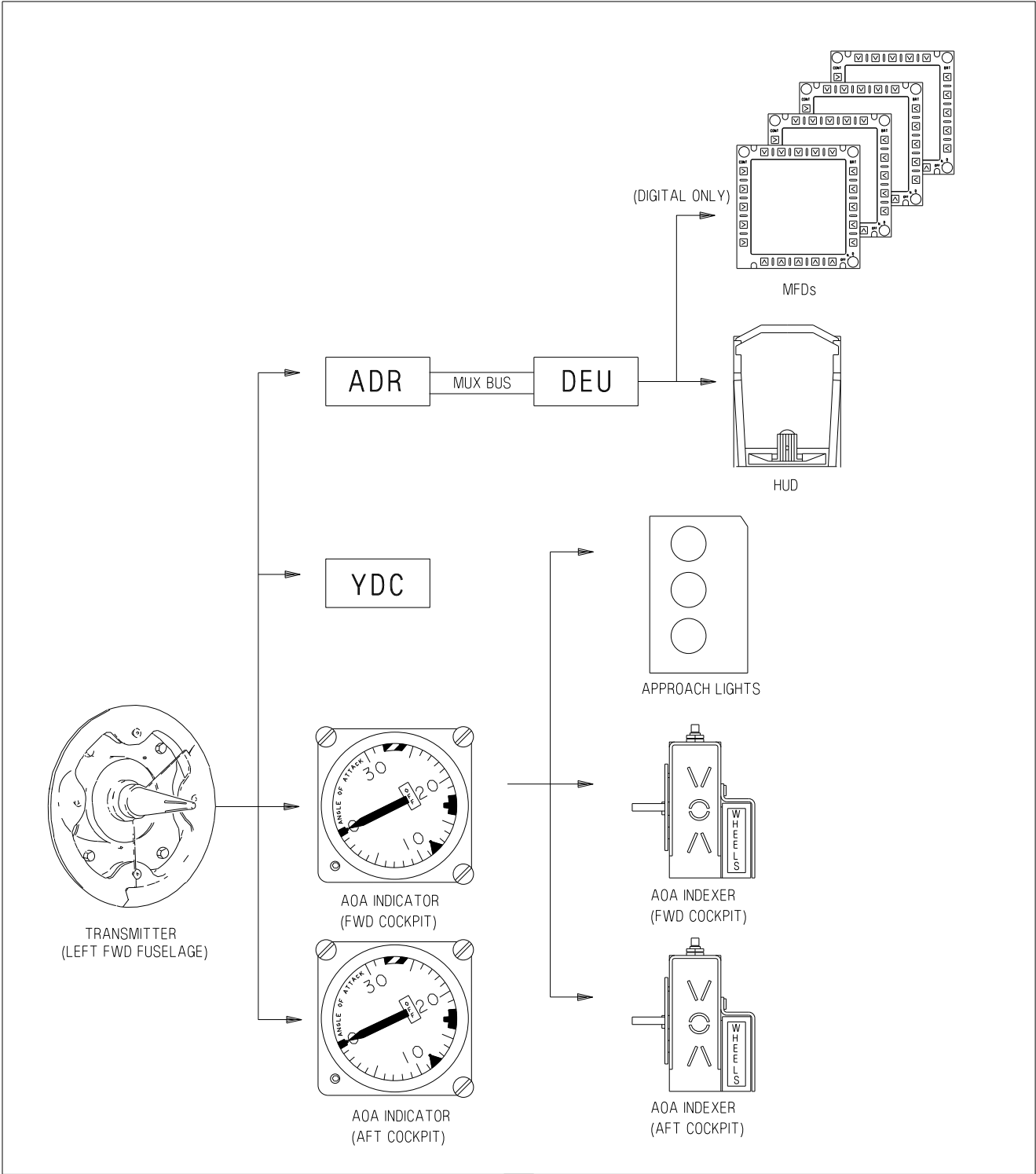
## 2.21 ANGLE-OF-ATTACK SYSTEM

The angle-of-attack (AOA) system consists of an AOA indicator and indexer lights in each cockpit, an AOA transmitter, and a three colored external approach lights assembly. The rudder



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Figure 2-36. Pitot-Static System



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Figure 2-37. AOA System Diagram

■ pedal shakers and stall warning tone operate at 21.5 units AOA to provide artificial warning of stall AOA. See Figure 2-37.

**2.21.1 AOA System Operation.** The transmitter probe, extending outboard on the left side of the forward fuselage, senses the attitude of the aircraft in relation to the relative wind and transmits the angle of the probe to the ADR, AOA indicators, and the YDC. The ADR then transmits the AOA via the mux bus to the DEU for MFD and HUD display. AOA indexers and approach lights are routed through all three landing gear down proximity switches. When the landing gear is down and locked and the NLG weight-off-wheels, AOA discrete signals are provided from the forward indicator to illuminate the indexer and approach lights. For protection against icing and moisture control, the transmitter probe, and its case are electrically heated with weight-off-wheels. An upper and lower slot on the probe are plumbed to an internal chamber separated by a vane. The vane rotates with the probe to equalize the pressures in the internal chambers and orient the slots equally into the airstream. The resulting probe angle is transmitted to the HUD (via the ADR/DEU) and AOA indicators. The servo driven pointer on the indicator displays aircraft AOA in units and drives the AOA indexer lights as well as the external approach lights. The AOA probe and indicator are powered from the 28 VDC Essential Services Bus.

