

The purpose of these notes is to list precisely all the known rules of abnormal machine behaviour, Whilst some of these are well known and have been described in various editions of the manual, others have not been documented previously. To aid in avoiding trouble in cases depending on the speed of the various machine commands; a list of these speeds is appended,

Restrictions in Drum Commands

1. If speed-up is to be used, drum commands must not be stored in cells 15, mod 16.

2. PK commands modifying lower-half digits are allowed provided only that the assembled command does not become a drum read command,

3. Drum locations pass the heads in order of ascending address, Programmes must be arranged so that after a drum write command, the drum address will pass 31, 31 before the next drum command (read or write) is executed. This is required to ensure that the drum clock time is corrected after each write command - the write pulse can upset the clock count, and the correction occurs after the 31, 31 address, This can be ensured by

(i) putting the uppermost count first - the address must pass 31, 31 to reach a lower count,
or (ii) allow enough time for the drum to pass the second address - see command speeds.

Other Restrictions

1. In time position 11, when S is called as a source the add 1 to S has not taken place, e.g. 11 S D places the un-incremented value of S in D11, This is discussed in the manual - D11 as a link register.

2. M PS using a lower half-word count. If the absolute address of the store cell called is 11 mod 16, over carry from p 10 to PE cannot be effected by this command, so that the routine will not exit.

3. Input commands should not have an address, unless the machine is not waiting on the reader when the command is called. This restriction also applies to input commands preceded by a PK command to provide the address e.g. 5 I D will fail if the machine has to wait for the reader.

4. Output commands may be modified by PK commands only if the machine is not waiting for the punch.

5. The left shift operation will occur only if the destination L receives a PS digit from any source. If it does receive such a digit, then the number of left shifts that occurs depends **ON** the address (mod 16) of the command, as described in the manual. PK commands may be used to modify the number of left shifts obtained.

However, the address 14 mod 16 must be avoided as the machine gives either 0 or 8 shifts at random.

6. The trigger shop will fail if the lower half of S is not clear.

7. The command MA XB tends to give trouble, and should always be avoided, as it may never be really reliable.

There is another group of commands:-

HA SC when A contains many digits

HA A with a p2 in A

1 RD as a source, with PL in D0 and PS in D1

which gave trouble earlier but since modifications to the machine in September 1961 these should be reliable.

COMMAND SPEEDS

Commands calling peripheral equipment

Drum 20 m.sec/cycle of 1024 locations

Punch (5-hole) 20 cps 50 m.sec/character

Input (5 hole) 100 cps 10 m.sec/character

Input (12-hole) 35-50 cps 29-20 m.sec/tape row

Other commands

Multiplication and left shift, 4 m.sec each always

On speed-up, for other commands, basic time is 2 m.sec

If address is 12, 13 or 14 mod 16, add 1 m.sec

If store location is " " " " " "

If both, add 2 m.sec

Hence on speed-up, commands may be 2, 3 or 4 m.sec.

On slow speed, all commands take 4 m.sec.

These command times may be used for designing optimal routines for special purposes, e.g, the fast loading routine for INTERPROGRAM specifically avoids locations and addresses 12, **13**, 14 mod 16.

T.S. Holden, Division of Building Research, C.S.I.R.O. 5/3/62