



## E. GEONAV SELF CONTAINED QUALITY CONTROL

### 1. Continuous Sensor Quality Control

The doppler sonar and associated parameters necessary for velocity measurement are of foremost importance. The basic sonar measurement provides a component of frequency from each of the four sonar axes (fore, aft, port, and starboard). These measurements are relative to the plane to which the sonar transducer is attached. Since this plane is normally free to roll and pitch with the vessel, vessel attitude must be measured. For similar reasons, the velocity of the vessel must be measured normal to the sonar transducer mounting plane. These sonar frequency measurements must be corrected for the velocity of sound in water. To complete the data set, the frequency of the transmitted sonar energy is required to resolve the velocity component normal to the sonar mounting plane.

In all cases, the basic measurement data are examined by the computer for reasonableness and rate of change; if found anomalous, the GeoNav operating system alerts the operator to the error condition. This is the most basic level of system quality control.

Another ancillary item of data measured by GeoNav is the time of arrival of the echoes from the four sonar beams with respect to the transmitted energy pulse. These measurements permit extension of GeoNav sonar quality control to include reasonableness of the locale of the sonar echoes. When combined with sound velocity data, these measurements extend GeoNav's usefulness as a depth-controlling device. The four sonar echoes per transmitted pulse also provide a powerful tool for bottom topography studies.

Likewise, data from the azimuth measurement subsystem are examined for reasonableness of magnitude and rate of change. The operator is informed of anomalies.