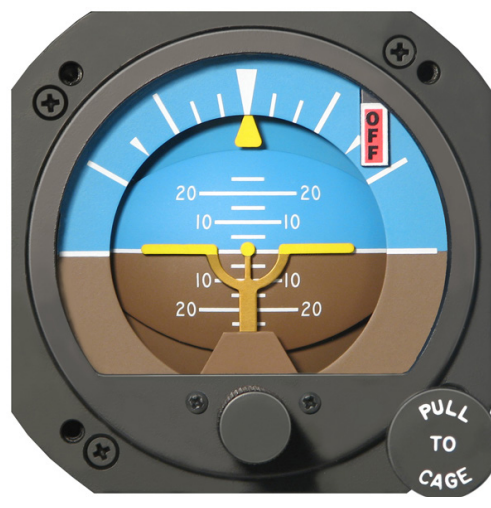




# RCA 26 SERIES ELECTRIC ATTITUDE GYRO INSTALLATION/OPERATION GUIDE



RCA26 AK/BK



RCA26 EK

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## REVISION DETAIL

REVISION	DATE	DETAIL
A	07/03/2008	Initial Release
B	01/07/2014	Added inclinometer installation details
C	10/02/2014	Added lighted instrument dimensions and mounting screw lengths.

## SECTION 1: INSTRUMENT DESCRIPTION

### 1.1 GENERAL DESCRIPTION

An attitude indicator, also known as a gyro horizon or artificial horizon, is an instrument used in an aircraft to inform the pilot of the orientation of the airplane relative to the earth. It indicates pitch (fore and aft tilt) and bank (side to side tilt), and is a primary instrument for flight in instrument meteorological conditions. Attitude indicators also have significant applications under visual flight rules.

The gyroscope actuates a display that has two dimensions of freedom, simultaneously displaying pitch and bank. The display is colored to indicate the horizon as the division between the two colored segments (typically, blue for sky and brown for ground), and is intended to be intuitive to use. The actual bank angle is calibrated around the circumference of the instrument dial. The pitch angle is indicated by a series of calibration lines, each representing 5° or 10° of pitch.

The electrically powered gyroscope rotor not only has the mass to create the gyroscopic effect, it has impeller blades which create airflow. This airflow from the impeller works with gravity-actuated vanes that direct “jets” of air to automatically level the gyro.

Attitude indicators can only tolerate a specific range of bank angles. If the aircraft rolls too steeply - while performing aerobatics, for example - the attitude indicator can “tumble” and become temporarily unusable. For this reason, the indicator is fitted with a “cage” (a device to restore the gyroscope to an level position.) The RCA 26 Series attitude indicators will however, gradually re-erect back to level after a tumble.

On the attitude indicator you will see two yellow horizontal lines with a dot between them. The horizontal lines represent the wings and the dot represents the nose of the aircraft. If the symbolic airplane dot is above the horizon line (more blue background) - the aircraft is nose up. If the symbolic airplane dot is below the horizon line (more brown background) - the aircraft is nose down. When the dot and wings are on the horizon line, you are in level flight. If the lines representing the wings roll to the left or the right, the aircraft is probably starting a turn.

### 1.2 PHYSICAL DESCRIPTION

The RCA 26 indicator is a gasket sealed, direct reading instrument which provides a visual display of aircraft pitch and roll in reference to the horizon. Refer to table 1.1 below for leading particulars.

<u>OPERATING VOLTAGE</u>	(RCA26AK Models).....	14VDC
	(RCA26BK Models).....	28VDC
	(RCA26EK Models).....	10VDC to 30VDC
<u>STARTING CURRENT</u>	(RCA26AK Models).....	2.4 AMP MAX
	(RCA26BK Models).....	1.4 AMP MAX
	(RCA26EK Models).....	14VDC SYSTEM: 3.4 AMP MAX
		28VDC SYSTEM: 1.4 AMP MAX
<u>RUNNING CURRENT</u>	(RCA26AK Models).....	1.21 AMP MAX
	(RCA26BK Models).....	0.62 AMP MAX
	(RCA26EK Models).....	14VDC SYSTEM: 1.21 AMP MAX
		28VDC SYSTEM: 0.62 AMP MAX
<u>ILLUMINATING VOLTAGE</u>	(RCA26AK Models).....	0 to 14VDC
	(RCA26BK Models).....	0 to 28VDC
	(RCA26EK Models).....	0 to 28VDC
<u>CIRCUIT BREAKER SIZE</u>	(RCA26AK Models).....	3 AMP
	(RCA26BK Models).....	2 AMP
	(RCA26EK Models).....	14VDC SYSTEM: 4 AMP
		28VDC SYSTEM: 2 AMP
SETTLING ERROR .....		1° MAXIMUM IN ROLL AND PITCH
OPERATING TEMPERATURE RANGE.....		-30° TO +50° C
DIMENSIONS .....		SEE FIGURE 1
PANEL CUTOUT .....		SEE FIGURE 1
FAA SPECIFICATION CONFORMANCE.....		TS0-C4c

