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DECUS NO.	8-266
TITLE	IBM EDITOR
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SOURCE LANGUAGE	PAL III

DECEMBER 1944

MEMORANDUM FOR THE RECORD



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ABSTRACT

This program provides editing service and 3000₁₀ character storage for text from an IBM 2741 terminal. In the present version, it also provides for punched paper tape storage of materials to be listed on the 2741.

The program permits the following operations: (1) correction of text by backspacing over the error and entering the correct character; (2) correction of a line of text by calling back the line; (3) an unlimited number of listings of text stored in the buffer; (4) paper tape output.

Peculiarities of the 2741 terminal, including time delays for data control transfer and carriage travel after tabulation and carriage return have been accommodated in the program.

LOADING AND SAVING

The program loads into locations ~~0020~~ through ~~0777~~, and expects to be able to use the remainder of core (through ~~6777~~) as a text buffer. Starting address is ~~0200~~.

INITIALIZING

If the program starts properly, it will cause ~~0000~~ to be sent to the TTY, causing an audible shift of the type-drum. It then waits for a carriage return from the IBM terminal.

When the carriage return is received, the program will cause the terminal to prompt the user with PROCEED.

COMMANDS TO THE EDITOR

There are three Editor commands: (1) backspace; (2) \$ ↓ and (3) NN\$ ↓, where a carriage return is indicated by ↓.

(1) The backspace is used to correct the current line of text. If an error is made and caught by the user prior to moving on to a new text line, he may backspace to the error, correct it, and retype the rest of the line to the right of the error.

(2) The \$ ↓ is used to LIST the entire text buffer. After a listing is complete, the user may append new text, may request another listing, or may correct a given line of text. The \$ ↓ is invisible to the text buffer.

(3) The NN\$ ↓ command causes the program to search the buffer for the line of text specified by NN. (Note, the lines must be specified with two digits, ~~00~~ through 99.) The specified line of text will be listed on the terminal, and the entire line must be retyped, presumably in correct

form. Up to five (5) additional characters may be added to the length of the line. The line may be shortened, of course, to less than the original length.

OVERFLOW

If the buffer capacity is exceeded while the user is entering a line, the Editor will cause a O (for "Overflow") to be typed by the 2741 just after the user terminates his current line with a carriage return. The program then waits for another carriage return. When this is received, the program lists the entire buffer contents. After the listing, the buffer may still be corrected through the use of the line-correction command, NN\$ ↓. In addition, new text may be appended, but at the risk of overlaying the program with text characters (resulting in a program disabling consequence).

PAPER TAPE OUTPUT

When listing buffer contents, the program continuously searches the switch register. If bit 11 = 1, (and the TTY and punch are on) the IBM-compatible codes will be punched in a 7-bit configuration on the TTY.

SOME EXAMPLES (Output from the computer is underlined.)

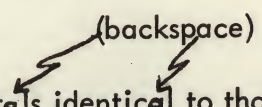
PROCEED

The PDP-12 has a complete line of peripherals identical to those...

\$ ↓

The PDP-12 has a complete line of peripherals identical to those...

(new text may be appended here without additional commands)



PROCEED

The PDP-12 has a complete line of peripherals identical to those offered for Digital Equipment corporations PDP-8/I and PDP-8/L. Included are two reandom access DECdisks, and high-speed paper tape reader and punch, synchronous and incremental IBM-compatible...

02\$ ↓

offered for Digital Equipment corporations PDP-8/I and PDP-8/L.

offered for Digital Equipment Corporation's PDP-8/I and PDP-8/L.

03\$ ↓

Included are two reandom access DECdisks, and high-speed paper

Included are two random access DECdisks, a high-speed paper

\$ ↓

The PDP-12 has a complete line of peripherals identical to those offered for Digital Equipment Corporation's PDP-8/I and PDP-8/L. Included are two random access DECdisks, a high-speed paper tape reader and punch, synchronous and incremental IBM-compatible...

(new text may be added here)

