

SYSTEMS ENGINEERING LABORATORIES PROGRAM LIBRARY

SOFTWARE DESCRIPTION

CATALOG NO. 310003B

DATE 1 February 1971

PROGRAM TITLE: 810A/B Stand-Alone I/O Package
(HSPT/ASR/CR/LP)

PURPOSE: To provide stand-alone I/O handlers for card reader, ASR-33 teletypewriter, high-speed paper tape reader/punch, and line printer.

CONFIGURATION: SYSTEMS 810A/B with any one or all of the following peripherals: (1) High-Speed Paper Tape Reader/Punch (Model 81-610); (2) ASR-33 Teletypewriter (Model 81-712); (3) Card Reader (Model 81-410, 450)

SOFTWARE ENVIRONMENT: Stand-Alone

PROGRAM LANGUAGE: SYSTEMS 810A/B Assembler Language

SIZE: 550 locations

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CALLING SEQUENCE:

<u>Character Read/Write</u>		<u>Binary Read/Write</u>	
LAA	LDN	LAA	LON
CALL	H\$WR	CALL	B\$WR
DAC	BUF	DAC	BUF
DATA	N	DATA	N

where:

BUF is the address of the first location of the I/O buffer.

N is the number of words for read/write.

LDN specifies logical device number as follows:
(Input = positive LDN; Output = negative LDN)

01	ASR-33 Keyboard
02	H. S. Paper Tape Reader/Punch
03	Card Reader
04	Line Printer
05	Paper Tape Reader/Punch on Teletype
06	Magnetic Tape - Transport 0
07	Magnetic Tape - Transport 1
08	Magnetic Tape - Transport 2
09	Magnetic Tape - Transport 3
10	Magnetic Tape - Transport 4
11	Magnetic Tape - Transport 5
12	Magnetic Tape - Transport 6
13	Magnetic Tape - Transport 7

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USE:

● ASR-33 KEYBOARD (Logical Device 1)

INPUT: A full ASCII character is stored in user's buffer. 1 character per word in bits 8-15. This character is also printed by the ASR-33. A delete ('377), line feed ('212) is ignored. An ↑ ('336) will cause characters in that line and all characters following to be ignored until a carriage return is typed. This allows user to have another attempt at typing a line which has an error in it. Input is always terminated on a carriage return even if the word count N has not been reached.

OUTPUT: The first character of the buffer is checked to determine if it is one of the following characters:

- (1) Output 4 carriage returns and line feeds to stimulate a skip to top of page.
- (0) Output 2 carriage returns and line feeds to space between lines.

A line counter, initially set to -60, is maintained for output to the ASR-33. The user may alter this count by storing a new count (A-Register) into symbolic location \$LINE.

● HIGH-SPEED PAPER TAPE READER/PUNCH (Logical Device 2)

INPUT: (Routine TINP) The same routine is used as is used for keyboard input. Zero characters are ignored. Paper tape is read until a non-zero character is sensed.

OUTPUT: (Routine POUT) No special checks are made. This routine can be used for binary output. The 8 bits are obtained from bits 7-15 of the users buffer.

● CARD READER (Logical Device 3)

INPUT: (Routine CINP) Cards are read in binary mode whether the card reader has a BCD mode or not. Thus, a 12 punch causes bit 4 to be set in the computer and a 9 punch causes bit 15 to be set. The resulting card binary code is first translated to BCD and then to full ASCII character is stored in the users buffer. A delay of approximately 2 milliseconds between columns is used for the translation for the previous column.

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USE (Cont'd)

● LINE PRINTER (Logical Device 4)

(Routine PROT) The first character is checked to determine if it is one of the following:

- (+) - Print line and exit.
- (1) - Top of form and fill buffer.
Print remaining characters in buffer.
- (0) - Space 2 lines before printing next line.

If none of the control characters are present, a line feed is issued before printing a line. The number of lines per page is determined by a control tape on the printer.

● TELETYPE PAPER TAPE READER/PUNCH (Logical Device 5)

INPUT: (Routine TINP) The same routine is used as for keyboard and high-speed paper tape input.

OUTPUT: (Routine POUT) The same routine is used as for high-speed punch.

● MAGNETIC TAPE (Logical Device 6-13)

INPUT: If the call is to H\$WR, data is transferred from the designated transport number at 800 bpi, 1 character per word. When data transfer is complete, a call is generated to OBWCT. A check is made for word count completed. If not, test is made for end-of-file, which, if found, will cause "EOF" to be typed on the ASR and a computer halt. Depressing START will cause the EOF to be accepted. If not an EOF record, the message "REC LENGTH" will be typed to the ASR, followed by a computer halt. Depressing START will cause the short record to be rejected, and another record to be read. If the word count is complete, checks are made for parity errors. If a parity error is encountered, the tape is backspaced one record, and a read retry attempted. Twenty-five (25) attempts are made to read the record, before "PARITY" is typed to the ASR, and the computer halts. Depressing START will cause the record to be accepted. Records are converted from BCD to ASCII. If the call is to B\$WR, data is transferred from the designated transport number at 556 bpi, 3 characters per word (binary format).

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USE (Cont'd)

OUTPUT: Processing is the same as for input, except that on call to H\$WR, the user's buffer is converted from ASCII to BCD prior to any data transfer.

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00001      *      310003B  SYSTEMS 810A/B I/O PACKAGE FOR HSPT/ASR/CR/LP      1
00002      *      2
00003      *      3
00004      *      4
00005      *      5
00006      *      6
00007      * CALLING SEQUENCE      7
00008      *   CALL H$WR      8
00009      *   DAC BA      9
00010      *   DATA WC     10
00011      *     11
00012      * WHERE BA IS BASE ADDRESS     12
00013      *   WC IS WORD COUNT     13
00014      *     14
00015      * A REGISTER CONTAINS LOGICAL DEVICE NUMBER     15
00016      *   IF POSITIVE INPUT     16
00017      *   NEGATIVE OUTPUT     17
00018      *     18
00019      * LOGICAL DEVICE NUMBERS     19
00020      * LOGICAL DEV. NO   INPUT   OUTPUT     20
00021      *   1             KEYBOARD KEYBOARD     21
00022      *   2             PAPER TAPE H.S. PAPER TAPE H.S.     22
00023      *   3             CARD READER CARD READER     23
00024      *   4             SPARE LINE PRINTER     24
00025      *   5             PAPER TAPE (TELETYPE) PAPER TAPE OUT (TELETYP     25
00026      *     26
00027      *     27
00028      * *****     28
00029      *     29
00030      * 00000 00000000 REL     30
00031      * 00000 50000000 NAME H$WR,H$WR     31
00032      * 00000 50000525 NAME LINE,LINE     32
00033      * 00000 50000542 NAME L$PG,L$PG #B     33
00034      * 00000 50000316 NAME P$PØ,P$PØ #B     34
00035      * #B     35
00036      * 00000 25400000 H$WR DAC 0 CKA     36
    
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00037	00001	03100600	STA	LDN	SAVE LOGICAL DEVICE NUMBER		37
00038	00002	00000005	TAB		USE AS INDEX		38
00039	00003	01100551	LALO	LAA	L025		39
00040	00004	03100526	STA	F1		CKA	40
00041	00005	03100521	STA	FC	FIRST CHARACTER INDICATOR	CKA	41
00042	00006	01300000	LAA*	H\$WR		CKA	42
00043	00007	03100522	STA	BA	ADDRESS OF BLOCK	CKA	43
00044	00010	14100000	IMS	H\$WR		CKA	44
00045	00011	01300000	LAA*	H\$WR	NUMBER OF OUTPUT WORDS	CKA	45
00046	00012	00000002	NEG			CKA	46
00047	00013	03100523	STA	NC	NEGATIVE CHARACTER COUNT	CKA	47
00048	00014	14100000	IMS	H\$WR		CKA	48
00049	00015	00000023	SAN			CKA	49
00050	00016	11300000	BRU*	H\$WR		CKA	50
00051	00017	01100576	LAA	CEU0	CEU 0,W		51
00052	00020	05500144	AMA	UNIT,1			52
00053	00021	03100024	STA	CEUL			53
00054	00022	01500127	LAA	DATZ,1			54
00055	00023	03100025	STA	DATL			55
00056	00024	00000033	CEUL	NOP			56
00057	00025	00000033	DATL	NOP			57
00058	00026	01100551	LAA	L025	==2		58
00059	00027	03100527	STA	WD	NEG CHARS/WORD		59
00060	00030	00000004	TBA				60
00061	00031	00000024	SAP		TEST FOR INPUT/OUTPUT		61
00062	00032	11100055	BRU	SOUT	OUTPUT		62
00063	00033	01100574	LAA	AIP0	AIP 0,W		63
00064	00034	05500144	AMA	UNIT,1			64
00065	00035	03100110	STA	AIPC			65
00066	00036	00000004	TBA				66
00067	00037	02100573	LRA	AOP1	AOP 1,W		67
00068	00040	00000110	RSA	1			68
00069	00041	00000022	SAZ		TEST FOR KEYBOARD INPUT		69
00070	00042	11100052	BRU	NTU1			70
00071	00043	00170401	MOP	ASR	DELETED WAIT BIT	11/70 RLD *B	71
00072	00044	00106400	CRTN	DATA	'106400		72

