SDS 930 COMPUTER
EXAMINER DIAGNOSTIC SYSTEM
TECHNICAL MANUAL

SDS 900097A October 1964

(Volume II)

LOGIC BY INSTRUCTION NUMBER, PHASE, AND CLOCK

SCIENTIFIC DATA SYSTEMS/1649 Seventeenth Street/Santa Monica, California

Printed in U.S.A.

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INTRODUCTION

The following equations show the complete logic flow for each instruction in terms of phase and clock. This logic breakdown per instruction indicates the logic terms involved during each clock time of every phase.

The right-hand columns contain remarks concerning an equation or group of equations.

The logical derivation of the B Register during Rsa, Br1, and A12, is illustrated in detail in Appendix A.

The last instructions have the heading "UDI". These are unassigned operator codes.

)0		HLT	Halt		4 Cycles
Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$)	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$	initiate P register increment	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= $\overline{OxcC4}$		
Ø5	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5($\overline{AOO}+\overline{GO}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{O2O4O5O6}$))($\overline{P12}\oplus$(P13P14Ia))		
		rP0	= (")($\overline{P12}\oplus$(P13P14Ia))		
		sP1	= (")(P13$\oplus$(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")($\overline{P13}\oplus$(P14Ia))		
		sP2	= (")(P14$\oplus$Ia)		
		rP2	= (")($\overline{P14}\oplus$Ia)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$($\overline{End+JuEax}$)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13$\oplus$(P14Ia))Sxp		
		sS2	= ("))(P14$\oplus$Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	TO	sHt	= Ø5TOO$\overline{1}$O2O5	initiate Halt (Set Halt light)	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rF3	= (")		
		rGO	= (")Ht	Machine enters HALT Status	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc		
		sO2	= Oc	NOP (20) → O	

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		sHz	= T8		
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	Tr	rIa	= TrF1		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rG0	= (")Ht	Machine enters HALT Status	
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The Computer is now in Halt status and will remain in this state until the mode switch is placed on "IDLE". The following shows what takes place in "IDLE".

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The Computer is now in Idle status and will remain in this state until the mode switch is placed on "RUN or STEP". The following shows what takes place when the mode switch is placed on "RUN".

Ø0	T8	rC24	= T8($\overline{\text{Ts}\overline{\text{Ts}}\text{r}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		sHz	= T8		
Ø5	T7	Ar3	= $\overline{(\text{Ø1Ø2}\overline{\text{Ø3}}\text{Ø4})}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
	T4	Sc	= T4(End+$\overline{\text{F1}}\overline{\text{F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		sGO	= $\overline{\text{A00}}\,\overline{\text{B00}}\,\overline{\text{TpHt}}$(Ks+Kg)Tem	Machine enters normal run status	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GO}}$Ht)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The Computer is now in normal run status with the contents of the C register about to be executed.

		BRU	Unconditional Branch	M → P	1 Cycle
Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initialize indexing	
		sJu	= $\overline{\text{Ia}}$GO$\overline{\text{C4}}\overline{\text{C5}}$C8$\overline{\text{C9}}$T8		
		Oxc	= $\overline{\text{Ia}}$GO$\overline{\text{C2}}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= $\overline{(\text{Ø1Ø2Ø3Ø4})}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ju$\overline{\text{Eax}}\overline{\text{Ø1}}$	Last cycle	
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC0	= (P12)Ju$\overline{\text{Ts}}$Cr3$\overline{\text{Q6}}$		
		rC0	= ($\overline{\text{ " }}$) "		
		sC(1,2)	= P(13,14)Ju$\overline{\text{Ts}}$Cr3Q2		
		rC(")	= $\overline{\text{P}}$(") "	P(1-14) → C(10-23)	T7 thru T3
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$Ts$\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)(Ju$\overline{\text{Eax}}$+$\overline{\text{Ø2Ø4Ø5}}$Ø6)Pr3		
		rP(")	= $\overline{\text{Add}}$(")(") "	C + X·Ix → P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
		Xz(1-3)	= Xn(1-3)ØØIx		
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØØIx+$\overline{\text{Ix}}$	Input to adder (X·Ix)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$		
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "	Input to adder (C)	T7 thru T0
		sCz	= KzQ1$\overline{\text{TØ}}$		
		rCz	= $\overline{\text{Kz}}$Q1	Carry logic	T7 thru T1
	T4	Sc	= $\overline{\text{Inr}}$F1$\overline{\text{F2}}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	rC0	= (Ju$\overline{\text{Ts}}$Cr3)Q4Q6	No input to C3, C6, C9	T3 thru T1
		Sxp	= $\overline{\text{Int}}$EndGOT3		
		sS(1,2)	= Add(2,3)(Ju$\overline{\text{Eax}}$+$\overline{\text{Ø2Ø4Ø5}}$Ø6)Sxp		
		sS(3-14)	= P(0-11)Sxp	P → S	
	T2	rC(1,2)	= (Ju$\overline{\text{Ts}}$Cr3)T2	No input to C7, C8	
	T1	sC(1,2)	= (Ju$\overline{\text{Ts}}$Cr3)$\overline{\text{Em}}$(1,2)T1		
		rC(")	= (")$\overline{\text{Em}}$(") "	(C1,C2) is (C4,C5) at T1	
	T0	rCz	= $\overline{\text{F1}}$T0		
		sC0	= $\overline{\text{Of}}$(Ju$\overline{\text{Ts}}$Cr3)T0		
		rC0	= $\overline{\text{Of}}$(") "	Set C0 if overflow	
		rC(1,2)	= (Ju$\overline{\text{Ts}}$Cr3)T0	No input to C1, C2	

Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= CxmTr	Tr thru Tp
	sHt	= CpTr$\overline{\text{KpK0Ø2}}$	Parity error
	rIx	= ($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)Tr	
	rRc	= Tr	
Tp	rA00	= EndGOTp	
	rB00	= (")	
	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity
	rJu	= Tp	
	0c	= ($\overline{\text{01O3Ia}}$+End$\overline{\text{Sk}}$)Tp	
	r0(1,3,4,5,6)	= 0c	
	s02	= 0c	NOP (20) → 0

01 **BRU*** Uncock Active Interrupt (M) → P 2 Cycles
(Unconditional Branch, Indirectly Addressed)

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIa	= $\overline{C2}$C9(C5+C8+C3C4)ØØT8	Indirect addressing	
		sIx	= C1GOØØT8	Initialize indexing	
		Oxc	= $\overline{Ia}$GO$\overline{C2}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
	T7	Ar3	= ($\overline{O5}\overline{F1}\overline{F2}$+($\overline{O1}$O2$\overline{O3}$O4))Q1	(All instructions except 66 & 67)	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{Ts}$ØØQ1		
		sC(0-2)	= Add(1-3)Cr3$\overline{JuTs}$		
		rC(")	= $\overline{Add}$(") "	C + X•Ix → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Xz(1-3)	= Xn(1-3)ØØIx		
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$	Xz input to adder	T7 thru Tp
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Yz input to adder	T7 thru Tp
		sCz	= KzQ1$\overline{T0}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T1
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	Ib	= Ia$\overline{O1}\overline{O2}\overline{O4}\overline{O5}$O6$\overline{Ts}$Q5Q6	Uncock active interrupt	T3 thru Tr
		Sxc	= $\overline{Ju}$T3		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X•Ix → S	
	T0	rCz	= $\overline{F1}$T0		
	Tr	Cxm	= $\overline{JuTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch effective add)	
		rC(")	= CxmTr		Tr thru Tp
		sHt	= CpTrKpK0Ø2	Parity error	
		rIx	= ($\overline{F1}$F3)(GOHt)Tr		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		rIa	= $\overline{C9}$Ia		
		sIx	= C1GOØØT8	Initialize indexing	
		sJu	= $\overline{C9}\overline{O2}\overline{O3}$ØØT8		
	T7	Ar3	= $\overline{O5}$ØØQ1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		End	= Ju$\overline{Eax}\overline{O1}$	Last cycle	
		Cr3	= $\overline{Ts}$ØØQ1		
		sC0	= (P12)Ju$\overline{Ts}$Cr3$\overline{Q6}$		
		rC0	= (") "		
		sC(1,2)	= P(13,14)Ju$\overline{Ts}$Cr3Q2		
		rC(")	= $\overline{P}$(") "	P(1-14) → C(10-23)	T7 thru T3
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$T$\overline{s}$H$\overline{t}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Parity check	T7 thru T[illegible]
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)$\overline{O2}\overline{O4}\overline{O5}$O6Pr3		
		rP(")	= $\overline{Add}$(") "		
		sP(3-14)	= P(0-11)Pr3	C + X·Ix → P	T7 thru T3
		rP(")	= $\overline{P}$(") "		
		Xz(1-3)	= Xn(1-3)ØØIx		
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$	Input to adder (X·Ix)	
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Input to adder (C)	
		sCz	= KzQ1$\overline{T0}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T1
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	rC0	= (Ju$\overline{Ts}$Cr3)Q4Q6	No input to C0	T3 thru T1
		Sxp	= $\overline{Int}$EndGOT3		
		sS(1,2)	= Add(2,3)(Ju$\overline{Eax}$+$\overline{O2}\overline{O4}\overline{O5}$O6)Sxp		
		sS(3-14)	= P(0-11)Sxp		
	T2	rC(1,2)	= (Ju$\overline{Ts}$Cr3)T2	No input to C1, C2	
	T1	sC(1,2)	= (Ju$\overline{Ts}$Cr3)Em(1,2)T1		
		rC(")	= (")$\overline{Em}$(") "		
	T0	rCz	= $\overline{F1}$T0		
		sC0	= Of(Ju$\overline{Ts}$Cr3)T0		
		rC0	= $\overline{Of}$(") "		
		rC(1,2)	= (Ju$\overline{Ts}$Cr3)T0		

Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= CxmTr	Tr thru Tp
	sHt	= CpTrKpK0$\overline{\text{02}}$	Parity error
	rIx	= ($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)Tr	
	rRc	= Tr	
Tp	rA00	= EndGOTp	
	rB00	= (")	
	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity
	rJu	= Tp	
	Oc	= ($\overline{\text{O1O3Ia}}$+$\overline{\text{EndSk}}$)Tp	
	rO(1,3,4,5,6)	= Oc	
	sO2	= Oc	NOP (20) → O

02 EOM 20001 Reset Overflow 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5(A00+GO)	last cycle	
		Eom	= (Ø5O1O5TsQ2Q5)O4		T7 thru Tr
		rOf	= (EomC1OC11)C23	Reset Overflow	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6)(P13⊕(P14Ia)Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

02 EOM 20002 Enable Interrupt 1 Cycle

Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$)	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$	initiate P register increment	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
Ø5	T7	Ar3	= ($\overline{O1O2O3O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5($\overline{A00}$+GO)	last cycle	
		Eom	= (Ø5$\overline{O1O5}\overline{Ts}$Q2Q5)$\overline{O4}$		T7 thru Tr
		Pr3	= (F1GO)$\overline{Q2}$		
		sP0	= (F1G0($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$(End+Ju$\overline{Eax}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{O2O4O5O6}$)(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	TO	sEn	= (EomC1O$\overline{C11}$)C22TO	Enable interrupt	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

02 EOM 20004 Disable Interrupt 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= Ø0T8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (Ø0T8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		End	= Ø5(A00+G0)	last cycle	
		Eom	= (Ø5O1O5TsQ2Q5)O4		T7 thru Tr
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmg		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rEn	= (EomC10C11)C21T0	Disable interrupt	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

02 **EOM** 20010 Set Overflow if X14 ≠ X15 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5(A00+GO)	last cycle	
		Eom	= (Ø5O1O5TsQ2Q5)O4		T7 thru Tr
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	sOf	= (EomC1OC11)C2OT4(Xn3⊕Kw1)	Set overflow if X14 ≠ X15	
		Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Xmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

06 **EOD** 2010X Set Bank Register 2 = X 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5(A00+GO)	last cycle	
		Eod	= (Ø5O1O5TsQ2Q5)O4		T7 thru Tr
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	sE2m(0-2)	= C(21-23)(EodC10C11C17)		
		rE2m(")	= C(")(")	Set bank register 2	
		Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

06 **EOD** 202X0 Set Bank Register 3 = X 1 Cycle

Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$)	initiate P register increment	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
Ø5	T7	Ar3	= ($\overline{O1O2O3O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5($\overline{AOO}$+$\overline{GO}$)	last cycle	
		Eod	= (Ø5$\overline{OlOsTs}$Q2Q5)O4		T7 thru Tr
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")($\overline{P13⊕(P14Ia)}$)		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	sE3m(0-2)	= C(18-20)(EodC10$\overline{C11}$C16)		
		rE3m(")	= $\overline{C}$(")(")	Set bank register 3	
		Sc	= T4(End+F1F2)$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{Int}$(End+Ju$\overline{Rax}$)GO+T3$\overline{Xmc}$		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= End$\overline{GO}$I$\overline{xm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOnt}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Rx}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1($\overline{GOnt}$)		
		rJu	= Tp		
		Os	= Tp$\overline{End}\overline{Rx}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

10		MIY	Memory to Y Buffer When Ready	(M) → Y	2 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$$\overline{O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}$$\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{Ju}$$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C←X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØO•Ix	Adder input (XIx)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{TO}$$\overline{Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{KzQ1}$		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1$\overline{F1}$$\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}$$\overline{F2}$$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}$$\overline{F2}$$\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
		sRf	= TO$\overline{F3}$O5$\overline{Yf}$(Y0+$\overline{Y9}$)	Set Rf if Y Buffer empty	
	Tr	Cxm	= $\overline{Ju}$ØO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr(Kp⊕KO)$\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rKO	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		sF1	= Tp($\overline{F1}$$\overline{F3}$O1O3$\overline{O4}$)$\overline{Ia}$Rf	Ø6 next clock (T8) if Rf	
		sF2	= (Tp$\overline{Ia}$Ø0)O3$\overline{O2}$	Ø2 next clock (T8) if $\overline{Rf}$	
		rRf	= Tpø1($\overline{GOHt}$)		

If the Y Buffer is empty and ready to accept from C, Ø6 will follow; otherwise, Ø2, the waiting phase, will occur.

Ø2	T7	Ar3	= $\overline{(0102\overline{0}3\overline{0}4)}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
	T0	rCz	= $\overline{\text{F1}}$T0		
		sRf	= T0$\overline{\text{F3}}\overline{\text{05}}\overline{\text{Yf}}$(Y0+$\overline{\text{Y9}}$)	Set Rf if Y Buffer empty	
	Tp	sF1	= Tp($\overline{\text{F1}}$F3$\overline{\text{0}}$10304)$\overline{\text{Ia}}$Rf	Ø6 next if Rf Ø2 next if $\overline{\text{Rf}}$	
		rRf	= TpØ1$\overline{(\text{GOHt})}$		

The Computer will continue to repeat Ø2 until to Y Buffer becomes ready.

Ø6	T8	sIa	= T8F1F3IjKr	Initiate P register increment	
		End	= F1F2	Last cycle	
		Rx	= (O1O3O4O6F1F3Ts)	Initiate transfer of C to Y buffer	
		Yxx	= RxO5		
		sCpr	= T8(C21⊕C22⊕C23)	Start parity generation for I/O	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= A(21-23)Ø6O2O4		
		Xz(")	= A(") "		
		Yz(1-3)	= C(21-23)Ø7	Unused adder inputs	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6O3		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		sYw(1-3)	= C(21-23)YxxQ1Y4		
		rYw(")	= C(") " Y4	C → Y buffer	T7 thru T0
		sCpr	= (C18⊕C19⊕C20)Q1		
		rCpr	= (")Q1	Generate parity for I/O	
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(O2O4O5O6)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		

	sS(3-14)	= P(0-11)Sxp	
	rS(")	= $\overline{P}$(") "	
Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTrKp$\overline{K0}\overline{\emptyset 2}$	Parity error
	rIa	= TrF1	
	rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)	
Tp	rA00	= TpEndGO	
	rB00	= (")	
	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity
	rCpr	= Tp	
	rF(1,2)	= TpEnd$\overline{Sk}$	∅0 next clock (T8)
	Oc	= (")	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → O

12		MIW	Memory to W Buffer When Ready	(M) → W	2 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize Indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2$\overline{\text{O}}$3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØØ$\overline{\text{Ju}}\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØØIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TO}}\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2}}\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2}}\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$TO		
		sRf	= TO$\overline{\text{F3}}$O5$\overline{\text{Wf}}$(WO+$\overline{\text{W9}}$)	Set Rf if W buffer empty	
	Tr	Cxm	= $\overline{\text{Ju}}$ØO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr(Kp)$\overline{\text{KO}}\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= Tp($\overline{\text{F1F3}}$O1O3O4)$\overline{\text{Ia}}$Rf	Ø6 next if Rf	
		sF2	= (Tp$\overline{\text{Ia}}$Ø0)O3$\overline{\text{O2}}$	Ø2 next if $\overline{\text{Rf}}$	
		rRf	= TpØ1($\overline{\text{GO}}$Ht)		

If the W Buffer is empty and ready to accept from C, Ø6 will follow; otherwise, Ø2, the waiting phase, will occur.

Ø2	T7	Ar3	= $\overline{(0102\overline{03}\overline{04})}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
	T0	rCz	= $\overline{\text{F1}}$T0		
		sRf	= T0$\overline{\text{F3}}$05$\overline{\text{Wf}}$(W0+$\overline{\text{W9}}$)	Set Rf if W Buffer empty	
	Tp	sF1	= Tp($\overline{\text{F1}}\overline{\text{F3}}01030\overline{\text{4}}$)$\overline{\text{I}}$aRf	Ø6 next if Rf Ø2 next if $\overline{\text{Rf}}$	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GO}}$Ht)		

The Computer will continue to repeat Ø2 until the W Buffer becomes ready.

Ø6	T8	sIa	= T8F1F3(I⊕Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
		Rx	= O1O3O4O6F1F3Ts		
		Wxx	= RxO5	Initiate transfer of C to W buffer	
		sCpr	= T8(C21⊕C22⊕C23)	Start parity generation for I/O	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= A(21-23)Ø6O2O4		
		Xz(")	= A(") "		
		Yz(1-3)	= C(21-23)Ø7	Unused adder inputs	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6O3		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		sWn(1-3)	= C(21-23)WxxQ1		
		rWn(")	= C(") "	C → W Buffer	T7 thru T0
		sCpr	= (C18⊕C19⊕C20)Q1		
		rCpr	= (")Q1	Generate parity for I/O	T7 thru T0
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(O2O4O5O6)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		

	sS(3-14)	= P(0-11)Sxp	
	rS(")	= $\overline{P}$(") "	
Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTr(Kp$\overline{K}$0$\overline{\emptyset 2}$	Parity error
	rIa	= Tr$\overline{F1}$	
	rIx	= Tr($\overline{\overline{F1}}$F3)($\overline{GO}$Ht)	
Tp	rA00	= TpEndGO	
	rB00	= (")	
	sCp	= M24Cxm$\overline{Ht}$Ts$\overline{Tp}$	Initiate parity
	rCpr	= Tp	
	rF(1,2)	= TpEnd$\overline{Sk}$	∅0 next clock (T8)
	Oc	= (")	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → O

13		POT	Parallel Output When Ready	(M) → Output Device	3 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= ($\overline{O1O2O3O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{T0Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{CpTsHtQ1F1F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1F2Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1F2Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1T0}$		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}$$\overline{K0Ø2}$	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{HtTs}$Tp	Initiate parity	
		sF2	= (Tp$\overline{Ia}$Ø0)O3$\overline{O2}$	Ø2 next clock (T8)	

Ø2	T7	Ar3	= $\overline{(0102\overline{03}04)}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sRf	= Q2$\overline{\text{F3}}$06F2Rt	External Device is ready (Rt) to receive information from the computer.	T7 thru T3
	T0	rCz	= $\overline{\text{F1}}$T0		
	Tp	sF1	= Tp($\overline{\text{F1}}\overline{\text{F3}}\overline{0}10\overline{3}\overline{04}$)$\overline{\text{Ia}}$Rf	Ø6 next if Rf Ø2 next if $\overline{\text{Rf}}$	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\overline{\text{GO}}\text{Ht}}$)		

The Computer will continue to repeat Ø2 until the External Device becomes ready, at which time the data will be transferred in parallel from the C register to the device. At Tp time, following the transfer, Ø6 will occur.

Ø6	T8	sIa	= T8F1F3(I⊕Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)ĀnrAr3		
		rA(")	= Ā(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= Ā(") "		
		sB(0-2)	= B(21-23)B̄nrAr3		
		rB(")	= B̄(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B̄(") "		
		Cr3	= F1F3(T̄sQ1)		
		sC(0-2)	= Add(1-3)Ø6T̄sCr3		
		rC(")	= Ādd(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C̄(") "		
		X̄z(1-3)	= Ix	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Ȳz(")	= C̄(")"		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= K̄zQ1		
		sCp	= (C21⊕C22⊕C23)C̄pT̄sH̄tQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(Ø2Ø4Ø5Ø6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P̄(") "		
		rIa	= (P̄12P̄13P̄14)Q2F1		
	T4	Sc	= T4EndĪnr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3ĪntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(Ø2Ø4Ø5Ø6)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P̄(") "		
	Tr	Cxm	= EndGOT̄sm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr(Kp⊕K̄ØØ2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp      Initiate parity
    rF(1,2)         = TpEndSk           ø0 next clock (T8)
    0c              = (  "  )
    s02             = 0c
    r0(1,3,4,5,6)   = 0c                NOP (20) → 0
```

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp          Initiate parity
    rF(1,2)         = TpEndSk               Ø0 next clock (T8)
    0c              = (  "  )
    s02             = 0c
    r0(1,3,4,5,6)   = 0c                    NOP (20) → 0
```

14		ETR	Extract	Ai·Mi → Ai	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØØ·Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")ØØIx+Ix		T7 thru TO
		Yz(1-3)	= C(21-23)Ø7	Adder input C register	T7 thru TO
		Yz(")	= C(") "		
		sCz	= KzQ1TØØ7	Carry for Adder	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØØTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØØ)(O4O5O6)		
		sHt	= CpTsKzKØØ2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rKO	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØØ)O3O4		
		sF2	= (")O3O2	ØØ next clock (T8)	

Ø6	T8	Anr	= $\overline{01}\overline{02}04\overline{06}Ø6$		
		sIa	= T8F1F3(Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= (A·C)(21-23)($\overline{01}\overline{02}04\overline{06}Ø6$)Ar3		
		rA(")	= $(\overline{A+C})$(")(") "	A·M → A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	A + C + 1 → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= A(21-23)Ø6$\overline{02}$04		
		$\overline{Xz}$(")	= $\overline{A}$(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1F1$\overline{Ø7}$	Carry logic	T7 thru T0
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO($\overline{02040506}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS1	= (P13⊕P14Ia)F1GO($\overline{02040506}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	Tr	Cxm	= End$\overline{GO}\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr$\overline{Cp}$K0$\overline{Ø2}$	Parity error	

16		MRG	Merge	Ai + Mi → Ai	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2O3O4)$\overline{\text{Q1}}$		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1}}\overline{\text{F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØOJu$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO•Ix	Adder input if Ix (indexing)	
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		T7 thru TO
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$		
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "	Adder input C register	T7 thru TO
		sCz	= KzQ1$\overline{\text{T0}}\overline{\text{Ø7}}$		
		rCz	= $\overline{\text{Kz}}$Q1	Carry for Adder	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1}}\overline{\text{F2}}$		
		rCp	= (")Cp "	Check parity	T7 thru TO
	T4	Sc	= T4$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C+X•Ix → S	
	TO	rCz	= $\overline{\text{F1}}$T0		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)O4O5Xw1	Set carry if Xw1	
		sHt	= CpTr$\overline{\text{Kp}}$K0$\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1}}\overline{\text{F3}}$)($\overline{\text{GO}}$Ht)		
		rK0	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)O3O4		
		sF2	= (")O3$\overline{\text{O2}}$	Ø6 next clock (T8)	

Ø6	T8	Anr	= $\overline{01}\overline{02}04\overline{06}Ø6$		
		sIa	= T8F1F3$\overline{I}$Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= (A+C)(21-23)($\overline{01}\overline{02}$04(05+$\overline{06}$)Ø6)		
		rA(")	= ($\overline{A}\cdot\overline{C}$)(")(")	A + M → A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	A + C + 1 → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= A(21-23)Ø6$\overline{02}$04		
		$\overline{Xz}$(")	= $\overline{A}$(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= $\overline{Kz}$Q1F1Ø7	Carry logic	T7 thru
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02}\overline{04}\overline{05}\overline{06}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12}\overline{P13}\overline{P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02}\overline{04}\overline{05}\overline{06}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	Tr	Cxm	= End$\overline{G0}\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTrKp$\overline{K0}$Ø2	Parity error	

```
     rIa              = TrF1
     rIx              = Tr(F1F3)(GOHt)
Tp   rA00             = TpEndGO
     rB00             = (  "  )
     sCp              = M24CxmHtTsTp        Initiate parity
     rF(1,2)          = TpEndSk             Ø0 next clock (T8)
     Oc               = (  "  )
     s02              = Oc
     rO(1,3,4,5,6)    = Oc                  NOP (20) → 0
```

17	EOR		Exclusive "or"	$A_i\overline{M}_i+\overline{A}_iM_i \rightarrow A_i$	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{I}$aGO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4Oxc}$		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$(TsQ1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{JuTs}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input if Ix (indexing)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(")"	Adder input C register	T7 thru T0
		sCz	= KzQ1$\overline{T0Ø7}$		
		rCz	= $\overline{KzQ1}$	Carry for Adder	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{CpTsHtQ1F1F2}$		
		rCp	= (")Cp "	Check parity	T7 thru T0
	T4	Sc	= T4$\overline{F1F2Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1F2Ju}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	T0	rCz	= $\overline{F1T0}$		
	Tr	Cxm	= $\overline{JuØ0Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{KpK0Ø2}$	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHt$\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{I}$aØ0)O3O4		
		sF2	= (")O3$\overline{O2}$	Ø6 next clock (T8)	

Ø6	T8	Anr	= $\overline{01}\overline{02}0405Ø6$		
		sIa	= T8F1F3$\overline{(1}$Kr$)$	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= (A⊕C)(21-23)($\overline{01}\overline{02}$0405Ø6)Ar3		
		rA(")	= ($\overline{A⊕C}$)(")(") "		
		sA(3-23)	= A(0-20)Ar3	$A\cdot\overline{M} + \overline{A}M \rightarrow A$	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= $\overline{Add}$(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= A(21-23)Ø6$\overline{02}$04		
		$\overline{Xz}$(")	= $\overline{A}$(") "		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Unused adder inputs	T7 thru T0
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1F1$\overline{Ø7}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)$\overline{CpTsHt}$Q1Ø603		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02040506}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02040506}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	Tr	Cxm	= EndG0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr(KpK0$\overline{02}$	Parity error	

```
     rIa          = TrF1
     rIx          = Tr(F1F3)(GOHt)
Tp   rA00         = TpEndGO
     rB00         = (  "  )
     sCp          = M24CxmHtTsTp          Initiate parity
     rF(1,2)      = TpEndSk               Ø0 next clock, (T8)
     Oc           = (  "  )
     s02          = Oc
     rO(1,3,4,5,6) = Oc                   NOP (20) → O
```

NOP 1

20 NOP No Operation 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	**T7 thru T3**
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

23		EXU	Execute	M → P	1 Cycle
Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initialize indexing	
		Oxc	= $\overline{Ia}$GO$\overline{C2}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= $\overline{C4Oxc}$		
	T7	Ar3	= $\overline{(O1O2\overline{O3}O4)}$Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{Ts}$ØØQ1		
		sC(0-2)	= Add(1-3)Cr3$\overline{JuTs}$		
		rC(")	= $\overline{Add}$(") "	C + X·Ix → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Parity error	T7 thru T0
		Xz(1-3)	= Xn(1-3)Ø0Ix	Adder input if Ix (indexing)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input C register	T7 thru T0
		sCz	= KzQ1$\overline{T0}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T1
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= $\overline{JuT3}$F1F2		
		sS(1,2)	= Add(2,3)Sxc	C(10-23) → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= $\overline{F1T0}$		
	Tr	Cxm	= $\overline{JuTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch instruction)	
		rC(")	= CxmTr		Tr thru Tp
		sHt	= CpTr⊕Kp$\overline{K0Ø2}$	Parity error	
		rIx	= $\overline{(F1F3)(GOHt)}$Tr		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	
		Oc	= $\overline{O1O3Ia}$		
		rO(1,3,4,5,6)	= Oc		
		sO2	= Oc	NOP (20) → O	

		YIM	Y Buffer Into Memory When Ready	Y → (M)	3 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{Ju}}$$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (XIx)	T7 thru T0
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru T0
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "		
		sCz	= KzQ1$\overline{\text{T0}}$$\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2}}$$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2}}$$\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= $\overline{\text{F1T0}}$		
		sRf	= T0$\overline{\text{F3O5Yf}}$(Y0+$\overline{\text{Y9}}$)	Y Buffer ready to send	
	Tr	Cxm	= $\overline{\text{Ju}}$Ø0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{\text{KpK0Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rK0	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= Tp($\overline{\text{F1F3O1O3O4}}$)$\overline{\text{Ia}}$Rf	Ø4 next clock if Rf	
		sF2	= Tp$\overline{\text{Ia}}$Ø0O3O4Rf	Ø2 next clock if $\overline{\text{Rf}}$	
		rRf	= TpØ1($\overline{\text{GOHt}}$)		

If the Buffer is ready, Ø2 is ignored and Ø4 will occur.

Ø2	T7	Ar3	= $\overline{(0102\overline{0}30\overline{4})}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{An}}$rAr3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bn}}$rAr3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
	T0	rCz	= $\overline{\text{F}}$1T0		
		sRf	= T0$\overline{\text{F}}$3$\overline{\text{0}}$5$\overline{\text{Yf}}$(Y0+$\overline{\text{Y}}$9)	Set Rf if Y Buffer full	
	Tp	sF1	= (Tp($\overline{\text{F}}$1$\overline{\text{F}}$3$\overline{\text{0}}$1030$\overline{\text{4}}$)$\overline{\text{I}}$aRf)	Ø4 next if Rf	
		rF2	= ($\overline{\quad}$ $\overline{\quad}$ ")Ø2	Ø2 next if $\overline{\text{Rf}}$	
		rRf	= TpØ1($\overline{\text{G}}$$\overline{\text{O}}$Ht)		

The Computer will continue to repeat Ø2 until the Y Buffer becomes ready.

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(IfKr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
		Rx	= O1O3O4O6F1F3Ts		
		sRn(1-3)	= Rwy(1-3)Tsr		
		rRn(")	= Rwy(") "	Information from Y	T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Rn(1-3)RxCr3		
		rC(")	= Rn(") "	Y Buffer → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTr(Kp⊕K0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrGOF2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (01020304)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)$\overline{Ia}$F1GO($\overline{02040506}$)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4End$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$EndGO	
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction) Tr thru Tp
		sC(0-23)	= M(0-23)Cxm	
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next
		Oc	= TpEnd$\overline{Sk}$	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

32		WIM	W Buffer Into Memory When Ready	W → (M)	3 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{I}}$aGO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (01O2$\overline{\text{O}}$3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{Ju}}\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix		
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$	Adder input (XIx)	T7 thru TO
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$		
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"	Adder input (C)	T7 thru TO
		sCz	= KzQ1$\overline{\text{T}}\overline{\text{O}}\overline{\text{Ø7}}$		
		rCz	= $\overline{\text{Kz}}$Q1	Carry logic	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$		
		rCp	= (")Cp "	Check parity	T7 thru TO
	T4	Sc	= T4$\overline{\text{F1F2}}\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{\text{F1F2}}\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	TO	rCz	= $\overline{\text{F1}}$TO		
		sRf	= TO$\overline{\text{F3}}$O5$\overline{\text{Wf}}$(WO+$\overline{\text{W9}}$)$\overline{\text{O6}}$	W Buffer ready to send	
	Tr	Cxm	= $\overline{\text{Ju}}$ØO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{\text{Kp}}\overline{\text{KO}}\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= Tp($\overline{\text{F1F3}}$O1O3O4)$\overline{\text{I}}$aRf	Ø4 next if Rf	
		sF2	= (Tp$\overline{\text{I}}$aØ0)O3O4$\overline{\text{Rf}}$	Ø2 next if $\overline{\text{Rf}}$	
		rRf	= TpØ1($\overline{\text{GOHt}}$)		

If Buffer is ready Ø2 is ignored and Ø4 will occur.

