

END TO END VLBA CORRELATOR STATION SPECTRA TEST RESULTS  
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We have (finally!) gotten far enough along in testing the VLBA correlator to perform the first controlled end to end test of the system.

The test was performed using the set-up shown in figure 1. A spectral line of controllable strength relative to a broadband continuum signal was used to drive the baseband converter of a VLBA data acquisition rack. The system was set for a 16-MHz filter (except for the last run described below), with 2-bit 32-MHz sampling and in VLBA1:4 formatter mode.

A spectrum analyzer was used to look at the sampler analog input signal. The spectrum analyzer display was photographed and this photograph became the test reference. After sampling, the 2-bit sampler output could be captured in a RAM buffer. With the RAM buffer, 131 msec of 2-bit samples were accumulated and transformed into the frequency domain by doing high precision 512 point Fourier Transforms and accumulation on a PC.

The sampler output also drove a VLBA formatter whose output could be used to feed either the correlator directly or a VLBA transport. With the correlator we could, then, obtain spectra from the direct formatter output and from the formatter output via a recorded VLBA tape played back on a PBD (play back drive). We could then compare both of these two results to the spectrum analyzer response.

Five tests were run with varying spectral line strengths. The 5 runs are listed below;

- 1) continuum (no cw signal)
- 2) correlation coefficient of 0.02
- 3) cc of 0.5
- 4) cc of 0.95
- 5) signal of run 3 except with an 8-MHz filter selected (but sampled at 32-MHz)

where correlation coefficient is defined as,

cc = power in cw signal / total power of sampler input signal.

The results of the tests are shown in figures 2 through 6. In each figure four spectra are seen, one from each of the four measurement points illustrated in figure 1. The only things out of the ordinary seen in the correlator results are the birdies that show up in the high strength lines and the "step" seen at the high end of the spectrum of run 5. The birdies seen are similar to those observed in the initial computer simulations of the low resolution FFT used in the correlator (see VLBA correlator memo 84, figure 11). All integration periods were 131 msec. All plots are semi-log plots.