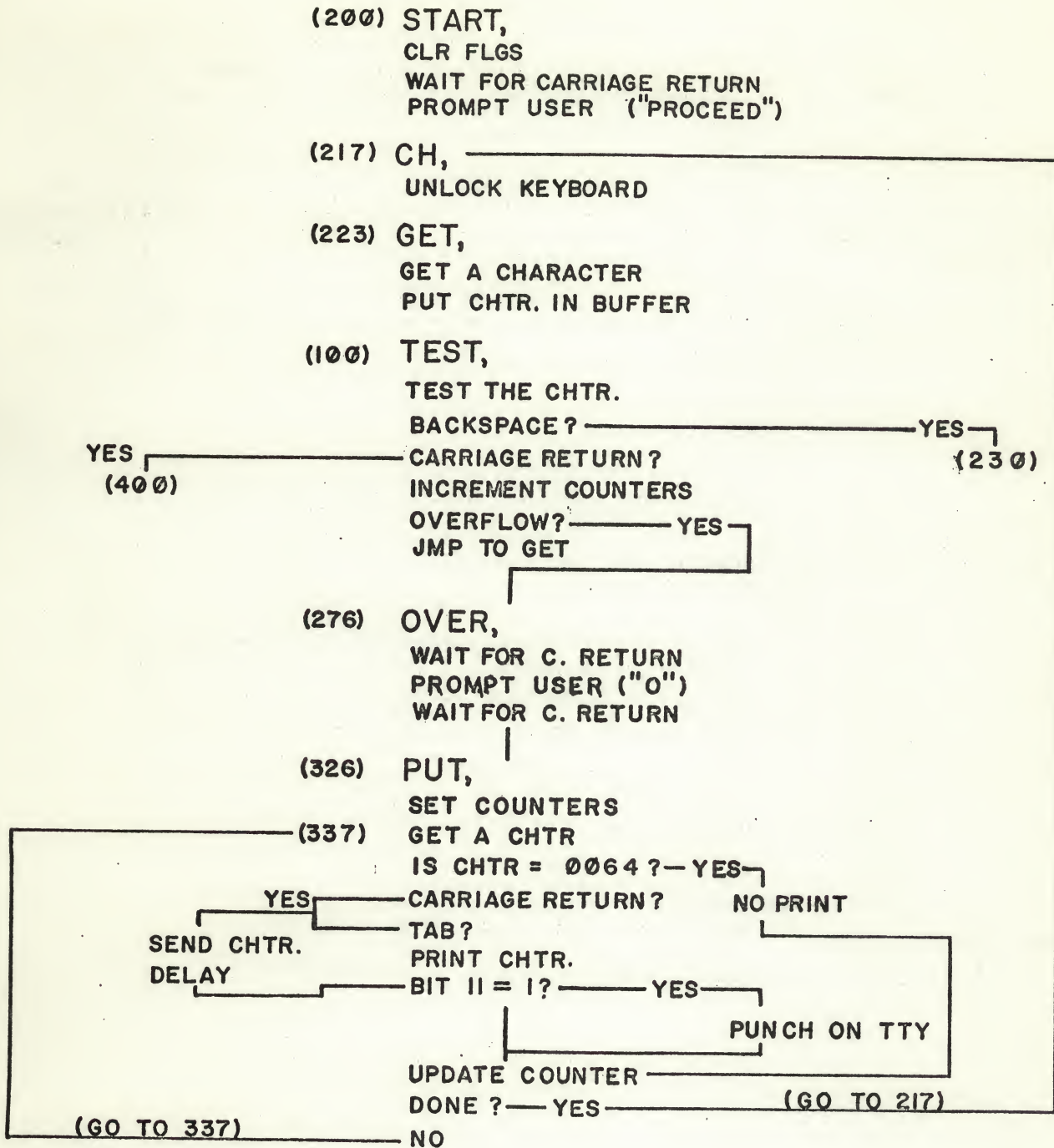
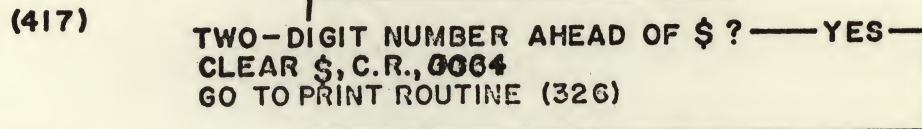
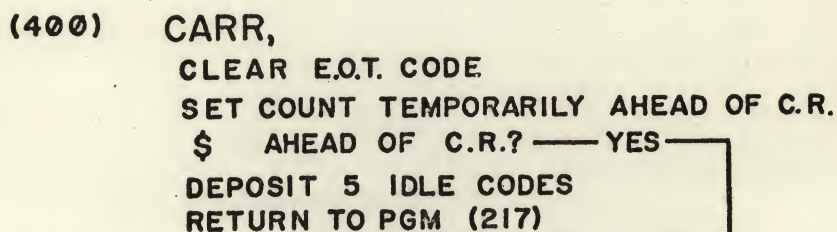
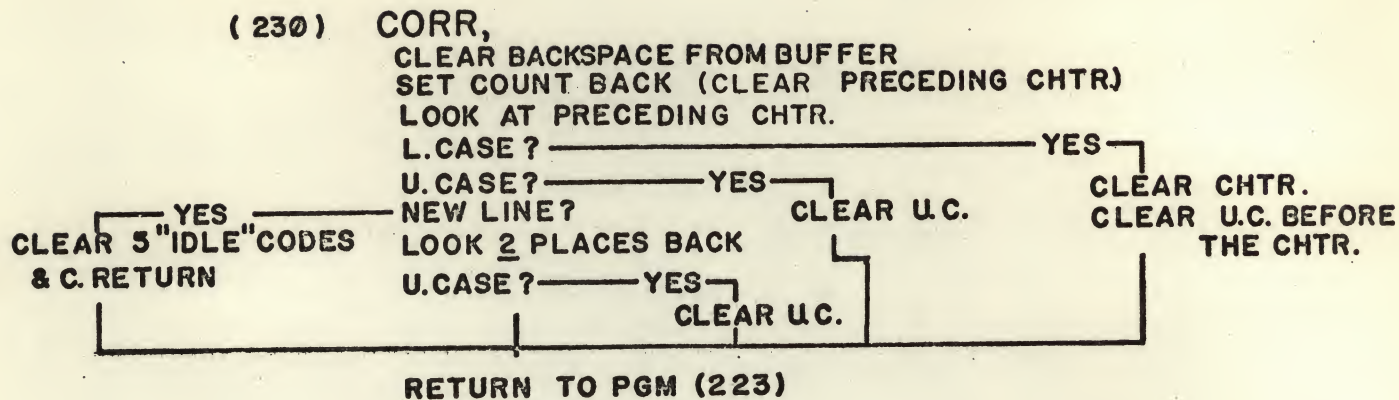


Figure 1. IBM Editor Flowchart. Numbers in parentheses refer to core locations.



(441) FORM DECIMAL EQUIVALENT

(547) FIND LINE

(600) PRINT LINE

(634) ALLOW CHANGE

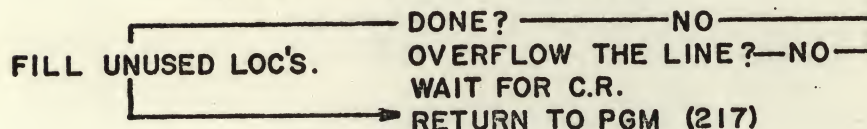


Figure 1. Continued. This portion of the chart covers the backspace correction and line correction routines.

