

UNIVERSITY OF ILLINOIS
DIGITAL COMPUTER LABORATORY
ILLIAC II LIBRARY ROUTINE P1-TTS-67v

TITLE: Test Typewriter System

TYPE: Complete program in NICAP source language.
Binary version is also available.

USE: "Quicky" check of the console typewriter system
to see if running correctly. Allows engineer to
see if all bit lines are correct.

LENGTH: 248 cards in uncondensed NICAP deck
297 words including all temporary storage.

TEMPORARY STORAGE: 128 words to store read-in characters for
Part III, 25 words of subroutine storage.

DESCRIPTION AND
OPERATING INSTRUCTIONS:

The test is composed of three parts, the first two of which test the output section of the console typewriter system and the third of which tests out the input section. A brief description of each part follows.

Part I

Part I prints out a table of 4-digit decimal numbers with zero suppression from 0 to 299. The numbers are printed 25 to a line with one space between numbers. Part I is entered immediately upon loading of TTS or at the end of operations in Part III.

Part II

Part II prints out a memory dump of the locations in core used by TTS. The format is identical to the NICAP monitor dump on the 1403. All locations are printed out with no suppression of blocks of words containing all zeros. This part is mainly used to provide a look at memory if something fouls up Parts I or III.

Part III

Part III allows the typing-in of up to 128 characters from the console typewriter keyboard. Upon the receipt of a LF/CR, the routine will do a LF/CR and print out all of the characters typed-in. Warning: At least 1 character other than LF/CR must be entered when Part III is executed.

The program flow of TTS is as follows:

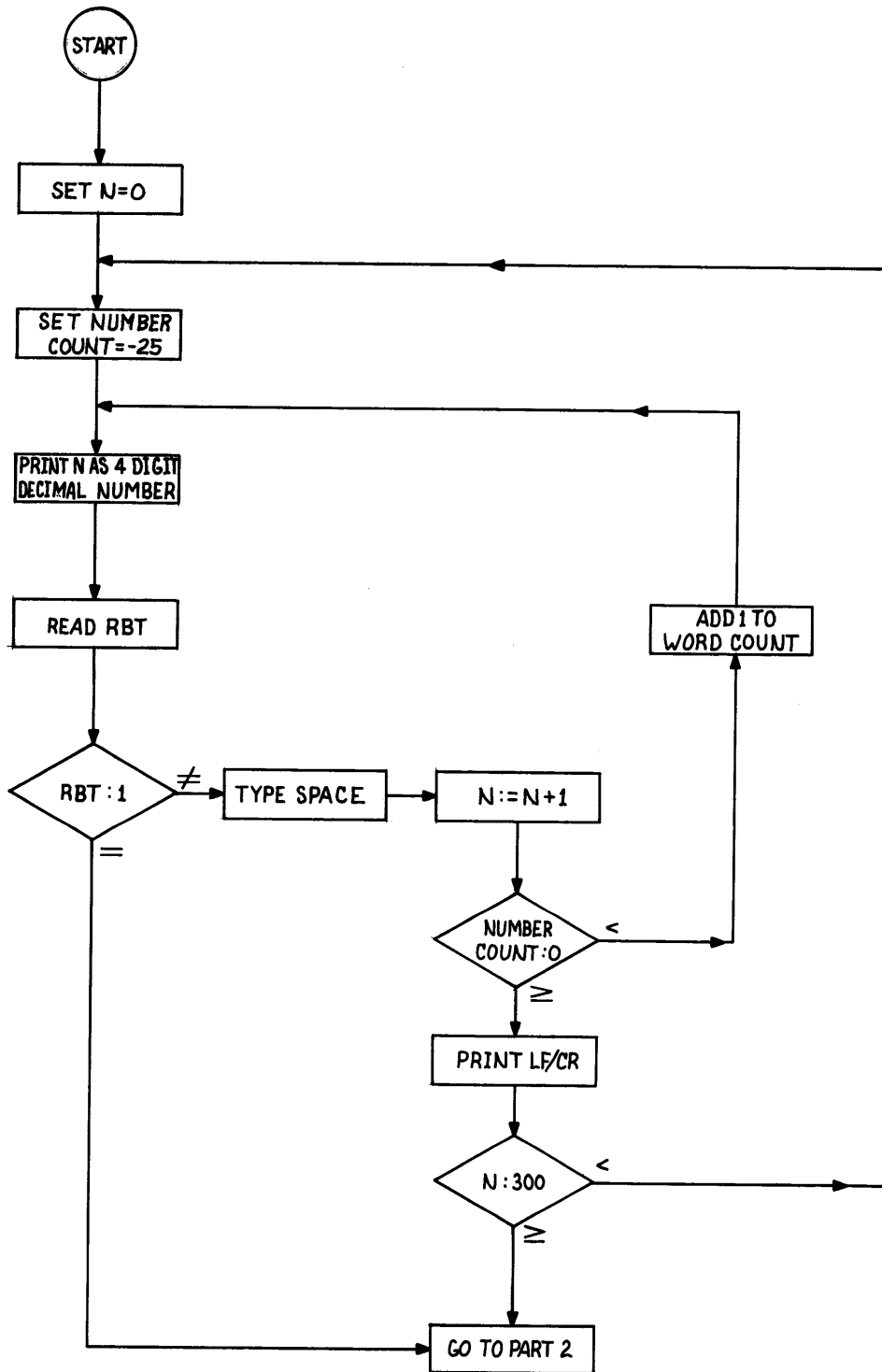
Part I
Part II
Part III
RBT
Part III
Part I
Part II
:
:

