

SYSTEMS ENGINEERING LABORATORIES PROGRAM LIBRARY

PROGRAM DESCRIPTION

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Catalog Number 303012B

IDENTIFICATION: SEL 810A Teletypewriter Test

AUTHOR: Systems Engineering Laboratories

ACCEPTED: July 19, 1968

PURPOSE: To provide a diagnostic program for the ASR-33 and ASR-35 Teletypewriters

COMPUTER CONFIGURATION: Basic SEL 810A Computer

SUBROUTINES REQUIRED: None

STORAGE: Relocatable with a bias of 2000_8 ; 454_8 memory locations

TIMING: N/A

LOADING PROCEDURE: Load the relocatable object tape by means of the SEL 810A Relocatable Loader (Catalog No. 300001B)

USE:

1. Set program counter to 2000.
2. Turn on punch.
3. Set sense switch 0 (Test 1).
4. Depress start twice (Test 1a).
5. A halt will occur at location ~~2056~~²⁰⁶⁰ to load punched tape into reader.
- 5A. LOAD PUNCHED TAPE ON READER
6. Depress start (Test 1b).
7. A halt will occur at location ~~2145~~²¹⁴⁷ to load duplicated tape into reader.

USE: (Cont'd)

8. Turn off punch.
9. Depress start (Test 1c).
10. A halt will occur at location ²²²⁵~~2223~~ to indicate end of Test 1.

NOTE

Test 1b can be restarted at 2057. Test 1c can be restarted at 2146.

11. Reset sense switch 0 and set sense switch 1 (Test 2).
12. Depress start.
13. Reset sense switch 1 and enter one more character to end turn-around test.
14. Load tape punched in Test 1 into reader and turn on punch.
15. Set sense switch 2 (Test 3).
16. A halt will occur at location ²³¹²~~2315~~ to indicate end of Test 3.

ERROR INDICATIONS

A program halt at location ²³⁶⁰~~2354~~ indicates a data comparison error has occurred. The A-Register contains the input character, and the B-Register contains the expected character.

NOTE

Sense switch 3 up - all errors will be ignored, and a continuous loop will be executed during test 1b and test 1c.

METHOD:

Test 1 (Sense switch 0 Up)

Test 1a - A binary progression will be punched and printed.

Test 1b - The tape just punched will be read, compared, and duplicated.

Test 1c - The tape just punched will be read and compared.

Test 2 (Sense switch 1 Up)

Keyboard turn-around test. Input from keyboard is typed out on the console printer.

Test 3 (Sense switch 2 Up)

The tape punched in Test 1 will be read and duplicated on an interrupt basis.

1	PAGE	0001	TELETYPEWRITER TEST (3030128) 19JUL68		
0002	00000	00000000	*	START AT '2000	
0003	00000	00000000	*	SNS 0 UP TEST 1 WILL BE EXECUTED	
0004	00000	00000000	*	SNS 1 UP TEST 2 WILL BE EXECUTED	
0005	00000	00000000	*	SNS 2 UP TEST 3 WILL BE EXECUTED	
0006	00000	00000000	*	SNS 3 UP CONTINUOUS LOOP WITH ERRORS IGNORED	
0007	00000	00000000	*	TEST 1 '2000-PUNCH BINARY PROGRESSION	
0008	00000	00000000	*	'2057-READ(SLAVED TO OUTPUT), COMPARE AND PUNCH	*B
0009	00000	00000000	*	'2146-READ(HIGH SPEED)COPIED TAPE AND COMPARE	*B
0010	00000	00000000	*	TEST 2 '2000-KEYBOARD TURNAROUND	
0011	00000	00000000	*	TEST 3 '2000-INPUT AND OUTPUT WITH INTERRUPT	
0012	00000	00000000		REL	
0013	00000	00000001		UNIT EQU 1	
0014	02000	70002000		ORG '2000	
0015	02000	01102441		LAA ADD3	JPB
0016	02001	03302437		STA* ADD1	STORE INTERRUPT ADDRESS IN '10.6
0017	02002	01102442		LAA ADD4	JPB
0018	02003	03302440		STA* ADD2	STORE INTERRUPT ADDRESS IN '10.7
0019	02004	00130400		SNS 0	
0020	02005	12102013		SPB TES1	
0021	02006	00130401		SNS 1	
0022	02007	12102227		SPB TES2	
0023	02010	00130402		SNS 2	
0024	02011	12102240		SPB TES3	
0025	02012	11102004		BRU *-6	
0026	02013	00000000		TES1 ZZZ **	
0027	02014	12102430		SPB LEOK	
0028	02015	01102443		LAA K1	JPB
0029	02016	03102225		STA NUM6	STORE FIRST NO. IN CELL
0030	02017	02102444		LBA N64	LOAD INDEX WITH CHAR. COUNT
0031	02020	01102225		ADD LAA NUM6	LOAD NEW NO. IN A
0032	02021	00001016		LSL 8	
0033	02022	00170101		AOP UN11,w	
0034	02023	00000026		IBS	64 CHARACTERS TYPED
0035	02024	11102027		BRU *+3	NO, CONTINUE
0036	02025	12102414		SPB CR0	YES, CARRIAGE RETURN
0037	02026	02102444		LBA N64	RELOAD INDEX
0038	02027	14102225		IMS NUM6	
0039	02030	01102445		LAA R377	LOAD A WITH BINARY 255

