rotate only in the horizontal plane. This is done by lowering the center of gravity below the pivot point and making the assembly heavy enough that the vertical component of the magnetic force is too weak to tilt it significantly out of the horizontal plane. The compass can then work effectively at all latitudes without specific compensation for dip. However, close to the magnetic poles, the horizontal component of the Earth's field is too small to align the compass which makes the compass unuseable for navigation. Because of this constraint, the compass only indicates correctly if the card is horizontal. Once tilted out of the horizontal plane, it will be affected by the vertical component of the Earth's field which leads to the following discussions on northerly and southerly turning errors.

Northerly Turning Errors

The center of gravity of the float assembly is located lower than the pivotal point. As the aircraft turns, the force that results from the magnetic dip causes the float assembly to swing in the same direction that the float turns. The result is a false northerly turn indication. Because of this lead of the compass card, or float assembly, a northerly turn should be stopped prior to arrival at the desired heading. This compass error is amplified with the proximity to either magnetic pole. One rule of thumb to correct for this leading error is to stop the turn 15 degrees plus half of the latitude (i.e., if the aircraft is being operated in a position near 40 degrees latitude, the turn should be stopped 15+20=35 degrees prior to the desired heading). *[Figure 8-36A]*

Southerly Turning Errors

When turning in a southerly direction, the forces are such that the compass float assembly lags rather than leads. The result is a false southerly turn indication. The compass card, or float assembly, should be allowed to pass the desired heading prior to stopping the turn. As with the northerly error, this error is amplified with the proximity to either magnetic pole. To correct this lagging error, the aircraft should be allowed to pass the desired heading prior to stopping the turn. The same rule of 15 degrees plus half of the latitude applies here (i.e., if the aircraft is being operated in a position near 30 degrees latitude, the turn should be stopped 15+15+30 degrees after passing the desired heading). *[Figure 8-36B]*

Acceleration Error

The magnetic dip and the forces of inertia cause magnetic compass errors when accelerating and decelerating on easterly and westerly headings. Because of the pendulous-type mounting, the aft end of the compass card is tilted upward when accelerating and downward when decelerating during changes of airspeed. When accelerating on either an easterly or westerly heading, the error appears as a turn indication toward north. When decelerating on either of these headings, the compass indicates a turn toward south. A mnemonic, or memory jogger, for the effect of acceleration error is the word "ANDS" (Acceleration-North/Deceleration-South) may help you to remember the acceleration error. *[Figure 8-37]* Acceleration causes an

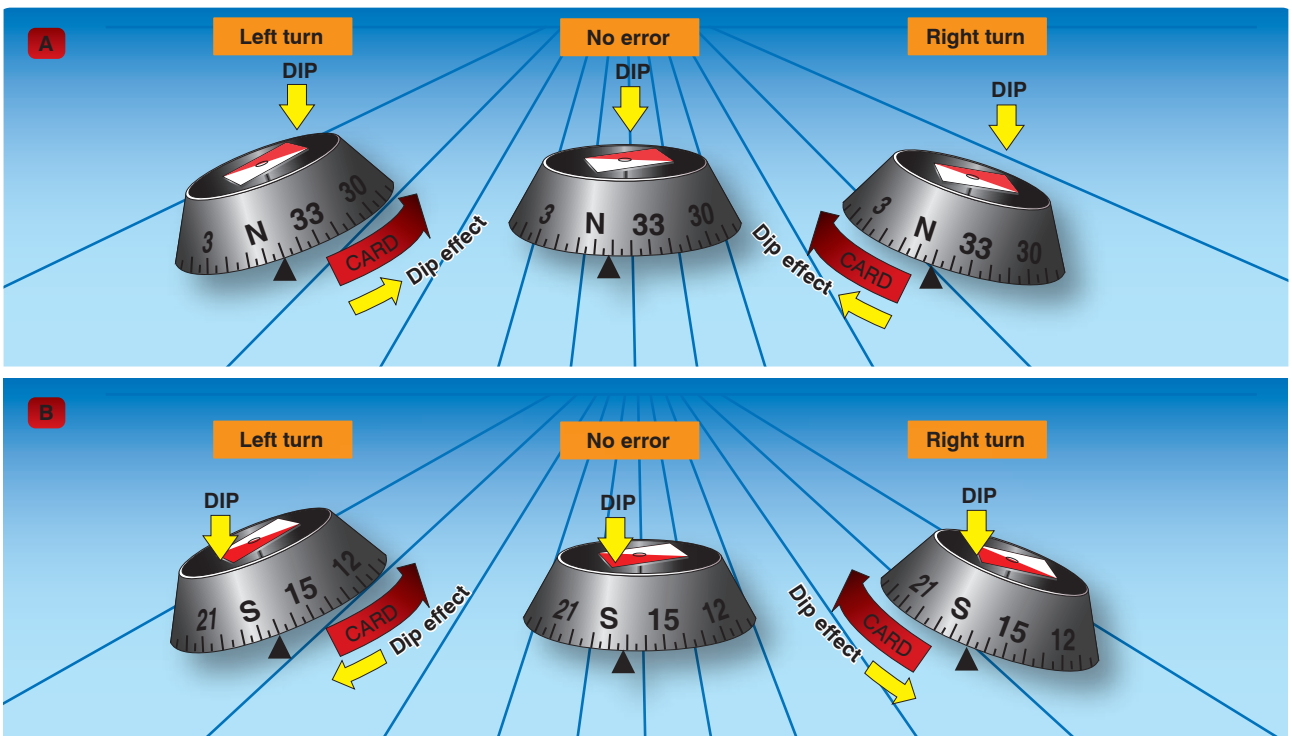

Figure 8-36. *Northerly and southerly turning errors.*