

June 9, 1959

MEMO TO: Mr. H. K. Wild

SUBJECT: Use of Spare Memory for Control Word Locations

The present control word logic used with the Basic Exchange makes no direct provision for indicating where a control word came from. Some programming considerations involving debugging techniques and analysis of Unit Check interrupts indicate that this information would be extremely useful.

The following scheme looks feasible and is suggested for consideration.

- (1) Let the present control word location be specified as CW1. CW1 falls in Exchange Memory Addresses 160-191.
- (2) Let the proposed secondary control word location be designated as CW2. CW2 falls in Exchange Memory Addresses 128-159. These locations are currently considered as spares.
- (3) It is proposed that whenever a control word is to be fetched from Main Memory for some CW1 location that this address be stored in the Refill Address portion of CW2. This would occur on all Control Word fetches originated by the Exchange in using Read, Write or chain refill operations.
- (4) In conjunction with the use of a Low Speed Channel (s) two alternatives are proposed.
  - (a) Assuming 64 units, requiring a total of 128 words of Exchange Memory. The same CW2 words could be used. However, with the first 32 Low Speed Unit Channels the Value Field (high order 18 bits) would be used. For the second group of Low Speed Unit Channels the Count Field would be used. This proposal is the most desirable from the point of view of full utilization of the memory.

- (b) The alternative proposal assumes 1 Low Speed Channel and Low Speed Exchange with 32 units maximum. Here a second group of Exchange Memory Locations would serve the same function as for the Medium Speed Channels. Clearly this alternative is wasteful of memory space.

For the Low Speed Units alternative (a) is to be preferred for the following reasons:

- (1) Assuming two Low Speed Channels and Low Speed Exchanges with a total of 64 units, the data rate per channel per 8 bit byte is assumed to be 4 ms. Therefore, with worst case chaining one reference to this "Location Address control word (CW2) will only be possible once every 32 milliseconds. Normally it would be much less frequent.
- (5) In order that the above be possible, it is assumed that one additional byte service request will be lost on each 10 microsecond format where control words must be fetched. This loss of one microsecond should not, however, interfere noticeably with Basic Exchange operation.
- (6) Finally, so that this information can be useable by the programmer it is suggested that the operation Copy Control Word be modified so that one or two words may be specified. If two words are requested, CW1 would be stored at the CCW address specified, CW2 would be stored at the CCW address specified plus 1.

Your comments on the feasibility of the above, would be greatly appreciated.

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