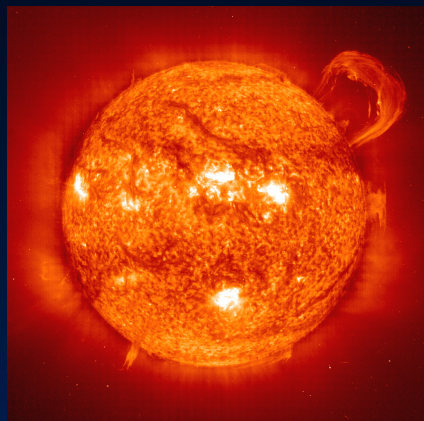


British Astronomical Association Radio Astronomy Group

2.695Ghz Solar Radiometer

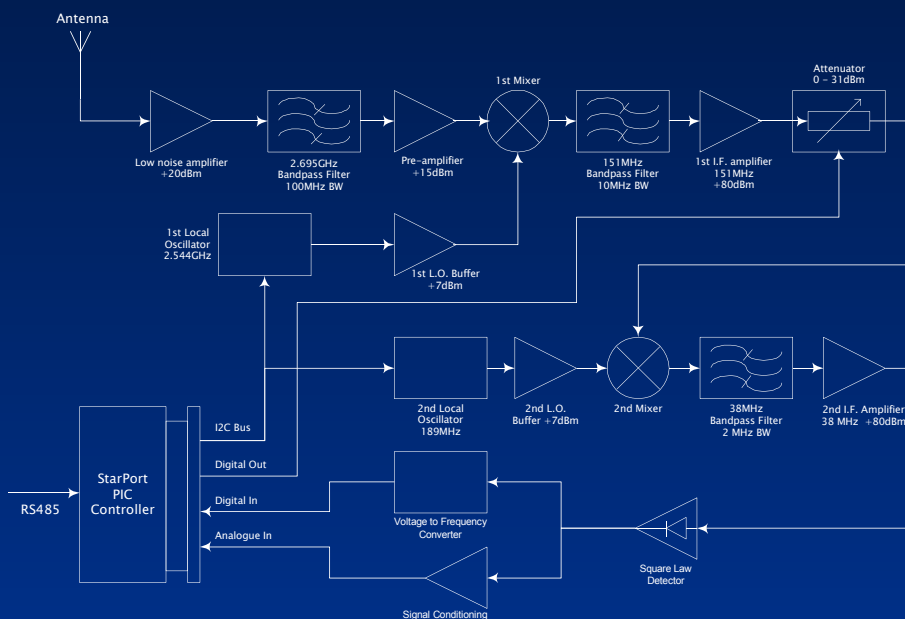


Courtesy of SOHO/EIT consortium. SOHO is a project of international cooperation between ESA and NASA.

This SOHO Extreme Ultraviolet Imaging Telescope full sun image, taken on 14 September 1999 in the He II emission line at 30.4nm, shows the upper chromosphere/lower transition region at a temperature of about 60,000 K. The bright features are called *active regions*.

Areas of high electron densities that form in active regions produce radio frequency emission covering a broad spectrum. This emission, known as the *slowly-varying* or *S-component*, changes as sunspots and plages evolve, decay and move across the face of the Sun during its 27-day rotation period. The correlation between the number of active regions and the S-component is known to be excellent over a range of microwave frequencies. Determination of the equation describing this correlation at 2.695GHz is one of the Group's many exciting projects in its solar observation programme.

In the absence of active regions, the received signal is expected to be equivalent to ~30 solar flux units, but this value can increase by over a thousand fold should a solar flare erupt. These extremes define the amplitude range presented to the detector. The receiver uses a *double-conversion superheterodyne* method to transform signals at 2.695GHz to 151MHz and thence to 38MHz where most of the signal amplification takes place prior to detection. This arrangement overcomes the possibility of any re-radiated signals from the receiver being picked up by the antenna and amplified again, thus avoiding positive feedback that would quickly saturate the detector.



1 Solar Flux Unit = 10^{-22} watts / square metre/ Hertz



Shown here are the 2.695GHz 5th-order bandpass filter using micro-stripline techniques, and the 38MHz intermediate frequency (IF) amplifier using surface-mount components. The antenna module comprises four, identical, 27-turn helices 720mm long, and is designed to be easily expandable in two dimensions when extra gain or narrower beamwidth is required. The direction and degree of circular polarisation associated with solar flares at microwave frequencies can be determined with the use of an additional module having its helices wound in the opposite sense.

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