00073	00045	11100043	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B	73
00074	00046	00170401	MØP	ASR	DELETED WAIT BIT	11/70 RLD *B	74
00075	00047	00105000	LNFD	DATA '105000			75
00076	00050	11100046	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B	76
00077	00051	11100053	BRU	*+2			77
00078	00052	02100127	NTU1	LBA	DATZ		78
00079	00053	04100113		STB	AØPC		79
00080	00054	11100070	BRU	INPT	INPUT		80
00081	00055	01100575	SØUT	LAA	AØPO		81
00082	00056	05500144		AMA	UNIT,1		82
00083	00057	03100117		STA	AØPØ		83
00084	00060	01300522	W\$W1	LAA*	BA	GET ONE CHAR FOR OUTPUT	84
00085	00061	03100160		STA	CØNV		85
00086	00062	02100600		LBA	LDN	LØGICAL DEVICE NØ.	86
00087	00063	11500160		BRU	CØNV,1		87
00088	00064	01100160	SPBØ	LAA	CØNV	GET CHARACTER	88
00089	00065	12100116		SPB	ØUTP		89
00090	00066	12100076		SPB	TEST	TEST FOR WORD COUNT ZERO	90
00091	00067	11100060		BRU	W\$W1	NØT	91
00092	00070	12100107	INPT	SPB	INPC	INPUT ONE CHARACTER	92
00093	00071	02100600		LBA	LDN	LØGICAL DEVICE NØ.	93
00094	00072	11500160		BRU	CØNV,1	CØNVERT	94
00095	00073	03300522	STAB	STA*	BA	STORE CHARACTER	95
00096	00074	12100076		SPB	TEST	TEST FOR WORD COUNT ZERO	96
00097	00075	11100070		BRU	INPT		97
00098	00076	00000000	TEST	ZZZ	**		98
00099	00077	14100523		IMS	NC	NEG. CHARACTER COUNT	99
00100	00100	11100105		BRU	NØTD	NØT DONE	100
00101	00101	01100526		LAA	F1		101
00102	00102	00000023		SAN		TEST FOR MORE I/O	102
00103	00103	11300526		BRU*	F1	YES	103
00104	00104	11300000		BRU*	H\$WR	RETURN	104
00105	00105	14100522	NØTD	IMS	BA	INCREMENT BASE ADDRESS	105
00106	00106	11300076		BRU*	TEST	RETURN	106
00107	00107	00000000	INPC	ZZZ	**	INPUT A CHARACTER	107
00108	00110	00000033	AIPC	NØP		AIP UNIT,W	108

00109	00111	03100160		STA	C0NV	SAVE CHARACTER	109
00110	00112	00001016		LST	8	PREPARE FOR OUTPUT	110
00111	00113	00000033	A0PC	N0P		OUTPUT IF KEYBOARD INPUT	111
00112	00114	01100160		LAA	C0NV	LAST CHARACTER INPUT	112
00113	00115	11300107		BRU*	INPC	RETURN	113
00114	00116	00000000	00TP	ZZZ	**	OUTPUT A CHARACTER	114
00115	00117	00000033	A0P0	N0P		A0P UNIT,W	115
00116	00120	11300116		BRU*	00TP	RETURN	116
00117	00121	00000000		HLT		N0 MAG TAPE I/O	117
00118	00122	00002000		DATA	'2000		118
00119	00123	00000200		DATA	'200		119
00120	00124	00000000		DATA	0		120
00121	00125	00004000		DATA	'4000		121
00122	00126	00002000		DATA	'2000		122
00123	00127	00000033	DATZ	N0P			123
00124	00130	00002000		DATA	'2000		124
00125	00131	00001000		DATA	'1000		125
00126	00132	00004000		DATA	'4000		126
00127	00133	00000000		DATA	0		127
00128	00134	00004000		DATA	'4000		128
00129	00135	00000000		HLT		N0 MAG TAPE I/O	129
00130	00136	00047733		DATA	'47733	N0P-CEU 0,W	130
00131	00137	00000001		DATA	1		131
00132	00140	00000005		DATA	5	CKA	132
00133	00141	00000001		DATA	1	CKA	133
00134	00142	00000002		DATA	2	CKA	134
00135	00143	00000001		DATA	1	CKA	135
00136	00144	25400000	UNIT	DAC	0	CKA	136
00137	00145	00000001		DATA	1	CKA	137
00138	00146	00000002		DATA	2	CKA	138
00139	00147	00000004		DATA	4	CKA	139
00140	00150	00000001		DATA	1	CKA	140
00141	00151	00000001		DATA	1	CKA	141
00142	00152	00047733		DATA	'47733	N0P-CEU 0,W	142
00143	00153	11100311		BRU	P0UT	-5 PAPER TAPE 0UT-TELETYPE	143
00144	00154	11100323		BRU	PR0T	-4 LINE PRINTER 0UTPUT	144

00145	00155	11100240	BRU	TØT2	-3 CARD PUNCH ØUTPUT	145
00146	00156	11100311	BRU	PØUT	-2 PAPER TAPE ØUT-BRPE	146
00147	00157	11100235	BRU	TØUT	-1 KEYBOARD ØUTPUT	147
00148	00160	25400000	CØNV	DAC 0	0	148
00149	00161	11100166	BRU	TINP	1 KEYBOARD INPUT	149
00150	00162	11100166	BRU	TINP	2 PAPER TAPE INPUT-HSR	150
00151	00163	11100370	BRU	CINP	3 CARD READER INPUT	151
00152	00164	00000033	NØP		4 SPARE INPUT	152
00153	00165	11100166	BRU	TINP	5 PAPER TAPE IN-TELETYPE	153
00154	00166	02100227	TINP	LBA IAD1		154
00155	00167	04100526	STB	F1		155
00156	00170	00000022	SAZ			156
00157	00171	11100173	BRU	**2		157
00158	00172	11100070	BRU	INPT	IGNØRE ZERO	158
00159	00173	15100552	CMA	L067		159
00160	00174	11100176	BRU	**2		160
00161	00175	11100070	BRU	INPT	IGNØRE DELETE	161
00162	00176	15100567	CMA	L053		162
00163	00177	11100201	BRU	**2		163
00164	00200	11100070	BRU	INPT	IGNØRE LINE FEED	164
00165	00201	15100570	CMA	L052		165
00166	00202	11100204	BRU	**2		166
00167	00203	11100221	BRU	TCRD	TERMINATE CARD ØN CRRG. RETURN	167
00168	00204	15100577	CMA	KDEL		168
00169	00205	11100073	BRU	STAB		169
00170	00206	11100210	BRU	**2	DELETE LINE ØF INPUT	170
00171	00207	11100073	BRU	STAB		171
00172	00210	12100107	SPB	INPC	INPUT CHARACTER	172
00173	00211	06100570	SMA	L052		173
00174	00212	00000022	SAZ			174
00175	00213	11100210	BRU	**3		175
00176	00214	01100000	LAA	H\$WR		176
00177	00215	05100551	AMA	L025		177
00178	00216	03100000	STA	H\$WR		178
00179	00217	02100600	LBA	LDN		179
00180	00220	11100003	BRU	LALØ		180

