



INERTIAL MEASUREMENT UNIT FOR THE SPACE SHUTTLE

Kearfott supplies the Inertial Measurement Unit (IMU) for the Space Shuttle Orbiter for both present and future applications. At present the Kearfott KT-70 IMU is operational on all the orbiters and has been so since the first launch.

The IMU provides accurate velocity and attitude information for use in the Shuttle Orbiter guidance, navigation and control system. The inertial sensors contained in the four gimbal platform are GYROFLEX® gyros and force rebalance accelerometers. Eight speed resolvers are utilized to provide precise digital gimbal angle readouts.

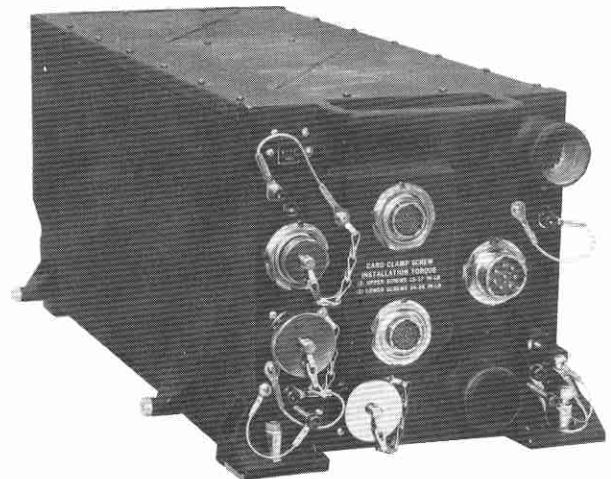
The IMU has been aboard all Orbiter flights to date and has performed well within the required specifications.

The future IMU presently being certified is a member of the Kearfott High Accuracy Inertial Navigation System (HAINS) family. This next generation unit is fully interchangeable with the KT-70 and in a phase-in program, will replace the KT-70 on the Orbiters in the early 1990's.

The HAINS unit contains the next generation inertial components and new technology electronics such as a microprocessor to store calibration constants. The replacement HAINS IMU provides additional enhancements in the form of higher performance, smaller volume, lower weight, more extensive Built-In Test (BIT) and lower life cycle costs.

Inertial Measurement Unit (IMU)

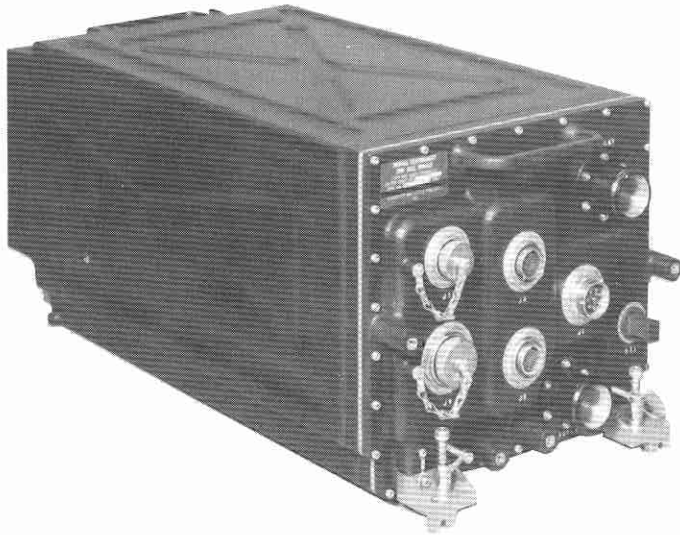
The Space Shuttle IMU consists of an all-attitude stabilized platform and associated electronics to supply output data proportional to the Orbiter's attitude and velocity.



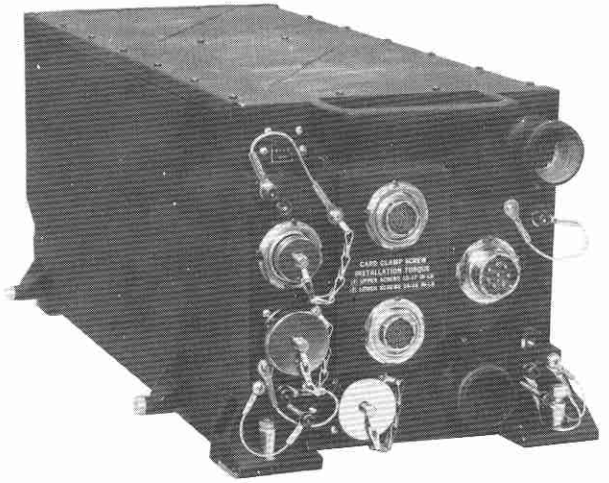
The Orbiter employs a triple redundant IMU configuration, with skewed inertial clusters, wherein both hardware and software performance and failure detection techniques are utilized. Software was developed and is operational for factory calibration/test, hangar calibration and preflight calibration and alignment. Factory-obtained calibration constants are stored and utilized for compensations within the HAINS unit. In-orbit IMU alignment updates are provided by on-board star trackers, which are mounted on a common navigation base.

The IMU interface is accomplished via a multiplexed serial data-line and its completely compatible with the Orbiter's general purpose computers. Each IMU is completely self-contained requiring only external power and cabin cooling air.

The HAINS IMU version, because of its reduced size, can be mounted on the common navigation base in a four-IMU configuration. The triple redundancy presently employed can thus be extended to a quadruple configuration.



**present application
KT-70 IMU**



**next generation
Space Shuttle HAINS**

CHARACTERISTICS	
DIMENSIONS (Max):	
HEIGHT	10.280 in.
WIDTH	12.000 in.
LENGTH	22.000 in.
WEIGHT	56.5 lbs. (Max)
POWER	28 V dc

CHARACTERISTICS	
DIMENSIONS (Max):	
HEIGHT	9.235 in.
WIDTH	10.880 in.
LENGTH	22.000 in.
WEIGHT	43.5 lbs (Max)
POWER	28 V dc