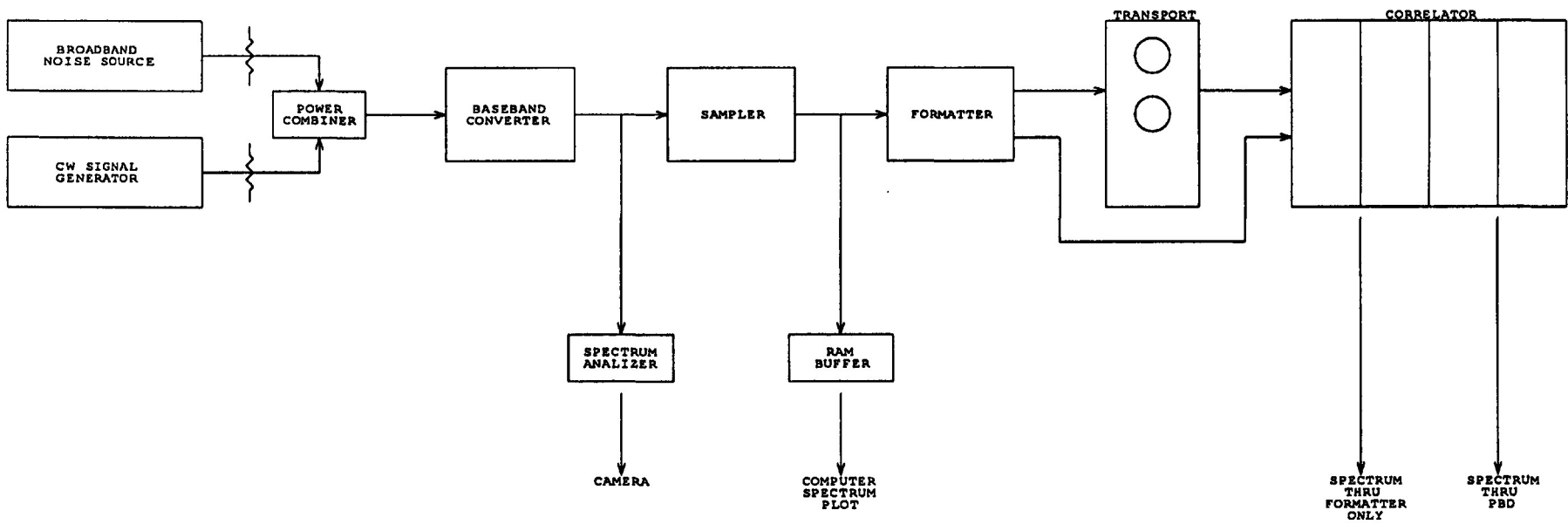


FIGURE 1

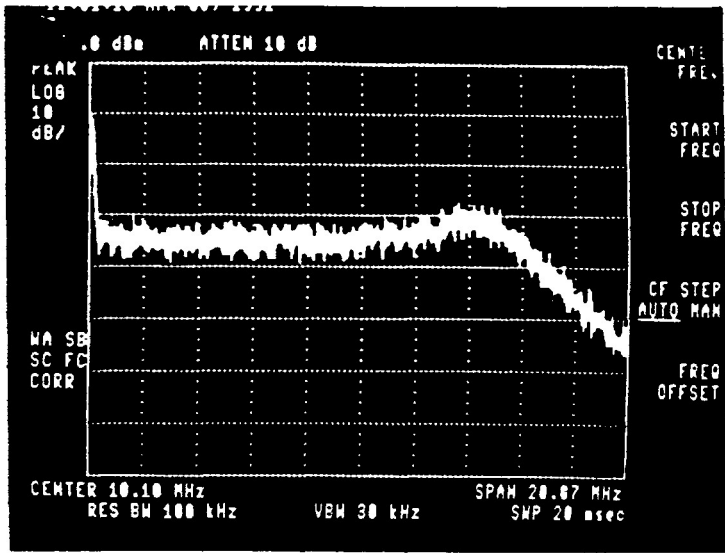


figure 2a  
spectrum analyzer

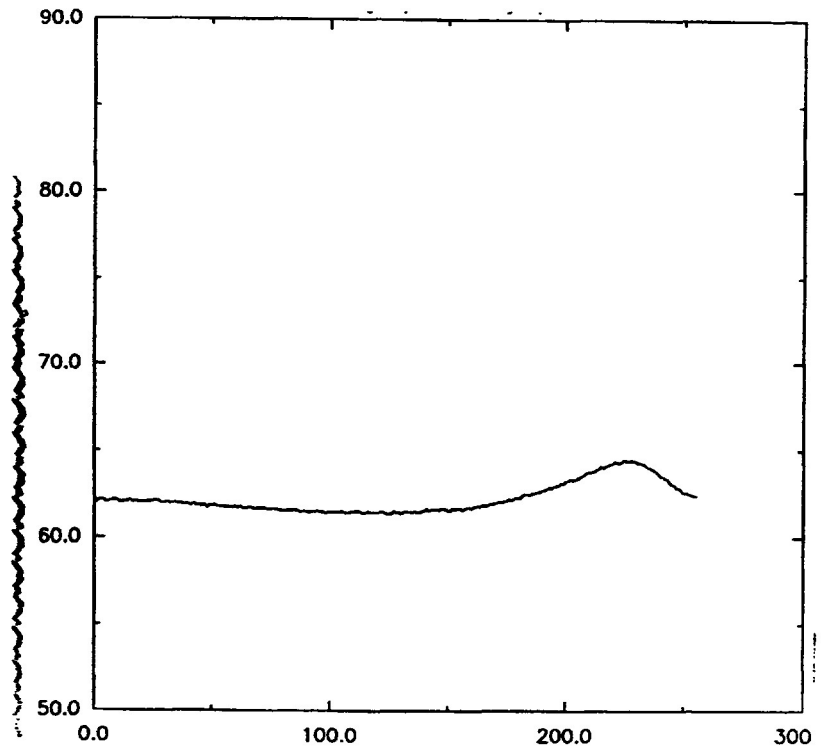


figure 2b  
spectrum using RAM buffer

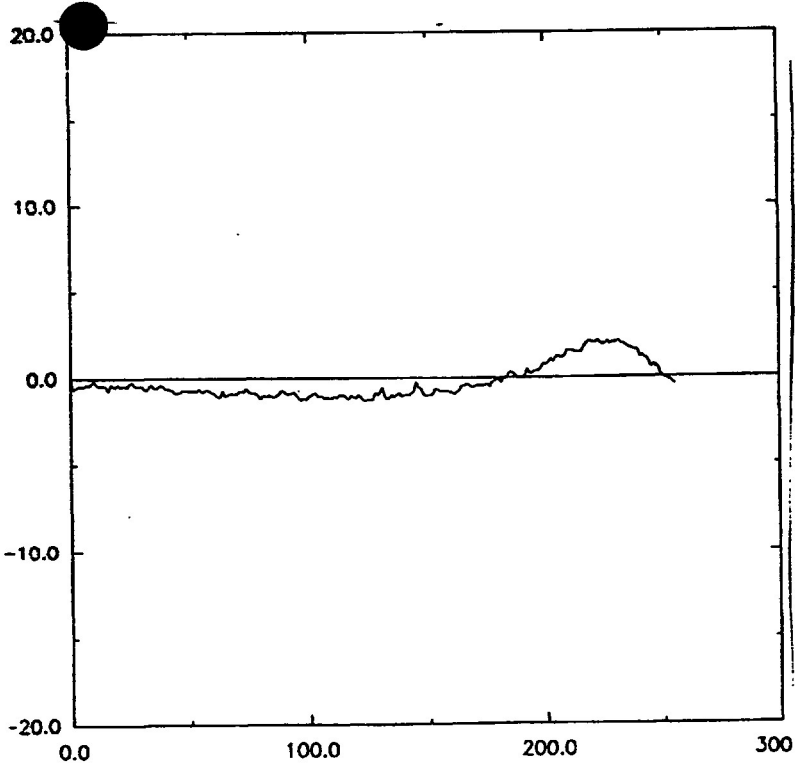