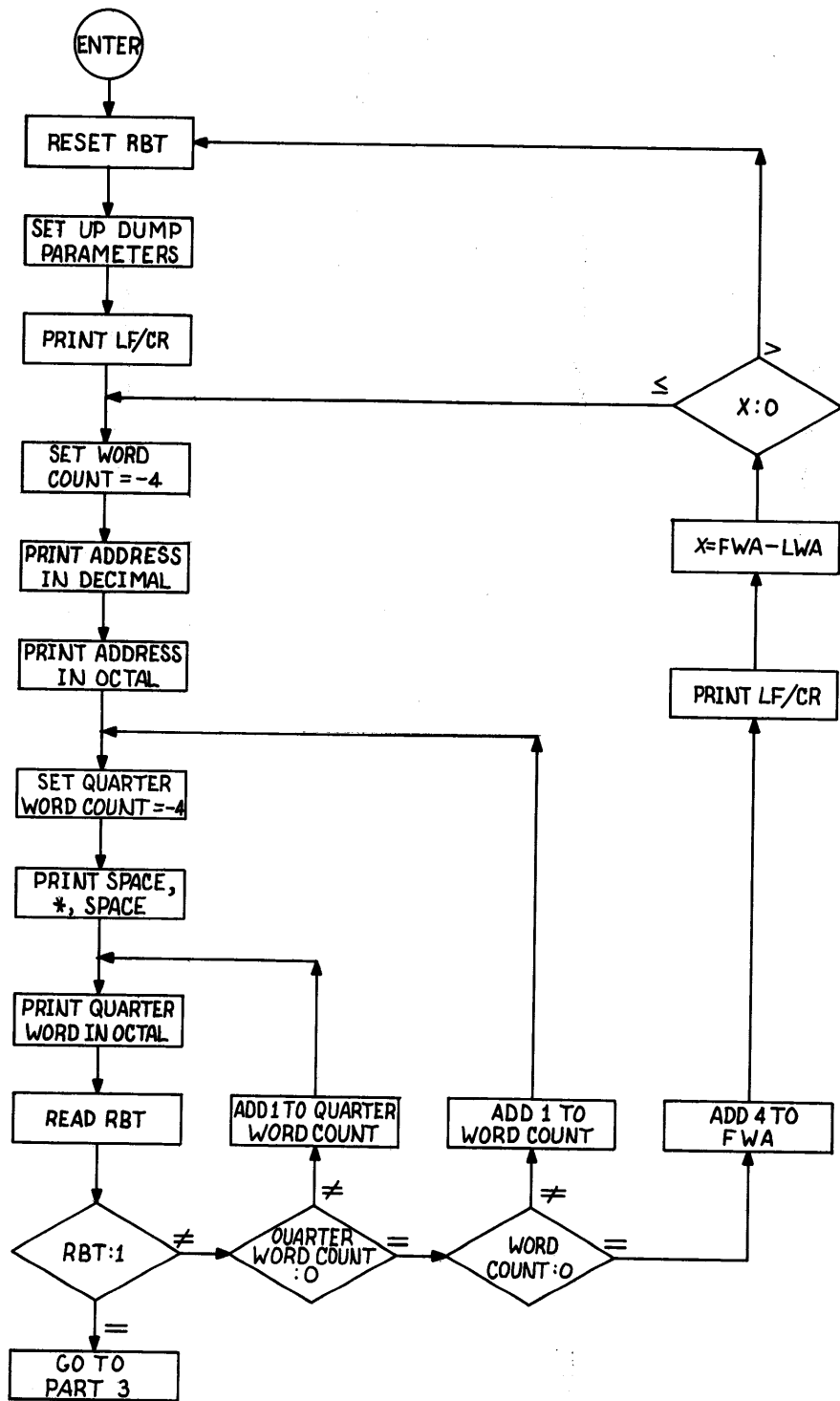
If RBT is pushed during Part I, Part I will be terminated and Part II begun. Likewise, if RBT is pushed during Part II, Part II will be terminated and Part III begun. NOTE: Pushing RBT during Part II is the only means of causing Part III to be executed.