00181	00221	01100553	TCRD	LAA	L003				181
00182	00222	03300522		STA*	BA				182
00183	00223	14100522		IMS	BA				183
00184	00224	14100523		IMS	NC				184
00185	00225	11100222		BRU	TCRD+1				185
00186	00226	11300000		BRU*	H\$WR				186
00187	00227	35400230	IAD1	DAC	**1				187
00188	00230	12100107		SPB	INPC				188
00189	00231	15100570		CMA	L052				189
00190	00232	11100230		BRU	*-2				190
00191	00233	11300000		BRU*	H\$WR				191
00192	00234	11100230		BRU	*-4				192
00193	00235	01100521	TØUT	LAA	FC	FIRST CHARACTER TEST			193
00194	00236	00000024		SAP					194
00195	00237	11100243		BRU	TØT1	YES			195
00196	00240	01100160	TØT2	LAA	CØNV				196
00197	00241	00001016		LSL	8		CKA		197
00198	00242	11100065		BRU	SPBØ+1				198
00199	00243	01100160	TØT1	LAA	CØNV				199
00200	00244	15100554		CMA	L117				200
00201	00245	11100247		BRU	**2				201
00202	00246	11100257		BRU	PGE	1= NEW PAGE		*B	202
00203	00247	15100555		CMA	L074				203
00204	00250	11100252		BRU	**2				204
00205	00251	11100254		BRU	TWLN			*B	205
00206	00252	12100273		SPB	CRLF	ØUTPUT CR, LF		*B	206
00207	00253	11100240		BRU	TØT2	ØUTPUT CHARACTER		*B	207
00208	00254	12100273	TWLN	SPB	CRLF	ØUTPUT 2LF,C/R			208
00209	00255	12100273		SPB	CRLF	ALL ØTHERS=C/R,LF			209
00210	00256	11100066		BRU	SPBØ+2			*B	210
00211	00257	01100525	PGE	LAA	LINE	REMAINING LINES/PAGE		*B	211
00212	00260	15100556		CMA	L077	INITIAL CØUNT		*B	212
00213	00261	11100265		BRU	NWPG	GØ SPACE TØ TØP ØF PAGE		*B	213
00214	00262	11100267		BRU	NWPG+2	STILL AT TØP ØF PAGE		*B	214
00215	00263	11100265		BRU	NWPG	GØ SPACE TØ TØP ØF PAGE		*B	215
00216	00264	12100532		SPB	CL	CRRG. RET./ LINE FEED			216

00217	00265	14100525	NWPG	IMS	LINE	COUNT DOWN REMAINING LINES		217
00218	00266	11100264		BRU	*-2			218
00219	00267	12100300		SPB	NPG	OUTPUT 4 JF		219
00220	00270	11100066		BRU	SPB0+2			220
00221						*-----C/R,LINE FEED AND BOOKKEEP LINE COUNT		221
00222	00271	12100532		SPB	CL	CRRG, RET,/ LINE FEED		222
00223	00272	11300273		BRU*	CRLF			223
00224	00273	11000000	CRLF	BRU	**			224
00225	00274	14100525		IMS	LINE			225
00226	00275	11100271		BRU	*-4			226
00227	00276	12100300		SPB	NPG	NEW PAGE		227
00228	00277	11300273		BRU*	CRLF			228
00229	00300	11000000	NPG	BRU	**			229
00230	00301	01100556		LAA	L077			230
00231	00302	03100525		STA	LINE			231
00232	00303	01100557		LAA	L018			232
00233	00304	03100530		STA	PAGE			233
00234	00305	12100532		SPB	CL	CRRG, RET,/ LINE FEED		234
00235	00306	14100530		IMS	PAGE			235
00236	00307	11100305		BRU	*-2			236
00237	00310	11300300		BRU*	NPG			237
00238	00311	02100571	P0UT	LBA	L100			238
00239	00312	04100526		STB	F1			239
00240	00313	11100240		BRU	T0T2			240
00241	00314	12100532	P0T1	SPB	CL	CRRG, RET,/ LINE FEED		241
00242	00315	11300000		BRU*	H\$WR		CKA	242
00243				*				243
00244	00316	00000000	P\$P0	***	**	TURN PUNCH POWER OFF		244
00245	00317	00130002		CEU	HSPT	DELETED WAIT BIT	11/70 RLD	245
00246	00320	00002000		DATA	'2000	PUNCH POWER OFF		246
00247	00321	11100317		BRU	*-2	DELETED WAIT BIT	11/70 RLD	247
00248	00322	11300316		BRU*	P\$P0	RETURN		248
00249				*				249
00250	00323	01100521	PR0T	LAA	FC			250
00251	00324	00000023		SAN				251
00252	00325	11100240		BRU	T0T2			252

00253	00326	01100572	LAA	L101			253
00254	00327	03100526	STA	F1			254
00255	00330	03100521	STA	FC			255
00256	00331	01100160	LAA	CØNV			256
00257	00332	15100560	CMA	L102			257
00258	00333	11100335	BRU	**2			258
00259	00334	11100364	BRU	PRØ1			259
00260	00335	15100554	CMA	L117			260
00261	00336	11100340	BRU	**2			261
00262	00337	11100356	BRU	ZØØL			262
00263	00340	15100555	CMA	L011			263
00264	00341	11100343	BRU	**2			264
00265	00342	11100347	BRU	TWØL			265
00266	00343	00130005	CEU	LP	DELETED WAIT BIT	11/70 RLD *B	266
00267	00344	00002100	DATA	'2100	FEED LINE, FILL BUFFER		267
00268	00345	11100343	BRU	**2	DELETED WAIT BIT	11/70 RLD *B	268
00269	00346	11100240	BRU	TØT2	START FILLING BUFFER		269
00270	00347	00130005	TWØL CEU	LP	DELETED WAIT BIT	11/70 RLD *B	270
00271	00350	00002000	DATA	'2000	FEED LINE		271
00272	00351	11100347	BRU	**2	DELETED WAIT BIT	11/70 RLD *B	272
00273	00352	00130005	CEU	LP	DELETED WAIT BIT	11/70 RLD *B	273
00274	00353	00002000	DATA	'2000	FEED ANØTHER LINE	*B	274
00275	00354	11100352	BRU	**2	DELETED WAIT BIT	11/70 RLD *B	275
00276	00355	11100361	BRU	CCCC		*B	276
00277	00356	00130005	ZØØL CEU	LP	DELETED WAIT BIT	11/70 RLD *B	277
00278	00357	00001100	DATA	'1100	PAGE EJECT, FILL BUFFER		278
00279	00360	11100356	BRU	**2	DELETED WAIT BIT	11/70 RLD *B	279
00280	00361	01100553	CCCC LAA	L003	= '240	*B	280
00281	00362	03100160	STA	CØNV	SUPPRESS CARRIAGE CØNTRØL CHARACTER	*B	281
00282	00363	11100240	BRU	TØT2			282
00283	00364	00130005	PRØ1 CEU	LP	DELETED WAIT BIT	11/70 RLD *B	283
00284	00365	00000400	DATA	'000400		CKA	284
00285	00366	11100364	BRU	**2	DELETED WAIT BIT	11/70 RLD *B	285
00286	00367	11300000	BRU*	H\$WR		CKA	286
00287	00370	01100437	CINP LAA	FRZ9	-9		287
00288	00371	03100531	STA	FCNT	SHIFT CØUNTER		288

00289	00372	02100561	LBA	DZRØ	0	289
00290	00373	01100160	LAA	CØNV	UNITARY CØDED CHAR	290
00291	00374	15100440	CMA	Ø6TH	TEST FØR QUESTION MARK	291
00292	00375	11100377	BRU	*+2	NØ	292
00293	00376	11100434	BRU	STB	YES	293
00294	00377	15100566	CMA	L004	TEST FØR ZERO	294
00295	00400	11100402	BRU	*+2	NØ	295
00296	00401	11100433	BRU	AMB1	YES	296
00297	00402	15100550	CMA	EXCL		297
00298	00403	11100405	BRU	*+2	NØ	298
00299	00404	11100432	BRU	AMB4	YES	299
00300	00405	00000022	SAZ		TEST FØR SPACE	300
00301	00406	11100411	BRU	*+3	NØ	301
00302	00407	02100562	LBA	L035	'20	302
00303	00410	11100434	BRU	STB		303
00304	00411	00000416	LSL	4		304
00305	00412	00000024	SAP		TEST FØR 12 PUNCH	305
00306	00413	16100441	AMB	ØSTY	'60	306
00307	00414	00000116	LSL	1		307
00308	00415	00000024	SAP		TEST FØR 11 PUNCH	308
00309	00416	16100563	AMB	D022	'40	309
00310	00417	00000116	LSL	1		310
00311	00420	00000024	SAP		TEST FØR 0 PUNCH	311
00312	00421	16100562	AMB	L035	'20	312
00313	00422	00000116	LSL	LSL 1		313
00314	00423	00000023	SAN		TEST FØR NEXT RØW PUNCH	314
00315	00424	11100427	BRU	IMS	NØ	315
00316	00425	16100564	AMB	D003	ADJUST TØTAL FØR PUNCH	316
00317	00426	16100531	AMB	FCNT		317
00318	00427	14100531	IMS	IMS FCNT		318
00319	00430	11100422	BRU	LSL	NØ	319
00320	00431	11100434	BRU	STB	YES	320
00321	00432	16100563	AMB4	AMB D022	'40	321
00322	00433	16100564	AMB1	AMB D003	'12	322
00323	00434	12100502	STR	SPB BCDA		323
00324	00435	00000004	TBA			324

