

TABLE OF EQUIVALENT FAST ACCESS TRACK LOCATIONS

| Tk 60 n=0 | Tk 61 n=1 | Tk 62 n=2 | Tk 63 n=3 | Tk 60 n=0 | Tk 61 n=1 | Tk 62 n=2 | Tk 63 n=3 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 000 | 040 | 100 | 140 | 100 | 140 | 000 | 040 |
| 001 | 041 | 101 | 141 | 101 | 141 | 001 | 041 |
| 002 | 042 | 102 | 142 | 102 | 142 | 002 | 042 |
| 003 | 043 | 103 | 143 | 103 | 143 | 003 | 043 |
| 004 | 044 | 104 | 144 | 104 | 144 | 004 | 044 |
| 005 | 045 | 105 | 145 | 105 | 145 | 005 | 045 |
| 006 | 046 | 106 | 146 | 106 | 146 | 006 | 046 |
| 007 | 047 | 107 | 147 | 107 | 147 | 007 | 047 |
| 010 | 050 | 110 | 150 | 110 | 150 | 010 | 050 |
| 011 | 051 | 111 | 151 | 111 | 151 | 011 | 051 |
| 012 | 052 | 112 | 152 | 112 | 152 | 012 | 052 |
| 013 | 053 | 113 | 153 | 113 | 153 | 013 | 053 |
| 014 | 054 | 114 | 154 | 114 | 154 | 014 | 054 |
| 015 | 055 | 115 | 155 | 115 | 155 | 015 | 055 |
| 016 | 056 | 116 | 156 | 116 | 156 | 016 | 056 |
| 017 | 057 | 117 | 157 | 117 | 157 | 017 | 057 |
| 020 | 060 | 120 | 160 | 120 | 160 | 020 | 060 |
| 021 | 061 | 121 | 161 | 121 | 161 | 021 | 061 |
| 022 | 062 | 122 | 162 | 122 | 162 | 022 | 062 |
| 023 | 063 | 123 | 163 | 123 | 163 | 023 | 063 |
| 024 | 064 | 124 | 164 | 124 | 164 | 024 | 064 |
| 025 | 065 | 125 | 165 | 125 | 165 | 025 | 065 |
| 026 | 066 | 126 | 166 | 126 | 166 | 026 | 066 |
| 027 | 067 | 127 | 167 | 127 | 167 | 027 | 067 |
| 030 | 070 | 130 | 170 | 130 | 170 | 030 | 070 |
| 031 | 071 | 131 | 171 | 131 | 171 | 031 | 071 |
| 032 | 072 | 132 | 172 | 132 | 172 | 032 | 072 |
| 033 | 073 | 133 | 173 | 133 | 173 | 033 | 073 |
| 034 | 074 | 134 | 174 | 134 | 174 | 034 | 074 |
| 035 | 075 | 135 | 175 | 135 | 175 | 035 | 075 |
| 036 | 076 | 136 | 176 | 136 | 176 | 036 | 076 |
| 037 | 077 | 137 | 177 | 137 | 177 | 037 | 077 |
| 040 | 100 | 140 | 000 | 140 | 000 | 040 | 100 |
| 041 | 101 | 141 | 001 | 141 | 001 | 041 | 101 |
| 042 | 102 | 142 | 002 | 142 | 002 | 042 | 102 |
| 043 | 103 | 143 | 003 | 143 | 003 | 043 | 103 |
| 044 | 104 | 144 | 004 | 144 | 004 | 044 | 104 |
| 045 | 105 | 145 | 005 | 145 | 005 | 045 | 105 |
| 046 | 106 | 146 | 006 | 146 | 006 | 046 | 106 |
| 047 | 107 | 147 | 007 | 147 | 007 | 047 | 107 |
| 050 | 110 | 150 | 010 | 150 | 010 | 050 | 110 |
| 051 | 111 | 151 | 011 | 151 | 011 | 051 | 111 |
| 052 | 112 | 152 | 012 | 152 | 012 | 052 | 112 |
| 053 | 113 | 153 | 013 | 153 | 013 | 053 | 113 |
| 054 | 114 | 154 | 014 | 154 | 014 | 054 | 114 |
| 055 | 115 | 155 | 015 | 155 | 015 | 055 | 115 |
| 056 | 116 | 156 | 016 | 156 | 016 | 056 | 116 |
| 057 | 117 | 157 | 017 | 157 | 017 | 057 | 117 |
| 060 | 120 | 160 | 020 | 160 | 020 | 060 | 120 |
| 061 | 121 | 161 | 021 | 161 | 021 | 061 | 121 |
| 062 | 122 | 162 | 022 | 162 | 022 | 062 | 122 |
| 063 | 123 | 163 | 023 | 163 | 023 | 063 | 123 |
| 064 | 124 | 164 | 024 | 164 | 024 | 064 | 124 |
| 065 | 125 | 165 | 025 | 165 | 025 | 065 | 125 |
| 066 | 126 | 166 | 026 | 166 | 026 | 066 | 126 |
| 067 | 127 | 167 | 027 | 167 | 027 | 067 | 127 |
| 070 | 130 | 170 | 030 | 170 | 030 | 070 | 130 |
| 071 | 131 | 171 | 031 | 171 | 031 | 071 | 131 |
| 072 | 132 | 172 | 032 | 172 | 032 | 072 | 132 |
| 073 | 133 | 173 | 033 | 173 | 033 | 073 | 133 |
| 074 | 134 | 174 | 034 | 174 | 034 | 074 | 134 |
| 075 | 135 | 175 | 035 | 175 | 035 | 075 | 135 |
| 076 | 136 | 176 | 036 | 176 | 036 | 076 | 136 |
| 077 | 137 | 177 | 037 | 177 | 037 | 077 | 137 |

