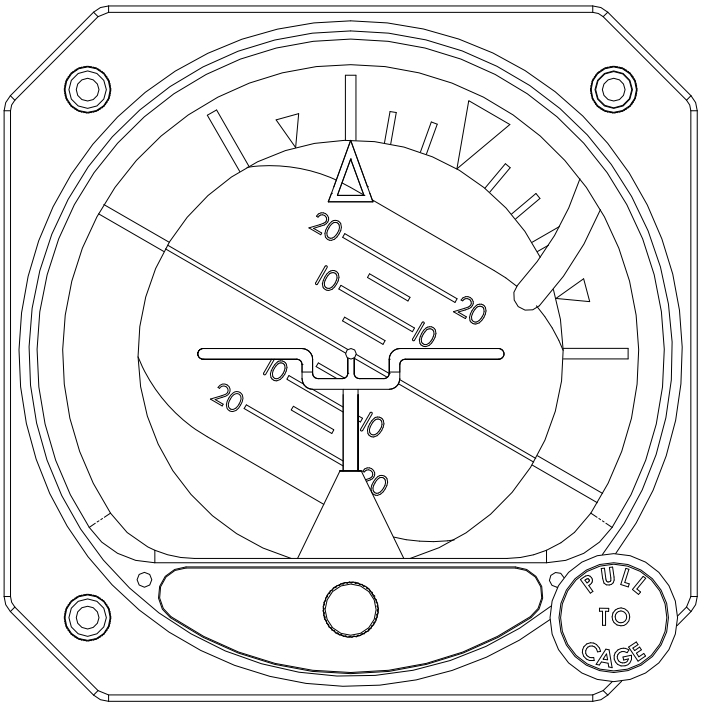
PILOTS GUIDE

for the

4300-xxx Series Electric Attitude Indicator



Mid-Continent Instruments and Avionics
9400 E. 34th Street N., Wichita, KS 67226 USA
Phone 316-630-0101 • Fax 316-630-0723
info@mcico.com

MANUAL NUMBER 9015834-1
REV. D September 30, 2009

Congratulations on selecting one of the most advanced new aviation products. The design team at Mid-Continent has incorporated four decades of experience with aircraft instrumentation to bring you the best possible reliability and value in aviation. We are proud to offer the finest Attitude Indicator in its class. New technology allows our unit to run twice as many hours as older designs. All this is backed by Mid-Continent's world class reputation for high quality and responsive service.

J. Todd Winter
President

Forward

This manual provides operational instructions for use by persons who operate aircraft in accordance with applicable Federal Aviation Regulations (Title 14 CFR).

We welcome your comments concerning this manual. Although every effort has been made to keep this manual free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table number, and the page number. Please email or send your comments to:

Mid-Continent Instruments and Avionics
Attn: Technical Publications
9400 E. 34th ST North
Wichita, KS 67226 USA
Phone 316-630-0101 Fax 316-630-0723
info@mcico.com

Table of Contents

		Page
Section 1	**General Description**	
	Purpose of Equipment	4
	Physical Description	4
	Functional Description	4
	Gyro Warning Flag	4
	Options and Configurations	4
	Specifications	5
Section 2	**Operation**	
	General	7
	Starting Procedures	7
	In-Flight Procedures	7
	Dynamic Errors	7
Figures	**List of Illustrations**	
	Display Configurations	7
	Typical Indicator Display Detail	6
Tables	**List of Tables**	
	Options Table	4
	Physical Characteristics	5
	Performance	5
	Light Tray Assembly Options	5

Section 1: General Description

Purpose of Equipment

The 4300 Electric Attitude Indicator incorporates a moving display that simulates the earth's horizon and provides the pilot with a real time visual indication of the aircraft pitch and roll attitude relative to the indicator symbolic airplane.

The instrument can function as a primary or standby indicator with special configurations available to match existing systems or electronic flight displays. Panel tilt, input voltage, lighting color/voltage, non-trimmable knob cover, front mount adapter plates and a slip indicator are available as options.

Physical Description

The 4300 Electric Attitude Indicator incorporates pitch and roll displays that are mechanically linked to a spinning mass gyroscope. The horizon bar moves behind the symbolic airplane. Precession error is corrected by the 4300's erection system or by pulling the "PULL TO CAGE" knob. A warning flag drops into view if the gyro motor is not receiving sufficient power to operate.

Functional Description

Model 4300-xxx Electric Attitude Indicators employ an efficient electrically driven internal vertical gyroscope assembly incorporating a special air erection mechanism. This mechanism simultaneously erects the pitch and roll axes of the gyroscope. Movement of the aircraft generates a reaction of the display that simulates the visual reference seen by the pilot when looking outside at the earth's true horizon line.