1	PAGE	0002	TELETYPEWRITER TEST (303012B) 19JUL68			
0040	02031	15102225	CMA	NUM0	COMPARE COUNT	
0041	02032	11102035	BRU	*+3	A < MEMORY, BRU TO DOWNCOUNT	
0042	02033	00000033	NOP		A = MEMORY, ONE MORE CYCLE	
0043	02034	11102020	BRU	ADD	A > MEMORY, MORE CYCLES	
0044	02035	12102414	SPB	CR0		
0045	02036	02102444	LBA	N64		
0046	02037	01102446	SUBI	LAA	NI	SUBTRACT 1 FROM MEMORY
0047	02040	05102225	AMA	NUM0		
0048	02041	03102225	STA	NUM0		
0049	02042	00001016	LSL	B		
0050	02043	00170101	AOP	UNIT,W		
0051	02044	00000026	IBS		64 CHARACTERS TYPED	
0052	02045	11102050	BRU	*+3	NO, CONTINUE	
0053	02046	12102414	SPB	CR0	YES, CARRIAGE RETURN	
0054	02047	02102444	LBA	N64	RELOAD INDEX	
0055	02050	00000003	CLA		LOAD ZEROS FOR COMPARE	
0056	02051	15102225	CMA	NUM0		
0057	02052	11102037	BRU	SUBI	A<MEMORY CONTINUE	
0058	02053	00000033	NOP		A=M HALT	
0059	02054	00000033	NOP		A>M HALT	
0060	02055	12102430	SPB	LEDR		
0061	02056	00000000	HLI		HALT TO LOAD PUNCHED TAPE	
0062	02057	12102430	SPB	LEDR		
0063	02060	00130101	CEU	UNIT,W		
0064	02061	25404000	DAC	*4000	READER MADE	
0065	02062	01102443	INLS	LAA	K1	
0066	02063	03102225	STA	NUM0	STORE FIRST NO. IN CELL	
0067	02064	02102444	LBA	N64		
0068	02065	00170301	INPA	AIP	UNIT,W	
0069	02066	00000022	SAZ			
0070	02067	11102071	BRU	*+2		
0071	02070	11102065	BRU	*-3		
0072	02071	00130403	SNS	3	IGNORE ANY ERRORS	
0073	02072	11102077	BRU	*+5		
0074	02073	15102225	CMA	NUM0	CHECK INPUT	
0075	02074	12102351	SPB	CLER		
0076	02075	11102077	BRU	*+2	NO ERRORS, CONTINUE	
0077	02076	12102351	SPB	CLER		
0078	02077	00001016	LSL	B		

