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2 *
3 *      70/620 TEST EXECUTIVE-PRELIM. TESTS
4 *      AND CARD LOADER
5 *
6 *
7 *      **** *
8 *      * * * * *
9 *      * * * * *
10 *     * * * * *
11 *     * * * * *
12 *     * * * * *
13 *     * * * * *
14 *

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15 * THIS LISTING CONTAINS A PRELIMINARY INSTRUCTION TEST AND A
16 * PRELIMINARY MEMORY TEST FOR THE 70/620 COMPUTER.

17 * INSTRUCTION TEST
18 * ONLY A BASIC SET OF INSTRUCTIONS ARE TESTED TO GAIN CONFIDENCE
19 * THAT STANDARD TEST PROGRAMS CAN BE LOADED.
20 * MOST OF THE SUBTESTS BUILD FROM PRECEDING SUBTESTS AND ASSUME
21 * THAT THE INSTRUCTIONS USED PREVIOUSLY ARE WORKING.

22 * MEMORY TEST
23 * LOCATIONS EMDB = 017777 ARE EXERCISED WITH THE
24 * ORIGINAL CONTENTS RESTORED. LOCATIONS 0 = EMDB
25 * ARE DESTROYED BY THE MEMORY TEST ROUTINE.

26 * SWITCHES
27 * USE S92 TO LOOP ON ERROR AFTER HALT
28 * USE S93 TO LOOP ON BOTH PRELIMINARY TESTS

29 * LOADER
30 * THE BINARY LOADER WILL ADAPT TO THE BOOTSTRAP
31 * AND LOAD/EXEC THE NEXT PROGRAM.

32 * INSTRUCTION TEST

Address	Op Code	Op Name	Op Data	Op Comment
007000	49	ORG	07000	ORIGIN FOR ABL
007000	51	JMP	**2	
007001				
007002	52	ENST	TZA	
007003	53	JAZ	ENA1	
007004				
007005	54	ENA0	JSS2	ENST
007006				
007007	55	HLT	01	ERROR--TZA/DAR/JAZ/JAN
007010	56	JMP	ENB0	
007011				
007012	57	ENA1	DAR	
007013	58	STA	ONES	
007014	59	JAN	ENA2	
007015				
007016	60	JMP	ENA0	
007017				
007020	61	ENA2	LDA	ONES
007021	62	IAR		
007022	63	JAZ	ENB0	
007023				
007024	64	JSS2	ENA2	
007025				
007026	65	HLT	02	ERROR--LDA/IAR/STA
007027	69	ENB0	LDB	ONES
007030	70	JBZ	ENB1	
007031				
007032	71	TZB		
007033	72	JBZ	ENB2	
007034				
007035	73	ENB1	JSS2	ENB0
007036				
007037	74	HLT	3	ERROR--LDB/JBZ/TZB
007040	75	ENB2	IBR	
007041	76	JBZ	ENB3	
007042				
007043	77	DBR		
007044	78	JBZ	ENCO	
007045				
007046	79	ENB3	JSS2	ENB0
007047				
007050	80	HLT	4	ERROR--IBR/DBR
007051	81			

