

GT40

QUICK VERIFY
MD-11-DDGTE-C

EP-DDGTE-C-DL-B
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RECEIVING ROOM BOOTSTRAP FOR THE GT40 MACV 11 27 1008 CS-10-76 12:10 PAGE 2
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.REM

IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DDGTE-C-D
PRODUCT NAME:	GT40 QUICK VERIFY
DATE:	DECEMBER 1976
MAINTAINER:	DIAGNOSTIC GROUP

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1. ABSTRACT

THIS VERSION OF THE PROGRAM SUPPORTS NON-SWITCH REGISTER CPU'S. FOR THESE CPU'S, THE SWITCH REGISTER CAN BE CHANGED BY CHANGING THE CONTENTS OF SWREG (170).

THIS PROGRAM IS A QUICK GO-NOGO TEST OF THE GT40 SYSTEM. THE PURPOSE OF THIS TEST IS TO QUICKLY IDENTIFY ANY PROBLEM IN THE SYSTEM. THE PROGRAM WILL START THE DISPLAY AND THEN INITIATE THE COMMUNICATION LINE. TWO BACKGROUND TASKS ARE EXECUTED, THE FIRST IS A GT-40 ROM VERIFY TEST. THE SECOND TASK IS A WORSE CASE NOISE TEST THRU MEMORY.

2. REQUIREMENTS2.1 EQUIPMENT

GT40 SYSTEM (11/05, DISPLAY PROCESSOR AND VR14 SCOPE)
MODEM TEST CONNECTOR WHICH CONNECTS DATA OUT TO DATA IN.

2.2 STORAGE

THIS PROGRAM USED MEMORY LOCATIONS 0-7776 AND 16000-16776 (2K OF MEMORY).

3. LOADING PROCEDURE3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE4.1 CONTROL SWITCH SETTINGS

CONSOLE SW 09 = 0	ROM PRESENT AS SPECIFIED BY SW 08
CONSOLE SW 09 = 1	NO ROM PRESENT
CONSOLE SW 08 = 0	TEST AS VERSION 2 ROM (512. WORDS)
CONSOLE SW 08 = 1	TEST AS VERSION 1 ROM (256. WORDS)

4.2 STARTING ADDRESS OR ADDRESSES

200 IS THE ONLY STARTING ADDRESS OF THIS TEST

5. OPERATING PROCEDURE

ONCE STARTED THE TEST WILL RUN IN THEIR NORMAL MANNER WITHOUT OPERATOR INTERVENTION OR SWITCH SELECTION. THE OPERATOR MUST VERIFY THE DATA RETURNING FROM THE COMMUNICATION LINE BY COMPARING 'COM OUTPUT' TO 'COM INPUT' ON THE DISPLAY SCREEN. BY TYPING ON THE CONSOLE KEYBOARD, THE CHARACTER AND OCTAL VALUE WILL BE DISPLAYED.

6. ERRORS

THE PROGRAM WILL ONLY HALT ON AN ERROR. THE PROGRAM DOES NOT CONTAIN FACILITIES FOR REPORTING MESSAGES OR ERROR CONDITIONS.

7. RESTRICTIONS

A COMMUNICATION TEST PLUG MUST BE INSTALLED ON THE DL-11.

8. MISCELLANEOUS

8.1 EXECUTION TIME

THE TEST WILL TAKE APPROXIMATELY 10 SECONDS FOR COMPLETION AND WILL RING THE 'GT-40' BELL.

8.2 DEVICE ADDRESS PROGRAM LOCATIONS

LOCATION 1000 CONTAINS THE GT40 DEVICE ADDRESS
LOCATION 1002 CONTAINS THE GT40 INTERRUPT VECTOR.
LOCATION 1004 CONTAINS THE GT40 INTERRUPT LEVEL.
LOCATION 1006 CONTAINS THE DL-11 DEVICE ADDRESS.
LOCATION 1010 CONTAINS THE DL-11 INTERRUPT VECTOR.
LOCATION 1012 CONTAINS THE DL-11 INTERRUPT LEVEL.
LOCATION 1014 CONTAINS THE GT-40 ROM BOOTSTRAP ADDRESS.
LOCATION 1016 CONTAINS THE GT-40 ROM WORD LENGTH.

9. PROGRAM DESCRIPTION

9.1 DISPLAY FILE (FORGROUND TASK)

THE DISPLAY FILE IS A COMPACT VISUAL TEST OF ALL GT40 DISPLAY INSTRUCTIONS. A BOX OUTLINING THE SCREEN WITH DIFFERENT LINE TYPE VALUE IS DISPLAYED. THREE PAIRS OF ASCII STRINGS ARE ALSO DISPLAYED TO TEST THE CHARACTER LOGIC. THE FIRST LINE OF A STRING IS DISPLAYED IN 'NORMAL' FONT. THE SECOND LINE OF A STRING IS DISPLAYED IN 'ITALICS'. ALSO INCLUDED IN THIS VISUAL TEST ARE THE 8 DIFFERENT INTENSITY LEVELS. THE DISPLAY PATTERN IS ENHANCED BY THE USE OF BLINKING OCTAGONS AND MOVING SINE WAVES. THE DISPLAY PATTERN ALSO SERVES AS FOR VISUAL INSPECTION OF THE COMMUNICATION LINE DATA. ALL LINES AND CHARACTERS ARE ENABLED FOR LIGHT-PEN INTERACTION EXCEPT FOR THE LARGEST OCTAGON. UPON LIGHT-PEN HIT, THE TEXT 'LIGHT-PEN HIT' WILL BE DISPLAYED NEAR CENTER SCREEN.

9.2 COMMUNICATION DATA (FORGROUND TASK)

THE DATA PRESENTED TO THE COMMUNICATION LINE APPEARS ON THE DISPLAY SCREEN AS FOUND AT 'COM OUTPUT'. (DECGRAPHIC-11 DISPLAY TERMINAL GT40 VR14) THE DATA ECHOED BACK BY THE TEST CONNECTOR IS DISPLAYED ON THE SCREEN AS FOUND AT 'COM INPUT'. A VISUAL TEST OF THE DATA MUST BE PERFORMED.

9.3 ROM VERIFY TEST (BACKGROUND TASK)

THIS TEST VERIFIES THE DATA CONTAINED IN THE GT-40 ROM BOOTSTRAP.

9.4 WORSE CASE NOISE TEST (BACKGROUND TASK)

THIS IS A BACKGROUND TEST OF ALL AVAILABLE MEMORY. A SMALL PROGRAM IS LOADED INTO ALL EXISTING MEMORY AND THEN EXECUTED THRU THE REMAINDER OF MEMORY.

9.5 KEYBOARD DATA (FORGROUND TASK)

UPON DEPRESSING A KEYBOARD KEY, THE OCTAL VALUE WILL BE DISPLAYED AND ECHO ONTO THE SCREEN.

