

Interoffice

National Radio Astronomy Observatory
Charlottesville, Virginia

To: Addressee August 26, 1976

From: A. Shalloway

Subject: Meeting Results - Model 4 Autocorrelator

Two new autocorrelation receivers are to be developed, one for the 140-ft. telescope and one for the 300-ft. telescope. To determine desirable characteristics for these A/C a meeting was held August 11 with the following staff members:

Mort Roberts
Bob Brown
Eric Greisen
Harvey Liszt

Preliminary specifications were discussed for the Model 4 A/C and are listed below:

<u>B.W.</u>	<u>Max. No. of Channels</u>	<u>Oversampling Factor</u>
40 MHz	256	1
20 MHz	512	1
10 MHz	1024	1
5 MHz	2048	1
2.5 MHz	2048	1
1.25 MHz	2048	2
.625 MHz	2048	2
.3125 MHz	2048	2

NOTE: The 2048 channels for 5 MHz and less will not be seen by the on-line computer. These channels will be used for increased sensitivity when right and left polarizations are available and the observed source is not polarized. The R&L signals will be added together in the A/C to produce 1024 channels.

There will be four IF sampler systems and the correlator will be divisible into four parts. The samplers and correlators will be two bit, three level units.

There will be four standard observation modes:

1. 50%/50% switching duty cycle: signal-reference.
2. 90%/10% switching duty cycle: signal-reference.
3. 100% signal-total power.
4. 100% reference-total power.

Manually, as in the Model 3 A/C, any switching mode may be obtained with the exception that the resolution to which the signal or reference time can be set will be poorer - possibly 0.5 to 4 ms. This is required because of the recirculation type of design of this A/C. This can only be important to pulsar observers, but a value will be chosen that is satisfactory to them. Also, by making the blanking time variable with a fine resolution, there will be no trouble staying in synchronism with pulsars. The manual switches for signal-reference switching modes and noise switching modes will be as on Model 3 A/C.

All of the above controls will normally be locked out as far as a human manipulating them, except for servicing or special cases. Normally all control of the A/C will be accomplished automatically by signals from the on-line computer, which are determined by the punched cards submitted by the observer. The only exception, being that of setting the IF attenuator. This will remain a manual control.

The only manual operation required will be that of setting the IF gain and the L.O. offsets.

The synchronous detector and gain modulator as incorporated in Model 3 correlator will not be designed into Model 4 A/C.

A different method of IF-filter design, using single side band operation, is being contemplated. This presents some problems and they are being investigated. In this method, the observed band of frequencies is not centered on some reference frequency. Instead, the band starts at the reference frequency and extends above or below the reference frequency. This design saves considerable money - \$7,000 to \$15,000 per A/C - but imposes more difficulty on the observer in calculating his L.O. frequency and probably provides more possibility for error. One possibility for overcoming these possible errors would be to have the computer calculate the offset settings and display these settings at the offset rack to aid the operator and reduce errors.

Any suggestions relative to the capabilities of the Model 4 A/C will be welcomed.

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