00325	00436	11100073	BRU	STAB		325
00326	00437	00177767	FR79	DATA	-9	326
00327	00440	00005000	Ø6TH	DATA	'5000	327
00328	00441	00000060	ØSTY	DATA	48	328
00329	00442	00137661	TARL	DATA	'137661	329
00330	00443	00131263		DATA	'1234567890=' :> /STUVWXYZ ,(#\"-JKL''	330
00330	00444	00132265				
00330	00445	00133267				
00330	00446	00134271				
00330	00447	00130275				
00330	00450	00123672				
00330	00451	00137240				
00330	00452	00120257				
00330	00453	00151724				
00330	00454	00152726				
00330	00455	00153730				
00330	00456	00154732				
00330	00457	00120254				
00330	00460	00124243				
00330	00461	00156242				
00330	00462	00126712				
00330	00463	00145714				
00331	00464	00146716	DATA	'MNPQR!\$*];@+ABCDEFGHI?.)[<+''		331
00331	00465	00147720				
00331	00466	00150722				
00331	00467	00120644				
00331	00470	00125335				
00331	00471	00135700				
00331	00472	00125701				
00331	00473	00141303				
00331	00474	00142305				
00331	00475	00143307				
00331	00476	00144311				
00331	00477	00137656				
00331	00500	00124733				
00331	00501	00136337				

00332	00502	00000000	BCDA	ZZZ	**					332	
00333	00503	03100517		STA	FSAV					333	
00334	00504	00000003		CLA						334	
00335	00505	00001713		FLL	15			DIVIDE CODE BY TWO		335	
00336	00506	00000006		IAB						336	
00337	00507	02500442		LBA	TABL,1			GET TWO CODES		337	
00338	00510	00000024		SAP				BCD CODE 0DD0		338	
00339	00511	00001013		FLL	8			YES		339	
00340	00512	00000004		TBA				NO		340	
00341	00513	00001015		RSL	8					341	
00342	00514	00000005		TAB						342	
00343	00515	01100517		LAA	FSAV					343	
00344	00516	11300502		BRU*	BCDA					344	
00345	00517	25400000	FSAV	DAC	0					345	
00346	00520	25400000	SIX	DAC	0					346	
00347	00521	25400000	FC	DAC	0					347	
00348	00522	25400000	BA	DAC	0					348	
00349	00523	25400000	NC	DAC	0					349	
00350	00524	25400000	WORD	DAC	0					350	
00351	00525	00177720	LINE	DATA	-160					351	
00352	00526	25400000	SCN	DAC	0	0			CKA	352	
00353	00527	25400000	SUN	DAC	0	0			CKA	353	
00354	00530	25400000	TUN	DAC	0	0			CKA	354	
00355	00531	00000526	F1	EQU	SCN				CKA	355	
00356	00531	00000527	WD	EQU	SUN				CKA	356	
00357	00531	00000530	PAGE	EQU	TUN				CKA	357	
00358			*							358	
00359			*							359	
00360	00531	00000000	FCNT	HLT						360	
00361			*-----THIS SUBROUTINE OUTPUTS C/R,LF ON SUN,								361
00362	00532	11000000	CL	BRU	**					362	
00363	00533	01100044		LAA	CRTN					363	
00364	00534	12100116		SPB	WUTP					364	
00365	00535	01100047		LAA	LNFD					365	
00366	00536	12100116		SPB	WUTP					366	
00367	00537	00000003		CLA						367	

00368	00540	03100521	STA	FC			368
00369	00541	11300532	BRU*	CL			369
00370			*				*B 370
00371	00542	00000000	L\$PG	***	**	SET NUMBER OF LINES/PAGE	*B 371
00372	00543	00000023	SAN				*B 372
00373	00544	00000002	NEG				*B 373
00374	00545	03100556	STA	L077			*B 374
00375	00546	03100525	STA	LINE			*B 375
00376	00547	11300542	BRU*	L\$PG		RETURN	*B 376
00377			*				377
00378	00550	00003000	EXCL	DATA	'3000		378
00379	00551	00177776	L025	DATA	-2		379
00380	00552	00000377	L067	DATA	'377		380
00381	00553	00000240	L003	DATA	'240	SPACE	381
00382	00554	00000261	L117	DATA	'261		382
00383	00555	00000260	L074	DATA	'260		383
00384	00556	00177720	L077	DATA	'-60		384
00385	00557	00177774	L018	DATA	-4		385
00386	00560	00000253	L102	DATA	'253		386
00387	00561	00000555	L011	EQU	L074		387
00388	00561	00000000	DZR0	DATA	0		388
00389	00562	00000020	L035	DATA	16		389
00390	00563	00000040	D022	DATA	'40		390
00391	00564	00000012	D003	DATA	'12		391
00392	00565	00177777	L013	DATA	'177777		392
00393	00566	00001000	L004	DATA	'001000	ASR 33 TYPE CODE	393
00394	00567	00000212	L053	DATA	'212		394
00395	00570	00000215	L052	DATA	'215		395
00396	00571	35400314	L100	DAC	P0T1		396
00397	00572	35400364	L101	DAC	PR01		397
00398	00573	00170101	A0P1	A0P	1,W		398
00399	00574	00170300	AIP0	AIP	0,W		399
00400	00575	00170100	A0P0	A0P	0,W		400
00401	00576	00130100	CEU0	CEU	0,W		401
00402	00577	00000336	KDFL	DATA	'336	DELETE A LINE CODE IS THE 'UP ARROW'	402
00403	00600	25400000	L0N	DAC	0		403

00404	00601	00000001	ASR	EQU	1	ASR-33	11/70	RLD	*B	404
00405	00601	00000002	HSPT	EQU	2	HIGH SPEED PAPER TAPE	11/70	RLD	*B	405
00406	00601	00000005	LP	EQU	5	LINE PRINTER	11/70	RLD	*B	406
00407	00601	70400000		END						407

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ERRORS 0000 00000

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...EXTERNALS...

H\$WR	31
L\$PG	33
LINE	32
P\$PØ	34

...SYMBOLICS...

AIP0	63	*	399							
AIPC	65	*	108							
AMB1	296	*	322							
AMB4	299	*	321							
AØP0	81	*	400							
AØP1	67	*	398							
AØPC	79	*	111							
AØPØ	83	*	115							
ASR	71		74	*	404					
BA	43		84		95	105	182	183	*	348
BCDA	323	*	332		344					
CCCC	276	*	280							
CEU0	51	*	401							
CEUL	53	*	56							
CINP	151	*	287							
CL	216		222		234	241	*	362		369
CØNV	85		87		88	94		109		112
	256		281		290				*	148
	256		281		290					196
CRLF	206		208		209	223	*	224		228
CRTN	* 72		363							
D003	316		322	*	391					
D022	309		321	*	390					
DATL	55	*	57							
DATZ	54		78	*	123					
DZRØ	289	*	388							
EXCL	297	*	378							
F1	40		101		103	155		239		254
FC	41		193		250	255	*	347		368
FCNT	288		317		318	*	360			
FRZ9	287	*	326							
FSAV	333		343	*	345					
H\$WR	31	*	36		42	44		45		48
	178		186		191	242		286		50
	178		186		191	242		286		104
HSPT	245	*	405							176
IAD1	154	*	187							
IMS	315	*	318							
INPC	92	*	107		113	172		188		
INPT	80	*	92		97	158		161		164
KDEL	168	*	402							