			82 *						
			83 *						
007051	034554	A	84	ENCO	LDX	ONES			
007052	001040	A	85		JXZ	ENC1			
007053	007057	A							
007054	005004	A	86		TZX				
007055	001040	A	87		JXZ	ENC2		CONTINUE	
007056	007062	A							
007057	001200	A	88	ENC1	JSS2	ENCO			
007060	007051	A							
007061	000005	A	89		HLT	5		ERROR==LDX/JXZ/TZX	
007062	005144	A	90	ENC2	IXR				
007063	001040	A	91		JXZ	ENC3			
007064	007070	A							
007065	005344	A	92		DXR				
007066	001040	A	93		JXZ	END0		CONTINUE	
007067	007073	A							
007070	001200	A	94	ENC3	JSS2	ENCO			
007071	007051	A							
007072	000006	A	95		HLT	6		ERROR==IXR/DXR	
			96 *						
			97 *						
			98 *						
007073	014532	A	99	END0	LDA	ONES			
007074	054002	A	100		STA	**+3			
007075	005001	A	101		TZA				
007076	006010	A	102		LDAI	1		(ALL ONES)	
007077	000001	A							
007100	001010	A	103		JAZ	END1			
007101	007104	A							
007102	001004	A	104		JAN	END2		CONTINUE	
007103	007107	A							
007104	001200	A	105	END1	JSS2	END0			
007105	007073	A							
007106	000007	A	106		HLT	7		ERROR==LDAI/JAN	
			107 *						
007107	134516	A	108	END2	ERA	ONES			
007110	001004	A	109		JAN	END3			
007111	007114	A							
007112	001010	A	110		JAZ	ENE0		CONTINUE	
007113	007117	A							
007114	001200	A	111	END3	JSS2	END0			
007115	007073	A							
007116	000010	A	112		HLT	010		ERROR==LDAI/ERA/JAN	
			113 *						
			114 *						
			115 *						
007117	014506	A	116	ENE0	LDA	ONES			
007120	054002	A	117		STA	**+3			
007121	005001	A	118		TZA				
007122	006130	A	119		ERAI	1		(ALL ONES)	
007123	000001	A							
007124	001002	A	120		JAP	ENE1			
007125	007131	A							
007126	134477	A	121		ERA	ONES			
007127	001002	A	122		JAP	ENF0		CONTINUE	
007130	007134	A							
007131	001200	A	123	ENE1	JSS2	ENE0			
007132	007117	A							
007133	000011	A	124		HLT	011		ERROR==ERAI/JAP	
			125 *						
			126 *						
			127 *						
007134	014471	A	128	ENF0	LDA	ONES			
007135	054002	A	129		STA	**+3			
007136	005002	A	130		TZB				
007137	006020	A	131		LDBI	1		(ALL ONES)	
007140	000001	A							
007141	005021	A	132		TBA				
007142	001002	A	133		JAP	ENF1			
007143	007147	A							
007144	134461	A	134		ERA	ONES			
007145	001010	A	135		JAZ	ENGO		CONTINUE	
007146	007152	A							
007147	001200	A	136	ENF1	JSS2	ENF0			
007150	007134	A							
007151	000012	A	137		HLT	012		ERROR==LDBI/TBA	
			138 *						
			139 *						
			140 *						
007152	014453	A	141	ENGO	LDA	ONES			
007153	054002	A	142		STA	**+3			
007154	005001	A	143		TZA				
007155	006030	A	144		LDXI	1		(ALL ONES)	
007156	000001	A							
007157	005041	A	145		TXA				
007160	001002	A	146		JAP	ENG1			
007161	007165	A							
007162	134443	A	147		ERA	ONES			
007163	001010	A	148		JAZ	ENH0		CONTINUE	
007164	007170	A							
007165	001200	A	149	ENG1	JSS2	ENGO			
007166	007152	A							
007167	000013	A	150		HLT	013		ERROR==LDXI/TXA	
			151 *						

			152 *						
			153 *						
007170	024434	A	154 ENH0	LDB	D125	CONSTANT=125252			
007171	005024	A	155	TRX					
007172	001040	A	156	JXZ	ENH1				
007173	007200	A							
007174	005041	A	157	TXA					
007175	134427	A	158	ERA	D125				
007176	001010	A	159	JAZ	ENI0	CONTINUE			
007177	007203	A							
007200	001200	A	160 ENH1	JSS2	ENH0				
007201	007170	A							
007202	000014	A	161	HLT	014	ERROR--LDB/TBX			
			162 *						
			163 *						
			164 *						
007203	014420	A	165 ENI0	LDA	D052	CONSTANT=052525			
007204	134417	A	166	ERA	D052				
007205	001010	A	167	JAZ	ENI1	CONTINUE			
007206	007212	A							
007207	001200	A	168	JSS2	ENI0				
007210	007203	A							
007211	000015	A	169	HLT	015	ERROR--LDA/ERA			
			170 *						
007212	014412	A	171 ENI1	LDA	D125	CONSTANT=125252			
007213	054413	A	172	STA	TS01	TEMP STORE			
007214	005001	A	173	TZA					
007215	014411	A	174	LDA	TS01				
007216	001010	A	175	JAZ	ENI2				
007217	007223	A							
007220	134404	A	176	ERA	D125				
007221	001010	A	177	JAZ	ENJ0	CONTINUE			
007222	007226	A							
007223	001200	A	178 ENI2	JSS2	ENI1				
007224	007212	A							
007225	000016	A	179	HLT	016	ERROR--LDA/STA			
			180 *						
			181 *						
			182 *						
007226	024375	A	183 ENJ0	LDB	D052	CONSTANT=052525			
007227	064377	A	184	STB	TS01	TEMP STORE			
007230	024376	A	185	LDB	TS01				
007231	005021	A	186	TBA					
007232	134371	A	187	ERA	D052				
007233	001010	A	188	JAZ	ENK0	CONTINUE			
007234	007240	A							
007235	001200	A	189	JSS2	ENJ0				
007236	007226	A							
007237	000017	A	190	HLT	017	ERROR--LDB/STB			
			191 *						
			192 *						
			193 *						
007240	034363	A	194 ENK0	LDX	D052	CONSTANT=052525			
007241	074365	A	195	STX	TS01	TEMP STORE			
007242	034364	A	196	LDX	TS01				
007243	005041	A	197	TXA					
007244	134357	A	198	ERA	D052				
007245	001010	A	199	JAZ	ENL0	CONTINUE			
007246	007252	A							
007247	001200	A	200	JSS2	ENK0				
007250	007240	A							
007251	000020	A	201	HLT	020	ERROR--LDX/STX			
			202 *						
			203 *						
			204 *						
007252	005111	A	205 ENL0	IAR					
007253	005001	A	206	TZA					
007254	005002	A	207	TZB					
007255	003010	A	208	XAZ	ENL0				
007256	007252	A							
007257	006130	A	209	ERAI	1				
007260	000001	A							
007261	001010	A	210	JAZ	ENL1	CONTINUE			
007262	007266	A							
007263	001200	A	211	JSS2	ENL0				
007264	007252	A							
007265	000021	A	212	HLT	021	ERROR--XAZ			
			213 *						
007266	014337	A	214 ENL1	LDA	ONES				
007267	003020	A	215	XBZ	ENL0				
007270	007252	A							
007271	001010	A	216	JAZ	ENM0	CONTINUE			
007272	007276	A							
007273	001200	A	217	JSS2	ENL0				
007274	007252	A							
007275	000022	A	218	HLT	022	ERROR--XBZ			
			219 *						
			220 *						
			221 *						
007276	007400	A	222 ENM0	ROF					
007277	001001	A	223	JOF	ENM1				
007300	007304	A							
007301	007401	A	224	SOF					
007302	001001	A	225	JOF	ENM2				
007303	007307	A							