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```
.LIST      SEQ,BIN
.NLIST     NO,MC,CNO
```

0-776 IS LOADED WITH .42, HALT

[illegible][illegible]

GO1

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239	000144	000146
240	000146	000000
241	000150	000152
242	000152	000000
243	000154	000156
244	000156	000000
245	000160	000162
246	000162	000000
247	000164	000166
248	000166	000000
249	000170	000172
250	000172	000000
251	000174	000176
252	000176	000000
253	000200	000202
254	000202	000000
255	000204	000206
256	000206	000000
257	000210	000212
258	000212	000000
259	000214	000216
260	000216	000000
261	000220	000222
262	000222	000000
263	000224	000226
264	000226	000000
265	000230	000232
266	000232	000000
267	000234	000236
268	000236	000000
269	000240	000242
270	000242	000000
271	000244	000246
272	000246	000000
273	000250	000252
274	000252	000000
275	000254	000256
276	000256	000000
277	000260	000262
278	000262	000000
279	000264	000266
280	000266	000000
281	000270	000272
282	000272	000000
283	000274	000276
284	000276	000000
285	000300	000302
286	000302	000000
287	000304	000306
288	000306	000000
289	000310	000312
290	000312	000000
291	000314	000316
292	000316	000000
293	000320	000322
294	000322	000000

[illegible]

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295	000324	000326	.+2
296	000326	000000	HALT
297	000330	000332	.+2
298	000332	000000	HALT
299	000334	000336	.+2
300	000336	000000	HALT
301	000340	000342	.+2
302	000342	000000	HALT
303	000344	000346	.+2
304	000346	000000	HALT
305	000350	000352	.+2
306	000352	000000	HALT
307	000354	000356	.+2
308	000356	000000	HALT
309	000360	000362	.+2
310	000362	000000	HALT
311	000364	000366	.+2
312	000366	000000	HALT
313	000370	000372	.+2
314	000372	000000	HALT
315	000374	000376	.+2
316	000376	000000	HALT
317	000400	000402	.+2
318	000402	000000	HALT
319	000404	000406	.+2
320	000406	000000	HALT
321	000410	000412	.+2
322	000412	000000	HALT
323	000414	000416	.+2
324	000416	000000	HALT
325	000420	000422	.+2
326	000422	000000	HALT
327	000424	000426	.+2
328	000426	000000	HALT
329	000430	000432	.+2
330	000432	000000	HALT
331	000434	000436	.+2
332	000436	000000	HALT
333	000440	000442	.+2
334	000442	000000	HALT
335	000444	000446	.+2
336	000446	000000	HALT
337	000450	000452	.+2
338	000452	000000	HALT
339	000454	000456	.+2
340	000456	000000	HALT
341	000460	000462	.+2
342	000462	000000	HALT
343	000464	000466	.+2
344	000466	000000	HALT
345	000470	000472	.+2
346	000472	000000	HALT
347	000474	000476	.+2
348	000476	000000	HALT
349	000500	000502	.+2
350	000502	000000	HALT

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000504	000506	.+2
000506	000000	HALT
000510	000512	.+2
000512	000000	HALT
000514	000516	.+2
000516	000000	HALT
000520	000522	.+2
000522	000000	HALT
000524	000526	.+2
000526	000000	HALT
000530	000532	.+2
000532	000000	HALT
000534	000536	.+2
000536	000000	HALT
000540	000542	.+2
000542	000000	HALT
000544	000546	.+2
000546	000000	HALT
000550	000552	.+2
000552	000000	HALT
000554	000556	.+2
000556	000000	HALT
000560	000562	.+2
000562	000000	HALT
000564	000566	.+2
000566	000000	HALT
000570	000572	.+2
000572	000000	HALT
000574	000576	.+2
000576	000000	HALT
000600	000602	.+2
000602	000000	HALT
000604	000606	.+2
000606	000000	HALT
000610	000612	.+2
000612	000000	HALT
000614	000616	.+2
000616	000000	HALT
000620	000622	.+2
000622	000000	HALT
000624	000626	.+2
000626	000000	HALT
000630	000632	.+2
000632	000000	HALT
000634	000636	.+2
000636	000000	HALT
000640	000642	.+2
000642	000000	HALT
000644	000646	.+2
000646	000000	HALT
000650	000652	.+2
000652	000000	HALT
000654	000656	.+2
000656	000000	HALT
000660	000662	.+2
000662	000000	HALT

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000664	000666	.+2	
000666	000000	HALT	
000670	000672	.+2	
000672	000000	HALT	
000674	000676	.+2	
000676	000000	HALT	
000700	000702	.+2	
000702	000000	HALT	
000704	000706	.+2	
000706	000000	HALT	
000710	000712	.+2	
000712	000000	HALT	
000714	000716	.+2	
000716	000000	HALT	
000720	000722	.+2	
000722	000000	HALT	
000724	000726	.+2	
000726	000000	HALT	
000730	000732	.+2	
000732	000000	HALT	
000734	000736	.+2	
000736	000000	HALT	
000740	000742	.+2	
000742	000000	HALT	
000744	000746	.+2	
000746	000000	HALT	
000750	000752	.+2	
000752	000000	HALT	
000754	000756	.+2	
000756	000000	HALT	
000760	000762	.+2	
000762	000000	HALT	
000764	000766	.+2	
000766	000000	HALT	
000770	000772	.+2	
000772	000000	HALT	
000774	000776	.+2	
000776	000000	HALT	
	000024	.+24	
000024	001674	PWRFL	;POWER FAIL VECTOR
000026	000340	340	
	000004	ERRVEC=4	
	177570	DSWR=177570	:11/45 LIGHT DISPLAY REGISTER
	000170	.+170	
000170	000000	SWREG: .WORD 0	
	000200	.+200	
000200	000137 001022	JMP	STARTE
	001000	.+1000	
001000	172000	GTADD: 172000	:GT-40 ADDRESS
001002	000320	GTVCY: 320	:GT-40 VECTOR
001004	000200	GTBRL: 200	:GT-40 BR LEVEL

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463	001006	175610		DLADD:	175610		:DL-11 ADDRESS
464	001010	000300		DLVCT:	300		:DL-11 VECTOR
465	001012	000240		DLBRL:	240		
466							
467	001014	166000		ROMADD:	166000		:ROM STARTING ADDRESS
468	001016	001000		WORDS:	512		
469	001020	006000		IMAGE:	6000		
470							
471	001022	012706	000500	STARTB:	MOV	#500, SP	:LOAD THE STACK POINTER
472	001026	012777	000340		MOV	#340, PSW	:RAISE PSW
473	001034	004737	001316	000176	JSR	PC, INITGT	:INIT DEVICE ADDRESSES
474	001040	005037	001020		CLR	IMAGE	:PRESET FOR NO ROM SELECTED
475	001044	032777	001000	000156	BIT	#1000, JSWR	:TEST FOR ROM SELECTED SWITCH
476	001052	001021			BNE	2S	:NO ROM SELECTED
477	001054	032777	000400	000146	BIT	#400, JSWR	:TEST ROM SWITCH
478	001062	001007			BNE	1S	:BR IF SET
479	001064	012737	001000	001016	MOV	#512, WORDS	:ASSUME VER. 2 ROM
480	001072	012737	006000	001020	MOV	#START, IMAGE	:LOAD IMAGE ADDRESS
481	001100	000406			BR	2S	:START TEST
482	001102	012737	000400	001016	1S: MOV	#256, WORDS	:SELECT VER. 1 ROM
483	001110	012737	016000	001020	MOV	#START, IMAGE	:LOAD IMAGE ADDRESS
484	001116	005077	000042		2S: CLR	DDLODBR	:CLEAR OUTPUT
485	001122	005077	000036		CLR	DDLODBR	
486	001126	004737	001720		JSR	PC, DDCORE	:SET UP CORE SIZE
487	001132	004737	001234		JSR	PC, PRIME	:INIT THE DEVICES
488	001136	005077	000070		CLR	PSW	
489	001142	000137	002630		JMP	OVER	:EXECUTE BACKGROUND TASK

