

National Radio Astronomy Observatory
Charlottesville, Virginia

May 3, 1968

To: *Arthur M. Shalloway*

From: Arthur M. Shalloway

Subject: Revised Functional Description of NRAO Correlation Receiver Model II
(See Original Description September 11, 1967)

The following information is being made available for those planning to use the receiver or program computers to process its output data.

SPECIFICATIONS OF NRAO CORRELATION RECEIVER MODEL II:

Number of Channels:

Total - 416
Correlation Channels - 413
Receiver Power Channels - 3

Configurations:

- Receiver A - 192 Channels Autocorrelation - 1 Channel Power
Receiver B - 192 Channels Autocorrelation - 1 Channel Power
Receiver C - 29 Channels Autocorrelation - 1 Channel Power
- Receiver A - 384 Channels Autocorrelation - 1 Channel Power
Receiver C - 29 Channels Autocorrelation - 1 Channel Power

Bandwidths:

1. 10 MHz	}		6. 312.5 KHz	}	
2. 5 MHz	}		7. 156.25 KHz	}	Available on
3. 2.5 MHz	}	Available on	8. 78.125 KHz	}	Receivers A & B.
4. 1.25 MHz	}	Receivers A, B & C.	9. 39.0625 KHz	}	
5. 625 KHz	}			}	

Dump Times (Integration Time Available in Correlation Receiver Prior to Dumping Data into Computer):

1 sec. and 10 sec.

Switching Rates:

1 Hz - 50%/50% (Signal/Reference) Duty Cycle
5 Hz - 50%/50% (Signal/Reference) Duty Cycle
10 Hz - 50%/50% (Signal/Reference) Duty Cycle
1 Hz - 90%/10% (Signal/Reference) Duty Cycle
5 Hz - 75%/25% (Signal/Reference) Duty Cycle

Blanking Times:

4 to 26 ms. in steps of 2 ms.

Switching Modes:

- | | | |
|------------------------|---|--|
| 1. Load Switching | } | With continuous or separate calibration, gain modulator switching, and synchronous detector switching for analog continuum recording |
| 2. Frequency Switching | } | |

Autocorrelation Data:

Signal and reference output data are provided as two independent groups of numbers. Thus, a continuous bandpass correction can be provided in the computer.

Display:

Any channel - signal or reference - plus the six power counters can be displayed in decimal.

Test Signals:

Square waves from 39.0625KHz to 10MHz can be fed into clipper inputs. Special internal tests available in digital system. Internally generated noise source can be fed into IF input.

Reference should be made to Memo: Input Interface - 300' and 140' On Line Computers by A. M. Shalloway dated October 18, 1966 for detailed information on transfer of data from the receiver to the computer. The following tabulation lists all of the output data available from the receiver and its format.

ORDER OF WORDS - A/C Receiver-to-Computer

COMPUTER WORDS	DESCRIPTION	FORMAT - DDP-116 Word Bits																	
		Note: All even numbered words have a "1" in word bit 1. All odd words have a "0" in word bit 1.																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
0 Through 825	413 Channels of Signal Correlation	Each channel is represented by a 20 bit word which is taken into the computer as two words	1st word	1	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
		2nd word	0	0	0	0	0	0	0	0	0	0	0	0	2 ¹⁹	2 ¹⁸	2 ¹⁷	2 ¹⁶	2 ¹⁵
826 827 828 829 830 831	Receiver A Signal Power Counter Receiver B Signal Power Counter Receiver C Signal Power Counter	Each counter is represented by a 20 bit word which is taken into the computer as two words.	Same as words 0 - 825.																
832 Through 1657	413 Channels of Reference Correlation	Each channel is represented by a 20 bit word which is taken into the computer as two words.	Same as words 0 - 825.																
1658 1659 1660 1661 1662 1663	Receiver A Refer- ence Power Counter Receiver B Refer- ence Power Counter Receiver C Refer- ence Power Counter	Each counter is represented by a 20 bit word which is taken into the computer as two words.	Same as words 826 - 831.																
1664	Spare Word	For future requirements	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1665	Receiver A Bandwidth	4 bit word: 0 = 10 MHz 1 = 5 MHz 2 = 2.5 MHz 3 = 1.25 MHz 4 = 625 KHz 5 = 312.5 KHz 6 = 156.25 KHz 7 = 78.125 KHz 8 = 39.0625 KHz	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ³	2 ²	2 ¹	2 ⁰
1666	Receiver B Bandwidth	Same as word 1665	Same as word 1665																