TABLE 1.1, LEADING PARTICULARS

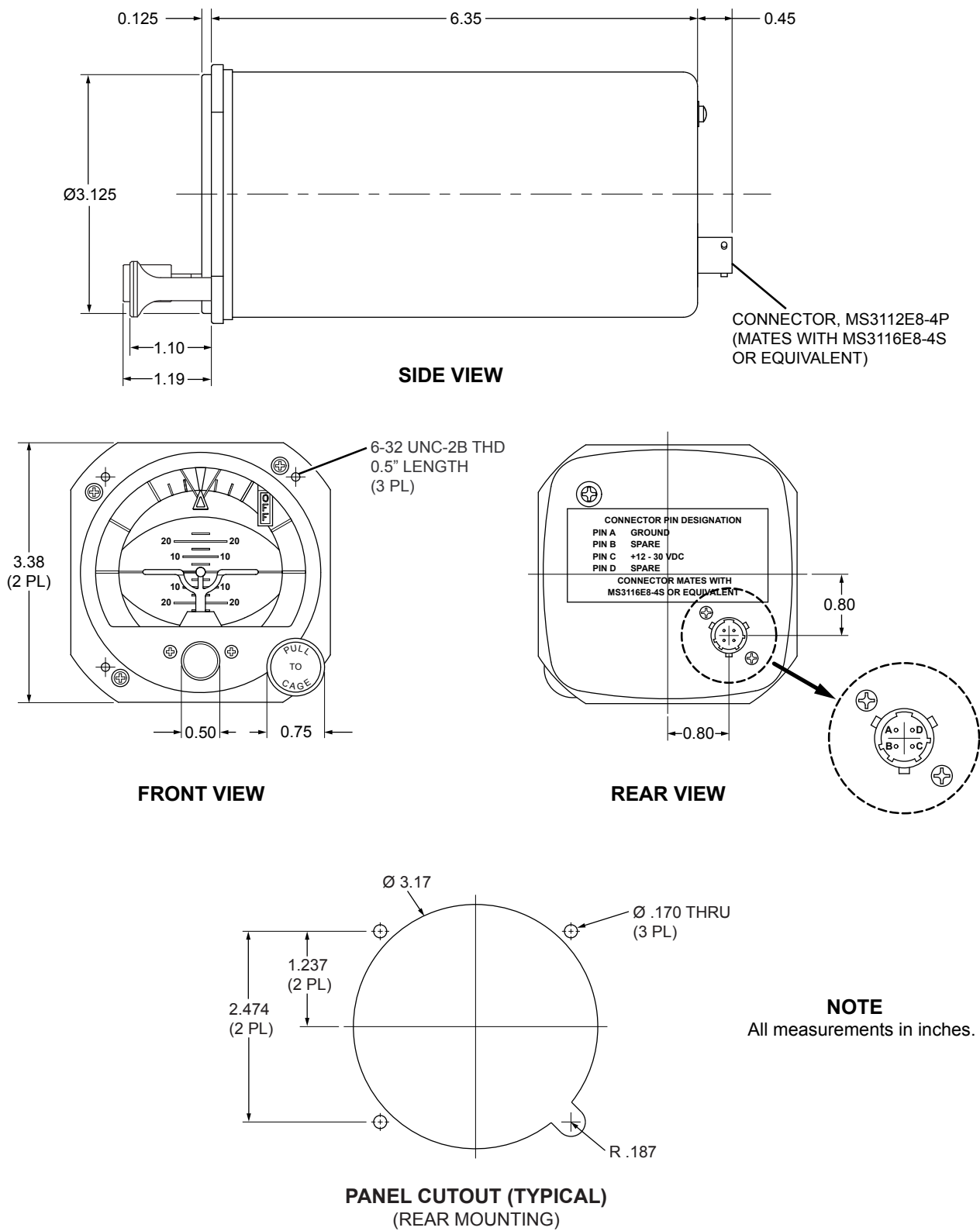


Figure 1.1, General Dimensions (Typical Unlighted)

