March 28, 1961

TO: File

SUBJECT: Proposed Overlap Optional Feature for the 1401

The overlap optional feature will be designed so
that processing can continue at the same time that the 1401 is
executing any one of the following operations:

1. Reading from the 1402
2. Punching out on the 1402
3. Reading and Punching on the 1402
4. Read or Writing on Magnetic Tape
5. Reading or Writing on the I/O Adapter Channel

The degree of overlapping will depend upon the particular device
and the type of operation that is being performed as follows:

Operation	Amount of Processing Time Available	
Normal Read 1402	63 MS	increase of 32 MS
Column Binary 1402	52 MS	24 "
Punch 1402	227 MS	48 "
Column Binary Punch 1402	215 MS	34 "
Combination Read & Punch	216 MS	35 "
Punch Feed Read	213 MS	32 "
7330 Tape	5 MS + time between characters for write, 7.6 MS + time between characters for read
729 II Low density	7.35 MS + time between characters for write, 6.6 MS + time between characters for read
729 II High density	7.35 MS for write, 6.6 MS for read
729 IV	4.9 MS for write, 4.4 MS for read
I/O Adapter	With any device under 25 KC the time between characters.

This feature will be designed so that it will be compatible with
the present 1401 programs and with the 1410. When a 1401 program is
run on the 1410 it may not run at the same speed but it will run.

The instructions will be as follows:

$\begin{matrix} M \\ L \end{matrix}$ ($XX) (BBB) $\begin{matrix} R \\ W \end{matrix}$ Normal Tape or I/O instruction

$\begin{matrix} M \\ L \end{matrix}$ (@XX) (BBB) $\begin{matrix} R \\ W \end{matrix}$ Overlap Tape or I/O instruction

K @   Execute all of the following Reader and/or Punch
           operation codes in an overlap mode until reset by
           KZ operation code on the load key.

KZ   Reset the overlap modeand the overlap test mode
           latches and execute all of the following Reader
           and/or Punch operation codes in their normal mode.

Ky   Set overlap test mode for use by the customer
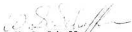   engineer for testing this feature.

B(AAA)H   Transfer to address AAA if Reader is busy.

B(AAA)I   Transfer to address AAA if Punch is busy.

B(AAA)J   Transfer to address AAA if Tape or I/O adapter is busy.

If Tape or I/O adapter are not busy go to next
instruction in sequence and at the same time reset
the B STAR on a non index machine and transfer the
I/O STAR to the B STAR on an index machine.

When running in an overlap operation the following conditions will
result:

1.   If a process error occurs - Processing will stop immediately.
     Overlap operation will continue
     to the end and then it will stop.

2.   If a hole count or validity error occurs - If the I/O check
     stop switch is on, processing will
     stop at the end of the execution
     of the present instruction and the
     overlap operation will continue to
     the end and then it will stop.
     If the switch is off there will be
     no effect on the operation.

3.   Transmission error - Processing will stop at the end of the
     execution of the tape or I/O operation
     when it completes the execution of the
     current instruction.

4.   Another I/O operation is given before the completion of an
     overlap operation - Operation will be held up until the
     present overlap operation is completed.

5.   Test for Reader Error when the reader is operation- Hold up
     until reader stops before completing
     the test.

6.   Test for Punch Error when the punch is operating - Hold up
     until the punch stops before completing
     the test.

7.   Test for Tape error when the tape unit is operating - Hold
     up until the tape stops before
     completing the test.

8.   Test for I/O Error when the I/O Channel is operating -
     Hold up until the I/O unit stops before
     completing the test.

9.   Address storage locations 000 through 080 while the reader
     is operating - Stop with an overlap error-illegal operation.

10.   Address storage locations 100 through 180 while the
     punch is operating - Stop with an overlap error-illegal
     operation.

11.   When a process error occurs between overlap cycles -
       stop processing immediately and the I/O
       operation continues but the I/O Record
       may be incorrect if the inhibit error
       light is on and you are in a load type
       of I/O operation. If in a move type of
       I/O operation a B register or inhibit
       error occurs the I/O record may be incorrect.

12.   A STAR Error Occurs - Everything stops immediately.

13.   Processing can be interrupted when in an overlap mode
       after any cycle except two types -(1) Iop cycle,
       (2) cycle where Readdressing occurs.

14.   An overlap operation can not occur during the following
       operations:

              1.   Print operation if no print storage.
              2.   File read or write operation.
              3.   1407 inquiry operation.

15.   When in a Reader or Punch overlap mode the 8 and 9
       operation codes are inoperative.

More detailed information will be available on this feature as soon
as Product Planning and Engineering agree on the details of this
feature.

                                        M. S. Schaffer
                                        Calculating Systems

WSS/mm

cc: 1401 Engineers
     1410 Engineers
     1401 Planning
     1410 Planning
     W. Harding
     C. Smith