figure 2c  
correlator via formatter

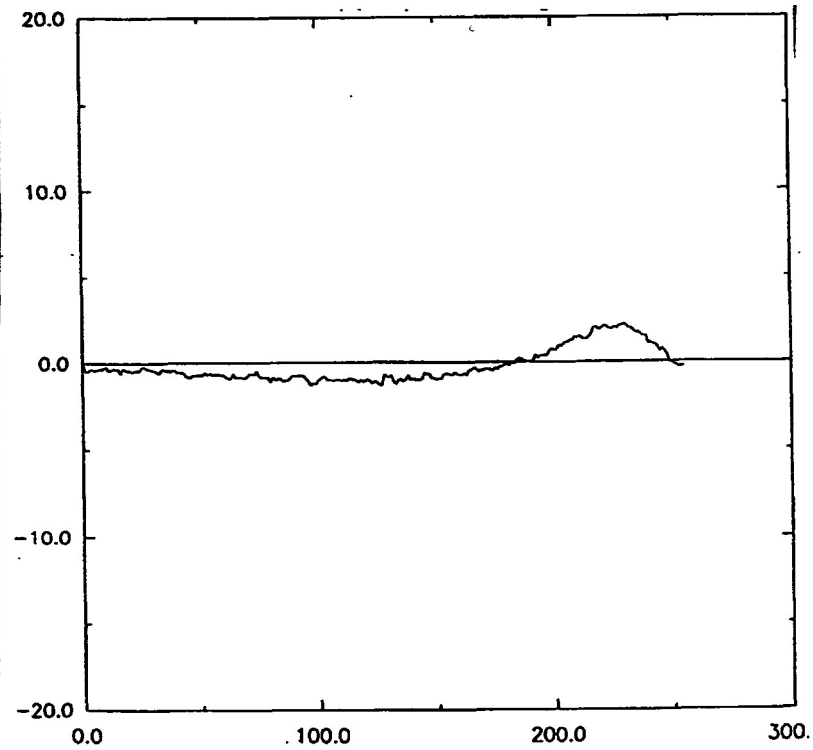


figure 2d  
correlator via PBD

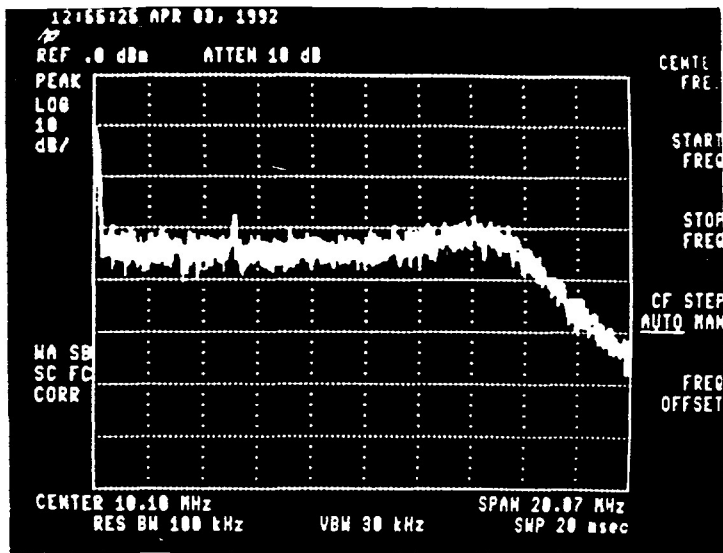


figure 3a  
spectrum analyzer

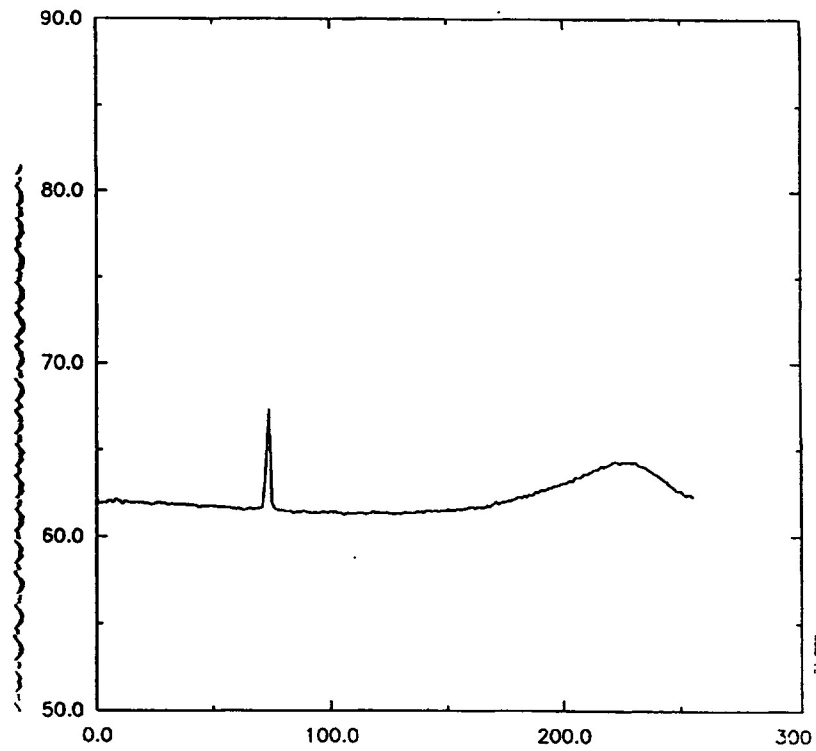