Ø2	T7	Ar3	= $\overline{(0102\overline{0}3\overline{0}4)}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
	T0	rCz	= $\overline{\text{F1}}$T0		
		sRf	= T0$\overline{\text{F3}}$05$\overline{\text{Wf}}$(W0+$\overline{\text{W9}}$)	Set Rf if W Buffer full	
	Tp	sF1	= (Tp($\overline{\text{F1}}\overline{\text{F3}}\overline{0}10\overline{3}\overline{0}\overline{4}$)$\overline{\text{Ia}}$Rf)	Ø4 next if Rf	
		sF2	= ($\overline{\quad\quad}$ ")Ø2	Ø2 next if $\overline{\text{Rf}}$	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GO}}$Ht)		

The Computer will continue to repeat Ø2 until the W Buffer becomes ready.

Ø4	T8	rC24	= T8($\overline{\text{TsTsr}}$)	Initialize parity generation	
		sIa	= F1$\overline{\text{F3}}$(I⊕Kr)	Initialize P register increment	
		Mxc	= $\overline{\text{Ø4Tsm}}$		T8 thru Tp
		Rx	= $\overline{\text{O1O3O4O6F1F3Ts}}$		
		sRn(1-3)	= Rwy(1-3)$\overline{\text{Tsr}}$		
		rRn(")	= $\overline{\text{Rwy(")}}$ "	Information from W	T8 thru Tp
	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= F1$\overline{\text{F3}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= $\overline{\text{Rn}}$(1-3)RxCr3		
		rC(")	= $\overline{\text{Rn}}$(") "	W Buffer → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO($\overline{\text{O2O4O5O6}}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)$\overline{\text{C24}}$($\overline{\text{TsTsr}}$)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= $\overline{\text{Ts}}$T0$\overline{\text{Ht}}$$\overline{\text{K0}}$(F1$\overline{\text{Ø7O1Ø6}}$)$\overline{\text{Ø2}}$		
	Tr	sHt	= CpTr⊕Kp$\overline{\text{K0Ø2}}$	Parity error	
		rIa	= TrF1		
		rK0	= Tr$\overline{\text{GOF2}}$		
	Tp	sF(1-3)	= Tp$\overline{\text{Ø4}}$	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= $\overline{\text{C}}$(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (0102$\overline{03}$04)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)$\overline{Ia}$F1GO($\overline{02040506}$)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4End$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$EndGO	
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction)
		sC(0-23)	= M(0-23)Cxm	Tr thru Tp
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next
		Oc	= TpEnd$\overline{Sk}$	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

33 PIN — Parallel Input to Memory When Ready External Device → (M) — 4 Cycles + Wait

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{T0}\overline{Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}\overline{K0}\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	
		sF2	= (Tp$\overline{Ia}$Ø0)O3$\overline{O4}\overline{Rf}$	Ø2 next clock (T8)	

Ø2	T7	Ar3	= $\overline{(0102\overline{03}04)}Q1$		
		sA(0-2)	= $A(21\text{-}23)\overline{Anr}Ar3$		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= $A(0\text{-}20)Ar3$	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= $B(21\text{-}23)\overline{Bnr}Ar3$		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= $B(0\text{-}20)Ar3$	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cxi	= $(\overline{F1}F2\overline{F3}06\overline{Ts})02Q105$		
		sC(0-23)	= CxiCd0	External Device → C	T7 thru T0
		rC(")	= CxiQ2		
		sRf	= $Q2\overline{F3}06F2Rt$	External Device ready (Rt)	
	T0	rCz	= $\overline{F1}T0$		
	Tp	sF1	= $(Tp(\overline{F1}\overline{F3}\overline{01}\overline{03}\overline{04})\overline{Ia}Rf)$	Ø4 next if Rf	
		rF2	= (")02	Ø2 next if $\overline{Rf}$	
		rRf	= $Tp\overline{Ø1}(\overline{GOHt})$		

The Computer will continue to repeat Ø2 until the External Device transmits to C.

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(T3Kr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= C(21-23)Ø4O1O4O6TsCr3	Recirculate C	T7 thru T0
		rC(")	= C(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)	Generate parity	T6 thru Tr
		rC24	= (")C24(")(")		
	T3	rM(0-24)	= T3	Clear M	
	TO	rCp	= TsTOHtKO(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTr⊕KOØ2	Parity error	
		rIa	= TrF1		
		rKO	= TrGOF2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp	C → M (Store operand)	
		rM(")	= C(") "		

Ø7	T8	End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= P(12-14)IaF1GO(02040506)Pr3		
		rP(")	= $\overline{P}$(") " (") "	Recirculate P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS(1,2)	= P(13,14)IaF1GO(02040506)Sxp	P(13,14) contains P(1,2) at T3	
		rS(")	= $\overline{P}$(") " (") "	P → S	
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGOTsm(Tr+Tp)	M → C (Fetch next instruction)	
		sC(0-23)	= M(0-23)Cxm		Tr thru Tp
		rC(")	= TrCxm		
		rIa	= F1Tr		
		rIx	= Tr($\overline{F1}$F3)($\overline{GOHt}$)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next	
		Oc	= TpEnd$\overline{Sk}$		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

35		STA	Store A	A → (M)	3 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{I}}$aGO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2$\overline{\text{O}}$3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{A}}$nrAr3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{B}}$nrAr3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1}}\overline{\text{F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{Ju}}\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (XIx)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TO}}\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1}}\overline{\text{F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$TO		
	Tr	Cxm	= $\overline{\text{Ju}}$ØO$\overline{\text{Ts}}\overline{\text{m}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{\text{Kp}}\overline{\text{K}}O\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1}}$F3)($\overline{\text{GO}}$Ht)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)O3O4	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(TsKr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= A(21-23)Ø4Ø4Ø5TsCr3	A → C	T7 thru T0
		rC(")	= A(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)	Generate parity	T6 thru Tr
		rC24	= (")C24(")(")		
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTr⊕CpK0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrGOF2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp	C → M (Store operand)	
		rM(")	= C(") "		

Ø7	T8	End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= P(12-14)$\overline{Ia}$F1GO($\overline{02040506}$)Pr3		
		rP(")	= $\overline{P}$(") " (") "	Recirculate P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3	
		rS(")	= $\overline{P}$(") " (") "	P → S	
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction)	
		sC(0-23)	= M(0-23)Cxm		Tr thru Tp
		rC(")	= TrCxm		
		rIa	= F1$\overline{Tr}$		
		rIx	= Tr($\overline{F1}$F3)($\overline{GOHt}$)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next	
		Oc	= TpEnd$\overline{Sk}$		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

36 STB Store B — B → (M) — 3 Cycle

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (XIx)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1$\overline{TO}\overline{Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}\overline{KO}\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}\overline{F3}$)($\overline{GO}$Ht)		
		rKO	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O3O4	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(TsKr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= B(21-23)Ø4O4O6TsCr3	B → C	T7 thru TC
		rC(")	= B(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(Ø2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)	Generate parity	T6 thru T7
		rC24	= (")C24(")(")		
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTr⊕K0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrC0F2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp	C → M (Store operand)	
		rM(")	= C(") "		

Ø7	T8	End	= F1F2	Last cycle	
	T7	Ar3	= (0102$\overline{03}$04)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= P(12-14)$\overline{\text{Ia}}$F1GO($\overline{02040506}$)Pr3		
		rP(")	= $\overline{\text{P}}$(") " (") "	Recirculate P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4End$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{\text{Int}}$EndGO		
		sS(1,2)	= P(13,14)$\overline{\text{Ia}}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3	
		rS(")	= $\overline{\text{P}}$(") " (") "	P → S	
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{\text{P}}$(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)	M → C (Fetch next instruction)	
		sC(0-23)	= M(0-23)Cxm		Tr thru Tp
		rC(")	= TrCxm		
		rIa	= F1Tr		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$	Ø0 next	
		Oc	= TpEnd$\overline{\text{Sk}}$		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

37 STX — Store X — X → C — 3 Cycles

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4Oxc}}$		
	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{JuTs}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (XIx)	T7 thru T0
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru T0
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TOØ7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{KzQ1}}$		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{CpTsHtQ1F1F2}}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1TO}}$		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr⊕K0⊕$\overline{\text{2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rK0	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{HtTs}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)O3O4	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3I1Kr	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= X1(1-3)Ø4Ø4Ø5Ø6TsCr3	X → C	T7 thru T0
		rC(")	= X(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)	Generate parity	T6 thru Tr
		rC24	= (")C24(")(")		
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7Ø1Ø6)Ø2		
	Tr	sHt	= CpTr⊕KpK0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrG0F2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (0102Ø304)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GØQ2	
		sP(0-2)	= P(12-14)$\overline{Ia}$F1GØ($\overline{Ø2Ø4Ø5Ø6}$)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4End$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$EndGØ	
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GØ($\overline{Ø2Ø4Ø5Ø6}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	TØ	rSk	= Ø7TØ	
	Tr	Cxm	= EndGØ$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction)
		sC(0-23)	= M(0-23)Cxm	Tr thru Tp
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1F3}$)($\overline{GØHt}$)	
	Tp	rAØØ	= TpEndGØ	
		rBØØ	= TpEndGØ	
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{Sk}$	ØØ next
		Oc	= TpEnd$\overline{Sk}$	
		sØ2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

40		SKS 10400	Channel Inter-Record Test (W Buffer)	Inter-Record Condition Not True = P + 1 → P Inter-Record Condition True = P + 2 → P	1 Cycle 2 Cycles
Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	Initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		Skr	= $\overline{\text{C1}}\overline{\text{C17}}\overline{\text{C9}}\overline{\text{C10}}$C11$\overline{\text{C19}}\overline{\text{C20}}\overline{\text{C21}}\overline{\text{C22}}\overline{\text{C23}}$C15Wsc		
		Sks	= $\overline{\text{Skrz}}$	Signal complete	
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5$\overline{\text{Bc23}}$	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$($\overline{\text{End+Ju}}\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
		sSk	= Ø5O1$\overline{\text{O4}}\overline{\text{A00}}$TrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{\text{Sk}}$	Ø7 next clock (T8) if Sk set	
		rRf	= Tp$\overline{\text{ØI}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8($\overline{TsTsr}$)		
		Ck	= Ø7T8$\overline{Ts}$		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk$\overline{IjIkr}$	Initiate P register increment	
	T7	Ar3	= ($\overline{O1O2O3O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= Ø7$\overline{O5}$($\overline{Ts}$Q1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= $\overline{C}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$		
		rRf	= Tpø1($\overline{GOHt}$)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 10500 Channel Inter-Record Test (Y Buffer)

Inter-Record Not True = 1 Cycle
P + 1 → P
Inter-Record True = 2 Cycles
P + 2 → P

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	Initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Skr	= C1C17C9C10C11C19C20C21C22C23C15Ysc		
		Sks	= Skrz	Signal complete	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		End	= Ø5Bc23	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4A00TrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set Ø7 next clock (T8) if Sk set	
		rF3	= TpEndSk		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7SkIjKr	Initiate P register increment	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= Ø7Ø5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(02040506))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(02040506))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 20001 Skip if Overflow not set

Set = P+1 → P reset overflow 1 Cycle
Reset = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= ØØT8	
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)
		sF3	= (")	
		sHz	= T8	
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment
		Oxc	= (ØØT8IaGO)C2	
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register
		rO2	= OxcC4	
		Sks	= (C1OC11)C23Of	Overflow not set
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		End	= Ø5Bc23	last cycle
		Pr3	= (F1GO)Q2	
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))	
		rP0	= (")(P12⊕(P13P14Ia))	
		sP1	= (")(P13⊕(P14Ia))	P+1 → P T7 thru T3
		rP1	= (")(P13⊕(P14Ia))	
		sP2	= (")(P14⊕Ia)	
		rP2	= (")(P14⊕Ia)	
		rIa	= (P12P13P14)Q2F1	
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= P(") "	
	T4	Sc	= T4(End+F1F2)Inr	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc	
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp	
		sS2	= (")(P14⊕Ia)Sxp	P → S
		sS(3-14)	= P(0-11)Sxp	
	Tr	Cxm	= EndGOTsm(Tr+Tp)	
		sC(0-23)	= M(0-23)Cxm	M → C Tr + Tp
		rC(")	= M(") "	
		rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
		sSk	= Ø5O1O4A00TrSks	Skip if Sks
	Tp	rF1	= TpEndSk	
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set
		rF3	= TpEndSk	Ø7 next clock (T8) if Sk set
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

```
Ø7  T8  rC24          = T8(TsTsr)
        Ck            = Ø7T8Ts
        End           = F1F2                          Last Cycle
        sIa           = T8Ø7SkI1Kr                    Initiate P register increment
    T7  Ar3           = (O1O2O3O4)Q1
        sA(0-2)       = A(21-23)AnrAr3
        rA( " )       = A( " )   "                    Recirculate A          T7 thru T0
        sA(3-23)      = A(0-20)Ar3
        rA( " )       = A( " ) "
        sB(0-2)       = B(21-23)BnrAr3
        rB( " )       = B( " )   "                    Recirculate B          T7 thru T0
        sB(3-23)      = B(0-20)Ar3
        rB( " )       = B( " ) "
        Cr3           = Ø7O5(TsQ1)
        sC(3-23)      = C(0-20)Cr3                    O → C
        rC( " )       = C( " ) "
        Pr3           = (F1GO)Q2
        sP0           = ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))
        rP0           = (      "      )(      "      )
        sP1           = (      "      )(P13⊕(P14Ia))
        rP1           = (      "      )(      "      )  P+1 → P             T7 thru T3
        sP2           = (      "      )(P14⊕Ia)
        rP2           = (      "      )(   "   )
        rIa           = (P12P13P14)Q2F1
        sP(3-14)      = P(0-11)Pr3
        rP( " )       = P( " ) "
    T4  Sc            = T4EndInr
        rS(1-14)      = Sc                            Clear S
    T3  Sxp           = T3IntEndGO
        sS1           = (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp
        sS2           = (      "      )(P14⊕Ia)Sxp    P → S
        sS(3-14)      = P(0-11)Sxp
    T0  rSk           = Ø7T0                          Reset skip
    Tr  Cxm           = EndGOTsm(Tr+Tp)
        sC(0-23)      = M(0-23)Cxm                    M → C
        rC( " )       = M( " ) "
        rIa           = TrF1
        rIx           = Tr(F1F3)(GOHt)
        rRc           = Tr
    Tp  sCp           = M24CxmHtTsTp                  Initiate parity
        rF(1-3)       = TpEndSk
        rRf           = TpØ1(GOHt)                    Ø0 next clock (T8)
        rJu           = Tp
        Oc            = TpEndSk
        rO(1,3,4,5,6) = Oc                            NOP → O
        sO2           = Oc
```

40 SKS 20002 Skip if Interrupt Disabled

Enabled = P+1 → P 1 Cycle
Disabled = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8($\overline{TsTsr}$)	
		rCz	= ØØT8	
		sF1	= (ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$))	Ø5 next (T7)
		sF3	= (")	
		sHz	= T8	
		sIa	= ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$)	initiate P register increment
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$	
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register
		rO2	= Oxc$\overline{C4}$	
		Sks	= ($\overline{C10}\overline{C11}$)$\overline{C22}\overline{En}$	Interrupt disabled
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru TO
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru TO
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		End	= Ø5$\overline{Bc}$23	last cycle
		Pr3	= (F1GO)Q2	
		sP0	= (F1GO($\overline{Ø2Ø4Ø5Ø6}$))(P12⊕(P13P14Ia))	
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)	
		sP1	= (")(P13⊕(P14Ia))	P+1 → P T7 thru T3
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	
		sP2	= (")(P14⊕Ia)	
		rP2	= (")($\overline{P14⊕Ia}$)	
		rIa	= ($\overline{P12P13P14}$)Q2F1	
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$(End+Ju$\overline{Eax}$)GO+T3Xmc	
		sS1	= (F1GO($\overline{Ø2Ø4Ø5Ø6}$))(P13⊕(P14Ia))Sxp	
		sS2	= (")(P14⊕Ia)Sxp	P → S
		sS(3-14)	= P(0-11)Sxp	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	
		sC(0-23)	= M(0-23)Cxm	M → C Tr + Tp
		rC(")	= $\overline{M}$(") "	
		rIa	= TrF1	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
		rRc	= Tr	
		sSk	= Ø5Ø1$\overline{O4}\overline{AØØ}$TrSks	Skip if Sks
	Tp	rF1	= TpEnd$\overline{Sk}$	
		sF2	= TpSk	ØØ next clock (T8) if Sk not set
		rF3	= TpEnd$\overline{Sk}$	Ø7 next clock (T8) if Sk set
		rRf	= TpØ1($\overline{GOHt}$)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{Sk}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7SkI⊕Kr	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 **SKS** 20004 Skip of Interrupt Enabled

Disabled = P+1 → P 1 Cycle
Enabled = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Sks	= (C10C11)C21(En+En)	Interrupts enabled	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Xmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4AOOTrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEndSk	Ø7 next clock (T8) if Sk set	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7Sk(I1Kr)	Initiate P register increment	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø7Ø5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	0 → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(02040506))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(02040506))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → 0	
		sO2	= Oc		

40 SKS 20010 W Buffer Error Test

Error = P + 1 → P 1 Cycle
No Error = P + 2 → P 2 Cycles

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}(\overline{\text{C3}}+\overline{\text{C4}})$)		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}(\overline{\text{C3}}+\overline{\text{C4}})$	Initiate P register increment	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GØ)$\overline{\text{C2}}$		
		sØ(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		Skr	= C1Ø$\overline{\text{C11}}$C2Ø$\overline{\text{WeC1}}$		
		Sks	= $\overline{\text{Skrz}}$	No Error Detected	
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5$\overline{\text{Bc23}}$	Last cycle	
		Pr3	= (F1GØ)Q2		
		sP0	= (F1GØ($\overline{\text{Ø2Ø4Ø5Ø6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Jax}}$)GØ+T3Kmc		
		sS1	= (F1GØ($\overline{\text{Ø2Ø4Ø5Ø6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GØHt)		
		rJx	= Tr		
		sJx	= Ø5ØIØ4AØØTrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{\text{Sk}}$	Ø7 next clock (T8) if Sk set	
		rRf	= TpØI($\overline{\text{GØHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8($\overline{TsTsr}$)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk$\overline{Ir}$Kr	Initiate P register increment	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= Ø7$\overline{05}$($\overline{Ts}$Q1)		
		sC(3-23)	= C(0-20)Cr3	0 → C	
		rC(")	= $\overline{C}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= ((F1G0)($\overline{02040506}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$End$\overline{G0}$		
		sS1	= (F1G0($\overline{02040506}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= End$\overline{G0Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= $\overline{M}$(") "		
		rIa	= Tr$\overline{F1}$		
		rIx	= Tr($\overline{F1F3}$)($\overline{G0Ht}$)		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{HtTs}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$		
		rRf	= Tpø1($\overline{G0Ht}$)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP → 0	
		sO2	= Oc		

40 SKS 20020 Y Buffer Error Test

Error = P + 1 → P 1 Cycle
No Error = P + 2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	Initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Skr	= C10C11C19YeC1		
		Sks	= Skrz	No error detected	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4AOOTrSks	Skip if Sks	
	Tp	rF1	= TpEndSk	Ø0 next clock (T8) if Sk not set	
		sF2	= TpSk	Ø7 next clock (T8) if Sk set	
		rF3	= TpEndSk		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk(Ir)	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1G0)Q2		
		sP0	= ((F1G0)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1G0(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 20040 Skip if Break Point 4 not set

BP4 set = P+1 → P 1 Cycle
BP4 reset = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Sks	= (C10C11)C18Kb4	Break Point 4	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4A00TrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEndSk	Ø7 next clock (T8) if Sk set	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7SkIrKr	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 20100 Skip if Break Point 3 not set

BP3 set = P+1 → P 1 Cycle
BP3 reset = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Sks	= (C10C11)C17Kb3	Break Point 3	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4A00TrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEndSk	Ø7 next clock (T8) if Sk set	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7Sk(I1)(Kr)	Initiate P register increment	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø705(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	0 → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(02040506))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(02040506))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 20200 Skip if Break Point 2 not set

BP2 set = P+1 → P 1 Cycle
BP2 reset = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (Ø0T8IaGO)C2		
		s0(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Sks	= (C10C11)C16Kb2	Break Point 2	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4A00TrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEndSk	Ø7 next clock (T8) if Sk set	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7SkI1Kr	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40		SKS 20400	Skip if Break Point 1 not set	BP1 set = P+1 → P BP1 reset = P+2 → P	1 Cycle 2 Cycles
Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (Ø0T8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		Sks	= (C10C11)C15Kb1	Break Point 1	
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5Bc23	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14Ia))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
		sSk	= Ø5O1O4AOOTrSks	Skip if Sks	
	Tp	rF1	= TpEndSk		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set Ø7 next clock (T8) if Sk set	
		rF3	= TpEndSk		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last Cycle	
		sIa	= T8Ø7SkI1Kr	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(")		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(")		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(")		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 21000 Skip if W Buffer Ready

Not Ready = P + 1 → P 1 Cycle
Ready = P + 2 → P 2 Cycles

Ø0	T8	rC24	= T8($\overline{TsTsr}$)	
		rCz	= ØØT8	
		sF1	= (ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$)	
		sF3	= (")	Ø5 next (T7)
		sHz	= T8	
		sIa	= ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$	Initiate P register increment
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$	
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register
		rO2	= Oxc$\overline{C4}$	
		Skr	= C1Ø$\overline{C1}$1C14$\overline{W1}$Ø$\overline{W1}$1$\overline{W1}$2$\overline{W1}$3$\overline{W1}$4C1	
		Sks	= $\overline{Skrz}$	Buffer ready (disconnected)
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3	
		rA(")	= $\overline{A}$(") "	
		sA(3-23)	= A(0-20)Ar3	Recirculate A T7 thru TO
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	
		sB(3-23)	= B(0-20)Ar3	Recirculate B T7 thru TO
		rB(")	= $\overline{B}$(") "	
		End	= Ø5$\overline{Bc23}$	Last cycle
		Pr3	= (F1GO)Q2	
		sP0	= (F1GO($\overline{Ø2Ø4Ø5Ø6}$))(P12⊕(P13P14Ia))	
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)	
		sP1	= (")(P13⊕(P14Ia))	
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P T7 thru T3
		sP2	= (")(P14⊕Ia)	
		rP2	= (")($\overline{P14⊕Ia}$)	
		rIa	= ($\overline{P12P13P14}$)Q2F1	
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4(End+$\overline{F1}\overline{F2}$)$\overline{Inr}$	
		rS(1-14)	= Sc	Clear S
	T3	Sxp	= T3$\overline{Int}$($\overline{End+Ju}\overline{Eax}$)GO+T3Kmc	
		sS1	= (F1GO($\overline{Ø2Ø4Ø5Ø6}$))(P13⊕(P14Ia))Sxp	
		sS2	= (")(P14⊕Ia)Sxp	P → S
		sS(3-14)	= P(0-11)Sxp	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	
		sC(0-23)	= M(0-23)Cxm	M → C Tr + Tp
		rC(")	= $\overline{M}$(") "	
		rIa	= TrF1	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
		rRc	= Tr	
		sSk	= Ø5Ø1$\overline{O4}\overline{A00}$TrSks	Skip if Sks
	Tp	rF1	= TpEnd$\overline{Sk}$	
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set
		rF3	= TpEnd$\overline{Sk}$	Ø7 next clock (T8) if Sk set
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{Sk}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7SkIjKr	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40		SKS 22000	Skip if Y Buffer Ready	Not Ready = P + 1 → P Ready = P + 2 → P	1 Cycle 2 Cycles
Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$)		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$	Initiate P register increment	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
		Skr	= C1O$\overline{C1}$1C13$\overline{Y1}$O$\overline{Y1}$1$\overline{Y1}$2$\overline{Y1}$3$\overline{Y1}$4$\overline{C1}$		
		Sks	= $\overline{Skrz}$	Buffer ready (disconnected)	
Ø5	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		End	= Ø5$\overline{Bc23}$	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$($\overline{End+JuEax}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
		sSk	= Ø5O1$\overline{O4}\overline{A00}$TrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{Sk}$		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{Sk}$	Ø7 next clock (T8) if Sk set	
		rRf	= Tp$\overline{ØI}$($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		Ck	= Ø7T8$\overline{\text{Ts}}$		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk$\overline{\text{Ti}}$$\overline{\text{Kr}}$	Initiate P register increment	
	T7	Ar3	= (O1O2$\overline{\text{O}}$3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= Ø7$\overline{\text{O}}$5($\overline{\text{Ts}}$Q1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= $\overline{\text{C}}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= ((F1G0)($\overline{\text{O}}$2$\overline{\text{O}}$4$\overline{\text{O}}$5$\overline{\text{O}}$6))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12}}$⊕($\overline{\text{P13P14Ia}}$))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13}}$⊕($\overline{\text{P14Ia}}$))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14}}$⊕$\overline{\text{Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4End$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$EndGO		
		sS1	= (F1G0($\overline{\text{O}}$2$\overline{\text{O}}$4$\overline{\text{O}}$5$\overline{\text{O}}$6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHt$\overline{\text{Ts}}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 24000 Power Off Test

Power Off = P + 1 → P 1 Cycle
Power Not Off = P+2 → P 2 Cycles

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	Initiate P register increment	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GØ)$\overline{\text{C2}}$		
		sØ(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rØ2	= Oxc$\overline{\text{C4}}$		
		Sks	= ($\underline{\text{C1}}$Ø$\overline{\text{C11}}$)C15Kb1		
Ø5	T7	Ar3	= (Ø1Ø2$\overline{\text{Ø3}}$Ø4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TØ
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TØ
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5$\overline{\text{Bc23}}$	Last cycle	
		Pr3	= (F1GØ)Q2		
		sPØ	= (F1GØ($\overline{\text{Ø2Ø4Ø5Ø6}}$))(P12⊕(P13P14Ia))		
		rPØ	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$($\underline{\text{End}}$+Ju$\overline{\text{Eax}}$)GØ+T3Kmc		
		sS1	= (F1GØ($\overline{\text{Ø2Ø4Ø5Ø6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGØ$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GØHt}}$)		
		rRc	= Tr		
		sSk	= Ø5Ø1$\overline{\text{Ø4}}$A$\overline{\text{ØØ}}$TrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		sF2	= TpSk	ØØ next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{\text{Sk}}$	Ø7 next clock (T8) if Sk set	
		rRf	= TpØI($\overline{\text{GØHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rØ(1,3,4,5,6)	= Oc	NOP (20) → O	
		sØ2	= Oc		

Ø7	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		Ck	= Ø7T8$\overline{\text{Ts}}$		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk$\overline{\text{IjKr}}$	Initiate P register increment	
	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= Ø7$\overline{\text{O5}}$($\overline{\text{Ts}}$Q1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= $\overline{\text{C}}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4End$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$End$\overline{\text{GO}}$		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= End$\overline{\text{GO}}$$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$		
		rRf	= TpØ1($\overline{\text{GOHt}}$)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 40001 Skip if Not Bank Register 2

Bank Register 2 = P+1 → P 1 Cycle
Not Bank Register 2 = 2 Cycles
P + 2 → P

Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$)	Initiate P register increment	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
		Sks	= $\overline{C10C11C9C23(E2m0E2m1E2m2)}$	Not Bank Register 2	
Ø5	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5$\overline{Bc23}$	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{Int}$($\overline{End+JuEax}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
		sSk	= Ø5O1O4$\overline{A00}$TrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{Sk}$		
		sF2	= TpSk	Ø0 next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{Sk}$	Ø7 next clock (T8) if Sk set	
		rRf	= Tp$\overline{ØI}$($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		Ck	= Ø7T8$\overline{\text{Ts}}$		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk$\overline{\text{IjKr}}$	Initiate P register increment	
	T7	Ar3	= (O1O2$\overline{\text{O}}$3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= Ø7$\overline{\text{O5}}$($\overline{\text{Ts}}$Q1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= $\overline{\text{C}}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4End$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$EndGO		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$		
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

40 SKS 40002 Skip if Not Bank Register 3

Bank Register 2 = P+1→P 1 Cycle
Not Bank Register 2 = 2 Cycles
P + 2 → P

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	Initiate P register increment	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		Sks	= $\overline{\text{C1ØC11C9C22(E3mØE3m1E3m2)}}$	Not Bank Register 3	
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5$\overline{\text{Bc23}}$	Last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{\text{Int}}$($\overline{\text{End+JuEax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
		sSk	= Ø5O1O4$\overline{\text{AUO}}$TrSks	Skip if Sks	
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		sF2	= TpSk	ØØ next clock (T8) if Sk not set	
		rF3	= TpEnd$\overline{\text{Sk}}$	Ø7 next clock (T8) if Sk set	
		rRf	= Tp$\overline{\text{ØI}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø7	T8	rC24	= T8(TsTsr)		
		Ck	= Ø7T8Ts		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk(IjKr)	Initiate P register increment	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= Ø7O5(TsQ1)		
		sC(3-23)	= C(0-20)Cr3	O → C	
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= ((F1GO)(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0	Reset skip	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk		
		rRf	= TpØ1(GOHt)	Ø0 next clock (T8)	
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP → O	
		sO2	= Oc		

41 BRX — Increment Index and Branch

(X+1 → X) If X(9)=1
M → P branch — 1 Cycle
(X+1 → X) If X(9)=0
P+1 → P — 2 Cycles

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initialize indexing	
		sJu	= $\overline{Ia}$GO$\overline{C4}\overline{C5}$C8$\overline{C9}$T8		
		Hx(1-3)	= $\overline{Xn(1-3)F1}$	Half adder inputs	
		Ha1	= $\overline{Hx1(Hx2Hx3Hz)+Hx1(Hx2Hx3Hz)}$		
		Ha2	= $\overline{Hx2(Hx3Hz)+Hx2(Hx3Hz)}$	Half adder outputs	
		Ha3	= $\overline{Hx3Hz+Hx3Hz}$		
	T7	Ar3	= O5ØOQ1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{Ts}$ØOQ1		
		sC0	= (P12)$\overline{JuTs}$Cr3$\overline{Q6}$		
		rC0	= (") "	P(1-14) → C(10-23)	T7 thru T
		sC(1,2)	= P(13,14)Ju$\overline{Ts}$Cr3Q2		
		rC(")	= $\overline{P}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Parity check	T7 thru T0
		rCp	= (")Cp "		
		rHz	= ($\overline{Hx1}+\overline{Hx2}+\overline{Hx3}$)$\overline{T8}$		
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)$\overline{O2}\overline{O4}\overline{O5}$O6Pr3		
		rP(")	= $\overline{Add}$(") "	C + X·Ix → P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		Xnr	= Ju01$\overline{O5}$		
		sXw(1-3)	= Ha(1-3)$\overline{Ts}$Ju01$\overline{O5}$	X + 1 → X	
		rXw(")	= $\overline{Ha}$(") "		
		Xz(1-3)	= Xn(1-3)ØOIx	Adder input (X·Ix)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru T0
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1$\overline{T0}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4	Clear S	
		rS(1-14)	= Sc		
	T3	rC0	= Ju$\overline{Ts}$Cr3Q4Q6	No input to C3, C6, C9	T3 thru T1

```
     Sxp            = IntJuEaxGOT3
     sS(1,2)        = Add(2,3)(JuEax+02040506)Sxp
     sS(3-14)       = P(0-11)Sxp                    P → S
T2   rO1            = Xw1Ju05T2                     Reset O1 if (X9 = 1)
     rC(1,2)        = (JuTsCr3)T2                   No input to C7, C8
T1   sC(1,2)        = Em(1,2)(JuTsCr3)T1
     rC( " )        = Em( " )(   "   ) "
     End            = JuEax01                       Branch condition (X9 = 1)
T0   rCz            = F1T0
     sC0            = 0f(JuTsCr3T0)
     rC0            = 0f(     "    )
     rC(1,2)        = JuTsCr3T0                     No input to C1, C2
Tr   Cxm            = EndGOTsm(Tr+Tp)               Branch condition (X9 = 1)
     sC(0-23)       = M(0-23)Cxm                    M → C (Fetch operand)    Tr thru Tp
     rC( " )        = CxmTr
     sCz            = 04050600Tr                    Initiate C register increment
     sHt            = CpTrKpK002                    Parity error
     rIx            = (F1F3)(G0Ht)Tr
     rRc            = Tr
Tp   rA00           = EndGOTp
     rB00           = ( " )                         Branch condition (X9 = 1)
     sCp            = M24CxmHtTsTp                  Initiate parity
     sF1            = 04Ia0100Tp                    06 next if 01 (X9 = 0)
     sF2            = 02    "
     rJu            = Tp
     0c             = (0103Ia+EndSk)Tp
     r0(1,3,4,5,6)  = 0c
     s02            = 0c                            NOP (20) → 0 if 01 (X9 = 1)
```