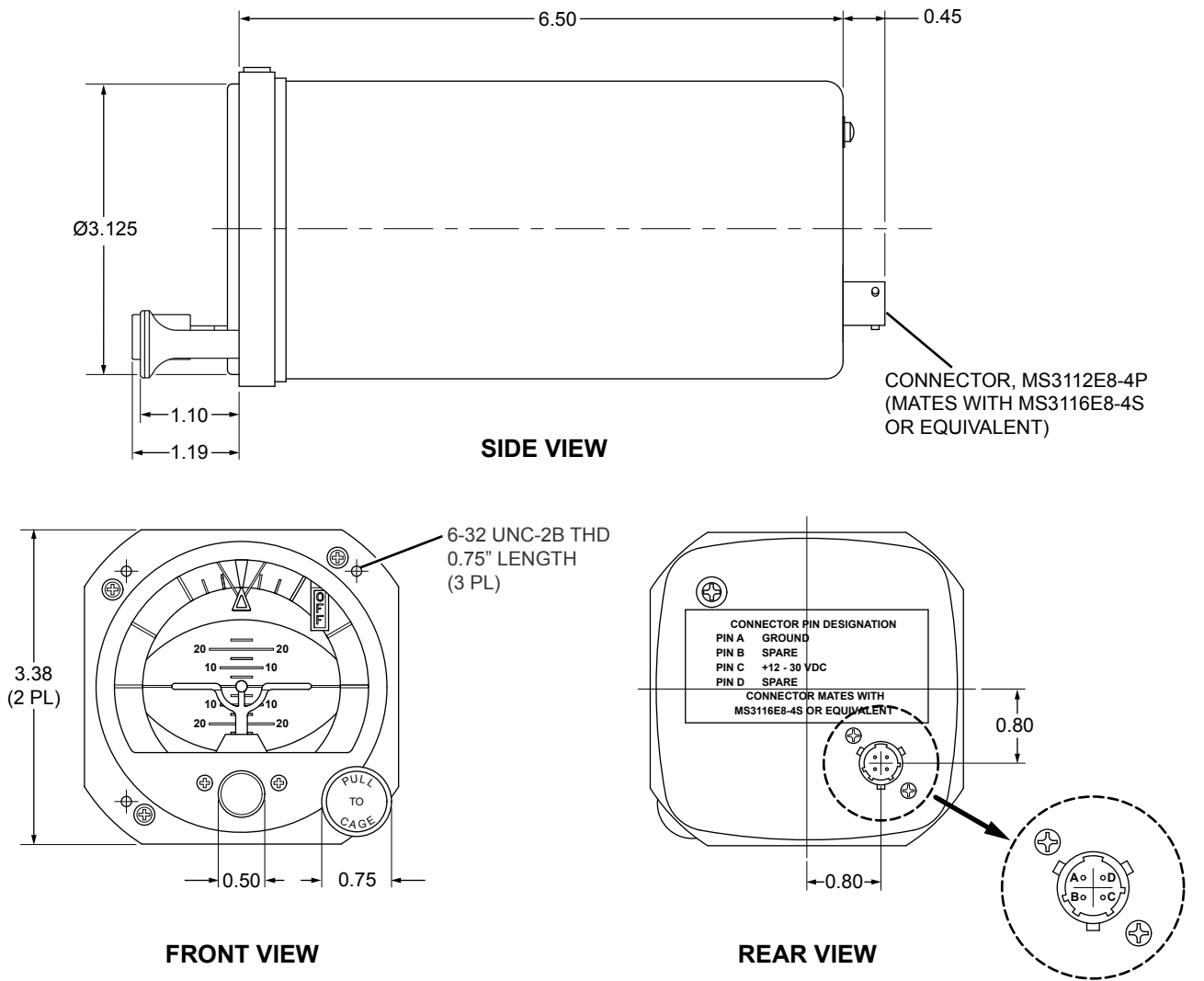


Figure 1.2, General Dimensions (Typical Lighted)

### 1.3 DISPLAY FEATURES

See Figure 1.2 below for typical display features. Colors and graphics vary with each model (RCA26 EK-11 shown).