SCALING:

ADD: (A) at 2^X + (OPA) at 2^Y = (A) at 2^X
 SUB: (A) at 2^X - (OPA) at 2^Y = (A) at 2^X
 MUL: (A) at 2^X x (OPA) at 2^Y = (A) (B) at $2^{X+Y} + (27-NN)$
 DIV: (A) at 2^X ÷ (OPA) at 2^Y = (A) at $2^{X-Y} - (27-NN)$
 REMAINDER = (B) at 2^Y
 SQRT: $\sqrt{(OPA) \text{ at } 2^{2X}} = (A) \text{ at } 2^X$

SCALE FACTOR:

All numbers will be scaled using the fixed machine point as the reference origin, e.g.; (+105.0)₈ scaled 2^{-9} has the binary point 9 places right of the machine point.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|
| 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | |

↑ MACHINE POINT

↑ BINARY POINT

ALL NUMBERS ARE LISTED IN OCTAL except those in OPERATION and SYMB columns

DIGITAL INPUTS:

Normal and Delayed Modes: Unused A bits → 0
 Operand Mode: Unused A bits unchanged

EXAMPLE: DIF-N (A) $S_{21-7} = 0$

OUTPUT BUFFER:

An output device must be selected using the OUSN command prior to giving the OUB.

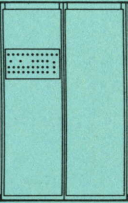
Maximum Output

128 words of 4-6 bit chars/word (Flex) or,
 128 words of 6-4 bit chars/word.