LSPG	33	*	371	376				
L003	181		280	*	381			
L004	294	*	393					
L011	263	*	387					
L013	* 392							
L018	232	*	385					
L025	39		58	177	*	379		
L035	302		312	*	389			
L052	165		173	189	*	395		
L053	162	*	394					
L067	159	*	380					
L074	203	*	383	387				
L077	212		230	374	*	384		
L100	238	*	396					
L101	253	*	397					
L102	257	*	386					
L117	200		260	*	382			
LALO	* 39		180					
LDN	37		86	93	179	*	403	
LINE	32		211	217	225	231	*	351
LNFD	* 75		365					375
LP	266		270	273	277	283	*	406
LSL	* 313		319					
NC	47		99	184	*	349		
NØTD	100	*	105					
NPG	219		227	*	229	237		
NTU1	70	*	78					
NWPG	213		214	215	*	217		
Ø6TH	291	*	327					
ØSTY	306	*	328					
ØUTP	89	*	114	116	364	366		
PSPØ	34	*	244	248				
PAGE	233		235	*	357			
PGE	202	*	211					
PØT1	* 241		396					
PØUT	143		146	*	238			
PRØ1	259	*	283	397				
PRØT	144	*	250					
SCN	* 352		355					
SIX	* 346							

SØUT		62	*	81					
SPBØ	*	88		198	210		220		
STAB	*	95		169	171		325		
STB		293		303	320	*	323		
SUN	*	353		356					
TABL	*	329		337					
TCRD		167	*	181	185				
TEST		90		96	* 98		106		
TINP		149		150	153	*	154		
TØT1		195	*	199					
TØT2		145	*	196	207		240	252	269
TØUT		147	*	193					282
TUN	*	354		357					
TWLN		205	*	208					
TWØL		265	*	270					
UNIT		52		64	82	*	136		
W		398		399	400		401		
WSW1	*	84		91					
WD		59	*	356					
WØRD	*	350							
ZØØL		262	*	277					

SYSTEMS ENGINEERING LABORATORIES PROGRAM LIBRARY

SOFTWARE DESCRIPTION

CATALOG NO. 310003B

DATE 1 February 1971

PROGRAM TITLE: 810A/B Stand-Alone I/O Package
(HSPT/ASR/CR/LP)

PURPOSE: To provide stand-alone I/O handlers for card reader, ASR-33 teletypewriter, high-speed paper tape reader/punch, and line printer.

CONFIGURATION: SYSTEMS 810A/B with any one or all of the following peripherals: (1) High-Speed Paper Tape Reader/Punch (Model 81-610); (2) ASR-33 Teletypewriter (Model 81-712); (3) Card Reader (Model 81-410, 450)

SOFTWARE ENVIRONMENT: Stand-Alone

PROGRAM LANGUAGE: SYSTEMS 810A/B Assembler Language

SIZE: 550 locations

SYSTEMS 310003B

CALLING SEQUENCE:

<u>Character Read/Write</u>		<u>Binary Read/Write</u>	
LAA	LDN	LAA	LON
CALL	H\$WR	CALL	B\$WR
DAC	BUF	DAC	BUF
DATA	N	DATA	N

where:

BUF is the address of the first location of the I/O buffer.

N is the number of words for read/write.

LDN specifies logical device number as follows:
(Input = positive LDN; Output = negative LDN)

- | | |
|----|-------------------------------------|
| 01 | ASR-33 Keyboard |
| 02 | H.S. Paper Tape Reader/Punch |
| 03 | Card Reader |
| 04 | Line Printer |
| 05 | Paper Tape Reader/Punch on Teletype |
| 06 | Magnetic Tape - Transport 0 |
| 07 | Magnetic Tape - Transport 1 |
| 08 | Magnetic Tape - Transport 2 |
| 09 | Magnetic Tape - Transport 3 |
| 10 | Magnetic Tape - Transport 4 |
| 11 | Magnetic Tape - Transport 5 |
| 12 | Magnetic Tape - Transport 6 |
| 13 | Magnetic Tape - Transport 7 |

SYSTEMS 310003B

USE:

- ASR-33 KEYBOARD (Logical Device 1)

INPUT: A full ASCII character is stored in user's buffer. 1 character per word in bits 8-15. This character is also printed by the ASR-33. A delete ('377), line feed ('212) is ignored. An ↑ ('336) will cause characters in that line and all characters following to be ignored until a carriage return is typed. This allows user to have another attempt at typing a line which has an error in it. Input is always terminated on a carriage return even if the word count N has not been reached.

OUTPUT: The first character of the buffer is checked to determine if it is one of the following characters:

- (1) Output 4 carriage returns and line feeds to stimulate a skip to top of page.
- (0) Output 2 carriage returns and line feeds to space between lines.

A line counter, initially set to -60, is maintained for output to the ASR-33. The user may alter this count by storing a new count (A-Register) into symbolic location \$LINE.

- HIGH-SPEED PAPER TAPE READER/PUNCH (Logical Device 2)

INPUT: (Routine TINP) The same routine is used as is used for keyboard input. Zero characters are ignored. Paper tape is read until a non-zero character is sensed.

OUTPUT: (Routine POUT) No special checks are made. This routine can be used for binary output. The 8 bits are obtained from bits 7-15 of the users buffer.

- CARD READER (Logical Device 3)

INPUT: (Routine CINP) Cards are read in binary mode whether the card reader has a BCD mode or not. Thus, a 12 punch causes bit 4 to be set in the computer and a 9 punch causes bit 15 to be set. The resulting card binary code is first translated to BCD and then to full ASCII character is stored in the users buffer. A delay of approximately 2 milliseconds between columns is used for the translation for the previous column.

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USE (Cont'd)

- LINE PRINTER (Logical Device 4)

(Routine PROT) The first character is checked to determine if it is one of the following:

- (+) - Print line and exit.
- (1) - Top of form and fill buffer.
Print remaining characters in buffer.
- (0) - Space 2 lines before printing next line.

If none of the control characters are present, a line feed is issued before printing a line. The number of lines per page is determined by a control tape on the printer.

- TELETYPE PAPER TAPE READER/PUNCH (Logical Device 5)

INPUT: (Routine TINP) The same routine is used as for keyboard and high-speed paper tape input.

OUTPUT: (Routine POUT) The same routine is used as for high-speed punch.

- MAGNETIC TAPE (Logical Device 6-13)

INPUT: If the call is to H\$WR, data is transferred from the designated transport number at 800 bpi, 1 character per word. When data transfer is complete, a call is generated to OBWCT. A check is made for word count completed. If not, test is made for end-of-file, which, if found, will cause "EOF" to be typed on the ASR and a computer halt. Depressing START will cause the EOF to be accepted. If not an EOF record, the message "REC LENGTH" will be typed to the ASR, followed by a computer halt. Depressing START will cause the short record to be rejected, and another record to be read. If the word count is complete, checks are made for parity errors. If a parity error is encountered, the tape is backspaced one record, and a read retry attempted. Twenty-five (25) attempts are made to read the record, before "PARITY" is typed to the ASR, and the computer halts. Depressing START will cause the record to be accepted. Records are converted from BCD to ASCII. If the call is to B\$WR, data is transferred from the designated transport number at 556 bpi, 3 characters per word (binary format).

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USE (Cont'd)

OUTPUT: Processing is the same as for input, except that on call to H\$WR, the user's buffer is converted from ASCII to BCD prior to any data transfer.

```

00001      *      J10003B   SYSTEMS 810A/B I/O PACKAGE FOR HSPT/ASR/CR/LP      1
00002      *                                                    2
00003      *                                                    3
00004      *                                                    4
00005      *                                                    5
00006      *                                                    6
00007      * CALLING SEQUENCE                                                    7
00008      *   CALL H$WR                                                    8
00009      *   DAC  BA                                                    9
00010      *   DATA WC                                                    10
00011      *                                                    11
00012      *   WHERE BA IS BASE ADDRESS                                        12
00013      *   WC IS WORD COUNT                                            13
00014      *                                                    14
00015      *   A REGISTER CONTAINS LOGICAL DEVICE NUMBER                    15
00016      *   IF POSITIVE INPUT                                            16
00017      *   NEGATIVE OUTPUT                                             17
00018      *                                                    18
00019      *   LOGICAL DEVICE NUMBERS                                        19
00020      *   LOGICAL DEV. NO      INPUT      OUTPUT                        20
00021      *   1                    KEYBOARD   KEYBOARD                    21
00022      *   2                    PAPER TAPE H.S. PAPER TAPE H.S.        22
00023      *   3                    CARD READER CARD READER                23
00024      *   4                    SPARE      LINE PRINTER                24
00025      *   5                    PAPER TAPE (TELETYPE) PAPER TAPE OUT (TELETYP 25
00026      *                                                    26
00027      *                                                    27
00028      * *****                                                    28
00029      *                                                    29
00030      00000 00000000      REL                                           30
00031      00000 50000000      NAME H$WR,H$WR                                31
00032      00000 50000525      NAME LINE,LINE                                32
00033      00000 50000542      NAME L$PG,L$PG                                33
00034      00000 50000316      NAME P$PØ,P$PØ                                34
00035      *                                                    35
00036      00000 25400000 H$WR DAC 0                                         36