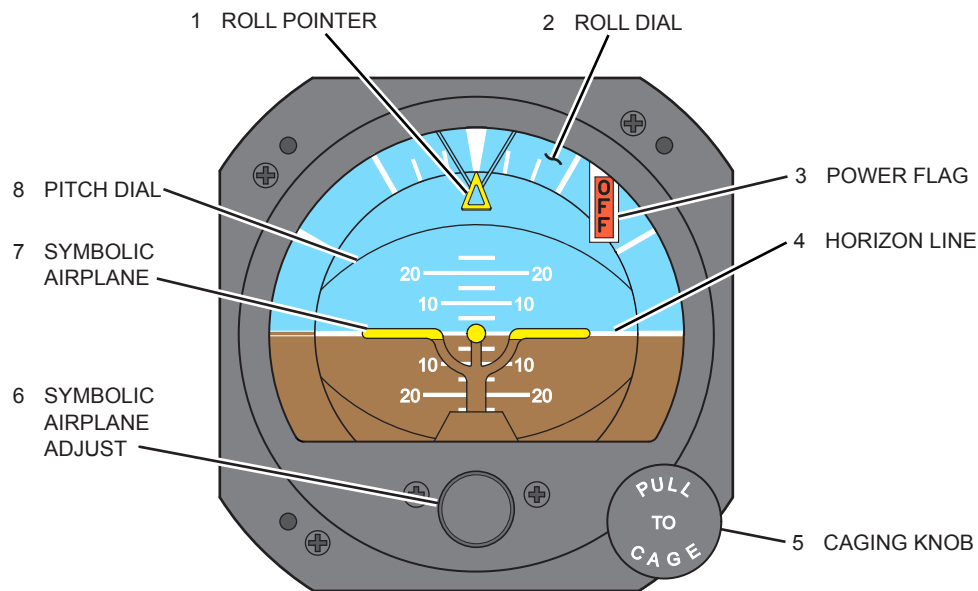


Figure 1.3, Typical Display Features

**1. ROLL POINTER**

Whether fixed or rotating (depending on indicator style), the Roll Pointer points to the degree of roll against the Roll Dial.

**2. ROLL DIAL**

Whether fixed or rotating (depending on indicator style), The Roll Dial shows the degree of roll against the Roll Pointer.

**3. POWER FLAG**

Indicates when operational power is supplied to the instrument. Flag moves out of view when adequate power is applied to instrument.

**4. HORIZON LINE**

Indicates earth horizon relative to aircraft pitch and roll.

**5. CAGING KNOB**

Re-sets the instrument dial to show as level.

**6. SYMBOLIC AIRPLANE ADJUST**

Adjusts the Symbolic Airplane to compensate for viewing parallax. Adjust Symbolic Airplane so that it is visually aligned with the horizon from pilot's normal sitting position.

**7. SYMBOLIC AIRPLANE**

Represents the orientation of the aircraft's wings and nose in relation to the horizon. The dot represents the nose of the aircraft and indicates Pitch. The wings indicate roll.

**8. PITCH DIAL**

Indicates the Pitch angle as determined by the Symbolic Airplane dot.

## 1.4 OPTIONS AND CONFIGURATIONS

For available options and configurations, refer to Table 1.2, below.

Panel Tilt Calibration	0° to 18°, set to customer requirements
Mating Connector	MS316E8-4S or equivalent
Lighting	Optional (user specified voltage)
Slip Indicator	Optional add-on (order RCA 444-0010-01)
Color Scheme	Available in Various color schemes
Display pointer style	Available as either stationary or rotating
Power Flag	All models
Symbolic Airplane Adjust	All models
Caging knob	All models

*Table 1.2, Options and Configurations*

## SECTION 2, INSTALLATION

### 2.1 GENERAL INFORMATION

The conditions and tests required for the TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have a separate approval installation in an aircraft. Installation must only be performed under 14CFR Part 43 or the applicable airworthiness requirements.