| OPERATION | OP CODE | | OPERAND ADDR. | NEXT INSTR. ADDRESS |
|--|-------------------------|----------------------|-------------------------------|---|
| | SYMB. | OCT. | | |
| DIGITAL INPUT: | | | | |
| Flex Input 1 Flex Char. → A ₆₋₁ | DIF-N DIF-D DIF-O | 0052 1052 0452 | 000-XXX 000-0FS 000-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Toggle Switches T _{18-T1} → A ₁₈₋₁ | DIT-N DIT-D DIT-O | 0052 1052 0452 | 001-XXX 001-0FS 001-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Teletype Reader 1 TT Char. → A ₅₋₁ | DIX-N DIX-D DIX-O | 0052 1052 0452 | 002-XXX 002-0FS 002-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| High Speed Reader 1 Reader Char. → A ₆₋₁ | DIR-N DIR-D DIR-O | 0052 1052 0452 | 003-XXX 003-0FS 003-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Console Switches S ₇₋₈ → A ₇₋₁ Function Select Switches S ₁₁ and S ₁₂ → A ₁₃₋₈ | DIS-N DIS-D DIS-O | 0052 1052 0452 | 004-XXX 004-0FS 004-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Digitran Switches S _{36-S31} → A ₂₄₋₁ (6 octal chars. + 6 1-bit codes) | DID-N DID-D DID-O | 0052 1052 0452 | 005-XXX 005-0FS 005-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Digitran Switches S ₂₆₋₂₁ → A ₂₄₋₁ (6 BCD Chars) | DID-N DID-D DID-O | 0052 1052 0452 | 006-XXX 006-0FS 006-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Digital Clock Clock → A ₁₃₋₁ | DIC-N DIC-D DIC-O | 0052 1052 0452 | 007-XXX 007-0FS 007-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| Input Lines 28 Lines → A | DIN-N DIN-D DIN-O | 0052 1052 0452 | 010-XXX 010-0FS 010-XXX | CIT + (CIS+2) CIT + (OPS+1) CIT + (CIS+2) |
| DIGITAL OUTPUT: | | | | |
| Flex Output A ₆₋₁ → Flex | OUF-N OUF-D | 0046 1046 | 000-XXX 000-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| Output Buffer | OUB-N OUB-D | 0046 1046 | 001-0FS 001-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| Single Bit Output: OFF | OUSF-N OUSF-D | 0046 1046 | 002-XXX 002-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| Single Bit Output: ON | OUSN-N OUSN-D | 0246 1246 | 002-XXX 002-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| High Speed Punch | OUP-N OUP-D | 0046 1046 | 003-XXX 003-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| Multi-Bit Output | OUM-N OUM-D | 0046 1046 | 004-XXX 004-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| Logging Typewriter | OUL-N OUL-D | 0046 1046 | 005-XXX 005-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| SET ANALOG SEQUENCE: | | | | |
| Set Analog Input Sequence Counter = NNN | SAS-N SAS-D | 0042 1042 | 032-NNN 032-NNN | CIT + (CIS+2) CIT + (NNN+1) |
| ACTIVATE CONTROL SIGNAL: | | | | |
| Output 130 μsec pulse | ACS-N ACS-D | 0042 1042 | 022-XXX 022-0FS | CIT + (CIS+2) CIT + (OPS+1) |
| INHIBIT INTERRUPT: | | | | |
| ON | ION | 0100 | OPA | OPA |
| OFF | IOF | 0200 | OPA | OPA |

THE TRW-330

DIGITAL CONTROL COMPUTER



Thompson Ramo Wooldridge, Inc.
 TRW Computers Company (division)
 8433 Fallbrook Avenue
 CANOGA PARK, CALIFORNIA

| FLEXWRITER CODES | | | | | |
|------------------|------------|------------|------------|------------|------------|
| UPPER CASE | LOWER CASE | OCTAL CODE | UPPER CASE | LOWER CASE | OCTAL CODE |
| A | A | 26 |) | 0 | 60 |
| B | B | 27 | " | 1 | 61 |
| C | C | 30 | " | 2 | 62 |
| D | D | 31 | # | 3 | 63 |
| E | E | 32 | \$ | 4 | 64 |
| F | F | 33 | % | 5 | 65 |
| G | G | 34 | ^ | 6 | 66 |
| H | H | 35 | & | 7 | 67 |
| I | I | 36 | * | 8 | 70 |
| J | J | 37 | (| 9 | 71 |
| K | K | 40 | ° | 10 | 72 |
| L | L | 41 | ? | 11 | 73 |
| M | M | 42 | : | 12 | 74 |
| N | N | 43 | . | . | 25 |
| O | O | 44 | . | . | 22 |
| P | P | 45 | / | - | 23 |
| Q | Q | 46 | - | , | 24 |
| R | R | 47 | - | SPACE | 20 |
| S | S | 50 | - | TAPE FEED | 00 |
| T | T | 51 | - | C-RETURN | 01 |
| U | U | 52 | - | TAB | 02 |
| V | V | 53 | - | UPPER CASE | 03 |
| W | W | 54 | - | LOWER CASE | 04 |
| X | X | 55 | - | RED | 05 |
| Y | Y | 56 | - | BLACK | 06 |
| Z | Z | 57 | - | STOP | 13 |
| | | | - | DELETE | 77 |

