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19. Mirror Full-Rotation 64 m Diameter Antenna for Radioastronomy

Designed by: TSNIIproektstalkonstruktsiya, USSR

Consumer: Observatories

Dimensions:

Diameter of the main mirror: 64 m

Accuracy of the surface for any inclination relative to the horizon and a wind action with a speed of 20 m/sec (mm): 1.0

Rotation range:

by the angle of position, deg.: - 5 to +95

by the azimuth, deg.: 0 to +360

Material:

Bearing frame: steel 38/23

Reflecting surface: aluminium alloy

Mass:

Members rotated by the angle of position: 2200 tons

Members rotated by the azimuth: 4000 tons

The antenna is intended for equipment of large scientific research centers and radiophysical observatories of the country investigating problems of radioastronomy. The structural members and mechanisms ensure highly effective operation of the antenna in the centimeter range of radiowaves at a wind speed of 20 m/sec and an insignificant lowering of accuracy at a wind speed of 25 m/sec. In the stationary state the antenna can withstand any stormy wind action. Antennae of this type are constructed in the Soviet Union for the first time.

The reflecting surface of the antenna is made up of 2000 separate high-precision profiled panels regulated with respect to the frame which allows to ensure the starting precision of the surface from within 0.5 mm keeping the requirements for accuracy of fabricating and erecting the frame members within the limits given in the Soviet Building Standards and Rules. This considerably facilitates fabrication and simplifies the structural members erection techniques.

The bearing frame of the mirror system is a multiple statically indeterminate grillage structure with a radially-annular positioning of separate members. This is the first example in designing metal structural members of the bearing frame in the USSR where the problem of their optimization has been solved by the effective work of the structure based on utilization of the phocus compensation principle.

The constructive solution of the structure and appropriate distribution of the material in the frame members ensures insignificant deformation of the antenna structure during its rotation and retains the parabolic form of the reflecting surface.

The supporting members of the mirror system are fabricated completely at structural metalwork plants. Compared to the existing practices of fabricating high-precision antenna structures at special plants the present method results in considerable economy (4'000'000 roubles when fabricating one 64 m diameter antenna).

*(A.G. Sokolov,
V.S. Poliak)*

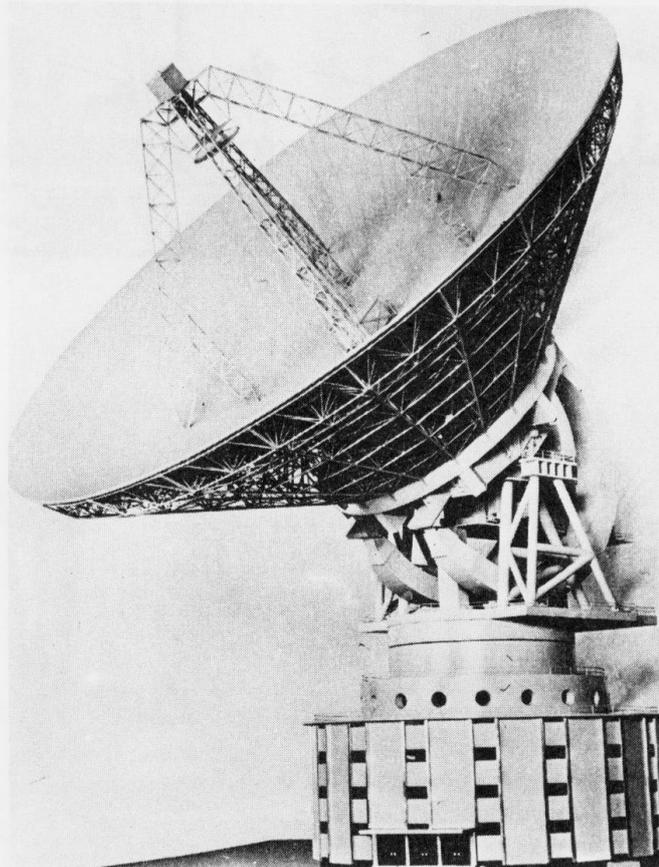


Fig. 1 General View