007304	001200	A	226	ENM1	JSS2	ENM0	
007305	007276	A					
007306	000023	A	227		HLT	023	ERROR--ROF/SOF/JOF
			228	*			
007307	007400	A	229	ENM2	ROF		
007310	001001	A	230		JOF	ENM3	
007311	007314	A					
007312	001000	A	231		JMP	ENM0	CONTINUE
007313	007317	A					
007314	001200	A	232	ENM3	JSS2	ENM2	
007315	007307	A					
007316	000024	A	233		HLT	024	ERROR--ROF/JOF/JMP
			234	*			
			235	*			
			236	*			
007317	014306	A	237	ENM0	LDA	ONES	
007320	002000	A	238		JMPM	ENM1	
007321	007331	A					
007322	001010	A	239		JAZ	ENM5	CONTINUE
007323	007336	A					
007324	001200	A	240		JSS2	ENM0	
007325	007317	A					
007326	000025	A	241		HLT	025	ERROR--JMPM/JMP*
007327	001000	A	242		JMP	ENM5	
007330	007336	A					
			243	*			
007331	000007	A	244	ENM1	DATA	7	ENTR = NONZERO
007332	005001	A	245		TZA		
007333	001000	A	246		JMP*	ENM1	
007334	107331	A					
007335	000026	A	247		HLT	026	ERROR--JMP*
			248	*			
007336	014265	A	249	ENM5	LDA	D052	
007337	004261	A	250		LRLA	17	A=125252
007340	134264	A	251		ERA	D125	
007341	001010	A	252		JAZ	ENM6	
007342	007346	A					
007343	001200	A	253		JSS2	ENM5	
007344	007336	A					
007345	000027	A	254		HLT	027	ERROR--LRLA
			255	*			
007346	005002	A	256	ENM6	TZB		
007347	014254	A	257		LDA	D052	
007350	004557	A	258		LLSR	15	A=0 B=125252
007351	001010	A	259		JAZ	ENM7	
007352	007356	A					
007353	001200	A	260		JSS2	ENM6	
007354	007346	A					
007355	000030	A	261		HLT	030	ERROR--LLSR
			262	*			
007356	005021	A	263	ENM7	TBA		
007357	134245	A	264		ERA	D125	
007360	001010	A	265		JAZ	ENM8	CONTINUE
007361	007365	A					
007362	001200	A	266		JSS2	ENM6	
007363	007346	A					
007364	000031	A	267		HLT	031	ERROR--LLSR
			268	*			
			269	*			
007365	004457	A	270	ENM8	LLRL	15	A=052525 B=0
007366	134235	A	271		ERA	D052	
007367	001010	A	272		JAZ	ENM9	
007370	007374	A					
007371	001200	A	273		JSS2	ENM6	
007372	007346	A					
007373	000032	A	274		HLT	032	ERROR--LLRL
			275	*			
007374	005021	A	276	ENM9	TBA		
007375	001010	A	277		JAZ	ENM0	
007376	007402	A					
007377	001200	A	278		JSS2	ENM6	
007400	007346	A					
007401	000033	A	279		HLT	033	ERROR--LLRL
			280	*			
			281	*			
			282	*			
007402	014220	A	283	ENM0	LDA	D001	
007403	124222	A	284		ADD	ONES	
007404	001010	A	285		JAZ	ENM1	OK
007405	007411	A					
007406	001200	A	286		JSS2	ENM0	
007407	007402	A					
007410	000034	A	287		HLT	034	ERROR--ADD
007411	006120	A	288	ENM1	ADDI	017777	
007412	177777	A					
007413	006110	A	289		DRAI	017777	
007414	177777	A					
007415	006130	A	290		ERAI	017777	
007416	177777	A					
007417	001010	A	291		JAZ	ENM0	CONTINUE
007420	007424	A					
007421	001200	A	292		JSS2	ENM0	
007422	007402	A					
007423	000035	A	293		HLT	035	ERROR--ADDI/DRAI
			294	*			