FLEXWRITER CONTROL

The Flex motor, punch and printer can be turned ON and OFF, singly or in combination, under program control using the OUSN or OUSF commands and 1-Bits in the following A-Register bit positions:

- Bit 1 = Flex Motor
- Bit 2 = PUNCH
- Bit 3 = PRINT
- Bit 4 = Select Flex: OUB

Example:

Executing OUSN with (A)₃₋₁ = 101 turns Flex motor, PRINT ON.

Executing OUSF with (A)₃₋₁ = 100 turns PRINT OFF.

DIGITAL CONTROL COMPUTER

SUMMARY OF INSTRUCTIONS

| OPERATION | OP CODE | | OPERAND ADDR. | NEXT INSTR. ADDRESS |
|---|---------|-------|-----------------|--------------------------------------|
| | SYMB. | OCT | | |
| LOAD A: (OPA) → (A) | LA-N | 0070 | OPA | CIT + (CIS+2) |
| | LA-D | 1070 | OPA | CIT + (OPS+1) |
| | LA-O | 0470 | OPRND | CIT + (CIS+2) |
| | LA-U | 0670 | OPRND | CIT + (CIS+2) |
| LOAD B: (OPA) → (B) | LB-N | 0032 | OPA | CIT + (CIS+2) |
| | LB-D | 1032 | OPA | CIT + (OPS+1) |
| | LB-O | 0432 | OPRND | CIT + (CIS+2) |
| | LB-U | 0632 | OPRND | CIT + (CIS+2) |
| LOAD C: (OPA) → (C) | LC-N | 0034 | OPA | CIT + (CIS+2) |
| | LC-D | 1034 | OPA | CIT + (OPS+1) |
| | LC-O | 0434 | OPRND | CIT + (CIS+2) |
| LOAD D: (OPA) → (D) | LD-N | 0024 | OPA | CIT + (CIS+2) |
| | LD-D | 1024 | OPA | CIT + (OPS+1) |
| | LD-O | 0424 | OPRND | CIT + (CIS+2) |
| | LD-U | 0624 | OPRND | CIT + (CIS+2) |
| LOAD X: (OPA) → (X) | LX-N | 0022 | OPA | CIT + (CIS+2) |
| | LX-D | 1022 | OPA | CIT + (OPS+1) |
| | LX-O | 0422 | OPRND | CIT + (CIS+2) |
| STORE A: (A) → (OPA) | SA-N | 0076 | OPA | CIT + (CIS+2) |
| | SA-D | 1076 | OPA | CIT + (OPS+1) |
| STORE A REPEAT: (A) → OPA, OPA+1, ... OPA+X. | SAR-N | 0176 | OPA | CIT + (CIS+X+2) |
| SAR-D | 1176 | OPA | CIT + (OPS+X+1) | |
| STORE B: (B) → (OPA) | SB-N | 0066 | OPA | CIT + (CIS+2) |
| | SB-D | 1066 | OPA | CIT + (OPS+1) |
| STORE D: (D) → (OPA) | SD-N | 0072 | OPA | CIT + (CIS+2) |
| | SD-D | 1072 | OPA | CIT + (OPS+1) |
| LOAD INDEX: (OPA) → (I) | LI-N | 0036 | OPA | CIT + (CIS+2) |
| | LI-D | 1036 | OPA | CIT + (OPS+1) |
| | LI-O | 0436 | OPRND | CIT + (CIS+2) |
| REDUCE INDEX: (I) - (OPA) → (I) | RI-N | 0026 | OPA | CIT + (CIS+2) |
| | RI-D | 1026 | OPA | CIT + (OPS+1) |
| | RI-O | 0426 | OPRND | CIT + (CIS+2) |
| EXTRACT: (A) ⊗ (OPA) → (A) | EX-N | 0020 | OPA | CIT + (CIS+2) |
| | EX-D | 1020 | OPA | CIT + (OPS+1) |
| | EX-O | 0420 | OPRND | CIT + (CIS+2) |
| | EX-U | 0620 | OPRND | CIT + (CIS+2) |
| MERGE: (A) ⊕ (OPA) → (A) | MG-N | 0064 | OPA | CIT + (CIS+2) |
| | MG-D | 1064 | OPA | CIT + (OPS+1) |
| | MG-O | 0464 | OPRND | CIT + (CIS+2) |
| MG-U | 0664 | OPRND | CIT + (CIS+2) | |
| BLOCK TRANSFER: | BT-N | 0074 | OPA | CIT + (CIS+C _{SSS} +2) |
| | BT-D | 1074 | OPA | CIT + (OPS+C _{SSS} +1) |
| SCAN TABLE: EQUAL LESS THAN GREATER THAN NOT EQUAL | SCNE | 0062 | OPA | Successful Scan NIA=CIT + (001) |
| | SCNL | 0162 | OPA | Successful Scan NIA=CIT + (001) |
| | SCNG | 0262 | OPA | Unsuccessful Scan NIA=CIT + (000) |
| | SCNN | 0362 | OPA | Unsuccessful Scan NIA=CIT + (000) |
| SCAN ANALOG INFUT: | SCNA | 0462 | OPA | |
| SCAN DIGITAL INFUT: | SCND | 1062 | OPA | |
| SQUARE ROOT: √(OPA) → (A) | SQRT-N | 0006 | OPA | CIT + (CIS+20) |
| | SQRT-D | 1006 | OPA | CIT + (OPS+17) |
| | SQRT-O | 0406 | OPRND | CIT + (CIS+20) |
| ADD: (A) + (OPA) → (A) | AD-N | 0060 | OPA | CIT + (CIS+2) |
| | AD-D | 1060 | OPA | CIT + (OPS+1) |
| | AD-O | 0460 | OPRND | CIT + (CIS+2) |
| SUBTRACT: (A) - (OPA) → (A) | SU-N | 0030 | OPA | CIT + (CIS+2) |
| | SU-D | 1030 | OPA | CIT + (OPS+1) |
| | SU-O | 0430 | OPRND | CIT + (CIS+2) |

