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Department 539
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September 25, 1958

FILE MEMORANDUM

SUBJECT: Present State of 729 Tape Control in the 7000 System.

On September 18, 1958 a meeting was held for the purpose of reviewing the present status of 729 tape control in the 7000 System. The meeting was attended by

Dr. W. Buchholz
Mr. J. D. Calvert
Mr. J. K. Crawford
Dr. A. Padegs
Mr. C. M. Pietras .
Mr. E. W. Coffin

After an outline of the operation of the tape control unit by Mr. Crawford, the following facts were brought to light:

1. Generation of Unit Signal

A 729 Tape unit, as specified in the 7000 Manual of Operation, should generate a Unit Signal whenever the unit assumes the Ready status as a result of a depression of the START key or upon completion of a rewinding operation. The Unit Signal should be transmitted regardless of whether the unit is selected or not.

As presently designed, the Ready Status indication is associated with the line signalling the selection of the unit, and hence a Unit Signal indicating the assumption of the Ready Status cannot be given. Furthermore, according to the present design a Unit Signal, if available, could be transmitted only from that unit which is selected (connected to the exchange by means of a LOCATE instruction).

It was resolved that the necessity of Unit Signal in the 7000 System is beyond question and that the possibility of its generation should be investigated further.

2. Identification of Unit Signals

Mr. Coffin emphasized the need for a method of distinguishing and identifying Unit Signals sent by different units attached to one control unit. He proposed a scheme for accomplishing this by means of an 8-trigger register in the tape control unit. This register would store the Unit Signal status bits for each of the 8 tape units. The status of the triggers then could be read into memory under program control after a Unit Signal interruption. A more detailed description of this proposal will be prepared by Mr. Coffin.

3. Logical and Physical Arrangement of Tape Units

As presently designed, a number of tape units will be physically connected one into another, the whole string being attached to a tape control unit. This arrangement presents problems when one of the units has to be removed for servicing since a unit in this arrangement cannot be removed without temporarily disabling other units in the same string. It was decided that a parallel arrangement would be more desirable, provided the transients caused by the disconnection of one unit would not disturb the rest of the system.

It was also felt that a selection switch would be desirable on each tape unit in order to provide operator control of the selection address of a unit. In this way the selection address of the unit would not be permanently fixed. A variable selection address would enable the logical replacement of any unit which is temporarily not operational without requiring physical substitution of another unit. However, in order to prevent inadvertent change of the selection address, provision should be made for locking the switch by means of a set screw or other appropriate means.

4. Space Block

The usefulness of the Space Block CONTROL instruction was questioned. It was decided to retain the instruction for the following reasons:

a. To make the operations moving tape forward symmetrical to those moving tape backward.

b. To make the 729 tape CONTROL instructions as compatible as possible with those of tractor tape.

5. Erase Long Gap

The Erase Long Gap CONTROL instruction does not move the tape by itself, but sets only a trigger as a result of which the succeeding WRITE instruction causes a 3 1/2 inch long gap to be placed on tape. Two or more adjacent gaps (i.e., a very long gap) can be written by repeating the following sequence of operations:

Erase Long Gap
WRITE
Backspace

The Erase Long Gap trigger is reset by the next instruction addressed to the same tape control unit.

6. Power On, Power Off

The power for all tape units accommodated by a tape control unit can be turned on or off by means of a main switch at a central location. There are no POWER ON and POWER OFF keys on the unit. Each unit, however, has a switch for turning the power on or off for customer engineer use. When this switch is in the off position, power cannot be applied to this unit from the central location.

7. Data Error Indication

In the no-ECC mode a Unit Check indication is given by the tape system whenever at least one transverse or longitudinal redundancy check bit does not agree. In the ECC mode, failure of one transverse check per word and all longitudinal checks are ignored. However, if the transverse check does not agree in two or more 6-bit bytes in one word, a Unit Check is sent. The tape system keeps track of the number of errors per word.

8. Status Indicators

It was decided that exceptional conditions in programming tapes shall be treated in accordance with the rules specified in the attached chart.

If CONTROL instructions specifying a state or a mode of operation cannot be executed because the unit or control unit to which the instruction is addressed is already in the desired state or mode of operation, the instruction is not executed and is terminated by an End of Operation indication. The following are the instructions to which the above rule applies:

Code	
0	RESERVED light off
1	RESERVED light on
4	ECC mode
5	No-ECC Mode and Odd Parity
6	No-ECC Mode and Even Parity
14	High Density Mode
15	Low Density Mode

A. Padegs
Associate Engineer
Project 7000 Planning

AP/pkb
Attach.
cc: Mr. J. D. Calvert
Mr. J. K. Crawford
Mr. R. J. Sippel
Dr. E. G. Newman
Mr. C. M. Pietras
7000 Product Planning
7000 Planning

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Status Indicators for 729 Tapes

The following chart outlines the various status indications due to exceptional conditions to be given when an instruction addressed to a tape unit is terminated by or after sensing the corresponding condition.

Instructions are either EOS or no-EOS unless otherwise specified.

Instructions	Load Point	Tape Mark	End of Tape Reflective Spot	Mechanical End of Tape *
READ	---	EE	---	UK
WRITE, Write Tape Mark	---	---	EE & EOP	UK
Incomplete Multiple WRITE **	---	---	EE	UK
Space Block, Space File	---	EE & EOP	---	UK
Backspace Block, Backspace File	EPK	EE & EOP	---	---
Rewind ***	US & EOP	---	---	---
Rewind EOS ***	US	---	---	---

* Tape is pulled off the reel and the unit becomes Not Ready.

** An end of tape reflective spot terminates a multiple WRITE operation at the end of the block in which the reflective spot is sensed.

*** This indication is given when rewinding is completed and in the case when tape is at load point before the rewinding instruction is given.

EPK = Exchange Program Check
UK = Unit Check
EE = End Exception
EOP = End of Operation
US = Unit Signal

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