PROGRAM LISTING: IBM EDITOR

TLSIBM=6416 PTO8 INSTRUCTIONS, MNEMONICS ARE ARBITRARY
 TSFIBM=6411
 KCCIBM=6402
 KRBIBM=6406
 KSFIBM=6401
 *0001

0001	0075	IDLE,	0075	TERMINAL "IDLE" CODE
0002	7764	MS,	7764	COUNTER FOR INITIAL PROMPT ("PROCEED")
0003	7764	RMS,	7764	
0004	0031	O,	0031	TERMINAL "O" CODE
0005	0017	MASK,	0017	USED TO READ DIGITS FROM TERMINAL
0006	0155	RET,	0155	TERMINAL CARRIAGE RETURN CODE
0007	7623	MCR,	7623	COMPLEMENT OF CARRIAGE RETURN CODE
		*0020		
0020	1000	POINT,	1000	INDICATES LOCATIONS WHERE CHARACTERS ARE STORED
0021	1000	RPOINT,	1000	
0022	2000	BUFF,	2000	COMPLEMENT OF BUFFER SIZE (1000 ₈ -7000 ₈) IN CORE
0023	2000	RBUFF,	2000	
0024	0000	PPOINT,	0000	POINTER USED IN PRINT ROUTINE
0025	0000	TEMP,	0000	TEMPORARY STORAGE LOCATION
0026	0000	COUNT,	0000	COUNTER FOR INPUT CHARACTERS
0027	0000	XCOUNT,	0000	COUNTER FOR PRINTING
0030	7777	M1,	7777	-1
0031	7776	M2,	7776	-2
0032	7775	M3,	7775	-3
0033	7772	M6,	7772	-6
0034	7772	RM6,	7772	
0035	0060	DIGIT,	0060	POINTER FOR OCTAL/DECIMAL CONVERSION
0036	0060	RDIGIT,	0060	
0037	0000	DIGIT1,	0000	STORAGE FOR DIGIT
0040	0000	DIGIT2,	0000	STORAGE FOR DIGIT
0041	0000	SLO,	0000	USED IN DELAY LOOPS
0042	7764	WAIT,	7764	USED IN DELAY LOOPS
0043	7764	RWAIT,	7764	
0044	0000	LINE,	0000	LINE COUNTER
0045	0741	SI,	STATEI	"PROCEED" STATEMENT POINTER
0046	0741	RSI,	STATEI	
0047	0717	RESET,	PUTBAC	INDIRECT ADDRESS
0050	0230	BKSP,	CORR	INDIRECT ADDRESS
0051	0400	CR,	CARR	INDIRECT ADDRESS
0052	0326	PRINT,	PUT	INDIRECT ADDRESS
0053	0217	NEXT,	CH	INDIRECT ADDRESS
0054	0276	OVFLW,	OVER	INDIRECT ADDRESS
0055	0174	EOT,	0174	END OF TRANSMISSION-UNLOCKS KEYBOARD

ØØ56	ØØ64	BET,	ØØ64	BEGIN TRANSMISSION
ØØ57	7613	MDOLAR,	7613	COMPLEMENT OF \$ CHARACTER
ØØ6Ø	7654	MZERO,	7654	COMPLEMENT OF Ø CHARACTER
ØØ61	774Ø	MONE,	774Ø	COMPLEMENT OF 1 CHARACTER
ØØ62	776Ø	MTWO,	776Ø	COMPLEMENT OF 2 CHARACTER
ØØ63	762Ø	MTHREE,	762Ø	COMPLEMENT OF 3
ØØ64	777Ø	MFOUR,	777Ø	COMPLEMENT OF 4
ØØ65	763Ø	MFIVE,	763Ø	COMPLEMENT OF 5
ØØ66	765Ø	MSIX,	765Ø	COMPLEMENT OF 6
ØØ67	771Ø	MSEVEN,	771Ø	COMPLEMENT OF 7
ØØ7Ø	7774	MEIGHT,	7774	COMPLEMENT OF 8
ØØ71	7634	MNINE,	7634	COMPLEMENT OF 9
ØØ72	76Ø4	MEOT,	76Ø4	COMPLEMENT OF EOT
ØØ73	7714	MØ64,	7714	COMPLEMENT OF BET (NEW LINE)
ØØ74	7721	MTAB,	7721	COMPLEMENT OF TAB
ØØ75	7643	MBKSP,	7643	COMPLEMENT OF BACKSPACE
ØØ76	7744	MUC,	7744	COMPLEMENT OF UPPER-CASE COMMAND
ØØ77	7741	MLC,	7741	COMPLEMENT OF LOWER-CASE COMMAND
Ø1ØØ	74Ø2	TEST, HLT		"TEST" ROUTINE:
Ø1Ø1	142Ø	TAD I POINT		LOOK AT CURRENT CHARACTER
Ø1Ø2	1Ø75	TAD MBKSP		IS IT A BACKSPACE?
Ø1Ø3	765Ø	SNA CLA		
Ø1Ø4	545Ø	JMP I BKSP		YES, GO TO BACKSPACE ROUTINE
Ø1Ø5	142Ø	TAD I POINT		LOOK AGAIN
Ø1Ø6	1Ø72	TAD MEOT		IS IT A CARRIAGE RETURN?
Ø1Ø7	765Ø	SNA CLA		
Ø11Ø	5451	JMP I CR		YES, GO TO CARRIAGE RETURN ROUTINE
Ø111	2Ø2Ø	ISZ POINT		NO, INCREMENT POINTER FOR NEXT CHARACTER
Ø112	2Ø26	ISZ COUNT		AND COUNTER
Ø113	2Ø22	ISZ BUFF		AND BUFFER
Ø114	55ØØ	JMP I TEST		AND RETURN TO GET NEW CHARACTER (CH)
Ø115	5454	JMP I OVFLW		IF BUFFER EXCEEDS 3000 ₁₀ CHARACTERS, GO TO OVFLW
Ø116	74Ø2	SET, HLT		"SET" ROUTINE:
Ø117	1Ø2Ø	TAD POINT		SUBTRACT 1 FROM POINTER
Ø12Ø	1Ø3Ø	TAD MI		
Ø121	3Ø2Ø	DCA POINT		
Ø122	1Ø26	TAD COUNT		COUNTER
Ø123	1Ø3Ø	TAD MI		
Ø124	3Ø26	DCA COUNT		
Ø125	1Ø22	TAD BUFF		AND BUFFER
Ø126	1Ø3Ø	TAD MI		
Ø127	3Ø22	DCA BUFF		
Ø13Ø	5516	JMP I SET		AND RETURN TO PROGRAM
Ø131	7ØØØ	DELAY, NOP		DELAY: USED AFTER TABS AND CARRIAGE
Ø132	73ØØ	CLA CLL		RETURNS
Ø133	1Ø43	TAD RWAIT		
Ø134	3Ø42	DCA WAIT		
Ø135	2Ø41	ISZ SLO		
Ø136	5135	JMP .-1		
Ø137	2Ø42	ISZ WAIT		

