

COMPANY CONFIDENTIAL

Griffith

Exchange Memo No. 10

November 1, 1956

Communications Between the Exchange and the Computer

Communications between the exchange and the computer will consist of the following lines. See Figure 1. From the computer to the exchange:

Read or Write	1 line
Interrogate Status	1 line
Extract Control Word	1 line
Control I/o Unit	1 line
I/O Unit Address	10 lines
Control Word Address	20 lines

From the exchange to the computer:

Instruction Response	1 line
Instruction Reject	1 line
Exchange Busy	1 line
I/O Unit Busy	1 line
I/O Unit Not Ready	1 line
I/O Unit at End of File	1 line
Error	1 to 6 lines

The exchange will store the status of each I/O unit as part of the unit's associated control word. A control word will contain the following:

Control Word Address	20 bits
Byte Count	18 bits
Now Address	20 bits
Grouping or Distribution - Flag	1 bit
Repeat Instruction with new control word	1 bit
Parity	1 bit
I/O Unit Ready	1 bit
I/O Unit Busy	1 bit
I/O Unit at End of File	1 bit
Error Conditions, etc.	6 bits
	<hr/>
	70 bits

Seventy bits is also the proposed size of the dataword. The last 9 bits of the above control word indicate the status of the unit. The exchange will insert and delete the various bits as the status of the units change.

The following is a brief explanation of how the exchange and the computer will communicate with each other.

Read or Write Instruction

During a read or write instruction the computer sends to the exchange the address of the I/O unit, the main memory address of the control word and a "read or write" signal. If a channel is not available, the exchange immediately sends an "exchange busy" signal and an "instruction reject" signal back to the computer. If a channel is available, the exchange will read the unit's control word from exchange memory and set the status part of the control word into the status register. If the status register indicates-that the unit is ready, not at end of file and unit not busy-the exchange will assign a channel to the unit and signal it to start. The exchange will send an "instruction response" to the computer, signalling the computer to go on to the next instruction. If all channels are busy, the average time required by the exchange to obtain the status of an I/O unit is approximately 14 usec.

If the conditions -ready, not end of file and unit not busy-are not satisfied, the exchange sends an "instruction reject" signal to the computer, signalling the computer to interrogate the status register to

determine why the instruction was not executed.

Any status changes that occur during a read or write operation such as end of file, error, etc., are inserted into the control word at the end of the read or write operation.

Interrogate I/O Unit Status

If the computer wants the status of an I/O unit, it sends the address of the unit and an interrogate status signal to the exchange. The exchange will read the unit's control word from exchange memory and set the status part of the control word into the status register. The exchange will then send an "instruction response" to the computer, signalling the computer that the status of the unit is in the status register.

Extract Control Word

If the computer wants the control word of an I/O unit, it sends to the exchange the address of the I/O unit, the main memory address of where the control word should be stored and an "extract control word" signal. The exchange will read the unit's control word from exchange memory and send it to main memory. The exchange sends an "instruction response" to the computer, signalling the computer that the control word is in main memory.

Control Instruction

During a control instruction the computer sends to the exchange the address of the I/O unit, the main memory address of the word containing the control instructions, and a "control I/O unit" signal. If an

November 1, 1956

output channel is not available, the exchange immediately sends an "exchange busy" signal and an "instruction reject" signal back to the computer.

If a channel is available, the exchange will read the unit's control word from exchange memory and set the status part of the control word into the status register. If the unit is ready and not busy, a prepare for control signal is sent to the unit, signalling the unit that it will receive control instructions. The exchange will also send an "instruction response" to the computer, signalling the computer to go on to the next instruction.

If the conditions -ready and not busy- are not satisfied, the exchange sends an "instruction reject" signal to the computer, signalling the computer to interrogate the status register to determine why the instruction was not executed.

