



1401 DATA PROCESSING SYSTEM PROGRAM CARD

| OPERATION CODE | INSTRUCTION | TRANSMISSION STOPPED BY | REQUIRED WORD MARKS | CAN INST. BE CHAINED | CONTENTS OF REGISTERS AT COMP. OF OPERATION | | | REMARKS |
|----------------|--------------------------------------|-----------------------------|---|----------------------|---|------|----------------------|--|
| | | | | | I | A | B | |
| 1 | Read A Card | | | | NSI | Ap | 081 | |
| 2 | Write A Line | | | | NSI | Ap | 335 | B-Add. Reg. stands at 333 with Print Storage |
| 2□ | Write Word Marks | | | | NSI | dbb | 335 | B-Add. Reg. stands at 333 with Print Storage |
| 3 | Write-Read | | | | NSI | Ap | 081 | Printing occurs first |
| 4 | Punch A Card | | | | NSI | Ap | 181 | |
| 4R | Read-Punch Feed | | | | NSI | dbb | 181 | |
| 5 | Read-Punch | | | | NSI | Ap | 181 or 081 | Normally B-Add. Reg. is at 181 unless punching is completed first |
| 6 | Write-Punch | | | | NSI | Ap | 181 | |
| 6R | Write-Read Punch Feed | | | | NSI | dbb | 181 | |
| 7 | Write-Read-Punch | | | | NSI | Ap | 181 or 081 | See remarks for Read-Punch |
| 8 | Start Read Feed | | | | NSI | Ap | Bp | |
| 9 | Start Punch Feed | | | | NSI | Ap | Bp | |
| A (A) (B) | Add | B-field word mark | B-field. A-field only if smaller than B-field | Yes | NSI | A-LW | B-LB | Blanks are treated as zeros, unsigned fields are treated as positive |
| S (A) (B) | Subtract | B-field word mark | B-field. A-field only if smaller than B-field | Yes | NSI | A-LW | B-LB | Same as remark for Add |
| ? (A) (B) | Zero and Add | B-field word mark | B-field. A-field only if smaller than B-field | Yes | NSI | A-LW | B-LB | |
| ! (A) (B) | Zero and Subtract | B-field word mark | B-field. A-field only if smaller than B-field | Yes | NSI | A-LW | B-LB | Can be used with a single address to change sign of field |
| @ (A) (B) | Multiply | | A and B-field | No | NSI | A-LC | B-L of product field | Product in low-order positions of B-field |
| % (A) (B) | Divide | | A-field | No | NSI | A-LA | Tens pos. of quot. | Quotient is developed in high-order position of B-field |
| B (I) | Branch | | | No | NSI | BI | BI | The I-address can be followed by a blank without a word mark |
| B (I) d | Branch if Indicator On | | | No | NSI | BI | dbb | |
| B (I) (B) d | Branch If Character Equal | | | Yes | NSI | BI | B-1 | The character at B-address is compared to the d-character |
| V (I) (B) d | Branch IF WM and/or Zone | | | Yes | NSI | BI | B-1 | Tests character at B for zone and/or WM |
| D (A) (B) | Move Numerical | Single digit move | | Yes | NSI | A-1 | B-1 | Numeric bits of A moved to B. B zone bits are retained. |
| L (A) (B) | Load Characters to A-Word Mark | A-field word mark | A-field | Yes | NSI | A-LA | B-LA | B-field word marks are cleared |
| M (A) (B) | Move Characters to A- or B-Word Mark | First word mark encountered | | Yes | NSI | A-LW | Bp-LW | |
| Y (A) (B) | Move Zone | | | Yes | NSI | A-1 | B-1 | Zone bits of A are moved to B. B numeric bits are retained. |
| Z (A) (B) | Move Characters and Suppress Zeros | A-field word mark | | No | NSI | A-LA | B + 1 | B-field word marks are cleared |
| , (A) (B) | Set Word Mark | | | Yes | NSI | A-1 | B-1 | Sets word marks in A- and B-address. Data is undisturbed |
| □ (A) (B) | Clear Word Mark | | | Yes | NSI | A-1 | B-1 | Removes the word marks at the A and B location. Data is undisturbed |
| C (A) (B) | Compare | First word mark encountered | A or B-field | Yes | NSI | A-LW | B-LW | If B field is longer than A field unequal compare results |
| E (A) (B) | Move Characters and Edit | B-field word mark | A and B-field | No | NSI | A-LA | B-LB | If zero suppression occurs B-Add. Reg. contains location of control zero + 1 |
| F d | Control Carriage | | | No | NSI | dbb | dbb | |