figure 3b  
spectrum using RAM buffer

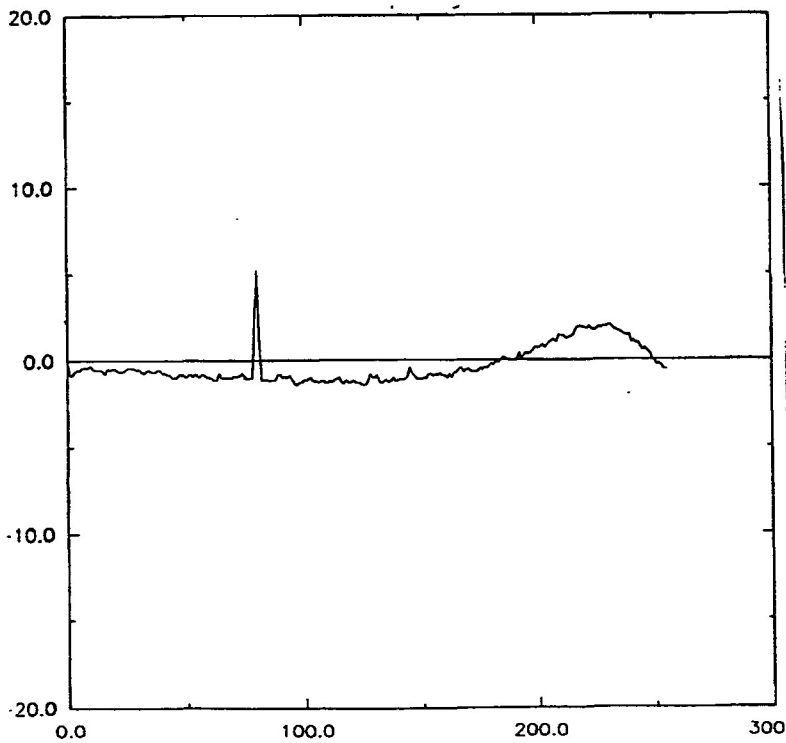


figure 3c  
correlator via formatter

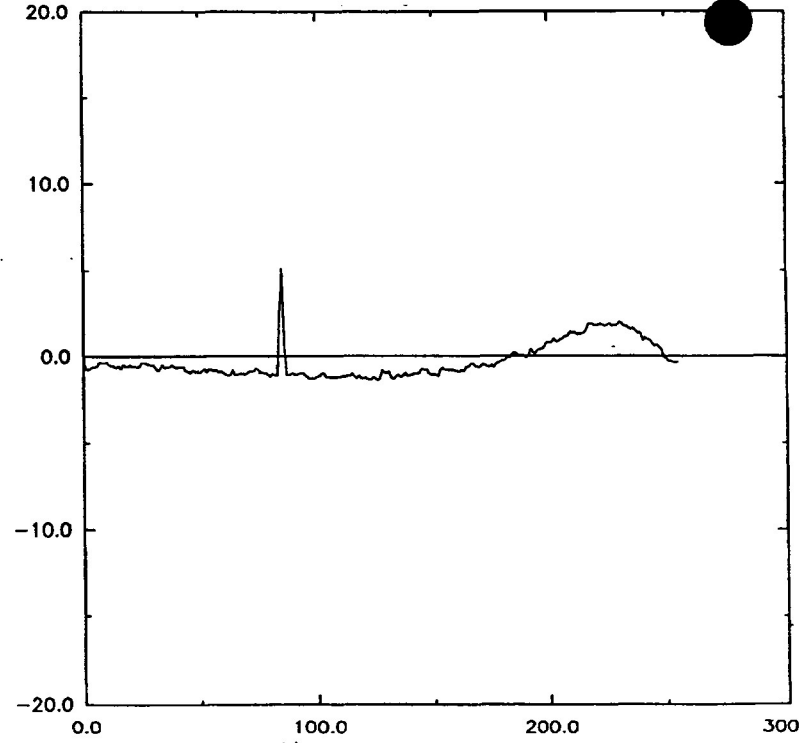


figure 3d  
correlator via PBD

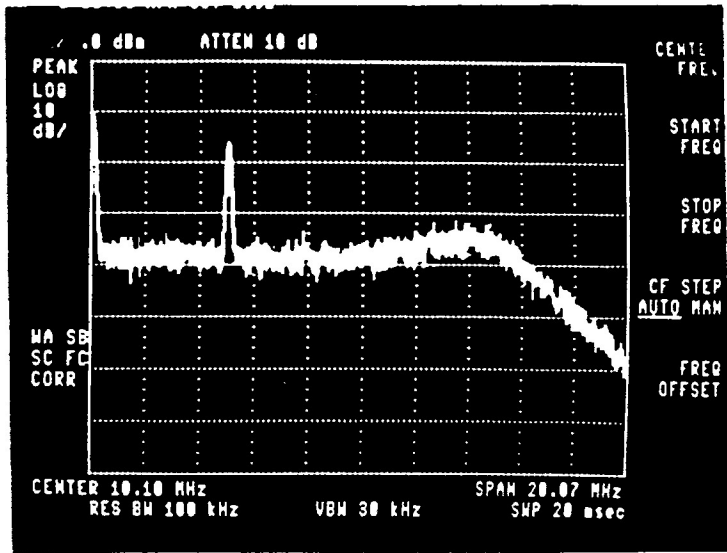


