NATIONAL RADIO ASTRONOMY OBSERVATORY

Charlottesville, Virginia

May 26, 1970

M E M O R A N D U M

TO: All Scientific Staff, All Electronics Engineers, J. Greenhalgh, D. Vitiello, B. Pasternak, T. Wilson, S. Manzo, D. Schiebel, W. Vrable, B. Zuckermann, J. Ball, K. Riegel, G. Westerhout, P. Palmer, T.K. Menon, W. Wilson, C. Heiles, S. Farris, B. Vance

FROM: A. Shalloway

SUBJECT: Correlation Receiver Model III Functional Operation

Note: This memo contains some corrections and additions to a similar memo dated January 20, 1970; and to a memo to Joe Greenhalgh dated February 20, 1970, covering the Data Format of the Correlation Receiver Model II output.

The following changes to the first of the above mentioned memos (dated January 20th) have been incorporated in the design:

1. Under Change I, choice 5 (1 ea. 96 ch. 1 ea. 288 ch.) has been eliminated. An additional choice has been added to provide twice the maximum bandwidth based upon the maximum sampling rate. In this choice there is only one 192 channel autocorrelator available. This is explained in more detail further on in this memo.

2. Under Change IV, the mode control switch will be eliminated. All switching cycles will be set up by means of push button (thumb-wheel type) switches which control signal, reference, blanking and dump time as described in the noted memo. Also under Change IV, the voltage controlled crystal oscillator - generally intended for locking on pulsars - will have a linearity of 10% instead of 1%; however, it will still be capable of calibration to 1/2% and will have one or two orders of magnitude greater stability than indicated in the noted memo. This will provide a slightly smaller drift with respect to the pulsar periods and require less calibration of the oscillator.

The following changes to the second of the above mentioned memos (dated February 20th) have been incorporated in the design.

1. Computer words numbered 1572 through 1575 - Receiver Bandwidth will be changed under the "Description" column to read as follows:

4-bit word:
0 = reserved for possible wider bandwidth operation
1 = 10 MHz
2 = 5 MHz
3 = 2.5 MHz
4 = 1.25 MHz
5 = 625 kHz
6 = 312.5 kHz
7 = 156.25 kHz
8 = 78.125 kHz
9 = 39.0625 kHz

2. Computer word number 1576 - Mode of Operation - will have the following additional mode under "description":

8 = 1-192 ch. A/C - double maximum bandwidth listed under word 1572. Under "Format-DDP-116 Word Bits", change bit 13 from a 0 to 2^3.

This addition to the digital design, allows operation at twice the maximum bandwidth with 192 channels. This will provide a minimum of 20 MHz bandwidth up to a possible 40 MHz bandwidth. This feature is being incorporated in the digital system, but will not be added to the IF-Filter System until after completion of the receiver. This is based on the fact that there is more change involved in the IF-Filter System and we also must see at what maximum sampling rate the digital system will operate.

3. Computer word number 1604 - Digital Test Signals - will be changed under the "Description" column to read as follows:

Word A:
0 = reserved for possible wider bandwidth operation
1 = 10 MHz
2 = 5 MHz
3 = 2.5 MHz
4 = 1.25 MHz
5 = 625 kHz
6 = 312.5 kHz
7 = 156.25 kHz
8 = 78.125 kHz
9 = 39.0625 kHz

Listed below is a tabulation of which set of channels are associated with each receiver in the eight possible Modes of Operation:

	Mode	Receiver	Channel Numbers
1.	1 ea. 384 ch. A/C	A	0-383
2.	2 ea. 192 ch. A/C	A	0-191
		B	192-383
3.	2 ea. 96 ch. & 1 ea. 192 ch. A/C	A	0-95
		B	96-191
		C	192-383
4.	4 ea. 96 ch. A/C	A	0-95
		B	96-191
		C	192-287
		D	288-383
5.	1 ea 384 ch. C/C	A	stored data - 0-383
		B	delayed data - 0-383
6.	2 ea. 192 ch. C/C	A	stored data - 0-191
		B	delayed data - 0-191
		C	stored data - 192-383
		D	delayed data - 192-383
7.	3 ea. 96 ch. C/C & 1 ea. 96 ch. A/C	A	stored data - 0-95
		C	delayed data 0-95
		B	stored data - 96-191
		A	delayed data - 96-191
		C	stored data - 192-287
		B	delayed data - 192-287
		D	288-388

8.	1 ea. 192 ch. A/C-double frequency [Sampler B contains A delayed by $0.5 \times 10^9 \div$ (maximum sampling rate available) in nanoseconds]	A	
		Sampler A	stored data 0-95
		Sampler B	non-stored data 0-95
		Sampler B	stored data 96-191
		Sampler B	non-stored data 96-191
		Sampler A	stored data 192-287
		Sampler A	non-stored data 192-287
		Sampler B	stored data 288-383
		Sampler A	non-stored data 288-383

Front end, local oscillator and noise tube switching signals will be provided at BNC jacks at the top of the digital rack. In all cases both positive and negative logical signals will be available with the following polarities and drive capabilities:

Signal	Condition	Negative Logic	Positive Logic	Minimum Drive
Front End & Local Oscillator	Signal	0V	+5V	1-5Mc S-PAC or 1-TTL LOAD
	Reference	-6V	0V	
Noise Tube	Off	0V	+5V	1-5Mc S-PAC or 1-TTL LOAD
	On	-6V	0V	1-5MC S-PAC or 1-TTL LOAD

If more than the minimum drive is required, contact me. There will generally be considerably more available.

AS;sw