```

*B
*B
*B

CKA

00037	00001	03100600	STA	LDN	SAVE LOGICAL DEVICE NUMBER		37
00038	00002	00000005	TAB		USE AS INDEX		38
00039	00003	01100551	LALO	LAA	L025		39
00040	00004	03100526	STA	F1		CKA	40
00041	00005	03100521	STA	FC	FIRST CHARACTER INDICATOR	CKA	41
00042	00006	01300000	LAA*	HSWR		CKA	42
00043	00007	03100522	STA	BA	ADDRESS OF BLOCK	CKA	43
00044	00010	14100000	IMS	HSWR		CKA	44
00045	00011	01300000	LAA*	HSWR	NUMBER OF OUTPUT WORDS	CKA	45
00046	00012	00000002	NEG			CKA	46
00047	00013	03100523	STA	NC	NEGATIVE CHARACTER COUNT	CKA	47
00048	00014	14100000	IMS	HSWR		CKA	48
00049	00015	00000023	SAN			CKA	49
00050	00016	11300000	BRU*	HSWR		CKA	50
00051	00017	01100576	LAA	CEU0	CEU 0,W		51
00052	00020	05500144	AMA	UNIT,1			52
00053	00021	03100024	STA	CEUL			53
00054	00022	01500127	LAA	DATZ,1			54
00055	00023	03100025	STA	DATL			55
00056	00024	00000033	CEUL	NOP			56
00057	00025	00000033	DATL	NOP			57
00058	00026	01100551	LAA	L025	--2		58
00059	00027	03100527	STA	WD	NEG CHARS/WORD		59
00060	00030	00000004	TRA				60
00061	00031	00000024	SAP		TEST FOR INPUT/OUTPUT		61
00062	00032	11100055	BRU	SOUT	OUTPUT		62
00063	00033	01100574	LAA	AIP0	AIP 0,W		63
00064	00034	05500144	AMA	UNIT,1			64
00065	00035	03100110	STA	AIPC			65
00066	00036	00000004	TBA				66
00067	00037	02100573	LRA	A0P1	A0P 1,W		67
00068	00040	00000110	RSA	1			68
00069	00041	00000022	SAZ		TEST FOR KEYBOARD INPUT		69
00070	00042	11100052	BRU	NTU1			70
00071	00043	00170401	MOP	ASR	DELETED WAIT BIT	11/70 RLD #B	71
00072	00044	00106400	CRTN	DATA	'106400		72

00073	00045	11100043	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B	73
00074	00046	00170401	MØP	ASR	DELETED WAIT BIT	11/70 RLD *B	74
00075	00047	00105000	LNFD	DATA	'105000		75
00076	00050	11100046	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B	76
00077	00051	11100053	BRU	*+2			77
00078	00052	02100127	NTU1	LBA	DATZ		78
00079	00053	04100113		STB	AØPC		79
00080	00054	11100070	BRU	INPT	INPUT		80
00081	00055	01100575	SØUT	LAA	AØPØ		81
00082	00056	05500144		AMA	UNIT,1		82
00083	00057	03100117		STA	AØPØ		83
00084	00060	01300522	W\$W1	LAA*	BA	GET ONE CHAR FOR OUTPUT	84
00085	00061	03100160		STA	CØNV		85
00086	00062	02100600		LBA	LDN	LØGICAL DEVICE NØ.	86
00087	00063	11500160		BRU	CØNV,1		87
00088	00064	01100160	SPRØ	LAA	CØNV	GET CHARACTER	88
00089	00065	12100116		SPB	AØTP		89
00090	00066	12100076		SPB	TEST	TEST FOR WORD COUNT ZERO	90
00091	00067	11100060		BRU	W\$W1	NØT	91
00092	00070	12100107	INPT	SPB	INPC	INPUT ONE CHARACTER	92
00093	00071	02100600		LBA	LDN	LØGICAL DEVICE NØ.	93
00094	00072	11500160		BRU	CØNV,1	CØNVERT	94
00095	00073	03300522	STAB	STA*	BA	STØRE CHARACTER	95
00096	00074	12100076		SPB	TEST	TEST FOR WORD COUNT ZERO	96
00097	00075	11100070		BRU	INPT		97
00098	00076	00000000	TEST	ZZZ	**		98
00099	00077	14100523		IMS	NC	NEG. CHARACTER COUNT	99
00100	00100	11100105		BRU	NØTD	NØT DØNE	100
00101	00101	01100526		LAA	F1		101
00102	00102	00000023		SAN		TEST FOR MORE I/O	102
00103	00103	11300526		BRU*	F1	YES	103
00104	00104	11300000		BRU*	H\$WR	RETURN	104
00105	00105	14100522	NØTD	IMS	BA	INCREMENT BASE ADDRESS	105
00106	00106	11300076		BRU*	TEST	RETURN	106
00107	00107	00000000	INPC	ZZZ	**	INPUT A CHARACTER	107
00108	00110	00000033	AIPC	NØP		AIP UNIT,W	108

00109	00111	03100160		STA	C0NV	SAVE CHARACTER		109
00110	00112	00001016		LSL	R	PREPARE FOR OUTPUT		110
00111	00113	00000033	A0PC	N0P		OUTPUT IF KEYBOARD INPUT		111
00112	00114	01100160		LAA	C0NV	LAST CHARACTER INPUT		112
00113	00115	11300107		BRU*	INPC	RETURN		113
00114	00116	00000000	0UTP	ZZZ	**	OUTPUT A CHARACTER		114
00115	00117	00000033	A0P0	N0P		A0P UNIT,W		115
00116	00120	11300116		BRU*	0UTP	RETURN		116
00117	00121	00000000		HLT		N0 MAG TAPE I/O		117
00118	00122	00002000		DATA	'2000			118
00119	00123	00000200		DATA	'200			119
00120	00124	00000000		DATA	0			120
00121	00125	00004000		DATA	'4000			121
00122	00126	00002000		DATA	'2000			122
00123	00127	00000033	DATZ	N0P				123
00124	00130	00002000		DATA	'2000			124
00125	00131	00001000		DATA	'1000			125
00126	00132	00004000		DATA	'4000			126
00127	00133	00000000		DATA	0			127
00128	00134	00004000		DATA	'4000			128
00129	00135	00000000		HLT		N0 MAG TAPE I/O		129
00130	00136	00047733		DATA	'47733	N0P-CEU 0,W		130
00131	00137	00000001		DATA	1		CKA	131
00132	00140	00000005		DATA	5		CKA	132
00133	00141	00000001		DATA	1		CKA	133
00134	00142	00000002		DATA	2		CKA	134
00135	00143	00000001		DATA	1		CKA	135
00136	00144	25400000	UNIT	DAC	0		CKA	136
00137	00145	00000001		DATA	1		CKA	137
00138	00146	00000002		DATA	2		CKA	138
00139	00147	00000004		DATA	4		CKA	139
00140	00150	00000001		DATA	1		CKA	140
00141	00151	00000001		DATA	1		CKA	141
00142	00152	00047733		DATA	'47733	N0P-CEU 0,W		142
00143	00153	11100311		BRU	P0UT	-5 PAPER TAPE OUT-TELETYPE		143
00144	00154	11100323		BRU	PR0T	-4 LINE PRINTER OUTPUT		144