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490									
491									
492	001146	172000		GTFC:	172000			:DISPLAY PC	
493	001150	172002		GTSP:	172002			:DISPLAY STATUS REG.	
494	001152	172004		GTSPCS:	172004			:DISPLAY X REGISTER	
495	001154	172006		GTSPCS:	172006			:DISPLAY Y REGISTER	
496									
497	001156	175610		DLICSR:	175610			:DL-11 STATUS	
498	001160	175612		DLIDBR:	175612			:DL-11 BUFFER	
499	001162	175614		DLICSR:	175614			:DL-11 STATUS	
500	001164	175616		DLIDBR:	175616			:DL-11 BUFFER	
501									
502	001166	000320		GTDONE:	320			:DISPLAY DONE VECTOR	
503	001170	000322		GTDONE1:	322				
504									
505	001172	000324		GTLPH:	324			:DISPLAY LIGHT-PEN VECTOR	
506	001174	000326		GTLPH1:	326				
507									
508	001176	000330		GTSOTM:	330			:DISPLAY SHIFT-OUT/ TIME-OUT VECTOR	
509	001200	000332		GTSOT1:	332				
510									
511	001202	000300		DLIVT:	300				
512	001204	000302		DLIVT1:	302				
513	001206	000304		DLOVT:	304				
514	001210	000306		DLOVT1:	306				
515									
516	001212	177560		TKS:	177560				
517	001214	177562		TKB:	177562				
518	001216	177564		TPS:	177564				
519	001220	177566		TPB:	177566				
520									
521	001222	000060		KRBVT:	60				
522	001224	000062		KRBVT1:	62				
523									
524	001226	000200		KRBBPL:	200				
525									
526	001230	177570		SWR:	177570				
527	001232	177776		PSW:	177776				
528									
529	001234	012777	003012	177704	PRIME:	MOV	#FILE00,GTFC	:START THE DISPLAY	
530	001242	012777	000100	177712		MOV	#100,DLICSR	:ENABLE DL OUTPUT	
531	001250	012777	000100	177700		MOV	#100,DLICSR	:ENABLE DL INPUT	
532	001256	012777	000100	177726		MOV	#100,TKS	:ENABLE KEYBOARD	
533	001264	113777	005422	177672		MOV	BUF1,DLIDBR	:OUTPUT A CHAR	
534	001272	012737	000001	002430		MOV	#1,PPNT	:PRESET PRINT POINTER	
535	001300	005037	002432			CLR	RPNT	:CLEAR READ BUFFER	
536	001304	005037	002624			CLR	KPNT		
537	001310	000207				RTS	PC	:EXIT	
538									
539	001312	017476			SIZE:	17476			
540	001314	000000			GTCLY0:	0			

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001316	012700	001146		INITGT:	MOV	#GTPC,RO		;LOAD STARTING ADDRESS
001322	013701	001000			MOV	GTADD,R1		;SAVE VALUE
001326	004737	001400			JSR	PC,LOADRO		;LOAD GT ADDR
001332	013701	001006			MOV	DLADD,R1		;LOAD STARTING ADDRESS (DL-11)
001336	004737	001400			JSR	PC,LOADRO		;LOAD DL-11 ADDRESSES
001342	013701	001002			MOV	GTVCT,R1		;LOAD VECTOR VALUE
001346	004737	001400			JSR	PC,LOADRO		;LOAD GT-40 VECTORS
001352	010110				MOV	R1,(R0)		
001354	062720	000010			ADD	#10,(R0)+		;LOAD GT TIME-OUT
001360	010110				MOV	R1,(R0)		
001362	062720	000012			ADD	#12,(R0)+		
001366	013701	001010			MOV	DLVCT,R1		;LOAD VECTOR VALUE
001372	004737	001400			JSR	PC,LOADRO		;LOAD DL-11 VECTORS
001376	000436				BR	INGT		;BR
001400	010120			LOADRO:	MOV	R1,(R0)+		;LOAD DONE
001402	010110				MOV	R1,(R0)		
001404	062720	000002			ADD	#2,(R0)+		
001410	010110				MOV	R1,(R0)		
001412	062720	000004			ADD	#4,(R0)+		;LOAD DONE
001416	010110				MOV	R1,(R0)		
001420	062720	000006			ADD	#6,(R0)+		;LOAD PSW
001424	013746	000004			MOV	#ERRVEC, -(SP)		;SAVE VECTORS CONTENTS
001430	012737	001456	000004		MOV	#15, #ERRVEC		;SET UP FOR TRAP
001436	012737	177570	001230		MOV	#DSWR, #SWR		;SET UP TO TEST FOR SWITCH REGISTER
001444	022777	177777	177556		CMP	#-1, #SWR		;TEST FOR SWITCH REGISTER
001452	001005				BNE	3\$		;SWITCH REGISTER IS PRESENT
001454	000401				BR	2\$		;NO SWITCH REGISTER
001456	022626			1\$:	CMP	(SP)+(SP)+		;POP 2 WORDS OFF STACK
001460	012737	000170	001230	2\$:	MOV	#SWREG, #SWR		;SET UP FOR SOFTWARE SWITCH REGISTER
001466	012637	000004		3\$:	MOV	(SP)+, #ERRVEC		;RESTORE VECTORS CONTENTS
001472	000207				RTS	PC		;EXIT
001474	012777	002130	177464	INGT:	MOV	#GTSTOP, #GTDONE		;LOAD DONE VECTOR
001502	013777	001004	177460		MOV	GTBRL, #GTDONE1		
001510	012777	002220	177454		MOV	#GTLPEN, #GTLPH		;LOAD LIGHT-PEN VECTOR
001516	013777	001004	177450		MOV	GTBRL, #GTLPH1		
001524	012777	002236	177444		MOV	#GTSHIF, #GTSOTM		;LOAD SHIFT-OUT VECTOR
001532	013777	001004	177440		MOV	GTBRL, #GTSOT1		
001540	012737	000040	001314		MOV	#40, #GTDLY0		
001546	012737	005752	005722		MOV	#FILEDC, FILEDA		
001554	012737	174104	003074		MOV	#STATSB, INCR+4, GRPINC		
001562	012700	005516			MOV	#BUFF2, RO		
001566	005020			INTD:	CLR	(RO)+		
001570	022700	005566			CMP	#BUFF2+50, RO		
001574	001374				BNE	INTD		
001576	012700	005612			MOV	#BUFF3, RO		;SET UP KRB BUFFER

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587	001602	005020			INTE:	CLR	(R0)+	
588	001604	022700	005662			CMP	#BUFF3+50,R0	
589	001610	001374				BNE	INTE	
590	001612	105037	005677			CLRB	OCTA	
591	001616	105037	005700			CLRB	OCTA+1	
592	001622	105037	005701			CLRB	OCTA+2	
593	001626	012777	002326	177346		MOV	#DLIN,#DLIYT	
594	001634	013777	001012	177342		MOV	DLBRL,#DLIYT1	
595	001642	012777	002244	177336		MOV	#DLOUT,#DLOVT	
596	001650	013777	001012	177332		MOV	DLBRL,#DLOVT1	
597	001656	012777	002440	177336		MOV	#KBIN,#KRBVT	;LOAD KRB VECTOR
598	001664	013777	001226	177332		MOV	KRBRL,#KRBVT1	;LOAD PSW
599	001672	000207				RTS	PC	
600								
601	001674	012737	001704	000024	PWRFL:	MOV	#PWRUP,#24	;LOAD VECTOR
602	001702	000000				HALT		
603								
604	001704	000005			PWRJP:	RESET		
605	001706	012737	001674	000024		MOV	#PWRFL,#24	
606	001714	000137	001022			JMP	STARTB	;RESTART AT BEGINING
607								
608								
609								
610								
611	001720	012737	001754	000004	DOCORE:	MOV	#25,#4	;SET UP FOR NEM
612	001726	012701	017776			MOV	#17776,R1	;SET UP ADDRESS
613	001732	005000				CLR	R0	
614	001734	062701	020000		1\$:	ADD	#20000,R1	;MOVE TO THE NEXT BANK
615	001740	005200				INC	R0	;INC BANK COUNTER
616	001742	005711				TST	(1)	;TIMEOUT ?
617	001744	022701	157776			CMP	#157776,R1	;END ?
618	001750	001371				BNE	1\$	
619	001752	000404				BR	3\$	
620	001754	022626			2\$:	CMP	(SP)+,(SP)+	;POP THE STACK X2
621	001756	005300				DEC	R0	;DECREMENT BANK COUNT
622	001760	162701	020000			SUB	#20000,R1	;RESTORE R1
623	001764	012737	000006	000004	3\$:	MOV	#6,#4	;RESET BUSS ERROR
624	001772	010137	001312			MOV	R1,SIZE	
625	001776	162737	007776	001312		SUB	#7776,SIZE	;BACK PAST LOADER

0040 2.00K VERTEX MANAGER-1000TE-1
0040 2.00K VERTEX MANAGER-1000TE-1

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:ROUTINE TO LOAD EXCESS CORE WITH WORSE CASE MEMOR. TEST