007424	014177	A	295 *					
007425	144176	A	296 ENQ0	LDA	D052	CONSTANT=052525		
007426	001010	A	297	SUB	D052			
007427	007433	A	298	JAZ	ENR0	CONTINUE		
007430	001200	A	299	JSS2	ENQ0			
007431	007424	A	300	HLT	036	ERROR==SUB		
007432	000036	A	301 *					
			302 *					
			303 *					
007433	005001	A	304 ENR0	TZA				
007434	054172	A	305	STA	TS01			
007435	014171	A	306	LDA	TS01			
007436	005000	A	307	NOP				
007437	001010	A	308	JAZ	EN80			
007440	007444	A						
007441	001200	A	309	JSS2	ENR0			
007442	007433	A						
007443	000037	A	310	HLT	037	ERROR==NOP		
			311 *					
			312 *					
			313 *					
007444	014161	A	314 EN80	LDA	ONES			
007445	024160	A	315	LDB	ONES			
007446	005103	A	316	INCR	03			
007447	005311	A	317	DAR				
007450	005322	A	318	DBR				
007451	001010	A	319	JAZ	EN82			
007452	007460	A						
007453	001200	A	320 ENS1	JSS2	EN80			
007454	007444	A						
007455	000040	A	321	HLT	040	ERROR==INCR 03		
007456	001000	A	322	JMP	ENT0			
007457	007464	A						
007460	001020	A	323 ENS2	JBZ	ENT0			
007461	007464	A						
007462	001000	A	324	JMP	ENS1			
007463	007453	A						
			325 *					
			326 *					
			327 *					
007464	005002	A	328 ENTO	TZB				
007465	005302	A	329	DECR	02			
007466	005021	A	330	TBA				
007467	134136	A	331	ERA	ONES			
007470	001010	A	332	JAZ	ENU0			
007471	007475	A						
007472	001200	A	333	JSS2	ENT0			
007473	007464	A						
007474	000041	A	334	HLT	041	ERROR==DECR 02		
			335 *					
			336 *					
			337 *					
007475	005103	A	338 ENU0	INCR	03			
007476	005122	A	339	IBR				
007477	005032	A	340	MERG	032			
007500	005021	A	341	TBA				
007501	006130	A	342	ERAI	03			
007502	000003	A						
007503	001010	A	343	JAZ	ENVO			
007504	007510	A						
007505	001200	A	344	JSS2	ENU0			
007506	007475	A						
007507	000042	A	345	HLT	042	ERROR==MERG 032		
			346 *					
			347 *					
			348 *					
007510	006010	A	349 ENVO	LDAI	0100			
007511	000100	A						
007512	004346	A	350	LSRA	6			
007513	005311	A	351	DAR				
007514	001010	A	352	JAZ	ENW0			
007515	007521	A						
007516	001200	A	353	JSS2	ENVO			
007517	007510	A						
007520	000043	A	354	HLT	043	ERROR==LSRA 6		
			355 *					
			356 *					
			357 *					
007521	006030	A	358 ENW0	LDXI	D125			
007522	007625	A						
007523	005001	A	359	TZA				
007524	015000	A	360	LDA	0,1			
007525	134077	A	361	ERA	D125			
007526	001010	A	362	JAZ	ENX0			
007527	007533	A						
007530	001200	A	363	JSS2	ENW0			
007531	007521	A						
007532	000044	A	364	HLT	044	ERROR==LDA 0,1		
			365 *					
			366 *					
			367 *					
007533	005001	A	368 ENX0	TZA				
007534	054072	A	369	STA	TS01			

