VLA COMPUTER MEMORANDUM #182

USE OF 'RASTER MODE' AT THE VLA

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It is possible to construct a raster of discrete pointings on the sky by use of lines of samples, each line described by a scan modified by an offset card. This could be useful for holographic antenna studies or beam mapping. The antennas step to each sample point and stop to integrate, while the phase center remains fixed. Any antennas marked as reference are kept fixed. An n x m raster could be constructed of n scans each measuring m samples uniformly spaced along a line. Calibrator scans may be interspersed at will.

OBSERVE does not know about the offset card, so it will be described in full here. The offset card must begin with '//OF' and modifies the source card which precedes it. The rest of the card contains nine parameters to describe the path to be followed by the antennas.

Beginning Column	Format	Variable
cc6	A1	OFSIF
cc8	A3	OFSFUN
cc12	A3	OFSTYP
cc16	F5.0	OFSAZ
cc21	F5.0	OFSEL
cc26	F5.0	OFSANG
cc31	F5.0	OFSINC
cc36	F5.0	OFSINT
cc41	I5	OFSNPT

OFSIF Gives the IF whose signed sum of LOs will be used to calculate the beam size. If not specified, IF A is used.

OFSFUN Functional form of the path to be traced. This is here for future use and is taken to be 'LIN' for line regardless of what is specified.

OFSTYP Type of raster. This, also, is here for future use and is taken to be 'ANT' for antenna, meaning the raster is done in azimuth and elevation coordinates. The natural extension would use 'SKY' to trace a pattern in RA and DEC coordinates.

OFSAZ Offsets, in units of points per beam, to the beginning of the line to
OFSEL be traced.

OFSANG Position angle, in degrees, of the line to be traced. This is measured in the usual cartesian plane with the identifications: +x ≡ +AZ and +y ≡ +EL.

OFSINC Desired spacing between sample points specified as the number of samples per beam. The angular spacing, in turns, is calculated from this by $\Delta\theta = 1.91 \times 10^{-3}/(f_{SSLO} \cdot \text{OFSINC})$. The frequency is in GHz.

OFSINT Desired integration time in seconds per sample. This must include the antenna move time for all but the first sample in a line. This should be a multiple of the 'traditional' integration time.

OFSNPT Desired number of samples along this line. When the last sample is finished, a source change is forced regardless of the stop time for this scan. A stop time that expires too soon (less than (OFSINC • OFSNPT + ϵ) seconds) will truncate the line being measured. The number of samples per line must be less than 256.

Antennas which are not flagged as reference antennas will have their u and v coordinates on the archive tape replaced by the current azimuth and elevation offset in turns. To signal this to offline programs (FILLM), the observing mode is forced to be 'H'. To identify samples along a line, the submode (fourth byte of the observing mode field) is used to count sample points.

FLAGGER runs once per integration and will flag antennas that are more than 0.1 beam off source; this should account for bad data between points.

The scanning mechanism and counting of integration per sample is not begun until at least one antenna is on source at the beginning of a line.