```

CORST:  MOV     R1, PC          ;GET LAST FREE CORE ADDRESS
        MOV     R2, PC          ;GET END OF PROGRAM
        MOV     R3, PC          ;TEST FOR EQUAL
        MOV     R4, PC          ;BRANCH IF NO ROOM
        MOV     R5, PC          ;MOVE CODE BETWEEN
        MOV     R6, PC          ;MENTST AND MEMEND TILL
        MOV     R7, PC          ;CORE IS FULL
        MOV     R8, PC          ;TEST FOR MORE ROOM
        MOV     R9, PC          ;SETUP RTS PC
        MOV     R10, PC
        MOV     R11, PC
        MOV     R12, PC
        MOV     R13, PC
        MOV     R14, PC
        MOV     R15, PC
    
```

ACTVAL: 151456
.DSABL AMA

:THIS IS THE BACKGROUND TASK WHICH WILL BE LOADED THRU
: THE REMAINDER OF MEMORY

```

MENTST:  SCC          ;SET CARRY BIT
        MOV     R1, PC          ;MEMDAT CONTAINS
        MOV     R2, PC          ;MEMDAT CONTAINS
        MOV     R3, PC          ;MEMDAT CONTAINS
        MOV     R4, PC          ;MEMDAT CONTAINS
        MOV     R5, PC          ;MEMDAT CONTAINS
        MOV     R6, PC          ;MEMDAT CONTAINS
        MOV     R7, PC          ;MEMDAT CONTAINS
        MOV     R8, PC          ;MEMDAT CONTAINS
        MOV     R9, PC          ;MEMDAT CONTAINS
        MOV     R10, PC         ;MEMDAT CONTAINS
        MOV     R11, PC         ;MEMDAT CONTAINS
        MOV     R12, PC         ;MEMDAT CONTAINS
        MOV     R13, PC         ;MEMDAT CONTAINS
        MOV     R14, PC         ;MEMDAT CONTAINS
        MOV     R15, PC         ;MEMDAT CONTAINS
    
```

MEMEND: 000000
.ENABL AMA

GT40 QUICK VERIFY MAINDEC-11-DOGTB-C
DOGTB.P11 05-NOV-76 10:20

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668
669 ; INTERRUPT SERVICE FOR THE GT STOP INTERRUPT
670
671 002130 005777 177014 GTSTOP: TST 0GTSA ; TEST STOP
672 002134 100403 BNE IS ;
673 002136 000000 HALT ; ERROR STOP INTERRUPT BUT NO STOP FLAG
674 002140 000137 001022 JMP STARTB ; RESTART TEST
675
676 002144 005337 001314 IS: DEC GTCLYD ; DECREMENT DELAY
677 002150 001014 BNE GTST1 ; BRANCH IF NOT
678 002152 012737 000040 001314 MOV #40, GTDLYD ; RESET DELAY
679 002160 005237 003074 INC GRPINC ; UPDATE GRAPH INCREMENT
680 002164 022737 174110 003074 CMP #STATSB!INCR+10, GRPINC ; TEST FOR INCREMENT
681 002172 001003 BNE GTST1 ; BRANCH IF NOT
682 002174 012737 174100 003074 MOV #STATSB!INCR, GRPINC ; RESET GRAPH INCREMENT
683 002202 012737 005752 005722 GTST1: MOV #FILEDC, FILEDA
684 002210 012777 000001 176730 MOV #1, 0GTPC ; RESUME THE DISPLAY
685 002216 000002 RTI ; EXIT
686
687 002220 012737 005724 005722 GTLPEN: MOV #FILEDB, FILEDA
688 002226 012777 000001 176712 MOV #1, 0GTPC ; RESUME THE DISPLAY
689 002234 000002 RTI
690
691 002236 000000 GTSHIF: HALT
692 002240 000137 001022 JMP STARTB ; GT-40 SHIFT-OUT/TIME-OUT ERROR

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```

```

; INTERRUPT SERVICE FOR THE DL PRINTER
DLOUT: TSTB 2DLOCSR ;TEST FOR DONE
      BMI  .+10
      HALT ;ERROR, PRINTER INTERRUPT BUT NO PRINTER FLAG
      JMP  STARTB ;RESTART TEST

      MOV  R4, -(SP)

DLOUTA: MOV  PPNT, R4 ;LOAD R4 WITH BYTE POINTER
      MOVB BUFF1(R4), PUNCHR ;LOAD A CHARACTER TO BE OUTPUTTED
      INC  PPNT ;UPDATE CHARACTER POINTER
      CMP  #40, PPNT ;TEST FOR END
      BNE  DLOUTB
      CLR  PPNT ;CLEAR PUNCH POINTER

DLOUTB: MOVB PUNCHR, 2DLOOBR ;OUTPUT A CHARACTER
      MOV  (SP)+, R4 ;RESTORE R4
      RTI ;EXIT

; INTERRUPT SERVICE FOR THE DL READER
DLIN: TSTB 2DLICSR ;TEST FOR DONE
      BMI  .+10
      HALT ;NOT DL INPUT FLAG
      JMP  STARTB ;RESTART TEST

      MOV  R4, -(SP) ;SAVE R4
      MOV  RPNT, R4
      MOVB 2DLIOBR, REDCHR ;READ A CHARACTER
      BIC  #177600, REDCHR ;MASK CHARACTER
      MOVB REDCHR, BUFF2(R4) ;PUT CHARACTER INTO THE BUFFER
      INC  RPNT ;UPDATE READ POINTER
      CMP  #40, RPNT ;TEST FOR END
      BNE  DLINB
      CLR  RPNT

DLINB: MOV  RPNT, R4
      MOVB #177, BUFF2(R4) ;ADD CURSOR
      MOV  (SP)+, R4 ;RESTORE R4
      RTI ;EXIT

PPNT: 0
RPNT: 0
PUNCHR: 240
REDCHR: 240

```

: INTERRUPT SERVICE FOR THE KEYBOARD

002440	105777	176546	KBIN:	TSTB	STKS	: TEST FOR DONE
002444	100403			BMI	.+10	
002446	000000			HALT		: NOT KRB INPUT FLAG
002450	000137	001022		JMP	STARTB	: RESTART
002454	010346			MOV	R3, -(SP)	: SAVE R3
002456	010446			MOV	R4, -(SP)	: SAVE R4
002460	013704	002624		MOV	KPNT, R4	
002464	117737	176524	002626	MOVB	STKB, KBCHR	: READ CHARACTER
002472	042737	177600	002626	BIC	#177600, KBCHR	: MASK
002500	113764	002626	005612	MOVB	KBCHR, BUFF3(4)	: SAVE THE CHAR
002506	005237	002624		INC	KPNT	: UPDATE POINTER
002512	022737	000050	002624	CMP	#40., KPNT	: TEST FOR END
002520	001002			BNE	15	
002522	005037	002624		CLR	KPNT	: CLEAR POINTER
002526	013704	002624	15:	MOV	KPNT, R4	
002532	112764	000177	005612	MOVB	#177, BUFF3(R4)	: ADD CURSOR

: UPDATE OCTAL READOUT

002540	013703	002626		MOV	KBCHR, R3	: GET CHAR
002544	004737	002610		JSR	PC, 105	: LOAD BITS
002550	110437	005701		MOVB	R4, OCTA+2	: SAVE BITS
002554	004737	002602		JSR	PC, 115	: MOVE BITS
002560	110437	005700		MOVB	R4, OCTA+1	: SAVE BITS
002564	004737	002602		JSR	PC, 115	: MOVE BITS
002570	110437	005677		MOVB	R4, OCTA	: SAVE BITS
002574	012604			MOV	(SP)+, R4	: RESTORE R4
002576	012603			MOV	(SP)+, R3	: RESTORE R3
002600	000002			RTI		: EXIT

115:	ROR	R3	
	ROR	R3	
	ROR	R3	
105:	MOV	R3, R4	
	BIC	#177770, R4	
	ADD	#60, R4	
	RTS	PC	

: LOAD R4
: MASK BITS
: MAKE A NUMBER

KPNT:	0
KBCHR:	240