Ø140	5135	JMP .-3
Ø141	5531	JMP I DELAY
Ø142	7402	OUT, HLT
Ø143	6416	TLSIBM
Ø144	6411	TSFIBM
Ø145	5144	JMP .-1
Ø146	7000	NOP
Ø147	7000	NOP
Ø150	5542	JMP I OUT
Ø151	7000	IN, NOP
Ø152	6401	KSFIBM
Ø153	5152	JMP .-1
Ø154	6406	KRBIBM
Ø155	5551	JMP I IN
Ø156	7000	UPDATE, NOP
Ø157	7300	CLA CLL
Ø160	1001	TAD IDLE
Ø161	3420	DCA I POINT
Ø162	2020	ISZ POINT
Ø163	2026	ISZ COUNT
Ø164	2022	ISZ BUFF
Ø165	5556	JMP I UPDATE
Ø166	5454	JMP I OVFLW
Ø167	7000	TOUT, NOP
Ø170	7300	CLA CLL
Ø171	6041	TSF
Ø172	5171	JMP .-1
Ø173	1424	TAD I PPOINT
Ø174	6046	TLS
Ø175	7300	CLA CLL
Ø176	5567	JMP I TOUT

"OUT" ROUTINE:
 CHARACTER IS IN ACCUMULATOR. PRINT IT.

AND RETURN TO PROGRAM
 "IN" ROUTINE:

PICK UP CHARACTER
 AND RETURN TO PROGRAM
 "UPDATE" ROUTINE:
 FILLS A GIVEN LOCATION WITH AN
 "IDLE" CODE. INCREMENTS THE
 POINTER, COUNTER, AND BUFFER, AND
 CHECKS FOR OVERFLOW.

TTY OUTPUT: FOR PUNCHED PAPER TAPE
 OUTPUT OF THE TEXT.

		*Ø2ØØ	
Ø2ØØ	73ØØ	START, CLA CLL	
Ø2Ø1	4447	JMS I RESET	RESTORE COUNTERS, ETC.
Ø2Ø2	64Ø2	KCC IBM	CLEAR PTO8 FLAG
Ø2Ø3	4151	LOOK, JMS IN	GET A CHARACTER
Ø2Ø4	1Ø72	TAD MEOT	IS IT A CARRIAGE RETURN? (EOT?)
Ø2Ø5	765Ø	SNA CLA	
Ø2Ø6	521Ø	JMP .+2	YES, GO TO 21Ø
Ø2Ø7	52Ø3	JMP LOOK	NO, LOOK AGAIN
Ø21Ø	4131	JMS DELAY	DELAY AFTER FINDING EOT
Ø211	73ØØ	PROMPT, CLA CLL	
Ø212	1445	TAD I S1	PROMPT THE USER: "PROCEED "
Ø213	4142	JMS OUT	
Ø214	2Ø45	ISZ S1	
Ø215	2ØØ2	ISZ MS	
Ø216	5211	JMP PROMPT	
Ø217	73ØØ	CH, CLA CLL	UNLOCK THE KEYBOARD
Ø22Ø	4131	JMS DELAY	(I.E., DELAY AFTER PRINTING "PROCEED" AND THEN
Ø221	1Ø55	TAD EOT	SEND AN EOT CODE.)
Ø222	4142	JMS OUT	
Ø223	73ØØ	GET, CLA CLL	GET A CHARACTER
Ø224	4151	JMS IN	
Ø225	342Ø	DCA I POINT	STORE IN CORE ^c PLACE INDICATED BY POINT VALUE
Ø226	41ØØ	JMS TEST	TEST THE CHARACTER
Ø227	5223	JMP GET	CHTR NOT BACKSPACE OR C. RETURN, SO GET NEXT CHTR
Ø23Ø	73ØØ	CORR, CLA CLL	<u>ARRIVE HERE IF BACKSPACE HAS BEEN ENCOUNTERED</u>
Ø231	342Ø	DCA I POINT	CLEAR BACKSPACE FROM BUFFER
Ø232	4116	JMS SET	SET POINTERS, ETC., BACK ONE PLACE
Ø233	73ØØ	CLA CLL	
Ø234	142Ø	TAD I POINT	LOOK AT THIS CHARACTER (AHEAD OF BACKSPACE)
Ø235	1Ø77	TAD MLC	IS IT A LOWER-CASE COMMAND?
Ø236	765Ø	SNA CLA	
Ø237	5263	JMP X2	IF SO, GO TO X1
Ø24Ø	142Ø	TAD I POINT	LOOK AGAIN
Ø241	1Ø76	TAD MUC	IS IT AN UPPER-CASE COMMAND?
Ø242	765Ø	SNA CLA	
Ø243	526Ø	JMP X1	IF SO, GO TO X1
Ø244	142Ø	TAD I POINT	LOOK AGAIN
Ø245	1Ø73	TAD MØ64	IS IT THE START OF A NEW LINE?
Ø246	765Ø	SNA CLA	
Ø247	5267	JMP X1A	IF SO, GO TO X1A
Ø25Ø	1Ø2Ø	TAD POINT	LOOK TWO PLACES AHEAD OF BACKSPACE
Ø251	1Ø3Ø	TAD M1	
Ø252	3Ø25	DCA TEMP	
Ø253	1425	TAD I TEMP	
Ø254	1Ø76	TAD MUC	IS IT AN UPPER-CASE COMMAND?
Ø255	765Ø	SNA CLA	