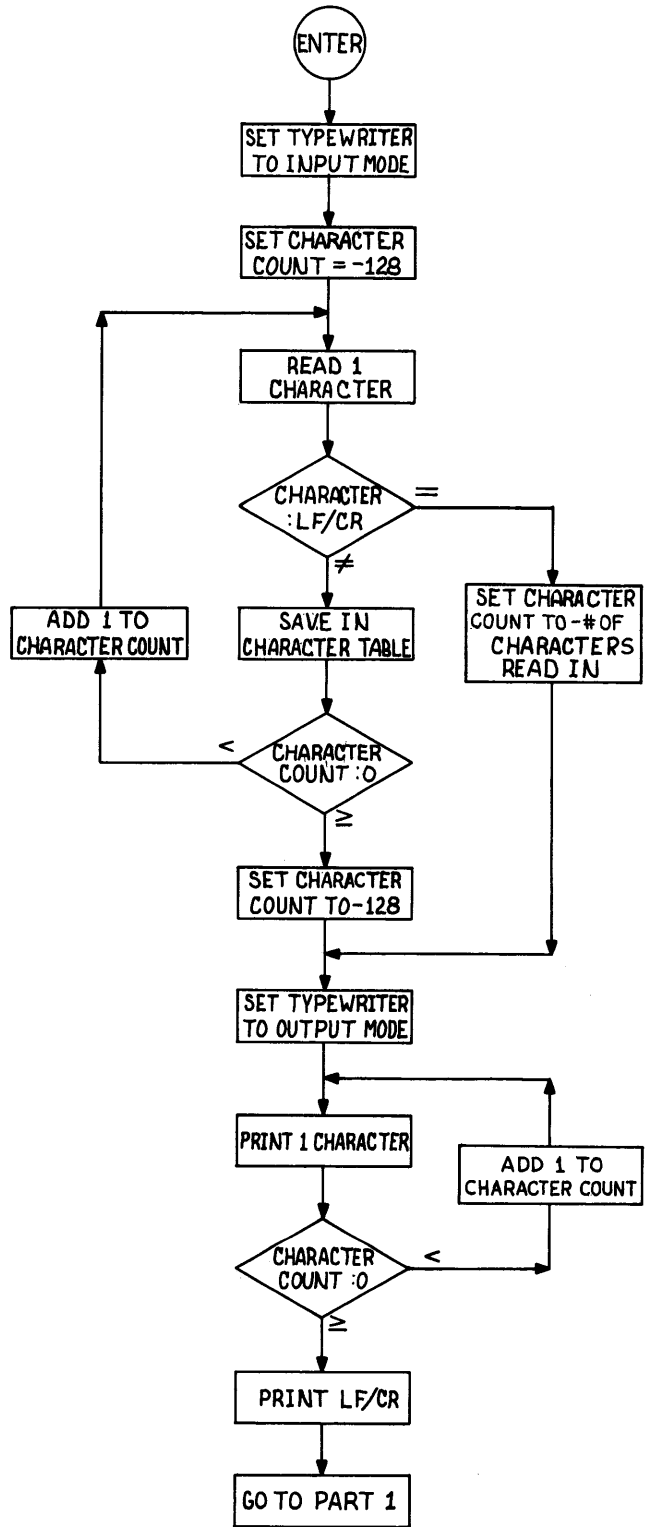
If no RBT signal is given, TTS will continuously dump out the memory until stopped by putting the Whiteswitch up to Fetch or Run. There is a Blackswitch HLT which occurs at the very beginning after loading and each time at the end of Part III.