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0079	02100	00170101	AOP	UNIL,w		
0080	02101	00000026	IBS			
0081	02102	11102105	BRU	*+3		
0082	02103	12102363	SPB	CRLF		
0083	02104	12102414	SPB	CR0		
0084	02105	14102225	IMS	NUM0	ADVANCE MEMORY	
0085	02106	01102445	LAA	K377	JPB	
0086	02107	15102225	CMA	NUM0	COMPARE COUNT	
0087	02110	11102113	BRU	*+3	A < MEMORY, BRU TO DOWNCOUNT	
0088	02111	00000033	N0P		A = MEM0R, ONE MORE CYCLE	
0089	02112	11102065	BRU	INPA	A > MEM0RY, MORE CYCLES	
0090	02113	12102363	SPB	CRLF		
0091	02114	12102414	SPB	CR0		
0092	02115	01102446	INPS	LAA	N1	JPB
0093	02116	02102225	AMA	NUM0	SUBTRACT 1 FROM MEMORY	
0094	02117	03102225	STA	NUM0		
0095	02120	00170301	AIP	UNIL,w		
0096	02121	00130403	SNS	3	IGNORE ANY ERRORS	
0097	02122	11102127	BRU	*+5		
0098	02123	15102225	CMA	NUM0	CHECK INPUT	
0099	02124	12102351	SPB	CLER		
0100	02125	11102127	BRU	*+2	NO ERROR, CONTINUE	
0101	02126	12102351	SPB	CLER		
0102	02127	00001016	LSL	8		
0103	02130	00170101	AOP	UNIL,w		
0104	02131	00000026	IBS			
0105	02132	11102135	BRU	*+3		
0106	02133	12102363	SPB	CRLF		
0107	02134	12102414	SPB	CR0		
0108	02135	00000003	CLA			
0109	02136	15102225	CMA	NUM0	CHECK COUNT	
0110	02137	11102115	BRU	INPS	A L.T. MEM, CONTINUE	
0111	02140	00000033	N0P		A = MEMORY HALT	
0112	02141	00000033	N0P		A > MEMORY HALT	
0113	02142	00130403	SNS	3	GO INTO LOOP	
0114	02143	11102062	BRU	INLS		
0115	02144	12102430	SPB	LEDR		
0116	02145	00000000	HLT			
0117	02146	01102443	INHS	LAA	K1	JPB

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0118	02147	03102225	STA	NUM0		
0119	02150	02102444	LBA	N64	JPB	
0120	02151	00130101	CEU	UNIT,W		
0121	02152	25404000	DAC	*4000	READER MADE	
0122	02153	00170301	IN31	AIP	UNIT,W	
0123	02154	00000022	SAZ		LEADER LOOP	
0124	02155	11102157	BRU	*+2		
0125	02156	11102153	BRU	*-3		
0126	02157	00130403	SNS	3		
0127	02160	11102165	BRU	*+5		
0128	02161	15102225	CMA	NUM0		
0129	02162	12102351	SPB	CLER	ERROR	
0130	02163	11102165	BRU	*+2		
0131	02164	12102351	SPB	CLER	ERROR	
0132	02165	00000026	IBS			
0133	02166	11102170	BRU	*+2		
0134	02167	12102363	SPB	CRLF		
0135	02170	14102225	IMS	NUM0		
0136	02171	01102445	LAA	K377	JPB	
0137	02172	15102225	CMA	NUM0		
0138	02173	11102176	BRU	*+3	A<NUM0	
0139	02174	00000033	N0P		A=NUM0	
0140	02175	11102153	BRU	IN31	A>NUM0	
0141	02176	12102363	SPB	CRLF		
0142	02177	01102446	IN32	LAA	N1	
0143	02200	05102225	AMA	NUM0	JPB	
0144	02201	03102225	STA	NUM0		
0145	02202	00170301	AIP	UNIT,W		
0146	02203	00130403	SNS	3		
0147	02204	11102211	BRU	*+5		
0148	02205	15102225	CMA	NUM0		
0149	02206	12102351	SPB	CLER	ERROR	
0150	02207	11102211	BRU	*+2		
0151	02210	12102351	SPB	CLER	ERROR	
0152	02211	00000026	IBS			
0153	02212	11102214	BRU	*+2		
0154	02213	12102363	SPB	CRLF		
0155	02214	00000003	CLA		LOAD ZEROS FOR COMPARE	
0156	02215	15102225	CMA	NUM0		