figure 4a  
spectrum analyzer

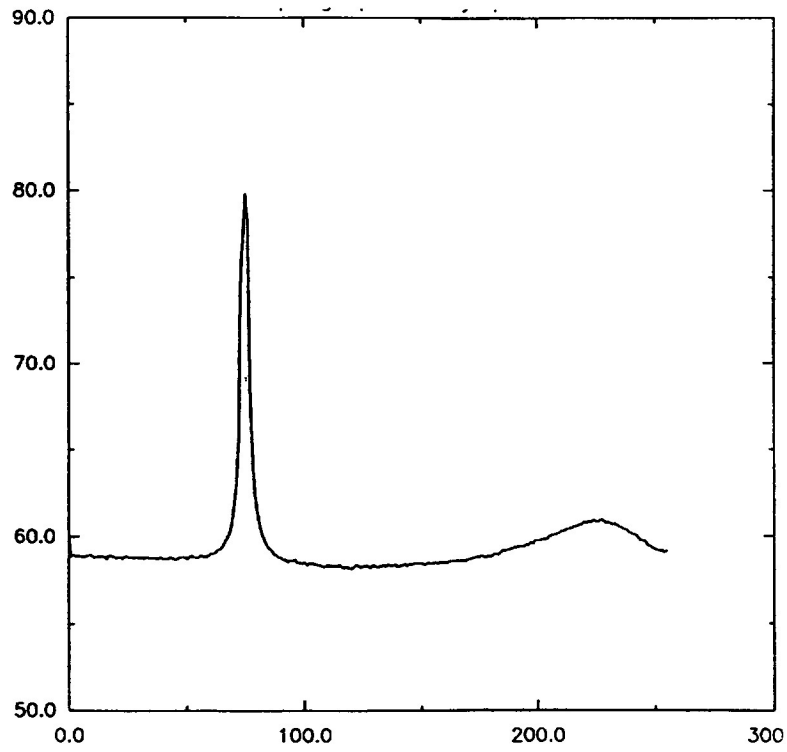


figure 4b  
spectrum using RAM buffer

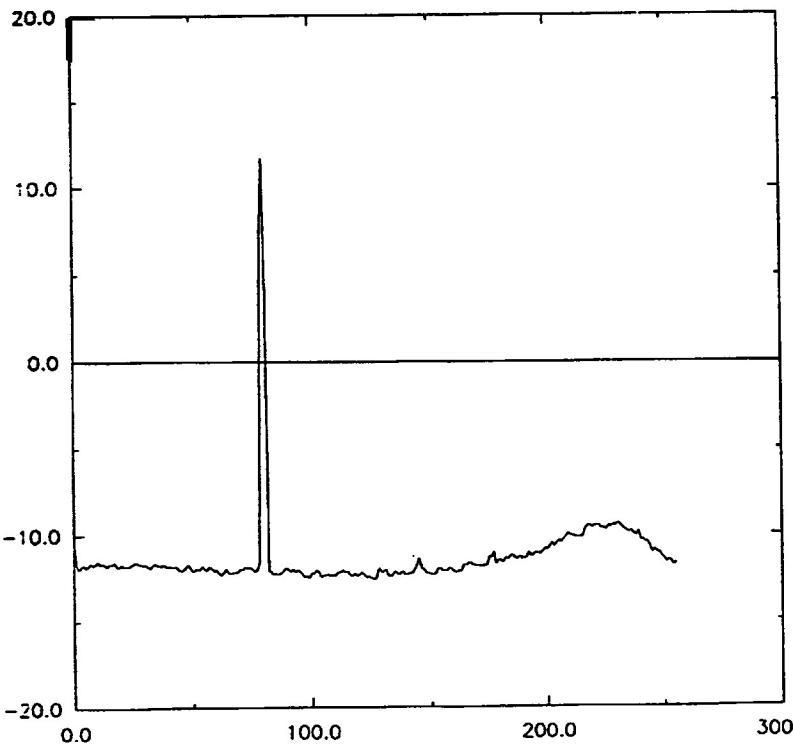


figure 4c  
correlator via formatter

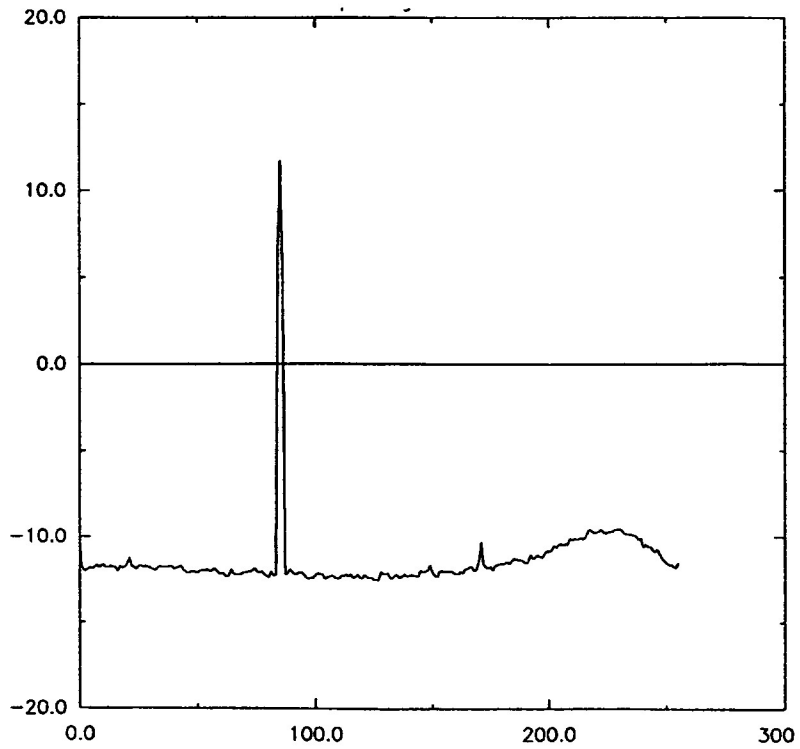


