INSTRUCTIONS

	OP CODES ASSEMBLER	OP CODES NUM	m	c	DESCRIPTION	WORD TIMES	MINIMUM LATENCY a	MINIMUM LATENCY m	MINIMUM LATENCY c
ARITH.	ADD	70	m	c	(m) + (rA) → rA, if Overflow c = c+1.	5	m − 2	m	m + 3 = NI
	SUB	75	m	c	(rA) − (m) → rA, if Overflow c = c+1.	5	m − 2	m	m + 3 = NI
	MUL	85	m	c	(rL) x (m) → rA MSD, rX LSD.	5 + ND + SD	m − 2	m	105 max
	DIV	55	m	c	(m) + (rL) → rA Quot, rX Rem. if Overflow c = c+1	20+SOD+STCED	m − 2	m	115 max
TRANSFER	LDA	25	m	c	(m) → rA	4	m − 2	m	m + 2 = NI
	LDX	05	m	c	(m) → rX	4	m − 2	m	m + 2 = NI
	LDL	30	m	c	(m) → rL	4	m − 2	m	m + 2 = NI
	STA	60	m	c	(rA) → m	4	m − 2	m	m + 2 = NI
	STX	65	m	c	(rX) → m } m cannot be register	4	m − 2	m	m + 2 = NI
	STL	50	m	c	(rL) → m	4	m − 2	m	m + 2 = NI
	ATL	77	–	c	(rA) → rL	3	a		a + 3 = NI
	CTA	23	m	–	(rC) → rA	3	a	a+3=NI	
	CLA	26	m	–	Zeros → rA, sign +	3	a	a+3=NI	
	CLX	06	m	–	Zeros → rX, sign +	3	a	a+3=NI	
	CLL	31	m	–	Zeros → rL, sign +	3	a	a+3=NI	
	CAA	36	m	–	Zeros → rA, retain original sign	3	a	a+3=NI	
	CAX	86	m	–	Zeros → rA, rX, sign of rL → rA, rX	14	a	a+14=NI	
LOGICAL	BUF	20	m	c	Superimpose (m) on (rA) → rA	4	m − 2	m	m + 2 = NI
	ERS	35	m	c	Extract (m) from (rA) → rA	4	m − 2	m	m + 2 = NI
	SHR	32	onoo	c	Shift right n places. (rA) → (rX) → rA	3 + n	a		a + 3 + n = NI
	SHL	37	onoo	c	Shift left n places. Zeros → rA LSD	3 + n	a		a + 3 + n = NI
	ZUP	62	–	c	Suppress Zeros, Commas. MC-6 in rA, rX.	4	a		a + 4 = NI
	JMP	00	m	–	Skip	2	a	a + 2 = NI	
	STP	67	m	c	Stop	–	a		
COMP	TEQ	82	=	≠	(rA) : (rL)	3	a	a + 3 = NI	a + 3 = NI
	TGR	87	>	≤	(rA) : (rL)	3	a	a + 3 = NI	a + 3 = NI
TRANS-LATE	CTM	12	–	c	CC (rA, rL, rX) → MC-6 (rA, rX). Zeros → rL	3	a		a + 3 = NI
	MTC	17	–	c	MC-6 (rA, rX) → CC (rA, rL, rX)	3	a		a + 3 = NI
	TMX	C1	–	c	MC-4 (rA) → XS-3 (rA)	3	a		a + 3 = NI
	TXM	C3	–	c	XS-3 (rA) → MC-4 (rA)	3	a		a + 3 = NI
INDEX REGISTERS	LIR[1]	02	m	c	m of instruction word → IRi	3	a		a + 3 = NI
	IIR[1]	07	m	c	m of instruction word + (IRi) → IRi, and m of rA. Zeros → balance of rA NOTE: If Sign Bit = 0 0 1 1, STR-3[3] = 0 1 0 1, Then Select None IR1 IR2 IR3	4	a		a + 4 = NI
PRINT	PRN[2]	11	bbnn	c	Advance nn lines, print bb band. (rA), (rX) destroyed[5]	592	L 197		L 189 = NI
	PFD[2]	16	00nn	c	Advance nn lines[5]	4	a		a + 4 = NI
	PBT	27	Yes	No	Printer-Free Test: Yes (rC) → rA	No = 3 Yes = 4	a	Yes: a + 4	No: a + 3
CARD READER	HBT	42	Yes	No	Buffer-Loaded Test: Yes (rC) → rA	No = 3 Yes = 4	a	Yes: a + 4	No: a + 3
	HBU	96	bb00	c	(B) → I interlace on bb band	203	L 198		L 001 = NI
	HBU	96	bb01	c	(B) → MC-6 → I, interlace on bb band	215	L 198		L 013 = NI