```

785 ;PART 1 OF THE BACKGROUND TASK
786
787 002630 012737 001000 003010 OVER: MOV #1000,PCOUNT ;SET UP EXECUTION COUNT
788
789 : COMPARE THE ROM DATA TO THE IMAGE DATA
790 : RD=WORD NUMBER
791 : R1=GOOD DATA
792 : R2=GOOD DATA
793 : R3=BAD ADDRESS
794 : R4=BAD DATA
795
796 002636 012700 000000 BACK: MOV #0,%0 ;SETUP INITIAL WORD NUMBER
797 002642 013701 001020 MOV IMAGE,%1 ;SET UP BUFFER
798 002646 001415 BEQ TMEM ;NO ROM SELECTED
799 002650 013703 001014 MOV ROMADD,%3 ;SET UP ROM ADDRESS
800 002654 011102 BACK1: MOV (%1),%2 ;READ A IMAGE WORD
801 002656 011304 MOV (%3),%4 ;READ A ROM WORD
802 002660 020204 CMP %2,%4 ;TEST FOR EQUAL
803 002662 001402 BEQ BACK2 ;BRANCH IF OK
804 002664 000000 HALT ;ERROR ROM VALUE FAILED TO EQUAL THE
805 002666 000772 BR BACK1 ; THE EXPECTED
806
807 002670 022123 BACK2: CMP (%1)+,(%3)+ ;BUMP BOTH REGISTERS
808 002672 005200 INC %0 ;UPDATE WORD COUNTER
809 002674 023700 001016 CMP WORDS,%0 ;TEST FOR LAST WORD
810 002700 001365 BNE BACK1 ;BRANCK IF NOT LAST
811
812 ;PART 2 OF THE BACKGROUND TASK
813 ; EXECUTE WORSE CASE NOISE TEST THRU MEMORY
814
815 002702 004737 017000 TMEM: JSR PC,BUFFER ;EXECUTE NOISE TEST
816 002706 005337 003010 DEC PCOUNT ;DONE PASS ?
817 002712 001351 BNE BACK ;NO
818 002714 012777 000001 176226 MOV #1,%GTSR ;YES RING THE BELL
819 002722 012777 000207 176270 MOV #207,%TPB ;RING THE BELL
820 002730 105777 176262 1$: TSTB %TPS
821 002734 100375 BPL 1$
822 002736 012777 000207 176254 MOV #207,%TPB
823 002744 105777 176246 2$: TSTB %TPS
824 002750 100375 BPL 2$
825 002752 005737 000042 TST %42 ;TEST LOC. 42
826 002756 001724 BEQ OVER ;BR IF =0
827 002760 000005 RESET
828 002762 000005 RESET
829 002764 000005 RESET
830 002766 013700 000042 MOV %42,R0 ;READ VALUE
831 002772 004710 LOGICAL: JSR PC,(0)
832 002774 000240 NOP
833 002776 000240 NOP
834 003000 000240 NOP
835 003002 000240 NOP
836 003004 000137 001022 JMP STARTB
837
838 003010 000000 PCOUNT: 0

```

G02

GT40 QUICK VERIFY MAINDEC-11-DOGT-E-C
DOGT-EC.P11 05-NOV-76 10:20

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990
991
992
993
994
995
996
997
998
999
1000003012 114140
003014 000000
003016 001377
003020 174300FILEOC: POINT!LPON
0
MAXY
STATSB!LPLITE

:LINE THE EDGES OF THE SCREEN

003022 113004
003024 041777
003026 000000
003030 110005
003032 040000
003034 021377
003036 110006
003040 061777
003042 000000
003044 110007
003046 040000
003050 001377LONGV!INT4!LINE0 :TOP LINE
INTX!MAXX
0
LONGV!LINE1 :RIGHT LINE
INTX
MINUSX!MAXY
LONGV!LINE2 :BOTTOM LINE
INTX!MINUSX!MAXX
0
LONGV!LINE3 :LEFT LINE
INTX
MAXY

:SETUP THE X SINEWAVE

003052 114004
003054 000400
003056 000200
003060 110000
003062 041200
003064 000000
003066 114000
003070 000440
003072 000200
003074 174104POINT!LINE0
400
200
LONGV
INTX+1200 :DRAW X AXIS
0
POINT
440
200

GRPINC: STATSB!INCR+4

:GRAPHPLOT THE X SINEWAVE

003076 124000
003100 000200
003102 000205
003104 000212
003106 000217
003110 000224
003112 000231
003114 000236
003116 000243
003120 000247
003122 000253
003124 000257
003126 000262
003130 000265
003132 000270
003134 000272
003136 000274
003140 000276
003142 000277
003144 000277GRAPHY
0200
0205
0212
0217
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0231
0236
0243
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0253
0257
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0270
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H02

ST40 QUICK VERIFY MAINDEC-11-DOGTE-C
DOGTEC.P11 05-NOV-76 10:20

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896	003146	000277	0277
897	003150	000277	0277
898	003152	000276	0276
899	003154	000275	0275
900	003156	000274	0274
901	003160	000272	0272
902	003162	000267	0267
903	003164	000264	0264
904	003166	000261	0261
905	003170	000256	0256
906	003172	000252	0252
907	003174	000246	0246
908	003176	000241	0241
909	003200	000235	0235
910	003202	000230	0230
911	003204	000223	0223
912	003206	000216	0216
913	003210	000211	0211
914	003212	000203	0203
915	003214	000176	0176
916	003216	000171	0171
917	003220	000163	0163
918	003222	000156	0156
919	003224	000151	0151
920	003226	000144	0144
921	003230	000137	0137
922	003232	000133	0133
923	003234	000127	0127
924	003236	000123	0123
925	003240	000117	0117
926	003242	000114	0114
927	003244	000111	0111
928	003246	000106	0106
929	003250	000104	0104
930	003252	000102	0102
931	003254	000101	0101
932	003256	000100	0100
933	003260	000100	0100
934	003262	000100	0100
935	003264	000100	0100
936	003266	000101	0101
937	003270	000102	0102
938	003272	000104	0104
939	003274	000106	0106
940	003276	000111	0111
941	003300	000113	0113
942	003302	000117	0117
943	003304	000122	0122
944	003306	000126	0126
945	003310	000132	0132
946	003312	000137	0137
947	003314	000144	0144
948	003316	000151	0151
949	003320	000156	0156
950	003322	000163	0163
951	003324	000170	0170

3742 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTE.P11 05-NOV-76 10:20

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952	003326	000175	0175
953	003330	000203	0203
954	003332	000210	0210
955	003334	000215	0215
956	003336	000222	0222
957	003340	000227	0227
958	003342	000234	0234
959	003344	000241	0241
960	003346	000245	0245
961	003350	000252	0252
962	003352	000255	0255
963	003354	000261	0261
964	003356	000264	0264
965	003360	000267	0267
966	003362	000271	0271
967	003364	000274	0274
968	003366	000275	0275
969	003370	000276	0276
970	003372	000277	0277
971	003374	000277	0277
972	003376	000277	0277
973	003400	000277	0277
974	003402	000276	0276
975	003404	000274	0274
976	003406	000273	0273
977	003410	000270	0270
978	003412	000266	0266
979	003414	000263	0263
980	003416	000257	0257
981	003420	000254	0254
982	003422	000247	0247
983	003424	000243	0243
984	003426	000237	0237
985	003430	000232	0232
986	003432	000225	0225
987	003434	000220	0220
988	003436	000213	0213
989	003440	000205	0205
990	003442	000200	0200
991	003444	000173	0173
992	003446	000165	0165
993	003450	000160	0160
994	003452	000153	0153
995	003454	000146	0146
996	003456	000141	0141
997	003460	000135	0135
998	003462	000130	0130
999	003464	000124	0124
1000	003466	000120	0120
1001	003470	000115	0115
1002	003472	000112	0112
1003	003474	000107	0107
1004	003476	000105	0105
1005	003500	000103	0103
1006	003502	000101	0101
1007	003504	000100	0100

J02

ST40 QUICK VERIFY MAINDEC-11-DOGTE-0
DOGTEC.P11 05-NOV-76 10:20

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1008	003506	000100	0100
1009	003510	000100	0100
1010	003512	000100	0100
1011	003514	000100	0100
1012	003516	000102	0102
1013	003520	000103	0103
1014	003522	000105	0105
1015	003524	000107	0107
1016	003526	000112	0112
1017	003530	000115	0115
1018	003532	000121	0121
1019	003534	000125	0125
1020	003536	000131	0131
1021	003540	000135	0135
1022	003542	000142	0142