Ø6	T8	End	= F1F3		
		sIa	= F1F3IjKrT8		
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= TsF1F3Q1		
		sC(0-2)	= Add(1-3)TsCr3Ø6		
		rC(")	= Add(") "		
		sC(3-23)	= C(0-20)Cr3	Recirculate C	T7 thru T0
		rC(")	= C(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= Add(1-3)02040506Pr3		
		rP(")	= Add(") "	C + 1 → P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		Xz(1-3)	= Ix		
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru T0
		sCz	= KzF1Q1		
		rCz	= KzQ1	Carry logic	T7 thru T1
		rIa	= (PI2PI3PI4)Q2F1		
	T4	Sc	= InrT4		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= IntEndGOT3		
		sS(1,2)	= Add(2,3)02040506Sxp	C+1 → S (C contains original P)	
		sS(3-14)	= P(0-11)Sxp		
	T0	rCz	= F1T0		
		rCp	= TsHtK0F1(Ø7Ø403)Ø2T0		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= CxmTr		Tr thru Tp
		rRc	= Tr		
	Tp	rA00	= EndGOTp		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity	
		rF1	= EndSkTp	Ø0 next clock (T8)	
		rF2	= (")		
		Oc	= (")		
		rO(1,3,4,5,6)	= Oc		
		sO2	= Oc	NOP (20) → O	

43		BRM	Mark Place and Branch	P → (M) 9-23 Of → (M) M + 1 → P	2 Cycles
Ø0	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GØØØT8	Initiate indexing	
		sJu	= IaGØC4C5C8C9T8		
		Oxc	= IaGØC2ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= C4Oxc		
	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TØ
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TØ
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= TsØØQ1		
		sCØ	= (P12)JuTsCr3Q6		
		rCØ	= (") "		
		sC(1,2)	= P(13,14)JuTsCr3Q2	P(1-14) → C(10-23)	T7 thru T3
		rC(")	= P(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Parity check	T7 thru TØ
		rCp	= (")Cp "		
		Mxc	= JuØ1Ø5Tsm	Initialize store into memory	
		Pr3	= JuQ2		T7 thru Tp
		sP(0-2)	= Add(1-3)JuEaxPr3		
		rP(")	= Add(") "	C + X·Ix → P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		Xz(1-3)	= Xn(1-3)ØØIx		
		Xz(")	= Xn(")ØØIx+Ix	Adder input (X·Ix)	T7 thru TØ
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru TØ
		sCz	= KzQ1TØ		
		rCz	= KzQ1	Carry logic	T7 thru T1
	T6	sC24	= C24(TsTsrCØ⊕C1⊕C2)(Q3+Q5)		
		rC24	= C24(")(")	Generate parity	T6 thru Tr
	T4	Sc	= InrF1F2T4		
		rS(1-14)	= Sc	Clear S	
	T3	rCØ	= JuTsCr3Q4Q6	No input to C3, C6, C9	T3 thru T1
		rM(0-24)	= T3		
		Sxp	= IntJuEaxGOT3		
		sS(1,2)	= Add(2,3)(JuEax+Ø2Ø4Ø5Ø6)Sxp		
		sS(3-14)	= P(0-11)Sxp	P → S P(C+X·Ix)	
	T2	sC(0-2)	= E2m(0-2)T2(JuTs)Cr3		
		rC(")	= E2m(")T2(") "	Record bank register 2 into C(6-8)	
	T1	sC(0-2)	= E3m(0-2)T2(JuTs)Cr3		
		rC(")	= E3m(")T2(") "	Record bank register 3 into C(3-5)	

T0	rCz	= $\overline{F1}$T0	
	sC0	= 0f(Ju$\overline{Ts}$Cr3T0)	
	rC0	= $\overline{0f}$(")	Set C0 if overflow
	rC(1,2)	= Ju$\overline{Ts}$Cr3T0	No input to C1, C2
Tr	sHt	= CpTr$\overline{Kp}$K0$\overline{\emptyset 2}$	Parity error
	rIx	= ($\overline{F1}$F3)($\overline{GO}$Ht)Tr	
	rRc	= Tr	
Tp	sF1	= $\overline{04}\overline{Ia}01\emptyset$0Tp	
	sF2	= $\overline{02}$ "	$\emptyset$6 next clock (T8)
	rJu	= Tp	
	sM(0-24)	= C(0-24)MxcTp	C $\rightarrow$ M

The C register at Tp contains the following information:

C0	= State of the Overflow Flip-Flop
C1 thru C2	= $\emptyset$
C3 thru C5	= Contents of Bank Register 3
C6 thru C8	= Contents of Bank Register 2
C9	= $\emptyset$
C10 thru C23	= Original contents of the P register

Ø6	T8	End	= F1F2		
		sIa	= F1$\overline{F3(I \oplus Kr)}$T8	Initiate P register increment	
	T7	Ar3	= ($\overline{010203}$04)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)$\overline{Ts}$Cr3Ø6		
		rC(")	= $\overline{Add}$(") "		
		sC(3-23)	= C(0-20)Cr3	Recirculate C	T7 thru T0
		rC(")	= $\overline{C}$(") "		
		Pr3	= F1GOQ2		
		sP0	= (F1GO($\overline{02}\overline{04}\overline{05}$06))(P12$\oplus$P13P14Ia)Pr3		
		rP0	= (")($\overline{\text{ " }}$) "		
		sP1	= (")(P13$\oplus$P14Ia)Pr3		
		rP1	= (")($\overline{\text{ " }}$) "	P+1 → P (P contains the original contents of the C register.)	T7 thru T3
		sP2	= (")(P14$\oplus$Ia)Pr3		
		rP2	= (")($\overline{\text{ " }}$) "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		$\overline{Xz}$(1-3)	= $\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input (C)	T7 thru T0
		sCz	= KzQ1F1		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T0
	T4	Sc	= $\overline{Inr}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= $\overline{Int}$EndGOT3		
		sS1	= (F1GO($\overline{02}\overline{04}\overline{05}$06))(P13$\oplus$P14Ia)Sxp		
		sS2	= (")(P14$\oplus$Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rCp	= $\overline{Ts}\overline{Ht}\overline{K0}$(F1$\overline{Ø7}$$\overline{Ø4}\overline{03}$)Ø2T0		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= CxmTr		Tr thru Tp
		rRc	= Tr		
	Tp	rA00	= EndGOTp		
		rB00	= (")		
		sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	
		rF(1,2)	= End$\overline{Sk}$Tp	Ø0 next clock (T8)	
		Oc	= (")		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CLX 00000,2 Clear X 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		sIx	= ØØT8C1GO	Initialize Clear X	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		sRc	= (ØØT8IaGO)C2C3C4C5C6		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		End	= Ø5(A00+G0)	last cycle	
		Pr3	= (F1G0)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		Xnr	= (O1O2O3O4Ix)		T7
	T6	sXw(1-3)	= (")Xw(1-3)T7	Ø → X	T6 thru T0
		rXw(")	= (")Xw(")T7		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CLA 00001 Clear A 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8IaC2C5C8(C3+C4))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= Ø0T8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (Ø0T8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		sRc	= (Ø0T8IaGO)C2C3C4C5C6		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		Anr	= RcC23		
		sA(3-23)	= A(0-20)Ar3	no inputs to A(0-2)	T7 thru T0
		rA(")	= A(") "	causes Ø → A	
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		End	= Ø5(AOO+GO)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-24)	= M(0-24)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CLB 00002 Clear B 1 Cycle

Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$))		
		sF3	= (")	Ø5 next (T7)	
		sHz	= T8		
		sIa	= Ø0T8$\overline{Ia}$C2$\overline{C5}\overline{C8}$($\overline{C3}$+$\overline{C4}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
		sRc	= ($\overline{Ø0T8Ia}$GO)$\overline{C2}$C3$\overline{C4}\overline{C5}$C6		
Ø5	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		Bnr	= RcC22		
		sB(3-23)	= B(0-20)Ar3	no inputs to B(0-2)	
		rB(")	= $\overline{B}$(") "	causes Ø → B	T7 thru T0
		End	= Ø5($\overline{AOO}$+$\overline{GO}$)	last cycle	
		Pr3	= (F1GO)$\overline{Q2}$		
		sP0	= (F1GO($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{P12⊕(P13P14Ia)}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{P13⊕(P14Ia)}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{P14⊕Ia}$)		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$(End+Ju$\overline{Eax}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Sk}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

\6 CAB 00004 Copy A into B 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= ØØT8		
		sF1	= (ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GØ)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= ($\overline{\text{ØØT8Ia}}$GØ)$\overline{\text{C2}}$C3$\overline{\text{C4}}\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		Bnr	= RcC21		
		sB(0-2)	= A(21-23)RcC21Ar3		
		rB(")	= $\overline{\text{A}}$(") "		
		sB(3-23)	= B(0-20)Ar3	A → B	T7 thru TO
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{AØØ}}$+$\overline{\text{GØ}}$)	last cycle	
		Pr3	= (F1GØ)Q2		
		sP0	= (F1GØ($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$($\overline{\text{End+JuEax}}$)GØ+T3Kmc		
		sS1	= (F1GØ($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGØ$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GØHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1($\overline{\text{GØHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CBA 00010 Copy B into A 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= ØOT8		
		sF1	= (ØOT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØOT8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (ØOT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= ($\overline{\text{ØOT8Ia}}$GO)$\overline{\text{C2}}$C3$\overline{\text{C4}}\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= (O1O2$\overline{\text{O}}$3O4)Q1		
		Anr	= RcC20		
		sA(0-2)	= B(21-23)RcC20Ar3		
		rA(")	= $\overline{\text{B}}$(") "	B → A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{AOO}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12}}$⊕($\overline{\text{P13P14Ia}}$))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13}}$⊕($\overline{\text{P14Ia}}$))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14}}$⊕$\overline{\text{Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1}}\overline{\text{F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1}}$F3)($\overline{\text{GO}}$Ht)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GO}}$Ht)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CBX 00020 Copy B into X 1 Cycle

Ø0	T8	rC24	= T8($\overline{TsTsr}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$)	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8$\overline{Ia}\overline{C2}\overline{C5}\overline{C8}(\overline{C3}+\overline{C4})$	initiate P register increment	
		Oxc	= (Ø0T8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
		sRc	= ($\overline{Ø0T8IAGO}$)$\overline{C2}$C3$\overline{C4}\overline{C5}$C6		
Ø5	T7	Ar3	= ($\overline{O1O2O3O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5($\overline{A00}$+$\overline{GO}$)	last cycle	
		Pr3	=(F1GO)Q2		
		sP0	= (F1GO($\overline{O2O4O5O6}$))(P12⊕(P13P14Ia))		
		rP0	= (")$\overline{(P12⊕(P13P14Ia))}$		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")$\overline{(P13⊕(P14Ia))}$	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")$\overline{(P14⊕Ia)}$		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		Xnr	= (Rc19)		
		sXw(1-3)	= (")B(21-23)	B → X	T7 thru T0
		rXw(")	= (")$\overline{B}$(")		
	T4	Sc	= T4(End+$\overline{F1F2}$)$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$($\overline{End+JuEax}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{O2O4O5O6}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{M}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Sk}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CXB 00040 Copy X into B 1 Cycle

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= (ØØT8IaC2C5C8(C3+C4))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= ØØT8IaC2C5C8(C3+C4)	initiate P register increment	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
		sRc	= (ØØT8IaGO)C2C3C4C5C6		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		Bnr	= RcC18		
		sB(0-2)	= Xn(1-3)RcC18Ar3		
		rB(")	= Xn(") "		
		sB(3-23)	= B(0-20)Ar3	X → B	T7 thru T0
		rB(")	= B(") "		
		End	= Ø5(A00+G0)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO(O2O4O5O6))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14Ia))		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")(P14⊕Ia)		
		rIa	= (P12P13P14)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3Int(End+JuEax)GO+T3Kmc		
		sS1	= (F1GO(O2O4O5O6))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= M(") "		
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 RCH 00100 — Copy least significant 9 bits only extend bit 15 throughout X when X is designation register. — 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$C3$\overline{\text{C4}}\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))($\overline{\text{P12}}$⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T5	sIx	= RcC17T5(C15+C19)	only for CAX or CBX	
		rRc	= C17T5	A and B recirculate	T4 thru T0
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
		Xnr	= O1$\overline{\text{O2O3}}$O4Ix		
		sXw(1-3)	= (")Xw1$\overline{\text{T7}}$	extend X15 thru X0	
		rXw(1-3)	= (")$\overline{\text{Xw1T7}}$		
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CXA 00200 Copy X into A 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}$C2$\overline{\text{C5C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8$\overline{\text{Ia}}$C2$\overline{\text{C5C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= ($\overline{\text{Ø0T8Ia}}$GO)$\overline{\text{C2}}$C3$\overline{\text{C4}}$$\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3}}$O4)Q1		
		Anr	= RcC16		
		sA(0-2)	= Xn(1-3)RcC16Ar3		
		rA(")	= $\overline{\text{Xn}}$(") "	X → A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{AOO}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)$\overline{\text{Q2}}$		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))		
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)	P+1 → P	T7 thru T3
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmd		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(Ø-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{ØI}}$($\overline{\text{GCHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

CAX 00400 Copy A into X 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8		
		sIa	= Ø0T8$\overline{\text{Ia}}\overline{\text{C2}}\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= ($\overline{\text{Ø0T8Ia}}$GO)$\overline{\text{C2}}$C3$\overline{\text{C4}}\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)AR3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")($\overline{\text{P12⊕(P13P14Ia)}}$)		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")($\overline{\text{P13⊕(P14Ia)}}$)		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
		Xnr	= (RcC15)		
		sXw(1-3)	= (")A(21-23)	A → X	T7 thru T0
		rXw(")	= (")$\overline{\text{A}}$(21-23)		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P ⟶ S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

46 CNA 01000 Copy Negative of A into A 1 Cycle

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= (Ø0T8$\overline{\text{Ia}}$C2$\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$))	Ø5 next (T7)	
		sF3	= (")		
		sHz	= T8	Set carry into half adder	
		sIa	= Ø0T8$\overline{\text{Ia}}$C2$\overline{\text{C5}}\overline{\text{C8}}$($\overline{\text{C3}}$+$\overline{\text{C4}}$)	initiate P register increment	
		Oxc	= (Ø0T8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= OxcC(3,5,6,7,8)	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{\text{C4}}$		
		sRc	= ($\overline{\text{Ø0T8Ia}}$GO)$\overline{\text{C2}}$C3$\overline{\text{C4}}\overline{\text{C5}}$C6		
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		Anr	= RcC14		
		sA(0-2)	= Ha(1-3)RcC14		
		rA(")	= $\overline{\text{Ha}}$(") "	Ha = Hx+1	
		Hx(1-3)	= F1$\overline{\text{O3}}\overline{\text{A}}$(21-23)	Hx = $\overline{\text{A}}$	T7 thru T0
		sA(3-23)	= A(0-20)Ar3	A = $\overline{\text{A}}$+1 = -A	
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		Pr3	= (F1GO)Q2		
		sP0	= (F1GO($\overline{\text{O2O4O5O6}}$))(P12⊕(P13P14Ia))		
		rP0	= (")(P12⊕(P13P14$\overline{\text{Ia}}$))		
		sP1	= (")(P13⊕(P14Ia))	P+1 → P	T7 thru T3
		rP1	= (")(P13⊕(P14$\overline{\text{Ia}}$))		
		sP2	= (")(P14⊕Ia)		
		rP2	= (")($\overline{\text{P14⊕Ia}}$)		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3$\overline{\text{Int}}$(End+Ju$\overline{\text{Eax}}$)GO+T3Kmc		
		sS1	= (F1GO($\overline{\text{O2O4O5O6}}$))(P13⊕(P14Ia))Sxp		
		sS2	= (")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C	Tr + Tp
		rC(")	= $\overline{\text{M}}$(") "		
		rIa	= Tr$\overline{\text{F1}}$		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

50 SKE — Skip if A Equals (M)

A ≠ (M); P + 1 → P — 2 Cycles
A = (M); P + 2 → P — 3 Cycles

Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØØ$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØØ·Ix	Adder input if Ix (indexing)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+Ix		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(")"	Adder input C register	T7 thru T0
		sCz	= Kz$\overline{Q1}\overline{T0}\overline{Ø7}$		
		rCz	= $\overline{Kz}$Q1	Carry for Adder	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Check parity	T7 thru T0
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	T0	rCz	= $\overline{F1}$T0		
	Tr	Cxm	= $\overline{Ju}$ØØ$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kz}$K0$\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O1O4		
		sF2	= (")O3O1	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3(TsQ1)	Initiate P register increment	
		End	= F1F2	Last cycle	
		sSk	= (Ø1Ø3Ø4Ø5Ø6)T8		
	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1		
		sA(0-2)	= A(21-23)ĀnrAr3		
		rA(")	= Ā(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= Ā(") "		
		sB(0-2)	= B(21-23)B̄nrAr3		
		rB(")	= B̄(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B̄(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Ādd(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C̄(") "		
		Xz(1-3)	= Ix	Adder input (Ø)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Ȳz(")	= C̄(")"		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= K̄zQ1		
		sCp	= (C21⊕C22⊕C23)C̄pTsH̄tQ1Ø6Ø3	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(Ø2Ø4Ø5Ø6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P̄(") "		
		rIa	= (P̄12P̄13P̄14)Q2F1		
		rSk	= A⊕C(21-23)(Ø6Ø1Ø3Ø4Ø5Ø6Q1)Ø2	Not skip logic	T7 thru T0
	T4	Sc	= T4EndĪnr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3ĪntEndG0		
		sS1	= (P13⊕P14Ia)F1G0(Ø2Ø4Ø5Ø6)Sxp		
		rS1	= (") "	P13,14 contains P1,P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P̄(") "		
	Tr	Cxm	= EndG0Īsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr(pX)Ø2	Parity error	

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     rIa          = TrF1
     rIx          = Tr(F1F3)(GOHt)
Tp   rA00         = TpEndGO
     rB00         = (  "  )
     sCp          = M24CxmHtTsTp          Initiate parity
     rF(1,2)      = TpEndSk               Ø0 next if Sk
     sF3          = TpSk                  Ø7 next if Sk
     0c           = TpEndSk
     s02          = 0c
     r0(1,3,4,5,6)= 0c                    NOP  (20)⟶0
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Ø7	T8	sIa	= SkØ7T8IaKr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rSk	= Ø7T0		
		rCp	= TsT0HtK0(F103Ø4Ø6)Ø2		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
	Tp	rA00	= TpEndGO		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity check	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

51		BRR	Return Branch	(M) + 1 → P	2 Cycles
Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initiate indexing	
		Oxc	= IaGOC2ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= (TsQ1)F1F2		
		sC(0-2)	= Add(1-3)JuTsCr3Ø0	C + X·Ix → C	T7 thru T0
		rC(")	= Add(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Xz(1-3)	= Xn(1-3)Ø0Ix		
		Xz(")	= Xn(")Ø0Ix+Ix	Adder input (X·Ix)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru T0
		sCz	= KzQ1T0		
		rCz	= KzQ1	Carry logic	T7 thru T1
	T4	Sc	= InrF1F2T4		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= JuF1F2T3		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C(10-23) → S	
	T0	rCz	= F1T0		
	Tr	Cxm	= JuTsmØ0(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= CxmTr		
		sCz	= O4O5O6ØØTr	Initiate C register increment	
		sHt	= CpKpK0Ø2Tr	Parity error	
		rIx	= (F1F3)(GOHt)Tr		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= O4Ia01ØØTp		
		sF2	= O2 "	Ø6 next clock (T8)	

Ø6	T8	End	= F1F2		
		sIa	= F1F3TjKrT8		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= TsF1F3Q1		
		sC(0-2)	= Add(1-3)TsCr3Ø6		
		rC(")	= Add(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		sCp	= TsCpHtO3Ø6Q1	Check parity	
		rCp	= TsCp "		
		sOf	= O3(O2O4O5O6)CØØ6T7	Set overflow if CO	
		Pr3	= F1GOQ2		
		sP(0-2)	= Add(1-3)O2O4O5O6Pr3	C + 1 → P	T7 thru T3
		rP(")	= Add(") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		Xz(1-3)	= Ix		
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzF1Q1	Carry logic	T7 thru T1
		rCz	= KzQ1		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= InrT4	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= IntEndGOT3		
		sS(1,2)	= Add(2,3)O2O4O5O6Sxp	C + 1 → S	
		sS(3-14)	= P(0-11)Sxp		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= CxmTr		Tr thru Tp
		sHt	= CpTrKpKOØ2	Parity error	
		rRc	= Tr		
	Tp	rA00	= EndGOTp		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1,2)	= EndSkTp	ØO next clock (T8)	
		Oc	= (")		
		rO(1,3,4,5,6)	= Oc		
		sO2	= Oc	NOP (20) → O	

62	SKB	Skip if B and M do not Compare Ones	Bi•(M)i=1; P + 1 → P	2 Cycles	
			Bi•(M)i=0; P + 2 → P	3 Cycles	
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= $\overline{Xn}$(1-3)ØO•Ix	Adder input if Ix (indexing)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+Ix		T7 thru TO
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C register	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1$\overline{TO}\overline{Ø7}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø$\overline{OTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}$K0$\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHt$\overline{Ts}\overline{Tp}$	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)0104	Ø6 next clock (T8)	
		sF2	= (")0301		

Ø6	T8	sIa	= T8F1F3(T⊕Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
		sSk	= (01030406Ø6)T8		
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Ix	Adder input (Ø)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		rSk	= B·C(21-23)02(Ø6010304060 5Q1)	Don't skip if B·(M)	T7 thru T0
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp	P13,14 contains P1,P2 at T3	
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTrKp⊕K0Ø2	Parity error	

```
     rIa              = TrF1
     rIx              = Tr(F1F3)(GOHt)
Tp   rA00             = TpEndGO
     rB00             = (  "  )
     sCp              = M24CxmHtTsTp          Initiate parity
     rF(1,2)          = TpEndSk               ØØ next if Sk
     sF3              = TpSk                  Ø7 next if Sk
     Oc               = TpEndSk
     s02              = Oc
     rO(1,3,4,5,6)    = Oc                    NOP (20) → O
```

Ø7	T8	sIa	= SkØ7T8IKr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (0102030 4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(0204050 6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (F12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0(0204050 6)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rSk	= Ø7T0		
		rCp	= TsT0HtK0(F103Ø4Ø6)Ø2		
	Tr	Cxm	= EndG0Tsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= TrF1		
		rIx	= Tr(F1F3)(G0Ht)		
	Tp	rA00	= TpEndG0		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity check	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

		SKN	Skip if M Negative	$M \geq 0$; P + 1 → P $M < 0$; P + 2 → P	2 Cycles 3 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{I}}$aGO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{A}}$nrAr3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{B}}$nrAr3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1}}\overline{\text{F2}}$($\overline{\text{T}}$sQ1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{J}}\overline{\text{u}}\overline{\text{T}}$sCr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input if Ix (indexing)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input C register	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{T}}$O$\overline{\text{Ø7}}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{C}}$p$\overline{\text{T}}$s$\overline{\text{H}}$tQ1$\overline{\text{F1}}\overline{\text{F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{I}}$nr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{J}}$u		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$TO		
	Tr	Cxm	= $\overline{\text{J}}$uØO$\overline{\text{T}}$sm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpT$\overline{\text{K}}$p$\overline{\text{K}}$OØ2	Parity error	
		rIx	= Tr($\overline{\text{F1}}$F3)($\overline{\text{G}}$OHt)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24CxmHt$\overline{\text{T}}$sTp	Initiate parity	
		sF1	= (Tp$\overline{\text{I}}$aØ0)O1$\overline{\text{O4}}$		
		sF2	= (")O3O1	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3IjKr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Ix	Adder input (Ø)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕KpK0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
    sSk             = 0103Ø4Ø6Ø5Ø6Tr(CØIx)          Sk if M < 0
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp                  Initiate parity
    rF(1,2)         = TpEndSk                       Ø0 next if Sk
    sF3             = TpSk                          Ø7 next if Sk
    Oc              = TpEndSk
    sO2             = Oc
    rO(1,3,4,5,6)   = Oc                            NOP (20) → 0
```

Ø7	T8	sIa	= SkØ7T8(I⊕Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P1P2P3P4)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0(O2O4O5O6)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rSk	= Ø7T0		
		rCp	= TsT0HtK0(F1O3Ø4Ø6)Ø2		
	Tr	Cxm	= EndG0Tsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= TrF1		
		rIx	= Tr(F1F3)(G0Ht)		
	Tp	rA00	= TpEndG0		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity check	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

54		SUB	Subtract	A - (M) → A	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØO•Ix	Adder input if Ix (indexing)	T7 thru T0
		Xz(")	= Xn(")ØOIx+Ix		
		Yz(1-3)	= C(21-23)Ø7	Adder input C register	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1T0Ø7	Carry for Adder	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)(04O5O6)	Set carry for two's complement	
		sHt	= CpTsKpKOØ2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rKO	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)0304		
		sF2	= (")0302	Ø6 next clock (T8)	

Ø6	T8	Anr	= 01$\overline{02}$0304Ø6		
		Ck	= (Ø601$\overline{02}$0304)$\overline{06}$T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")"		
		sIa	= T8F1F3$\overline{I}$1$\overline{Kr}$	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (0102$\overline{03}$04)Q1		
		sA(0-2)	= Add(1-3)(01$\overline{02}$0304Ø6)Ar3		
		rA(")	= $\overline{Add}$(")(") "	A + $\overline{C}$ + 1 → A =	T7 thru T0
		sA(3-23)	= A(0-20)Ar3	A - (M) → A	
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	A + $\overline{C}$ + 1 → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		$\overline{Xz}$(1-3)	= A(21-23)Ø6$\overline{02}$04	Adder input (A)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{A}$(") "		
		$\overline{Yz}$(1-3)	= C(21-23)$\overline{Ø7}$	Adder input ($\overline{C}$)	T7 thru
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1F1$\overline{Ø7}$	Carry logic	T7 thru T0
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1Ø603	Check parity of $\overline{C}$	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02}$$\overline{04}$$\overline{05}$$\overline{06}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12}$$\overline{P13}$$\overline{P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02}$$\overline{04}$$\overline{05}$$\overline{06}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		

T0	sOf	= (Ø6Ø1Ø2Ø3Ø4)T0Ofe	
	Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Overflow logic
Tr	Cxm	= EndGOTsm(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTrKpK0Ø2	Parity error
	rIa	= TrF1	
	rIx	= Tr(F1F3)(GOHt)	
	X1d	= Cz(Ø1Ø2Ø3Ø4Ø6)Tr	
	X1d	= Cz(") "	Save carry
Tp	rA00	= TpEndGO	
	rB00	= (")	
	sCp	= M24CxmHtTsTp	Initiate parity
	rF(1,2)	= TpEndSk	Ø0 next clock (T8)
	Oc	= (")	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → O

55		ADD	Add	A + (M) → A	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input if Ix (indexing)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C register	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{TO}\overline{Ø7}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø$\overline{OTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}$$\overline{K0}\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHt$\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O3O4		
		sF2	= (")O3$\overline{O2}$	Ø6 next clock (T8)	

Ø6	T8	Anr	= 01Ø2Ø3Ø4Ø6		
		sIa	= T8F1F3(I⊕Kr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01Ø2Ø3Ø4)Q1		
		sA(0-2)	= Add(1-3)(01Ø2Ø3Ø4Ø6)Ar3		
		rA(")	= Add(") "	A + C → A =	T7 thru T0
		sA(3-23)	= A(0-20)Ar3	A + (M) → A	
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= A(21-23)Ø6Ø2Ø4	Adder input (A)	T7 thru T0
		Xz(")	= A(") "		
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6Ø3	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(Ø2Ø4Ø5Ø6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0(Ø2Ø4Ø5Ø6)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	sOf	= (Ø6Ø1Ø2Ø3Ø4)T00fe		
		Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Overflow logic	
	Tr	Cxm	= EndG0Tsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr(Kp⊕K0Ø2	Parity error	

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    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
    Xld             = Cz(01020304Ø6)Tr
    Xld             = Cz(     "    ) "          Save carry
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp              Initiate parity
    rF(1,2)         = TpEndSk                   Ø0 next clock (T8)
    Oc              = (  "  )
    sO2             = Oc
    rO(1,3,4,5,6)   = Oc                        NOP (20) → O
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⁻6		Suc	Subtract With Carry	A - (M) + Carry → A	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)Ø0•Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")Ø0Ix+Ix		T7 thru TO
		Yz(1-3)	= C(21-23)Ø7	Adder input C register	T7 thru TO
		Yz(")	= C(") "		
		sCz	= KzQ1TOØ7	Carry for Adder	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)0405Xw1	Set carry if Xw1	
		sHt	= CpTrKpK0Ø2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rK0	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)0304		
		sF2	= (")0302	Ø6 next clock (T8)	

Ø6	T8	Anr	= 01$\overline{02}$030406		
		Ck	= (")$\overline{06}$T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")"		
		sIa	= T8F1$\overline{F3}$I$\overline{Kr}$	Inititate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (0102$\overline{03}$04)Q1		
		sA(0-2)	= Add(1-3)(0102030406)Ar3		
		rA(")	= $\overline{Add}$(")(") "	A + $\overline{C}$ + Carry → A =	
		sA(3-23)	= A(0-20)Ar3	A - (M) + Carry → A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	A + $\overline{C}$ + Carry → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= A(21-23)Ø6$\overline{02}$04		
		$\overline{Xz}$(")	= $\overline{A}$(") "	Adder input (A)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(")"	Adder input ($\overline{C}$)	T7 thru
		sCz	= K2Q1F1$\overline{Ø7}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1Ø603		
		rCp	= (")Cp "	Check parity of $\overline{C}$	T7 thru T0
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02040506}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
		rOf	= (Ø601$\overline{02}$0304)05Q2	Reset Overflow	T7 thru T3
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02040506}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		

T0	sOf	= (Ø601Ō20304)T00fe	
	Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Overflow logic
Tr	Cxm	= EndGOTsm(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTrKpK0Ø2	Parity error
	rIa	= TrF1	
	rIx	= Tr(F1F3)(GOHt)	
	X1d	= Cz(01Ō20304Ø6)Tr	
	X1d	= Cz(") "	Save carry
Tp	rA00	= TpEndGO	
	rB00	= (")	
	sCp	= M24CxmHtTsTp	Initiate parity
	rF(1,2)	= TpEndSk	Ø0 next clock (T8)
	Oc	= (")	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → O

57		ADC	Add With Carry	A + (M) + Carry → A	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØØ•Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")ØØIx+Ix		T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input C register	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1T0Ø7	Carry for Adder	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= F1T0		
	Tr	Cxm	= JuØØTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)O4O5Xw1	Set carry if Xw1	
		sHt	= CpTrKpK0Ø2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rK0	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)O3O4		
		sF2	= (")O3O2	Ø6 next clock (T8)	

Ø6	T8	Anr	= 01$\overline{02}$0304Ø6		
		sIa	= T8F1$\overline{F3}$(I⊕jKr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= ($\overline{01\,02\,03\,04}$)Q1		
		sA(0-2)	= Add(1-3)(01$\overline{02}$0304Ø6)Ar3		
		rA(")	= $\overline{\text{Add}}$(")(") "	A + C → A =	
		sA(3-23)	= A(0-20)Ar3	A + (M) + Carry → A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= A(21-23)Ø6$\overline{02}$04		
		$\overline{\text{Xz}}$(")	= $\overline{\text{A}}$(") "	Adder input (A)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$		
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "	Adder input (C)	T7 thru T0
		sCz	= KzQ1F1$\overline{\text{Ø7}}$		
		rCz	= $\overline{\text{Kz}}$Q1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1Ø603		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02\,04\,05\,06}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
		rOf	= (Ø60102$\overline{03}$04)05Q2	Reset Overflow	
	T4	Sc	= T4End$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02\,04\,05\,06}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{\text{P}}$(") "		
	T0	sOf	= (Ø60102$\overline{03}$04)T00fe		
		Ofe	= $\overline{\text{Add}}$1Xz1Yz1+Add1$\overline{\text{Xz}}$1$\overline{\text{Yz}}$1	Overflow logic	
	Tr	Cxm	= EndG0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTrKpK0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
    X1d             = Cz(01Ø2Ø3Ø4Ø6)Tr
    X1d             = Cz(     "    )"          Save carry
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp             Initiate parity
    rF(1,2)         = TpEndSk                  Ø0 next clock (T8)
    Oc              = (  "  )
    s02             = Oc
    r0(1,3,4,5,6)   = Oc                       NOP (20) → 0
```