The Indicator operates on any input voltage between 10 and 32 VDC. An integral lighting system featuring a user replaceable light tray assembly that operates from the aircraft lighting bus is available in 5V, 14V, or 28V versions (dependent on configuration).

Gyro Warning Flag

A power warning circuit monitors the electrical current used to power the gyro motor. When a loss of input voltage occurs, the gyro warning flag comes into view.

Options and Configurations

Options Table	
Panel Tilt Calibration	0° to 20°
Lighting Voltage	5V, 14V, or 28V (See Table 1.4)
Lighting Color	Blue/White, White, or Red (See Table 1.4)
Miscellaneous Parts:	Non-trimmable Symbolic Airplane Knob Cover (P/N 36022)
	Slip Indicator Kit (P/N 36023)
	Front Mount Kit: 3/32” thk (P/N 36028-1) or 1/2” thk (P/N 36027-1)
	Panel Wedges: 3° (P/N PW3R-3) or 4° (P/N PW3R-4)
	Mating Connector Kit (P/N 9015514)

Table 1.1

Specifications

Physical Characteristics:	
Qualification:	FAA-TSO-C4c
Environmental Qualification:	RTCA DO-160D Environmental Category C1BAB[(SBM)(RBB1)(P)]XXXXXXZZAZZ[WF]M[A3H33]XXA
Weight:	2.7 pounds maximum
Dimensions:	Length behind panel (not including mating connector) 6.6 inches long maximum. 3.28 inches high maximum. 3.28 inches wide maximum.
Mating Connector:	MS3116F8-4S or equivalent (MCI P/N 9015514)
Cover Glass	HEA (anti-reflective) coated.
Instrument Panel Mounting:	Rear mount. Front mount with adapter plate.

Table 1.2

Performance:	
Reliability	7500 Hour Mean Time Between Failure (MTBF)
Initial Erection:	The "PULL TO CAGE" knob will erect the gyroscope to within 2.0° of case vertical in roll and pitch from any position at any time.
Final Erection:	The vertical gyroscope should be allowed to spin up for 3 minutes after rated power is applied and after initial erection. After 5 minutes the final erection accuracy of pitch and roll will be within 1° of vertical.

Erection Rate:	Gyroscope will erect to local vertical in pitch and roll at 2.5° per minute minimum.
Warning Flag:	A gyro warning circuit provides for continuous monitoring of input voltage. If loss of input voltage occurs, the red warning flag will appear.
Symbolic Airplane:	The adjustment range will be ± 4° minimum from the zero pitch position.
Power Consumption: Starting: Running: Lighting:	 Will not exceed 1.5A at 14 VDC. Will not exceed 0.7A at 28 VDC. Nominal 0.55A ±15% at 14 VDC. Nominal 0.27A ±15% at 28 VDC. Will not exceed 2.5 watts for models using 5V, 14V, or 28V.

Table 1.3

Light Tray Assembly Options P/N 9015640-( )			
	5V	**14V**	**28V**
Blue/White	-1	-2	-3
White	-4	-5	-6
Red	-7	-8	-9

Table 1.4

Roll Pointer: A) Fixed roll pointer: Indicates aircraft roll displacement relative to a rotating roll dial.
B) Rotating roll pointer: Indicates aircraft roll displacement relative to a fixed roll dial.

Gyro Warning Flag: If loss of input voltage should occur, gyro warning flag will come into view.