| | | |
|----------------------------|----------------------------|---------------------|
| LEGEND: | NIA | Next Instr. Addr. |
| CIT | PPP | Amount of Shift |
| CIS | NNN | Counter Setting |
| OPA | SYMB | Symbolic |
| OPRND | OCT | Octal |
| OPS | AL | A Reg. Bit 1 |
| C _{SSS} | LSD | Least (Most) |
| -N,-D | (MSD) | Significant Digits |
| -O,-U | XXX | Numbers used not |
| Contents of, or NIA Sector | XXXXXX | effective in instr. |
| → | REGISTERS: A,B,C,D,I,X,Q,M | |



| OPERATION | OP CODE | | OPERAND ADDR. | NEXT INSTR. ADDRESS | |
|--|--|---------|---------------|---------------------|----------------------------------|
| | SYMB. | OCT | | | |
| MULTIPLY: NN LSD BITS (OPA)x(A) → (A) and NN MSD BITS (B) The 27-NN LSD Bits (B) = 27-NN MSD Bits (OPA) NN = 07, 14, 21, 27 | M7-N | 0002 | OPA | CIT + (CIS+12) | |
| | M7-D | 1002 | OPA | CIT + (OPS+11) | |
| | M7-O | 0402 | OPRND | CIT + (CIS+12) | |
| | M14-N | 0102 | OPA | CIT + (CIS+21) | |
| | M14-D | 1102 | OPA | CIT + (OPS+20) | |
| | M14-O | 0502 | OPRND | CIT + (CIS+21) | |
| | M21-N | 0202 | OPA | CIT + (CIS+30) | |
| | M21-D | 1202 | OPA | CIT + (OPS+27) | |
| | M21-O | 0602 | OPRND | CIT + (CIS+30) | |
| | M27-N | 0302 | OPA | CIT + (CIS+36) | |
| | M27-D | 1302 | OPA | CIT + (OPS+35) | |
| | M27-O | 0702 | OPRND | CIT + (CIS+36) | |
| | DIVIDE: (A)/(OPA) → NN LSD BITS (A) REM=(B) NN=07,14,21,27 UNDEVELOPED 27-NN MSD QUOTIENT BITS: = 0 for + NUMBERS = 1 for - NUMBERS | D7-N | 0012 | OPA | CIT + (CIS+13) |
| | | D7-D | 1012 | OPA | CIT + (OPS+12) |
| D7-O | | 0412 | OPRND | CIT + (CIS+13) | |
| D14-N | | 0112 | OPA | CIT + (CIS+22) | |
| D14-D | | 1112 | OPA | CIT + (OPS+21) | |
| D14-O | | 0512 | OPRND | CIT + (CIS+22) | |
| D21-N | | 0212 | OPA | CIT + (CIS+31) | |
| D21-D | | 1212 | OPA | CIT + (OPS+30) | |
| D21-O | | 0612 | OPRND | CIT + (CIS+31) | |
| D27-N | | 0312 | OPA | CIT + (CIS+37) | |
| D27-D | | 1312 | OPA | CIT + (OPS+36) | |
| D27-O | | 0712 | OPRND | CIT + (CIS+37) | |