60		SKR	Reduce Memory and Skip if Negative	(M) - 1 → (M) (M) ⩾ 0; P + 1 → P (M) < 0; P + 2 → P	3 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru TO
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{TO}\overline{Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}$$\overline{KO}\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rKO	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O1$\overline{O4}$	Ø4 next clock (T8)	

61		MIN	Memory Increment	(M) + 1 → (M)	3 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØØ$\overline{\text{Ju}}\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØØ·Ix	Adder input (XIx)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØØIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "		
		sCz	= KzQ1$\overline{\text{TØ}}\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1}}\overline{\text{F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1}}\overline{\text{F2}}\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$TO		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø$\overline{\text{Ø}}\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)$\overline{\text{O4O5}}$O6	Initiate increment C	
		sHt	= CpTr$\overline{\text{Kp}}\overline{\text{KO}}\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)O1$\overline{\text{O4}}$	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3I⊕jKr	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø401		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø401O5TsCr3		
		rC(")	= Add(") "		
		sC(3-23)	= C(0-20)Cr3	C + 1 → M	T7 thru T0
		rC(")	= C(") "		
		Xz(1-3)	= Ø4O5O6Ix	Adder input (Ø's)	
		Yz(1-3)	= C(21-23)Ø7		T7 thru T0
		Yz(")	= C(") "	Adder input (C)	
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T0
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	sOf	= OfeT0Ø401O5Ts		
		Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Overflow logic	
	Tr	sHt	= CpTrKpK0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrG0F2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (01020304)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)$\overline{IaF1GO}$($\overline{02040506}$)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4End$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$EndGO	
		sS(1,2)	= P(13,14)$\overline{IaF1GO}$($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction) Tr thru Tp
		sC(0-23)	= M(0-23)Cxm	
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next
		Oc	= TpEnd$\overline{Sk}$	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

62 XMA Exchange A and Memory A ⟷ (M) 3 Cycles

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TC
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TC
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TC
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØØ·Ix		
		Xz(")	= Xn(")ØØIx+Ix	Adder input (XIx)	T7 thru TC
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(")"	Adder input (C)	T7 thru TC
		sCz	= KzQ1TØØ7		
		rCz	= KzQ1	Carry logic	T7 thru T1
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2		
		rCp	= (")Cp "	Check parity	T7 thru TC
	T4	Sc	= T4F1F2Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr⊕Kp⊕KOØ2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rKO	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØO)O1O4	Ø4 next clock (T8)	

Ø4	T8	Anr	= Ø4Ø1Ø5$\overline{Ø6}$		
		rC24	= T8(Ts$\overline{Tsr}$)	Initialize parity generation	
		sIa	= F1$\overline{F3}$(I⊕Kr)	Initialize P register increment	
		Mxc	= Ø4$\overline{Tsm}$		T8 thru Tp
	T7	Ar3	= (Ø1Ø2$\overline{Ø3}$Ø4)Q1		
		sA(0-2)	= C(21-23)Ø4Ø1Ø5$\overline{Ø6}$Ar3		
		rA(")	= $\overline{C}$(") "		
		sA(3-23)	= A(0-20)Ar3	C → A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1Ø4Ø1		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= A(21-23)Ø4Ø1Ø5$\overline{Ø6}$		
		rC(")	= $\overline{A}$(") "	A → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{Ø2Ø4Ø5Ø6}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)$\overline{C24}$($\overline{Ts}$$\overline{Tsr}$)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	Tr	sHt	= CpTr(Kp$\overline{K0}$Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrG0$\overline{F2}$		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= $\overline{C}$(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (01020304)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)IaF1GO(02040506)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4EndInr	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3IntEndGO	
		sS(1,2)	= P(13,14)IaF1GO(02040506)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGOTsm(Tr+Tp)	M → C (Fetch next instruction)
		sC(0-23)	= M(0-23)Cxm	Tr thru Tp
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24CxmHtTsTp	Initiate parity
		rF(1-3)	= TpEndSk	Ø0 next
		Oc	= TpEndSk	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

63		ADM	Add A to (M) and Store in (M)	A + (M) → (M)	3 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4Oxc}$		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø$\overline{Ju}$$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	T7 thru T0
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{T0}$$\overline{Ø7}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1$\overline{F1F2}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1F2}$$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1F2}$$\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= $\overline{F1}$T0		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}$$\overline{K0}$$\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O1$\overline{O4}$	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3I1Kr	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (0102O304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø401	Parity check	T7 thru T0
		rCp	= (")Cp "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø401O6TsCr3		
		rC(")	= Add(") "		
		sC(3-23)	= C(0-20)Cr3	A + M → M	T7 thru T0
		rC(")	= C(") "		
		Xz(1-3)	= A(21-23)Ø405	Adder input (A)	T7 thru T0
		Xz(")	= A(") "		
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(")"		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	sOf	= OfeT0Ø405	Overflow logic	
		Ofe	= Add1Xz1Yz1+Add1Xz1Yz1		
	Tr	sHt	= CpTrKp⊕K0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrGOF2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (0102$\overline{03}$04)Q1	
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3	
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{\text{A}}$(") "	
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3	
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{\text{B}}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)$\overline{\text{Ia}}$F1GO($\overline{02040506}$)Pr3	
		rP(")	= $\overline{\text{P}}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{\text{P}}$(") "	
	T4	Sc	= T4End$\overline{\text{Inr}}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{\text{Int}}$EndGO	
		sS(1,2)	= P(13,14)$\overline{\text{Ia}}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{\text{P}}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{\text{P}}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)	M → C (Fetch next instruction)
		sC(0-23)	= M(0-23)Cxm	Tr thru Tp
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{\text{F1}}$F3)($\overline{\text{GOHt}}$)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$	Ø0 next
		Oc	= TpEnd$\overline{\text{Sk}}$	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

64		MUL	Multiply	A•(M) → A	4 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{I}}$aGO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2$\overline{\text{O}}$3$\overline{\text{O}}$4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		Bnr	= (Ø$\overline{\text{O}}$3Ø4$\overline{\text{O}}$5$\overline{\text{O}}$6)		
		rB(")	= (")	0 → B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$(TsQ1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{\text{Ju}}$$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0•Ix	Adder input (X•Ix)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")Ø0Ix+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TO}}$$\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{KzQ1}}$		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2}}$$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2}}$$\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$$\overline{\text{TO}}$		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø$\overline{\text{O}}$$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{\text{Kp}}$$\overline{\text{KO}}$Ø$\overline{\text{2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		sF2	= (Tp$\overline{\text{Ia}}$Ø0)O4$\overline{\text{O}}$5$\overline{\text{O}}$6	Ø3 next clock (T8)	
		sF3	= (")$\overline{\text{O}}$3O4		
		sKO	= (")$\overline{\text{O}}$3O4$\overline{\text{O}}$6	Hold Computer in "1 bit per clock" mode	

```
Ø3  T8  Ar1          = F2F3Ø5Ø6K0
        sA0          = B23Ø5Ar1
        rA0          = B23   "
        sA(1,2)      = A(0,1)Ø5Ar1          Shift A right 1 bit - bring in first
        rA( " )      = A( " )  "            product bit (always 0)
        sA(3-22)     = A(2-21)Ar1
        rA( "  )     = A( "  ) "
        sA23         = A22Ø6Ar1
        rA23         = A22   "
        Br1          = (F2F3Ø5Ø6K0)A23      Shift B right if A23
        Rsa          = (    "     )A23      Shift B right and add C if A23
        sB00         = RsaC0                BØØ = CØ after the first Rsa
```

Rsa causes the B register to shift right 1 bit and then be added in parrallel octates with the C register, the results occuring in B. One bit (B23) is shifted into A and represents one product bit.

Br1 causes the B register to shift right 1 bit. B23 is shifted into A and represents one product bit.

```
    T7  (refer Ø3 T8) generates B(22) from A(22)
    T6  (     "     )     "     B(21)   "  A(21)
    T5  (     "     )     "     B(20)   "  A(20)
    T4  (     "     )     "     B(19)   "  A(19)
    T3  (     "     )     "     B(18)   "  A(18)
    T2  (     "     )     "     B(17)   "  A(17)
    T1  (     "     )     "     B(16)   "  A(16)
    T0  (     "     )     "     B(15)   "  A(15)
    Tr  (     "     )     "     B(14)   "  A(14)
    Tp  (     "     )     "     B(13)   "  A(13)
        sSk          = Ø3Ø5Ø6Tp
Ø3  T8  (refer Ø3 T8) generates B(12) from A(12)
    T7  (     "     )     "     B(11)   "  A(11)
    T6  (     "     )     "     B(10)   "  A(10)
    T5  (     "     )     "     B(9)    "  A(9)
    T4  (     "     )     "     B(8)    "  A(8)
    T3  (     "     )     "     B(7)    "  A(7)
    T2  (     "     )     "     B(6)    "  A(6)
    T1  (     "     )     "     B(5)    "  A(5)
    T0  (     "     )     "     B(4)    "  A(4)
    Tr  (     "     )     "     B(3)    "  A(3)
    Tp  (     "     )     "     B(2)    "  A(2)
        sF1          = TpSk                 Ø7 next clock
```

```
Ø7  T8  (refer Ø3 T8) generates B(1) from A(1)
        Anr             = Ø7Ø3Ø4Ø5Ø6
        Bnr             =      "
        Ck              = Ø7T8Ts
        sC(0-23)        = C(0-23)Ck                          Invert C
        rC( " )         = C( " ) "
        End             = F1F2                               Last cycle
        sIa             = T8Ø7SkIjKr                         Initiate P register increment
    T7  (refer Ø3 T8) generates B(0) from A(0)
        sBc23           = RsaØ7Q1                            Rsa means A0 = 1; C + 1 = -C
        Cr3             = Ø7Ø5TsQ1
        rC(0-2)         =      "
        sC(3-23)        = C(0-20)Cr3                         0 → C                    T7 thru T0
        rC( " )         = C( " ) "
        sCp             = (C21⊕C22⊕C23)Cp(Ø7Ø3Ø4Ø5Ø6)TsHtQ1
        rCp             = (     "     )Cp(     "     ) "   Check parity            T7 thru T0
        rK0             = Ø7Q1Ø601                           Release-Computer from 1 bit/clock mod
        Pr3             = (F1G0)Q2
        sP0             = (P12⊕P13P14Ia)F1G0(Ø2Ø4Ø5Ø6)Pr3
        rP0             = (      "      )      "
        sP1             = (P13⊕P14Ia)          "
        rP1             = (      "     )       "
        sP2             = (P14⊕Ia)             "         P + 1 → P                T7 thru T3
        rP2             = (     "     )        "
        sP(3-14)        = P(0-11)Pr3
        rP( " )         = P( " ) "
        rIa             = (P12P13P14)Q2F1
    T6  Ar3             = (Ø7Ø3Ø4Ø5Ø6)K0Tp
        sA(0-2)         = Add(1-3)(Ø7Ø3Ø4Ø5Ø6)Ar3
        rA( " )         = Add( " )(     "     ) "          B+Bc → A (add Bc's to B) T6 thru Tr
        sA(3-23)        = A(0-20)Ar3
        rA( " )         = A( " ) "
        Xz(1-3)         = B(21-23)Ø7Ø5Ø6
        Xz( " )         = B( " )  "                          Adder input (B)          T6 thru Tr
        Yz1             = Ø7Rf
        Yz2             = Ø7K0
        Yz3             = Ø7Bc23                             Adder input (Bc)         T6 thru Tr
        Yz3             = Ø7Bc23
        rB00            = Ar3G0
        sB(0-2)         = A(21-23)Ø7Ø3Ø4Ø5Ø6
        rB( " )         = A( " )     "
        sB(3-23)        = A(0-20)Ar3                         A → B                    T6 thru Tr
        rB( " )         = A( " ) "
    T4  Sc              = T4EndInr
        rS(1-14)        = Sc                                 Clear S
    T3  Sxp             = T3IntEndG0
        sS(1,2)         = P(13,14)IaF1G0(Ø2Ø4Ø5Ø6)Sxp
        rS( " )         = P( " )  " (     "   ) "           P(13,14) contains P(1,2) at T3
        sS(3-14)        = P(0-11)Sxp                         P → S
        rS( " )         = P( " ) "
```

T0	rSk	= Ø7T0	
Tr	Cxm	= EndGOTsm(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTrKpK0Ø2	Parity error
	rIa	= F1Tr	
	rIx	= Tr(F1F3)(GOHt)	
Tp	rA00	= TpEndGO	
	rB00	= TpEndGO	
	sCp	= M24CxmHtTsTp	Initiate parity
	rF(1-3)	= TpEndδk	Ø0 next
	sOf	= (Ø7O3O4O5O6)TpA0A00	-1 times -1
	Oc	= TpEndδk	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → 0

65		DIV	Divide	A,B/(M) → A,B	10 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{IaGO}}$)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= $\overline{\text{F1F2O5}}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sA00	= A0ØØT7	Set A00 = Sign of A	
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{\text{Ju}}\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C(Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix		
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")Ø0Ix+$\overline{\text{Ix}}$	Adder input (XIx)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$		
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "	Adder input (C)	T7 thru T0
		sCz	= KzQ1$\overline{\text{T0}}\overline{\text{Ø7}}$		
		rCz	= $\overline{\text{Kz}}$Q1	Carry logic	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}\overline{\text{Ts}}\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$		
		rCp	= (")Cp "	Check parity	T7 thru T0
	T4	Sc	= T4$\overline{\text{F1F2Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{\text{F1F2Ju}}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	T0	rCz	= $\overline{\text{F1T0}}$		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr(Kp⊕$\overline{\text{K0}}$)$\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rK0	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}\overline{\text{Ts}}$Tp	Initiate parity	
		sF3	= (Tp$\overline{\text{Ia}}$Ø0)$\overline{\text{O3}}$O4	Ø1 next clock (T8)	

Ø1	T8	Anr	= Ø1$\overline{O5}$		
		Bnr	= Ø1$\overline{O5}$		
		Ck	= Ø1T8$\overline{C0}\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C if C $\geqslant$ 0	
		rC(")	= C(") "		
		sCz	= Ø1T8$\overline{C0}$		
		sHz	= T8	Initiate - B if A -	
		sIx	= Ø1T8C0	Set Ix = Sign of (M)	
	T7	Ar3	= $\overline{F1F2O5}$Q1		
		sA(0-2)	= (Ha(1-3)A00+B(21-23)$\overline{A00}$)Ø1$\overline{O5}$Ar3		
		rA(")	= ($\overline{Ha}$(") " +$\overline{B}$(") ") "	$B \rightarrow A$ if $A \geqslant 0$ $\overline{B} + 1 \rightarrow A < 0$	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		Hx(1-3)	= $\overline{B}$(21-23)Ø1	Half Adder inputs ($\overline{B}$+1)	T7 thru T0
		$\overline{Hx}$(")	= B(") "	(B23 is turned off unconditionally)	
		sB(0-2)	= Add(1-3)Ø1$\overline{O5}$Ar3		
		rB(")	= $\overline{Add}$(") "		
		sB(3-23)	= $\overline{B}$(0-20)Ar3	$\|A\| - \|C\| \rightarrow B$	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Xz(1-3)	= (A(21-23)$\overline{A00}$+$\overline{A}$(21-23)A00)Ø1		
		$\overline{Xz}$(")	= ($\overline{A}$(") " +A(") ") "	Adder input ($\|A\|$)	T7 thru T0
		Yz(1-3)	= $\overline{C}$(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input ($\|C\|$)	
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= C(21-23)$\overline{F1F2F3Ts}$Cr3		
		rC(")	= $\overline{C}$(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21$\oplus$C22$\oplus$C23)$\overline{CpTsHtQ1F1F2}$		
		rCp	= (")$\overline{Cp}$ "	Check parity	T7 thru T0
	T6	sRf	= Ø1($\overline{Q3Q6}$)($\overline{B0B1B2A0A1A2Bc23}$)	$\overline{Rf}$ means $\|A,B\| - \|C\| \geqslant 0$	T6 thru Tp
	T4	Sc	= T4$\overline{F1F2}$Inr	when A > 0 Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1F2Ju}$		
		sS(1,2)	= Add(2,3)Sxc		
		rS(")	= $\overline{Add}$(") "	Junk input to C	
		sS(3-14)	= C(0-11)Sxc		
		rS(")	= $\overline{C}$(") "		
	Tr	sBc23	= Ø1TrHzA00	Set Bc23 if B = 0 and A < 0	
		sHt	= CpTr$\overline{Kp}$K0Ø2	Parity error	
	Tp	sF2	= Ø1Tp	Ø3 next	
		Sc	= Ø1Tp		
		rS(1-14)	= Sc	Clear S	

Ø3	T8	sS2	= $\overline{S1}\,\overline{S2}\,\overline{Sk}$(Ø3Ø5Ø6)	Set S(1,2)=1 (Counts:0,1,2,0,1...etc)
	T7	AL2	= (Ø3Ø5Ø6)S2	Cycle A,B left 2 bits
		sB00	= (B1⊕B2Bc2)AL2	
		rB00	= $\overline{(B1 \oplus B2Bc2)}$AL2	
		Ck	= (Ø3Ø5Ø6)S2$\overline{Ts}$(C0⊕B0⊕Bzo)	
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C if sign of last result =
		rC(")	= C(")"	sign of C
		sOf*	= (Ø3Ø5Ø6)T7($\overline{S9}\,\overline{S10}\,\overline{S11}\,\overline{S12}$)(($\overline{Bzo \oplus B0}$)(Rf$\overline{B0}$+($\overline{A00 \oplus Ix}$))+Bzo$\overline{B0}$)	
		sS1	= (Ø3Ø5Ø6)S2	
		rS2	= (")"	Set S(1,2) = 2
	T6	Ar1	= (Ø3Ø5Ø6)S1	Cycle A(Ø-21) right 1 bit - cycle B23 → A0
		sA23	= C0Ø5Ø6Ar1	Generate 1st quotiant bit (A0)
		rA23	= $\overline{C0}$ "	
		Rsa	= (Ø3Ø5Ø6)$\overline{Sk}$S1	B(00-22)+C(0-23) → B(0-23)
		sBc23	= (C0⊕Ix)Rsa06	If C is inverted at T7: $\overline{C}$+1(sBc23)
		rBc23	= $\overline{(C0 \oplus Ix)}$ "	if C ≠ C original; $\overline{C}$(rBc23) if C = C original.
		rS1	= (Ø3Ø5Ø6)S1	Set S(1,2) = 0
	T5	(refer Ø3T8)		S(1,2) = 1
	T4	(" "T7)		" 2
	T3	(" "T6)	generates A1	" 0
	T2	(" "T8)		" 1
	T1	(" "T7)		" 2
	T0	(" "T6)	generates A2	" 0
		rCp	= T0$\overline{Ht}\,\overline{K0}\,\overline{Ts}$(F2Ø7Ø4Ø6)$\overline{Ø2}$	
	Tr	(refer Ø3T8)		S(1,2) = 1
	Tp	(" "T7)	generates A3	" 2
		rRf	= Tp$\overline{Ø1}$($\overline{G0}$Ht)	
		Sd2	= (Ø3Ø5Ø6)Tp$\overline{Sk}$	
		sS11	= Sd2$\overline{S11}\,\overline{S12}\,\overline{S13}$	
		sS12	= Sd2$\overline{S12}\,\overline{S13}$	Set S(11,12,13)=7 (Counts 7,6,5,4...
		sS13	= Sd2$\overline{S13}$	etc)

*The overflow logic is as follows:

($\overline{Bzo \oplus B0}$) = positive result (|A,B| ≥ |M|)

$\overline{Rf}$ = all zero's result (|A,B| = |M|)

($\overline{Bzo \oplus B0}$)(Rf$\overline{B0}$) = all one's with Bc23 set (|A,B| = |M|; signs different)

($\overline{Bzo \oplus B0}$)($\overline{A00 \oplus Ix}$) = positive result (|A,B| > |M|)

Bzo$\overline{B0}$ = minus one inverted in B with Bc23 on

Ø3	T8	(refer Ø3 T6 $\overline{S1}\overline{S12}\overline{S13}$)	generates	A3		S(1,2) = 0
	T7	(" " T8 ")				" 1
	T6	(" " T7 ")				" 2
	T5	(" " T6 ")	"	A4		" 0
	T4	(" " T8 ")				" 1
	T3	(" " T7 ")				" 2
	T2	(" " T6 ")	"	A5		" 0
	T1	(" " T8 ")				" 1
	T0	(" " T7 ")				" 2
	Tr	(" " T6 ")	"	A6		" 0
	Tp	(" " T8 ")				" 1
	rS13	= Sd2S13				Set S(11,12,13) = 6
Ø3	T8	(refer Ø3 T7 $\overline{S1}\overline{S12}\overline{S13}$)				S(1,2) = 2
	T7	(" " T6 ")	"	A7		" 0
	T6	(" " T8 ")				" 1
	T5	(" " T7 ")				" 2
	T4	(" " T6 ")	"	A8		" 0
	T3	(" " T8 ")				" 1
	T2	(" " T7 ")				" 2
	T1	(" " T6 ")	"	A9		" 0
	T0	(" " T8 ")				" 1
	Tr	(" " T7 ")				" 2
	Tp	(" " T6 ")	"	A10		" 0
	rS12	= Sd2S12$\overline{S13}$				
	sS13	= Sd2$\overline{S13}$				Set S(11,12,13) = 5
Ø3	T8	(refer Ø3 T8 $\overline{S1}\overline{S12}\overline{S13}$)				S(1,2) = 1
	T7	(" " T7 ")				" 2
	T6	(" " T6 ")	"	A11		" 0
	T5	(" " T8 ")				" 1
	T4	(" " T7 ")				" 2
	T3	(" " T6 ")	"	A12		" 0
	T2	(" " T8 ")				" 1
	T1	(" " T7 ")				" 2
	T0	(" " T6 ")	"	A13		" 0
	Tr	(" " T8 ")				" 1
	Tp	(" " T7 ")				" 2
	rS13	= Sd2S13				Set S(11,12,13) = 4

Ø3	T8	(refer Ø3 T6 $\overline{S11}\overline{S12}\overline{S13}$) generates A14	S(1,2) = 0
	T7	(" " T8 ")	" 1
	T6	(" " T7 ")	" 2
	T5	(" " T6 ") " A15	" 0
	T4	(" " T8 ")	" 1
	T3	(" " T7 ")	" 2
	T2	(" " T6 ") " A16	" 0
	T1	(" " T8 ")	" 1
	T0	(" " T7 ")	" 2
	Tr	(" " T6 ") " A17	" 0
	Tp	(" " T8 ")	" 1
		rS11 = Sd2S11$\overline{S12}\overline{S13}$	
		sS12 = Sd2$\overline{S12}\overline{S13}$	Set S(11,12,13) = 3
		sS13 = Sd2$\overline{S13}$	
Ø3	T8	(refer Ø3 T7 $\overline{S11}\overline{S12}\overline{S13}$)	S(1,2) = 2
	T7	(" " T6 ") " A18	" 0
	T6	(" " T8 ")	" 1
	T5	(" " T7 ")	" 2
	T4	(" " T6 ") " A19	" 0
	T3	(" " T8 ")	" 1
	T2	(" " T7 ")	" 2
	T1	(" " T6 ") " A20	" 0
	T0	(" " T8 ")	" 1
	Tr	(" " T7 ")	" 2
	Tp	(" " T6 ") " A21	" 0
		rS13 = Sd2S13	Set S(11,12,13) = 2
Ø3	T8	(refer Ø3 T8 $\overline{S11}\overline{S12}\overline{S13}$)	S(1,2) = 1
	T7	(" " T7 ")	" 2
	T6	(" " T6 ") " A22	" 0
	T5	(" " T8 ")	" 1
		sSk = (Ø3$\overline{O}$506)T5$\overline{S11}$S12$\overline{S13}$	
	T4	(refer Ø3 T7 $\overline{S11}\overline{S12}\overline{S13}$)	" 2
		sK0 = (Ø3$\overline{O}$506)S2Sk(B0⊕B1B2Bc2)	Save B0 (B0 would be last by AL2)
	T3	Ar1 = (Ø3$\overline{O}$506)S1	Cycle A(0-21) right 1 bit - cycle B23 → A0
		sA23 = C0$\overline{O}$506Ar1	Generate last quotiant bit (A23)
		rA23 = $\overline{C0}$ "	
		Br1 = (Ø3$\overline{O}$506)S1Sk	Shift B(00-23) right 1 bit
		sB00 = K0Br106	Set B00 = B0 (refer sK0 Ø3 T4)
		rB00 = $\overline{K0}$ "	
		rK0 = Ø306Q6	
	Tr	sCz = A00(Ø30506)Tr	Initiate - A if original sign of A is minus
	Tp	Rsa = (Ø3$\overline{O}$506)SkTp$\overline{C0}$	Force remainder to lie between 0 and + 1
		Br1 = (Ø3$\overline{O}$506)SkTpC0	
		sF1 = TpSk	Ø7 next clock

```
Ø7  T8  Anr          = (Ø7Ø3Ø4Ø5Ø6)(A00⊕Ix)
        Bnr          = (     "    )
        rC24         = T8(TsIsr)
        Ck           = Ø7T8Ts
        sHz          = T8
        End          = F1F2                              Last cycle
        sIa          = T8Ø7Sk(Ij)(Kr)                    Initiate P register increment
        sK0          = (Ø7T8Bc23A00)                     K0 is used to negate the Bcs
        sRf          = (     "    )                      Rf combines the - Bcs with B
    T7  Ar3          = Ø7Ø6Q1
        sA(0-2)      = A(21-23)Anr+Ha(1-3)Anr(A00⊕Ix)
        rA( " )      = A( " ) " +Ha( " )Anr( " )         A → A if sign A = sign M   T7 thru T0
        sA(3-23)     = A(0-20)Ar3                        Ā+1→ A if sign A ≠ sign M
        rA( " )      = Ā( " ) "
        Hx(1-3)      = Ā(21-23)F1Ø3
        Hx( " )      = A( " ) "                          Half adder input (Ā)
        sB(0-2)      = Add(1-3)Ø7Ø3Ø4Ø5Ø6Ar3
        rB( " )      = Add( " )    "                     B → B if sign of B = A00   T7 thru T0
        sB(3-23)     = B(0-20)Ar3                        -B → B if sign of B ≠ A00
        rB( " )      = B̄( " ) "
        Xz(1-3)      = (B(21-23)A00+B̄(21-23)A00)Ø7Ø5Ø6    Adder input (B) if A00 = +
        Xz( " )      = (B̄( " )A00+B( " )A00)  "          Adder input (B̄) if A00 = -
        Yz(1-3)      = RfØ7
        Yz( " )      = RfØ7                              Negate the Bc's
        sK0          = (Ø7Ø6Q1A00Bc20)
        sRf          = (     "    )                      Form 2's complement of the Bc's
        Cr3          = Ø7Ø5(TsQ1)                                          T7 thru T0
        sC(3-23)     = C(0-20)Cr3
        rC( " )      = C̄( " ) "
        Pr3          = (F1GO)Q2
        sP0          = ((F1GO)(Ø2Ø4Ø5Ø6))(P12⊕(P13P14Ia))Pr3
        rP0          = (     "    )(     "    ) "
        sP1          = (     "    )(P13⊕(P14Ia))Pr3
        rP1          = (     "    )(     "    ) " P + 1 → P                 T7 thru T3
        sP2          = (     "    )(P14⊕Ia)Pr3
        rP2          = (     "    )(     "    ) "
        rIa          = (P12P13P14)Q2F1
        sP(3-14)     = P(0-11)Pr3
        rP( " )      = P̄( " ) "
    T4  Sc           = T4EndInr
        rS(1-14)     = Sc                                Clear S
    T3  Sxp          = T3IntEndGO
        sS1          = (F1GO(Ø2Ø4Ø5Ø6))(P13⊕(P14Ia))Sxp
        sS2          = (     "    )(P14⊕Ia)Sxp           P → S
        sS(3-14)     = P(0-11)Sxp
    T0  rSk          = Ø7T0                              Reset skip
    Tr  Cxm          = EndGOTsm(Tr+Tp)
        sC(0-23)     = M(0-23)Cxm                        M → C                     Tr thru Tp
        rC( " )      = CxmTr
        rIa          = TrF1
        rIx          = Tr(F1F3)(GOHt)
        rK0          = Ø7Tr
        rRc          = Tr
```

Tp	rA00	= EndGOTp	
	sCp	= M24CxmHtTsTp	Initiate parity
	rF(1-3)	= TpEndSk	Ø0 next clock (T8)
	rRf	= TpØ1(GOHt)	
	rJu	= Tp	
	Oc	= TpEndSk	
	rO(1,3,4,5,6)	= Oc	
	sO2	= Oc	NOP → O

66 RSH 000XX — Right Shift A,B — A,B right XX bits extend Sign of A — $2+\frac{XX-3}{10}$ Cycles

Ø0	T8	rCz	= (ØØT8)		
		sIx	= (")C1GO		
		Oxc	= (")$\overline{Ia}$GO$\overline{C2}$	Initiate indexing	
		sO(1-6)	= $\overline{C}$(3-8)Oxc	C(3-8) → 0 if not Indirect Addressing	
		rO(")	= $\overline{C}$(") "		
	T7	sA00	= AØØT7	Save sign of A	
		Cr3	= $\overline{F1}\overline{F2}\overline{Ts}$Q1		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3	C(15-23)+X(15-23)Ix→ C	T7 thru T5
		rC(")	= $\overline{Add}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0Ix		
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$	Adder input (X) if indexing	
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input C	
		sCz	= Kz$\overline{Q1}\overline{T0}\overline{Ø7}$		
		rCz	= $\overline{Kz}$Q1	Adder carry logic	
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Try for parity check	T7 thru T2
	T5	sF3	= Ø0$\overline{Ia}$Q4$\overline{03}$04Ø5	Ø1 next clock (T4)	
Ø1	T4	sC(0-2)	= C(21-23)$\overline{F1}\overline{F2}$F3$\overline{Ts}$	C recirculate. Indexing	
		rC(")	= $\overline{C}$(") "	is terminated.	T4 thru T2
		Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C(10-23)+X(15-23)Ix→S	
		sS(3-14)	= C(0-11)Sxc	put shift count into S	
	T2	sF2	= Ø1Ø5$\overline{Q2}$	Ø3 next clock (T1)	
		rS(1-8)	= Ø1Ø5T2	Clear S(1-8)	
		Sx48	= ($\overline{S6}\overline{S7}\overline{S8}$+S9S10)Ø1Ø5T2		
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift	
		rS(11-14)	= Sx48	count ≥ 48.	
		sSk	= (Ø1Ø5T2)($\overline{S6}\overline{S7}\overline{S8}\overline{S9}\overline{S10}\overline{S11}\overline{S12}\overline{S13}\overline{S14}$)	Shift count = 0	
Ø3	T1	Ar1	= Ø3Ø5Ø6Sk		
		sA0	= A0005$\overline{C4}$Ar1		
		rA0	= $\overline{A00}$05$\overline{C4}$Ar1	Extend sign bit	
		sA(1-23)	= A(0-22)Ar1		
		rA(")	= $\overline{A}$(") "		
		Br1	= Ø3Ø5Ø6Sk	Shift A,B right 1 bit if Sk	
		sB0	= A23Ø5Br1		
		rB0	= $\overline{A23}$Ø5Br1		
		sB(1-23)	= B(0-22)Br1		
		rB(")	= $\overline{B}$(") "		
		Sd2	= (Ø3Ø5Ø6Sk)$\overline{S14}$	Count every other clock until Sk set	
		rS9	= Sd2$\overline{S10}$($\overline{S11}\overline{S12}\overline{S13}$)		
		sS10	= Sd2$\overline{S10}$(")		
		rS10	= Sd2S10(")		
		sS11	= Sd2$\overline{S11}$($\overline{S12}\overline{S13}$)		
		rS11	= Sd2S11(")	Decrement count by 2	
		sS12	= Sd2$\overline{S12}\overline{S13}$	every other clock	
		rS12	= Sd2S12$\overline{S13}$		

(continued)

Ø3	T1	sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sS14	= (Ø305Ø6$\overline{Sk}$)$\overline{S14}$	
		rS14	= (")S14	Count each clock
		sSk	= (Ø305$\overline{Sk}$)($\overline{S9S10S11S12}$)$\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (Ø305Ø6)TpSkS14	
	sA0	= A0005$\overline{C4}$	
	rA0	= $\overline{A0005C4}$	
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø305Ø6)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk	Ø7 next clock (T8)
	rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)	Clear Rf