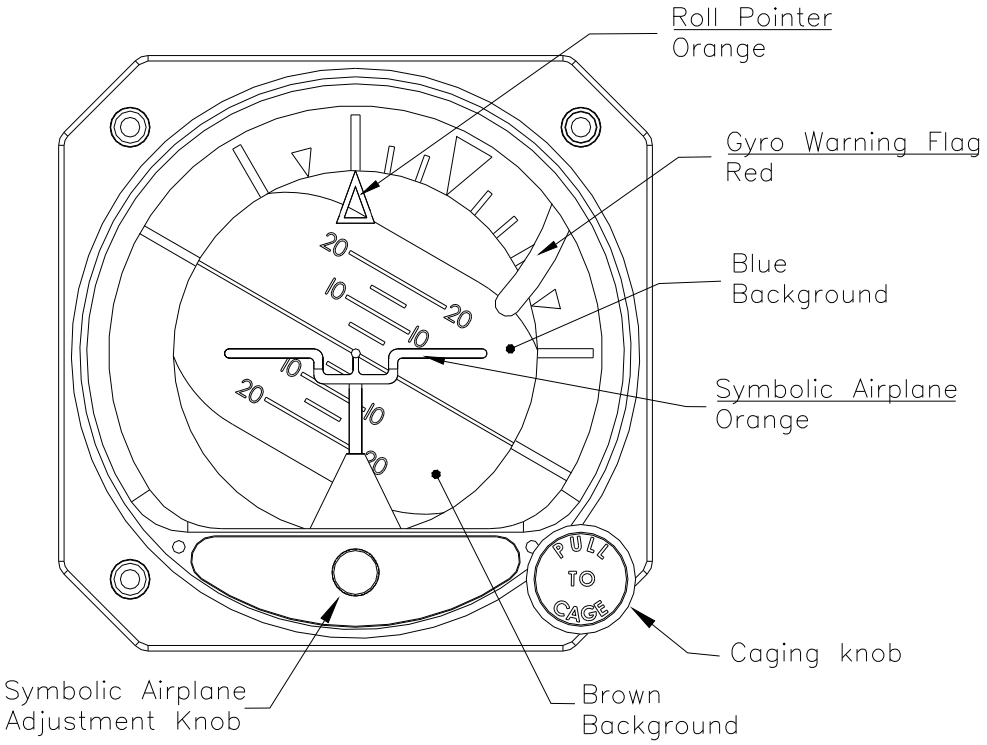
Display: Lower area of display, when referenced to the symbolic airplane, indicates aircraft nose is below horizon or in a dive attitude. Upper area of display indicates aircraft nose is above horizon or in a climb attitude.

Symbolic Airplane: Indicates roll and pitch attitude relative to the horizon. The symbolic airplane can be moved (pitch only) using the symbolic airplane adjustment knob.

Horizon Line: Indicates earth horizon relative to aircraft pitch and roll attitude.

Caging knob: (Manual Erection) When pulled, manually erects the gyro vertical to the case orientation.

Symbolic Airplane Adjustment Knob: Used to adjust the symbolic airplane.



Typical Electric Attitude Indicator Display
(Rotating Roll Dial, Fixed Roll Pointer, Traditional Wing Symbolic Airplane Shown)
Figure 1.2

Section 2: Operation

General

This section describes the Model 4300-xxx Electric Attitude Indicator operating procedures. The indicator is required to be installed in an aircraft with the specified inputs applied. Figure 1.2 provides an illustration of a typical Model 4300 display and a table describing indicator functions.

Starting Procedures

The following operational procedures are recommended when preparing the indicator for use:

CAUTION: THE INDICATOR MAY BE DAMAGED IF THE "PULL TO CAGE" KNOB IS RELEASED WITH A "SNAP." RELEASE "PULL TO CAGE" KNOB AVOIDING A "SNAP" RELEASE.

NOTE: Indicator may be momentarily caged by pulling "PULL TO CAGE" knob to the fully extended position, holding knob until the display stabilizes, and then allowing the knob to return to the normal position.

A. Apply power to the indicator. Note that the Gyro Warning flag (red) will pull out-of-view. Also allow three minutes for presentation stabilization.

B. On models with trim adjustment, rotate the symbolic airplane adjustment knob for the desired pitch attitude presentation, i.e. aligning the symbolic airplane with the horizon.

C. If caging is required, caging should be accomplished when the aircraft is in a wings level, normal cruise attitude, as indicated by other instruments or the horizon. If the gyro is caged when the aircraft is not in this attitude, the resulting attitude presentation immediately after caging will be in error by the difference between true vertical and actual aircraft attitude. Small errors in caging erection will be corrected by the indicator to true vertical in pitch and roll at 2.5° per minute minimum (5°/min. nominal).

In-Flight Procedures

A. Adjust the symbolic airplane to obtain desired pitch attitude presentation after take-off.

B. In the event of errors in excess of 10° caused by extended bank or fore-aft acceleration, the indicator should be momentarily caged after the aircraft is returned to level flight.

Dynamic Errors

A. Turn Induced Errors

Pitch indication errors resulting from a standard coordinated turn (180 degrees in one minute at a true airspeed of 156 knots) will not exceed 3°. Dynamic errors developed under non-standard conditions may be greater. Errors that develop will be self corrected by the internal erection system or manually corrected by the actuation of the caging system.

B. Acceleration & Deceleration Errors

Pitch indicating errors may occur due to accelerations experienced during takeoff, climb-out, descent, and landing. Errors that develop will be self-corrected by the internal erection system or manually corrected (in straight and level flight) by the actuation of the caging system.

C. Taxiing Errors

A pitch and roll indicator display error of approximately 1° will occur during a sudden 90° ground turn. A pitch indicator display error of approximately 2° will occur during a sudden 180° ground turn. Errors that develop will be self corrected by the internal erection system or manually corrected by the actuation of the caging system.