ORDER OF WORDS -A/C Receiver-to-Computer (continued)

COMPUTER WORDS	DESCRIPTION	FORMAT															
		DDP-116 Word Bits															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1670 Receiver B Attenuator	Same as word 1668	Same as word 1668															
1671 Receiver B Gain Modulator	Same as word 1669	Same as word 1669															
1672 Receiver C Attenuator	4 bit word - same as section B of word 1668	1	0	0	0	0	0	0	0	0	0	0	0	2 ³	2 ²	2 ¹	2 ⁰
1673 Gain Modulator & Synchronous Detector Phase	1 bit word: 0 = normal 1 = inverted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ⁰
1674 Series-Parallel Operation	1 bit word: 0 = series 1 = parallel	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ⁰
1675 Switch Rate & Duty Cycle	3 bit word: 0 = 1Hz } 50%-50% Duty 1 = 5Hz } Cycle 2 = 10Hz } 3 = 1Hz - 90%-10% (Sig.- Ref.) Duty Cycle 4 = 5Hz - 75%-25% (Sig.- Ref.) Duty Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ²	2 ¹	2 ⁰
1676 Dump Time	1 bit word: 0 = 1 sec. 1 = 10 sec.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ⁰
1677 Blanking Time	4 bit word: 0 = 4 ms 6 = 16 ms 1 = 6 ms 7 = 18 ms 2 = 8 ms 8 = 20 ms 3 = 10 ms 9 = 22 ms 4 = 12 ms 10 = 24 ms 5 = 14 ms 11 = 26 ms	0	0	0	0	0	0	0	0	0	0	0	0	2 ³	2 ²	2 ¹	2 ⁰

ORDER OF WORDS - A/C Receiver-to-Computer (continued)

COMPUTER WORDS	DESCRIPTION	FORMAT																
		DDP-116 Word Bits																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1678 Digital Test Signals	<p>These words apply only when word 1679 is not all zeros.</p> <p>1 ea. 4 bit word, 1 ea. 1 bit word:</p> <p>Word A - 4 bits:</p> <p>0 = 10 MHz) 1 = 5 MHz) 2 = 2.5 MHz) 3 = 1.25 MHz) 4 = 625 KHz) To 5 = 312.5 KHz) Clipper 6 = 156.25 KHz) 7 = 78.125 KHz) 8 = 39.0625 KHz)</p> <p>9 = Logic - 0 - to Sampler Output Flip Flop</p> <p>10 = Logic - 1 - to Sampler Output Flip Flop</p> <p>11 = Shift Register Memory Test Signal</p> <p>Word B - 1 bit:</p> <p>Applies only when Word A is 11.</p> <p>0 = Special Test Signal into Shift Register Memory for servicing purposes only.</p> <p>1 = Standard Test Signal into Shift Register Memory.</p>	1	0	0	0	0	0	0	0	0	0	0	0	2 ⁰	2 ³	2 ²	2 ¹	2 ⁰

ORDER OF WORDS - A/C Receiver-to-Computer (continued)

COMPUTER WORDS	DESCRIPTION	FORMAT																
		DDP-116 Word Bits																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1683 Noise Tube Duty Cycle and On-Off Indicator	2 ea. - 1 bit words: 0 = 50%-50% } Word 1 = 90%-10%(Sig.-Ref.) } A 0 = Noise Tube Off } Word 1 = Noise Tube On } B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 ⁰	2 ⁰
																	B	A

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