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0157	02216	11102177	BRU	IN32	A<NUM0	
0158	02217	00000033	N0P		A=NUM0	
0159	02220	00000033	N0P			
0160	02221	00130403	SNS	3	G0 IN10 L00P	
0161	02222	11102146	BRU	INHS		
0162	02223	00000000	HLI		A>NUM0	
0163	02224	11302013	BRU*	TES1		
0164	02225	00000000	NUM0	ZZZ	**	
0165	02226	00000000	CHAR	ZZZ	**	
0166	02227	00000000	TES2	ZZZ	**	
0167	02230	00130101	CEU	UNIT,W		
0168	02231	25402000	DAC	*2000	KEYBOARD MODE	
0169	02232	00170301	AIP	UNIT,W		
0170	02233	00001016	LSL	8		
0171	02234	00170101	A0P	UNIT,W		
0172	02235	00130401	SNS	1		
0173	02236	11102232	BRU	*-4		
0174	02237	11302227	BRU*	TES2		
0175	02240	00000000	TES3	ZZZ	**	
0176	02241	12102430	SPB	LEDR		
0177	02242	01102447	LAA	N04		JPB
0178	02243	03102226	STA	CHAR		
0179	02244	00000003	CLA			
0180	02245	00130101	CEU	UNIT,W		
0181	02246	25404000	DAC	*4000	READER MODE	
0182	02247	00170301	AIP	UNIT,W		
0183	02250	00000022	SAZ		LEADER L00P	
0184	02251	11102253	BRU	*+2		
0185	02252	11102247	BRU	*-3		
0186	02253	02102450	LBA	N10		JPB
0187	02254	03502351	STA	BL0K,1		
0188	02255	00000026	IBS			
0189	02256	00000033	N0P			
0190	02257	11102261	BRU	*+2		
0191	02260	02102450	INPU	LBA	N10	JPB
0192	02261	00130101	CEU	UNIT,W		
0193	02262	00031000	DATA	*31000	CLEAR INTERRUPTS AND READER	
0194	02263	00130101	CEU	UNIT,W		
0195	02264	00064000	DATA	*64000	ENABLE INPUT INTERRUPT AND READER	*B

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0196	02265	00130601	PIU	DISABLE GROUP 1, LEVEL 2	*B
0197	02266	00010002	DATA	'10002	
0198	02267	00130600	PIE	ENABLE GROUP 1, LEVEL 1	*B
0199	02270	00010001	DATA	'10001	
0200	02271	11102271	BRU	*	
0201	02272	11102271	BRU	*-1	
0202	02273	00130101	OUT CEU	UNIT,W	
0203	02274	00031000	DATA	'31000	CLEAR ALL INTERRUPTS
0204	02275	00130101	CEU	UNIT,W	
0205	02276	00050000	DATA	'50000	
0206	02277	00130601	PIU	DISABLE GROUP 1, LEVEL 1	*B
0207	02300	00010001	DATA	'10001	
0208	02301	00130600	PIE	ENABLE GROUP 1, LEVEL 2	*B
0209	02302	00010002	DATA	'10002	
0210	02303	02102450	LDA	N10	JPB
0211	02304	00000000	* REMOVED	LAA BL0K,1	*B
0212	02304	00000000	* REMOVED	LSL 8	*B
0213	02304	00000000	* REMOVED	AOP UNIT,W	*B
0214	02304	00000000	* REMOVED	LDI	*B
0215	02304	00000000	* REMOVED	NOP	*B
0216	02304	11102304	BRU	*	
0217	02305	11102304	BRU	*-1	
0218	02306	14102226	CNT	IMS CHAR	
0219	02307	11102260	BRU	INPU	
0220	02310	00000000	HLT		
0221	02311	11302240	BRU*	TESS	
0222	02312	00000000	INT1	ZZZ **	
0223	02313	00170301	AIP	UNIT,W	
0224	02314	03502351	STA	BL0K,1	STORE A INDEXED
0225	02315	00000026	IBS		
0226	02316	11102321	BRU	*+3	
0227	02317	00000035	T01		
0228	02320	11302335	BRU*	C0N1	BRANCH TO OUTPUT ENABLE
0229	02321	00000035	T01		
0230	02322	11302312	BRU*	INT1	RETURN TO INPUT LOOP
0231	02323	00000000	INT2	ZZZ **	
0232	02324	01502351	LAA	BL0K,1	LOAD A
0233	02325	00001016	LSL	8	
0234	02326	00170101	AOP	UNIT,W	