RF:ja

R. Fletcher

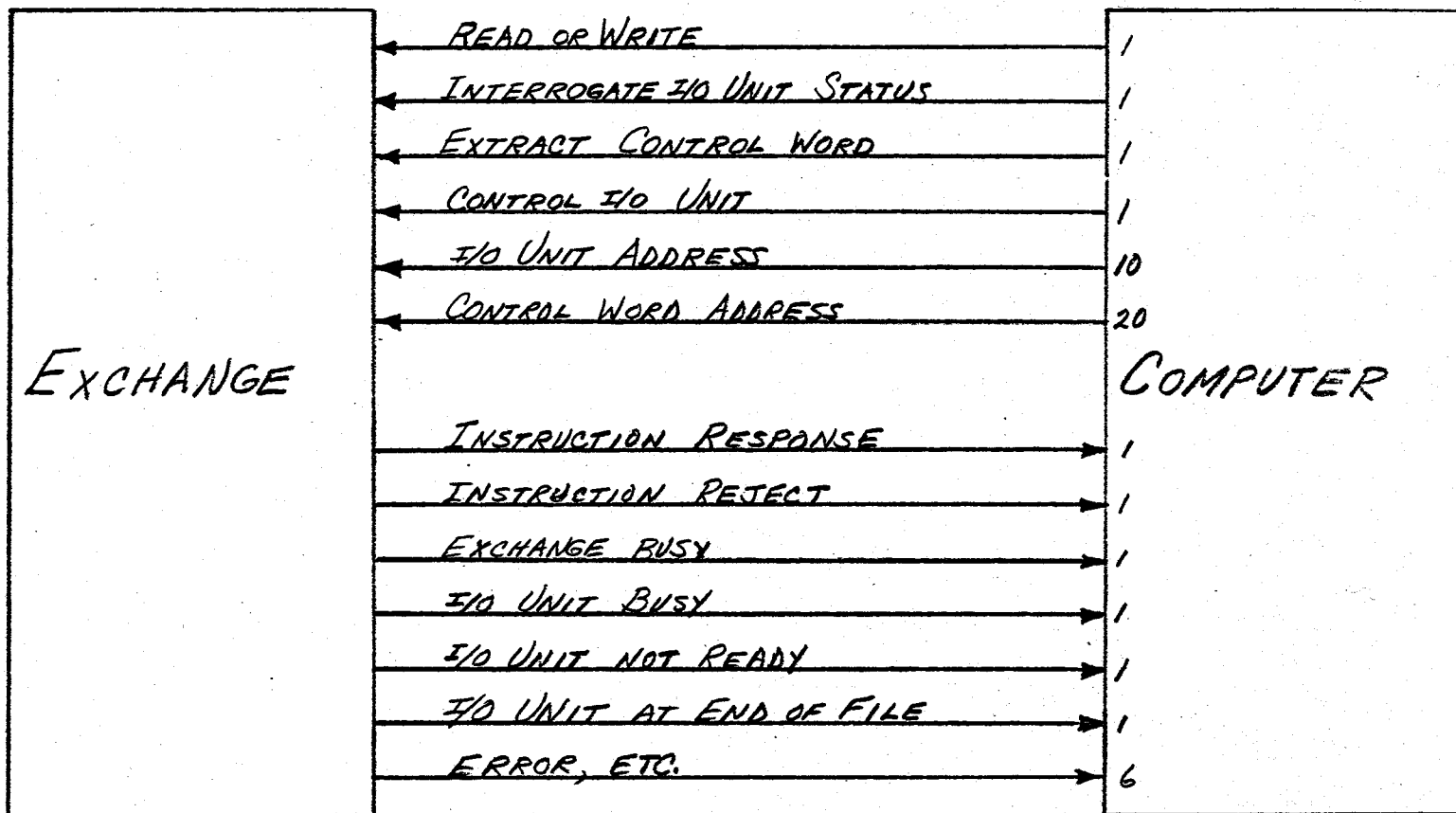


FIGURE 1. EXCHANGE-COMPUTER COMMUNICATIONS

R.P.F.
11-1-56