	HCC[2]	72	m	c	Card Cycle. Interlock (rC) → rA; NI → m	3 if c; 4 if m	a	a + 4	a + 3 = NI
	HSS	47	0n00	c	Select Stacker n (n = 0, 1, 2)	3	a		a + 3 = NI
READ-PUNCH	RBT	22	Yes	No	Buffer-Loaded Test: Yes, (rC) → rA	No = 3 Yes = 4	a	Yes: a + 4	No: a + 3
	RBU	46	bb00	c	(B) → I interlace on bb band	203	L 098		L 101 = NI
	RBU	46	bb01	c	(B) → MC-6 → Ir interlace on bb band	215	L 098		L 113 = NI
	RCC[2]	81	bb00	c	Card Cycle. 0 interlace on bb band → B	103	L 098		L 001 = NI
	RCC[2]	81	bb01	c	Card Cycle. MC-6 in Or interlace on bb band → CC → B.	210	L 098		L 108 = NI
	RSS	57	–	c	Select Stacker 1 (sort).	3	a		a + 3 = NI
MAGNETIC TAPE	TST	C2	Yes	No	Synchronizer Test: Free, (rC) → rA	No = 3 Yes = 4	a	Yes: a + 4	No: a + 3
	TBL	C6	bb00	c	Tape Interlace on bb band → B	205	L 048		L 053 = NI
	TBT	C7	Yes	No	Buffer-Free Test: Yes, (rC) → rA, Error FF → rL	No = 3 Yes = 5	a	Yes: a + 5	No: a + 3
	TRW	F2	0xy0	c	Rewind Uniservo X. (X = 0-9) y = 0, no interlock. y = 2, interlock.	600 ms.			
	TBU[2]	F6	bb00	c	(B) → Tape interlace on bb band	205	L 198		L 003 = NI
	TRD	G2	0xyz	c	Read 1 blk from tape → B; x = UNISERVO Number (0-9); y = 0: 250 cpi (USS); y = 1: 125 cpi (USS); y = 5: 250 cpi (UNIVAC); y = 6: 125 cpi (UNIVAC); z = 0: forward normal; z = 1: forward low; z = 2: forward high; z = 5: backward normal; z = 6: backward low; z = 7: backward high	17	a		a + 17 = NI
	TWR	H2	0xy0	c	Write 1 blk. from B → Tape. x = UNISERVO Number (0-9); y = 0: 250 cpi (USS); y = 1: 125 cpi (USS); y = 5: 250 cpi (UNIVAC); y = 6: 125 cpi (UNIVAC)	17	a		a + 17 = NI
RANDEX® STORAGE UNITS		40	m	c	(m) → SIR	4	a	m	a + 4
		92	Yes	No	Head Position Test: Branch	No = 3, Yes = 4	a	Yes: a + 4	No: a + 3
		43	0n00	c	Set Head Position n = Randex Unit (1–10)	3	a		a + 3
	TBU[2]	F6	bb00	c	(B) → Tape Interlace on bb band	205	L 198		L 003 = NI
	TBL	C6	bb00	c	Tape Interlace on bb band → B	205	L 048		L 053 = NI
	TBT	C7	Yes	No	Buffer-Free Test: Yes, (rC) → rA, Error FF → rL	No=3, Yes=4	a	Yes: a + 5	No: a + 3
	TST	C2	Yes	No	Synchronizer-Free Test: Yes, (rC) → rA	No=3, Yes=4	a	Yes: a + 4	No: a + 3
		18	OUDSSTTB[4]		Position Read-Write Head.	125 m.s. (min)			
		28	OUDSSTTB[4]		Write RANDEX Blk. (B) → blk. specified	35 m.s. (min)			
		38	OUDSSTTB[4]		Read RANDEX Blk. Blk. specified → B	105 m.s. + Lat.			
		48	OUDSSTTB[4]		Write/Check RANDEX Blk.	105 m.s. + Lat.			
		58	OUDSSTTB[4]		Search Write. (B) → Blk. indentified by Search	35 m.s. + Lat.			
		68	OUDSSTTB[4]		Search Read. Blk. identified by Search → B	35 m.s.			

