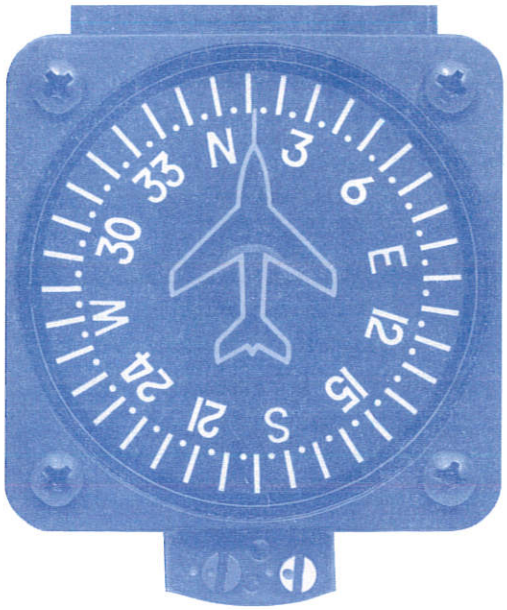
Precision Aviation, Inc. • 8124 Lockheed Ave. • Houston, TX 77061 • 713-644-7383 • http://www.pai700.com

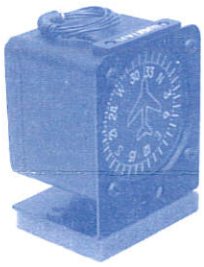
THE PAI-700!



VERTICAL CARD MAGNETIC COMPASS

The most obvious advantage of the PAI-700 Vertical Card Magnetic Compass is the *Easy to Steer By* presentation! With a glance at the aero design lubber line on the lens, you see the complete 360° dial in proper relation to your aircraft heading, or the reciprocal thereof, presented the way you *think*. The PAI-700 utilizes eddy current damping, no fluid. Over swing is minimized or eliminated. Lighting 28V, 14V, 5V or no Light. *Capable of Overhead, Glare Shield, or Panel Mounting.*

Manufactured exclusively by Precision Aviation, Inc. under authorization by the U.S.D.O.T., Federal Aviation Administration citing 14CFR-21 and TSO C7c Type 1.



PACMG-2

This is a universal mount that can be used on many aircraft that utilize a glare shield or deck mount. Some models of –

Beech Baron
Beech Bonanza
Cessna Skyhawk
Cessna Cardinal
Cessna Skylane
Piper S.E.

PACMO-PIPER-N

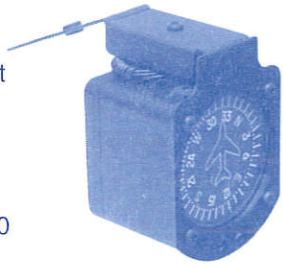
A custom mount for several Piper models that utilize a 5/8" hat-section center windshield post.
Some models of –

Seneca II
Cherokee
Warrior
Arrow
Archer
Lance

PACMO-CESNO2

A custom mount for several Cesna models that utilize a one-piece windshield with a compass mounting block.
Some models of –

Cessna 150, 152, 170, 172, 180, 182, 185, 210



PACMO-APZ21N

A custom mount for –

Piper Apache
Piper Aztec
Cessna 421

PACMO-UN

This is a universal overhead bracket kit for customer adaptation. The vertical hanger can be bent forward or aft to the desired angle. Holes can be drilled where needed. Once installed the compass face must be parallel to the instrument panel.