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7$\overline{Ij}\overline{kr}$	Initiate P register increment	
	T7	Ar3	= Ø7Ø6Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1GØ)Q2		
		sP0	= (")($\overline{Ø2Ø4Ø5Ø6}$)(P12⊕P13P14Ia)Pr3		
		rP0	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "	P + 1 → P	T7 thru T3
		sP2	= (")(")(P14⊕Ia)Pr3		
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= $\overline{P12P13P14}$Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGØ		
		sS1	= (F1GØ)($\overline{Ø2Ø4Ø5Ø6}$)(P13⊕P14Ia)Sxp		
		sS2	= (")(")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGØ$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	Fetch next instruction	
		rC(")	= CxmTr		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GØHt}$)		
		rK0	= Ø7Tr		
		rA00	= TpEndGØ		
	Tp	sCp	= M24CxmTp$\overline{Ht}\overline{Ts}$	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rRf	= Tp$\overline{Ø1}$($\overline{GØHt}$)		
		Oc	= TpEnd$\overline{Sk}$		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

		RCY 200XX	Right Cycle A,B	A,B right cycle XX bits $2+\frac{XX-3}{10}$ Cycles B23 → A0
Ø0	T8	rCz	= (Ø0T8)	
		sIx	= (")C1GO	
		Oxc	= (")$\overline{Ia}$GO$\overline{C2}$	Initiate indexing
		sO(1-6)	= $\overline{C}$(3-8)Oxc	C(3-8) → 0 if not Indirect Addressing
		rO(")	= $\overline{C}$(") "	
	T7	sA00	= A0Ø0T7	Save sign of A
		Cr3	= $\overline{F1}\overline{F2}\overline{Ts}$Q1	
		sC(0-2)	= $\overline{Add}$(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3	C(15-23)+X(15-23)Ix→ C T7 thru T5
		rC(")	= $\overline{Add}$(") "	
		Xz(1-3)	= $\overline{Xn}$(1-3)Ø0Ix	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$	Adder input (X) if indexing
		Yz(1-3)	= $\overline{C}$(21-23)$\overline{Ø7}$	
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input C
		sCz	= KzQ1$\overline{T0}\overline{Ø7}$	
		rCz	= $\overline{Kz}$Q1	Adder carry logic
		sCp	= (C21⊕C22⊕C23)$\overline{CpTs}$H$\overline{t}$Q1$\overline{F1}\overline{F2}$	
		rCp	= (")Cp "	Try for parity check T7 thru T2
	T5	sF3	= Ø0$\overline{Ia}$Q4$\overline{O3}$O4O5	Ø1 next clock (T4)
Ø1	T4	sC(0-2)	= $\overline{C}$(21-23)$\overline{F1}\overline{F2}$F3$\overline{Ts}$	C recirculate. Indexing
		rC(")	= $\overline{C}$(") "	is terminated. T4 thru T2
		Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	
		rS(1-14)	= Sc	Clear S
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$	
		sS(1,2)	= Add(2,3)Sxc	C(10-23)+X(15-23)Ix→ S
		sS(3-14)	= C(0-11)Sxc	put shift count into S
	T2	sF2	= Ø1O5$\overline{Q2}$	Ø3 next clock (T1)
		rS(1-8)	= Ø1O5T2	Clear S(1-8)
		Sx48	= ($\overline{S6}$S7S8+S9S10)Ø1O5T2	
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift
		rS(11-14)	= Sx48	count ≥ 48.
		sSk	= (Ø1O5T2)($\overline{S6}\overline{S7}\overline{S8}\overline{S9}\overline{S10}\overline{S11}\overline{S12}\overline{S13}\overline{S14}$)	Shift count = 0
Ø3	T1	Ar1	= Ø3O5O6Sk	
		sA0	= B23C4$\overline{C6}$Ar1	
		rA0	= $\overline{B23}$C4$\overline{C6}$Ar1	Cycle B23 into A0
		sA(1-23)	= $\overline{A}$(0-22)Ar1	
		rA(")	= $\overline{A}$(") "	
		Br1	= Ø3O5$\overline{O6}\overline{Sk}$	Shift A,B right 1 bit if $\overline{Sk}$
		sB0	= A23O5Br1	
		rB0	= $\overline{A23}$O5Br1	
		sB(1-23)	= $\overline{B}$(0-22)Br1	
		rB(")	= $\overline{B}$(") "	
		Sd2	= (Ø3O5$\overline{O6}\overline{Sk}$)$\overline{S14}$	Count every other clock until Sk set
		rS9	= Sd2$\overline{S10}$($\overline{S11}\overline{S12}\overline{S13}$)	
		sS10	= Sd2$\overline{S10}$(")	
		rS10	= Sd2S10(")	
		sS11	= Sd2$\overline{S11}$($\overline{S12}\overline{S13}$)	
		rS11	= Sd2S11(")	Decrement count by 2
		sS12	= Sd2$\overline{S12}\overline{S13}$	every other clock
		rS12	= Sd2S12$\overline{S13}$	

(continued)

Ø3	T1	sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sS14	= (Ø305$\overline{06}$$\overline{Sk}$)$\overline{S14}$	
		rS14	= (")S14	Count each clock
		sSk	= (Ø305$\overline{Sk}$)($\overline{S9}$$\overline{S10}$$\overline{S11}$$\overline{S12}$)$\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= TpØ1($\overline{\overline{GO}}$Ht)	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (Ø30506)TpSkS14	
	sA0	= B23C4$\overline{C6}$Ar1	
	rA0	= $\overline{B23}$C4$\overline{C6}$Ar1	Cycle B23 into A0
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø30506)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk ____	Ø7 next clock (T8)
	rRf	= TpØ1($\overline{GO}$Ht)	Clear Rf

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7$\overline{Ij}$$\overline{kr}$	Initiate P register increment	
	T7	Ar3	= Ø706Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (")($\overline{02040506}$)(P12⊕P13P14Ia)Pr3		
		rP0	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "		
		sP2	= (")(")(P14⊕Ia)Pr3	P + 1 → P	T7 thru T3
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= $\overline{P12P13P14}$Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS1	= (F1GO)($\overline{02040506}$)(P13⊕P14Ia)Sxp		
		sS2	= (")(")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	Fetch next instruction	
		rC(")	= CxmTr		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rK0	= Ø7Tr		
		rA00	= TpEndGO		
	Tp	sCp	= M24CxmTpHt$\overline{Ts}$	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		
		Oc	= TpEnd$\overline{Sk}$		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

66 RCY 240XX Logical Right Cycle A,B — A,B right XX bits Zero's → A0 — $2+\frac{XX-3}{10}$ Cy

Ø0	T8	rCz	= (ØØT8)		
		sIx	= (")C1GO		
		Oxc	= (")$\overline{Ia}$GO$\overline{C2}$	Initiate indexing	
		sO(1-6)	= C(3-8)Oxc	C(3-8) → 0 if not Indirect Addressing	
		rO(")	= $\overline{C}$(") "		
	T7	sA00	= A0ØØT7	Save sign of A	
		Cr3	= $\overline{F1F2Ts}$Q1		
		sC(0-2)	= Add(1-3)ØØ$\overline{Ju}\overline{Ts}$Cr3	C(15-23)+X(15-23)Ix→ C	T7 thru T5
		rC(")	= $\overline{Add}$(") "		
		Xz(1-3)	= Xn(1-3)ØØIx		
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$	Adder input (X) if indexing	
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input C	
		sCz	= $\overline{Kz}$Q1$\overline{T0}$$\overline{Ø7}$		
		rCz	= $\overline{Kz}$Q1	Adder carry logic	
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Try for parity check	T7 thru T2
	T5	sF3	= ØØ$\overline{Ia}$Q4$\overline{O3}$O4O5	Ø1 next clock (T4)	
Ø1	T4	sC(0-2)	= C(21-23)$\overline{F1}\overline{F2}\overline{F3}\overline{Ts}$	C recirculate. Indexing	
		rC(")	= $\overline{C}$(") "	is terminated.	T4 thru T2
		Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C(10-23)+X(15-23)Ix→ S	
		sS(3-14)	= C(0-11)Sxc	put shift count into S	
	T2	sF2	= Ø1O5$\overline{Q2}$	Ø3 next clock (T1)	
		rS(1-8)	= Ø1O5T2	Clear S(1-8)	
		Sx48	= ($\overline{S6}\overline{S7}\overline{S8}$+S9S10)Ø1O5T2		
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift	
		rS(11-14)	= Sx48	count ≥ 48.	
		sSk	= (Ø1O5T2)($\overline{S6}\overline{S7}\overline{S8}\overline{S9}\overline{S10}\overline{S11}\overline{S12}\overline{S13}\overline{S14}$)	Shift count = 0	
Ø3	T1	Ar1	= Ø3O5O6Sk		
		rA0	= C4C6O5	Ø → A0 (C4 cycle bit, C6 logical)	
		sA(1-23)	= A(0-22)Ar1		
		rA(")	= $\overline{A}$(") "		
		Br1	= Ø3O5O6$\overline{Sk}$	Shift A,B right 1 bit if $\overline{Sk}$	
		sB0	= A23O5Br1		
		rB0	= $\overline{A23}$O5Br1		
		sB(1-23)	= B(0-22)Br1		
		rB(")	= $\overline{B}$(") "		
		Sd2	= (Ø3O5O6Sk)$\overline{S14}$	Count every other clock until Sk set	
		rS9	= Sd2$\overline{S10}$($\overline{S11}\overline{S12}\overline{S13}$)		
		sS10	= Sd2$\overline{S10}$(")		
		rS10	= Sd2S10(")		
		sS11	= Sd2$\overline{S11}$($\overline{S12}\overline{S13}$)		
		rS11	= Sd2S11(")	Decrement count by 2	
		sS12	= Sd2$\overline{S12}\overline{S13}$	every other clock	
		rS12	= Sd2S12$\overline{S13}$		

(continued)

Ø3	T1	sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sS14	= (Ø305$\overline{06}$$\overline{Sk}$)$\overline{S14}$	
		rS14	= (")S14	Count each clock
		sSk	= (Ø305$\overline{Sk}$)($\overline{S9}$$\overline{S10}$$\overline{S11}$$\overline{S12}$)$\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= Tp$\overline{Ø1}$($\overline{\overline{GO}}$Ht)	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (Ø30506)TpSkS14	
	rA0	= C4C605	0 → A0
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø30506)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk	Ø7 next clock (T8)
	rRf	= Tp$\overline{Ø1}$($\overline{GO}$Ht)	Clear Rf

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7IjKr	Initiate P register increment	
	T7	Ar3	= Ø7Ø6Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1GØ)Q2		
		sPØ	= (")($\overline{ØØ4Ø5Ø6}$)(P12⊕P13P14Ia)Pr3		
		rPØ	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "	P + 1 → P	T7 thru T3
		sP2	= (")(")(P14⊕Ia)Pr3		
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= $\overline{P12P13P14}$Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGØ		
		sS1	= (F1GØ)($\overline{ØØ4Ø5Ø6}$)(P13⊕P14Ia)Sxp		
		sS2	= (")(")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	TØ	rSk	= Ø7TØ		
	Tr	Cxm	= EndGØ$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	Fetch next instruction	
		rC(")	= CxmTr		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GØHt}$)		
		rKØ	= Ø7Tr		
		rAØØ	= TpEndGØ		
	Tp	sCp	= M24CxmTp$\overline{HtTs}$	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rRf	= TpØ1($\overline{GØHt}$)		
		Oc	= TpEnd$\overline{Sk}$		
		sØ2	= Oc	NOP (20) → 0	
		rØ(1,3,4,5,6)	= Oc		

67 LSH 000XX — Left Shift A,B — A,B left XX bits; Set overflow if A0 changes — $2+\frac{XX-6}{20}$ Cycles

Ø0	T8	rCz	= (Ø0T8)	
		sIx	= (")ClGO	
		Oxc	= (")$\overline{IaGOC2}$	Initiate indexing
		sO(1-6)	= C(3-8)Oxc	C(3-8) → 0 if not Indirect Addressing
		rO(")	= $\overline{C}$(") "	
	T7	sA00	= A0Ø0T7	Save sign of A
		Cr3	= $\overline{F1F2Ts}$Q1	
		sC(0-2)	= Add(1-3)Ø0$\overline{JuTs}$Cr3	C(15-23)+X(15-23)Ix→ C T7 thru T5
		rC(")	= $\overline{Add}$(") "	
		Xz(1-3)	= Xn(1-3)Ø0Ix	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$	Adder input (X) if indexing
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	
		$\overline{Yz}$(")	= $\overline{C}$(")"	Adder input C
		sCz	= KzQ1$\overline{T0Ø7}$	
		rCz	= $\overline{Kz}$Q1	Adder carry logic
		sCp	= (C21⊕C22⊕C23)$\overline{CpTsHt}$Q1F1F2	
		rCp	= (")Cp "	Try for parity check T7 thru T2
	T5	sF3	= Ø0$\overline{Ia}$Q4O3O405	Ø1 next clock (T4)
Ø1	T4	sC(0-2)	= C(21-23)$\overline{F1F2F3Ts}$	C recirculate. Indexing
		rC(")	= $\overline{C}$(") "	is terminated. T4 thru T2
		Sc	= T4$\overline{F1F2Inr}$	
		rS(1-14)	= Sc	Clear S
	T3	Sxc	= T3$\overline{F1F2Ju}$	C(10-23)+X(15-23)Ix→ S
		sS(1,2)	= Add(2,3)Sxc	put shift count into S
		sS(3-14)	= C(0-11)Sxc	
	T2	sF2	= Ø1O5$\overline{Q2}$	Ø3 next clock (T1)
		rS(1-8)	= Ø1O5T2	Clear S(1-8)
		Sx48	= ($\overline{S6S7S8}$+S9S10)Ø1O5T2	
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift
		rS(11-14)	= Sx48	count ≥ 48.
		sSk	= (Ø1O5T2)($\overline{S6S7S8S9S10S11S12S13S14}$)	Shift count = 0
Ø3	T1	AL2	= (Ø3O5O6)$\overline{Sk}$	
		sA00	= A1AL2O5	Save old A1 for clean up shift
		rA00	= $\overline{A1}$ "	when Ø3 terminates
		sA(0-21)	= A(2-23)AL2	
		rA(")	= $\overline{A}$(") "	
		sA(22,23)	= B(0,1)AL2	A,B left 2 bits
		rA(")	= $\overline{B}$(") "	
		sB(0-21)	= B(2-23)AL2	
		rB(")	= $\overline{B}$(") "	
		rB(22,23)	= $\overline{C4}$AL2O5	0 → B(22,23) C4=C10 (cycle bit) during Ø3
		sOf	= (Ø3O5O6$\overline{Sk}$$\overline{C4}$$\overline{C5}$)(A0⊕A1)	Normalized and shifting 2
		sOf	= (")(A1⊕A2)($\overline{S9...S13}$)	Normalized in 1 and shifting 2
		Sd2	= Ø3O5O6$\overline{Sk}$	Count until Sk set.
		rS9	= Sd2$\overline{S10}$($\overline{S11S12S13}$)	
		sS10	= Sd2$\overline{S10}$(")	
		rS10	= Sd2S10(")	
		sS11	= Sd2$\overline{S11}$($\overline{S12S13}$)	
		rS11	= Sd2S11(")	Decrement count by 2
		sS12	= Sd2$\overline{S12S13}$	each clock.
		rS12	= Sd2S12$\overline{S13}$	

(continued)

Ø3	T1	sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sSk	= (Ø30506$\overline{Sk}$)($\overline{S9}\overline{S10}\overline{S11}\overline{S12}$)$\overline{S14}$	Count = 0 or 2
		sSk	= (Ø305$\overline{Sk}$)($\overline{S9}\overline{S10}\overline{S11}\overline{S12}$)$\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= TpØ1($\overline{GOHt}$)	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (Ø30506)TpSkS14	
	sA0	= A0005$\overline{C4}$	
	rA0	= $\overline{A0005C4}$	
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø30506)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk	Ø7 next clock (T8)
	rRf	= TpØ1($\overline{GOHt}$)	Clear Rf

```
Ø7  T8  Ck          = Ø7T8Ts
        sC(0-23)    = C(0-23)Ck                          Invert C
        rC( " )     = C( " )Ck
        End         = F1F2
        sIa         = SkT8Ø7CJKr                         Initiate P register increment
    T7  Ar3         = Ø7Ø6Q1
        sA(0-2)     = A(21-23)AnrAr3
        rA( " )     = A( " )  "
        sA(3-23)    = A(0-20)Ar3                         Recirculate A          T7 thru T0
        rA( " )     = A( " ) "
        sB(0-2)     = B(21-23)BnrAr3
        rB( " )     = B( " )  "
        sB(3-23)    = B(0-20)Ar3                         Recirculate B          T7 thru T0
        rB( " )     = B( " ) "
        Pr3         = (F1GO)Q2
        sP0         = ( " )(Ø2Ø4Ø5Ø6)(P12⊕P13P14Ia)Pr3
        rP0         = ( " )(   "   )(P12⊕P13P14Ia) "
        sP1         = ( " )(   "   )(P13⊕P14Ia)Pr3
        rP1         = ( " )(   "   )(P13⊕P14Ia) "
        sP2         = ( " )(   "   )(P14⊕Ia)Pr3        P + 1 → P              T7 thru T3
        rP2         = ( " )(   "   )(P14⊕Ia) "
        rIa         = P12P13P14Q2F1
        sP(3-14)    = P(0-11)Pr3
        rP( " )     = P( " ) "
    T4  Sc          = T4EndInr
        rS(1-14)    = Sc                                 Clear S
    T3  Sxp         = T3IntEndGO
        sS1         = (F1GO)(Ø2Ø4Ø5Ø6)(P13⊕P14Ia)Sxp
        sS2         = ( " )(   "   )(P14⊕Ia)Sxp         P → S
        sS(3-14)    = P(0-11)Sxp
    T0  rSk         = Ø7T0
    Tr  Cxm         = EndGOTsm(Tr+Tp)
        sC(0-23)    = M(0-23)Cxm                         Fetch next instruction
        rC( " )     = CxmTr
        rIa         = TrF1
        rIx         = Tr(F1F3)(GOHt)
        rK0         = Ø7Tr
        rA00        = TpEndGO
    Tp  sCp         = M24CxmTpHtTs                       Initiate parity
        rF(1-3)     = TpEndSk                            Ø0 next clock (T8)
        rRf         = TpØ1(GOHt)
        Oc          = TpEndSk
        sO2         = Oc
        rO(1,3,4,5,6) = Oc                               NOP (20) → O
```

67		NOD 100XX	Normalize A,B	A,B left until A0≠A1, or XX shifts have occured $2+\frac{XX-6}{20}$ Cyc
Ø0	T8	rCz	= (Ø0T8)	
		sIx	= (")C1GO	
		Oxc	= (")$\overline{Ia}$GO$\overline{C2}$	Initiate indexing
		sO(1-6)	= C(3-8)Oxc	C(3-8) → 0 if not Indirect Addressing
		rO(")	= $\overline{C}$(") "	
	T7	sA00	= A0Ø0T7	Save sign of A
		Cr3	= $\overline{F1F2Ts}$Q1	
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\,\overline{Ts}$Cr3	C(15-23)+X(15-23)Ix→ C T7 thru T5
		rC(")	= $\overline{Add}$(") "	
		Xz(1-3)	= Xn(1-3)Ø0Ix	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$	Adder input (X) if indexing
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input C
		sCz	= KzQ1$\overline{T0}$$\overline{Ø7}$	
		rCz	= $\overline{Kz}$Q1	Adder carry logic
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\,\overline{Ts}\,\overline{Ht}$Q1$\overline{F1}\,\overline{F2}$	
		rCp	= (")Cp "	Try for parity check T7 thru T2
	T5	sF3	= Ø0$\overline{Ia}$Q4$\overline{O3}$0405	Ø1 next clock (T4)
Ø1	T4	sC(0-2)	= C(21-23)$\overline{F1}\,\overline{F2}\,\overline{F3}\,\overline{Ts}$	C recirculate. Indexing
		rC(")	= $\overline{C}$(") "	is terminated. T4 thru T2
		Sc	= T4$\overline{F1}\,\overline{F2}\,\overline{Inr}$	
		rS(1-14)	= Sc	Clear S
	T3	Sxc	= T3$\overline{F1}\,\overline{F2}\,\overline{Ju}$	
		sS(1,2)	= Add(2,3)Sxc	C(10-23)+X(15-23)Ix→S
		sS(3-14)	= C(0-11)Sxc	put shift count into S
	T2	sF2	= Ø105$\overline{Q2}$	Ø3 next clock (T1)
		rS(1-8)	= Ø1$\overline{05T2}$	Clear S(1-8)
		Sx48	= ($\overline{S6S7S8}$+S9S10)Ø105T2	
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift
		rS(11-14)	= Sx48	count ⩾ 48.
		sSk	= (Ø105T2)($\overline{S6S7S8S9S10S11S12S13S14}$)	Shift count = 0
		sSk	= (")(A0⊕A1)C2	A,B normalized. C2=C11(norm bit) at T2
		rS14	= (")(")C2	Avoid clear up shift.
Ø3	T1	AL2	= (Ø30506)$\overline{Sk}$	
		sA00	= A1AL205	Save old A1 for clean up shift
		rA00	= $\overline{A1}$ "	when Ø3 terminates
		sA(0-21)	= A(2-23)AL2	
		rA(")	= $\overline{A}$(") "	
		sA(22,23)	= B(0,1)AL2	A,B left 2 bits
		rA(")	= $\overline{B}$(") "	
		sB(0-21)	= B(2-23)AL2	
		rB(")	= $\overline{B}$(") "	
		rB(22,23)	= $\overline{C4}$AL205	0 → B(22,23) C4=C10(cycle bit) during Ø3
		rBc23	= AL2	Clear Bc23
		sIx	= Ø305	Initiate adder input (X) during Ø7
		rK0	= Ø306Q6	Clear K0 T3 thru Tp

(continued)

Ø3	T1	Sd2	= Ø30506$\overline{Sk}$	Count until Sk set.
		sS2	= (Sd205)$\overline{S6}\,\overline{S7}$	
		sS3	= (")$\overline{S3}(\overline{S4}\,\overline{S5}\,\overline{S6}\,\overline{S7})$	
		rS3	= (")S3(")	
		sS4	= (")$\overline{S4}(\overline{S5}\,\overline{S6}\,\overline{S7})$	
		rS4	= (")S4(")	Develop negative count
		sS5	= (")$\overline{S5}(\overline{S6}\,\overline{S7})$	to be added to the
		rS5	= (")S5(")	index register during Ø7.
		sS6	= (")$\overline{S6}\,\overline{S7}$	(counts for each AL2)
		rS6	= (")S6$\overline{S7}$	
		sS7	= (")$\overline{S7}$	
		rS7	= (")S7	
		rS9	= Sd2$\overline{S10}(\overline{S11}\,\overline{S12}\,\overline{S13})$	
		sS10	= Sd2$\overline{S10}$(")	
		rS10	= Sd2S10(")	
		sS11	= Sd2$\overline{S11}(\overline{S12}\,\overline{S13})$	
		rS11	= Sd2S11(")	Decrement count by 2
		sS12	= Sd2$\overline{S12}\,\overline{S13}$	each clock.
		rS12	= Sd2S12$\overline{S13}$	
		sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sS14	= (Ø30506$\overline{Sk}$)(A1⊕A2)C5	Set clean up shift.
		rS14	= (")$\overline{(A1 \oplus A2)}(A2 \oplus A3)(\overline{S9}....\overline{S13})$C5	
				No clean up shift.
		sSk	= (")(A1⊕A2)C5	Over normalized
		sSk	= (")$\overline{(A1 \oplus A2)}(A2 \oplus A3)(\overline{S9}...\overline{S13})$C5	
				Normalized
		sSk	= (")$(\overline{S9}\,\overline{S10}\,\overline{S11}\,\overline{S12})\overline{S14}$	Count = 0 or 2
		sSk	= (Ø305$\overline{Sk}$)$(\overline{S9}\,\overline{S10}\,\overline{S11}\,\overline{S12})\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= Tp$\overline{Ø1}(\overline{GO}Ht)$	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (030506)TpSkS14	
	sA0	= A0005$\overline{C4}$	
	rA0	= $\overline{A0}$05$\overline{C4}$	
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø30506)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk	Ø7 next clock (T8)
	rRf	= Tp$\overline{Ø1}(\overline{GO}Ht)$	Clear Rf

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7CjKr	Initiate P register increment	
		sBc23	= (Ø7Ø5T8)S14	Rf,K0,Bc23 form an Octal input to	
		sK0	= (")S7	Yz(1-3) from T8 thru T6 which	
		sRf	= (")S6	represent the negative number of shifts during normalize.	
	T7	Ar3	= Ø7Ø6Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (")($\overline{Ø2Ø4Ø5Ø6}$)(P12⊕P13P14Ia)Pr3		
		rP0	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "	P + 1 → P	T7 thru T3
		sP2	= (")(")(P14⊕Ia)Pr3		
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= $\overline{P12P13P14}$Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		Xnr	= $\overline{Ø3}$(Ø4Ø5Ø6)$\overline{C5}$Ø7	$\overline{C5}$ is norm bit inverted at T8	
		sXw(1-3)	= Add(1-3)$\overline{Ø3}$(Ø4Ø5Ø6)$\overline{C5}$Ø7F1	X + S(2-7) + S14 → X	T7 thru T0
		rXw(")	= $\overline{Add}$(") "	(X-number of shifts → X)	
		Xz(1-3)	= Xn(1-3)IxØ7Ø5	Adder input (X)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(") "		
		Yz1	= RfØ7	Adder input (S)	
		$\overline{Yz1}$	= $\overline{Rf}$Ø7	Bits S3 thru S7 contain	
		Yz2	= K0Ø7	a negative count of the	
		$\overline{Yz2}$	= $\overline{K0}$Ø7	AL2's during normalize.	
		Yz3	= Bc23Ø7	S14 contains the clean up.	
		$\overline{Yz3}$	= $\overline{Bc23}$Ø7		
		sBc23	= (Ø7Ø5T7)S5		
		rBc23	= (")$\overline{S5}$		
		sK0	= (")S4	Rf, K0 and Bc23 must	
		rK0	= (")$\overline{S4}$	be set for the next	
		sRf	= (")S3	clock	
		rRf	= (")$\overline{S3}$		

T6	sBc23	= (Ø705T6)S2		
	sK0	= (")S2	Extend minus sign for negative count to Yz	T5 thru T0
	sRf	= (")S2		
T4	Sc	= T4EndInr		
	rS(1-14)	= Sc	Clear S	
T3	Sxp	= T3IntEndGO		
	sS1	= (F1GO)(02040506)(P13⊕P14Ia)Sxp		
	sS2	= (")(")(P14⊕Ia)Sxp	P → S	
	sS(3-14)	= P(0-11)Sxp		
T0	rSk	= Ø7T0		
Tr	Cxm	= EndGOTsm(Tr+Tp)		
	sC(0-23)	= M(0-23)Cxm	Fetch next instruction	
	rC(")	= CxmTr		
	rIa	= TrF1		
	rIx	= Tr(F1F3)(GOHt)		
	rK0	= Ø7Tr		
	rA00	= TpEndGO		
Tp	sCp	= M24CxmTpHtTs	Initiate parity	
	rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
	rRf	= TpØ1(GOHt)		
	Oc	= TpEndSk		
	sO2	= Oc	NOP (20) → O	
	rO(1,3,4,5,6)	= Oc		

67		LCY 200XX	Left Cycle A,B	A,B left cycle XX bits A0 into B23	$2+\frac{XX-6}{20}$ Cycles
Ø0	T8	rCz	= (Ø0T8)		
		sIx	= (")C1G0		
		0xc	= (")$\overline{Ia}$G0$\overline{C2}$	Initiate indexing	
		sO(1-6)	= C(3-8)0xc	C(3-8) → 0 if not Indirect Addressing	
		rO(")	= $\overline{C}$(") "		
	T7	sA00	= A0Ø0T7	Save sign of A	
		Cr3	= $\overline{F1F2Ts}$Q1		
		sC(0-2)	= Add(1-3)Ø0$\overline{JuTs}$Cr3	C(15-23)+X(15-23)Ix→ C	T7 thru T5
		rC(")	= $\overline{Add}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0Ix	Adder input (X) if indexing	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C	
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{T0Ø7}$	Adder carry logic	
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{TsHt}$Q1$\overline{F1F2}$	Try for parity check	T7 thru T2
		rCp	= (")Cp "		
	T5	sF3	= Ø0$\overline{Ia}$Q4$\overline{03}$0405	Ø1 next clock (T4)	
Ø1	T4	sC(0-2)	= C(21-23)$\overline{F1F2F3Ts}$	C recirculate. Indexing is terminated.	T4 thru T2
		rC(")	= $\overline{C}$(") "		
		Sc	= T4$\overline{F1F2Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1F2Ju}$	C(10-23)+X(15-23)Ix→ S	
		sS(1,2)	= Add(2,3)Sxc	put shift count into S	
		sS(3-14)	= C(0-11)Sxc		
	T2	sF2	= Ø105$\overline{Q2}$	Ø3 next clock (T1)	
		rS(1-8)	= Ø105T2	Clear S(1-8)	
		Sx48	= ($\overline{S6S7S8}$+S9S10)Ø105T2		
		sS(9,10)	= Sx48	Set S(9-14) = 48 if shift	
		rS(11-14)	= Sx48	count ≥ 48.	
		sSk	= (Ø105T2)($\overline{S6S7S8S9S10S11S12S13S14}$)	Shift count = 0	
Ø3	T1	AL2	= (Ø30506)$\overline{Sk}$		
		sA00	= A1AL205	Save old A1 for clean up shift	
		rA00	= $\overline{A1}$ "	when Ø3 terminates	
		sA(0-21)	= A(2-23)AL2		
		rA(")	= $\overline{A}$(") "		
		sA(22,23)	= B(0,1)AL2	A,B left 2 bits	
		rA(")	= $\overline{B}$(") "		
		sB(0-21)	= B(2-23)AL2		
		rB(")	= $\overline{B}$(") "		
		sB(22,23)	= A(0,1)AL2		
		rB(")	= $\overline{A}$(") "	Cycle A0,A1 into B22,B23	
		Sd2	= Ø30506$\overline{Sk}$	Count until Sk set.	
		rS9	= Sd2$\overline{S10}$($\overline{S11S12S13}$)		
		sS10	= Sd2$\overline{S10}$(")		
		rS10	= Sd2S10(")		
		sS11	= Sd2$\overline{S11}$($\overline{S12S13}$)		
		rS11	= Sd2S11(")	Decrement count by 2	
		sS12	= Sd2$\overline{S12S13}$	each clock.	
		rS12	= Sd2S12$\overline{S13}$		

(continued)

Ø3	T1	sS13	= Sd2$\overline{S13}$	
		rS13	= Sd2S13	
		sSk	= (Ø30506$\overline{Sk}$)($\overline{S9}\overline{S10}\overline{S11}\overline{S12}$)$\overline{S14}$	Count = 0 or 2
		sSk	= (Ø305$\overline{Sk}$)($\overline{S9}\overline{S10}\overline{S11}\overline{S12}$)$\overline{S13}$	Count = 0 or 1
	T0	(refer Ø3 T1)		Initiate X into Xz during Ø7
	Tr	(")		
	Tp	(")		
		rRf	= Tp$\overline{Ø1}$($\overline{\overline{GO}Ht}$)	Clear Rf

If Sk is not set ($\overline{Sk}$) at Tp, Ø3 will continue to occur with each clock responding as shown in Ø3 T1 until Sk sets. When this happens, all functions will stop, except the clock, until Tp. The following shows what occurs at Tp when Sk is set.