00145	00155	11100240	BRU	TØT2	-3 CARD PUNCH ØUTPUT	145
00146	00156	11100311	BRU	PØUT	-2 PAPER TAPE ØUT-BRPE	146
00147	00157	11100235	BRU	TØUT	-1 KEYBØARD ØUTPUT	147
00148	00160	25400000	CØNV	DAC 0	0	148
00149	00161	11100166	BRU	TINP	1 KEYBØARD INPUT	149
00150	00162	11100166	BRU	TINP	2 PAPER TAPE INPUT-HSR	150
00151	00163	11100370	BRU	CINP	3 CARD READER INPUT	151
00152	00164	00000033	NØP		4 SPARE INPUT	152
00153	00165	11100166	BRU	TINP	5 PAPER TAPE IN-TELETYPE	153
00154	00166	02100227	TINP	LBA IAD1		154
00155	00167	04100526		STB F1		155
00156	00170	00000022		SAZ		156
00157	00171	11100173	BRU	**2		157
00158	00172	11100070	BRU	INPT	IGNØRE ZERØ	158
00159	00173	15100552	CMA	L067		159
00160	00174	11100176	BRU	**2		160
00161	00175	11100070	BRU	INPT	IGNØRE DELETE	161
00162	00176	15100567	CMA	L053		162
00163	00177	11100201	BRU	**2		163
00164	00200	11100070	BRU	INPT	IGNØRE LINE FEED	164
00165	00201	15100570	CMA	L052		165
00166	00202	11100204	BRU	**2		166
00167	00203	11100221	BRU	TCRD	TERMINATE CARD ØN CRRG, RETURN	167
00168	00204	15100577	CMA	KDEL		168
00169	00205	11100073	BRU	STAB		169
00170	00206	11100210	BRU	**2	DELETE LINE ØF INPUT	170
00171	00207	11100073	BRU	STAB		171
00172	00210	12100107	SPB	INPC	INPUT CHARACTER	172
00173	00211	06100570	SMA	L052		173
00174	00212	00000022	SAZ			174
00175	00213	11100210	BRU	**3		175
00176	00214	01100000	LAA	H\$WR		176
00177	00215	05100551	AMA	L025		177
00178	00216	03100000	STA	H\$WR		178
00179	00217	02100600	LBA	LDN		179
00180	00220	11100003	BRU	LALO		180

00181	00221	01100553	TCRD	LAA	L003				181
00182	00222	03300522		STA*	BA				182
00183	00223	14100522		IMS	BA				183
00184	00224	14100523		IMS	NC				184
00185	00225	11100222		BRU	TCRD+1				185
00186	00226	11300000		BRU*	H\$WR				186
00187	00227	35400230	IAD1	DAC	**1				187
00188	00230	12100107		SPB	INPC				188
00189	00231	15100570		CMA	L052				189
00190	00232	11100230		BRU	*-2				190
00191	00233	11300000		BRU*	H\$WR				191
00192	00234	11100230		BRU	*-4				192
00193	00235	01100521	TØUT	LAA	FC	FIRST CHARACTER TEST			193
00194	00236	00000024		SAP					194
00195	00237	11100243		BRU	TØT1	YES			195
00196	00240	01100160	TØT2	LAA	CØNV				196
00197	00241	00001016		LSL	8			CKA	197
00198	00242	11100065		BRU	SPBØ+1				198
00199	00243	01100160	TØT1	LAA	CØNV				199
00200	00244	15100554		CMA	L117				200
00201	00245	11100247		BRU	**2				201
00202	00246	11100257		BRU	PGE	1= NEW PAGE		*B	202
00203	00247	15100555		CMA	L074				203
00204	00250	11100252		BRU	**2				204
00205	00251	11100254		BRU	TWLN			*B	205
00206	00252	12100273		SPB	CRLF	ØUTPUT CR, LF		*B	206
00207	00253	11100240		BRU	TØT2	ØUTPUT CHARACTER		*B	207
00208	00254	12100273	TWLN	SPB	CRLF	ØUTPUT 2LF,C/R			208
00209	00255	12100273		SPB	CRLF	ALL ØTHERS=C/R,LF			209
00210	00256	11100066		BRU	SPBØ+2			*B	210
00211	00257	01100525	PGE	LAA	LINE	REMAINING LINES/PAGE		*B	211
00212	00260	15100556		CMA	L077	INITIAL CØUNT		*B	212
00213	00261	11100265		BRU	NWPG	GØ SPACE TØ TØP ØF PAGE		*B	213
00214	00262	11100267		BRU	NWPG+2	STILL AT TØP ØF PAGE		*B	214
00215	00263	11100265		BRU	NWPG	GØ SPACE TØ TØP ØF PAGE		*B	215
00216	00264	12100532		SPB	CL	CRRG. RET./ LINE FEED			216

00217	00265	14100525	NWPG	IMS	LINE	COUNT DOWN REMAINING LINES			217
00218	00266	11100264		BRU	*-2				218
00219	00267	12100300		SPB	NPG	OUTPUT 4 JF			219
00220	00270	11100066		BRU	SPB0+2				220
00221			*	-----C/R,LINE FEED AND BOOKKEEP LINE COUNT					221
00222	00271	12100532		SPB	CL	CRRG, RET./ LINE FEED			222
00223	00272	11300273		BRU*	CRLF				223
00224	00273	11000000	CRLF	BRU	**				224
00225	00274	14100525		IMS	LINE				225
00226	00275	11100271		BRU	*-4				226
00227	00276	12100300		SPB	NPG	NEW PAGE			227
00228	00277	11300273		BRU*	CRLF				228
00229	00300	11000000	NPG	BRU	**				229
00230	00301	01100556		LAA	L077				230
00231	00302	03100525		STA	LINE				231
00232	00303	01100557		LAA	L018				232
00233	00304	03100530		STA	PAGE				233
00234	00305	12100532		SPB	CL	CRRG, RET./ LINE FEED			234
00235	00306	14100530		IMS	PAGE				235
00236	00307	11100305		BRU	*-2				236
00237	00310	11300300		BRU*	NPG				237
00238	00311	02100571	P0UT	LBA	L100				238
00239	00312	04100526		STB	F1				239
00240	00313	11100240		BRU	T0T2				240
00241	00314	12100532	P0T1	SPB	CL	CRRG, RET./ LINE FEED			241
00242	00315	11300000		BRU*	H\$WR		CKA		242
00243			*					#B	243
00244	00316	00000000	P\$P0	***	**	TURN PUNCH POWER OFF		#B	244
00245	00317	00130002		CEU	HSPT	DELETED WAIT BIT	11/70 RLD	#B	245
00246	00320	00002000		DATA	'2000	PUNCH POWER OFF		#B	246
00247	00321	11100317		BRU	*-2	DELETED WAIT BIT	11/70 RLD	#B	247
00248	00322	11300316		BRU*	P\$P0	RETURN		#B	248
00249			*					#B	249
00250	00323	01100521	PR0T	LAA	FC				250
00251	00324	00000023		SAN					251
00252	00325	11100240		BRU	T0T2				252

00253	00326	01100572	LAA	L101				253
00254	00327	03100526	STA	F1				254
00255	00330	03100521	STA	FC				255
00256	00331	01100160	LAA	C0NV				256
00257	00332	15100560	CMA	L102				257
00258	00333	11100335	BRU	*+2				258
00259	00334	11100364	BRU	PR01				259
00260	00335	15100554	CMA	L117				260
00261	00336	11100340	BRU	*+2				261
00262	00337	11100356	BRU	Z00L				262
00263	00340	15100555	CMA	L011				263
00264	00341	11100343	BRU	*+2				264
00265	00342	11100347	BRU	TW0L				265
00266	00343	00130005	CEU	LP	DELETED WAIT BIT	11/70 RLD *B		266
00267	00344	00002100	DATA	'2100	FEED LINE, FILL BUFFER			267
00268	00345	11100343	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B		268
00269	00346	11100240	BRU	T0T2	START FILLING BUFFER			269
00270	00347	00130005	TW0L CEU	LP	DELETED WAIT BIT	11/70 RLD *B		270
00271	00350	00002000	DATA	'2000	FEED LINE			271
00272	00351	11100347	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B		272
00273	00352	00130005	CEU	LP	DELETED WAIT BIT	11/70 RLD *B		273
00274	00353	00002000	DATA	'2000	FEED ANOTHER LINE	*B		274
00275	00354	11100352	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B		275
00276	00355	11100361	BRU	CCCC		*B		276
00277	00356	00130005	Z00L CEU	LP	DELETED WAIT BIT	11/70 RLD *B		277
00278	00357	00001100	DATA	'1100	PAGE EJECT, FILL BUFFER			278
00279	00360	11100356	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B		279
00280	00361	01100553	CCCC LAA	L003	= '240	*B		280
00281	00362	03100160	STA	C0NV	SUPPRESS CARRIAGE CONTROL CHARACTER	*B		281
00282	00363	11100240	BRU	T0T2				282
00283	00364	00130005	PR01 CEU	LP	DELETED WAIT BIT	11/70 RLD *B		283
00284	00365	00000400	DATA	'000400		CKA		284
00285	00366	11100364	BRU	*-2	DELETED WAIT BIT	11/70 RLD *B		285
00286	00367	11300000	BRU*	H\$WR		CKA		286
00287	00370	01100437	CINP LAA	FRZ9	-9			287
00288	00371	03100531	STA	FCNT	SHIFT COUNTER			288

