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THE AIRBORNE MULTICHANNEL RADIO-METER COMPLEX "KYI" FOR REMOTE SOUNDING OF THE EARTH FROM SPACE

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The paper give a short description of the "Kyi" radio-meter complex for equipping the "Sich-3" artificial earth satellite designed for solving problems of Earth monitoring from the space.

The "Kyi" radio-meter complex (RMC) is designed for the Earth and atmosphere remote sounding by measuring spatial distribution of radio-luminance temperatures of the Earth-atmosphere system in several bands of the radio range in order to obtain information of the atmosphere, earth covers, water surfaces, and anthropogenic objects.

The operating principle when doing the joint processing of data on spatial distribution of radio-luminance temperatures of the Earth-atmosphere system obtained in six frequency channels within the range of 6–90 GHz on two linear polarizations helps us to solve the following problems: the measurement of oceanographic parameters; study of ice situation; investigation of the cloud cover; determination of temperature and humidity of soils and grounds in oceanology, meteorology, nature conservation, and ecology.

The radio-heat radiation of the medium under investigation arrives at the antenna-waveguide system of reflector type *1* (Fig. 1). Reflector *2* is a cut-out from the paraboloid of revolution having the aperture size of up to 1.5 m. Scanning is conducted by continuos revolution at the constant speed of all the antenna system around the axis passing through the center of the nadir projection of the reflector (the antenna electric axis is shifted from the nadir through the angle of some 46 degrees) by means of a synchronous drive located on pivotal device *3*. Control of the scanning system motor is done by the control unit of scanning mechanism *4*.

RMC calibration is run during scanning by means of the units of "hot" *5* and "cold" *6* standard samples which according to the design are located so that during revolution of the antenna-waveguide system at certain time instances the units of feeds *7* are successively overlapped by the units of the "hot" and "cold" standard samples. Vestigial radiation from the space is used as the "cold" standard sample and the unit of the "cold" standard sample is made in the form of an auxiliary re-reflecting mirror. The "hot" standard sample is a wide-band load, whose thermodynamic field is controlled by the data processing unit (DPU).

The radio-meter receiving unit is located on the movable part and consists of 13 radio-frequency channels. A radio-heat signal in channels *1—9* of the receiving unit is amplified on the frequency up to 50–55 dB, detected and then is amplified by means of a direct-current amplifier (DCA) whose circuit of negative feedback incorporates the system of controlling the gain. The signal for adjusting the gain is shaped by the data processing unit by the calibration results. From the DCA output the signal through a analog-to-digital converter arrives at the digital integrator and then the control and data acquisition unit shapes a group information signal. The DCA, which is located in a sealed section of the space vehicle, performs operational data processing.

The RMC specifications: central working frequencies, GHz (the band of working frequencies, MHz) constitute: 6.6 (300); 10.65(100); 18.7(200); 22.2(250); 36.5(1000); polarization of the signal received is 22.3 GHz – vertical, while in other receiving channels it is vertical and horizontal; the band of the Earth's field of vision during the movement of the space vehicle constitutes 900–1,000 km; the size of a spot on the Earth's surface whose radiation is registered during scanning by