figure 4d  
correlator via PBD

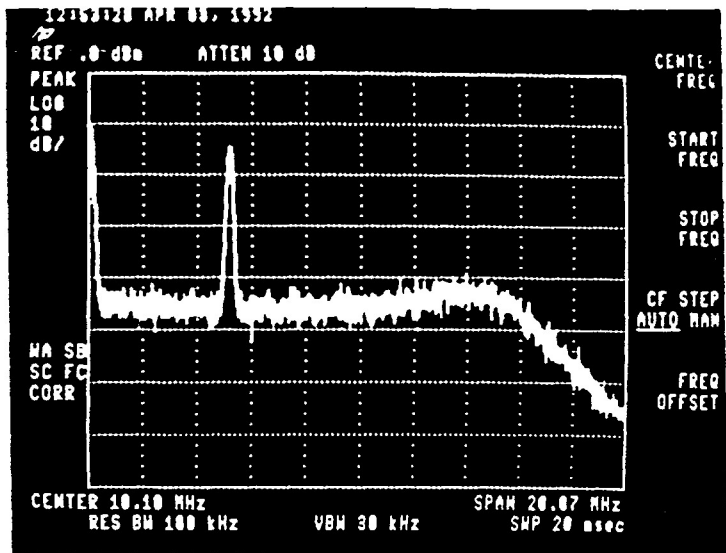


figure 5a  
spectrum analyzer

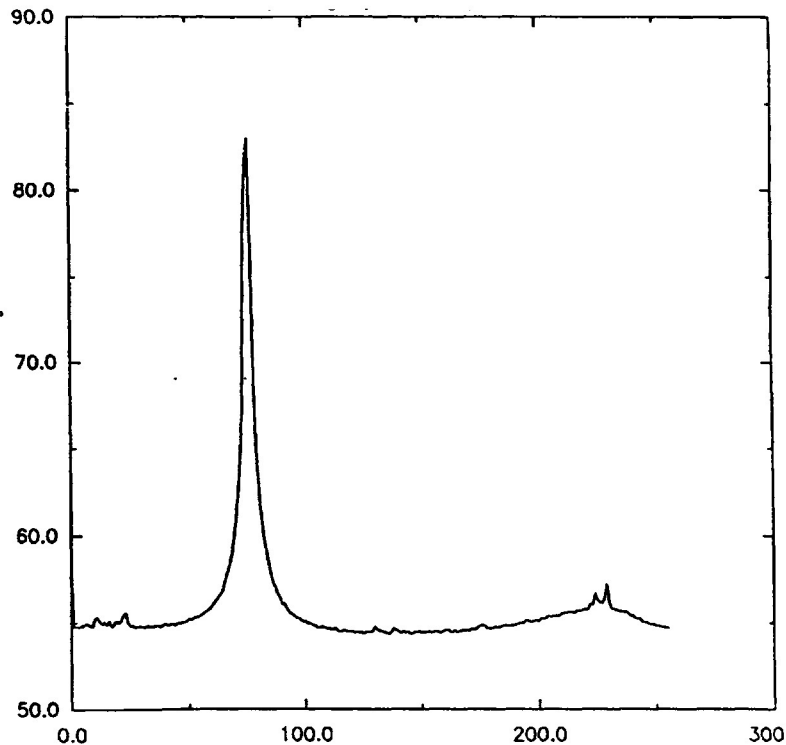


figure 5b  
spectrum using RAM buffer

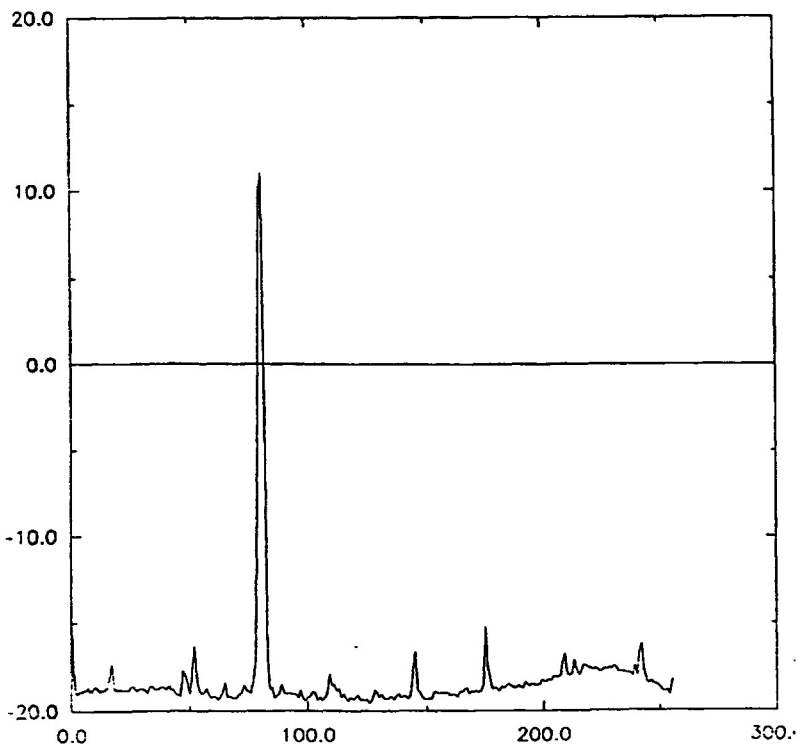