Tp	Ar1	= (Ø30506)TpSkS14	
	sA0	= B23C4$\overline{C6}$Ar1	
	rA0	= $\overline{B23}$C4$\overline{C6}$Ar1	Cycle B23 into A0
	sA(1-23)	= A(0-22)Ar1	
	rA(")	= $\overline{A}$(") "	
	Br1	= (Ø30506)TpSkS14	Clean up right shift A,B
	sB0	= A23Br1	(If S14 reset, no shift occurs)
	rB0	= $\overline{A23}$Br1	
	sB(1-23)	= B(0-22)Br1	
	rB(")	= $\overline{B}$(") "	
	sF1	= TpSk	Ø7 next clock (T8)
	rRf	= Tp$\overline{Ø1}$($\overline{\overline{GO}Ht}$)	Clear Rf

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7(IjKr)	Initiate P register increment	
	T7	Ar3	= Ø7Ø6Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (")($\overline{Ø2Ø4Ø5Ø6}$)(P12⊕P13P14Ia)Pr3		
		rP0	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "	P + 1 → P	T7 thru T3
		sP2	= (")(")(P14⊕Ia)Pr3		
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= $\overline{P12P13P14}$Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS1	= (F1GO)($\overline{Ø2Ø4Ø5Ø6}$)(P13⊕P14Ia)Sxp		
		sS2	= (")(")(P14⊕Ia)Sxp	P → S	
		sS(3-14)	= P(0-11)Sxp		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= End$\overline{GO}$$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	Fetch next instruction	
		rC(")	= CxmTr		
		rIa	= TrF1		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rK0	= Ø7Tr		
		rA00	= TpEndGO		
	Tp	sCp	= M24CxmTp$\overline{HtTs}$	Initiate parity	
		rF(1-3)	= Tp$\overline{EndSk}$	Ø0 next clock (T8)	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		
		Oc	= Tp$\overline{EndSk}$		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

70		SKM	Skip if A Equal (M) on B Mask	A·B≠(M)·B; P + 1 → P A·B=(M)·B; P + 2 → P	2 Cycles 3 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØOJuTsCr3		
		rC(")	= Add(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")ØOIx+Ix		T7 thru TO
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input C register	T7 thru TO
		sCz	= KzQ1TOØ7		
		rCz	= KzQ1	Carry for Adder	T7 thru T1
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2		
		rCp	= (")Cp "	Check parity	T7 thru TO
	T4	Sc	= T4F1F2Inr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTrKpKOØ2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rKO	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)O1O4		
		sF2	= (")O3O1	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3I⊕Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
		sSk	= (O1O3O4O6Ø6)T8		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Ix	Adder input (Ø)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6O3	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		rSk	= B(A⊕C)(21-23)(Ø6O1O3O4O5O6Q1)	Don't skip logic	T7 thru T0
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(O2O4O5O6)Sxp	P13,14 contains P1,P2 at T3	
		rS1	= (") "	P + 1 → S	
		sS2	= (P14⊕Ia) "		
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕KpK0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp      Initiate parity
    rF(1,2)         = TpEndSk           Ø0 next if Sk
    sF3             = TpSk              Ø7 next if Sk
    Oc              = TpEndSk
    s02             = Oc
    r0(1,3,4,5,6)   = Oc                NOP (20) → 0
```

Ø7	T8	sIa	= SkØ7T8I⊕Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (0102$\overline{03}$04)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{0204}$0506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{\text{P}}$(") "		
		rIa	= ($\overline{\text{P12P13P14}}$)Q2F1		
	T4	Sc	= T4End$\overline{\text{Inr}}$		
		rS(1-14)	= $\overline{\text{Sc}}$	Clear S	
	T3	Sxp	= T3$\overline{\text{Int}}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{0204}$0506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= $\overline{\text{P}}$(0-11)Sxp		
		rS(")	= $\overline{\text{P}}$(") "		
	T0	rSk	= $\overline{\text{Ø7T0}}$		
		rCp	= $\overline{\text{TsT0HtK0}}$(F1O3$\overline{\text{Ø4Ø6}}$)$\overline{\text{Ø2}}$		
	Tr	Cxm	= $\overline{\text{EndG0Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= $\overline{\text{TrCxm}}$		Tr thru Tp
		rIa	= $\overline{\text{TrF1}}$		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{G0Ht}}$)		
	Tp	rA00	= $\overline{\text{TpEnd00}}$		
		rB00	= (")		
		sCp	= M24Cxm$\overline{\text{HtTs}}$Tp	Initiate parity check	
		rF(1-3)	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

71 LDX Load X (M) → X 2 Cycles

Ø0	T8	rCz	= ØØT8	Initialize carry
		sIx	= ØØT8C1GO	Initialize indexing
		Oxc	= (ØØT8IaGO)C2	
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O
		rO2	= C4Oxc	
	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru TO
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru TO
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		Cr3	= F1F2(TsQ1)	
		sC(0-2)	= Add(1-3)ØØJuTsCr3	
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz) T7 thru TC
		sC(3-23)	= C(0-20)Cr3	
		rC(")	= C(") "	
		Xz(1-3)	= Xn(1-3)ØØ•Ix	Adder input if Ix (indexing)
		Xz(")	= Xn(")ØØIx+Ix	T7 thru TC
		Yz(1-3)	= C(21-23)Ø7	Adder input C register T7 thru TC
		Yz(")	= C(") "	
		sCz	= KzQ1TØØ7	Carry for Adder T7 thru T1
		rCz	= KzQ1	
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity T7 thru TC
		rCp	= (")Cp "	
	T4	Sc	= T4F1F2Inr	Clear S
		rS(1-14)	= Sc	
	T3	Sxc	= T3F1F2Ju	
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S
		sS(3-14)	= C(0-11)Sxc	
	TO	rCz	= F1TO	
	Tr	Cxm	= JuØØTsm(Tr+Tp)	
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand) Tr thru T1
		rC(")	= TrCxm	
		sCz	= (TrØØ)O2O3	
		sHt	= CpTrKpKØØ2	Parity error
		rIx	= Tr(F1F3)(GOHt)	
		rKO	= GOTrF2	
	Tp	sCp	= M24CxmHtTsTp	Initiate parity
		sF1	= (TpIaØØ)O1O4	
		sF2	= (")O3O1	ØØ6 next clock (T8)

Ø6	T8	sIa	= T8F1F3(IjKr)	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (0102Ø304)Q1		
		sA(0-2)	= A(21-23)ĀnrAr3		
		rA(")	= Ā(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= Ā(") "		
		sB(0-2)	= B(21-23)B̄nrAr3		
		rB(")	= B̄(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B̄(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	B + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C̄(") "		
		Xz(1-3)	= A(21-23)Ø602Ø4		
		Xz(")	= Ā(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C̄(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= K̄zQ1		
		sCp	= (C21⊕C22⊕C23)C̄pTsH̄tQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(Ø2Ø4Ø5Ø6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "	P + 1 → P	T7 thru T3
		sP2	= (P14⊕Ia) "		
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P̄(") "		
		rIa	= (P̄12P̄13P̄14)Q2F1		
		Xnr	= Ø6Ø1Ø2Ø3Ø4Ø5Ø6		
		sXw(1-3)	= (")T̄sC(21-23)	C → X	T7 thru T0
		rXw(")	= (")T̄sC̄(")		
	T4	Sc	= T4EndĪnr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3ĪntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(Ø2Ø4Ø5Ø6)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P̄(") "		
	Tr	Cxm	= EndGOT̄sm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr(Kp⊕K̄)Ø2	Parity error	

```
     rIa            = TrF1
     rIx            = Tr(F1F3)(GOHt)
Tp   rA00           = TpEndGO
     rB00           = (  "  )
     sCp            = M24CxmHtTsTp        Initiate parity
     rF(1,2)        = TpEndSk             Ø0 next clock (T8)
     Oc             = (  "  )
     s02            = Oc
     rO(1,3,4,5,6)  = Oc                  NOP (20) → 0
```

72		SKA	Skip if A and M do not Compare Ones	Ai(M)i=1; P + 1 → P Ai(M)i=0; P + 2 → P	2 Cycles 3 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø0$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input if Ix (indexing)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")Ø0Ix+$\overline{Ix}$		T7 thru TO
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C register	T7 thru TO
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1T0$\overline{Ø7}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr$\overline{Kp}\overline{K0}\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O1O4		
		sF2	= (")O3O1	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3IKr	Initiate P register increment	
		End	= F1F2	Last cycle	
		sSk	= 0103040607T8		
	T7	Ar3	= (0102030)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	Recirculate C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Ix	Adder input (Ø)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		rSk	= A·C(21-23)02(Ø6010303040 6)05Q1	Don't skip if A·(M)	T7 thru T0
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕KpK0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp      Initiate parity
    rF(1,2)         = TpEndSk           Ø0 next if Sk
    sF3             = TpSk              Ø7 next if Sk
    Oc              = TpEndSk
    s02             = Oc
    r0(1,3,4,5,6)   = Oc                NOP (20) → 0
```

Ø7	T8	sIa	= SkØ7T8$\overline{I}$Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= ($\overline{0}$1$\overline{0}$2$\overline{0}$3$\overline{0}$4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{0}$2$\overline{0}$4$\overline{0}$5$\overline{0}$6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P1}$2$\overline{P1}$3$\overline{P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{0}$2$\overline{0}$4$\overline{0}$5$\overline{0}$6)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	T0	rSk	= Ø7T0		
		rCp	= $\overline{Ts}$T0$\overline{Ht}$K0(F1Ø3$\overline{Ø4}$$\overline{Ø6}$)$\overline{Ø2}$		
	Tr	Cxm	= EndG0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= Tr$\overline{F1}$		
		rIx	= Tr($\overline{F1}$$\overline{F3}$)($\overline{G0Ht}$)		
	Tp	rA00	= TpEndG0		
		rB00	= (")		
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity check	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

73 SKG — Skip if A Greater Than M

$A \leqslant (M)$; $P + 1 \rightarrow P$ — 2 Cycles
$A > (M)$; $P + 2 \rightarrow P$ — 3 Cycles

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)ØØ•Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")ØØIx+Ix		T7 thru T0
		Yz(1-3)	= C(21-23)Ø7	Adder input C register	T7 thru T0
		Yz(")	= C(") "		
		sCz	= KzQ1T0Ø7	Carry logic	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= F1T0		
	Tr	Cxm	= JuØ0Tsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= TrØ00203	Initiate - A into Xz	
		sHt	= CpTsKpK0Ø2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rK0	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)0104		
		sF2	= (")0301	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3IaKr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T(
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T(
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	$\overline{A} + C + 1 \rightarrow C$ = (M) - A → C	T7 thru T(
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= A(21-23)O2O4Ø6		
		Xz(")	= A(") "	Adder input ($\overline{A}$)	T7 thru T(
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru T(
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T(
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6O3		
		rCp	= (")Cp "	Check parity	T7 thru T(
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(O2O4O5O6)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	sIx	= Ø6T00fe		
		Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Ix if Overflow	
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTrKpK0Ø2	Parity error	

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     rIa          = TrF1
     rIx          = Tr(F1F3)(GOHt)
     sSk          = 0103Ø4Ø5Ø6Ø6TrCØ⊕Ix          Skip if (M-A<Ø)⊕Of
Tp   rA00         = TpEndGO
     rB00         = (  "  )
     sCp          = M24CxmHtTsTp                Initiate parity
     rF(1,2)      = TpEndSk                     Ø0 next if Sk
     sF3          = TpSk                        Ø7 next if Sk
     Oc           = TpEndSk
     sO2          = Oc
     rO(1,3,4,5,6)= Oc                          NOP(20) → O
```

Ø7	T8	sIa	= SkØ7T8IKr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		PrS	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0(02040506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rSk	= Ø7T0		
		rCp	= TsT0HtK0(F103Ø4Ø6)Ø2		
	Tr	Cxm	= EndG0Tsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= TrF1		
		rIx	= Tr(F1F3)(G0Ht)		
	Tp	rA00	= TpEndG0		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Initiate parity check	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

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B(15-23) - (M)(15-23) → X(14-23)
If X14=0 ;P+1 → P 2 Cycles
If X14=1, -X → X; P+2 → P 3 Cycles

Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2O3O4)$\overline{Q1}$		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØØJu$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØØ•Ix	Adder input if Ix (indexing)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C register	T7 thru T0
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1T0$\overline{Ø7}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1$\overline{F1F2}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1F2Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1F2Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= $\overline{F1T0}$		
	Tr	Cxm	= $\overline{Ju}$Ø$\overline{0Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)04$\overline{0506}$	Initiate - M into Yz	
		sHt	= CpTr$\overline{Kp}$$\overline{K0Ø2}$	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)0304		
		sF2	= (")0301	Ø6 next clock (T8)	

Ø6	T8	Ck	= 0102030405Ø6Ø6T8Ts		
		sC(0-23)	= C(0-23)Ck	C → C	
		rC(")	= C(") "		
		sIa	= T8F1F3IjKr	Initiate P register increment	
		End	= F1F2	Last cycle	
		Xnr	= Ø6Ø102030405Ø6		
	T7	Ar3	= (0102Ø304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	B + C + 1 → C =	T7 thru T0
		sC(3-23)	= C(0-20)Cr3	B - (M) → C	
		rC(")	= C(") "		
		Xz(1-3)	= B(21-23)Ø6Ø2Ø4		
		Xz(")	= B(") "	Adder input (B)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru T0
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6Ø3		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(Ø2Ø4Ø5Ø6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		sXw(1-3)	= Add(1-3)Ø6Ø102030405Ø6F1		
		rXw(")	= Add(") "	B - (M) → X	T7 thru T0
	T5	sIx	= Ø6Ø6T5Ofe		
		Ofe	= Add1Xz1Yz1+Add1Xz1Yz1	Overflow of X15 into X14	
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
		sSk	= Ø6Ø102030405Ø6T4(CØ⊕Ix)	Sk if X14 ⊕ Of	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(Ø2Ø4Ø5Ø6)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		

	sS(3-14)	= P(0-11)Sxp	
	rS(")	= $\overline{P}$(") "	
Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= TrCxm	Tr thru Tp
	sHt	= CpTr(Kp)$\overline{K0}\overline{\emptyset 2}$	Parity error
	rIa	= TrF1	
	rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)	
Tp	rA00	= TpEndGO	
	rB00	= (")	
	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity
	rF(1,2)	= TpEnd$\overline{Sk}$	∅0 next if $\overline{Sk}$
	sF3	= TpSk	∅7 next if Sk
	Oc	= TpEnd$\overline{Sk}$	
	sO2	= Oc	
	rO(1,3,4,5,6)	= Oc	NOP (20) → O

Ø7	T8	End	= F1F2	Last cycle	
		sHz	= T8	Initiate - X → X	
		sIa	= T8SkØ7IjKr	Initiate P register increment	
		Xnr	= 03040506Ø7		
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
		sXw(1-3)	= Ha(1-3)03040506Ø7Ts		
		rXw(")	= Ha(") "	X + 1 → X =	T7 thru T0
		Hx(1-3)	= Xn(1-3)03	- X → X	
		Hx(")	= Xn(") "		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "	P13, P14 contain P1, P2 at T3	
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rCp	= TsT0HtK0(F1030406)Ø2		
		rSk	= Ø7T0		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
	Tp	rA00	= TpEndGO		
		rB00	= (")		
		sCp	= M24CxmHtTsTp	Parity error	
		rF(1-3)	= TpEndSk	Ø0 next clock (T8)	
		Oc	= (")		
		sO2	= Oc		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	

75		LDB	Load B	(M) → B	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4}}$Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØOJu$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO•Ix	Adder input if Ix (indexing)	T7 thru T0
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru T0
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(") "		
		sCz	= KzQ1T0$\overline{\text{Ø7}}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2}}$$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2}}$$\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	T0	rCz	= $\overline{\text{F1}}$T0		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)O2O3		
		sHt	= CpTr$\overline{\text{Kp}}$K0$\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rK0	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)0304		
		sF2	= (")0301	Ø6 next clock (T8)	

Ø6	T8	Bnr	= 0102030405Ø6Ø6		
		sIa	= T8F1F3I1Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= 0102030405Ø6Ar3Ø6C(21-23)		
		rB(")	= " " C(")	(M) → B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "	B + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= B(21-23)Ø6Ø2Ø4		
		Xz(")	= B(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6Ø3	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕Kp⊕K0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp      Initiate parity
    rF(1,2)         = TpEndSk           Ø0 next clock (T8)
    Oc              = (  "  )
    s02             = Oc
    rO(1,3,4,5,6)   = Oc                NOP (20) → 0
```

76		LDA	Load A	(M) → A	2 Cycles
Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8IaGO)C2		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= C4Oxc		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= F1F2(TsQ1)		
		sC(0-2)	= Add(1-3)ØØJuTsCr3		
		rC(")	= Add(") "	C+X•Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Xz(1-3)	= Xn(1-3)Ø0•Ix	Adder input if Ix (indexing)	
		Xz(")	= Xn(")ØØIx+Ix		T7 thru TO
		Yz(1-3)	= C(21-23)Ø7	Adder input (C)	T7 thru TO
		Yz(")	= C(") "		
		sCz	= KzQ1TOØ7	Carry for Adder	T7 thru T1
		rCz	= KzQ1		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4F1F2Inr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3F1F2Ju		
		sS(1,2)	= Add(2,3)Sxc	C+X•Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= F1TO		
	Tr	Cxm	= JuØOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch Operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØO)O2O3		
		sHt	= CpTrKpKOØ2	Parity error	
		rIx	= Tr(F1F3)(GOHt)		
		rKO	= GOTrF2		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	
		sF1	= (TpIaØ0)0304		
		sF2	= (")0301	Ø6 next clock (T8)	

Ø6	T8	Anr	= 0102030405$\overline{06}$Ø6		
		sIa	= T8F1$\overline{F3}$($\overline{I3}$⊕Kr)	Initiate P register increment	
		End	= F1$\overline{F2}$	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= C(21-23)0102030405$\overline{06}$Ø6		
		rA(")	= $\overline{C}$(") "	(M) → A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1$\overline{F3}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)Ø6$\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= B(21-23)Ø60204		
		$\overline{Xz}$(")	= $\overline{B}$(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1F1$\overline{Ø7}$	Carry logic	T7 thru T0
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$$\overline{Ts}$$\overline{Ht}$Q1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02040506}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= $\overline{Sc}$	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02040506}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	Tr	Cxm	= End$\overline{GO}$$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr$\overline{Kp}$$\overline{K0Ø2}$	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp      Initiate parity
    rF(1,2)         = TpEndSk           ∅0 next clock (T8)
    0c              = (  "  )
    s02             = 0c
    r0(1,3,4,5,6)   = 0c                NOP (20) → 0
```

77		EAX	Effective Address to X	M → X	2 Cycles
Ø0	T8	rCz	= ØØT8		
		sEax	= (ØØT8$\overline{\text{IaGO}}$)C3C4C5C6C7C8$\overline{\text{C9}}$		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{IaGO}}$)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction ↔ O	
		rO2	= $\overline{\text{C4Oxc}}$		
	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= $\overline{\text{Add}}$(1-3)ØO$\overline{\text{Ju}}$$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (X·Ix)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{T0Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{Kz}}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1$\overline{\text{F1F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
		Xnr	= Eax$\overline{\text{Ju}}$		
		sX(0-2)	= (")Add(1-3)$\overline{\text{Q6}}$	C + X·Ix → X	T7 thru T3
		rX(")	= (")$\overline{\text{Add}}$(")"		
	T4	Sc	= T4$\overline{\text{F1F2Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	rEax	= $\overline{\text{Ju}}$T3		
		Sxc	= T3$\overline{\text{F1F2Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
		sXw1	= EaxQ6Xn1	Recirculate X10	
		rXw1	= EaxQ6$\overline{\text{Xn1}}$		
	T2	sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	Recirculate X	T2 on
		rXw(")	= $\overline{\text{Xn}}$(") "		
	TO	rCz	= $\overline{\text{F1T0}}$		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø0$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sCz	= (TrØ0)O2O3		

	sHt	= CpTrKpK0Ø2	Parity error
	rIx	= Tr(F1F3)(GOHt)	
	rK0	= GOTr	
Tp	sCp	= M24CxmHtTsTp	Initiate parity
	sF1	= (TpIaØ0)0304	
	sF2	= (")0301	Ø6 next clock (T8)

Ø6	T8	sIa	= T8F1F3(C)Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)ĀnrAr3		
		rA(")	= Ā(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= Ā(") "		
		sB(0-2)	= B(21-23)B̄nrAr3		
		rB(")	= B̄(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B̄(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6T̄sCr3		
		rC(")	= Ād̄d(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C̄(") "		
		Xz(1-3)	= A(21-23)Ø6Ō204		
		X̄z(")	= Ā(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		Ȳz(")	= C̄(") "		
		sCz	= KzQ1F1Ø7	Carry logic	T7 thru T0
		rCz	= K̄zQ1		
		sCp	= (C21⊕C22⊕C23)C̄pT̄sH̄tQ1Ø6Ø3	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(02040506)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P̄(") "		
		rIa	= (P12P13P14)Q2F1		
	T4	Sc	= T4EndĪnr	Clear S	
		rS(1-14)	= S̄c		
	T3	Sxp	= T3ĪntEndGO		
		sS1	= (P13⊕P14Ia)F1GO(02040506)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P̄(") "		
	Tr	Cxm	= EndGOT̄sm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕Cp⊕Ø6Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp          Initiate parity
    rF(1,2)         = TpEndSk               Ø0 next clock (T8)
    0c              = (  "  )
    s02             = 0c
    r0(1,3,4,5,6)   = 0c                    NOP (20) → 0
```

Programmed Operator (C2) — P → Location 0; C(2-8) → P — 2 Cycles

Ø0	T8	rCz	= ØØT8		
		sEax	= $\overline{Ia}$GOC2ØØT8		
		sJu	= "		
	T7	Ar3	= $\overline{(0102030 4)}$Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2Ts}$Q1		
		sC0	= (P12)Ju$\overline{Ts}$Cr3$\overline{Q6}$		
		rC0	= (") "		
		sC(1,2)	= P(13,14)Ju$\overline{Ts}$Cr3Q2	P(1-14) → C(10-23)	T7 thru T3
		rC(")	= $\overline{P}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		$\overline{Xz}$(1-3)	= $\overline{Ix}$		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input (C)	
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= Kz$\overline{Ø7}$Q1$\overline{T0}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{CpTsHtF1F2}$Q1	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Mxc	= Eax$\overline{Tsm}$		T7 thru Tp
		Pr3	= JuQ2		
		sP(0-2)	= C(6-8)Eax(T6+T7)Pr3		
		rP(")	= $\overline{C}$(") "		
		sP(3-14)	= P(0-11)Pr3	C(3-8) → P	T7 thru T6
		rP(")	= $\overline{P}$(") "		
	T5	sP2	= EaxT5	C2 → P	
	T4	Sc	= $\overline{Inr}$F1F2T4	Clear S	
		rS(1-14)	= Sc		
	T3	sC0	= $\overline{Ts}$EaxCr3T3	C9 set	
		rM(0-24)	= T3		
	T2	sC(0-2)	= E2m(0-2)(Ju$\overline{Ts}$Cr3)T2	Contents of Bank Register 2 → C(6-8)	
		rC(")	= $\overline{E2m}$(")(") "		
	T1	sC(0-2)	= E3m(0-2)(Ju$\overline{Ts}$Cr3)T1	Contents of Bank Register 3 → C(3-5)	
		rC(")	= $\overline{E3m}$(")(") "		
	T0	rCz	= $\overline{F1}$T0		
		sC0	= Of(Ju$\overline{Ts}$Cr3)T0		
		rC0	= $\overline{Of}$(") "	Sign of C = Of	
		rC(1,2)	= (Ju$\overline{Ts}$Cr3)T0	No input to C1, 2	
	Tr	sHt	= CpTrKp$\overline{K0}$Ø2	Parity error	
	Tp	rEax	= Tp		
		sF(1-3)	= EaxTp	Ø7 next cycle (T8)	
		rJu	= Tp		
		sM(0-24)	= C(0-24)MxcTp	C → M(P → Location 0)	

Ø7	T8	End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= P(12-14)IaF1GO(02040506)Pr3		
		rP(")	= P(") " (") "	Recirculate P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS(1,2)	= P(13,14)IaF1GO(02040506)Sxp	P(13,14) contains P(1,2) at T3	
		rS(")	= P(") " (") "	P → S	
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGOTsm(Tr+Tp)	M → C (Fetch next instruction)	
		sC(0-23)	= M(0-23)Cxm		Tr thru Tp
		rC(")	= TrCxm		
		rIa	= F1Tr		
		rIx	= Tr(F1F3)(GOHt)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next	
		Oc	= TpEndSk		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

Indirect Addressing, 1 Level (Ia) (M) → P 1 Cycle

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIa	= $\overline{C2}$C9(C5+C8+C3C4)ØØT8		
		sIx	= C1GOØØT8	Initialize indexing	
		Oxc	= $\overline{Ia}$GO$\overline{C2}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	C(3-8) → O instruction to O register	
		rO2	= OxcC4		
	T7	Ar3	= ($\overline{O5}\overline{F1}\overline{F2}$+($\overline{O1}$O2$\overline{O3}$O4))Q1	(All instructions except 66 & 67)	
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{Ts}$ØØQ1		
		sC(0-2)	= Add(1-3)Cr3$\overline{JuTs}$	C + X·Ix → C	T7 thru T0
		rC(")	= $\overline{Add}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{CpTs}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Parity check	T7 thru T0
		rCp	= (")Cp "		
		Xz(1-3)	= Xn(1-3)ØØIx	Xz input to adder (X·Ix)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$		T7 thru Tp
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Yz input to adder (C)	T7 thru Tp
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{TO}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= $\overline{JuT3}$	C(10-23) → S	
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{JuTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= CxmTr		
		sHt	= CpTr⊕Kp$\overline{KOØ2}$	Parity error	
		rIx	= ($\overline{F1}$F3)($\overline{GO}$Ht)Tr		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	

Oxc is inhibited for next cycle because the instruction is already in the O register and is now ready to be executed.

Indirect Addressing, 2 Levels (Ia) ((M)) → P — 2 Cycles

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIa	= $\overline{C2}$C9(C5+C8+C3C4)ØØT8		
		sIx	= C1GOØØT8	Initialize indexing	
		Oxc	= $\overline{Ia}$GO$\overline{C2}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	C(3-8) → O instruction to O register	
		rO2	= Oxc$\overline{C4}$		
	T7	Ar3	= ($\overline{O5}\overline{F1}\overline{F2}$+($\overline{O1}$O2$\overline{O3}$O4))Q1	(All instructions except 66 & 67)	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{Ts}$ØQ1		
		sC(0-2)	= Add(1-3)Cr3$\overline{JuTs}$	C + X·Ix → C	T7 thru TO
		rC(")	= $\overline{Add}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Parity check	T7 thru TO
		rCp	= (")Cp "		
		Xz(1-3)	= Xn(1-3)ØOIx	Xz input to adder (X·Ix)	
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+$\overline{Ix}$		T7 thru Tp
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Yz input to adder (C)	T7 thru Tp
		Yz(")	= $\overline{C}$(") "		
		sCz	= KzQ1$\overline{TO}$	Carry logic	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
	T4	Sc	= $\overline{Inr}\overline{F1}\overline{F2}$T4	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= $\overline{Ju}$T3		
		sS(1,2)	= Add(2,3)Sxc	C(10-23) → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{JuTsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= CxmTr		
		sHt	= CpTr⊕Kp$\overline{KOØ2}$	Parity error	
		rIx	= ($\overline{F1}$F3)($\overline{GO}$Ht)Tr		
		rRc	= Tr		
	Tp	sCp	= M24Cxm$\overline{Ht}\overline{Ts}$Tp	Initiate parity	

00	T8	rCz	= 00T8		
		sHz	= T8		
		sIa	= C2C9(C5+C8+C3C4)00T8		
		rIa	= 00T8C9Ia		
		sIx	= C1G0Ø0T8	Initialize indexing	
	T7	Ar3	= (05F1F2+(0102030 4))Q1	(All instructions except 66 & 67)	
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= TsØ0Q1		
		sC(0-2)	= Add(1-3)Cr3JuTs		
		rC(")	= Add(") "	C + X·Ix → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Xz(1-3)	= Xn(1-3)Ø0Ix	Xz input to adder (X·Ix)	
		Xz(")	= Xn(")Ø0Ix+Ix		T7 thru Tp
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Yz input to adder (C)	T7 thru Tp
		sCz	= KzQ1T0		
		rCz	= KzQ1	Carry logic	T7 thru T1
	T4	Sc	= InrF1F2T4		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= JuT3		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C(10-23) → S	
	T0	rCz	= F1T0		
	Tr	Cxm	= JuTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm		
		rC(")	= CxmTr	M → C (Fetch operand)	Tr thru Tp
		sHt	= CpTr⊕KpK0Ø2	Parity error	
		rIx	= (F1F3)(G0Ht)Tr		
		rRc	= Tr		
	Tp	sCp	= M24CxmHtTsTp	Initiate parity	

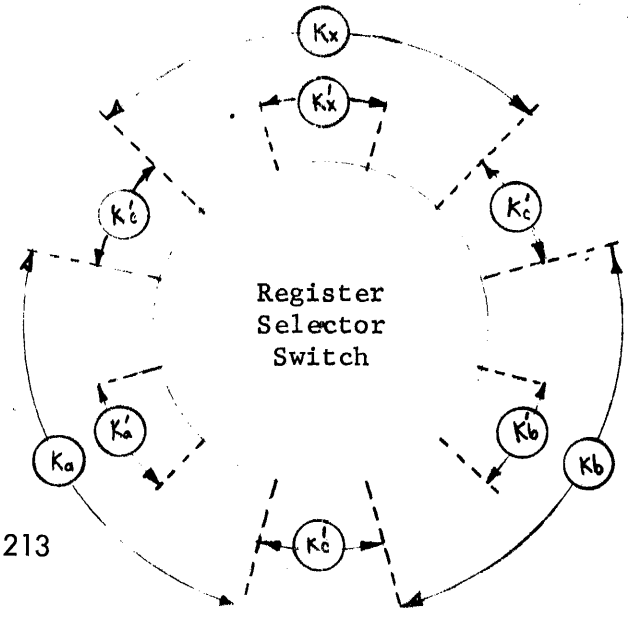
Oxc is inhibited for next cycle because the instruction is already in the O register and is now ready to be executed.

A Register Selection - Computer in "IDLE" ($\overline{GO}\overline{Ht}$) with C Register Selected (Kc')

Ø0	T8	rC24	= T8($\overline{Ts}\overline{Tsr}$)	
		rCz	= Ø0T8	
		sF1	= T8$\overline{GO}$	Ø5 next (T7)
		sF3	= T8$\overline{GO}$	
		rHt	= T8(Ks)(Kg)$\overline{Cp}\overline{GO}$	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (01020$\overline{3}$304)Q1	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		End	= Ø5($\overline{A00}$+$\overline{GO}$)	last cycle
		sXw(1-3)	= Xn(1-3)$\overline{Xnr}$	Recirculate X
		rXw(")	= $\overline{Xn}$(") "	
	T4	Sc	= T4(End+$\overline{F1}\overline{F2}$)$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	Tr	rIa	= TrF1	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
		rRc	= Tr	
	Tp	rF1	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)
		rF3	= (")	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{Sk}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

The C register is being displayed. The following shows what takes place when the Register Selector Switch is placed on A.

(Ka) encludes (Ka')
(Kb) " (Kb')
(Kc) " (Kc')
(Kx) " (Kx')



Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= Ø0T8	
		sF1	= T8GO	
		sF3	= T8GO	Ø5 next (T7)
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		End	= Ø5(AOO+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	Recirculate X
		rXw(")	= Xn(") "	
	T4	Sc	= T4(End+F1F2)Inr	Clear S
		rS(1-14)	= Sc	
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	sEx	= (TsTpGOHt)AOOKaKsKg	initiate exchange between A and C
		rF1	= TpEndSk	Ø0 next clock (T8)
		rF3	= (")	
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → 0
		sO2	= Oc	

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light	
		sHz	= T8		
Ø5	T7	Ar3	= $\overline{(\text{O1O2O3O4})}$Q1		
		Anr	= ExKa		
		sA(0-2)	= C(21-23)ExKaAr3	C → A	T7 thru T0
		rA(")	= $\overline{\text{C}}$(") "		
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= Ex($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= A(21-23)ExKa$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{A}}$(") "	A → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	Recirculate X	
		rXw(")	= $\overline{\text{Xn}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1}}$$\overline{\text{F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T0	sA00	= ExT0$\overline{\text{A00}}$Ka		
	Tr	rIa	= Tr$\overline{\text{F1}}$		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rEx	= ExTp		
		rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= ØØT8	
		sF1	= T8GO	Ø5 next (T7)
		sF3	= T8GO	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		End	= Ø5(AØØ+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	Recirculate X
		rXw(")	= Xn(") "	
	T4	Sc	= T4(End+F1F2)Inr	Clear S
		rS(1-14)	= Sc	
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	rF1	= TpEndSk	Ø0 next clock (T8)
		rF3	= (")	
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → 0
		sO2	= Oc	

The A register is now being displayed. The following shows what takes place when the Register Selector Switch is returned to C.

