Sally K. Ride Papers - STS-51B and STS-51L Material

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Each spectrometer uses the Ebert-Fastie design: an off-axis reflector telescope, with magnesium fluoride coatings to enhance transmission which focuses light from Halley, via a spherical mirror and a spectral grating, on a coded anode convertor with 1,024 detectors in a straight line. The grating is ruled at 2,400 lines per millimeter.

The detectors are made of cesium iodide (CsI) for the G-spectrometer (128-168 nm) and cesium telluride (CsTe) for the F-spectrometer (180-340 nm). The system has a focal length of 250 mm and an aperture of 50 mm.

The F-spectrometer grating can be rotated to cover its wider range in six 40 nm sections. A slit limits its field of view to a strip of sky 1 by 80 arc-minutes (the apparent diameter of the moon is about 30 arc-minutes). The G-spectrometer has a 3 x 80 arc-minute slit because emissions are fainter at shorter wavelengths.

With Halley as little as 10 degrees away from the sun, two sets of baffles must be used to reduce stray light. An internal set is part of the Mariner design. A new external set serves both instruments. It has two knife-edge baffles 38.5 inches away from the spectrometer entrances, and 20 secondary baffles to stop earthlight. Together the two baffle sets reduce stray light by a factor of a trillion. It is this system that will make it possible for Spartan-Halley to observe the comet while so close to the sun. In addition, internal filters reduce solar lyman-alpha light (121.6 nm), scattered by the Earth's hydrogen corona, which would saturate the instruments.

Two film cameras, boresighted with the spectrometers, will photograph Halley to assure pointing accuracy in post-flight analysis and to match changes in the tail with spectral changes. The 35mm Nikon F3 cameras have 105 mm and 135 mm lenses and are loaded with 65-frame rolls of QX-851 thin-base color film. The cameras will capture large-scale activity such as the separation angle between the dust and ion tails, bursts from the nucleus, and asymmetries in the shape of the coma.

The whole instrument package is mounted on an aluminum optical bench -- 35 by 37 inches and weighing 175 lb. -- attached to the Spartan carrier. This provides a clean interface with the carrier and aligns the spectrometers with the Spartan attitude control sensors. A 15-inch high housing covers the spectrometers and the cameras.

The instrument package is controlled by a LASP-developed microprocessor which stores the comet Halley ephemeris and directs the Spartan carrier attitude control system.

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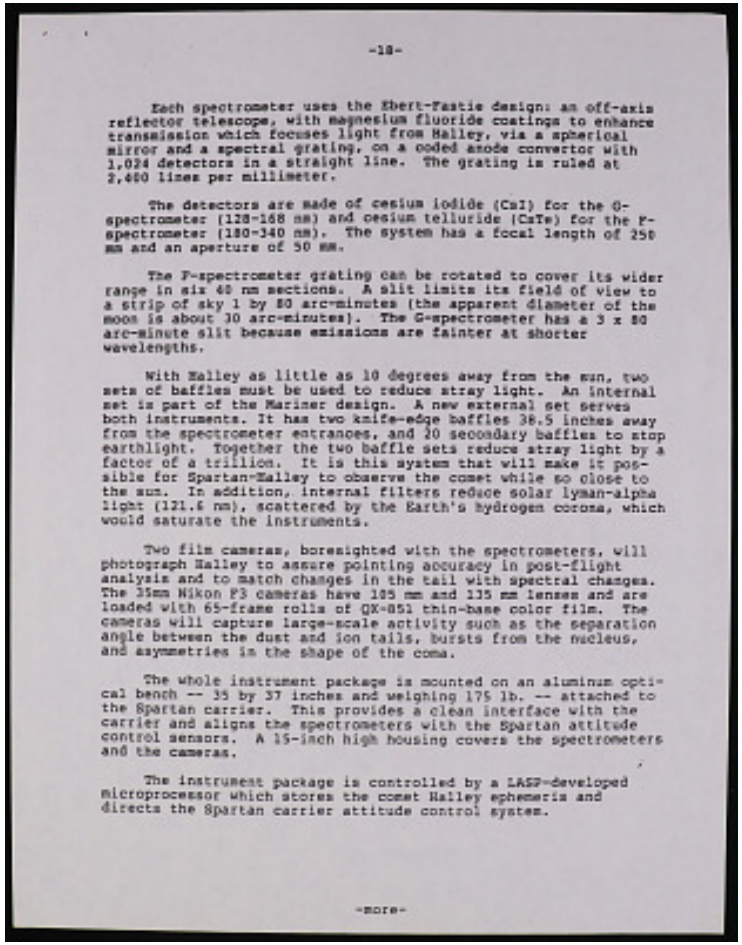

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