figure 5c  
correlator via formatter

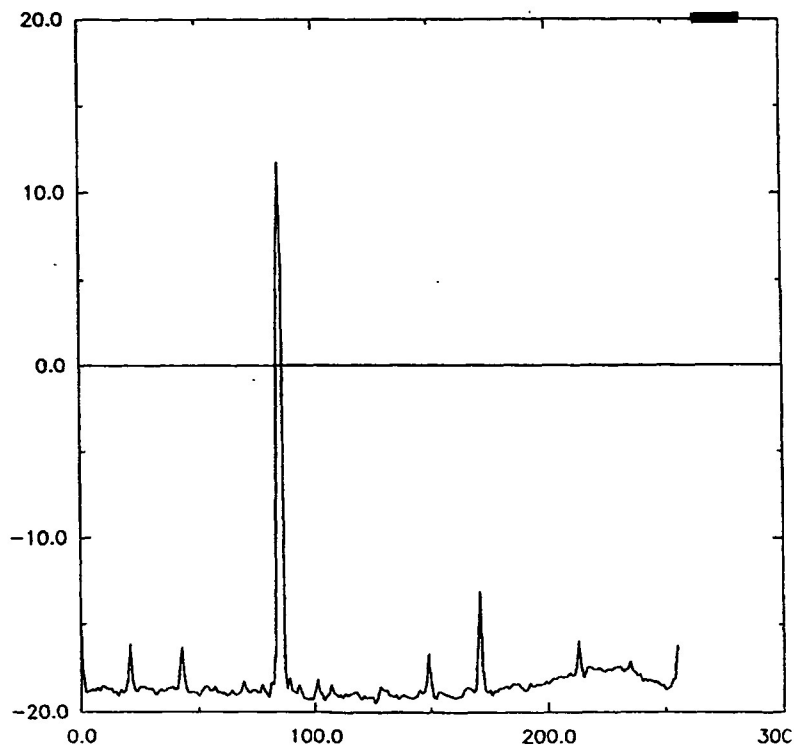


figure 5d  
correlator via PBD

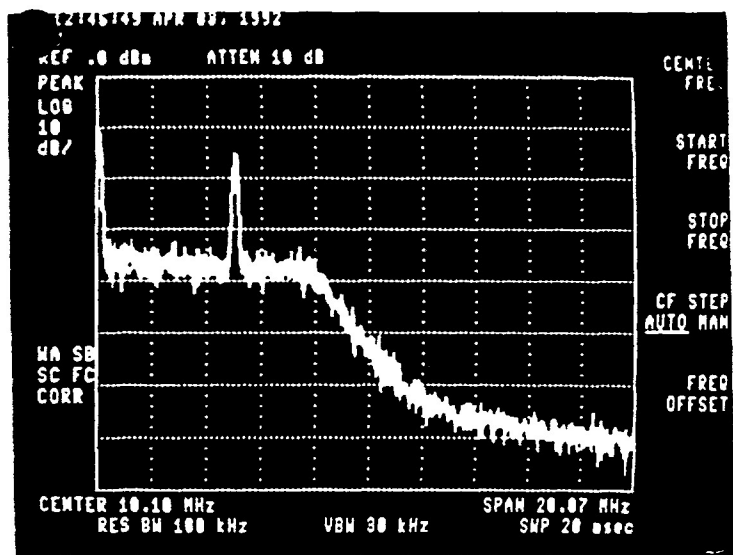


figure 6a  
spectrum analyzer

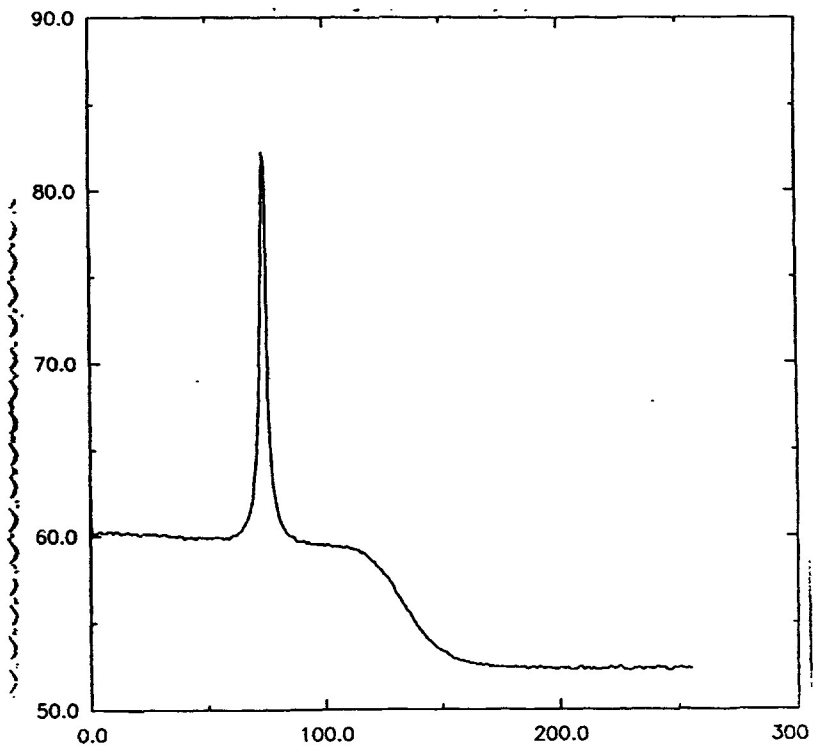