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	Recirculate X	
		rXw(")	= $\overline{\text{Xn}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	sEx	= ($\overline{\text{Ts}}$Tp$\overline{\text{GOHt}}$)($\overline{\text{A00B00}}$)Kc	initiate exchange between A and C.	
		rF1	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= T8GO	Ø5 next (T7)	
		sF3	= T8GO		
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		Anr	= ExA00B00		
		sA(0-2)	= C(21-23)ExA00B00Ar3	C → A	T7 thru T0
		rA(")	= C(") "		
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ex(TsQ1)		
		sC(0-2)	= A(21-23)ExA00B00TsCr3		
		rC(")	= A(") "	A → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		End	= Ø5(A00+GO)	last cycle	
		sXw(1-3)	= Xn(1-3)Xnr	Recirculate X	
		rXw(")	= Xn(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T0	rA00	= ExT0A00		
	Tr	rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rEx	= ExTp		
		rF1	= TpEndSk	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= ØØT8		
		sF1	= T8GO		
		sF3	= T8GO	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (Ø1Ø2Ø3Ø4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		End	= Ø5(A00+GO)	last cycle	
		sXw(1-3)	= Xn(1-3)Xnr	Recirculate X	
		rXw(")	= Xn(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rF1	= TpEndSk	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The computer is now in normal "IDLE" mode with C being displayed.

B Register Selection - Computer in "IDLE" ($\overline{GO}\overline{Ht}$) with C Register Selected (Kc').

Ø0	T8	rC24	= T8($\overline{Ts}\overline{Tsr}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{GO}$	Ø5 next (T7)	
		sF3	= T8$\overline{GO}$		
		rHt	= T8(Ks)(Kg)$\overline{Cp}\overline{GO}$	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= ($\overline{O1}\overline{O2}\overline{O3}\overline{O4}$)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ø5($\overline{A00}$+$\overline{GO}$)	last cycle	
		sXw(1-3)	= Xn(1-3)$\overline{Xnr}$	Recirculate X	
		rXw(")	= $\overline{Xn}$(") "		
	T4	Sc	= T4(End+$\overline{F1}\overline{F2}$)$\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= Tp$\overline{Ø1}$($\overline{GO}$Ht)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{Sk}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → 0	
		sO2	= Oc		

The C register is being displayed. The following shows what takes place when the Register Selector Switch is placed on B.

(Ka) encludes (Ka')
(Kb) " (Kb')
(Kc) " (Kc')
(Kx) " (Kx')

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= ØØT8	
		sF1	= T8GO	
		sF3	= T8GO	Ø5 next (T7)
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		End	= Ø5(A00+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	
		rXw(1-3)	= Xn(") "	Recirculate X
	T4	Sc	= T4(End+F1F2)Inr	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	sEx	= (TsTpGOHt)B00KbKsKg	initiate exchange between B and C
		rF1	= TpEndSk	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= Ø0T8	
		sF1	= T8GO	Ø5 next (T7)
		sF3	= T8GO	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		Bnr	= ExKb	
		sB(0-2)	= C(21-23)ExKbAr3	
		rB(")	= C(") "	C → B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		Cr3	= Ex(TsQ1)	
		sC(0-2)	= B(21-23)ExKbTsCr3	
		rC(")	= B(") "	B → C T7 thru T0
		sC(3-23)	= C(0-20)Cr3	
		rC(")	= C(") "	
		End	= Ø5(AOO+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	Recirculate X
		rXw(")	= Xn(") "	
	T4	Sc	= T4(End+F1F2)Inr	Clear S
		rS(1-14)	= Sc	
	T0	sBOO	= ExTOBOOKbAr3	
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	rEx	= ExTp	
		rF1	= TpEndSk	Ø0 next clock (T8)
		rF3	= (")	
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		sF3	= T8$\overline{\text{GO}}$		
		rHt	= T8$\overline{\text{KsKgCpGO}}$	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{AOO}}$+$\overline{\text{GO}}$)	last cycle	
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	Recirculate X	
		rXw(")	= $\overline{\text{Xn}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The B register is now being displayed. The following shows what takes place when the Register Selector Switch is returned to C.

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= Ø0T8	
		sF1	= T8GO	
		sF3	= T8GO	Ø5 next (T7)
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	
		sA(3-23)	= A(0-20)Ar3	Recirculate A T7 thru T0
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	
		sB(3-23)	= B(0-20)Ar3	Recirculate B T7 thru T0
		rB(")	= B(") "	
		End	= Ø5(A00+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	
		rXw(")	= Xn(") "	Recirculate X
	T4	Sc	= T4(End+F1F2)Inr	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	sEx	= (TsTpGOHt)(A00B00)Kc	initiate exchange between B and C.
		rF1	= TpEndSk	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= T8GO		
		sF3	= T8GO	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (0102O304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		Bnr	= ExA00B00		
		sB(0-2)	= C(21-23)ExA00B00Ar3		
		rB(")	= C(") "	C → B	T7 thru T0
		Cr3	= Ex(TsQ1)		
		sC(0-2)	= B(21-23)ExA00B00TsCr3		
		rC(")	= B(") "	B → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		End	= Ø5(A00+GO)	last cycle	
		sXw(1-3)	= Xn(1-3)Xnr		
		rXw(")	= Xn(") "	Recirculate X	
	T4	Sc	= T4(End+F1F2)Inr		
		rS(1-14)	= Sc	Clear S	
	T0	rB00	= ExT0B00		
	Tr	rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rEx	= ExTp		
		rF1	= TpEndSk		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → 0	
		sO2	= Oc		

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= Ø0T8	
		sF1	= T8GO	
		sF3	= T8GO	Ø5 next (T7)
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	
		sA(3-23)	= A(0-20)Ar3	Recirculate A T7 thru T0
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	
		sB(3-23)	= B(0-20)Ar3	Recirculate B T7 thru T0
		rB(")	= B(") "	
		End	= Ø5(A00+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	
		rXw(")	= Xn(") "	Recirculate X
	T4	Sc	= T4(End+F1F2)Inr	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	rF1	= TpEndSk	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

The Computer is now in normal "IDLE" mode with C being displayed.

X Register Selection - Computer in "IDLE" ($\overline{GO}\overline{Ht}$) with C Register Selected (Kc').

Ø0	T8	rC24	= T8($\overline{Ts}\overline{Tsr}$)	
		rCz	= Ø0T8	
		sF1	= T8$\overline{GO}$	Ø5 next (T7)
		sF3	= T8$\overline{GO}$	
		rHt	= T8(Ks)(Kg)$\overline{Cp}\overline{GO}$	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (Ø1Ø2$\overline{Ø3}$Ø4)Q1	
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		End	= Ø5($\overline{A00}$+$\overline{GO}$)	last cycle
		sXw(1-3)	= Xn(1-3)$\overline{Xnr}$	Recirculate X
		rXw(")	= $\overline{Xn}$(") "	
	T4	Sc	= T4(End+$\overline{F1}\overline{F2}$)$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	Tr	rIa	= TrF1	
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)	
		rRc	= Tr	
	Tp	rF1	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)
		rF3	= (")	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{Sk}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

The C register is being displayed. The following shows what takes place when the Register Selector Switch is placed on X.

(Ka) encludes (Ka')

(Kb) " (Kb')

(Kc) " (Kc')

(Kx) " (Kx')

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)	
		rCz	= Ø0T8	
		sF1	= T8$\overline{\text{GO}}$	Ø5 next (T7)
		sF3	= T8$\overline{\text{GO}}$	
		rHt	= T8KsKgCp$\overline{\text{GO}}$	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1	
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3	
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{\text{A}}$(") "	
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3	
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{\text{B}}$(") "	
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	
		rXw(")	= $\overline{\text{Xn}}$(") "	Recirculate X
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)	
		rRc	= Tr	
	Tp	sEx	= ($\overline{\text{Ts}}$TpGOHt)$\overline{\text{B00}}$KsKsKg	initiate exchange between X and C
		rF1	= TpEnd$\overline{\text{Sk}}$	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{\text{Sk}}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= Ex($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Xn(1-3)ExKx$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Xn}}$(") "	X → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		Xnr	= ExKx		
		sXw(1-3)	= C(21-23)ExKx$\overline{\text{Ts}}$	C → X	T7 thru T0
		rXw(")	= $\overline{\text{C}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$		
		rS(1-14)	= Sc	Clear S	
	T0	sA00	= T0Ex$\overline{\text{A00}}$Kx		
		sB00	= Ar3T0Ex$\overline{\text{B00}}$Kx		
	Tr	rIa	= Tr$\overline{\text{F1}}$		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rEx	= ExTp		
		rF1	= TpEnd$\overline{\text{Sk}}$		
		rF3	= (")	Ø0 next clock (T8)	
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)	Ø5 next (T7)
		rCz	= Ø0T8	
		sF1	= T8$\overline{\text{GO}}$	
		sF3	= T8$\overline{\text{GO}}$	
		rHt	= T8KsKgCp$\overline{\text{GO}}$	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1	
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3	
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{\text{A}}$(") "	
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3	
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{\text{B}}$(") "	
		End	= Ø5($\overline{\text{AOO}}$+$\overline{\text{GO}}$)	last cycle
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	
		rXw(")	= $\overline{\text{Xn}}$(") "	Recirculate X
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr($\overline{\text{F1}}$F3)($\overline{\text{GO}}$Ht)	
		rRc	= Tr	
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GO}}$Ht)	
		rJu	= Tp	
		Oc	= TpEnd$\overline{\text{Sk}}$	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

The X register is now being displayed. The following shows what takes place when the Register Selector Switch is returned to C.

Ø0	T8	rC24	= T8(TsTsr)	
		rCz	= Ø0T8	
		sF1	= T8GO	
		sF3	= T8GO	Ø5 next (T7)
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)
		sHz	= T8	
Ø5	T7	Ar3	= (O1O2O3O4)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= A(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= A(") "	
		sB(0-2)	= B(21-23)BnrAr3	
		rB(")	= B(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= B(") "	
		End	= Ø5(AOO+GO)	last cycle
		sXw(1-3)	= Xn(1-3)Xnr	
		rXw(")	= Xn(") "	Recirculate X
	T4	Sc	= T4(End+F1F2)Inr	
		rS(1-14)	= Sc	Clear S
	Tr	rIa	= TrF1	
		rIx	= Tr(F1F3)(GOHt)	
		rRc	= Tr	
	Tp	sEx	= (TsTpGOHt)(AOOBOO)Kc	initiate exchange between X and C.
		rF1	= TpEndSk	
		rF3	= (")	Ø0 next clock (T8)
		rRf	= TpØ1(GOHt)	
		rJu	= Tp	
		Oc	= TpEndSk	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O
		sO2	= Oc	

Ø0	T8	rC24	= T8(TsTsr)		
		rCz	= Ø0T8		
		sF1	= T8GO		
		sF3	= T8GO	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B(") "		
		Cr3	= Ex(TsQ1)		
		sC(0-2)	= Xn(1-3)ExA00B00TsCr3		
		rC(")	= Xn(") "	X → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		End	= Ø5(A00+GO)	last cycle	
		Xnr	= A00B00Ex		
		sXw(1-3)	= C(21-23)A00B00Ex	C → X	T7 thru T0
		rXw(")	= C(") "		
	T4	Sc	= T4(End+F1F2)Inr	Clear S	
		rS(1-14)	= Sc		
	T0	rA00	= ExT0A00		
		rB00	= ExT0B00Ar3		
	Tr	rIa	= TrF1		
		rIx	= Tr(F1F3)(GOHt)		
		rRc	= Tr		
	Tp	rEx	= ExTp		
		rF1	= TpEndSk	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= TpØ1(GOHt)		
		rJu	= Tp		
		Oc	= TpEndSk		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

Ø0	T8	rC24	= T8($\overline{\text{TsTsr}}$)		
		rCz	= Ø0T8		
		sF1	= T8$\overline{\text{GO}}$		
		sF3	= T8$\overline{\text{GO}}$	Ø5 next (T7)	
		rHt	= T8KsKgCpGO	initiate idle (also reset halt light)	
		sHz	= T8		
Ø5	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		End	= Ø5($\overline{\text{A00}}$+$\overline{\text{GO}}$)	last cycle	
		sXw(1-3)	= Xn(1-3)$\overline{\text{Xnr}}$	Recirculate X	
		rXw(")	= $\overline{\text{Xn}}$(") "		
	T4	Sc	= T4(End+$\overline{\text{F1F2}}$)$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	Tr	rIa	= TrF1		
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rRc	= Tr		
	Tp	rF1	= TpEnd$\overline{\text{Sk}}$	Ø0 next clock (T8)	
		rF3	= (")		
		rRf	= Tp$\overline{\text{Ø1}}$($\overline{\text{GOHt}}$)		
		rJu	= Tp		
		Oc	= TpEnd$\overline{\text{Sk}}$		
		rO(1,3,4,5,6)	= Oc	NOP (20) → O	
		sO2	= Oc		

The Computer is now in normal "IDLE" mode with C being displayed.

03	UDI	Same as Unconditional Branch
04	UDI	Same as Halt

05 UDI — Branch to Address Plus One, A,B,C Registers Change as in Divide (Ø1). — 5 Cycles

Ø0	T8	rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initialize indexing	
		sJu	= $\overline{Ia}$GO$\overline{C4}\overline{C5}$C8$\overline{C9}$T8		
		Oxc	= $\overline{Ia}$GO$\overline{C2}$ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= $\overline{C4}$Oxc		
	T7	sA00	= ØØT7A0	Set A00 = sign of A	
		Ar3	= $\overline{F1F2}\overline{O5}$Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		End	= Ju$\overline{Eax}\overline{O1}$	Last cycle	
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC0	= (P12)Ju$\overline{Ts}$Cr3$\overline{Q6}$		
		rC0	= ($\overline{\ \ }$) "		
		sC(1,2)	= P(13,14)Ju$\overline{Ts}$Cr3Q2	P(1-14) → C(10-23)	T7 thru T3
		rC(")	= $\overline{P}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1F2}$		
		rCp	= (")Cp "	Parity check	T7 thru T0
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)Ju$\overline{Eax}$Pr3		
		rP(")	= $\overline{Add}$(") "	C + X•Ix → P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		Xz(1-3)	= Xn(1-3)ØØIx		
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØØIx+$\overline{Ix}$	Input to adder (X•Ix)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Input to adder (C)	T7 thru T0
		sCz	= KzQ1$\overline{T0}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T1
	T4	Sc	= $\overline{Inr}\overline{F1F2}$T4		
		rS(1-14)	= Sc	Clear S	
	T3	rC0	= ($\overline{JuTs}$Cr3)Q4Q6	No input to C3, C6, C9	T3 thru T1
		Sxp	= $\overline{Int}$EndGOT3		
		sS(1,2)	= Add(2,3)(Ju$\overline{Eax}$)Sxp		
		sS(3-14)	= P(0-11)Sxp	P → S	
	T2	rC(1,2)	= ($\overline{JuTs}$Cr3)T2	No input to C7, C8	
	T1	sC(1,2)	= (JuTsCr3)Em(1,2)T1		
		rC(")	= (")$\overline{Em}$(") "	(C1,C2) is (C4,C5) at T1	
	T0	rCz	= $\overline{F1}$T0		
		sC0	= Of(Ju$\overline{Ts}$Cr3)T0		
		rC0	= $\overline{Of}$(") "	Set C0 if overflow	
		rC(1,2)	= ($\overline{JuTs}$Cr3)T0	No input to C1, C2	

Tr	Cxm	= EndGO$\overline{\text{Tsm}}$(Tr+Tp)	
	sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)
	rC(")	= CxmTr	Tr thru Tp
	sHt	= CpTrKpK0Ø2	Parity error
	rIx	= (F1F3)(GOHt)Tr	
	rRc	= Tr	
Tp	rA00	= EndGOTp	
	rB00	= (")	
	sCp	= M24CxmHtTsTp	Initiate parity
	sF3	= Ia0304Ø0Tp	Ø1 next clock (T8)
	rJu	= Tp	
	0c	= (0103Ia+EndSk)Tp	
	r0(1,3,4,5,6)	= 0c	
	s02	= 0c	NOP (20) → 0

Ø1	T8	Anr	= Ø1$\overline{05}$		
		Bnr	= Ø1$\overline{05}$		
		Ck	= Ø1T8$\overline{C0}\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C if C $\geqslant$ 0	
		rC(")	= C(") "		
		sCz	= Ø1T8$\overline{C0}$		
		sHz	= T8	Initiate -B if A-	
		sIx	= Ø1T8C0	Set Ix = sign of (M)	
	T7	Ar3	= $\overline{F1F2}\overline{05}$Q1		
		sA(0-2)	= (Ha(1-3)A00+B(21-23)$\overline{A00}$)Ø1$\overline{05}$Ar3		
		rA(")	= ($\overline{Ha}$(") " +$\overline{B}$(") ") "	$\overline{B}$ $\rightarrow$A if A $\geqslant$ 0 $\overline{B}$ + 1 $\rightarrow$A if A < 0	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		Hx(1-3)	= $\overline{B}$(21-23)Ø1		
		$\overline{Hx}$(")	= B(") "	Half adder inputs ($\overline{B}$+1)	T7 thru T0
		sB(0-2)	= Add(1-3)Ø1$\overline{05}$Ar3		
		rB(")	= $\overline{Add}$(") "		
		sB(3-23)	= B(0-20)Ar3	|A| - |C| $\rightarrow$B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		Xz(1-3)	= (A(21-23)$\overline{A00}$+$\overline{A}$(21-23)A00)Ø1		
		$\overline{Xz}$(")	= ($\overline{A}$(") " +A(") ")"	Adder input (|A|)	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input (|C|)	T7 thru T0
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= C(21-23)$\overline{F1F2}$F3$\overline{Ts}$Cr3		
		rC(")	= $\overline{C}$(") "		
		sC(3-23)	= C(0-20)Cr3	Recirculate C	T7 thru T0
		rC(")	= $\overline{C}$(") "		
		sCp	= (C21$\oplus$C22$\oplus$C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1F2}$		
		rCp	= (")$\overline{Cp}$ "	Check parity	T7 thru T0
	T6	sRf	= Ø1($\overline{Q3Q6}$)($\overline{B0B1B2A0A1A2Bc23}$)	$\overline{Rf}$ means 0 $\leqslant$ A,B = |C|	T6 thru Tp
	T4	Sc	= T4$\overline{F1F2}\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc		
		rS(")	= $\overline{Add}$(") "	Junk input to C	
		sS(3-14)	= C(0-11)Sxc		
		rS(")	= $\overline{C}$(") "		
	Tr	sBc23	= Ø1TrHzA00	Set Bc23 if B = 0 and A < 0	
		sHt	= CpTr$\overline{Kp}\overline{K0}$Ø2	Parity error	
	Tp	sF2	= Ø1Tp	Ø3 next	
		Sc	= Ø1Tp		
		rS(1-14)	= Sc	Clear S	

Ø1 same as for a Divide instruction.

Ø3	T7	Ar3	= $\overline{(0102\overline{0}3\overline{0}4)}$Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Reciruclate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
	T0	rCp	= $\overline{\text{TsHtK}}$0(F1+F2)($\overline{\text{Ø7Ø4Ø6Ø2}}$)T0		
		rCz	= $\overline{\text{F1}}$T0		
	Tp	sSk	= Ø3$\overline{\text{0}}$5$\overline{\text{0}}$6Tp		
		sF1	= TpSk	Ø7 next clock (T8)	

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")"		
		End	= F1F2	Last cycle	
		sIa	= T8Ø7Sk(Ij)Kr	Initiate P register increment	
	T7	Cr3	= Ø7Ø5$\overline{Ts}$Q1		
		rC(0-2)	= "		
		sC(3-23)	= C(0-20)Cr3	O → C	T7 thru T0
		rC(")	= $\overline{C}$(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO($\overline{Ø2Ø4Ø5Ø6}$)Pr3		
		rP0	= ($\overline{\quad "\quad}$) "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= ($\overline{\quad "\quad}$) "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= ($\overline{\quad "\quad}$) "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T6	Xz(1-3)	= B(21-23)Ø7Ø5Ø6		
		Xz(")	= $\overline{B}$(") "	Adder input (B)	T6 thru Tr
		Yz3	= Ø7Bc23		
		rYz1	= Ø7$\overline{Rf}$		
		rYz2	= Ø7$\overline{KO}$	Adder input (Bc)	T6 thru Tr
		rYz3	= Ø7$\overline{Bc23}$		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3$\overline{Int}$EndGO		
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GO($\overline{Ø2Ø4Ø5Ø6}$)Sxp		
		rS(")	= $\overline{P}$(") " (") "	P(13,14) contains P(1,2) at T3	
		sS(3-14)	= P(0-11)Sxp	P → S	
		rS(")	= $\overline{P}$(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr(Kp)$\overline{KO}$Ø2	Parity error	
		rIa	= F1Tr		
		rIx	= Tr($\overline{F1F3}$)($\overline{GOHt}$)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity	
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next	

07 UDI — Branch to Address Plus One. (Phasing Similar to Left Shift, May Hang-up in Ø3 if Sk Doesn't Set) (Shift May Occur But it May be Dependent Upon Contents of P Register)

Ø0	T8	rCz	= ØØT8		
		sIx	= C1GOØØT8	Initialize indexing	
		sJu	= $\overline{C4}\overline{C5}$C8$\overline{C9}\overline{Ia}$GOØØT8		
		Oxc	= $\overline{C2}\overline{Ia}$GOØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	C(3-8) → O if not indirect addressi	
		rO2	= $\overline{C4}$Oxc		
	T7	sAOO	= AOØØT7	Save sign of A	
		Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		T7 thru T2
		sCO	= (P12)Ju$\overline{Ts}$Cr3$\overline{Q6}$		
		rCO	= ($\overline{\text{ " }}$) "		
		sC(1,2)	= P(13,14)Ju$\overline{Ts}$Cr3Q2	P(6-14) → C(15-23)	T7 thru T5
		rC(")	= $\overline{P}$(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		End	= Ju$\overline{Eax}$ØI		
		Xz(1-3)	= Xn(1-3)ØØIx	Adder input if Ix(indexing)	
		$\overline{Xz}$(")	= $\overline{Xn}$(") " +$\overline{Ix}$		T7 thru TO
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "	Adder input (C)	T7 thru TO
		sCz	= Kz$\overline{Ø7}$Q1$\overline{TO}$		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru TO
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$		
		rCp	= (")Cp "	Check parity	T7 thru TO
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)Ju$\overline{Eax}$Pr3		
		rP(")	= $\overline{Add}$(") "		
		sP(3-14)	= P(0-11)Pr3	C + X·Ix → P	T7 thru T3
		rP(")	= $\overline{P}$(") "		
	T5	sF3	= $\overline{Ia}$O3O4O5ØOQ4	Ø1 next clock (T8)	
Ø1	T4	sCO	= (C21$\overline{F1}\overline{F2}$F3+P12Ju$\overline{Q6}$)$\overline{Ts}$Cr3	Merge (P4+C12 → C15)	T4 only
		rCO	= ($\overline{C21}$ " +$\overline{P12}$ ") "	C(6,9) → C(9,12)	T3 thru T2
		sC(1,2)	= (C(22,23)$\overline{F1}\overline{F2}$F3+P(13,14)JuQ2)$\overline{Ts}$Cr3	Merge (P(2,3,5,6)+C(10,11,13,14) → C(13,14,16,17)	T4 thru T3
		rC(")	= ($\overline{C}$(") " +$\overline{P}$(") ") "	C(7,8) → C(10,11)	T2 only
		sC	=$\overline{Inr}\overline{F1}\overline{F2}$T4	Clear S	
		rS(1-14)	= Sc		
	T3	rCO	= Ju$\overline{Ts}$Cr3Q4Q6	No inputs to C6,C9	T3 thru T2

		Sxp	= (End+JuEax)IntT3	
		sS(1,2)	= Add(2,3)JuEaxSxp	
		rS(")	= Add(") "	
		sS(3-14)	= P(0-11)Sxp	P → S
		rS(")	= P(") "	
	T2	rC(1,2)	= JuTsCr3T2	No input C7,C8
		sF2	= 05Ø1Q2	Ø3 next clock (T8)
		Sx48	= (S6S7S8+S9S10)05Ø1T2	Shift ⩾ 48 bits
		rS(1-8)	= 05Ø1T2	Zero → S(1-8)
		sS(9,10)	= Sx48	Set count = 48 if shift ⩾ 48
		rS(11-14)	= Sx48	Leave count alone if shift < 48
		sSk	= (05Ø1T2)(S6S7...S14)	Count = zero
		sSk	= (")(A0⊕A1)C2	A,B normalized C2=C11(norm.bit) at T2
		rS14	= (")(")C2	Avoid clean up shift.
Ø3	T1	AL2	= 0506SkØ3	See instruction 67 (Ø3 T1)
		sB(22,23)	= A(0,1)AL2C405	" " " "
		rB(")	= A(") "	" " " "
		Sd2	= 0506SkØ3	" " " "
		sSk	= 05Sk(S9S10S11S12)S13Ø3	" " " "
		sSk	= 0506Sk(S9S10S11S12)S14Ø3	
	T0	rCz	= FIT0	
		sC0	= Of(JuTsCr3)T0	
		rC0	= Of(")T0	
		rC(1,2)	= (JuTsCr3)T0	No input to C1,C2
		rCp	= TsT0HtK0(F2Ø7Ø4Ø6)Ø2	Avoid erroneous parity error
		(refer Ø3 T1)		
	Tr	sHt	= CpTr(Kp⊕K0)Ø2	Parity error
		(refer Ø3 T1)		

If Sk is not set (Sk) the Computer will hang up in Ø3. If Sk sets before Tp, the Computer will remain in a dynamic halt until Tp occurs.

	Tp	Ar1	= (0506SkS14)Ø3Tp	See instruction 67 (Ø3 Tp)
		Br1	= (") "	" " " "
		sF1	= TpSk	Ø7 next clock (T8)
		rJu	= Tp	
		Oc	= EndSkTp	
		rO(1,3,4,5,6)	= Oc	NOP (20) → O if Sk
		sO2	= Oc	
		rRf	= (GOHt)Ø1Tp	Clear Rf

If Ø7 occurs Sk must be set and the instruction (07) is still in O.

Ø7	T8	Ck	= Ø7T8$\overline{Ts}$		
		sC(0-23)	= $\overline{C}$(0-23)Ck	Invert C	
		rC(")	= C(")Ck		
		End	= F1F2		
		sIa	= SkT8Ø7$\overline{I}$$\overline{Kr}$	Initiate P register increment	
		sBc23	= (Ø705T8)S14	Rf,K0,Bc23 form an Octal input to	
		sK0	= (")S7	Yz(1-3) from T8 thru T6 which	
		sRf	= (")S6	represent the negative number of shifts during normalize.	
	T7	Ar3	= Ø706Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Pr3	= (F1G0)Q2		
		sP0	= (")($\overline{0}$2040506)(P12⊕P13P14Ia)Pr3		
		rP0	= (")(")($\overline{P12⊕P13P14Ia}$) "		
		sP1	= (")(")(P13⊕P14Ia)Pr3		
		rP1	= (")(")($\overline{P13⊕P14Ia}$) "		
		sP2	= (")(")(P14⊕Ia)Pr3	P → S	T7 thru T3
		rP2	= (")(")($\overline{P14⊕Ia}$) "		
		rIa	= P12P13P14Q2F1		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		Xnr	= $\overline{0}$3(040506)$\overline{C}$5Ø7		
		sXw(1-3)	= Add(1-3)$\overline{0}$3(040506)$\overline{C}$5Ø7F1	X+S(2-7)+S14 → X	
		rXw(")	= $\overline{Add}$(") "	(X-number of shifts → X)	T7 thru T0
		Xz(1-3)	= Xn(1-3)IxØ705		
		$\overline{Xz}$(")	= $\overline{Xn}$(") "	Adder input (X)	T7 thru T0
		Yz1	= RfØ7		
		$\overline{Yz1}$	= $\overline{Rf}$Ø7	Adder input (S)	
		Yz2	= K0Ø7	Bits S3 thru S7 contains	
		$\overline{Yz2}$	= $\overline{K0}$Ø7	a negative count of the	
		Yz3	= Bc23Ø7	AL2's during normalize.	
		$\overline{Yz3}$	= $\overline{Bc23}$Ø7	S14 contains the clean up.	
		sBc23	= (Ø705T7)S5		
		rBc23	= (")$\overline{S5}$		
		sK0	= (")S4	Rf, K0 and Bc23 must	
		rK0	= (")$\overline{S4}$	be set for the next	
		sRf	= (")S3	clock	
		rRf	= (")$\overline{S3}$		

T6	sBc23	= (Ø705T6)S2		
	sK0	= (")S2	Extend minus sign for negative count to Yz	T5 thru T0
	sRf	= (")S2		
T4	Sc	= T4End$\overline{Inr}$		
	rS(1-14)	= Sc	Clear S	
T3	Sxp	= T3$\overline{Int}$End$\overline{GO}$		
	sS1	= (F1G0)($\overline{0}\overline{2}\overline{0}\overline{4}\overline{0}\overline{5}\overline{0}\overline{6}$)(P13⊕P14Ia)Sxp		
	sS2	= (")(")(P14⊕Ia)Sxp	P → S	
	sS(3-14)	= P(0-11)Sxp		
T0	rSk	= Ø7T0		
Tr	Cxm	= End$\overline{GO}$$\overline{Tsm}$(Tr+Tp)		
	sC(0-23)	= M(0-23)Cxm	M → C(Fetch next instruction)	
	rC(")	= CxmTr		Tr thru Tp
	rIa	= Tr$\overline{F1}$		
	rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
	rK0	= Ø7Tr		
	rA00	= TpEndGO		
Tp	sCp	= M24CxmTp$\overline{Ht}$$\overline{Ts}$	Initiate parity	
	rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next clock (T8)	
	rRf	= Tp$\overline{ØI}$($\overline{GO}$Ht)		
	Oc	= TpEnd$\overline{Sk}$		
	s02	= Oc		
	r0(1,3,4,5,6)	= Oc	NOP (20) → 0	

11		UDI	Similar to Parallel Output When Ready (Next instruction is found in location designated by operand)	(M) → Output Device	3 Cycles + Wait
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix		
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+$\overline{Ix}$	Adder input (XIx)	T7 thru T0
		Yz(1-3)	= C(21-23)Ø7		
		$\overline{Yz}$(")	= $\overline{C}$(")"	Adder input (C)	T7 thru
		sCz	= KzQ1$\overline{T0}$Ø7		
		rCz	= $\overline{Kz}$Q1	Carry logic	T7 thru T1
		sCp	= (C21⊕C22⊕C23)$\overline{CpTs}\overline{HtQ1F1F2}$		
		rCp	= (")Cp "	Check parity	T7 thru T0
	T4	Sc	= T4$\overline{F1F2Inr}$		
		rS(1-14)	= Sc	Clear S	
	T3	Sxc	= T3$\overline{F1F2Ju}$		
		sS(1,2)	= Add(2,3)Sxc		
		sS(3-14)	= C(0-11)Sxc	C + X·Ix → S	
	T0	rCz	= $\overline{F1}$T0		
	Tr	Cxm	= $\overline{Ju}$Ø0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr⊕Kp⊕K0Ø2	Parity error	
		rIx	= Tr($\overline{F1F3}$)($\overline{GO}$Ht)		
		rK0	= GOTr$\overline{F2}$		
	Tp	sCp	= M24Cxm$\overline{HtTs}$Tp	Initiate parity	
		sF2	= (Tp$\overline{Ia}$Ø0)O3$\overline{O2}$	Ø2 next clock (T8)	

Ø2	T7	Ar3	= $\overline{(0102\overline{03}04)}Q1$		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{B}$(") "		
		sRf	= Q2$\overline{F3}$06F2Rt	External Device is ready (Rt) to receive information from the computer.	T7 thru T3
	T0	rCz	= $\overline{F1}$T0		
	Tp	sF1	= Tp($\overline{F1F30}$10$\overline{304}$)$\overline{Ia}$Rf	Ø6 next if Rf Ø2 next if $\overline{Rf}$	
		rRf	= Tp$\overline{Ø1}$($\overline{GOHt}$)		

The Computer will continue to repeat Ø2 until the External Device becomes ready, at which time the data will be transferred in parallel from the C register to the device. At Tp time, following the transfer, Ø6 will occur.