## **2.21.2 AOA Controls and Indicators.**

**2.21.2.1 AOA Indicator.** The AOA indicator functions throughout the entire flight regime to display AOA information, see Figure 2-38. The indicator registers units of AOA to the relative airstream, from 0 to 30 units. An OFF flag is visible if electrical power is lost. The indicator is set with the optimum unit setting at the 3 o'clock position. Both cockpit AOA indicators independently receive their input from the AOA probe.

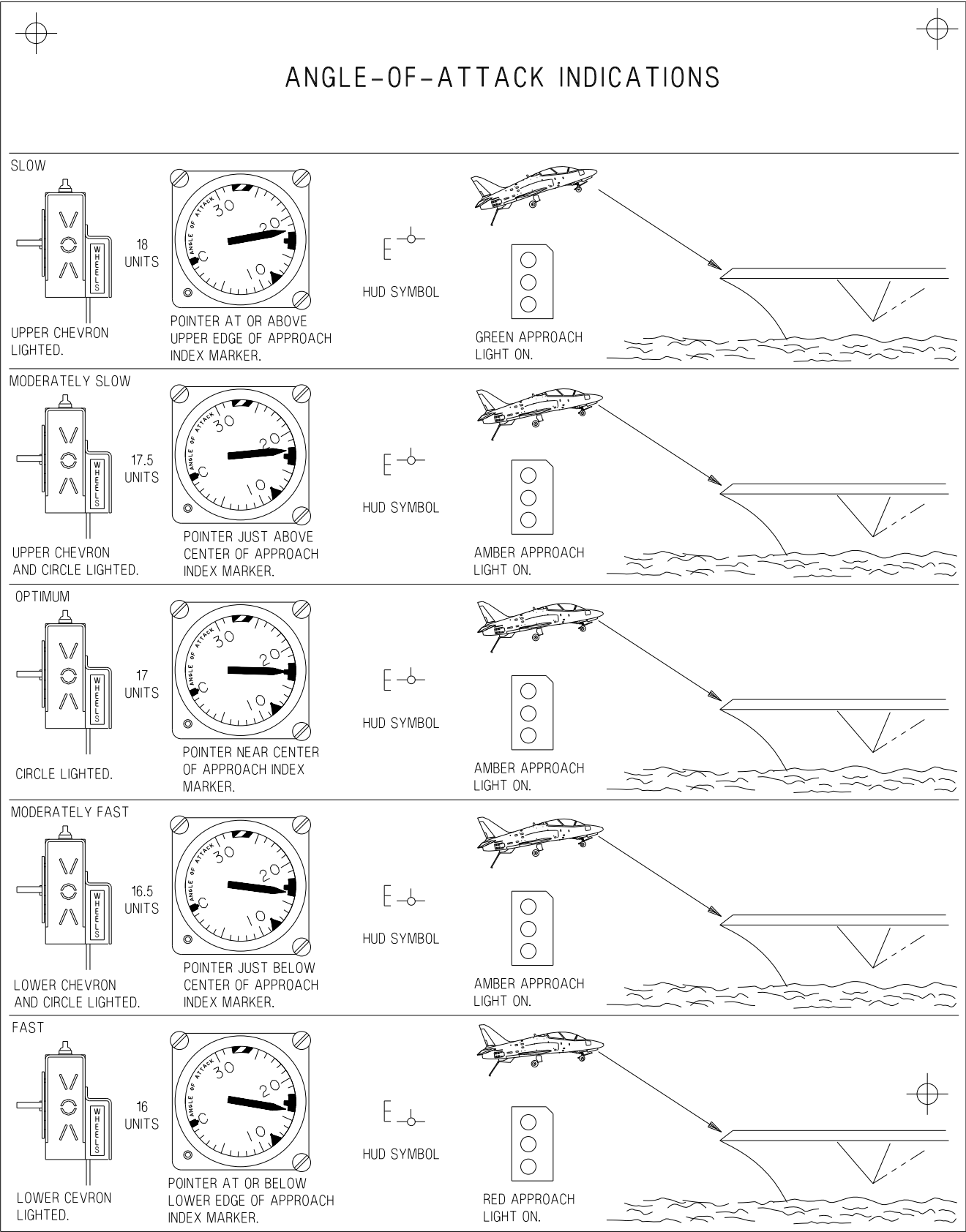
**2.21.2.2 AOA Indexer.** The AOA indexer, located on the glareshield in both cockpits, consists of three indexer lights; the upper chevron (∧) is green and indicates a high ( $\geq 18$  units)

AOA, the center donut (O) is amber and indicates the optimum (17 units) AOA, and the lower chevron (∨) is red and indicates a low ( $\leq 16$  units) AOA. Two intermediate conditions are also indicated by illuminations of the donut (O) with the upper or lower chevron. Dimming control of the indexer lights is achieved by a four position lever mounted next to the lights. Moving the lever up brightens the lights. The indexer includes press-to-test light capability. Both cockpit indexers receive their input from the forward cockpit AOA indicator. The indexers provide the principal reference for controlling airspeed during landing approaches.

