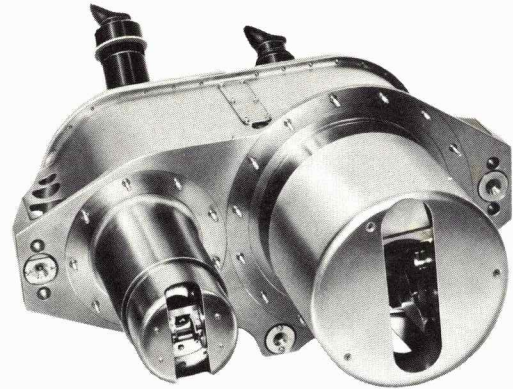


OPTICAL UNIT ASSEMBLY (OUA)



The OUA, a sextant-telescope package, is used to sight on known reference stars and landmarks for the fine angle measurements needed in navigational checks. In most operations, the Command Module pilot will use the telescope to locate a target star, then sight the selected star in the magnified field of view of the sextant to make precise measurements.

Measuring the angle from the stars to the base line of the optical sub-system yields information for aligning the Inertial Measurement Unit of the Guidance and Navigation System. This accurately establishes the spacecraft's orientation. Measuring the angle from reference stars to earth or lunar landmarks checks the position of the spacecraft.

In both cases, when the star is accurately located in the sextant cross hairs, the astronaut presses a Mark button, feeding the information to an on-board guidance computer. The computer calculates and performs the alignment of the Inertial Measurement Unit and provides course correction information to the pilot.

SPECIFICATIONS

More than 50 optical elements

Dimensions 21¾ x 11½ x 14½ inches
Total Weight 53 pounds

The OUA Sextant

Image Magnification 28 power
Field of View 1.8 degrees
Angular Measuring Accuracy . . . 10 arc seconds

The OUA Telescope

Image Magnification 1 power
Field of View 60 degrees
Angular Measuring Accuracy . . . 4 arc minutes

ALIGNMENT OPTICAL TELESCOPE (AOT)

The AOT is part of the guidance and navigation system of the Lunar Module and is mounted in the LM cabin on a common base with the Inertial Measurement Unit (IMU). It is used to align the Inertial Measurement Unit during separation in earth orbit and as the LM returns to the Command Module.

The navigator in the LM selects a known navigational star within the field of view of the telescope, then adjusts the instrument's reticle until the star is bracketed by two radial lines engraved on the reticle's surface. The angular position of the star is then read from an attached digital counter and punched into the LM Guidance Computer.

Another adjustment is then made to bracket the star between two spiral lines on the same reticle. When similar data is read from the counter and entered into the LM Guidance Computer, the computer calculates and performs the alignment of the IMU.



SPECIFICATIONS

23 Optical Elements

Image Magnification 1 power
Field of View 60 degrees
Weight 25 pounds
Dimensions 34¾ x 12 11/16 x 7¾ inches

APOLLO RANGEFINDER



The rangefinder will provide the Command Module pilot with a reading of the distance to the Lunar Module during the rendezvous maneuver.

The astronaut sights the Lunar Module through a rendezvous window and turns an adjustment control until a movable image of the LM is tangent to a second, fixed image. The adjustment rotates a pair of wedges which are calibrated in terms of range and mechanically linked to a drum scale. As the astronaut monitors the rendezvous he takes distance readings without computation on his part.

The rangefinder is designed for either hand-held or bracket-mounted operation. On the Apollo 9 mission, it will be mounted above the headrest of the flight commander's couch.

SPECIFICATIONS

21 Optical Elements

Image Magnification 8 power
Field of View 7 degrees
Weight 6 pounds, 13 ounces
Dimensions 8½ x 6 x 6 inches
Range 0.15 to 4.0 nautical miles measured to an accuracy of 5%

NAVIGATION INSTRUMENTS FOR APOLLO

Apollo Navigational Star Chart



Kollsman Instrument Corporation

SYOSSET, NEW YORK

Subsidiary of Standard Kollsman Industries Inc.

Kollsman Instrument Corporation