The operating procedure is to simply load the program and execute it.

WRITTEN BY:	<i>Jack Bouknight</i>
APPROVED BY:	<i>James Metzger</i>
DATE:	7-13-64







	SSR	14	RBT	TTS	030
	CAM	5,ENDPRG	SET M5=LAST ADDRESS OF PROGRAM	TTS	031
	ATN	768	PERFORM	TTS	032
	SSR	62	LF/CR	TTS	033
CMDUM1	CSM	6,4	SET COUNT TO DUMP 4 WORDS	TTS	034
	CAM	1,M4	SET M1 = M4	TTS	035
	CALL	PTDQ	PRINT M1 AS DECIMAL NUMBER	TTS	036
	CAM	14,M4	SET M14=M4	TTS	037
	SFR	6,COMMON+LEVEL2+2	SAVE F6	TTS	038
	SFR	7,COMMON+LEVEL2+3	SAVE F7	TTS	039
	CALL	ESTQW1	PRINT M14 IN OCTAL	TTS	040
	LFR	6,COMMON+LEVEL2+2	RESTORE F6	TTS	041
	LFR	7,COMMON+LEVEL2+3	RESTORE F7	TTS	042
CMDUM2	ATN	4,1,	LOAD F6 WITH WORD AT ADDRESS	TTS	043
	LFR	6	NOW IN M4 AND ADD 1 TO M4	TTS	044
	CSM	7,4	SET COUNT FOR 4 QUARTER WORDS	TTS	045
	ATN	256	PERFORM	TTS	046
	SSR	62	SPACE	TTS	047
	ATN	4194	PRINT	TTS	048
	SSR	62	ASTERISK	TTS	049
CMDUM3	ORB	M7+4	LOAD M8,M9,M10,OR M11	TTS	050
	CAM	14,M8	INTO M14	TTS	051
	SFR	6,COMMON+LEVEL2+2	SAVE F6	TTS	052
	SFR	7,COMMON+LEVEL2+3	SAVE F7	TTS	053
	CALL	ESTQW1	PUNCH M14 IN OCTAL	TTS	054
	ASN	14	READ RBT	TTS	055
	CAM	3	PLACE IN M3	TTS	056
	CRM	3,10	SHIFT TO SIGN POSITION	TTS	057
	JNM	3,STARTA	JUMP IF RBT = 1	TTS	058
	LFR	6,COMMON+LEVEL2+2	RESTORE F6	TTS	059
	LFR	7,COMMON+LEVEL2+3	RESTORE F7	TTS	060
	CJU	7,CMDUM3	RETURN FOR NEXT QUARTER WORD	TTS	061
	CJU	6,CMDUM2	RETURN FOR NEXT WORD	TTS	062
	ATN	768	PERFORM	TTS	063
	SSR	62	LF/CR	TTS	064

