

UNIVAC® 1824 AIRBORNE DIGITAL COMPUTER

INSTRUCTION REPERTOIRE

	F	B	X	SYMBOLIC	FUNCTION	TIME μsec.
ENTER	12	B	0	ENT.B ⁿ .Y	(Y) → B ⁿ	12
	12	B	1	ENT.B ⁿ .Y	Y → B ⁿ	8
	13	S	X	ENT.SP ⁿ .Y	(Y) → SP ⁿ	12
	25	B	X	ENT.A.Y	(Y) → A	8
	27	B	X	ENT.Q.Y	(Y) → Q	8
	35	B	0	ENT.X.Y	(Y) ₁₈₋₂₃ → X Register	8
	35	B	1	ENT.X.Y	Y → X Register	4
STORE	10	3	X	CLR.Y	Zero → Y	12
	24	B	X	STR.A.Y	(A) → Y	8
	26	B	X	STR.Q.Y	(Q) → Y	8
	34	B	X	STR.X.Y	(X) → Y	8
ARITHMETIC	11	0	X	DEC.Y	(Y)-1 → Y	12
	11	1	X	INC.Y	(Y)+1 → Y	12
	11	2	X	RAD.Y	(Y)+(A) → Y	12
	20	B	X	ADD.AQ.Y*	(AQ)+(Y+1), (Y) → AQ	12
	21	B	X	ADD.A.Y	(A)+(Y) → A	8
	22	B	X	SUB.AQ.Y*	(AQ)-(Y+1), (Y) → AQ	12
	23	B	X	SUB.A.Y	(A)-(Y) → A	8
	30	1	1	SQR.0	√(A) → Q, R → A	192
	36	B	X	MPY.Y	(A)(Y) → AQ	44-92
	37	B	X	DIV.Y	(AQ)-(Y) → Q, R → A	128
MISC.	30	0	0	LGP.0	L(A)(Q) → A	8
	30	1	0	STP.N	Stop if switch N is set	8

NOTES:

* Y must specify an even address.

A—a 24-bit accumulator register.

B—indicates B bits may be used to select index register modification. B=1, 2, or 3 for mod. B=0 for no mod. To use the modification, add .Bⁿ to symbolic code and 4 μ sec to time.

C—indicates B and X bit setting to designate the I/O channel. Bit 5=Ch 5; bit 6=Ch 6; bit 7=Ch 7.

P—indicates B or X bits used as part of operand Y.

Q—a 24-bit quotient register.

S—indicates B bits used to select special register 0, 1, 2, or 3.

X—indicates X bit used for extension register modification. X=1 use mod. X=0 no mod.

AQ—a 48-bit double precision accumulator.

	F	B	X	SYMBOLIC	FUNCTION	TIME μsec.	
SKIP	Non-Mod.	04	B	X	NSK.Y	Skip if (Y)=0	8
		06	B	X	ZSK.Y	Skip if (Y)=0	8
	Modifying	10	0	X	DEC.Y.SK	(Y)-1 → Y, Skip if (Y)=0	12-16
		10	1	X	INC.Y.SK	(Y)+1 → Y, Skip if (Y)=0	12-16
	10	2	X	RAD.Y.SK	(Y)+(A) → Y, Skip if (Y)=0	12-16	
JUMP	Uncond.	00	B	P	GJP.Y	Y → P ₇₋₁₅	4
		01	B	X	IJP.Y	(Y) ₉₋₂₃ → P ₇₋₁₅	8
		02	P	P	DJP.Y	Y → P ₇₋₁₅	4
		03	B	X	RJP.Y	P+1 → 10, (Y) ₉₋₂₃ → P ₇₋₁₅	12
Cond.	05	B	P	NJP.Y	If (A)=0, Y → P ₇₋₁₅	4	
	07	B	P	ZJP.Y	If (A)=0, Y → P ₇₋₁₅	8	
SHIFT	30	0	1	XCH.0	(A) → Q, (Q) → A	12	
	31	B	X	SCF.Y	Scale (AQ), (K) → Y ₁₈₋₂₃	12-52	
	32	B	0	RSH.Y	Shift (AQ) right by (Y) ₁₈₋₂₃	12-52	
	32	0	1	RSH.Y	Shift (AQ) right by Y	8-48	
	33	B	0	LSH.Y	Shift (AQ) left by (Y) ₁₈₋₂₃	12-52	
	33	0	1	LSH.Y	Shift (AQ) left by Y	8-48	
I/O	11	3	X	UIO.Y	Update Incr. Registers Y	12	
	14	C	C	OUT.C ⁿ .Y	(Y) → Output Channel C	8	
	15	C	C	INP.C ⁿ .Y	Input Channel C → Y	8	
	16	B	X	OUT.Y	Output according to (Y)	12	
	17	B	X	INP.Y	Input according to (Y)	12	

