

# PGHM Vision Measurement System

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For installation of payloads into the Orbiter cargo bay while at the pad, the payload is delivered to the launchpad in a canister. The payload is then transferred into the payload bay of the Shuttle Orbiter. The mechanism responsible for manipulating the payload, the Payload Ground Handling Mechanism (PGHM), consists of a set of movable J-Hooks that lift the payload by its trunnions. Successful, safe integration of the payload requires careful position measurement of the J-Hooks relative to the payload trunnions and the payload relative to the Orbiter payload bay. Due to the complex nature and high mission-to-mission variability of the geometry involved with the flight hardware, rulers are presently the best way to measure these relative positions; however measurement with rulers is difficult, time-consuming, and relatively inaccurate. The PGHM Vision Measurement System alleviates this measurement problem by using a standard inexpensive, RS-170, monochrome camera coupled with digital image processing to precisely measure the relative position of the payload. The image processing algorithms are specifically designed to locate and track uniquely designed targets. The system accurately measures the X, Y, and Z position of the payload via the vector position of the targets. The vision measurement system is currently being integrated into the PGHM.

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