007535	006030	A	370	LDXI	TS01	
007536	007627	A				
007537	014065	A	371	LDA	D125	
007540	055000	A	372	STA	0,1	
007541	134065	A	373	ERA	TS01	
007542	001010	A	374	JAZ	ENY0	
007543	007547	A				
007544	001200	A	375	JSS2	ENY0	
007545	007533	A				
007546	000045	A	376	HLT	045	ERROR--STA 0,1
			377	*		
			378	*		
			379	*		
007547	014056	A	380	ENY0 LDA	ONES	
007550	006150	A	381	ANAI	0125252	
007551	125252	A				
007552	134052	A	382	ERA	D125	
007553	001010	A	383	JAZ	ENZ0	
007554	007560	A				
007555	001200	A	384	JSS2	ENY0	
007556	007547	A				
007557	000046	A	385	HLT	046	ERROR--ANAI
			386	*		
			387	*		
			388	*		
007560	014044	A	389	ENZ0 LDA	D125	
007561	006050	A	390	STAI	01	
007562	000001	A				
007563	006030	A	391	LDXI	**1	
007564	007562	A				
007565	015000	A	392	LDA	0,1	
007566	134036	A	393	ERA	D125	
007567	001010	A	394	JAZ	EN10	
007570	007574	A				
007571	001200	A	395	JSS2	ENZ0	
007572	007560	A				
007573	000047	A	396	HLT	047	ERROR--STAI
			397	*		
			398	*		
			399	*		
007574	005003	A	400	EN10 MERG	03	
007575	003022	A	401	XIF	022,EN11	
007576	007604	A				
007577	001004	A	402	JAN	EN20	
007600	007605	A				
007601	001200	A	403	JSS2	EN10	
007602	007574	A				
007603	000050	A	404	HLT	050	ERROR--XIF 022
007604	005311	A	405	EN11 DAR		
			406	*		
			407	*		
			408	*		
007605	005001	A	409	EN20 TZA		
007606	007401	A	410	SOF		
007607	001011	A	411	JIF	011,EN22	
007610	007616	A				
007611	001200	A	412	EN21 JSS2	EN20	
007612	007605	A				
007613	000051	A	413	HLT	051	ERROR--JIF 011
007614	001000	A	414	JMP	EMEM	
007615	007630	A				
007616	007400	A	415	EN22 RDF		
007617	001011	A	416	JIF	011,EN21	
007620	007611	A				
007621	001000	A	417	JMP	EMEM	START OF PRELIMINARY MEMORY TEST
007622	007630	A				
			418	*		
			419	*		
			420	*		
			421	*		
			422	*		
					DATA TABLE	
007623	000001	A	423	D001 DATA	1	
007624	052525	A	424	D052 DATA	052525	
007625	125252	A	425	D125 DATA	0125252	
007626	000001	A	426	ONES DATA	1	
007627	000007	A	427	TS01 DATA	7	WILL BE MADE ALL ONES TEMP. STORAGE. 7 FOR NON-ZERO BOOTSTRAP FORMAT
			428	*		
			429	*		
			430	*		
			431	*		
					PRELIMINARY MEMORY TEST	
			432	*	TESTS LOCS, EMDB = 017777 WITH 052525 AND 0125252 PATTERNS	
			433	*	ORIGINAL CONTENTS ARE SAVED AND RESTORED.	
			434	*		
007630	006030	A	435	EMEM LDXI	MEM2+2	START OF TEST ROUTINE
007631	007645	A				
007632	005002	A	436	TZB		TARGET LOCATION
007633	015000	A	437	MEM1 LDA	0,1	
007634	056000	A	438	STA	0,2	
007635	005144	A	439	IXR		
007636	005123	A	440	INCR	023	
007637	006140	A	441	SUBI	EMDB+1	
007640	000044	A				
007641	001010	A	442	JAZ	1	
007642	000001	A				
007643	001000	A	443	MEM2 JMP	MEM1	