### **NOTE**

The lack of AOA indexers and approach lights with the LDG GEAR handle down may indicate one or more landing gear not down and locked.

**2.21.2.3 Approach Lights.** The external approach lights assembly is located on the nose gear strut. The assembly provides the LSO with an indication of AOA and consists of three separate lights covered by red, amber, and green lenses. The corresponding AOA conditions are shown to the LSO as green for too high an AOA, amber for optimum AOA, and red for too low an AOA. The lights are controlled by the AOA system and function when the landing gear is down and locked in flight and extinguish upon landing. The lights are controlled by the HOOK BYP (bypass) switch in the forward cockpit. Placing the switch to CARRIER position causes the lights to flash if the arresting hook is not down. With the switch in FIELD, the lights remain steady regardless of arresting hook position. Day or night operation is selected by the PANEL light switch in the forward cockpit. Placing the switch to the OFF position selects day (bright) illumination. With the switch at PANEL, night (dim) illumination is selected.



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Figure 2-38. AOA System Indications

**2.21.2.4 HOOK BYP Switch.** The two position toggle HOOK BYP switch is located in the front cockpit, on the right side of the main instrument panel. The switch has the following positions:

CARRIER	Approach light/AOA indexers flash if the landing gear is down and locked and the arresting hook is not down.
FIELD	Approach lights/AOA indexers operate steady regardless of the arresting hook position.

## 2.22 RADAR ALTIMETER

The radar altimeter (RALT) system consists of a receiver-transmitter, and two antennas. Refer to the BIT System description, paragraph 2.26 and subsequent, for a description of the RALT BIT. The RALT employs the pulse radar technique to provide instantaneous AGL information from 0 to 5,000, feet in 10 foot increments, at aircraft attitudes of 40 degree or less angle of bank or pitch. Aircraft height above ground is determined by measuring the elapsed transit time of a radar pulse, which is converted to feet. Audio and visual warnings are activated when the aircraft is at or below the selected low altitude limit (LAW setting). The system provides the radar altitude to the ADR which in turn forwards the altitude to the DEU for display on the MFDs and HUD. The DEU commands the HUD to display radar altitude below the altitude box and MFDs (ADI display) to display the radar altitude below the barometric altitude scale. The letter R will be displayed to the right of the altitude to indicate radar altitude. If the ADR or RALT signal is invalid, fails, or exceeds 5,000 feet the radar altitude will be removed and the letter R will remain displayed on the HUD and ADI display. After IBIT is performed on the ground, a RALT failure is reported by the message DEGD on the BIT display. On the ground (weight-on-wheels) the radar altitude defaults to 10 feet.

RALT power is controlled by the RALT PWR option on the BIT display. Successive actuation of the RALT PWR option turns on/turns off

(boxes/unboxes) the RALT. Upon power up of the electrical system with weight-on-wheels, the RALT will default to the power on (boxed) state. If a power interruption occurs with weight-on-wheels the RALT will again default to the power on state regardless of the power state prior to the interruption. When airborne and a power interruption occurs, the RALT will return to the power state prior to the interruption.

**2.22.1 Low Altitude Warning.** The LAW consists of a LAW advisory displayed in the MFD advisory window, an audio warning tone, and flashing of the LAW setting and option accompanied by the HUD warning indication. The LAW is initiated when the aircraft descends to or below the LAW setting and continues until the aircraft ascends above the LAW setting, see Figure 2-39.

With the landing gear extended the LAW advisory/tone and HUD warning will be displayed/emitted for 3 seconds. With the landing gear retracted, the LAW advisory/tone and HUD warning will be displayed/emitted continuously until rejected. The LAW setting and option will continue to flash after the advisory and tone are rejected as a reminder until either the LAW setting is reset to below the aircraft's altitude, the aircraft climbs above the LAW setting, or the aircraft transitions to weight-on-wheels. Flashing of the LAW setting and option are not affected by the landing gear position.

**2.22.2 LAW Setting.** The LAW setting is displayed on the ADI display above the LAW option. The setting may be set using either the ADI display or the DEP. Upon power up the LAW setting defaults to 500 feet.

**2.22.2.1 ADI Entry.** The LAW setting is controlled from the ADI display by selecting the LAW option and LAW increment/decrement options. Successive actuations of the LAW option selects/deselects (boxes/unboxes) the option. Selection of the BNGO or PT options will unbox the option. When the LAW option is selected, the LAW increment and decrement options are displayed. Selecting either option changes the LAW setting accordingly in 10 foot increments. Pressing and holding the increment/decrement option initially changes the LAW