MARK 5 MEMO #033

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY
WESTFORD, MASSACHUSETTS 01886

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Telephone: 978-692-4764
Fax: 781-981-0590

To: Mark 5 Development Group

From: Alan E. E. Rogers

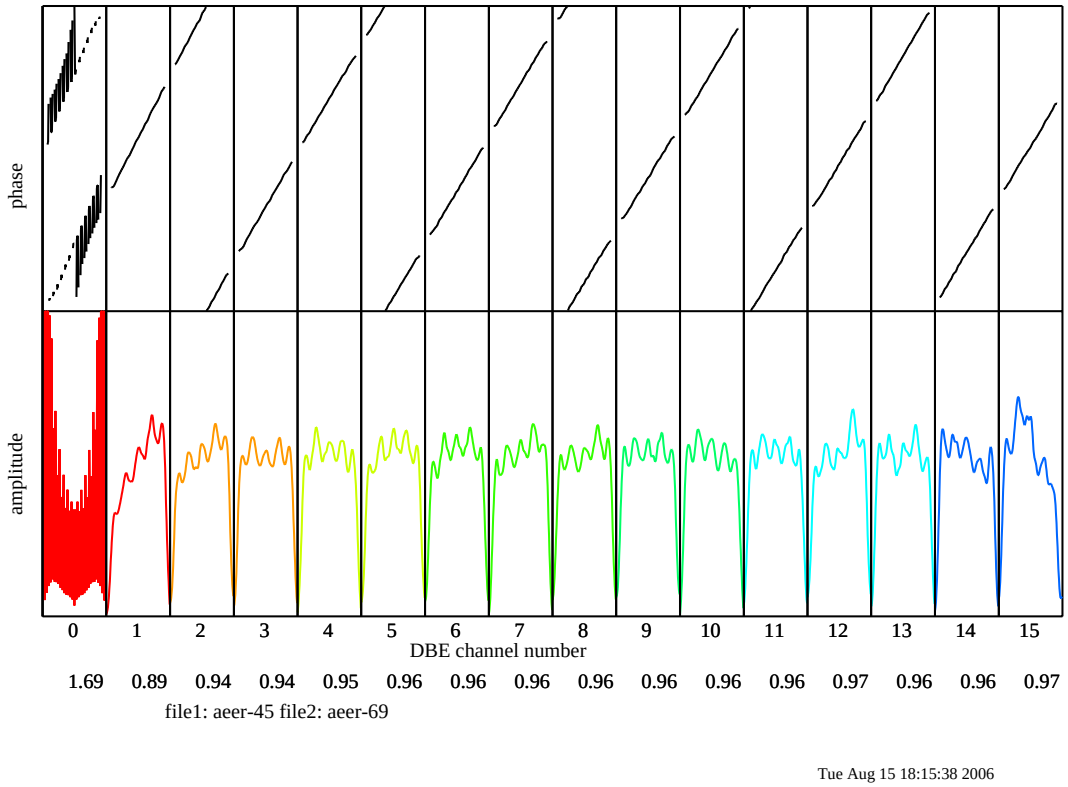
Subject: Zerobaseline test of DBE

A zerobaseline test of the DBE was made by feeding a noise source plus phase cal signal to 2 DBEs. The noise and phase cal signal was filtered with a 500 MHz bandwidth filter centered at 768 MHz. The DBEs were connected to Mark 5-645 and Mark 5-669. In the first test, whose cross-spectrum results are shown in the figure, a common 10 MHz reference was used to feed the 1024 MHz sample clock synthesizers in each DBE. The DBE channel number shown in the figure uses the convention that channel zero is the channel that is not useable because it is folded about D.C.. Since the signal was placed in the second Nyquist zone the "D.C." edge of the input frequencies are

DBE channel	"D.C." edge of input (MHz)
0	1024
1	992
.	.
.	.
15	544

and the 32 MHz bandwidth channels should be considered as Lower Sideband (LSB). The plot shows that the DBE maintains the phase from one channel to the next. That is the 10 ns difference between the synchronization of the DBEs produces a continuous phase slope of 115 degrees across each 32 MHz channel and 1843 degrees slope across the 512 MHz band. This means that, unlike the analog BBCs, the DBEs will not require any phase cal or phase calibration within each 500 MHz band. However, phase calibration will be needed between DBEs because of the unknown sampling clock phase for each DBE.

In a second test the 10 MHz signal to one of the DBEs was changed to 10 MHz and 1 Hz to produce an offset clock rate of 0.1 microseconds per second. This scan was processed by the VLBI correlator.



The cross-spectrum (using SRT software correlation) between DBEs with common I.F. input. Channel “zero” is not useable as it is folded about “D.C.”.