007644	007633	A							
000000			444	LOC	0				
000000	000001	A	445	EMTS	DATA	1		TEMPORARY STORAGE	
000001	005002	A	446	TZB					
000002	006030	A	447	EME1	LDXI	EMDB		START LOCATION FOR MEMORY TEST	
000003	000043	A							
000004	015000	A	448	EME2	LDA	0,1			
000005	050000	A	449		STA	EMTS		SAVE CURRENT CONTENTS	
000006	010042	A	450	EME3	LDA	EMDC		CURRENT TEST PATTERN	
000007	055000	A	451		STA	0,1		STORE IT	
000010	005001	A	452		TZA				
000011	015000	A	453		LDA	0,1			
000012	130042	A	454		ERA	EMDC		COMPARE WORD STORED WITH WORD READ	
000013	001010	A	455		JAZ	**5			
000014	000020	A							
000015	001200	A	456	JSS2	EME3			LOOP ON ERROR	
000016	000006	A							
000017	000077	A	457	HLT	077			COMPARE ERROR HALT	
000020	010000	A	458		LDA	EMTS			
000021	055000	A	459		STA	0,1		RESTORE ORIGINAL CONTENTS	
000022	005145	A	460		INCR	045			
000023	006150	A	461		ANAI	020000			
000024	020000	A							
000025	001010	A	462	JAZ	EME2			GO TO NEXT LOCATION	
000026	000004	A							
000027	001020	A	463	JBZ	EME4				
000030	000035	A							
000031	001400	A	464	JSS3	ENST			REPEAT TESTS	
000032	007002	A							
000033	001000	A	465	JMP	BEGIN			GO MODIFY LOADER	
000034	007711	A							
000035	010043	A	466	EME4	LDA	EMDB			
000036	050042	A	467		STA	EMDC		0125252 DATA PATTERN	
000037	005122	A	468		IBR				
000040	001000	A	469	JMP	EME1			LOOP THRU MEMORY	
000041	000002	A							
000042	052525	A	470	EMDC	DATA	052525		FIRST DATA PATTERN	
000043	125252	A	471	EMDB	DATA	0125252		SECOND DATA PATTERN	
007711			472	LOC	MEM2+EMDB+3				
			473 *						
			474 *	LOADER	FOLLOWS				
			475 *						
			476 *					CARD READER	
			477 *						
	000474	A	478	OADR	EQU	0474			
007711	010213	A	479	BEGIN	LDA	0213			
007712	006150	A	480		ANAI	077			
007713	000077	A							
007714	050474	A	481		STA	OADR			
007715	001000	A	482	JMP	LOAC				
007716	007733	A							
			483 *						
007717	000001	A	484	SET	DATA	1			
			485 *						
007720	025000	A	486	LDB	0,1				
007721	001020	A	487	JBZ*	SET				
007722	107717	A							
007723	016000	A	488	LDA	0,2				
007724	006150	A	489		ANAI	0177700			
007725	177700	A							
007726	110474	A	490	ORA	OADR				
007727	056000	A	491		STA	0,2			
007730	005144	A	492	IXR					
007731	001000	A	493	JMP	SET+1				
007732	007720	A							
			494 *						
			495 *					CARD BINARY LOADER	
			496 *						
007733	007733	A	497	LOAC	EQU	*			
007733	006030	A	498		LDXI	CD00			
007734	010053	A							
007735	002000	A	499		JMPM	SET			
007736	007717	A							
	000010	A	500	AZ	EQU	010		A REG ZERO	
	000020	A	501	BZ	EQU	020		B REG ZERO	
007737	005001	A	502	INC	TZA			INITIALIZE A REG	
007740	054104	A	503		STA	CNT		INITIALIZE COUNT	
007741	054107	A	504		STA	CKSM		INITIALIZE CHECK SUM	
007742	054103	A	505		STA	CYCLE			
007743	101630	A	506	CD01	SEN	0630,**4		READER READY	
007744	007747	A							
007745	001000	A	507	JMP	**2			WAIT UNTIL IT IS READY	
007746	007743	A							
007747	100230	A	508	CD02	EXC	0230		READ A CARD	
007750	002000	A	509		CALL	LOAI		GET COLUMN 1	
007751	010040	A							
007752	004244	A	510	LOAE	LRLA	4		POSITION TO HIGH ORDER	
007753	054073	A	511		STA	PART		SAVE TO INCLUDE NEXT COLUMN	
007754	002000	A	512		CALL	LOAI		GET NEXT COLUMN	
007755	010040	A							
007756	004550	A	513		LLSR	8		ONLY 4 BITS NEEDED NOW	
007757	002000	A	514		CALL	LOAH		PUT WORD AND GET NEXT COLUMN	
007760	010001	A							
007761	004544	A	515		LLSR	4		ONLY NEED 8 BITS NOW	
007762	002000	A	516		CALL	LOAH		PUT WORD AND GET NEXT COLUMN	