	CAM	8, M5-M4	CHECK BOUNDARY ADDRESSES	TTS	065
	JZM	8, CMDUM4	JUMP IF BOUNDARY PRESENT	TTS	066
	JNM	8, CMDUM4	JUMP IF BOUNDARY EXCEEDED	TTS	067
	TRA	CMDUM1	RETURN FOR MORE WORDS	TTS	068
CMDUM4	TRA	JB1	RETURN TO RESTART TABLE PRINT	TTS	069
STARTA	ATN	768	PRINT	TTS	070
	SSR	62	LF/CR	TTS	071
	ATN	512	RESET	TTS	072
	SSR	14	RBT	TTS	073
	ATN	3584	SET TYPEWRITER TO	TTS	074
	SSR	62	THE INPUT MODE	TTS	075
	CSM	4, 128	SET COUNT FOR POSSIBLE 128 CHARACTERS	TTS	076
LOOP	ASN	62	READ ONE CHARACTER FROM TYPEWRITER	TTS	077
	CAM	0, 0	PLACE IN M0	TTS	078
	ATN	M0	OUTPUT M0 TO	TTS	079
	SSR	6	SR 06	TTS	080
	JNM	0, REG	JUMP IF PRINT FUNCTION	TTS	081
MASK	ANN	0, 3840	CLEAR ALL BITS EXCEPT CONTROL FUNCTION	TTS	082
	CAM	8, 0	PLACE IN M8	TTS	083
	EOM	8, 768	IS CONTROL FUNCTION LF/CR	TTS	084
	JZM	8, IMM	JUMP IF LF/CR	TTS	085
REG	SFR	4, COMMON+128+M4	STORE CHARACTER IN BUFFERS	TTS	086
	CJU	4, LOOP	RETURN FOR MORE CHARACTERS	TTS	087
	ATN	3840	SET TYPEWRITER TO	TTS	088
	SSR	62	OUTPUT MODE	TTS	089
	ATN	768	PRINT	TTS	090
	SSR	62	LF/CR	TTS	091
	CSM	4, 128	SET COUNT FOR 128 CHARACTERS	TTS	092
	CAM	5, M4	SET BASE ADDRESS INCREMENT	TTS	093
LOOP2	LFR	4, COMMON+128+M5	LOAD CURRENT CHARACTER	TTS	094
	ATN	M0	OUTPUT	TTS	095
	SSR	62	CHARACTER	TTS	096
	ADM	5, 1	INCREMENT ADDRESS COUNTER	TTS	097
	CJU	4, LOOP2	RETURN FOR REMAINING CHARACTERS	TTS	098
	TRA	START	GO TO TABLE PRINTOUT SECTION	TTS	099

IMM	CSM	4,128+M4	SET COUNT FOR N CHARACTERS	TTS	100
	ATN	3840	SET TYPEWRITER TO	TTS	101
	SSR	62	OUTPUT MODE	TTS	102
	ATN	768	PRINT	TTS	103
	SSR	62	LF/CR	TTS	104
	CSM	5,128	SET ADDRESS INCREMENT	TTS	105
	TRA	LOOP2	RETURN TO PRINT TYPED MESSAGE	TTS	106
	FIL			TTS	107
TYPKOD	OCTQ	10070,10171,10172,10073,10130,10031,10032,10133		TTS	108
	OCTQ	10174,10075,10040,10177,10002,10103,10144,10045		TTS	109
	OCTQ	10046,10147,10004,10105,10106,10007,10160,10061		TTS	110
	OCTQ	10062,10163,10020,10121,10122,10023,10064,10165		TTS	111
	OCTQ	10166,10067,10124,10025,10026,10127		TTS	112
	FIL			TTS	113
ESTQW3	ATN	512	SET UP FOR TAB FUNCTION	TTS	114
ESTQW2	ATN	512	SET UP FOR LF/CR FUNCTION	TTS	115
ESTQW1	ATN	256	SET UP FOR SPACE FUNCTION	TTS	116
ESTQW	CAM	13	SET UP PREFIX CONTROL FUNCTION	TTS	117
	JPM	14,ESTQW+2	JUMP IF SIGN BIT IS 0	TTS	118
	ATN	M13+4217	PRINT PREFIX FUNCTION	TTS	119
	SSR	62	AND 1	TTS	120
	JNM	14,3,ESTQW+2	JUMP IF SIGN BIT IS 1	TTS	121
	ATN	M13+4152	PRINT PREFIX FUNCTION	TTS	122
	SSR	62	AND 0	TTS	123
	SFR	6,ESTS	SAVE F6	TTS	124
	CRN	14,12	SHIFT FIRST OCTAL CHARACTER INTO	TTS	125
	CAM	10	POSITION AND PLACE IN M10	TTS	126
	CAM	11,M15	SET M11 = M15	TTS	127
	CSM	9,4	SET CHARACTER COUNT TO 4	TTS	128
	JPM	10,ESTQW+6	JUMP IF OCTAL CHARACTER L.T. 4	TTS	129
	ATN	1	FETCH CONVERSION ENTRY	TTS	130
	LFR	7,TYPKOD	FROM TABLE	TTS	131
	CRM	10,10	POSITION OCTAL CHARACTER FOR PRINT	TTS	132
	ORB	M10	FETCH CORRECT	TTS	133
	ATN	M12	CONVERSION CHARACTER	TTS	134