00289	00372	02100561	LBA	DZRØ	0	289
00290	00373	01100160	LAA	CØNV	UNITARY CØDED CHAR	290
00291	00374	15100440	CMA	Ø6TH	TEST FØR QUESTION MARK	291
00292	00375	11100377	BRU	**2	NØ	292
00293	00376	11100434	BRU	STB	YES	293
00294	00377	15100566	CMA	L004	TEST FØR ZERØ	294
00295	00400	11100402	BRU	**2	NØ	295
00296	00401	11100433	BRU	AMB1	YES	296
00297	00402	15100550	CMA	EXCL		297
00298	00403	11100405	BRU	**2	NØ	298
00299	00404	11100432	BRU	AMB4	YES	299
00300	00405	00000022	SAZ		TEST FØR SPACE	300
00301	00406	11100411	BRU	**3	NØ	301
00302	00407	02100562	LBA	L035	'20	302
00303	00410	11100434	BRU	STB		303
00304	00411	00000416	LSL	4		304
00305	00412	00000024	SAP		TEST FØR 12 PUNCH	305
00306	00413	16100441	AMB	ØSTY	'60	306
00307	00414	00000116	LSL	1		307
00308	00415	00000024	SAP		TEST FØR 11 PUNCH	308
00309	00416	16100563	AMB	D022	'40	309
00310	00417	00000116	LSL	1		310
00311	00420	00000024	SAP		TEST FØR 0 PUNCH	311
00312	00421	16100562	AMB	L035	'20	312
00313	00422	00000116	LSL	LSL 1		313
00314	00423	00000023	SAN		TEST FØR NEXT RØW PUNCH	314
00315	00424	11100427	BRU	IMS	NØ	315
00316	00425	16100564	AMB	D003	ADJUST TØTAL FØR PUNCH	316
00317	00426	16100531	AMB	FCNT		317
00318	00427	14100531	IMS	IMS FCNT		318
00319	00430	11100422	BRU	LSL	NØ	319
00320	00431	11100434	BRU	STB	YES	320
00321	00432	16100563	AMB4	AMB D022	'40	321
00322	00433	16100564	AMB1	AMB D003	'12	322
00323	00434	12100502	STR	SPB BCDA		323
00324	00435	00000004	TBA			324

00325	00436	11100073	BRU	STAB		325
00326	00437	00177767	FR79	DATA	-9	326
00327	00440	00005000	Ø6TH	DATA	'5000	327
00328	00441	00000060	ØSTY	DATA	48	328
00329	00442	00137661	TARL	DATA	'137661	329
00330	00443	00131263	DATA	'1234567890=':>	/STUVWXYZ ,(#\"-JKL''	330
00330	00444	00132265				
00330	00445	00133267				
00330	00446	00134271				
00330	00447	00130275				
00330	00450	00123672				
00330	00451	00137240				
00330	00452	00120257				
00330	00453	00151724				
00330	00454	00152726				
00330	00455	00153730				
00330	00456	00154732				
00330	00457	00120254				
00330	00460	00124243				
00330	00461	00156242				
00330	00462	00126712				
00330	00463	00145714				
00331	00464	00146716	DATA	'MNØPQR!\$*];@+ABCDEFGHI? ,)[<+''		331
00331	00465	00147720				
00331	00466	00150722				
00331	00467	00120644				
00331	00470	00125335				
00331	00471	00135700				
00331	00472	00125701				
00331	00473	00141303				
00331	00474	00142305				
00331	00475	00143307				
00331	00476	00144311				
00331	00477	00137656				
00331	00500	00124733				
00331	00501	00136337				

00332	00502	00000000	BCDA	ZZZ	**				332	
00333	00503	03100517		STA	FSAV				333	
00334	00504	00000003		CLA					334	
00335	00505	00001713		FLL	15		DIVIDE CODE BY TWO		335	
00336	00506	00000006		IAB					336	
00337	00507	02500442		LBA	TABL,1		GET TWO CODES		337	
00338	00510	00000024		SAP			BCD CODE ODDO		338	
00339	00511	00001013		FLL	8		YES		339	
00340	00512	00000004		TRA			NO		340	
00341	00513	00001015		RSL	8				341	
00342	00514	00000005		TAB					342	
00343	00515	01100517		LAA	FSAV				343	
00344	00516	11300502		BRU*	BCDA				344	
00345	00517	25400000	FSAV	DAC	0				345	
00346	00520	25400000	SIX	DAC	0				346	
00347	00521	25400000	FC	DAC	0				347	
00348	00522	25400000	BA	DAC	0				348	
00349	00523	25400000	NC	DAC	0				349	
00350	00524	25400000	WORD	DAC	0				350	
00351	00525	00177720	LINE	DATA	'160				351	
00352	00526	25400000	SCN	DAC	0	0		CKA	352	
00353	00527	25400000	SUN	DAC	0	0		CKA	353	
00354	00530	25400000	TUN	DAC	0	0		CKA	354	
00355	00531	00000526	F1	EQU	SCN			CKA	355	
00356	00531	00000527	WD	EQU	SUN			CKA	356	
00357	00531	00000530	PAGE	EQU	TUN			CKA	357	
00358			*						358	
00359			*						359	
00360	00531	00000000	FCNT	HLT					360	
00361			*-----THIS SUBROUTINE OUTPUTS C/R,LF ON SUN,							361
00362	00532	11000000	CL	BRU	**				362	
00363	00533	01100044		LAA	CRTN				363	
00364	00534	12100116		SPB	OUTP				364	
00365	00535	01100047		LAA	LNFD				365	
00366	00536	12100116		SPB	OUTP				366	
00367	00537	00000003		CLA					367	

00368	00540	03100521	STA	FC					368
00369	00541	11300532	BRU*	CL					369
00370			*					*B	370
00371	00542	00000000	LSPG	***	**	SET NUMBER OF LINES/PAGE		*B	371
00372	00543	00000023	SAN					*B	372
00373	00544	00000002	NEG					*B	373
00374	00545	03100556	STA	L077				*B	374
00375	00546	03100525	STA	LINE				*B	375
00376	00547	11300542	BRU*	LSPG	RETURN			*B	376
00377			*						377
00378	00550	00003000	EXCL	DATA	'3000				378
00379	00551	00177776	L025	DATA	-2				379
00380	00552	00000377	L067	DATA	'377				380
00381	00553	00000240	L003	DATA	'240	SPACE			381
00382	00554	00000261	L117	DATA	'261				382
00383	00555	00000260	L074	DATA	'260				383
00384	00556	00177720	L077	DATA	'-60				384
00385	00557	00177774	L018	DATA	-4				385
00386	00560	00000253	L102	DATA	'253				386
00387	00561	00000555	L011	EQU	L074				387
00388	00561	00000000	DZRØ	DATA	0				388
00389	00562	00000020	L035	DATA	16				389
00390	00563	00000040	D022	DATA	'40				390
00391	00564	00000012	D003	DATA	'12				391
00392	00565	00177777	L013	DATA	'177777				392
00393	00566	00001000	L004	DATA	'001000	ASR 33 TYPE CODE			393
00394	00567	00000212	L053	DATA	'212				394
00395	00570	00000215	L052	DATA	'215				395
00396	00571	35400314	L100	DAC	PØT1				396
00397	00572	35400364	L101	DAC	PRØ1				397
00398	00573	00170101	AØP1	AØP	1,W				398
00399	00574	00170300	AIP0	AIP	0,W				399
00400	00575	00170100	AØP0	AØP	0,W				400
00401	00576	00130100	CEU0	CEU	0,W				401
00402	00577	00000336	KDFL	DATA	'336	DELETE A LINE CODE IS THE 'ØP ARRØR'			402
00403	00600	25400000	LØN	DAC	0				403

00404	00601	00000001	ASR	EQU	1	ASR-33	11/70	RLD	*B	404
00405	00601	00000002	HSPT	EQU	2	HIGH SPEED PAPER TAPE	11/70	RLD	*B	405
00406	00601	00000005	LP	EQU	5	LINE PRINTER	11/70	RLD	*B	406
00407	00601	70400000		END						407

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ERRORS 0000 00000

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...EXTERNALS...

H\$WR	31
L\$PG	33
LINE	32
P\$PØ	34

L\$PG	33	*	371	376				
L003	181		280	* 381				
L004	294	*	393					
L011	263	*	387					
L013	* 392							
L018	232	*	385					
L025	39		58	177	*	379		
L035	302		312	* 389				
L052	165		173	189	*	395		
L053	162	*	394					
L067	159	*	380					
L074	203	*	383	387				
L077	212		230	374	*	384		
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