Ø6	T8	sIa	= T8F1F3(I)Kr	Has no effect	
		End	= F1F2	Last cycle	
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= Add(") "		
		sC(3-23)	= C(0-20)Cr3	A + C → C	T7 thru T0
		rC(")	= C(") "		
		Xz(1-3)	= Ix		
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	
		sCz	= KzQ1F1Ø7		
		rCz	= KzQ1	Carry logic	T7 thru T0
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1Ø6O3		
		rCp	= (")Cp "	Check parity	T7 thru T0
		Pr3	= (F1GO)Q2		
		sP(0-2)	= Add(1-3)O2O4O5O6Pr3	C(10-23) → P	T7 thru T3
		rP(")	= Add(") "	C contains operand (bits 14-23 of	
		sP(3-14)	= P(0-11)Pr3	which represent I/O starting address)	
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1	Has no effect	
	T4	Sc	= T4EndInr		
		rS(1-14)	= Sc	Clear S	
	T3	Sxp	= T3IntEndGO		
		sS1	= Add(2,3)O2O4O5O6Sxp		
		rS1	= Add(") "		
		sS(3-14)	= P(0-11)Sxp	C(10-23) + A(10-23) → S	
		rS(")	= P(") "		
	Tr	Cxm	= EndGOTsm(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= CxmTr		Tr thru Tp
		sHt	= CpTr⊕KpK0Ø2	Parity error	

```
    rIa             = TrF1
    rIx             = Tr(F1F3)(GOHt)
Tp  rA00            = TpEndGO
    rB00            = (  "  )
    sCp             = M24CxmHtTsTp          Initiate parity
    rF(1,2)         = TpEndSk               ø0 next clock (T8)
    0c              = (  "  )
    s02             = 0c
    r0(1,3,4,5,6)   = 0c                    NOP (20) → 0
```

15 UDI Two Cycle NOP 2 Cycles

Ø0	T8	rCz	= ØØT8	Initialize carry	
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{Ia}$GO)$\overline{C2}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{C4}$Oxc		
	T7	Ar3	= (O1O2$\overline{O3}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{Anr}$Ar3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= $\overline{F1}\overline{F2}$($\overline{Ts}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{Ju}\overline{Ts}$Cr3		
		rC(")	= $\overline{Add}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input if Ix (indexing)	T7 thru T0
		$\overline{Xz}$(")	= $\overline{Xn}$(")ØOIx+Ix		
		Yz(1-3)	= C(21-23)$\overline{Ø7}$	Adder input C register	T7 thru T0
		$\overline{Yz}$(")	= $\overline{C}$(")"		
		sCz	= KzQ1$\overline{TO}\overline{Ø7}$	Carry for Adder	T7 thru T1
		rCz	= $\overline{Kz}$Q1		
		sCp	= (G21⊕C22⊕C23)$\overline{Cp}\overline{Ts}\overline{Ht}$Q1$\overline{F1}\overline{F2}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{F1}\overline{F2}\overline{Inr}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{F1}\overline{F2}\overline{Ju}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{F1}$TO		
	Tr	Cxm	= $\overline{Ju}$Ø$\overline{O}\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTnKpK0$\overline{Ø2}$	Parity error	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)		
		rKO	= GOTr$\overline{F2}$		
	Tp	sCp	= M24CxmHt$\overline{Ts}$Tp	Initiate parity	
		sF1	= (Tp$\overline{Ia}$Ø0)O3O4		
		sF2	= (")O3$\overline{O2}$	Ø6 next clock (T8)	

Ø6	T8	sIa	= T8F1F3(T)Kr	Initiate P register increment	
		End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= $\overline{A}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{A}$(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= $\overline{B}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{B}$(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= Add(1-3)Ø6TsCr3		
		rC(")	= $\overline{Add}$(") "	A + C → C	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{C}$(") "		
		Xz(1-3)	= A(21-23)Ø60204		
		$\overline{Xz}$(")	= $\overline{A}$(") "	Unused adder inputs	T7 thru T0
		Yz(1-3)	= C(21-23)$\overline{Ø7}$		
		$\overline{Yz}$(")	= $\overline{C}$(") "		
		sCz	= KzQ1F1$\overline{Ø7}$	Carry logic	T7 thru T0
		rCz	= $\overline{Kz}$Q1		
		sCp	= (C21⊕C22⊕C23)$\overline{Cp}$TsHtQ1Ø603	Check parity	T7 thru T0
		rCp	= (")Cp "		
		Pr3	= (F1G0)Q2		
		sP0	= (P12⊕P13P14Ia)F1G0($\overline{02040506}$)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= $\overline{P}$(") "		
		rIa	= ($\overline{P12P13P14}$)Q2F1		
	T4	Sc	= T4End$\overline{Inr}$		
		rS(1-14)	= $\overline{Sc}$	Clear S	
	T3	Sxp	= T3IntEndG0		
		sS1	= (P13⊕P14Ia)F1G0($\overline{02040506}$)Sxp		
		rS1	= (") "		
		sS2	= (P14⊕Ia) "	P + 1 → S	
		rS2	= (") "		
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= $\overline{P}$(") "		
	Tr	Cxm	= EndG0$\overline{Tsm}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch next instruction)	
		rC(")	= TrCxm		Tr thru Tp
		sHt	= CpTr⊕pK0Ø2	Parity error	

```
     rIa          = TrF1
     rIx          = Tr(F1F3)(GOHt)
Tp   rA00         = TpEndGO
     rB00         = (  "  )
     sCp          = M24CxmHtTsTp        Initiate parity
     rF(1,2)      = TpEndSk             Ø0 next clock (T8)
     Oc           = (  "  )
     s02          = Oc
     rO(1,3,4,5,6) = Oc                 NOP (20) → O
```

21	UDI	Same as Execute
22	UDI	Same as EOM 2000(1,2,4,10)-(See EOM for specific EOM instruction)
24	UDI	Same as No Operation
25	UDI	Same as Execute
26	UDI	Same as EOD 200(30,21,12,3)-(See EOD for specific EOD instruction)
27	UDI	Same as Execute

31 UDI — M → C (Ø0), C → M (Ø4), No Other Registers Affected — 3 Cyc

Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{IaGO}}$)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= $\overline{\text{C(3,5,6,7,8)Oxc}}$	Instruction → O	
		rO2	= $\overline{\text{C4Oxc}}$		
	T7	Ar3	= (O1O2$\overline{\text{O3}}$O4)Q1		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= Add(1-3)ØO$\overline{\text{JuTs}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)ØO·Ix	Adder input (X·Ix)	T7 thru T0
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")ØOIx+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru T0
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TO}}$$\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{KzQ1}}$		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{CpTsHtQ1F1F2}}$	Check parity	T7 thru T0
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1F2Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1F2Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1TO}}$		
		sRf	= $\overline{\text{O5F3TO}}$	No input to Y buffer	
	Tr	Cxm	= $\overline{\text{JuØOTsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr⊕Kp⊕K0$\overline{\text{Ø2}}$	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GOHt}}$)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24CxmHt$\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= $\overline{\text{O1O3O4IaRfF1F3}}$Tp	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(TsKr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= C(21-23)O1O4O6TsØ4	Recirculate C	T7 thru T0
		rC(")	= C(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T3
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTrKpK0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrGOF2		
	Tp	sF(2,3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle	
	T7	Ar3	= (01020304)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= Ā(") "	Recirculate A	T7 thru T0
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= Ā(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B̄(") "	Recirculate B	T7 thru T0
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= B̄(") "		
		Pr3	= F1GOQ2		
		sP(0-2)	= P(12-14)IaF1GO(02040506)Pr3		
		rP(")	= P̄(") " (") "	Recirculate P	T7 thru T3
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P̄(") "		
	T4	Sc	= T4EndInr	Clear S	
		rS(1-14)	= Sc		
	T3	Sxp	= T3IntEndGO		
		sS(1,2)	= P(13,14)IaF1GO(02040506)Sxp	P(13,14) contains P(1,2) at T3	
		rS(")	= P̄(") " (") "	P → S	
		sS(3-14)	= P(0-11)Sxp		
		rS(")	= P̄(") "		
	T0	rSk	= Ø7T0		
	Tr	Cxm	= EndGOTsm(Tr+Tp)	M → C (Fetch next instruction)	
		sC(0-23)	= M(0-23)Cxm		Tr thru Tp
		rC(")	= TrCxm		
		rIa	= F1Tr		
		rIx	= Tr(F1F3)(GOHt)		
	Tp	rA00	= TpEndGO		
		rB00	= TpEndGO		
		sCp	= M24CxmHtTsTp	Initiate parity	
		rF(1-3)	= TpEndSk	Ø0 next	
		Oc	= TpEndSk		
		sO2	= Oc	NOP (20) → O	
		rO(1,3,4,5,6)	= Oc		

34		UDI	Merge A + B and Store	A + B → (M)	3 Cycles
Ø0	T8	rCz	= ØØT8		
		sIx	= ØØT8C1GO	Initialize indexing	
		Oxc	= (ØØT8$\overline{\text{Ia}}$GO)$\overline{\text{C2}}$		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction → O	
		rO2	= $\overline{\text{C4Oxc}}$		
	T7	Ar3	= ($\overline{\text{O1O2O3O4}}$)Q1		
		sA(0-2)	= $\overline{\text{A}}$(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "	Recirculate A	T7 thru TO
		sA(3-23)	= A(0-20)Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= $\overline{\text{B}}$(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "	Recirculate B	T7 thru TO
		sB(3-23)	= B(0-20)Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		Cr3	= $\overline{\text{F1F2}}$($\overline{\text{Ts}}$Q1)		
		sC(0-2)	= $\overline{\text{Add}}$(1-3)ØO$\overline{\text{Ju}}$$\overline{\text{Ts}}$Cr3		
		rC(")	= $\overline{\text{Add}}$(") "	C+X·Ix → C (Add=Xz+Yz)	T7 thru TO
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= $\overline{\text{C}}$(") "		
		Xz(1-3)	= Xn(1-3)Ø0·Ix	Adder input (XIx)	T7 thru TO
		$\overline{\text{Xz}}$(")	= $\overline{\text{Xn}}$(")Ø0Ix+$\overline{\text{Ix}}$		
		Yz(1-3)	= C(21-23)$\overline{\text{Ø7}}$	Adder input (C)	T7 thru TO
		$\overline{\text{Yz}}$(")	= $\overline{\text{C}}$(")"		
		sCz	= KzQ1$\overline{\text{TO}}$$\overline{\text{Ø7}}$	Carry logic	T7 thru T1
		rCz	= $\overline{\text{KzQ1}}$		
		sCp	= (C21⊕C22⊕C23)$\overline{\text{Cp}}$$\overline{\text{Ts}}$$\overline{\text{Ht}}$Q1$\overline{\text{F1}}$$\overline{\text{F2}}$	Check parity	T7 thru TO
		rCp	= (")Cp "		
	T4	Sc	= T4$\overline{\text{F1}}$$\overline{\text{F2}}$$\overline{\text{Inr}}$	Clear S	
		rS(1-14)	= Sc		
	T3	Sxc	= T3$\overline{\text{F1}}$$\overline{\text{F2}}$$\overline{\text{Ju}}$		
		sS(1,2)	= Add(2,3)Sxc	C + X·Ix → S	
		sS(3-14)	= C(0-11)Sxc		
	TO	rCz	= $\overline{\text{F1}}$TO		
	Tr	Cxm	= $\overline{\text{Ju}}$Ø$\overline{\text{O}}$$\overline{\text{Tsm}}$(Tr+Tp)		
		sC(0-23)	= M(0-23)Cxm	M → C (Fetch operand)	Tr thru Tp
		rC(")	= TrCxm		
		sHt	= CpTr⊕Kp⊕KOØ2	Parity error	
		rIx	= Tr($\overline{\text{F1F3}}$)($\overline{\text{GO}}$Ht)		
		rKO	= GOTr$\overline{\text{F2}}$		
	Tp	sCp	= M24Cxm$\overline{\text{Ht}}$$\overline{\text{Ts}}$Tp	Initiate parity	
		sF1	= (Tp$\overline{\text{Ia}}$Ø0)0304	Ø4 next clock (T8)	

Ø4	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		sIa	= F1F3(I⊕Kr)	Initialize P register increment	
		Mxc	= Ø4Tsm		T8 thru Tp
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= B(") "		
		Cr3	= F1F3(TsQ1)		
		sC(0-2)	= (B(21-23)O6+A(21-23)O5)O4TsCr3Ø4	A+B → C (Merge of A and	
		rC(")	= (B(") "	B with result in C)	T7 thru T0
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		Pr3	= (F1GO)Q2		
		sP0	= (P12⊕P13P14Ia)F1GO(O2O4O5O6)Pr3		
		rP0	= (") "		
		sP1	= (P13⊕P14Ia) "		
		rP1	= (") "		
		sP2	= (P14⊕Ia) "	P + 1 → P	T7 thru T8
		rP2	= (") "		
		sP(3-14)	= P(0-11)Pr3		
		rP(")	= P(") "		
		rIa	= (P12P13P14)Q2F1		
	T6	sC24	= (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)		
		rC24	= (")C24(")(")	Generate parity	T6 thru Tr
	T3	rM(0-24)	= T3	Clear M	
	T0	rCp	= TsT0HtK0(F1Ø7O1Ø6)Ø2		
	Tr	sHt	= CpTr⊕Kp⊕K0Ø2	Parity error	
		rIa	= TrF1		
		rK0	= TrGOF2		
	Tp	sF(1-3)	= TpØ4	Ø7 next clock (T8)	
		sM(0-24)	= C(0-24)MxcTp		
		rM(")	= C(") "	C → M (Store operand)	

Ø7	T8	End	= F1F2	Last cycle
	T7	Ar3	= (0102$\overline{03}$04)Q1	
		sA(0-2)	= A(21-23)AnrAr3	
		rA(")	= $\overline{A}$(") "	Recirculate A T7 thru T0
		sA(3-23)	= A(0-20)Ar3	
		rA(")	= $\overline{A}$(") "	
		sB(0-2)	= B(21-23)$\overline{Bnr}$Ar3	
		rB(")	= $\overline{B}$(") "	Recirculate B T7 thru T0
		sB(3-23)	= B(0-20)Ar3	
		rB(")	= $\overline{B}$(") "	
		Pr3	= F1GOQ2	
		sP(0-2)	= P(12-14)$\overline{Ia}$F1GO($\overline{02040506}$)Pr3	
		rP(")	= $\overline{P}$(") " (") "	Recirculate P T7 thru T3
		sP(3-14)	= P(0-11)Pr3	
		rP(")	= $\overline{P}$(") "	
	T4	Sc	= T4End$\overline{Inr}$	Clear S
		rS(1-14)	= Sc	
	T3	Sxp	= T3$\overline{Int}$EndGO	
		sS(1,2)	= P(13,14)$\overline{Ia}$F1GO($\overline{02040506}$)Sxp	P(13,14) contains P(1,2) at T3
		rS(")	= $\overline{P}$(") " (") "	P → S
		sS(3-14)	= P(0-11)Sxp	
		rS(")	= $\overline{P}$(") "	
	T0	rSk	= Ø7T0	
	Tr	Cxm	= EndGO$\overline{Tsm}$(Tr+Tp)	M → C (Fetch next instruction) Tr thru Tp
		sC(0-23)	= M(0-23)Cxm	
		rC(")	= TrCxm	
		rIa	= F1Tr	
		rIx	= Tr($\overline{F1}$F3)($\overline{GO}$Ht)	
	Tp	rA00	= TpEndGO	
		rB00	= TpEndGO	
		sCp	= M24Cxm$\overline{Ht}$$\overline{Ts}$Tp	Initiate parity
		rF(1-3)	= TpEnd$\overline{Sk}$	Ø0 next
		Oc	= TpEnd$\overline{Sk}$	
		sO2	= Oc	NOP (20) → O
		rO(1,3,4,5,6)	= Oc	

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UDI 44-1
UDI 44-2
UDI 44-3
UDI 44-4
UDI 44-5
UDI 44-6
UDI 44-7
UDI 44-8
UDI 44-9
UDI 44-10
UDI 44-11

42	UDI	Same as No Operation
44	UDI 00000,2	Same as Clear X
44	UDI 00001	Same as Clear A
44	UDI 00002	Same as Clear B
44	UDI 00004	Same as Copy A into B
44	UDI 00010	Same as Copy B into A
44	UDI 00020	Same as Copy B into X
44	UDI 00040	Same as Copy X into B
44	UDI 00100	Same as Copy least significant 9 bits only extend bit 15 throughout X when X is designation register.
44	UDI 00200	Same as Copy X into A
44	UDI 00400	Same as Copy A into X
44	UDI 01000	Same as Copy Negative of A into A

45		UDI	Branch to Address Plus One. Register Changing Occurs in Ø0, Count in Ø3 as in Divide.	Of → (M) M + 1 → P	3-10 Cycles
Ø0	T8	rC24	= T8(TsTsr)	Initialize parity generation	
		rCz	= ØØT8		
		sHz	= T8		
		sIx	= C1GOØØT8	Initiate indexing	
		sJu	= IaGOC4C5C8C9T8		
		Oxc	= IaGOC2ØØT8		
		sO(1,3,4,5,6)	= C(3,5,6,7,8)Oxc	Instruction to O register	
		rO2	= C4Oxc		
		sRc	= (ØØT8IaGO)C2C3C4C5C6		
	T7	Ar3	= (O1O2O3O4)Q1		
		sA(0-2)	= A(21-23)AnrAr3		
		rA(")	= A(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru TO
		rA(")	= A(") "		
		sB(0-2)	= B(21-23)BnrAr3		
		rB(")	= B(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru TO
		rB(")	= B(") "		
		Cr3	= TsØØQ1		
		sCO	= (P12)JuTsCr3Q6		
		rCO	= (") "		
		sC(1,2)	= P(13,14)JuTsCr3Q2	P(1-14) → C(10-23)	T7 thru T3
		rC(")	= P(") "		
		sC(3-23)	= C(0-20)Cr3		
		rC(")	= C(") "		
		sCp	= (C21⊕C22⊕C23)CpTsHtQ1F1F2		
		rCp	= (")Cp "	Parity check	T7 thru TO
		Pr3	= JuQ2		
		sP(0-2)	= Add(1-3)JuEaxPr3		
		rP(")	= Add(") "		
		sP(3-14)	= P(0-11)Pr3	C + X·Ix → P	T7 thru T3
		rP(")	= P(") "		
		Xz(1-3)	= Xn(1-3)ØOIx		
		Xz(")	= Xn(")ØOIx+Ix	Adder input (X·Ix)	T7 thru TO
		Yz(1-3)	= C(21-23)Ø7		
		Yz(")	= C(") "	Adder input (C)	T7 thru TO
		sCz	= KzQ1TO		
		rCz	= KzQ1	Carry logic	T7 thru T1
	T6	sC24	= C24(TsTsrCO⊕C1⊕C2)(Q3+Q5)		
		rC24	= C24(")(")	Generate parity	T6 thru Tr
	T4	Sc	= InrF1F2T4		
		rS(1-14)	= Sc	Clear S	
	T3	rCO	= JuTsCr3Q4Q6	No input to C3, C6, C9	T3 thru T1
		rM(0-24)	= T3		
		Sxp	= IntJuEaxGOT3		
		sS(1,2)	= Add(2,3)(JuEax+O2O4O5O6)Sxp		
		sS(3-14)	= P(0-11)Sxp	P → S P(C + X·Ix)	
	T2	rC(1,2)	= (JuTsCr3)T2	No input to C7, C8	
	T1	sC(1,2)	= Em(1,2)(JuTsCr3)T1		
		rC(")	= Em(")(") "	C1, C2 is C4, C5 at T1	

T0	rCz	= $\overline{F1}$T0	
	sC0	= 0f(Ju$\overline{Ts}$Cr3T0)	
	rC0	= $\overline{0f}$(")	Set C0 if overflow.
	rC(1,2)	= Ju$\overline{Ts}$Cr3T0	No input to C1, C2
Tr	sHt	= CpTr$\overline{Kp}$K0$\overline{\emptyset 2}$	Parity error
	rIx	= ($\overline{F1}$F3)($\overline{G0}$Ht)Tr	
	rRc	= Tr	
Tp	sF2	= $\overline{02}\overline{Ia}01\emptyset$0Tp	
	sF3	= $\overline{03}$04$\overline{Ia}\emptyset$0Tp	$\emptyset$3 next clock (T8)
	rJu	= Tp	

The C register at Tp contains the following information:

C0	= State of the Overflow Flip-Flop
C1 thru C3	= $\emptyset$
C4	= State of the Em1 Flip-Flop
C5	= State of the Em2 Flip-Flop
C6 thru C9	= $\emptyset$
C10 thru C23	= Original contents of the P register

Rc is set at T8 which allows register change activity to go on during $\emptyset$0 of this instruction. See RCH (46) instruction for details on what effect indexing and the address configuration of a UDI (45) instruction will have in regard to register changes.

Ø3	T7	Ar3	= $\overline{(0102\overline{03}04)}Q1$		
		sA(0-2)	= A(21-23)$\overline{\text{Anr}}$Ar3		
		rA(")	= $\overline{\text{A}}$(") "		
		sA(3-23)	= A(0-20)Ar3	Recirculate A	T7 thru T0
		rA(")	= $\overline{\text{A}}$(") "		
		sB(0-2)	= B(21-23)$\overline{\text{Bnr}}$Ar3		
		rB(")	= $\overline{\text{B}}$(") "		
		sB(3-23)	= B(0-20)Ar3	Recirculate B	T7 thru T0
		rB(")	= $\overline{\text{B}}$(") "		
		sOf	= $(\overline{\text{S9S10S11S12}})(\overline{\text{Bz}0 \oplus \text{B}0})(\text{Rf}\overline{\text{B}0}+(\overline{\text{A}00 \oplus \text{Ix}}))\overline{05}06Ø3T7$		
	T5	sSk	= $\overline{05}06\overline{\text{S11}}\text{S12}\overline{\text{S13}}Ø3T5$		
	T0	rCp	= $\overline{\text{TsHtK}}0(\text{F1}+\text{F2})(\overline{Ø7Ø4Ø6Ø2})T0$		
		rCz	= $\overline{\text{F1}}T0$		
	Tp	sF1	= SkTp	Ø7 next clock (T8)	
		Sd2	= $\overline{05}06\overline{\text{Sk}}Ø3Tp$		
		sS11	= $\overline{\text{S11}}\overline{\text{S12}}\overline{\text{S13}}$Sd2		
		rS11	= S11$\overline{\text{S12}}\overline{\text{S13}}$Sd2		
		sS12	= $\overline{\text{S12}}\overline{\text{S13}}$Sd2		
		rS12	= S12$\overline{\text{S13}}$Sd2	Counter for divide	
		sS13	= $\overline{\text{S13}}$Sd2		
		rS13	= S13Sd2		

The Computer will continue to repeat Ø3 until Sk is set. The Computer may hang-up in Ø3 as much as eight cycles; the following is a sequence of combinations of S11, S12, S13 and number of cycles required before Ø7 is encountered:

S11	S12	S13	Number of Cycles
0	0	1	8
0	0	0	7
1	1	1	6
1	1	0	5
1	0	1	4
1	0	0	3
0	1	1	2
0	1	0	1

This method of counting is the same as the one for a Divide instruction.

```
Ø7  T8  End          = F1F2
        Ck           = TsØ7T8
        sC(0-23)     = C(0-23)Ck
        rC( " )      = C( " ) "                    Ones complement of C → C
        sIa          = I1KrSkØ7T8                  Initialize P register increment
    T7  Ar3          = (0102030405)Q1
        sA(0-2)      = A(21-23)AnrAr3
        rA( " )      = A( " )  "
        sA(3-23)     = A(0-20)Ar3                  Recirculate A          T7 thru T0
        rA( " )      = A( " ) "
        sB(0-2)      = B(21-23)BnrAr3
        rB( " )      = B( " )  "
        sB(3-23)     = B(0-20)Ar3                  Recirculate B          T7 thru T0
        rB( " )      = B( " ) "
        Cr3          = 05TsØ7Q1
        sC(3-23)     = C(0-20)Cr3                  Zero → C (No input to C(0-23))
        rC( " )      = C( " ) "                                           T7 thru T0
        Pr3          = F1GOQ2
        sP0          = (P12⊕P13P14Ia)F1GO(02040506)Pr3
        rP0          = (  "  )        "
        sP1          = (P13⊕P14Ia)    "            P + 1 → P (P contains
        rP1          = (  "  )        "            original contents of   T7 thru T2
        sP2          = (P14⊕Ia)       "            the C register.)
        rP2          = (  "  )        "
        sP(3-14)     = P(0-11)Pr3
        rP( " )      = P( " ) "
        rIa          = (P12P13P14)F1Q2
    T6  sC24         = (C0⊕C1⊕C2)C24(TsTsr)(Q3+Q5)
        rC24         = (  "  )C24(  "  )(  "  )   Generate parity          T6 thru Tr
    T4  Sc           = EndInrT4
        rS(1-14)     = Sc                          Clear S
    T3  Sxp          = EndIntGOT3
        sS(1,2)      = P(13,14)IaF1GO(02040506)Sxp
        sS(3-14)     = P(0-11)Sxp                  P(13,14) contains P(1,2) at T3
        rS( " )      = P( " ) "                    P → S
    T0  rSk          = Ø7T0
    Tr  Cxm          = EndGOTsm(Tr+Tp)
        sC(0-23)     = M(0-23)Cxm                  M → C (Fetch next instruction)
        rC( " )      = TrCxm                                              Tr thru Tp
        rIa          = F1Tr
        rIx          = (F1F3)(GOHt)Tr
    Tp  rA00         = EndGOTp
        rB00         =   "
        sCp          = M24CxmHtTsTp                Initiate parity check
        rF(1-3)      = EndGOSk                     Ø0 next clock (T8)
        Oc           =   "
        sO2          = Oc
        rO(1,3,4,5,6) = Oc                         NOP (20) → O
```

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This UDI is quite complex in its operation. The phases encountered are those of shift instructions. However both Ju, a flip-flop that controls branching, and Rc, a flip-flop that is true during the register change instructions, are set at Ø0 T8 time.

The effect of Ju is that the next instruction will be designated by the address of the instruction plus one. The effect of Rc is not predictable unless the address of the instruction and the contents of bit 10 are known. The contents of the P-register also affect the instruction in that a transfer of the contents of P(6-14) to C(15-23) is made during Ø0 (T7-T5). Since register change instructions employ the address portion of the instruction the contents of the P-register will be interpreted as part of the instruction.

APPENDIX A

B Register Right Shift Add (Rsa)

$$
\begin{aligned}
B00 &= C0 \\
B0 &= B00 \oplus C0 \oplus \{B0C1 + (B0 \oplus C1)[B1C2 + (B1 \oplus C2)B2Bc2]\} \\
B1 &= B0 \oplus C1 \oplus [B1C2 + (B1 \oplus C2)B2Bc2] \\
B2 &= B1 \oplus C2 \oplus B2Bc2 \\
Bc2 &= (B2 \oplus Bc2)C3 + (B2 \oplus Bc2 \oplus C3)\{B3C4 + (B3 \oplus C4)[B4C5 + (B4 \oplus C5)B5Bc5]\} \\
B3 &= (B2 \oplus Bc2) \oplus C3 \oplus \{B3C4 + (B3 \oplus C4)[B4C5 + (B4 \oplus C5)B5Bc5]\} \\
B4 &= (B3 \oplus C4) \oplus [B4C5 + (B4 \oplus C5)B5Bc5] \\
B5 &= B4 \oplus C5 \oplus B5Bc5 \\
Bc5 &= (B5 \oplus Bc5)C6 + (B5 \oplus Bc5 \oplus C6)\{B6C7 + (B6 \oplus C7)[B7C8 + (B7 \oplus C8)B8Bc8]\} \\
B6 &= (B5 \oplus Bc5) \oplus C6 \oplus \{B6C7 + (B6 \oplus C7)[B7C8 + (B7 \oplus C8)B8Bc8]\} \\
B7 &= B6 \oplus C7 \oplus [B7C8 + (B7 \oplus C8)B8Bc8] \\
B8 &= B7 \oplus C8 \oplus B8Bc8 \\
Bc8 &= (B8 \oplus Bc8)C9 + (B8 \oplus Bc8 \oplus C9)\{B9C10 + (B9 \oplus C10)[B10C11 + (B10 \oplus C11)B11Bc11]\} \\
B9 &= (B8 \oplus Bc8) \oplus C9 \oplus \{B9C10 + (B9 \oplus C10)[B10C11 + (B10 \oplus C11)B11Bc11]\} \\
B10 &= B9 \oplus C10 \oplus [B10C11 + (B10 \oplus C11)B11Bc11] \\
B11 &= B10 \oplus C11 \oplus B11Bc11 \\
Bc11 &= (B11 \oplus Bc11)C12 + (B11 \oplus Bc11 \oplus C12)\{B12C13 + (B12 \oplus C13)[B13C14 + (B13 \oplus C14)B14Bc14]\} \\
B12 &= (B11 \oplus Bc11) \oplus C12 \oplus \{B12C13 + (B12 \oplus C13)[B13C14 + (B13 \oplus C14)B14Bc14]\} \\
B13 &= B12 \oplus C13 \oplus [B13C14 + (B13 \oplus C14)B14Bc14] \\
B14 &= B13 \oplus C14 \oplus B14Bc14 \\
Bc14 &= (B14 \oplus Bc14)C15 + (B14 \oplus Bc14 \oplus C15)\{B15C16 + (B15 \oplus C16)[B16C17 + (B16 \oplus C17)B17Bc17]\} \\
B15 &= (B14 \oplus Bc14) \oplus C15 \oplus \{B15C16 + (B15 \oplus C16)[B16C17 + (B16 \oplus C17)B17Bc17]\} \\
B16 &= B15 \oplus C16 \oplus [B16C17 + (B16 \oplus C17)B17Bc17] \\
B17 &= B16 \oplus C17 \oplus B17Bc17 \\
Bc17 &= (B17 \oplus Bc17)C18 + (B17 \oplus Bc17 \oplus C18)\{B18C19 + (B18 \oplus C19)[B19C20 + (B19 \oplus C20)B20Bc20]\} \\
B18 &= (B17 \oplus Bc17) \oplus C18 \oplus \{B18C19 + (B18 \oplus C19)[B19C20 + (B19 \oplus C20)B20Bc20]\} \\
B19 &= B18 \oplus C19 \oplus [B19C20 + (B19 \oplus C20)B20Bc20] \\
B20 &= B19 \oplus C20 \oplus B20Bc20 \\
Bc20 &= (B20 \oplus Bc20)C21 + (B20 \oplus Bc20 \oplus C21)\{B21C22 + (B21 \oplus C22)[B22C23 + (B22 \oplus C23)B23Bc23]\} \\
B21 &= (B20 \oplus Bc20) \oplus C21 \oplus \{B21C22 + (B21 \oplus C22)[B22C23 + (B22 \oplus C23)B23Bc23]\} \\
B22 &= B21 \oplus C22 \oplus [B22C23 + (B22 \oplus C23)B23Bc23] \\
B23 &= B22 \oplus C23 \oplus B23Bc23 \\
Bc23 &= B23Bc23
\end{aligned}
$$

B Register Right One (Brl)

B0 = B00
B1 = B0
B2 = B1
Bc2 = B2Bc2

B3 = B2 ⊕ Bc2
B4 = B3
B5 = B4
Bc5 = B5Bc5

B6 = B5 ⊕ Bc5
B7 = B6
B8 = B7
Bc8 = B8Bc8

B9 = B8 ⊕ Bc8
B10 = B9
B11 = B10
Bc11 = B11Bc11

B12 = B11 ⊕ Bc11
B13 = B12
B14 = B13
Bc14 = B14Bc14

B15 = B14 ⊕ Bc14
B16 = B15
B17 = B16
Bc17 = B17Bc17

B18 = B17 ⊕ Bc17
B19 = B18
B20 = B19
Bc20 = B20Bc20

B21 = B20 ⊕ Bc20
B22 = B21
B23 = B22
Bc23 = B23Bc23

A Left Two (AL2) B Register

B0 = B2 ⊕ Bc2
B1 = B3
B2 = B4
Bc2 = B5Bc5

B3 = B5 ⊕ Bc5
B4 = B6
B5 = B7
Bc5 = B8Bc8

B6 = B8 ⊕ Bc8
B7 = B9
B8 = B10
Bc8 = B11Bc11

B9 = B11 ⊕ Bc11
B10 = B12
B11 = B13
Bc11 = B14Bc14

B12 = B14 ⊕ Bc14
B13 = B15
B14 = B16
Bc14 = B17Bc17

B15 = B17 ⊕ Bc17
B16 = B18
B17 = B19
Bc17 = B20Bc20

B18 = B20 ⊕ Bc20
B19 = B21
B20 = B22
Bc20 = B23Bc23

B21 = B23 ⊕ Bc23
B22 = A0
B23 = A1
Bc23 = 0