PACMO-VMN

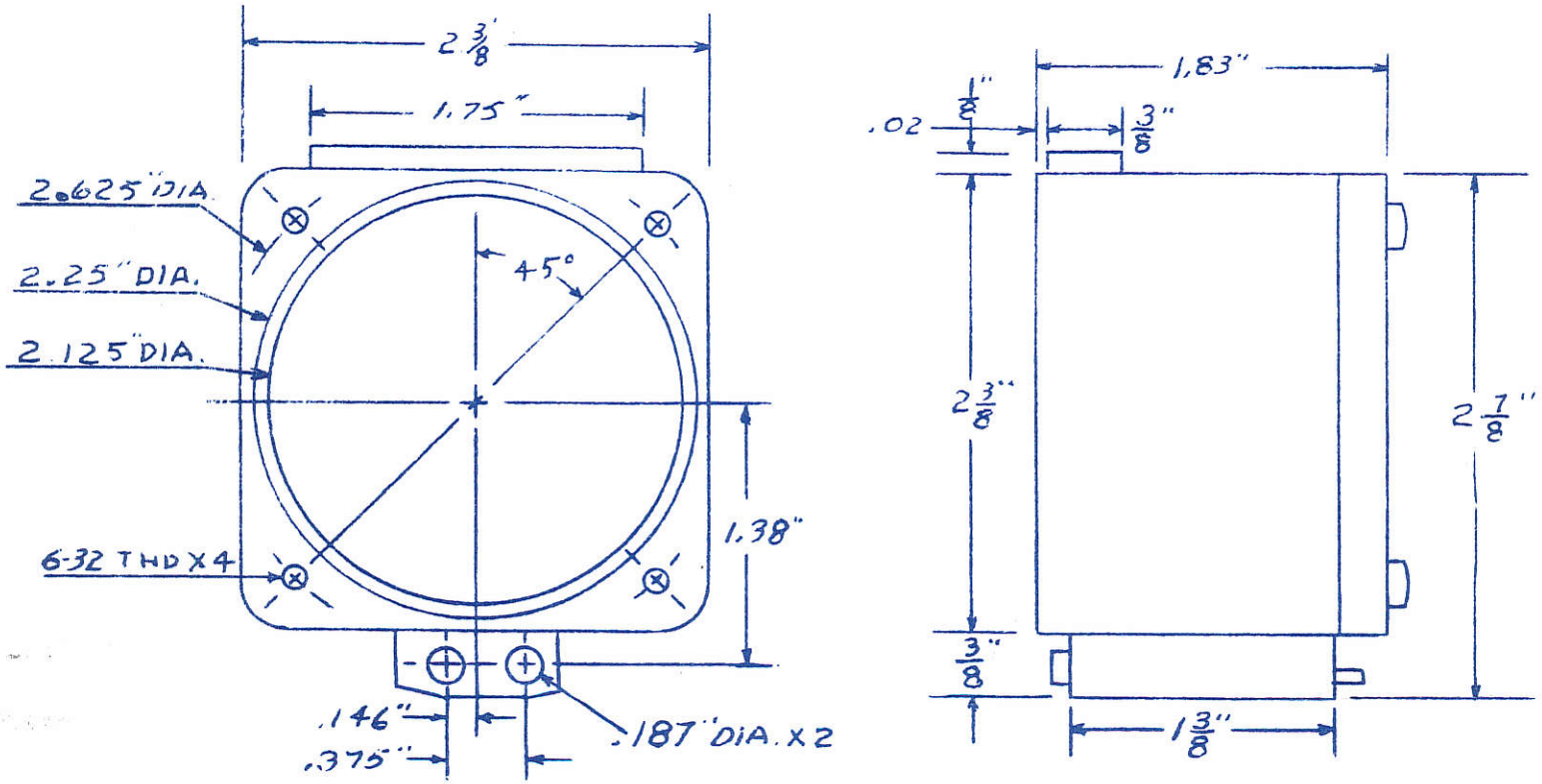
A custom mount for several Mooney models that utilize a box section wind-screen divider with front mount screws.

PACMO-CIRRUS

A custom mount for the Cirrus SR20 and SR22.

PACMO-R22/R44

A custom mount for the Robinson R22 or R44 helicopters.



NOTE ! ANY OUTSIDE DIMENSION DIFFERENCES REFLECTED ON THIS DRAWING DO NOT ALTER THE OPERATION OF ANY UNIT PREVIOUSLY MANUFACTURED BY PRECISION AVIATION, INC.

NOTATIONS UNLESS SPECIFIED			
TOLERANCES		**FINISH**	
FRACTIONS	± 010	FAO 32	
X	± 010	BURR FREE 10 MAG DEBUR TO SPEC MAG	
XX	± 010	**THREADS**	
XXX	± 002	A.S. CLASS 3 OR BETTER	
XXXX	± 0003		
ANGLES	± 5°		
CONCENTRICITY OF HOLE TO OD	002TIR		

REVISIONS		
NO.	DATE	BY
1		
2		
3		
4		
5		

PRECISION AVIATION, INC.

PAI-700 DIMENSIONS

DRAWN BY	SCALE 1" = 1"	MATERIAL
CHK'D	DATE 10-25-90	DRAWING NO CD700
TRACED	APP'D	

PAI-700
VERTICAL CARD MAGNETIC COMPASS

MAGNETIC COMPASS COMPENSATION INFO

The inherent magnetic field, present in all aircraft, will vary in pattern and intensity, aircraft to aircraft. The poly-plane compensator used on the PAI-700 Vertical Card Magnetic Compass provides adequate compensation adjustment for most aircraft. However, some aircraft have magnetic characteristics which may necessitate additional compensating effort.

