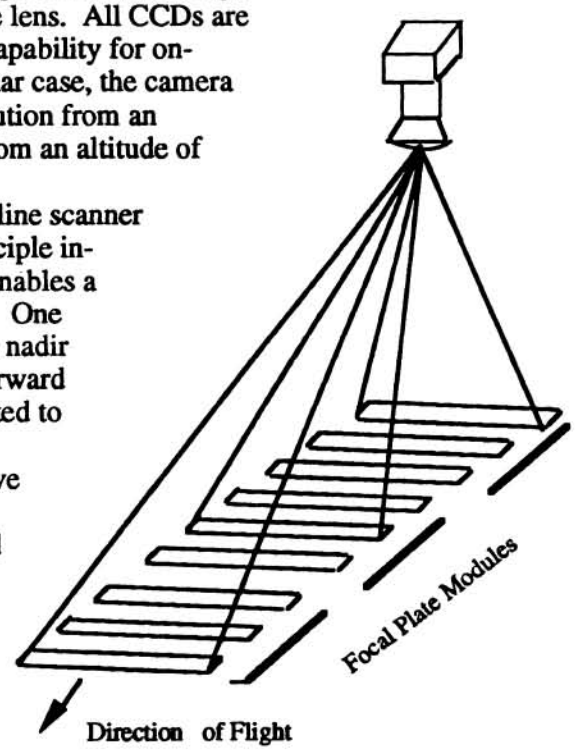
THE HIGH RESOLUTION STEREO CAMERA (HRSC) FOR THE LUNAR SCOUT I MISSION; G. Neukum, DLR, Institute for Planetary Exploration, Berlin-Adlershof/ Oberpfaffenhofen.

The High Resolution Stereo Camera (HRSC) is a planetary imaging system developed by the German Aerospace Research Establishment (DLR) with the involvement of the German Space Industry under the leadership of the German Space Agency (DARA) for the Russian Mars 94 and Mars 96 missions. The same instrument, virtually unmodified, is ideal for imaging the Moon. If flown on a Lunar Scout spacecraft, The HRSC will be operated so that it will produce data suitable for generation of a global lunar geodetic net, a global stereo image data set (both data sets produced at an orbit altitude of 200 kms approximately) and high resolution stereo imagery of areas of interest to the scientific community from an orbit altitude of 100 kms (resolution is a function of orbit altitude). All data will be digital.

The HRSC consists of a camera system and a mass memory system. The camera has one objective lens (focal length = 175 mm, f-number = 5.6 as configured for Mars) nine spectral filters and three focal plate modules. The focal plate modules have three line CCDs each for a total of nine. Each CCD (Thomson THX 7808) has 5272 7x7 micron pixels, of which 5184 are active. Each focal plate module is separately adjustable with respect to the objective lens. All CCDs are active simultaneously. There is significant capability for on-board camera parameter selection. In the lunar case, the camera system is capable of 8 meters per pixel resolution from an altitude of 200 kms and 4 meters per pixel from an altitude of 100 kms.

The HRSC operates in the "push broom" line scanner mode as shown in the figure. The basic principle involves a triple stereo image generation that enables a geometric reconstruction of the orientation. One focal plate module is forward looking, one is nadir pointing, and the third is aft looking. The forward looking focal plate module CCDs are dedicated to stereo, infrared (970nm) and photometry (675nm), the nadir module CCDs are sensitive in the blue (440nm), green (530nm) and the nadir stereo CCD in the visible (675nm), and the aft looking module has stereo, purple (750nm) and photometry (675nm). Stereo capability is provided by a viewing angle separation of 18.9 degrees between the fore and aft focal plate modules with respect to nadir.



The mass memory unit has a maximum capability of 2 Gbits and a net of 1 Gbit storage. A high degree of on-board data manipulation is possible, e.g., compression of 10:1, pixel summing and parameter selection. Capacity is sufficient for the lunar mapping modes that are planned. Software is being developed for data reduction and photogrammetric data processing for the Mars 94 / 96 missions and can be applied to the lunar case.