figure 6b  
spectrum using RAM buffer

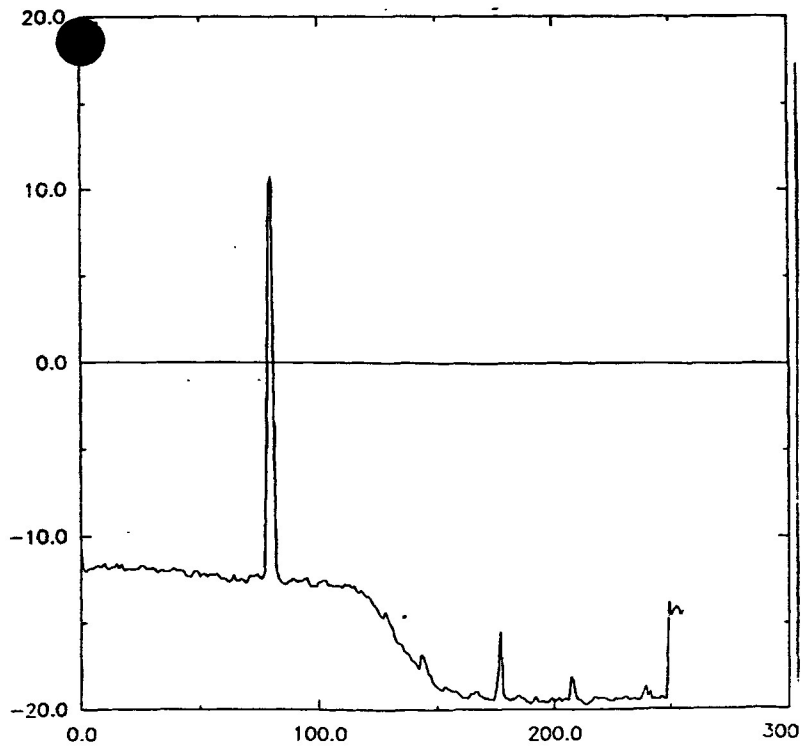


figure 6c  
correlator via formatter

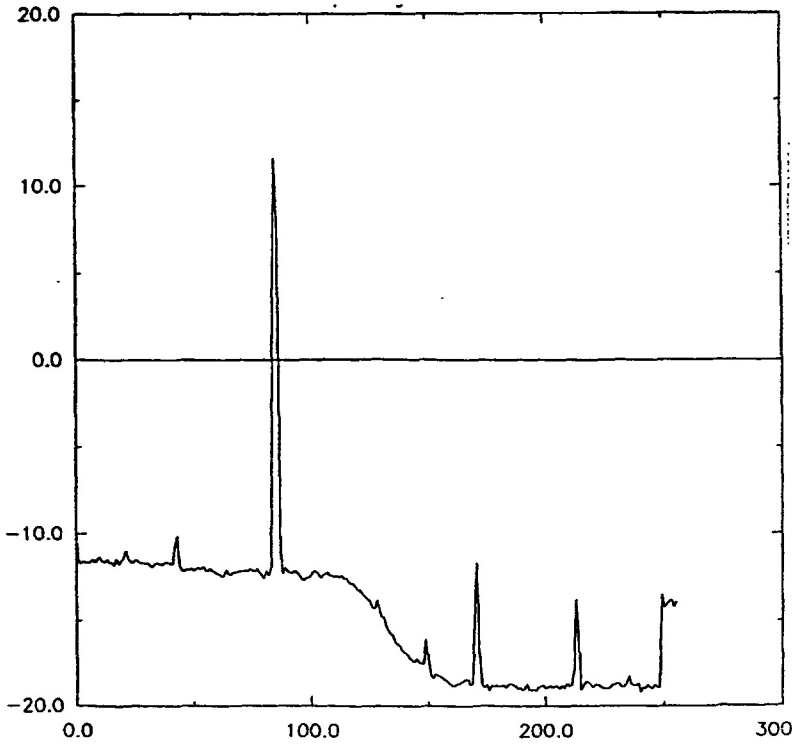


figure 6d  
correlator via PBD

FIGURE 6, CC = 0.5, 8 MHz filter