1023	003544	000147	0147
1024	003546	000154	0154
1025	003550	000161	0161
1026	003552	000166	0166
1027	003554	000173	0173

:SETUP THE Y SINEWAVE

1030			
1031	003556	114000	POINT
1032	003560	000200	200
1033	003562	000040	40
1034	003564	110000	LONGV
1035	003566	040000	INTX
1036	003570	001200	1200
1037	003572	114000	POINT
1038	003574	000200	200
1039	003576	000100	100
1040	003600	120000	GRAPHX

:DRAW Y AXIS

:GRAPHPLOT THE Y SINEWAVE

1041			
1042	003602	000200	0200
1043	003604	000205	0205
1044	003606	000212	0212
1045	003610	000217	0217
1046	003612	000224	0224
1047	003614	000231	0231
1048	003616	000236	0236
1049	003620	000243	0243
1050	003622	000247	0247
1051	003624	000253	0253
1052	003626	000257	0257
1053	003630	000262	0262
1054	003632	000265	0265
1055	003634	000270	0270
1056	003636	000272	0272
1057	003640	000274	0274
1058	003642	000276	0276
1059	003644	000277	0277
1060	003646	000277	0277
1061	003650	000277	0277
1062	003652	000277	0277
1063	003654	000276	0276

K02

G740 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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1064	003656	000275	0275
1065	003660	000274	0274
1066	003662	000272	0272
1067	003664	000267	0267
1068	003666	000264	0264
1069	003670	000261	0261
1070	003672	000256	0256
1071	003674	000252	0252
1072	003676	000246	0246
1073	003700	000241	0241
1074	003702	000235	0235
1075	003704	000230	0230
1076	003706	000223	0223
1077	003710	000216	0216
1078	003712	000211	0211
1079	003714	000203	0203
1080	003716	000176	0176
1081	003720	000171	0171
1082	003722	000163	0163
1083	003724	000156	0156
1084	003726	000151	0151
1085	003730	000144	0144
1086	003732	000137	0137
1087	003734	000133	0133
1088	003736	000127	0127
1089	003740	000123	0123
1090	003742	000117	0117
1091	003744	000114	0114
1092	003746	000111	0111
1093	003750	000106	0106
1094	003752	000104	0104
1095	003754	000102	0102
1096	003756	000101	0101
1097	003760	000100	0100
1098	003762	000100	0100
1099	003764	000100	0100
1100	003766	000100	0100
1101	003770	000101	0101
1102	003772	000102	0102
1103	003774	000104	0104
1104	003776	000106	0106
1105	004000	000111	0111
1106	004002	000113	0113
1107	004004	000117	0117
1108	004006	000122	0122
1109	004010	000126	0126
1110	004012	000132	0132
1111	004014	000137	0137
1112	004016	000144	0144
1113	004020	000151	0151
1114	004022	000156	0156
1115	004024	000163	0163
1116	004026	000170	0170
1117	004030	000175	0175
1118	004032	000203	0203
1119	004034	000210	0210

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GT40 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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1120	004036	000215	0215
1121	004040	000222	0222
1122	004042	000227	0227
1123	004044	000234	0234
1124	004046	000241	0241
1125	004050	000245	0245
1126	004052	000252	0252
1127	004054	000255	0255
1128	004056	000261	0261
1129	004060	000264	0264
1130	004062	000267	0267
1131	004064	000271	0271
1132	004066	000274	0274
1133	004070	000275	0275
1134	004072	000276	0276
1135	004074	000277	0277
1136	004076	000277	0277
1137	004100	000277	0277
1138	004102	000277	0277
1139	004104	000276	0276
1140	004106	000274	0274
1141	004110	000273	0273
1142	004112	000270	0270
1143	004114	000266	0266
1144	004116	000263	0263
1145	004120	000257	0257
1146	004122	000254	0254
1147	004124	000247	0247
1148	004126	000243	0243
1149	004130	000237	0237
1150	004132	000232	0232
1151	004134	000225	0225
1152	004136	000220	0220
1153	004140	000213	0213
1154	004142	000205	0205
1155	004144	000200	0200
1156	004146	000173	0173
1157	004150	000165	0165
1158	004152	000160	0160
1159	004154	000153	0153
1160	004156	000146	0146
1161	004160	000141	0141
1162	004162	000135	0135
1163	004164	000130	0130
1164	004166	000124	0124
1165	004170	000120	0120
1166	004172	000115	0115
1167	004174	000112	0112
1168	004176	000107	0107
1169	004200	000105	0105
1170	004202	000103	0103
1171	004204	000101	0101
1172	004206	000100	0100
1173	004210	000100	0100
1174	004212	000100	0100
1175	004214	000100	0100

M02

GT40 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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1176	004216	000100	0100
1177	004220	000102	0102
1178	004222	000103	0103
1179	004224	000105	0105
1180	004226	000107	0107
1181	004230	000112	0112
1182	004232	000115	0115
1183	004234	000121	0121
1184	004236	000125	0125
1185	004240	000131	0131
1186	004242	000135	0135
1187	004244	000142	0142
1188	004246	000147	0147
1189	004250	000154	0154
1190	004252	000161	0161
1191	004254	000166	0166
1192	004256	000173	0173
1193			

N02

GT4C Qlick VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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:SETUP TO DISPLAY THE OCTAGONS

1194			
1195			
1196			
1197	004260	114000	POINT
1198	004262	001434	1434
1199	004264	000724	724
1200	004266	130030	RELATV:BLKON
1201	004270	041600	INTX+1600
1202	004272	041607	INTX+1600+7
1203	004274	040007	INTX+7
1204	004276	061607	INTX!MINUSX+1600+7
1205	004300	061600	INTX!MINUSX+1600
1206	004302	061707	INTX!MINUSX+1600+MINSUY+7
1207	004304	040107	INTX+MINSUY+7
1208	004306	041707	INTX+1600+MINSUY+7
1209	004310	114000	POINT
1210	004312	001430	1430
1211	004314	000710	710
1212	004316	130020	RELATV:BLKOFF
1213	004320	043600	INTX+3600
1214	004322	043617	INTX+3600+17
1215	004324	043017	INTX+17
1216	004326	063617	INTX!MINUSX+3600+17
1217	004330	063600	INTX!MINUSX+3600
1218	004332	063717	INTX!MINUSX+3600+MINSUY+17
1219	004334	040117	INTX+MINSUY+17
1220	004336	043717	INTX+3600+MINSUY+17
1221	004340	114000	POINT
1222	004342	001420	1420
1223	004344	000660	660
1224	004346	104030	SHORTV:BLKON
1225	004350	047600	INTX+7600
1226	004352	047637	INTX+7600+37
1227	004354	040037	INTX+37
1228	004356	067637	INTX!MINUSX+7600+37
1229	004360	067600	INTX!MINUSX+7600
1230	004362	067737	INTX!MINUSX+7600+MINSJY+37
1231	004364	040137	INTX+MINSUY+37
1232	004366	047737	INTX+7600+MINSJY+37
1233	004370	114000	POINT
1234	004372	001400	1400
1235	004374	000600	600
1236	004376	104020	SHORTV:BLKOFF
1237	004400	057600	INTX+17600
1238	004402	057677	INTX+17600+77
1239	004404	040077	INTX+77
1240	004406	077677	INTX!MINUSX+17600+77
1241	004410	077600	INTX!MINUSX+17600
1242	004412	077777	INTX!MINUSX+17600+MINSUY+77
1243	004414	040177	INTX+MINSUY+77
1244	004416	057777	INTX+17600+MINSUY+77
1245	004420	114030	POINT:BLKON
1246	004422	001360	1360
1247	004424	000520	520
1248	004426	110000	LONGV
1249	004430	040137	INTX+137

;CCTOGON BY LENGTH OF 137

BT42 2010K VERIFY MAINDEC-11-0007E-0
0007EC.P11 05-NOV-76 10:20

05-NOV-76 10:20

04:502	042504
0445:0	0455:2
0475:16	0505:20
052524	053526
1:32	
02:041	022043
024047	025051
027055	030057
032063	033065
035071	036063
000077	

:OCTOGON BY LENGTH OF 177

C03

3740 QUICK VERIFY MAINDEC-11-00GTE-0
00GTEC.P11 05-NOV-76 10:20