### 2.2 HANDLING

#### **-CAUTION-**

Gyroscopic instruments are easily damaged by improper handling. Please follow all handling precautions to prevent damage to the gyro.

Gyros are very delicate instruments. Please observe the following precautions while handling.

1. A high gyroscope failure rate can be attributed to poor handling. Do not drop, jar or shake instrument. Store instrument in shipping container until installation. Avoid placing instrument on hard surfaces. Place on padded surface only.
2. Gyros should be transported in the original shipping container when moved to and from aircraft. If container is not available, carefully carry by hand in upright position.
3. Never move the instrument while the gyro is still spinning. Excessive movement while gyro is spinning may damage gimbal bearings.
4. To prevent further damage, a malfunctioning instrument should be handled as carefully as a new instrument. Most malfunctioning gyros can be repaired and returned to service. Contact Kelly Manufacturing Co. for repair information.

### 2.3 PRE-INSTALLATION INSPECTION

1. When instrument is first received, inspect container for any shipping damage.
2. Carefully remove instrument from shipping container and retain container for later storage or shipping.
3. Inspect instrument for any signs of damage. Contact your Shipper to file any claim due to shipping damage.

## 2.4 INSTALLATION

### **NOTE**

Before installation, check labeling on the instrument to assure that the instrument voltage and panel tilt angle is correct for your aircraft.

Install the instrument on the aircraft by using the aircraft manufacturer's recommendations and by the following steps:

1. The RCA26 Series horizon uses the standard 3 1/8 inch panel cutout. Refer to figure 1.1 "General Dimensions" for instrument and cutout dimensions.
2. Refer to label on back of instrument for correct pin designation. See table 1.1 "Leading Particulars" for additional electrical information.
3. Attach aircraft electrical connector to instrument and insert the instrument into the instrument panel cutout.
4. With the aircraft on level surface, level the instrument using an "L" bubble level on the lip of the bezel at the bottom of the glass and adjust the instrument until the bubble is centered.
5. Secure instrument with user supplied screws. Use 6-32 UNC-2b screws or equivalent. Screw length should not exceed .38 inches plus bezel and panel thickness.
6. Apply power to instrument. Observe that the Power Flag moves out of view and lighting (if installed) is working properly.

## SECTION 3, OPERATION

### 3.1 PRE-FLIGHT PROCEDURES

During pre-flight procedures, the attitude gyro must be provided with adequate electrical power under normal vibration conditions (engine running). Allow a minimum of three minutes for the gyro to settle to true level.

The gyro will normally settle to true level on it's own but you may level the gyro presentation if desired by pulling the "PULL TO CAGE" knob. The caging knob is spring-loaded to return the caging mechanism to return to normal position.

### **-CAUTION-**

Do not allow the caging knob to "snap back" to the normal position by prematurely releasing the knob from the "pulled" position. Use a steady pull until the gyro presentation has stopped moving and indicates level in both pitch and roll. Gently release the knob to return it to the spring-loaded position.

### **NOTE**

On tail-dragger aircraft, caging should be done after take-off and after achieving level flight.

Adjust the "Symbolic Airplane" to visually align the "wings" with the horizon line. This adjustment compensates for viewing parallax error (pilot's viewing angle).

### 3.2 IN-FLIGHT PROCEDURES

In flight, you may cage the unit at any time as needed. You may also adjust the Symbolic Airplane indicator at any time.

### **WARNING**

Caging the gyro while in flight when the aircraft is not level will cause the level indication to be incorrect. The gyro must be allowed a few minutes to settle to True Level before it can be safely relied upon. The gyro is settled when both pitch and roll indications remain constant.

If you must cage the gyro while in flight, it is best to have your aircraft as close to level flight as possible. The closer to level the aircraft, the quicker the gyro will settle to True Level.



### 3.3 FLIGHT LIMITATIONS

It is not recommended to perform aerobatic maneuvers while using the RCA26 Series Attitude Indicator. Extreme maneuvers will cause the instrument to show an error and will become unreliable as a reference to the horizon. Damage to the instrument may also occur under these conditions. Turn the unit off at least 5 minutes before performing any extreme maneuvers to allow the gyro to spin down.