Always a good idea, when installing a magnetic compass, is to use a small permanent magnet and check all screws, washers, nuts, etc. in the vicinity of the compass for magnetic attraction. Should any be found, they can usually be replaced with brass, aluminum or non-magnetic stainless steel.

Magnetic shielding material, a nickel alloy, may be used effectively to contain the magnetic field radiated by permanent magnets used in the manufacture of some radio navigation indicators and some turn coordinators. The magnetic field induced by the flow of an electrical current may, on occasion, be similarly contained.

Another approach to consider is relocation of the compass mounting. Sometimes only a matter of inches can be very effective.

De-gaussing the aircraft is a lengthy specialized procedure. While this is sometimes effective for a time, magnetism in a structure will try to rearrange itself, similar to water seeking its own level.

The strategic placement of small permanent magnets to change the magnetic pattern has been a method used by some experienced personnel for years.

PAI PBB-475 BALANCING BALLS

The PAI PBB-475 Balancing Balls are designed specifically for use with the PAI-700 Vertical Card Magnetic Compass in an aircraft having a magnetic field or pattern which makes compensation particularly difficult, thereby necessitating the use of some means of increasing the compensating ability. Basically the Balancing Balls consist of two additional compensating magnets, mounted on each side of the Vertical Card Magnetic Compass parallel to the fixed plane of the direction sensing magnet, whereas the poly-plane compensator magnets are located below the vertical axis.

The PAI PBB-475 Balancing Balls are sold in a kit containing all necessary mounting parts and complete instructions.

The PAI PBB-475 Balancing Balls are used in many different aircraft. To illustrate, they are used in some models of the following: Aztecs, Beavers, Bellancas, Commanders, Comanches, Cubs, Mooneys, Pitts, Chipmunk, and more.

PRECISION AVIATION, INC.
Bulletin IC-102
March 8, 2004

PAI-700
VERTICAL CARD MAGNETIC COMPASS
INSTALLATION AND COMPENSATION

INSTALLATION INFORMATION

For proper operation of the Vertical Card Magnetic Compass, it is important for the installer to understand the basic design differences of the "Wet Magnetic Compass" and the PAI-700 Vertical Card Magnetic Compass.

"WET MAGNETIC COMPASS"

The magnetic sensing element consists of bar magnets attached to a float or other device in such a manner as to create a pendulous assembly which sits on a pivot in a jeweled cup, free to tilt and rotate. The azimuth card is attached to said device in such a manner as to be viewed through the instrument lens.

The complete assembly is submerged in fluid, which acts as a damper, and is free to react to the earth's magnetic lines of force, horizontal and/or vertical, as well as other forces – gravity, kinetic, and centrifugal.

"PAI-700 VERTICAL CARD MAGNETIC COMPASS"

The magnetic sensing element consists of a somewhat more massive magnet with the additional torque required for rotating the vertical azimuth card. The sensing magnet is mounted on a shaft which rotates on jeweled bearings in a vertical housing affixed to the compass case assembly. Thus, the sensing magnet is maintained in a captive plane in relation to the aircraft. The rotation of the sensing magnet is transferred through miter gears and a shaft rotating on jeweled bearings in a horizontal housing to the vertical azimuth card. The design utilizes eddy-current damping (magnetic), and contains no fluid. Overswing is minimized or eliminated.

When level, the sensing magnet reacts to the earth's horizontal lines of force, and when not level, to some product of the earth's horizontal and vertical magnetic lines of force. The reaction of the sensing magnet to the forces present – gravity, kinetic, and centrifugal – is reduced due to the absence of pendulosity.

INSTALLATION

The afore-mentioned design details - shafts, jewels, gears, massive magnet, etc. - make it necessary to install the PAI-700 Vertical Card Magnetic Compass with adequate vibration damping. When installed too solidly, it is possible that a resonant vibration transmitted directly to the compass case may cause undue magnet and dial card movement. The best way to think of the mounting is to "gently" hold the compass in place - as in the palm of your hand.

Panel mounting, in some cases, can be difficult as this area has magnetic interferences.

COMPENSATION INFORMATION

Each aircraft has its own inherent magnetic pattern and no two are alike, even off the same assembly line. The inherent magnetic pattern of an aircraft is a product of magnetic influences, physical presence in ferrous metal used in structure or components, induced, by electrical circuits of varying strength and location, and the earth's magnetic field.

From the above, one realizes that it is highly desirable to have the aircraft as close to flying configuration as possible, or flying, as the compensation procedure is followed. Known magnetic headings may be obtained for ground compensation by the use of a compass rose, master compass, or transit-pelorus. For taking each reading, the engine rpm should be at normal cruise and electrical and radio equipment should be in the flying norm. A directional gyro is a convenient azimuth reference with frequent rechecks of the original known magnetic heading to check possible drift. It is a good policy to confirm all ground compensations in flight.