| FLOATING SHIFT COMMANDS FLOAT SHIFT A LEFT ARITH FLOAT SHIFT A LEFT OPEN FLOAT SHIFT A LEFT LOGICAL CLOSED FLOAT SHIFT AB LEFT A ARITH B ARITH B LOGICAL FLOAT SHIFT AB LEFT A ARITH B LOGICAL | | SFLA | 0442 | 011-XXX | CIT + (CIS+35) |
| | | SFLL | 0442 | 007-XXX | (X) DECREASED BY AMOUNT OF SHIFT |
| | SFLC | 0442 | 005-XXX | | |
| | SFRA | 0442 | 017-XXX | | |
| | SFBL | 0442 | 015-XXX | | |
| | EXCHANGE AND REPLACE COMMANDS: (A) ↔ (B) (A) ↔ (C) (A) ↔ (D) (A) ↔ (X) (X) → (A) ₂₀ MSD(A) → 0 (A) → (X) 7LSD(X) → 7LSD(A) 21 MSD(A) → 21 MSD(A) (A) ↔ (I) (I) → (A) (A) → (I) (A) ↔ (M) (M) → (A) (A) → (M) | EAB-N | 0042 | 035-XXX | CIT + (CIS+2) |
| | | EAB-D | 1042 | 035-OPS | CIT + (OPS+1) |
| | | EAC-N | 0042 | 031-XXX | CIT + (CIS+2) |
| | | EAC-D | 1042 | 031-OPS | CIT + (OPS+1) |
| | | EAD-N | 0042 | 030-XXX | CIT + (CIS+2) |
| | | EAD-D | 1042 | 030-OPS | CIT + (OPS+1) |
| | | EAX-N | 0042 | 024-XXX | CIT + (CIS+2) |
| | | EAX-D | 1042 | 024-OPS | CIT + (OPS+1) |
| | | RACX-N | 0142 | 024-XXX | CIT + (CIS+2) |
| RACX-D | | 1142 | 024-OPS | CIT + (OPS+1) | |
| RXA-N | | 0242 | 024-XXX | CIT + (CIS+2) | |
| RXA-D | | 1242 | 024-OPS | CIT + (OPS+1) | |
| RAHX-N | | 0542 | 024-XXX | CIT + (CIS+2) | |
| RAHX-D | | 1542 | 024-OPS | CIT + (OPS+1) | |
| Bits of A → M for B bits=1; for B bits=0 M=M(M) → (A) Same as EABM except no (M) → (A) occurs. | EAI-N | 0042 | 025-XXX | CIT + (CIS+2) | |
| | EAI-D | 1042 | 025-OPS | CIT + (OPS+1) | |
| | RAI-N | 0142 | 025-XXX | CIT + (CIS+2) | |
| | RAI-D | 1142 | 025-OPS | CIT + (OPS+1) | |
| | RIA-N | 0242 | 025-XXX | CIT + (CIS+2) | |
| | RIA-D | 1242 | 025-OPS | CIT + (OPS+1) | |
| | EAM-N | 0042 | 020-XXX | CIT + (CIS+2) | |
| | EAM-D | 1042 | 020-OPS | CIT + (OPS+1) | |
| | RAM-N | 0142 | 020-XXX | CIT + (CIS+2) | |
| | RAM-D | 1142 | 020-OPS | CIT + (OPS+1) | |
| | RMA-N | 0242 | 020-XXX | CIT + (CIS+2) | |
| | RMA-D | 1242 | 020-OPS | CIT + (OPS+1) | |
| | EABM-N | 0442 | 020-XXX | CIT + (CIS+2) | |
| | EABM-D | 1442 | 020-OPS | CIT + (OPS+1) | |
| RMA-B-N | 0642 | 020-XXX | CIT + (CIS+2) | | |
| RMA-B-D | 1642 | 020-OPS | CIT + (OPS+1) | | |