SPERRY RAND CORPORATION

UNIVAC Defense Systems Division

UNIVAC TITAN III MGC

INSTRUCTION WORD FORMAT

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F				B			X	Y							

SPECIAL ADDRESS ASSIGNMENTS

ADDRESS	ASSIGNMENT
00000	B BOX No. 0 (Not for operand modification)
00001	B BOX No. 1
00002	B BOX No. 2
00003	B BOX No. 3
00004	Special Register No. 0
00005	Special Register No. 1
00006	Special Register No. 2
00007	Special Register No. 3
00010	P Storage for Return Jump
00016	P Storage for Real Time Interrupt
00017	P Storage for External Interrupt
00200-00237	TM data storage addresses
00300-00377	A → D data input addresses
04016	RTI Entrance address
04017	External interrupt entrance address
47777	Master-Clear Entrance Address

INCREMENTAL INPUTS

ADDRESS	ASSIGNMENT	BITS
N*	α (IMU Data)	(S+2)
N+1	β (IMU Data)	(S+2)
N+2	γ (IMU Data)	(S+2)
N+3	U (IMU Data)	(S+5)
N+4	V (IMU Data)	(S+5)
N+5	W (IMU Data)	(S+5)
N+6	MOL Assignment #1	(S+5)
N+7	MOL Assignment #2	(S+5)
N+10	MOL Assignment #3	(S+5)
N+11	MOL Assignment #4	(S+5)
N+12	MOL Assignment #5	(S+5)
N+13	MOL Assignment #6	(S+5)
N+14	(2KC) Precision Reference Counter	(S+5)

*N can be any address module 20₀ from 20 thru 00760.

INDIRECT INPUT/OUTPUT CONTROL WORD FORMAT

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Channel Selection												Not Used		X	Data Address								

MGC I/O CHANNEL ASSIGNMENTS

	CHANNEL	FUNCTION	BITS
INPUT	D1-5	A → D Data	0- 9
	D1-6	DO-6 Feedback and (TM) Timing Data	0-10
	D1-7	Parallel or Discrete Data (VECOS)	13-23
	I1-0	Flight Discretes 0-23 Feedback	0-23
	I1-1	Flight Discretes 24-36 Feedback	0-12
	I1-2	MGAGC Data	0-18
	I1-4	IMU Number	18-23
	I1-5	Gemini Data	0-20
	I1-9	Parallel and Discrete Data from GSE	12-23
OUTPUT	DO-5	Telemetry Data	0-23
	DO-6	Internal MGC Discretes	0- 8
	IO-0	Flight Discretes 0-23	0-23
	IO-1	Flight Discretes 24-35	0-11
	IO-2	MGAGC Data plus Flight Discrete 36	0- 7
	IO-3	D → A 3-8 bit commands (1 & 2; 3 & 4; 5 & 6)	0-23
	IO-4	GSE/IMU Display only	0-23
	IO-5	D → A 2-8 bit commands (7; 8 & 9)	8-23
	IO-6	D → A 2-8 bit commands (10; 11 & 12)	8-23
	IO-7	D → A 2-8 bit commands (13; 14 & 15)	8-23
	IO-8	D → A 2-8 bit commands (16; 17)	8-23
	IO-9	GSE Command Selection	0- 5
	IO-10	GSE Punch/Printer/Function Register	0- 5
IO-11	GSE Keyset Register Data/Input Acknowledge	0- 5	

MGC PROGRAMMABLE ADDRESSES

DRO VARIABLES	NDRO CONSTANTS OR INSTRUCTIONS		NDRO INSTRUCTIONS
00000-00377	04010-05007	24010-25007	44010-45007
00405-00770	05020-06017	25020-26017	45020-46017
	06030-07027	26030-27027	46030-47027
	07040-10737	27040-30737	47040-50737
	10750-11747	30750-31747	50750-51747
	11760-12757	31760-32757	51760-52757
	12770-13767	32770-33767	52770-53767

SPERRY RAND CORPORATION

UNIVAC Defense Systems Division