

VLBA Electronics Memo No. 144
July 30, 2001

To: Jon Thunborg
From: Dan Merteley
Subject: Location of PT 74 MHz Antenna Eyebolts

I've done some checking around, and it appears that the correct location for the 74 MHz, cross dipoles on the PT antenna would be 7 inches below the P-band cross dipole when the FRM system is set to its bottom software limit.

The ideal position for the 74 MHz cross dipole elements is just inside of 1/4 wavelength from the bottom of the sub-reflector. The best focus position is as high up as possible, for both 4m and 90cm--That puts the cross dipoles as close to the prime focus as possible. However, the 74 MHz cross dipoles must not interfere with the P-band cross dipole when the sub-reflector is at its bottom software limit.

Given those facts, the following calculations generate the ideal location for the 74 MHz dipole on a VLBA antenna:

GIVEN:

Total VLBA FRM travel, software limit to software limit = 25.82" (See VLBA Tech Report #5, section on FRM focus command, as pointed out by Mack Stephenson).

Current P-band cross dipole is at 3/8 wavelength from the sub-reflector at 610 MHz, which = 7.25". (See VLBA Project Book section on "0.31-0.34/0.58-0.64 GHz Feed", as pointed out by Peter Napier).

Ideal distance for the proposed 74 MHz cross dipole from the sub-reflector is 1/4 wavelength at 73.8 MHz, which = 40". (See the "Practical Antenna Handbook" by Joseph J. Carr plot of dipole radiation resistance vs height above ground in wavelengths, + reference private conversations with Rick Perley and Bill Erickson via telephone, 010723 MDT).

THEREFORE:

The ideal distance for the proposed 74 MHz dipole would be at $40" - 7.25" = 32.75"$ from the bottom of the current P-band cross dipole, with the FRM up at its top software limit.

That corresponds to $32.75" - 25.82" \sim 7"$ below the bottom of the current P-band cross dipole, with the FRM down at its bottom software limit.