JUMP RECORD ADDR

| A. JRAO | | | B. JRAL | | |
|---------|---------|-------------|---------|---------|-------------|
| CIS | NIA | OPTIMUM OPS | CIS | NIA | OPTIMUM OPS |
| 177-036 | 060-040 | 041 | 177-036 | 060-041 | 042 |
| 037-076 | 061-100 | 101 | 037-076 | 061-101 | 102 |
| 077-136 | 062-140 | 141 | 077-136 | 062-141 | 142 |
| 137-176 | 063-000 | 001 | 137-176 | 063-001 | 002 |

| OPERATION | OP CODE | | OPERAND ADDR. | NEXT INSTR. ADDRESS |
|---|---------|------|---------------|--|
| | SYMB. | OCT | | |
| EXCHANGE AND REPLACE COMMANDS: (A) ↔ (Q) (Q) → (A) (A) → (Q) | EAQ-N | 0042 | 021-XXX | CIT + (CIS+2) |
| | EAQ-D | 1042 | 021-OPS | CIT + (OPS+1) |
| | EAQ-N | 0142 | 021-XXX | CIT + (CIS+2) |
| | RAQ-D | 1142 | 021-OPS | CIT + (OPS+1) |
| | RQA-N | 0242 | 021-XXX | CIT + (CIS+2) |
| | RQA-D | 1242 | 021-OPS | CIT + (OPS+1) |
| CLEAR AB: (A)(B) → 0 | ZAB-N | 0042 | 036-XXX | CIT + (CIS+2) |
| | ZAB-D | 1042 | 036-OPS | CIT + (OPS+1) |
| COMPLEMENT A: 2's COMPLEMENT (A) → (A) | CMP-N | 0042 | 026-XXX | CIT + (CIS+2) |
| | CMP-D | 1042 | 026-OPS | CIT + (OPS+1) |
| SHIFT A LEFT ARITHMETIC | SLA-N | 0042 | 011-PPP | CIT + (CIS+35) |
| | SLA-D | 1042 | 011-PPP | CIT + (CIS+PPP+1) |
| SHIFT A RIGHT ARITHMETIC | SRA-N | 0042 | 010-PPP | CIT + (CIS+35) |
| | SRA-D | 1042 | 010-PPP | CIT + (CIS+PPP+1) |
| SHIFT A LEFT LOGICAL | SLL-N | 0042 | 007-PPP | CIT + (CIS+35) |
| | SLL-D | 1042 | 007-PPP | CIT + (CIS+PPP+1) |
| SHIFT A RIGHT LOGICAL | SRL-N | 0042 | 006-PPP | CIT + (CIS+35) |
| | SRL-D | 1042 | 006-PPP | CIT + (CIS+PPP+1) |
| SHIFT A LEFT LOGICAL CLOSED | SLC-N | 0042 | 005-PPP | CIT + (CIS+35) |
| | SLC-D | 1042 | 005-PPP | CIT + (CIS+PPP+1) |
| SHIFT (AB) LEFT, A ARITH B ARITH | SBA-N | 0042 | 017-PPP | CIT + (CIS+35) |
| | SBA-D | 1042 | 017-PPP | CIT + (CIS+PPP+1) |
| SHIFT (AB) LEFT, A ARITH B LOGICAL | SBL-N | 0042 | 015-PPP | CIT + (CIS+35) |