Ø256	526Ø	JMP X1	IF SO, GO TO X1
Ø257	5223	JMP GET	IF NONE OF THESE, Ø232 CLEARED CHARACTER, SO RETURN
Ø26Ø	73ØØ	X1, CLA CLL	
Ø261	4116	JMS SET	CLEAR THE UC COMMAND
Ø262	5223	JMP GET	
Ø263	73ØØ	X2, CLA CLL	
Ø264	4116	JMS SET	CLEAR THE PRINTED CHARACTER AHEAD OF THE LC
Ø265	4116	JMS SET	AND CLEAR THE UC COMMAND AHEAD OF THE CHARACTER
Ø266	5223	JMP GET	
Ø267	73ØØ	X1A, CLA CLL	
Ø27Ø	4116	JMS SET	CLEAR THE 5 IDLE CODES PLACED AT THE END OF THE LINE
Ø271	2Ø33	ISZ M6	AND THE CARRIAGE RETURN CODE. POINTER IS NOW SET
Ø272	5267	JMP X1A	AFTER THE LAST CHARACTER ON THE PRECEDING LINE.
Ø273	1Ø34	TAD RM6	
Ø274	3Ø33	DCA M6	
Ø275	5223	JMP GET	
Ø276	73ØØ	OVER, CLA CLL	OVERFLOW ROUTINE:
Ø277	4151	JMS IN	GET A CHARACTER
Ø3ØØ	1Ø72	TAD MEOT	IS AN A CARRIAGE RETURN (END OF TRANSMISSION?)
Ø3Ø1	765Ø	SNA CLA	
Ø3Ø2	53Ø4	JMP .+2	YES, GO TO 304
Ø3Ø3	5276	JMP OVER	NO, LOOK AGAIN
Ø3Ø4	4131	JMS DELAY	EOT FOUND, SO DELAY
Ø3Ø5	73ØØ	CLA CLL	
Ø3Ø6	1Ø56	TAD BET	SEND A BEGIN TRANSMISSION CODE
Ø3Ø7	4142	JMS OUT	
Ø31Ø	73ØØ	CLA CLL	
Ø311	1ØØ4	TAD O	AND THE PROMPT "O" (FOR OVERFLOW) TO TERMINAL
Ø312	4142	JMS OUT	
Ø313	73ØØ	CLA CLL	
Ø314	4131	JMS DELAY	DELAY
Ø315	73ØØ	CLA CLL	
Ø316	1Ø55	TAD EOT	SEND EOT TO UNLOCK KEYBOARD
Ø317	4142	JMS OUT	
Ø32Ø	73ØØ	NEW, CLA CLL	
Ø321	4151	JMS IN	AND LOOK FOR A CHARACTER FROM KEYBOARD
Ø322	1Ø72	TAD MEOT	IS IT A CARRIAGE RETURN?
Ø323	765Ø	SNA CLA	
Ø324	5452	JMP I PRINT	YES, PRINT ENTIRE BUFFER CONTENTS
Ø325	532Ø	JMP NEW	NO, LOOK AGAIN
Ø326	73ØØ	PUT, CLA CLL	<hr/> PRINTING ROUTINE
Ø327	1Ø26	TAD COUNT	TAKE COUNT VALUE AND
Ø33Ø	7Ø41	CMA IAC	FORM TWO'S COMPLEMENT
Ø331	3Ø27	DCA XCOUNT	
Ø332	1Ø21	TAD RPOINT	PUT STARTING "POINT" VALUE INTO
Ø333	3Ø24	DCA PPOINT	PPOINT
Ø334	4131	JMS DELAY	DELAY (BEFORE STARTING TO PRINT)
Ø335	1Ø56	TAD BET	SEND A BEGIN TRANSMISSION CODE
Ø336	4142	JMS OUT	
Ø337	73ØØ	PUTL, CLA CLL	PRINT THE BUFFER