NOTE:
1 Add 1 Word Time to instructions employing IR instructions.
2 If not executed, (rC) → rA. next instruction at c + 1.
3 STR-3 is the 4-bit position of the LSD of the Operation Code.
4 Instruction executed in SIR. 0 = unused digit position; U = RANDEX Unit specified; D = Drum Half; SS = Sector; TT = Track within Sector; B = Block.
5 nn = No. of lines to advance. 00–49 = 00–49; 50–59 = A0–A9; 60–69 = B0–B9; 70–79 = C0–C9

TRANSLATION TABLE

80-COLUMN CODE				COMPUTER CODE			UNIVAC XS-3 CODE		
PUNCHING CHARACTER	UNPRIMED rA YX01	PRIMED rL 2345	DUOPRIMED rX 6789	ZONE rX 5421	NUMERIC rA 5421	PRINTING CHARACTER	ZONE	NUMERIC	CHARACTER
0	0010	0000	0000	0000	0000	0	0000	0011	0
1	0001	0000	0000	0000	0001	1	0000	0100	1
2	0000	1000	0000	0000	0010	2	0000	0101	2
3	0000	0100	0000	0000	0011	3	0000	0110	3
4	0000	0010	0000	0000	0100	4	0000	0111	4
5	0000	0001	0000	0000	1000	5	0000	1000	5
6	0000	0000	1000	0000	1001	6	0000	1001	6
7	0000	0000	0100	0000	1010	7	0000	1010	7
8	0000	0000	0010	0000	1011	8	0000	1011	8
9	0000	0000	0001	0000	1100	9	0000	1100	9
A	1001	0000	0000	0001	0001	A	0001	0100	A
B	1000	1000	0000	0001	0010	B	0001	0101	B
C	1000	0100	0000	0001	0011	C	0001	0110	C
D	1000	0010	0000	0001	0100	D	0001	0111	D
E	1000	0001	0000	0001	1000	E	0001	1000	E
F	1000	0000	1000	0001	1001	F	0001	1001	F
G	1000	0000	0100	0001	1010	G	0001	1010	G
H	1000	0000	0010	0001	1011	H	0001	1011	H
I	1000	0000	0001	0001	1100	I	0001	1100	I
J	0101	0000	0000	0010	0001	J	0010	0100	J
K	0100	1000	0000	0010	0010	K	0010	0101	K
L	0100	0100	0000	0010	0011	L	0010	0110	L
M	0100	0010	0000	0010	0100	M	0010	0111	M
N	0100	0001	0000	0010	1000	N	0010	1000	N
O	0100	0000	1000	0010	1001	O	0010	1001	O
P	0100	0000	0100	0010	1010	P	0010	1010	P
Q	0100	0000	0010	0010	1011	Q	0010	1011	Q
R	0100	0000	0001	0010	1100	R	0010	1100	R
S	0010	1000	0000	0011	0010	S	0011	0101	S
T	0010	0100	0000	0011	0011	T	0011	0110	T
U	0010	0010	0000	0011	0100	U	0011	0111	U
V	0010	0001	0000	0011	1000	V	0011	1000	V
W	0010	0000	1000	0011	1001	W	0011	1001	W
X	0010	0000	0100	0011	1010	X	0011	1010	X
Y	0010	0000	0010	0011	1011	Y	0011	1011	Y
Z	0010	0000	0001	0011	1100	Z	0011	1100	Z
PUNCH POSITIONS 3-8	#	0000	0100	0010	0001	1111	#	0001	1101	#
Y-3-8	.	1000	0100	0010	0001	0101	.	0001	0010	.
X-3-8	$	0100	0100	0010	0010	0101	$	0010	0010	¢(N.P.)
0-8-3	,	0010	0100	0010	0011	0101	,COMMA	0011	0010	:
Blank	Blank	0000	0000	0000	0000	0110	SPACE (N.P.)	0000	0001	Space
4-8	@	0000	0010	0010	0011	0000	+	0011	0011	+
Y-4-8	□	1000	0010	0010	0001	0110	:	0001	0001	,
X-4-8	*	0100	0010	0010	0010	0110	*	0010	0001	¤(N.P.)
0-4-8	%	0010	0010	0010	0011	0110	%	0011	0001	BREAK-POINT
Y	&	1000	0000	0000	0001	0111	&	0001	0000	¢(N.P.)
X	–	0100	0000	0000	0000	0101	–	0000	0010	–
0-1	/	0011	0000	0000	0011	0001	/	0011	0100	/
1-4-8		0001	0010	0010	0000	0111	)	0000	0000	Ignore
4-6-8		0000	0010	1010	0000	1111	' APOS-TROPHE	0000	1101	' APOS-TROPHE
4-5-8		0000	0011	0010	0000	1110	;	0000	1110	&
3-5-8		0000	0101	0010	0000	1101	(	0000	1111	(
Y-0		1010	0000	0000	0001	0000	N.P.	0001	0011	;
X-0		0110	0000	0000	0010	0000	N.P.	0010	0011	)