007763	010001	A							
007764	002000	A	517	CALL	LOAH			PUT WORD AND GET NEXT COLUMN	
007765	010001	A							
007766	001000	A	518	JMP	LOAE			DO AGAIN FOR NEXT THREE WORDS	
007767	007752	A							
007770	054054	A	519	LOAF	STA	CNT		SAVE COUNT	
007771	001010	A	520		JAZ	LOAW		BLANK CARD OR ILLEGAL	
007772	010052	A							
007773	034044	A	521		LDX	LOAI		GET LAST WORD (LOAD/EXECUTION ADR)	
007774	074053	A	522		STX	EXEC		SAVE FOR EXECUTION	
007775	044050	A	523	LOAG	INR	CYCLE		INCREMENT WORD IN RECORD COUNT	
007776	002000	A	524		CALL	LOAI		GET NEXT COLUMN	
007777	010040	A							
010000	001000	A	525	JMP	**			RETURN	
010001	110000	A							
	010001	A	526	LOAH	EQU	**1		ENTRY	
010002	114044	A	527		DRA	PART		COMPLETE WORD	
010003	064043	A	528		STB	PART		SAVE PARTIAL FOR NEXT WORD	
010004	054033	A	529		STA	LOAI		SAVE INPUT WORD FOR STORE	
010005	134043	A	530		ERA	CKSM		INCLUDE IN CHECKSUM	
010006	054042	A	531		STA	CKSM		SAVE CHECKSUM	
010007	024036	A	532		LDB	CYCLE			
010010	001020	A	533		JBZ	LOAF		FIRST WORD OF RECORD, GET NEXT COLUMN	
010011	007770	A							
010012	005322	A	534		DBR			DECREMENT SUB CYCLE INDICATOR FOR TEST	
010013	001020	A	535		JBZ	LOAF+3		SECOND WORD OF RECORD, GET NEXT COLUMN	
010014	007773	A							
010015	024027	A	536		LDB	CNT		GET COUNT	
010016	005122	A	537		IBR				
010017	001030	A	538		JIF	AZ+8Z,(EXEC)*		EXECUTION ADDRESS	
010020	110050	A							
010021	005322	A	539		DBR				
010022	001030	A	540		JIF	AZ+8Z,INC		GOOD END OF RECORD, READ NEXT CARD	
010023	007737	A							
010024	001020	A	541		JBZ	LOAW		RAD CHECKSUM	
010025	010052	A							
010026	005322	A	542		DBR			REDUCE COUNT	
010027	064015	A	543		STR	CNT		SAVE COUNT	
010030	014007	A	544		LDA	LOAI		GET WORD TO STORE	
010031	055000	A	545		STA	0,1		STORE WORD	
010032	005144	A	546		IXR			INCREMENT STORE POINTER	
010033	001000	A	547		JMP	LOAG		GO TO GET NEXT COLUMN	
010034	007775	A							
010035	102530	A	548	CD03	CIA	030		INPUT COLUMN	
010036	005002	A	549		TZR			CLEAR REG	
010037	001000	A	550		JMP	**		RETURN	
010040	110037	A							
	010040	A	551	LOAI	EQU	**1		ENTRY AND TEMPORARY SAVE	
010041	101130	A	552	CD04	SEN	0130,**4		CHAR READY	
010042	010035	A							
010043	001000	A	553		JMP	**2		WAIT FOR CHAR READY	
010044	010041	A							
010045	000001	A	554	CNT	DATA	1			
010046	000001	A	555	CYCLE	DATA	1			
010047	000001	A	556	PART	DATA	1			
010050	000001	A	557	EXEC	DATA	1			
010051	000001	A	558	CKSM	DATA	1			
010052	000001	A	559	LOAW	HLT	1		ERROR HALT	
010053	007743	A	560	CD00	DATA	CD01,CD02,CD03,CD04,0			
010054	007747	A							
010055	010035	A							
010056	010041	A							
010057	000000	A							
	010060	A	561	ELDR	EQU	*			
010060	006030	A	563	DUMP	LDXI	07000			
010061	007000	A							
010062	100031	A	564		EXC	0031			
010063	002000	A	565	D1	CALL	PAC			
010064	010070	A							
010065	001016	A	566		JANZ	D1			
010066	010063	A							
010067	000000	A	567		HLT				
010070	000000	A	568	PAC	ENTR				
010071	006020	A	569		LDRI	40			
010072	000050	A							
010073	015000	A	570	PAC1	LDA	0,1			
010074	001016	A	571		JANZ	PAC3			
010075	010105	A							
010076	006010	A	572		LOAI	05001			
010077	005001	A							
010100	006057	A	573		STAE	PAC1			
010101	010073	A							
010102	054005	A	574		STA	PAC4			
010103	054015	A	575		STA	PAC5			
010104	005001	A	576	PAC2	TZA				
010105	004350	A	577	PAC3	LSRA	8			
010106	002000	A	578		JMPM	PNCH			
010107	010124	A							
010110	015000	A	579	PAC4	LDA	0,1			
010111	006150	A	580		ANAI	0377			
010112	000377	A							
010113	002000	A	581		JMPM	PNCH			
010114	010124	A							
010115	005144	A	582		IXR				
010116	005322	A	583		DBR				