	SSR	62	AND PRINT IT.	TTS	135
	CJU	9,ESTQW+5	RETURN FOR MORE CHARACTERS	TTS	136
	CAM	15,M11	SET M15=M11	TTS	137
	LFR	6,ESTS	RESTORE F6	TTS	138
	JLH	M3	RETURN	TTS	139
ESTS	BSS	8	SUBROUTINE TEMPORARY STORAGE	TTS	140
PTEMP	BSS	17		TTS	141
LEVEL3	EQU	8		TTS	142
PTCON	DECQ	4152,4217,4218,4155,4184,4121,4122,4187	01234567	TTS	143
	DECQ	4220,4157,4128,4223,4098,4163,4196,4133	89+-ABCD	TTS	144
	DECQ	4134,4199,4100,4165,4166,4103,4208,4145	EFGHIJKL	TTS	145
	DECQ	4146,4211,4112,4177,4178,4115,4148,4213	MNOPQRST	TTS	146
	DECQ	4214,4151,4180,4117,4118,4183,4097,4348	UVWXYZ'	TTS	147
	DECQ	4286,4158,,,,,	.	TTS	148
	DECQ	3840,,,,,		TTS	149
	DECQ	256,,,,,4194,768	*	TTS	150
	DECQ	4259,4250,4285,4280,4345,4346,4249,4321)	TTS	151
	DECQ	4351,4322,4193,4283,4226,4291,4324,4261	(= ABCD	TTS	152
	DECQ	4262,4327,4228,4293,4294,4231,4336,4273	EFGHIJKL	TTS	153
	DECQ	4274,4339,4240,4305,4306,4243,4276,4341	MNOPQRST	TTS	154
	DECQ	4342,4279,4308,4245,4246,4311,4225,4262	UVWXYZ E	TTS	155
	DECQ	4131,4160,,,,,	/,	TTS	156
	DECQ	1280,,,,,		TTS	157
	DECQ	512,,,,1024,,4256,0	\$	TTS	158
		FIL			TTS
	ORG	PTCON+32		TTS	160
PZERO	DECQ	,,,		TTS	161
PTA	SFR	4,PTEMP	FREE F4	TTS	162
	ASN	28	READ SR34	TTS	163
	CAM	2		TTS	164
	JNM	2,PTA1	BYPASS OUTPUT	TTS	165
	CRM	2,12		TTS	166
	JNM	2,PTA2	PUNCH MODE	TTS	167
	SFR	7,PTEMP+1	FREE F7	TTS	168
	CRN	1,2	FETCH PROPER WORD OF PTCON	TTS	169

	CAM			TTS	170
	ANN	,31		TTS	171
	LFR	7,PTCON		TTS	172
	ORB	M1	TYPE PROPER CHARACTER	TTS	173
	ATN	M12		TTS	174
	SSR	62		TTS	175
	LFR	7,PTEMP+1	RESTORE F7	TTS	176
PTA1	LFR	4,PTEMP	RESTORE F4	TTS	177
	JLH	M3	EXIT	TTS	178
PTA2	ATN	M1	PUNCH CHARACTER	TTS	179
	SSR			TTS	180
PTDQ	SFR	4,PTEMP+LEVEL1	SAVE F4	TTS	181
	CAM	1,48	SET FOR OUTPUT	TTS	182
	TRA	PTDQY		TTS	183
PTDQ1	SFR	4,PTEMP+LEVEL1	SAVE F4	TTS	184
	CAM	2,63	OUTPUT LF/CR	TTS	185
	TRA	PTDQZ	CHARACTER	TTS	186
PTDQ2	SFR	4,PTEMP+LEVEL1	SAVE F4	TTS	187
	CAM	2,56	OUTPUT SPACE	TTS	188
	TRA	PTDQZ	CHARACTER	TTS	189
PTDQ3	SFR	4,PTEMP+LEVEL1	SAVE F4	TTS	190
	CAM	2,112	OUTPUT TAB CHARACTER	TTS	191
PTDQZ	CAM	1,48	SET FOR OUTPUT FOR	TTS	192
	CALL	PTA	PREFIX CHARACTERS	TTS	193
	CAM	1,M2		TTS	194
PTDQY	CALL	PTA	OUTPUT PREFIX CHARACTERS	TTS	195
	SFR	7,PTEMP+LEVEL1+1	SAVE F7	TTS	196
	LDM	1,PTEMP+LEVEL1	FETCH QUARTER-WORD (N)	TTS	197
	LFR	7,PZERO	SET ALL COUNTERS TO ZERO	TTS	198
	JPM	1,PTDQA	N L.T. 4096	TTS	199
	SBM	1,4100	REDUCE N	TTS	200
	JPM	1,PTDQ4	N G. T. 4099	TTS	201
	CAM	12,4	SET 409X TO BE OUTPUT	TTS	202
	CAM	14,9		TTS	203
	CAM	15,M1+10		TTS	204