MAGNETIC TAPE UNITS – RANDEX®

MEMORY LEVEL	TAPE WORD	MEMORY LEVEL	TAPE WORD	MEMORY LEVEL	TAPE WORD	MEMORY LEVEL	TAPE WORD
000	93′	050	18′	100	43′	150	68′
① 001	0R	051	25R	101	50	151	75
002	62′	052	87′	102	12′	152	37′
003	69	053	94	103	19R	153	44R
004	31′	054	56′	104	81′	154	6′
005	38R	055	63	105	88	155	13R
006	0′	056	25′	106	50′	156	75′
007	7R	057	32R	107	57	157	82
008	69′	058	94′	108	19′	158	44′
009	76	059	1R	109	26R	159	51
010	38′	060	63′	110	88′	160	13′
011	45R	061	70	111	95	161	20R
012	7′	062	32′	112	57′	162	82′
013	14R	063	39R	113	64	163	89
014	76′	064	1′	114	26′	164	51′
015	83	065	8R	115	33R	165	58
016	45′	066	70′	116	95′	166	20′
017	52	067	77	117	2R	167	27R
018	14′	068	39′	118	64′	168	89′
019	21R	069	46R	119	71	169	96
020	83′	070	8′	120	33′	170	58′
021	90	071	15R	121	40R	171	65
022	52′	072	77′	122	2′	172	27′
023	59	073	84	123	9R	123	34R
024	21′	074	46′	② 124	71′	174	96′
025	28R	075	53	125	78	175	3R
026	90′	076	15′	126	40′	176	65′
027	97	077	22R	④ 127	47R	177	72
028	59′	078	84′	128	9′	178	34′
029	66	079	91	129	16R	179	41R
030	28′	080	53′	130	78′	180	3′
031	35R	081	60	131	85	181	10R
032	97′	082	22′	132	47′	182	72′
033	4R	083	29R	133	54	183	79
034	66′	084	91′	134	16′	184	41′
035	73	085	98	135	23R	185	48
036	35′	086	60′	136	85′	186	10′
037	42R	087	67	137	92	187	17R
038	4′	088	29′	138	54′	188	79′
039	11R	089	36R	139	61	189	86
040	73′	090	98′	140	23′	190	48′
041	80	091	5R	141	30R	191	55
042	42′	092	67′	142	92′	192	17′
043	49	093	74	143	99	193	24R
044	11′	094	36′	144	61′	194	86′
045	18R	095	43R	145	68	195	93
046	80′	096	5′	146	30′	196	55′
047	87	097	12R	147	37R	197	62
048	49′	098	74′	③ 148	99′	198	24′
049	56	099	81	149	6R	199	31R

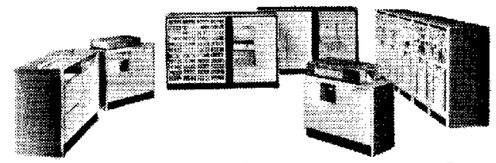
① START ② UNIVAC END ③ USS END ④ RANDEX END R=RANDEX