Ø34Ø	1424	TAD I PPOINT	TAKE CHARACTER
Ø341	1Ø73	TAD MØ64	IS IT AN ØØ64 (NEW LINE) CODE?
Ø342	765Ø	SNA CLA	
Ø343	5362	JMP PUTUP	IF SO, DO NOT PRINT IT
Ø344	1424	TAD I PPOINT	IF NOT, PRINT IT AFTER ASKING THREE QUESTIONS---
Ø345	1ØØ7	TAD MCR	(IS IT A CARRIAGE RETURN?)
Ø346	765Ø	SNA CLA	
Ø347	5367	JMP OUTSLO	(IF SO, DELAY AFTER PRINTING TO ALLOW TRAVEL)
Ø35Ø	1424	TAD I PPOINT	
Ø351	1Ø74	TAD MTAB	(IS IT A TAB?)
Ø352	765Ø	SNA CLA	
Ø353	5367	JMP OUTSLO	(IF SO, DELAY TO ALLOW TRAVEL OF MECHANISM)
Ø354	76Ø4	LAS	LOOK AT SWITCH REGISTER
Ø355	7Ø1Ø	RAR	
Ø356	763Ø	SZL CLA	DOES BIT 11 = 1?
Ø357	4167	JMS TOUT	IF SO, PUNCH CHARACTER ON TTY
Ø36Ø	1424	TAD I PPOINT	
Ø361	4142	JMS OUT	OTHERWISE, JUST PRINT IT
Ø362	2Ø24	PUTUP, ISZ PPOINT	UPDATE THE PRINTING POINTER
Ø363	2Ø27	ISZ XCOUNT	AND COUNTER, DONE?
Ø364	5337	JMP PUTL	NO, RETURN
Ø365	73ØØ	CLA CLL	YES,
Ø366	5217	JMP CH	<u>UNLOCK KEYBOARD-----RETURN TO CH (NEW CHARACTER)</u>
Ø367	76Ø4	OUTSLO, LAS	<u>DELAY ROUTINE FOR TABS AND CARRIAGE RETURNS.</u>
Ø37Ø	7Ø1Ø	RAR	DELAY TIME WAS EMPIRICALLY DETERMINED TO ALLOW
Ø371	763Ø	SZL CLA	ABOUT 15" OF CARRIAGE TRAVEL ON THE TYPEWRITER.
Ø372	4167	JMS TOUT	
Ø373	1424	TAD I PPOINT	
Ø374	4142	JMS OUT	
Ø375	4131	JMS DELAY	
Ø376	4131	JMS DELAY	
Ø377	5362	JMP PUTUP	

		*Ø4ØØ	
Ø4ØØ	73ØØ	CARR, CLA CLL	FOUND A CARRIAGE RETURN
Ø4Ø1	342Ø	DCA I POINT	CLEAR OUT EOT CODE FOLLOWING CARRIAGE RETURN
Ø4Ø2	1Ø2Ø	TAD POINT	
Ø4Ø3	1Ø31	TAD M2	TEMPORARILY SET POINTER TWO PLACES AHEAD OF EOT
Ø4Ø4	3Ø25	DCA TEMP	
Ø4Ø5	1425	TAD I TEMP	LOOK AT THIS CHARACTER
Ø4Ø6	1Ø57	TAD MDOLAR	IS IT A \$ CODE?
Ø4Ø7	765Ø	SNA CLA	
Ø41Ø	5217	JMP .+7	YES, JMP TO 417.
Ø411	4156	JMS UPDATE	NO, DEPOSIT AN IDLE CODE AFTER CR
Ø412	4156	JMS UPDATE	AND ANOTHER
Ø413	4156	JMS UPDATE	ANOTHER
Ø414	4156	JMS UPDATE	ANOTHER
Ø415	4156	JMS UPDATE	AND ONE MORE FOR A TOTAL OF FIVE
Ø416	5453	JMP I NEXT	AND GO GET A NEW CHARACTER
Ø417	1Ø25	TAD TEMP	SET POINTER AHEAD OF THE \$
Ø42Ø	1Ø31	TAD M2	BY TWO PLACES
Ø421	3Ø25	DCA TEMP	
Ø422	73ØØ	CLA CLL	
Ø423	1425	TAD I TEMP	TAKE THIS CHARACTER
Ø424	7Ø1Ø	RAR	
Ø425	743Ø	SZL	IS IT A DIGIT (Ø THROUGH 9 FROM TERMINAL)?
Ø426	5233	JMP .+5	
Ø427	7Ø1Ø	RAR	
Ø43Ø	743Ø	SZL	
Ø431	5233	JMP .+2	NOT A DIGIT, JMP TWO PLACES AHEAD
Ø432	524Ø	JMP .+6	
Ø433	73ØØ	CLA CLL	
Ø434	4116	JMS SET	NO DIGIT, SO CLEAR CARRIAGE RETURN
Ø435	4116	JMS SET	THE NEW LINE CODE, AND
Ø436	4116	JMS SET	THE EOT CODE, AND
Ø437	5452	JMP I PRINT	GO TO THE PRINT ROUTINE
Ø44Ø	73ØØ	CLA CLL	FOUND DIGITS AHEAD OF THE \$ CODE
Ø441	1425	TAD I TEMP	
Ø442	3Ø37	DCA DIGIT1	DEPOSIT FIRST DIGIT
Ø443	3425	DCA I TEMP	CLEAR BUFFER OF THIS DIGIT
Ø444	2Ø25	ISZ TEMP	
Ø445	1425	TAD I TEMP	
Ø446	3Ø4Ø	DCA DIGIT2	DEPOSIT SECOND DIGIT
Ø447	3425	DCA I TEMP	CLEAR BUFFER OF THIS DIGIT
Ø45Ø	2Ø25	ISZ TEMP	
Ø451	3425	DCA I TEMP	THE \$ IS CLEARED FROM BUFFER
Ø452	2Ø25	ISZ TEMP	
Ø453	3425	DCA I TEMP	AND THE CARRIAGE RETURN CODE IS CLEARED
Ø454	4116	JMS SET	
Ø455	4116	JMS SET	
Ø456	4116	JMS SET	
Ø457	4116	JMS SET	
Ø46Ø	4116	JMS SET	