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|----------------|---|--|--|----------------------|---|---------------|-------------------------|---|
| | | | | | I | A | B | |
| Q (A) | Store A-Address Register | | | No | NSI | A-3 | Ap | Stores contents of A-address register in A-address |
| K d | Select Stacker | | | No | NSI | dbb | dbb | |
| N | No Operation | | | No | NSI | Ap | Bp | Program resumes at next Op code with a WM |
| H (A) | Store B-Address Register | | | No | NSI | A-3 | Bp | Stores contents of B-address register in A-address |
| / (A) | Clear Storage | Stops at hundreds position of storage block involved | | Yes | NSI | A | X-001 | |
| • | Halt | | | No | NSI | Ap | Bp | Press start key to resume operation |
| # (A) (B) | Modify Address | This is a 3-position Add operation | | No | NSI | A-3 | B-1 or B-3 | |
| M (% UX) (B) R | Read Tape | Inter-record gap or GM-WM in storage | | No | NSI | % 4X | GM + 1 | GM is inserted in storage after last character is read from tape |
| M (% UX) (B) W | Write Tape | GM-WM | | No | NSI | % 4X | GM + 1 | |
| L (% UX) (B) R | Read Tape with Word Marks | Inter-record gap with a GM-WM in storage | | No | NSI | % 4X | GM + 1 | Word separator characters are translated into WM in storage |
| L (% UX) (B) W | Write Tape with Word Marks | GM-WM | | No | NSI | % 4X | GM + 1 | WM in storage are written on tape as Word Separator Characters |
| M (% CX) (B) R | Read Compressed Tape | Inter-record gap | | No | NSI | % 3X | B + L _{RECORD} | |
| P (A) (B) | Move Characters to Record Mark or GM-WM | GM-WM or record mark in A-field | | Yes | NSI | A + LA | B + LA | WM are not moved or cleared |
| X (A) (B) | Move and Insert Zeros | GM-WM to left of high-order position of A-field | High-order position of expanded fields | No | NSI | A-field GM-WM | A-field GM-WM | |
| M (% F0) (B) R | Seek Disk | | GM-WM in B + 8 | No | NSI | B + 1 | B + 8 | Sends access arm to proper disk and track |
| M (% FX) (B) R | Read Disk | End of sector (1 or 5) | GM-WM mark in B + 8 and B + 209 | No | NSI | B + 1 | B + 210 | Can READ 1 or 5 sectors depending on X-character in A-address |
| M (% FX) (B) W | Write Disk | End of sector (1 or 5) | GM-WM in B + 8 and B + 209 | No | NSI | B + 1 | B + 210 | Can WRITE 1 or 5 sectors depending on X-character in A-address |
| L (% FX) (B) R | Read Disk with Word Marks | End of sector (1 or 5) | GM-WM in B + 8 and B + 185 | No | NSI | B + 1 | B + 186 | 176 characters and word marks are read from a sector |
| L (% FX) (B) W | Write Disk with Word Marks | End of sector (1 or 5) | GM-WM in B + 8 and B + 185 | No | NSI | B + 1 | B + 186 | 176 characters and word marks are written on a sector |
| M (% F3) (B) W | Write Disk Check | End of sector (1 or 5) | GM-WM in B + 8 and B + 209 | No | NSI | B + 1 | B + 210 | A char. by char. comparison is made of the data in storage with the disk record |
| L (% F3) (B) W | Write Disk Check | End of sector (1 or 5) | GM-WM in B + 8 and B + 185 | No | NSI | B + 1 | B + 186 | A char. by char. comparison is made of the data in storage with the disk record |
| M (% T0) (B) R | Read from Console Printer | GM-WM or pressing Clear key | | No | NSI | % 30 | B + LB | Inquiry Request indicator must be ON |
| M (% T0) (B) W | Write On Console Printer | GM-WM in core storage | | No | NSI | % 30 | B + LB | |
| L (% T0) (B) R | Read from Console Printer with WM | GM-WM or pressing Clear key | | No | NSI | % 30 | B + LB | Word marks are entered by pressing WM key |
| L (% T0) (B) W | Write On Console Printer with WM | GM-WM in core storage | | No | NSI | % 30 | B + LB | Characters with a WM are printed in red |
| M (% T0) (B) W | Line Space | GM-WM | GM-WM at B-Address | No | NSI | % 30 | B + 1 | |

KEY TO ABBREVIATIONS

| | | | |
|-----|--|-------|---|
| A | A-address of the instruction | LD | The number of characters in a disk record |
| B | B-address of the instruction | LW | The number of characters in the A- or B-field, whichever is smaller |
| NSI | Address of the next sequential instruction | Ap | The previous setting of the A-address register |
| BI | Address of the next instruction if a branch occurs | Bp | The previous setting of the B-address register |
| LA | The number of characters in the A-field | dbb | The d-character and blank in the units and tens positions |
| LB | The number of characters in the B-field | dpp | The d-character and the tens and units positions of the previous register setting |
| LC | The number of characters in multiplicand field | GM-WM | Group-Mark with a Word-Mark |