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000000	000000	000000	000000
000001	000001	000001	000001
000002	000002	000002	000002
000003	000003	000003	000003
000004	000004	000004	000004
000005	000005	000005	000005
000006	000006	000006	000006
000007	000007	000007	000007
000008	000008	000008	000008
000009	000009	000009	000009
000010	000010	000010	000010
000011	000011	000011	000011
000012	000012	000012	000012
000013	000013	000013	000013
000014	000014	000014	000014
000015	000015	000015	000015
000016	000016	000016	000016
000017	000017	000017	000017
000018	000018	000018	000018
000019	000019	000019	000019
000020	000020	000020	000020
000021	000021	000021	000021
000022	000022	000022	000022
000023	000023	000023	000023
000024	000024	000024	000024
000025	000025	000025	000025
000026	000026	000026	000026
000027	000027	000027	000027
000028	000028	000028	000028
000029	000029	000029	000029
000030	000030	000030	000030
000031	000031	000031	000031
000032	000032	000032	000032
000033	000033	000033	000033
000034	000034	000034	000034
000035	000035	000035	000035
000036	000036	000036	000036
000037	000037	000037	000037
000038	000038	000038	000038
000039	000039	000039	000039
000040	000040	000040	000040
000041	000041	000041	000041
000042	000042	000042	000042
000043	000043	000043	000043
000044	000044	000044	000044
000045	000045	000045	000045
000046	000046	000046	000046
000047	000047	000047	000047
000048	000048	000048	000048
000049	000049	000049	000049
000050	000050	000050	000050
000051	000051	000051	000051
000052	000052	000052	000052
000053	000053	000053	000053
000054	000054	000054	000054
000055	000055	000055	000055
000056	000056	000056	000056
000057	000057	000057	000057
000058	000058	000058	000058
000059	000059	000059	000059
000060	000060	000060	000060
000061	000061	000061	000061
000062	000062	000062	000062
000063	000063	000063	000063
000064	000064	000064	000064
000065	000065	000065	000065
000066	000066	000066	000066
000067	000067	000067	000067
000068	000068	000068	000068
000069	000069	000069	000069
000070	000070	000070	000070
000071	000071	000071	000071
000072	000072	000072	000072
000073	000073	000073	000073
000074	000074	000074	000074
000075	000075	000075	000075
000076	000076	000076	000076
000077	000077	000077	000077
000078	000078	000078	000078
000079	000079	000079	000079
000080	000080	000080	000080
000081	000081	000081	000081
000082	000082	000082	000082
000083	000083	000083	000083
000084	000084	000084	000084
000085	000085	000085	000085
000086	000086	000086	000086
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000088	000088	000088	000088
000089	000089	000089	000089
000090	000090	000090	000090
000091	000091	000091	000091
000092	000092	000092	000092
000093	000093	000093	000093
000094	000094	000094	000094
000095	000095	000095	000095
000096	000096	000096	000096
000097	000097	000097	000097
000098	000098	000098	000098
000099	000099	000099	000099
000100	000100	000100	000100
000101	000101	000101	000101
000102	000102	000102	000102
000103	000103	000103	000103
000104	000104	000104	000104
000105	000105	000105	000105
000106	000106	000106	000106
000107	000107	000107	000107
000108	000108	000108	000108
000109	000109	000109	000109
000110	000110	000110	000110
000111	000111	000111	000111
000112	000112	000112	000112

PCINT
100
MAXY-130
CHAR
.ASCII 'ABCDEFGHIJKLMNOPQRSTUVWXYZ'

.ASCII @ ! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @

.EVEN
STATSA:ITALO
POINT
220
MAXY-200
CHAR
.BYTE 140,141,142,143,144,145,146,147

.BYTE 150,151,152,153,154,155,156,157

.BYTE 160,161,162,163,164,165,166,167

.BYTE 170,171,172,173,174,175,176,177

.EVEN
STATSA:ITALI
POINT
220
MAXY-230
CHAR
.BYTE 140,141,142,143,144,145,146,147

.BYTE 150,151,152,153,154,155,156,157

.BYTE 160,161,162,163,164,165,166,167

.BYTE 170,171,172,173,174,175,176,177

.EVEN
STATSA:ITALO
POINT
220
MAXY-300

003

5740 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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1362	005114	100000		
1363	005116	016	000	001
1364	005121	002	003	004
1365	005124	005	006	007
1366	005127	010	011	012
1367	005132	013	014	015
1368	005135	016		
1369	005136	020	021	022
1370	005141	023	024	025
1371	005144	026	027	030
1372	005147	031	032	033
1373	005152	034	035	036
1374	005155	037	017	000
1375				
1376	005160	170060		
1377	005162	114000		
1378	005164	000220		
1379	005166	001047		
1380	005170	100000		
1381	005172	016	000	001
1382	005175	002	003	004
1383	005200	005	006	007
1384	005203	010	011	012
1385	005206	013	014	015
1386	005211	016		
1387	005212	020	021	022
1388	005215	023	024	025
1389	005220	026	027	030
1390	005223	031	032	033
1391	005226	034	035	036
1392	005231	037	017	000
1393				
1394	005234	170040		
1395				
1396				
1397	005236	114000		
1398	005240	000340		
1399	005242	001000		
1400	005244	113604		
1401	005246	040400		
1402	005250	000000		
1403	005252	114000		
1404	005254	000340		
1405	005256	000740		
1406	005260	113400		
1407	005262	040400		
1408	005264	000000		
1409	005266	114000		
1410	005270	000340		
1411	005272	000700		
1412	005274	113200		
1413	005276	040400		
1414	005300	000000		
1415	005302	114000		
1416	005304	000340		
1417	005306	000640		

CHAR
.BYTE 16,0,1,2,3,4,5,6,7,10,11,12,13,14,15,16

.BYTE 20,21,22,23,24,25,26,27,30,31,32,33,34,35,36,37,17,0

.EVEN
STATSA:ITALI
POINT
220
MAXY-330
CHAR
.BYTE 16,0,1,2,3,4,5,6,7,10,11,12,13,14,15,16

.BYTE 20,21,22,23,24,25,26,27,30,31,32,33,34,35,36,37,17,0

.EVEN
STATSA:ITALD

:SETUP INTENSITY LEVEL TEST

POINT
340
1000
LONGV:INT7:LINE0
INTX+400
0
POINT
340
740
LONGV:INT6
INTX+400
0
POINT
340
700
LONGV:INT5
INTX+400
0
POINT
340
640

E03

GT40 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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```

14108 005310 113000
14109 005312 040400
14120 005314 000000
14121 005316 114000
14122 005320 000340
14123 005322 000600
14124 005324 112600
14125 005326 040400
14126 005330 000000
14127 005332 114000
14128 005334 000340
14129 005336 000540
14130 005340 112400
14131 005342 040400
14132 005344 000000
14133 005346 114000
14134 005350 000340
14135 005352 000500
14136 005354 112200
14137 005356 040400
14138 005360 000000
14139 005362 114000
14140 005364 000340
14141 005366 000440
14142 005370 112000
14143 005372 040400
14144 005374 000000
14145
14146
14147
14148 005376 117000
14149 005400 000400
14150 005402 000020
14151 005404 100000
14152 005406 047503
14153 005414 050124
14154 005422 042504
14155 005430 044120
14156 005436 020061
14157 005444 040514
14158 005452 046522
14159 005460 043440
14160 005466 051126
14161 005472 114000
14162 005474 000400
14163 005476 000320
14164 005500 100000
14165 005502 047503
14166 005510 050116
14167 005516 000
14168 005521 000
14169 005524 000
14170 005527 000
14171 005532 000
14172 005535 000
14173 005540 000