PROGRAM LOADING DECK KEY:	KEY	IMAGE	SIGN	BUFF STN-3	INDEX REGISTER
	0	Store Numeric	+	0	None
	1	Store Numeric	+	1	IR_1
	2	Store Numeric	–	0	IR_2
	3	Store Numeric	–	1	IR_3
	5	Store Numeric	+	0	None
	6	Store Numeric	–	0	IR_2
	7	Store Zone	+	0	None
	8	Store Zone	–	0	IR_2

Key 0, 1, 2 & 3 used for instructions & constants requiring non-numerics.
Key 5, 6, 7 & 8 used for constants.

NON-NUMERICS ARE CODED
(with key 0, 1, 2 or 3):

A = 0101 = rA
B = 0110 = rL
C = 0111 = rX
F = 1101
G = 1110
H = 1111



UNIVAC®
SOLID-STATE 80
REFERENCE CARD

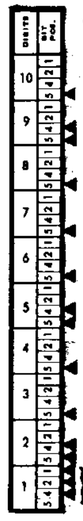
	CARD COLUMNS	UNTRANSLATED 1ST READ 110-17	1'10-17	1"10-17	PUNCH 010-17	0'10-17	0"10-17	2ND READ 120-27	1'20-27	1"20-27
READ-PUNCH	1-10	103	107	111	109	113	117	008	012	016
	11-20	115	119	123	121	125	129	020	024	028
	21-30	127	131	135	133	137	141	032	036	040
	31-40	139	143	147	145	149	153	044	048	052
	41-50	151	155	159	157	161	165	056	060	064
	51-60	163	167	171	169	173	177	068	072	076
	61-70	175	179	183	181	185	189	080	084	088
	71-80	187	191	195	193	197	105	092	096	004

	CARD COLUMNS	TRANSLATED 1ST READ NUMERIC	ZONE	2ND READ NUMERIC	ZONE
READER	1-10	013	018	118	123
	11-20	025	030	130	135
	21-30	037	042	142	147
	31-40	049	054	154	159
	41-50	061	066	166	171
	51-60	073	078	178	183
	61-70	085	090	190	195
	71-80	097	111	006	011

	CARD COLUMNS	TRANSLATED 1ST READ NUMERIC	ZONE	PUNCH NUMERIC	ZONE	2ND READ NUMERIC	ZONE
READ-PUNCH	1-10	113	118	102	107	018	023
	11-20	125	130	114	119	030	035
	21-30	137	142	126	131	042	047
	31-40	149	154	138	143	054	059
	41-50	161	166	150	155	066	071
	51-60	173	178	162	167	078	083
	61-70	185	190	174	179	090	095
	71-80	197	011	186	191	106	111

	CARD COLUMNS	UNTRANSLATED 1ST READ J10-17	J'10-17	J"10-17	2ND READ J20-27	J'20-27	J"20-27
READER	1-10	003	007	011	108	112	116
	11-20	015	019	023	120	124	128
	21-30	027	031	035	132	136	140
	31-40	039	043	047	144	148	152
	41-50	051	055	059	156	160	164
	51-60	063	067	071	168	172	176
	61-70	075	079	083	180	184	188
	71-80	087	091	095	192	196	104

	PRINT WHEELS	P NUMERIC	P ZONE
PRINTER	1-10	000	005
	11-20	081	086
	21-30	165	170
	31-40	050	055
	41-50	134	139
	51-60	018	023
	61-70	103	108
	71-80	041	046
	81-90	125	130
	91-100	009	014
	101-110	094	099
	111-120	178	183
	121-130	062	067



TAPE ERROR CONDITIONS: (EF)→rL

- FIR BIR check
- Interrupt operation switch energized
  Manual tape ending switch energized
- Control check-tapes not physically responding.
- ITCH Syn. o'flow during read or u'flow write
- TACH hash pulses between blocks
- Write comparison check
  10 PC parity error during reading or writing
- < 720 (1100) character count
- 720 (1100) character count.
- Parity during buffer → memory or buffer → synchronizer
  739 (1121) more than one block
- If any error condition is present, master indication (0111).