Ø461	1Ø37	SEARCH, TAD DIGIT1	FIND APPROPRIATE LINE FOR CORRECTION:
Ø462	1435	TAD I DIGIT	TAKE DIGIT1, COMPARE IT TO LOOKUP TABLE
Ø463	765Ø	SNA CLA	
Ø464	5267	JMP FIND1	FOUND? YES--GO TO FIND1
Ø465	2Ø35	ISZ DIGIT	NO, LOOK AGAIN
Ø466	5261	JMP SEARCH	
Ø467	73ØØ	FIND1, CLA CLL	FOUND 1st DIGIT IN LOOKUP TABLE
Ø47Ø	1Ø35	TAD DIGIT	
Ø471	ØØØ5	AND MASK	
Ø472	7Ø4Ø	CMA	
Ø473	3Ø37	DCA DIGIT1	FORM COUNTER, AND PUT INTO DIGIT1
Ø474	1Ø36	TAD RDIGIT	
Ø475	3Ø35	DCA DIGIT	
Ø476	73ØØ	SEARC2, CLA CLL	DO SAME FOR DIGIT2
Ø477	1Ø4Ø	TAD DIGIT2	
Ø5ØØ	1435	TAD I DIGIT	
Ø5Ø1	765Ø	SNA CLA	
Ø5Ø2	53Ø5	JMP FIND2	
Ø5Ø3	2Ø35	ISZ DIGIT	
Ø5Ø4	5276	JMP SEARC2	
Ø5Ø5	73ØØ	FIND2, CLA CLL	
Ø5Ø6	1Ø35	TAD DIGIT	
Ø5Ø7	ØØØ5	AND MASK	
Ø51Ø	7Ø4Ø	CMA	
Ø511	3Ø4Ø	DCA DIGIT2	
Ø512	1Ø36	TAD RDIGIT	
Ø513	3Ø35	DCA DIGIT	
Ø514	3Ø44	DCA LINE	
Ø515	73ØØ	LINECT, CLA CLL	BOTH DIGITS FORMED AS COUNTERS
Ø516	2Ø37	ISZ DIGIT1	INCREMENT DIGIT1, DONE?
Ø517	5321	JMP .+2	NO, SKIP NEXT INSTRUCTION
Ø52Ø	5336	JMP XLINEC	YES, GO TO 536
Ø521	1Ø44	TAD LINE	TAKE LINE VALUE AND
Ø522	7ØØ1	IAC	INCREMENT IT
Ø523	7ØØ1	IAC	TEN TIMES
Ø524	7ØØ1	IAC	FOR EACH
Ø525	7ØØ1	IAC	INTEGER VALUE
Ø526	7ØØ1	IAC	OF DIGIT1
Ø527	7ØØ1	IAC	
Ø53Ø	7ØØ1	IAC	
Ø531	7ØØ1	IAC	
Ø532	7ØØ1	IAC	
Ø533	7ØØ1	IAC	
Ø534	3Ø44	DCA LINE	
Ø535	5315	JMP LINECT	NOT FINISHED, INCREMENT DIGIT1 AGAIN
Ø536	73ØØ	XLINEC, CLA CLL	DO THE SAME FOR DIGIT2, EXCEPT INCREMENT
Ø537	2Ø4Ø	ISZ DIGIT2	LINECOUNTER ONCE FOR EACH INTEGER VALUE
Ø54Ø	5342	JMP .+2	OF DIGIT2.

Ø541	5346	JMP LINEST	
Ø542	1Ø44	TAD LINE	
Ø543	7ØØ1	IAC	
Ø544	3Ø44	DCA LINE	
Ø545	5336	JMP XLINEC	
Ø546	1Ø21	LINEST, TAD RPOINT	FINISHED, PUT STARTING VALUE FOR POINTER IN
Ø547	3Ø25	DCA TEMP	TEMPORARY LOCATION
Ø55Ø	73ØØ	LINEL, CLA CLL	COMPLEMENT THE LINE COUNTER.
Ø551	1Ø44	TAD LINE	
Ø552	7Ø4Ø	CMA	
Ø553	7ØØ1	IAC	
Ø554	3Ø44	DCA LINE	
Ø555	73ØØ	LINELX, CLA CLL	LOOK AT EVERY BUFFER CHARACTER.
Ø556	1425	TAD I TEMP	
Ø557	1Ø73	TAD MØ64	IS THIS CHARACTER A "NEW LINE" CODE?
Ø56Ø	765Ø	SNA CLA	
Ø561	5364	JMP .+3	
Ø562	2Ø25	ISZ TEMP	
Ø563	5355	JMP LINELX	NO, PICKUP NEXT CHARACTER
Ø564	2Ø25	ISZ TEMP	
Ø565	2Ø44	ISZ LINE	YES, INCREMENT LINE COUNTER, DONE?
Ø566	5355	JMP LINELX	NO, PICKUP NEXT CHARACTER
Ø567	1Ø25	TAD TEMP	YES, SET TEMP BACK ONE PLACE.
Ø57Ø	1Ø3Ø	TAD MI	
Ø571	3Ø25	DCA TEMP	
Ø572	4131	JMS DELAY	DELAY
Ø573	5774	JMP I.+1	
Ø574	Ø6ØØ	ROUT, Ø6ØØ	AND GO TO THE SPECIAL PRINTING ROUTINE.