| | SBL-D | 1042 | 015-PPP | CIT + (CIS+PPP+1) |
| SHIFT (AB) RIGHT, A ARITH B LOGICAL | SBR-N | 0042 | 014-PPP | CIT + (CIS+35) |
| | SBR-D | 1042 | 014-PPP | CIT + (CIS+PPP+1) |
| JUMP UNCONDITIONALLY | JUN-N | 0000 | OPA | C _{ttt} + C _{SSS} |
| | JUN-O | 0400 | XXXXXX | |
| JUMP A ZERO | JZE-N | 0044 | OPA | A=0: CIT+(CIS+2) A=0: OPA |
| | JZE-O | 0444 | XXXXXX | A=0: CIT+(CIS+2) A=0: C _{ttt} + C _{SSS} |
| JUMP A NEGATIVE | JNG-N | 0050 | OPA | A<0: CIT+(CIS+2) A<0: OPA |
| | JNG-O | 0450 | XXXXXX | A<0: CIT+(CIS+2) A<0: C _{ttt} + C _{SSS} |
| JUMP A LOW BIT | JLB-N | 1000 | OPA | AL=0: CIT+(CIS+2) AL=1: OPA |
| | JLB-O | 1400 | XXXXXX | AL=0: CIT+(CIS+2) AL=1: C _{ttt} + C _{SSS} |
| JUMP INDEX | JIN-N | 0014 | OPA | I=0: CIT+(CIS+2) I=0: OPA |
| | JIN-O | 0414 | XXXXXX | I=0: CIT+(CIS+2) I=0: C _{ttt} + C _{SSS} |
| JUMP OVERFLOW | JOF-N | 0054 | OPA | No OF: CIT+(CIS+2) OF: OPA |
| | JOF-O | 0454 | XXXXXX | No OF: CIT+(CIS+2) OF: C _{ttt} + C _{SSS} P.E.: OPA |
| JUMP PARITY ERROR | JPE-N | 0010 | OPA | No P.E.: CIT+(CIS+2) P.E.: OPA |
| | JPE-O | 0410 | XXXXXX | No P.E.: CIT+(CIS+2) P.E.: C _{ttt} + C _{SSS} |
| STOP - JUMP RESUME | STP-N | 0040 | OPA | OPA |
| | STP-O | 0440 | XXXXXX | C _{ttt} + C _{SSS} |
| JUMP-RECORD ADDRESS 000 | JRAO | 0256 | OPA | OPA |
| JUMP-RECORD ADDRESS 001 | JRAL | 0356 | OPA | OPA |
| JUMP-RECORD ADDRESS C | JRAC | 0056 | OPA | OPA |

PROGRAMMING NOTES:

- ADDRESSABLE REGISTERS - The B,C,D Registers can be addressed as OPRNDs on LOAD, STORE, +, -, x, :, EX, MG, SQRT, and RI commands by using the OPRND TK assignments: B=075, C=076, D=077.
- INDEXING - The NORMAL and DELAYED modes of all commands except those with a XX42, XX46 and XX52 OP CODE can be indexed.
- OVERFLOW - Overflow is indicated during +, -, : and any command involving SHIFT A LEFT ARITH.
- DELAYED SHIFTS - If PPP = 0, NIA = CIT + (CIS+2)
- PARITY ERRORS - All commands are checked for parity.