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0235	02327	00000026	IDS
0236	02330	11102333	BRU *+3
0237	02331	00000035	T01
0238	02332	11302336	BRU* C0N2
0239	02333	00000035	T01
0240	02334	11302323	BRU* INT2
0241	02335	35402273	C0N1 DAC 70T
0242	02336	35402306	C0N2 DAC CNT
0243	02351	70002351	BL0K BES 10
0244	02351	00000000	CLER ZZZ **
0245	02352	00130101	CEU UNII,W
0246	02353	25401000	DAC *1000 CLEAR MODE
0247	02354	04102427	STB SVB #8
0248	02355	02102225	LBA NUM0 #8
0249	02356	00000000	HLT #8
0250	02357	02102427	LBA SVB #8
0251	02360	00130101	CEU UNII,W
0252	02361	25404000	DAC *4000 READER MODE
0253	02362	11302351	BRU* CLER
0254	02363	00000000	CRLF ZZZ **
0255	02364	01102225	LAA NUM0 SAVE LAST FRAME
0256	02365	03102426	STA SVA
0257	02366	01102421	LAA K215 JPB
0258	02367	03102225	STA NUM0
0259	02370	00170301	AIP UNII,W
0260	02371	00130403	SNS 3
0261	02372	11102377	BRU *+5
0262	02373	15102225	CMA NUM0
0263	02374	12102351	SPB CLER
0264	02375	11102377	BRU *+2
0265	02376	12102351	SPB CLER
0266	02377	01102452	LAA K212 JPB
0267	02400	03102225	STA NUM0
0268	02401	00170301	AIP UNII,W
0269	02402	00130403	SNS 3
0270	02403	11102410	BRU *+3
0271	02404	15102225	CMA NUM0
0272	02405	12102351	SPB CLER
0273	02406	11102410	BRU *+2

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0274	02407	12102351	SPB	CLEN			
0275	02410	01102426	LAA	SVA			
0276	02411	03102225	STA	NUM0			
0277	02412	02102444	LBA	N04		JPB	
0278	02413	11302363	BRU*	CRLF			
0279	02414	00000000	CR0	ZZZ	**	***** CARRIAGE RETURN/LINE FEED SUBROUTINE *****	
0280	02415	03102426	STA	SVA			
0281	02416	01102451	LAA	K215		JPB	
0282	02417	00001016	LSL	8			
0283	02420	00170101	A0P	UNIT,W			
0284	02421	01102452	LAA	K212		JPB	
0285	02422	00001016	LSL	8			
0286	02423	00170101	A0P	UNIT,W			
0287	02424	01102426	LAA	SVA			
0288	02425	11302414	BRU*	CR0			
0289	02426	00000000	SVA	ZZZ	**		
0290	02427	00000000	SVB	ZZZ	**	*B	
0291	02430	00000000	LEDR	ZZZ	**	LEADER ROUTINE	
0292	02431	02102453	LBA	N50		JPB	
0293	02432	00000003	CLA				
0294	02433	00170101	A0P	UNIT,W			
0295	02434	00000026	IBS				
0296	02435	11102432	BRU	*-3			
0297	02436	11302430	BRU*	LEDR			
0298	02437	25401016	ADD1	DAC	'1016	JPB	
0299	02440	25401017	ADD2	DAC	'1017	JPB	
0300	02441	35402312	ADD3	DAC	INT1	JPB	
0301	02442	35402323	ADD4	DAC	INT2	JPB	
0302	02443	00000001	K1	DATA	1	JPB	
0303	02444	00177700	N64	DATA	-64	JPB	
0304	02445	00000377	K377	DATA	'377	JPB	
0305	02446	00177777	N1	DATA	-1	JPB	
0306	02447	00177712	N54	DATA	-54	JPB	
0307	02450	00177766	N10	DATA	-10	JPB	
0308	02451	00000215	K215	DATA	'215	JPB	
0309	02452	00000212	K212	DATA	'212	*B	
0310	02453	00177716	N50	DATA	-50	JPB	
0311	02454	70400000	END				
ERRORS	0000	00000					