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010117 001026 A 584 JBNZ PAC1
010120 010073 A
010121 015000 A 585 PAC5 LDA 0,1
010122 001000 A 586 JMP* PAC
010123 110070 A
010124 000000 A 587 PNCH ENTR
010125 101031 A 588 SEN 031,**4
010126 010131 A
010127 001000 A 589 JMP PNCH+1
010130 010125 A
010131 103131 A 590 QAR 031
010132 001000 A 591 JMP* PNCH
010133 110124 A
010060 A 592 *
010060 A 593 END DUMP
    
```

ENTRY NAMES

EXTERNAL NAMES

SYMBOLS

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000010 A AZ 007711 A BEGIN 000020 A BZ 010053 A CD00
007743 A CD01 007747 A CD02 010035 A CD03 010041 A CD04
010051 A CKSM 010045 A CNT 010046 A CYCLE 007623 A D001
007624 A D052 010063 A D1 007625 A D125 010060 A DUMP
010060 A ELDR 000043 A EMDB 000042 A EMDC 000002 A EME1
000004 A EME2 000006 A EME3 000035 A EME4 007630 A EMEM
000000 A EMTS 007574 A EN10 007604 A EN11 007605 A EN20
007611 A EN21 007616 A EN22 007005 A ENA0 007012 A ENA1
007020 A ENA2 007027 A ENB0 007035 A ENB1 007040 A ENB2
007046 A ENB3 007051 A ENC0 007057 A ENC1 007062 A ENC2
007070 A ENC3 007073 A ENDO 007104 A END1 007107 A END2
007114 A EN03 007117 A ENE0 007131 A ENE1 007134 A ENF0
007147 A ENF1 007152 A ENG0 007165 A ENG1 007170 A ENH0
007200 A ENH1 007203 A ENI0 007212 A ENI1 007223 A ENI2
007226 A ENJ0 007240 A ENK0 007252 A ENL0 007266 A ENL1
007276 A ENM0 007304 A ENM1 007307 A ENM2 007314 A ENM3
007317 A ENN0 007331 A ENN1 007336 A ENO5 007346 A ENO6
007356 A ENO7 007365 A ENO8 007374 A ENO9 007402 A ENP0
007411 A ENP1 007424 A ENQ0 007433 A ENR0 007444 A ENS0
007453 A ENS1 007460 A ENS2 007002 A ENST 007464 A ENT0
007475 A ENU0 007510 A ENVO 007521 A ENW0 007533 A ENX0
007547 A ENY0 007560 A ENZ0 010050 A EXEC 007737 A INC
007733 A LOAC 007752 A LOAE 007770 A LOAF 007775 A LOAG
010001 A LOAH 010040 A LOAI 010052 A LOAM 007633 A MEM1
007643 A MEM2 000474 A OADR 007626 A ONES 010070 A PAC
010073 A PAC1 010104 A PAC2 010105 A PAC3 010110 A PAC4
010121 A PAC5 010047 A PART 010124 A PNCH 007717 A SET
007627 A TS01
    
```

0 ERRORS ASSEMBLY COMPLETE

LITERALS

POINTERS

* * UNREFERENCED SYMBOLS * *

561 ELDR 576 PAC2

* * PROGRAM / SUBROUTINE ENTRY POINTS * *

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244 ENN1 -LD- 238 246
526 LOAH -LD- 314 310 317
551 LOAI -ST- 529 -LD- 509 512 521 524 544
568 PAC -LD- 565 586
587 PNCH -LD- 578 581 589 591
484 SET -LD- 487 493 499
    
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* * REFERENCED SYMBOLS * *

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500 AZ -LD- 538 540
479 BEGIN -LD- 465
501 BZ -LD- 538 540
560 CD00 -LD- 498
506 CD01 -LD- 560
508 CD02 -LD- 560
548 CD03 -LD- 560
552 CD04 -LD- 560
558 CKSM -ST- 504 531 -LD- 530
554 CNT -ST- 503 519 543 -LD- 536
555 CYCLE -ST- 505 523 -LD- 532
423 D001 -LD- 283
424 D052 -LD- 165 166 183 187 194 198 249 257 271 296 297
565 D1 -LD- 566
425 D125 -LD- 154 158 171 176 251 264 358 361 371 382 389 393
563 DUMP -LD- 593
471 EMDB -LD- 441 447 466 472
470 EMDC -ST- 467 -LD- 450 454
447 EME1 -LD- 469
448 EME2 -LD- 462
450 EME3 -LD- 456
466 EME4 -LD- 463
435 EMEM -LD- 414 417
445 EMTS -ST- 449 -LD- 458
400 EN10 -LD- 394 403
405 EN11 -LD- 401
409 EN20 -LD- 402 412
412 EN21 -LD- 416
415 EN22 -LD- 411
54 ENA0 -LD- 60
57 ENA1 -LD- 53
    
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