	TRA	PTDQK		TTS	205
PTDQ4	CAM	12,4	CORRECT FOR N G. T. 4099	TTS	206
	CAM	13,1		TTS	207
PTDQA	SBM	1,1000	EXTRACT	TTS	208
	JNM	1,PTDQB	THOUSANDS	TTS	209
	CJU	12,PTDQA	DIGIT	TTS	210
PTDQB	ADM	1,1000		TTS	211
PTDQC	SBM	1,100	EXTRACT	TTS	212
	JNM	1,PTDQD	HUNDREDS	TTS	213
	CJU	13,PTDQC	DIGIT	TTS	214
PTDQD	ADM	1,100		TTS	215
PTDQE	SBM	1,10	EXTRACT	TTS	216
	JNM	1,PTDQF	TENS	TTS	217
	CJU	14,PTDQE	DIGIT	TTS	218
PTDQF	ADM	15,M1+10	EXTRACT UNITS DIGIT	TTS	219
	SBN	13,10	CORRECT FOR CARRY	TTS	220
	CAM	1		TTS	221
	JUM	1,PTDQ5		TTS	222
	CAM	13		TTS	223
	CJU	12,PTDQK		TTS	224
PTDQ5	JUM	12,PTDQK	SCAN TO ELIMINATE	TTS	225
	CAM	12,56	LEADING ZEROS	TTS	226
	JUM	13,PTDQK		TTS	227
	CAM	13,56		TTS	228
	JUM	14,PTDQK		TTS	229
	CAM	14,56		TTS	230
PTDQK	CSM	2,4	SET DIGIT COUNTER	TTS	231
PTDQ6	ORB	M2	OUTPUT	TTS	232
	CAM	1,M12	ALL	TTS	233
	CALL	PTA	DIGITS	TTS	234
	CJU	2,PTDQ6		TTS	235
PTX7	LFR	7,PTEMP+LEVEL1+1	RESTORE F7	TTS	236
PTX4	LFR	4,PTEMP+LEVEL1	RESTORE F4	TTS	237
	JLH	M3	EXIT	TTS	238
	FIL			TTS	239

ZERO	DECQ	,,,
SAV	BSS	5
LEVEL1	EQU	12
LEVEL2	EQU	4
TSL2	EQU	0
ENDPRG	BSS	1
COMMON	BSS	128
	GO	START

TTS	240
TTS	241
TTS	242
TTS	243
TTS	244
TTS	245
TTS	246

TABLE 5 Tape Character Code

	Bits 7-6-5							
	000	001	010	011	100	101	110	111
0000	0	e	u	delay)	E	U	tab
0001	1	f	v		#	F	V	
0010	2	g	w	black*	{	G	W	red*
0011	3	h	x		}	H	X	
0100	4	i	y		<	I	Y	
0101	5	j	z		>	J	Z	
0110	6	k	'		^	K	"	
0111	7	l	-		→	L	D	
1000	8	m	:	space	?	M	/	
1001	9	n	.	(clear)	(N	,	(set)
1010	+	o	□	tab	=	O	-	(tab)
1011	-	p				P		
1100	a	q			A	Q		
1101	b	r			B	R		
1110	c	s		◇	C	S		◇
1111	d	t		LF/CR	D	T		erase

NOTE: Bit 8 is 1 or 0 in order to make the entire 8 bits have even parity. It is inserted automatically by the paper tape punch equipment attached to the computer.

*Shift typewriter ribbon.