

1.10 Survey of 34m VLBI Antenna Reference Point

(1) Survey method

- 1) In 1999, the survey of the reference point of 34m VLBI antenna was conducted through the same “indirect method” applied in 1998 survey.
- 2) The indirect method applied here was a method to set a survey target near the reference point of VLBI antenna and measure this target with TS from base points located on two sides of VLBI antenna. From each of the base point, a total of nine positions of the target have been measured by rotating the azimuth angle and elevation angle of VLBI antenna respectively to three different directions. As a result, coordinates of the target at 18 different positions on a spherical surface have been gained. And from these coordinates, the coordinates of the spherical center (reference point) of VLBI antenna were estimated by applying the method of least squares.
- 3) For controlling the change of direction of the survey target whenever the azimuth angle and the angle of elevation of VLBI antenna have been shifted, remote radio-controlled method was used in 1999 instead of the manual method applied in the previous year (1998). Apparently, this new method brought significant improvement in terms of higher safety of the surveyors and better efficiency of their work.

(2) Survey results

- 1) As displayed in Table 19, the estimated coordinates of the spherical center (reference point) by applying the method of least squares to the eighteen (18) coordinate values gained in 1999 survey showed evidently that the reference point was appropriately determined.

Table 19 Results of the calculation of the spherical center using the method of least squares

Maximum value of the residual (mm)			Standard deviation of the spherical center (mm)		
X	Y	H	SD _X	SD _Y	SD _H
0.9	0.8	0.7	0.2	0.3	0.3

2) As compared in Table 20, the discrepancy between the coordinates of VLBI antenna reference point gained in 1999 survey and those gained in 1998 survey was insignificantly small.

Table 20 Discrepancy resulting from the comparison with the coordinates of VLBI antenna reference point gained in 1998 and in 1999

Year	N (mm)	E (mm)	U (mm)
1998	-1.1	0.6	0.7