

**VOLUME IV APPENDIX F****SECTION 1: SYSTEM DESCRIPTION, RATE GYRO**

Each SRB contains two Rate Gyro Assemblies (RGAs); the four RGAs (2 in each SRB) are treated as a quad redundant system by Orbiter software. Two out of four are required for satisfactory operation. Each RGA contains two rate integrating gyros (RIGs); one RIG senses rates about the vehicle pitch axis and the other RIG senses rates about the vehicle yaw axis.

Flight usage for the RGAs is short; used only for boost stage. The RGAs have gyro hunt-frequency and amplitude matched over temperature range to 0.4 HZ. The RGAs are designed to Contract End Item (CEI) specification.

**SECTION 2: COMPONENT DESCRIPTION**

## o Pitch and Yaw Axis

The torquer amplifier applies a conditioned output error signal to the torquer winding. The gimbal of the high speed gyro is driven to null by the torquer winding. The gimbal is driven away from null by vehicle motion. A microsyn detector outputs an error signal to the signal conditioner. The conditioned signal is fed to rate output amplifiers and the torquer amplifier.

## o Spin Motor Rotation Detector (SMRD) BIT Circuit

This circuit detects the slight hunt - frequency voltage in the high speed gyro caused by minor imperfections. SMRD output indicates the gyro is spinning. SMRD "dropouts" can be caused by a too-perfect gyro. There is one SMRD signal for each RIG (two per RGA).

## o BITE Torquing Circuits

These circuits drive the RIG torquer amplifier to full positive or full negative output. This forces the rate signal to full scale positive or negative. Positive and negative torque commands are available for each gyro.

## o Qualification

Design is proven and parts are derated twenty-five percent to operating requirements. No state of the art problems have been identified.

**SECTION 3: TESTING**

Full range acceptance testing is performed on each RGA prior to delivery. Ground turnaround and preflight tests are performed including BITE, SMRD and torque testing. Power to return and power to chassis isolation test are performed. (All Failure Causes)

A complete functional test will be performed prior to placing the RGA in storage for reuse.

DCN032

**ESD Protection**

ACO OMRSD 10REQ-0021, Para 4.11 requires that grounding wrist straps be worn at all times when electrical connector pins are being contacted with anything other than the mating connector and/or the component is being handled with covers removed. In addition, LRU connectors shall have metal caps or non-metallic ESD protective caps installed when not mated to cables, and prior to removing the LRU connector protective caps for cable mating. The shell of the mating connector shall be grounded. Interconnecting cables terminated on one end to an LRU are considered an extension of the LRU and are handled in accordance with the specified procedures.

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### SECTION 4: VENDOR INSPECTION

Raw material verification to meet specification is performed.

Parts identification, protection, manufacturing process and assembly are verified.

Welds and brazes are verified by NDE evaluation.

#### Critical Processes

Soldering  
Conformal Coating

### SECTION 5: KSC RELATED INSPECTIONS

- a. RGA ACO power-on, SMRD and rate gyro null and torque test are verified by per 10REQ-0021, para 1.2.2.19.1, 1.2.2.19.3.
- b. Verification that RGAs remain in the null position during ascent is performed during simulated ascent testing per 10REQ-0021, para. 1.2.3.2.3.
- c. SPC verifies RGA power-on and SMRD and attitude responses per OMRSD File II, Vol. 1 Requirement Number S00000.640.
- d. SPC verifies that RGAs respond to both positive and negative torque commands and return to null per OMRSD File II, Vol. 1 Requirement Number S00000.643.
- e. SPC verifies polarity of rate gyro outputs per File II, Vol. 1 Requirement Number S00000.645.