### 3.4 EMERGENCY PROCEDURES

In the event that the Power Flag comes into view, the accuracy of the instrument becomes unreliable until the flag moves back out of view. The Power Flag is actuated by the amount of voltage to the instrument and will display in the "off" position when less than minimum voltage is available to the instrument. A thorough check of the instrument power source is recommended if this situation should occur.

## SECTION 4, SLIP INDICATOR INSTALLATION

### 4.1 LEGACY INSTRUMENTS

P/N 444-0010-01 is used for all new RCA26 Series Indicators. When ordering to retrofit an older instrument, note that instruments manufactured before March 4, 2011 have a different screw spacing and use P/N 444-0011-01. Refer to illustration below for proper part number selection.

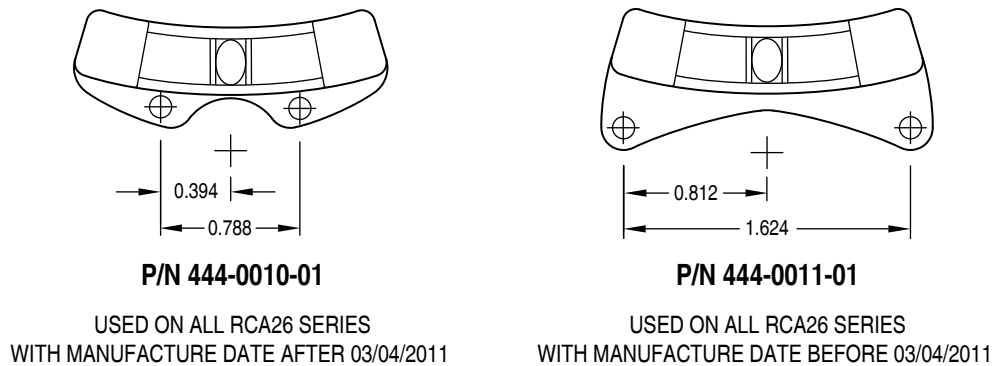


Figure 4.1 Slip Indicator Selection

### 4.2 INSTALLATION

The Optional Slip Indicator can be installed on the instrument before or after the instrument has been installed on the aircraft. Before installation, assure that the instrument or aircraft is level (left and right) using a bubble level.

1. Remove two screws on the face of the instrument.
2. Align Inclinator with holes and replace screws. Do not tighten.
3. Adjust the Inclinator until the bubble is centered and tighten screws just enough to secure Inclinator. Do not over tighten.

## ***Frequently Asked Questions***

### How long should my gyro last?

There are many factors that determine the life of a gyro. We have seen gyros with everything from corrosion from sea air to excessive bearing wear from rough landings. Ideally you should receive hundreds of hours of use, but it is completely dependent on how the unit is treated and the environment in which it is used. If a gyro sits stationary for a long period of time, the bearings become unusable. The gyro should be run at least once a month to keep the bearings lubricated.

### At what voltage level will my gyro become unreliable?

For the RCA26 AK (14VDC system), a minimum of 12VDC is required for the unit to operate accurately.

For the RCA26 BK (28VDC system), a minimum of 26.5VDC is required for the unit to operate accurately.

For the RCA26EK a minimum of 10VDC is required for the unit to operate accurately.

### My instrument is showing a climb/dive, what can I do?

You can check your aircraft owner's manual or contact the aircraft manufacturer to determine if your aircraft's instrument panel is tilted (pitched fore and aft). The tilt angle is any deviation from vertical of your instrument panel in level flight. Your instrument needs to be calibrated to compensate for this angle.

### My instrument is showing a turn in level flight, what can I do?

It is very important to have the instrument level (left and right) in your panel. If the instrument is not level, it will show a turn when in level flight. To level the instrument place an "L" bubble level on the lip of the bezel at the bottom of the glass and adjust the instrument until the bubble is centered.

### How do I get my instrument repaired?

For any overhaul or repair questions you can contact Kelly Manufacturing Company. Our Service Center can repair or refurbish any R.C. Allen instrument. The only thing really required is information. You can send us your instrument with a letter giving us your name, return shipping address, phone number and a brief description of what is wrong with the instrument. Email us for more information: [SERVICE@KELLYMFG.COM](mailto:SERVICE@KELLYMFG.COM).