		*0600	
0600	7300	OUTX, CLA CLL	PRINTING ROUTINE FOR CORRECTIONS
0601	1425	TAD I TEMP	TAKE CHARACTER
0602	1007	TAD MCR	IS IT THE END OF THE LINE?
0603	7650	SNA CLA	
0604	5212	JMP FINIS	YES, GO TO 612
0605	1425	TAD I TEMP	NO, PRINT CHARACTER
0606	4142	JMS OUT	
0607	7300	CLA CLL	
0610	2025	ISZ TEMP	INCREMENT THE TEMPORARY POINTER
0611	5200	JMP OUTX	AND GO GET NEXT CHARACTER
0612	7300	FINIS, CLA CLL	FOUND CARRIAGE RETURN
0613	1425	TAD I TEMP	PRINT IT
0614	4142	JMS OUT	
0615	7300	CLA CLL	NOW, BACK UP THE TEMPORARY POINTER
0616	1425	TAD I TEMP	TO THE "NEW LINE" CODE (0064) WHICH
0617	1073	TAD M064	DEFINED THE START OF THIS LINE.
0620	7650	SNA CLA	
0621	5226	JMP .+5	
0622	1025	TAD TEMP	
0623	1030	TAD MI	
0624	3025	DCA TEMP	
0625	5216	JMP .-7	
0626	7300	CLA CLL	WHEN FOUND,
0627	1055	TAD EOT	SEND EOT TO TERMINAL, UNLOCKING KEYBOARD
0630	4142	JMS OUT	
0631	4131	JMS DELAY	AND DELAY
0632	7300	CLA CLL	
0633	5241	JMP .+6	
0634	7300	CHANGE, CLA CLL	
0635	1425	TAD I TEMP	PICK UP CHARACTER TO BE REPLACED IN BUFFER
0636	1073	TAD M064	IS IT THE START OF THE NEXT LINE?
0637	7650	SNA CLA	
0640	5275	JMP EOL	IF SO, GO TO 675
0641	4151	JMS IN	IF NOT, GET A CHARACTER TO REPLACE THIS ONE
0642	3425	DCA I TEMP	AND PUT IT IN BUFFER @ PLACE INDICATED BY TEMP
0643	1425	TAD I TEMP	
0644	1072	TAD MEOT	IS THIS A CARRIAGE RETURN?
0645	7650	SNA CLA	
0646	5263	JMP SEOL	IF SO, GO TO 663
0647	1425	TAD I TEMP	IF NOT, IS IT A BACKSPACE?
0650	1075	TAD MBKSP	
0651	7650	SNA CLA	
0652	5255	JMP CHBKSP	
0653	2025	ISZ TEMP	IF NOT, STORE CHARACTER, AND
0654	5234	JMP CHANGE	GO GET NEXT CHARACTER
0655	7300	CHBKSP, CLA CLL	BACKSPACE ENCOUNTERED DURING CORRECTION,
0656	3425	DCA I TEMP	SO CLEAR BACKSPACE FROM BUFFER
0657	1025	TAD TEMP	AND SET POINTER BACK ONE PLACE

0660	1030	TAD M1	
0661	3025	DCA TEMP	
0662	5234	JMP CHANGE	AND GO GET NEXT CHARACTER
0663	3425	SEOL, DCA I TEMP	CARRIAGE RETURN ENCOUNTERED, CLEAR THE EOT CODE
0664	2025	SZ, ISZ TEMP	INCREMENT THE TEMPORARY POINTER
0665	1425	TAD I TEMP	
0666	1073	TAD M064	IS THIS LOCATION = TO START OF NEXT LINE?
0667	7650	SNA CLA	
0670	5274	JMP .+4	
0671	1001	TAD IDLE	IF NOT, PUT AN IDLE CODE IN THE LOCATION
0672	3425	DCA I TEMP	
0673	5264	JMP SZ	AND LOOK AGAIN FOR THE START OF THE NEXT LINE
0674	5453	GO, JMP I NEXT	NEXT LINE FOUND, RETURN TO PROGRAM (CH)
0675	7300	EOL, CLA CLL	USER TRIED TO ADD MORE THAN FIVE CHARACTERS TO
0676	4151	JMS IN	THE LINE, WAIT FOR
0677	1072	TAD MEOT	A CARRIAGE RETURN (EOT) CODE
0700	7650	SNA CLA	
0701	5303	JMP .+2	
0702	5275	JMP EOL	
0703	1025	TAD TEMP	WHEN FOUND, PUT THE CARRIAGE RETURN
0704	1030	TAD M1	IN LAST AVAILABLE LOCATION FOR THIS
0705	3025	DCA TEMP	LINE, TRUNCATING IT TO MAXIMUM PERMISSIBLE LENGTH
0706	1006	TAD RET	
0707	3425	DCA I TEMP	
0710	5453	JMP I NEXT	AND RETURN TO PROGRAM (CH)
0711	7000	NOP	
0712	7000	NOP	
0713	7000	NOP	
0714	7000	NOP	
0715	7000	NOP	
0716	7000	NOP	
0717	7000	PUTBAC, NOP	RESTORING ROUTINE SETS POINTERS, COUNTERS,
0720	7300	CLA CLL	ETC., BACK TO APPROPRIATE STARTING VALUES.
0721	1021	TAD RPOINT	
0722	3020	DCA POINT	
0723	1023	TAD RBUFF	
0724	3022	DCA BUFF	
0725	1046	TAD RS1	
0726	3045	DCA S1	
0727	1003	TAD RMS	
0730	3002	DCA MS	
0731	3026	DCA COUNT	
0732	3027	DCA XCOUNT	
0733	1036	TAD RDIGIT	
0734	3035	DCA DIGIT	
0735	1034	TAD RM6	
0736	3033	DCA M6	

Ø737	6Ø46	TLS	
Ø74Ø	5717	JMP I PUTBAC	
Ø741	ØØ64	STATE1,	ØØ64 (BET) LOOKUP TABLE FOR INITIAL PROMPT TO USER
Ø742	Ø155	0155	(CR)
Ø743	ØØ34	ØØ34	(UC)
Ø744	Ø171	Ø171	(P)
Ø745	ØØ45	ØØ45	(R)
Ø746	ØØ31	ØØ31	(O)
Ø747	Ø163	Ø163	(C)
Ø75Ø	Ø153	Ø153	(E)
Ø751	Ø153	Ø153	(E)
Ø752	ØØ13	ØØ13	(D)
Ø753	Ø155	Ø155	(CR)
Ø754	ØØ75	ØØ75	(IDLE)