May 24, 1957

MEMO TO: Dr. W. Buchholz

SUBJECT: Observations on Scatter-Read and Scatter-Write for Stretch

REFERENCE: Your memo of 5/21/57

Your observations seem to be based on the following assumptions:

A.   That the Exchange will be used with the Harvest exclusively.

B.   That if subject feature were impossible for high performance
       tapes, then it should be eliminated for all.

The Exchange has been proposed for Sigma.   The high performance tape
will not use the basic Exchange.   Are assumptions A and B proper?

May I make the following comments on the numbered paragraphs in your
memo?

1.   The three techniques itemized do not seem to include input from
       several devices, the cornerstone of merging (which appears in
       nearly every application, particularly sorting).

2.   This depends on assumption A.   One should observe that memory-
       to-memory transfers require significant memory accesses and
       hence more traffic on the memory bus.   It would be interesting to
       know what your "break-even" point represents and how it was cal-
       culated.   Master file records can easily run to 600 or more char-
       acters in length and this is more to be expected among those
       customers whose work is large enough to support Stretch equipment.

3.   As you say, subject feature does provide the significant advantages
       of fewer memory cycles and smaller memory areas.

4.   Again fewer memory cycles is an advantage.

5, 6. These are engineering problems upon which, you have told me,
       only a cursory study has been made to date.   Their effect is depend-
       ent upon the validity of assumption B.

7.   Scatter-write in itself is excellent for the sorting pass where an
       internal sort is made, for subsequent merge-type sorting passes,
       and for general skipping and inserting portions of the input record.

8. This depends on assumptions A and B as well as the assumption the 100X tape will be ready for the first machine.

9. A technique was proposed for improving this performance in my memo of 4/24/57 on the Grouping-Distribution feature.

10. The 709 has this feature.

11. If this philosophy is valid, one would also discard indexing.

12. The 709 evaluation of which you speak is in regard to 709 III tapes. Subject feature has been announced with present I/O.

Conclusions:

As you say, the saving in memory space is significant and speed is not a factor to consider. Programming is simplified by subject feature because fewer instructions need be written and tested. Reduction in number of memory accesses is extraordinarily important. The feature implements sorting and merging beautifully. (In sorting it can materially reduce the number of passes).

These point to the conclusion that we should not omit the feature.

Jack C. Gibson

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JCG/jv