NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

300-FOOT CONTROL COMPUTER MEMO NO. 24

COMPUTER TO COMPUTER COMMUNICATION

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Each computer has been coded with a RECEIVE and TRANSMIT TASK. These tasks presently use DMC for transferring data. Locations 12 and 13 are used for start address and final address, respectively. Three types of interrupts are used: reset, transmit, and receipt. A short block always precedes a long block.

The short block is used to synchronize the transmissions/receipts along with a flag to identify the long block to follow. The short block is 3 words long:

Word 1 - 123456
Word 2 - 123456
Word 3 - FLAG

DDP116 Receipt Block

Flag	Identification
1	Position Block
2	Temporary Block
3	Time Request

DDP116 Transmission Block

Flag	Identification
1	Position Command
2	Expected Positions
3	LST
4	Pointing Code
5	End Observation

H316 Receipt Block

Flag	Identification
1	Actual Positions
2	Expected Positions
3	Time Initialization
4	Pointing Code Info
5	End Observation

H316 Transmission Block

Flag	Identification
1	Send Positions
2	Predicted Positions
3	Time Request

Electronics Division Internal Report No. 158, "300-ft Telescope H316 Computer Interface," describes the interface for the H316. Parts of that report are reproduced and attached for quick reference.

Attachment

Extracted from Electronics Division Internal Report No. 158.

316-116 Link

Commands for both computers.

OCP 001 - Set transmit channel in output mode.

OCP 101 - Reset transmit channel from output mode.

OCP 201 - Set receive channel in input mode.

OCP 301 - Reset receive channel from input mode.

OCP 401 - Resets transmit from output mode, resets the other computer from its receive mode, and interrupts the other computer.

116 DMC channels:	2 = Transmit = Locations 12 and 13
	3 = Receive = Locations 14 and 15
316 DMC channels:	2 = Transmit = Locations 22 and 23
	3 = Receive = Locations 24 and 25
116 Interrupt lines:	10 - 316 OCP 401 = Location 41
	11 = Transmit End of Range = Location 42
	12 = Receive End of Range = Location 43
316 interrupt lines:	2 = 116 OCP 401 = Location 65
	3 = Transmit End of Range = Location 66
	4 = Receive End of Range = Location 67

10. 316 Receiver

The 316 receiver is located in slot 7. This card decodes all addresses used in the 116-316 computer link.

To receive data the 316 must issue an OCP 201. This sets the receiver in the input mode. When the 116 sends "116 Ready" after a delay of 75 μsec, the 316 will do a DMC input transfer. When this transfer is complete, a "Set 116 DIL" is sent back to the 116. When the 116 completes another DMC output transfer, it again sends a "116 Ready" to the 316 and the cycle is repeated. This process repeats until the 316 DMC receive channel has reached its "End of Range". When this happens, the receiver is reset from its input mode and the computer is interrupted on line 4. This input mode can also be reset by the 116, doing an OCP 401, or by pressing "Master Clear" on the 316. This OCP 401 will also interrupt the 316 on line 2.

11. 316 DMC Out

The 316 DMC out card is located in slot 8. This card transfers data from the 316 to the 116. To initiate a transfer the 316 must do an OCP 001. This OCP will set the transmitter in the output mode and cause the DMC transmit channel to output a word and set "316 Ready". When the 116 receives this ready condition, it will take the data and reply with "RESET 316 READY". This "RESET 316 READY" will cause the 316 DMC transmit channel to output another word and the cycle is repeated. This will continue until the transmit channel has reached its "End of Range". This will reset the transmitter from the output mode and interrupt the 316 on line 3. This output mode can also be reset by the 316 doing an OCP 401 or pressing "Master Clear" on the 316. The OCP 401 will also interrupt the 116 computer on line 10 and reset the 116 receiver from its input mode.

14. 116 Receiver

The 116 receiver located in slot 3 of the level conversion system of the 116 is identical to the 316 receiver except for signal names.

15. 116 Transmitter

The 116 transmitter is located in slot 4 of the level conversion system in the 116.

To set the transmitter in the output mode, the computer must execute an OCP 001. This OCP 001 will also generate a DIL 02 to the 116. When the 116 transfers a word of data, this data is stored, DIL 02 is reset, and "116 READY" is sent to the 316. When the 316 takes the data, it replies with "RESET 116 READY" (DAL 03) and "SET 116 DIL" (DAL 03 · RRLIN). When the 116 receives "RESET 116 READY", the "116 READY" condition is reset. Upon receipt of "SET 116 DIL", another DIL 02 is set and the process continues until end of range is reached. When this happens, the transmitter is reset from its output mode. The output mode can also be reset by master clear or the 116 doing an OCP 401. This OCP 401 will also reset the 316 receiver from its input mode.

The 116 transmitter also contains all three interrupts used by the DMC link. The three interrupts and their use is listed below:

1. PIL 10 — interrupts when the 316 does an OCP 401.
2. PIL 11 — interrupts when the 116 transmitter has reached its end of range.
3. PIL 12 — interrupts when the 116 receiver has reached its end of range.

16. DMC Link Interconnecting Signals

Reset 116 Ready. This signal is used to reset the 116 ready flip-flop. It is generated in the 316 by DAL 03.

Set 116 DIL. This signal is used to set DIL 02 in the 116. It is generated by DAL 03 · RRLIN in the 316.

Reset 316 Ready. This signal is used to reset the 316 ready condition and set DIL 02. It is generated in the 116 by DAL 03 · RRL.

116 OCP 401. This signal interrupts the 316 on interrupt line 2 and resets the 316 receiver from its input mode. The 116 transmitter will also be reset from its output mode. This signal is generated by the 116 doing an OCP 401.

316 OCP 401. This signal interrupts the 116 on interrupt line 10 and resets the 116 receiver from its input mode. The 316 transmitter will also be reset from its output mode. This signal is generated by the 316 doing an OCP 401.

116 Ready. This signal is used to inform the 316 that the 116 has data ready. It is generated by DAL 02 · OTP.

316 Ready. This signal informs the 116 that the 316 has data ready. It is generated by DAL 02 · RRLIN.

D Data Out 1-16. Output data from a computer to the other computer.

D Data In 1-16. Data that is received by a computer from the other computer.