

CONTROL DATA 1604 COMPUTER INSTRUCTIONS

00 ZRO	(not used)	Fault
01 ARS	A Right Shift	Shift (A) Right by K
02 QRS	Q Right Shift	Shift (Q) Right by K
03 LRS	AQ Right Shift	Shift (AQ) Right by K
04 ENQ	Enter Q	$Y \rightarrow Q$, Extend Sign Y
05 ALS	A Left Shift	Shift (A) Left by K
06 QLS	Q Left Shift	Shift (Q) Left by K
07 LLS	AQ Left Shift	Shift (AQ) Left by K
10 ENA	Enter A	$Y \rightarrow A$, Extend Sign Y
11 INA	Increase A	$[Y + (A)] \rightarrow A$, Extend Sign Y
12 LDA	Load A	$(M) \rightarrow A$
13 LAC	Load A, Complement	$(M)' \rightarrow A$
14 ADD	Add	$[(A) + (M)] \rightarrow A$
15 SUB	Subtract	$[(A) - (M)] \rightarrow A$
16 LDQ	Load Q	$(M) \rightarrow Q$
17 LQC	Load Q, Complement	$(M)' \rightarrow Q$
20 STA	Store A	$(A) \rightarrow M$
21 STQ	Store Q	$(Q) \rightarrow M$
22 AJP	A Jump*	Jump to m on condition j
23 QJP	Q Jump*	Jump to m on condition j
24 MUI	Multiply Integer	$(M)(A) \rightarrow QA$
25 DVI	Divide Integer	$(QA)/(M) \rightarrow A$; Remainder = Q_f
26 MUF	Multiply Fractional	$(M)(A) \rightarrow AQ$
27 DVF	Divide Fractional	$(AQ)/(M) \rightarrow A$; Remainder = Q_f
30 FAD	Floating Add	$[(A) + (M)] \rightarrow A$
31 FSB	Floating Subtract	$[(A) - (M)] \rightarrow A$
32 FMU	Floating Multiply	$(M)(A) \rightarrow A$
33 FDV	Floating Divide	$(A)/(M) \rightarrow A$
34 SCA	Scale A	A left until $ (A) \geq .5$ or $k=0$; k - No. of Shifts $\rightarrow B^b$
35 SCQ	Scale AQ	AQ left until $ (AQ) \geq .5$ or $k=0$; k - No. of Shifts $\rightarrow B^b$
36 SSK	Storage Skip #	(M_{47}) Neg: EXIT; (M_{47}) Pos: Half EXIT
37 SSH	Storage Shift #	(M_{47}) Neg: EXIT, left 1; (M_{47}) Pos: Half EXIT, left 1
40 SST	Selective Set	Set (A_n) for $(M_n) = 1$
41 SCL	Selective Clear	Clear (A_n) for $(M_n) = 1$
42 SCM	Selective Complement	Complement (A_n) for $(M_n) = 1$
43 SSU	Selective Substitute	$(M_n) \rightarrow (A_n)$ for $(Q_n) = 1$
44 LDL	Load Logical	$L(Q)(M) \rightarrow A$
45 ADL	Add Logical	$[(A) + L(Q)(M)] \rightarrow A$

Legend

b - desig. for indexing
j - desig. for 22, 23, 74-76
k - exec. add. as shift cnt.
 $K = k + (B^b)$
m - exec. add. as op. add.
 $M = m + (B^b)$
y - exec. add. as operand
 $Y = y + (B^b)$
- skip inst. (up. posit.)

46 SBL Subtract Logical	$[(A) - L(Q) (M)] \rightarrow A$
47 STL Store Logical	$L(Q) (A) \rightarrow M$
50 ENI Enter Index	$y \rightarrow B^b; b = 0: \text{pass}$
51 INI Increase Index	$y + (B^b) \rightarrow B^b$
52 LIU Load Index (upper)	$(m_{UA}) \rightarrow B^b$
53 LIL Load Index (lower)	$(m_{LA}) \rightarrow B^b$
54 ISK Index Skip #	$(B^b) \neq y: B^b + 1 \rightarrow B^b, \text{NI}; (B^b) = y: 0 \rightarrow B^b \text{ Skip NI}$
55 IJP Index Jump	$(B^b) \neq 0: B^b - 1 \rightarrow B^b, \text{Jump to } m; (B^b) = 0: \text{NI}$
56 SIU Store Index (upper)	$(B^b) \rightarrow m_{UA}$
57 SIL Store Index (lower)	$(B^b) \rightarrow m_{LA}$
60 SAU Substitute Address (up.)	$(A_{00-14}) \rightarrow M_{UA}$
61 SAL Substitute Address (lwr.)	$(A_{00-14}) \rightarrow M_{LA}$
62 INT Input Transfer	(B^b) words to memory start at M-1
63 OUT Output Transfer	(B^b) words to memory start at M-1
64 EQS Equality Search #	Search (B^b) words, if (M-1), (M-2), etc. = (A) Skip NI
65 THS Threshold Search #	Search (B^b) words, if (M-1), (M-2), etc. > (A) Skip NI
66 MEQ Masked Equality #	Search (B^b) words, if $L(Q) (M-1), (M-2), \text{etc.} = (A) \text{ Skip NI}$
67 MTH Masked Threshold #	Search (B^b) words, if $L(Q) (M-1), (M-2), \text{etc.} > (A) \text{ Skip NI}$
70 RAD Replace Add	$[(M) + (A)] \rightarrow M \& A$
71 RSB Replace Subtract	$[(M) - (A)] \rightarrow M \& A$
72 RAO Replace Add One	$[(M) + 1] \rightarrow M \& A$
73 RSO Replace Subtract One	$[(M) - 1] \rightarrow M \& A$
74 EXP External Function	$j=1-6: \text{activate ch. } j, j=0: \text{sel. ext. equip. } m, j=7\#: \text{skip on cond. } m$
75 SLJ Selective Jump*	Jump to m on condition j
76 SLS Selective Stop*	Stop on j, and Jump to m*
77 SEV (not used)	Fault

DESIGNATOR FOR *INSTRUCTION

22	23	75	76
0 (A) = 0: Jump	(Q) = 0: Jump	Jump	Jump, Stop
1 (A) ≠ 0: Jump	(Q) ≠ 0: Jump	Key 1: Jump	Jump; Key 1: Stop
2 (A) Pos: Jump	(Q) Pos: Jump	Key 2: Jump	Jump; Key 2: Stop
3 (A) Neg: Jump	(Q) Neg: Jump	Key 3: Jump	Jump; Key 3: Stop
4 (A) = 0: Ret. Jump	(Q) = 0: Ret. Jump	Ret. Jump	Ret. Jump, Stop
5 (A) ≠ 0: Ret. Jump	(Q) ≠ 0: Ret. Jump	Key 1: Ret. Jump	Ret. Jump; Key 1: Stop
6 (A) Pos: Ret. Jump	(Q) Pos: Ret. Jump	Key 2: Ret. Jump	Ret. Jump; Key 2: Stop
7 (A) Neg: Ret. Jump	(Q) Neg: Ret. Jump	Key 3: Ret. Jump	Ret. Jump; Key 3: Stop

1, 2, & 3 refer to Selective Jump or Stop Key Switches



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