On a smooth air day the compensation procedure may be followed in flight using the directional gyro azimuth with frequent rechecks of the original known magnetic heading to check possible drift. A known magnetic heading may be from a runway, section lines (with magnetic variation figured), or the "old iron compass" - a railroad.

(CONTINUED ON BACK)

IMPORTANT

The compensator is in neutral when the dots on the adjusting screws are aligned with the dots on the compensator face - NINE O'CLOCK. MAXIMUM compensator correction is attained when the adjusting screw is rotated - clockwise or counter-clockwise - 180°, or to THREE O'CLOCK. DAMAGE to the compensator mechanism will occur if the adjusting screws are forced beyond 180° in either direction.

COMPENSATION PROCEDURE

The poly-plane compensator used on the PAI-700 VC Magnetic Compass has a deviation correction range of approximately plus or minus twenty degrees on the cardinal headings. The readings in quadrants between cardinal headings are products of the adjacent cardinal headings corrective adjustments.

Use a non-magnetic screw driver for making adjustments.

In lieu of aircraft vibration, which is necessary in the next seven steps, this vibration can be provided by tapping the top right hand portion of the case with a wooden pencil three to four times at each heading or by using your forefinger to slightly tap the front glass or upper right hand portion of the case.

1. Starting with the aircraft on a known magnetic heading of North, use the N-S adjusting screw to remove all deviation so the compass indicates North. The N-S adjusting screw is the LH screw on the compensator.
2. Rotate the aircraft to a known magnetic heading of East. Use the E-W adjusting screw to remove all deviation so the compass indicates East. The E-W adjusting screw is the RH screw on the compensator.
3. Rotate the aircraft to a known magnetic heading of South. Note the degrees of deviation. Using the N-S adjusting screw, remove one half of the deviation.
4. Rotate the aircraft to a known magnetic heading of West. Note the degrees of deviation. Using the E-W adjusting screw, remove one half of the deviation.
5. Return the aircraft to the known magnetic heading of North to confirm its relation to South. The deviation should be the same. In some aircraft "fine tuning" adjustments and rechecks are necessary.
6. Return the aircraft to the known magnetic heading of East to confirm its relation to West. The deviation should be the same. In some aircraft "fine tuning" adjustments and rechecks are necessary.
7. On completion of the preceding procedure, the aircraft is rotated to each 30 degree known magnetic heading thru 360 degrees and the deviation is recorded on the compass correction card.
8. The compass correction card should be installed close to the compass and convenient for the pilot to read.

SHOULD the preceding procedure fail to produce satisfactory results, here are some suggestions:

Use a magnet to check hardware in the proximity of the compass. Steel screws and nuts can be replaced with brass or aluminum in some uses. Steel shake-proof lockwashers will hold magnetism.

Some radio navigational instruments with meter movements have been the problem when they have no magnetic shield. This is a physical problem and not an electrical problem.

If the problem is electrical, manipulation of the switches should point out the site. On some rare occasions, it has been necessary to reroute some wiring.

Relocation of the compass is sometimes the answer. Sometimes only slight relocation can be the answer.

PAI MAGNETIC BALANCING BALLS - PART NO. PBB 475

The PAI Magnetic Balancing Balls are additional compensation aids. They are used in some aircraft to overcome compensation problems that resist all else. They are used successfully in many steel frame aircraft -Mooney, Bellanca, etc. Major deviation errors can be adjusted with the PAI Magnetic Balancing Balls and "fine tuning" is accomplished with the poly-plane compensator.

Phone (713) 644-7383
Fax (713) 644-7385

8124 Lockheed
Houston, Texas 77061

PRECISION AVIATION, INC.

WARRANTY REGISTRATION

TO BE RETURNED TO MANUFACTURER ON INSTALLATION

DATE _____

PAI-700 VERTICAL CARD MAGNETIC COMPASS

SERIAL NO. 84854

CUSTOMER _____ TELEPHONE _____

ADDRESS _____

PURCHASED FROM _____ DATE _____

INSTALLED BY _____ DATE _____

ADDRESS _____ TELEPHONE _____

INSTALLATION INFO

AIRCRAFT, Manufacturer, Model, Year _____

Mounting Location _____ Light Voltage _____

Type of Bracket _____

Vibration Damping? _____

REMARKS

_____

_____

_____

_____

P.A.I. INC., Date _____

_____

_____

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