```

```

LONGV!INT4
INTX+400
0
POINT
340
600
LONGV!INT3
INTX+400
0
POINT
340
540
LONGV!INT2
INTX+400
0
POINT
340
500
LONGV!INT1
INTX+400
0
POINT
340
440
LONGV!INT0
INTX+400
0

```

:SETUP THE MESSAGA BUFFERS

```

POINT!INT4
400
20
CHAR
.ASCII /COM OUTPUT /

```

BUFF1: .ASCII /DECGRAPHIC-11 DISPLAY TERMINAL GT40 VR14/

```

POINT
400
320
CHAR
.ASCII /COM. INPUT /

```

BUFF2: .BYTE 0,0

```

020115 052517
052125 020040
043503 040522
041511 030455
044504 050123
020131 042524
047111 046101
032124 020060
032061
027115 044440
052125 020040
000 000
000 000
000 000
000 000
000 000
000 000
000 000

```

F03

GT40 QUICK VERIFY MAINDEC-11-DDGTE-C MACY11 27(1006) 05-NOV-76 12:10 PAGE 32
DDGTEC.P11 05-NOV-76 10:20

1474	005542	000	000	000	.BYTE	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
1475	005543	000	000	000		
1476	005550	000	000	000		
1477	005553	000	000	000		
1478	005556	000	000	000		
1479	005561	000	000	000		
1480	005564	000	000	000		
1481	005566	114000			POINT	
1482	005570	000400			400	
1483	005572	000350			350	
1484	005574	100000			CHAR	
1485	005576	051113	027102	044440	.ASCII	/KRB. INPUT /
1486	005604	050116	052125	020040		
1487	005612	000	000	000	BUFF3: .BYTE	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
1488	005615	000	000	000		
1489	005620	000	000	000		
1490	005623	000	000	000		
1491	005626	000	000	000		
1492	005631	000	000	000		
1493	005634	000	000	000		
1494	005636	000	000	000	.BYTE	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
1495	005641	000	000	000		
1496	005644	000	000	000		
1497	005647	000	000	000		
1498	005652	000	000	000		
1499	005655	000	000	000		
1500	005660	000	000	000		
1501						
1502	005662	114000			POINT	
1503	005664	000400			400	
1504	005666	000400			400	
1505	005670	100000			CHAR	
1506	005672	041517	020124	000	.ASCIZ	/OCT /
1507	005677	000	000	000	OCTA: .BYTE	0,0,0
1508	005702	164000			DNOP	
1509	005704	164000			DNOP	
1510	005706	164000			DNOP	
1511	005710	164000			DNOP	
1512	005712	164000			DNOP	
1513	005714	164000			DNOP	
1514	005716	164000			DNOP	
1515	005720	160000			DJMP	
1516	005722	005752			FILE0A: FILE0C	
1517	005724	114000			FILE0B: POINT	
1518	005726	001000			1000	
1519	005730	000440			440	
1520	005732	100000			CHAR	
1521	005734	044514	044107	026524	.ASCIZ	/LIGHT-PEN HIT/
1522	005742	042520	020116	044510		
1523	005750	000124				
1524						
1525	005752	173400			FILE0C: .EVEN	
1526	005754	160000			DSTOP	
1527	005756	003012			DJMP	
1528					FILE00	

G03

GT40 QUICK VERIFY MAINDEC-11-DDGTE-C
DDGTEC.P11 05-NOV-76 10:20

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: EXCEPT FOR THE NEW ORIGIN ADDRESS AND SEVERAL "160000"
: FOR ADDRESS FUDGING THIS IS AN EXACT COPY OF THE CONTENTS
: OF THE GT-40 BOOTSTRAP VERSION #2

.TITLE SCROLLING ROM BOOTSTRAP FOR THE GT40

; BOOTGT.T16 OCT 10, 1973

: COPYRIGHT 1973, DIGITAL EQUIPMENT CORPORATION
: 146 MAIN STREET
: MAYNARD, MASSACHUSETTS 01754

; WRITTEN BY JACK BURNES.

: THIS PROGRAM IS THE SECOND VERSION THE THE ROM BOOTSTRAP FOR
: THE GT40 DISPLAY TERMINAL. IT INCLUDES SCROLLING AND AN END OF
: MEMORY SEARCH FOR THE LOADER.

.ENABL ABS,AMA

; ASSEMBLER DIRECTIVES FOR ABSOLUTE BINARY OUTPUT
; NOTE: USE "MACDLX" TO ASSEMBLE THIS PROGRAM.

.SBTTL DEFINITION SECTION

1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
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1557
1558
1559
1560
1561

REGISTER DEFINITIONS
-----BASIC DEFINITIONS
-----000000
000001
000002
000003
000004
000005
000006
000007R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
SP=%6
PC=%7

;DEFINE STANDARD VALUES.

GT40 DEFINITIONS
-----000000
000001
000002
000003CHAR=R0
POINTR=R1
TABCNT=R2
SCAN=R3

000004

HOLD=R4

000005

COUNTR=R5

;CONTAINS THE INPUT CHARACTER.
;POINTS TO NEXT INSERTION BYTE IN DISPLAY BUFFER
;CHARACTER COUNTER FOR THE "TAB" FEATURE.
;GENERALLY CONTAINS A POINTER WHICH
;IS USED WHEN SCANNING MEMORY FOR SOMETHING.
;TYPICALLY A TEMPORARY WHICH IS USED TO RETAIN
;A VALUE FOR A SHORT TIME.
;TYPICALLY USED AS A COUNTER.LOADER DEFINITIONS
-----000000
000001
000002
000003
000004L.BYT=CHAR
L.ADR=POINTR
L.BC=TABCNT
L.CKSM=COUNTR
INDEX=SCAN;CHARACTER INPUT FOR THE LOADER.
;CURRENT MEMORY ADDRESS TO BE LOADED.
;NUMBER OF DATA ITEMS TO LOAD.
;CHECKSUM ON THE INPUT DATA.
;INDICATES HOW TO ASSEMBLE THE 8 BIT CHARACTER.

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTCC.P11 05-NOV-76 10:20

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DEFINITION SECTION

MAJOR SYSTEM DEFINITIONS

1635			
1636			
1637			
1638			
1639			
1640			
1641			
1642	166000	ORIGIN=166000	:ORIGIN OF THE BOOTSTRAP.
1643			
1644	175610	DL11IS=175610	:INPUT STATUS REGISTER OF DL11
1645	175612	DL11IB=DL11IS+2	:INPUT CHARACTER FROM DL11
1646	175614	DL11OS=DL11IB+2	:OUTPUT STATUS OF THE DL11
1647	175616	DL11OB=DL11OS+2	:OUTPUT CHARACTER TO THE DL11
1648			
1649	177560	KBDIS=177560	:KEYBOARD INPUT STATUS
1650	177562	KBDIB=KBDIS+2	:CURRENT CHARACTER FROM KEYBOARD.
1651			
1652	172000	GT40PC=172000	:GT40 PROGRAM COUNTER.
1653	172002	GT40SR=GT40PC+2	:GT40 STATUS REGISTER ADDRESS.
1654			
1655			
1656	001000	BSTART=1000	:START OF THE DISPLAY BUFFER
1657	007000	BLIMIT=7000	:APPROXIMATE END OF THE DISPLAY BUFFER.
1658	007776	TMPEND=7776	:LOCATION OF INITIALIZATION STACK.
1659	000004	CORSTR=4	:LOCATION OF PDP-11 TRAP VECTOR.
1660	007012	JMPADD=BLIMIT+10.	:WHERE THE POINTER IS TO FIRST CHAR ON SCREEN
1661	000040	NUMLIN=32.	:NUMBER OF LINES ON TEXT TO SHOW ON THE SCREEN
1662			
1663	005015	CRLF=5015	:CARRIAGE RETURN - LINE FEED
1664	000175	ALTMOD=175	:THE "KEY" CHARACTER [I.E. ALTMODE].
1665			
1666	160000	DISJMP=160000	:THE GT40 JMP INSTRUCTION
1667	173000	DISTOP=173000	:THE GT40 STOP DISPLAY INSTRUCTION.
1668			
1669			
1670			
1671			
1672			
1673			
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.SBTTL INITIALIZATION AND RESTART CODE

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTec.P11 05-NOV-76 10:20.

MACY11 27(1006) 05-NOV-76 12:10 PAGE 36
INITIALIZATION AND RESTART CODE

```

1687
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1689
1690          :          GT40 BOOTSTRAP CODE
1691          :          -----
1692
1693
1694
1695
1696          006000          . =6000
1697
1698          :          . =ORIGIN          ;DEFINE ORIGIN OF THE BOOTSTRAP.
1699
1700
1701
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1704
1705          :          COLD INITIALIZATION CODE
1706          :          -----
1707
1708
1709
1710 006000 000005          START: RESET          ;RESET ALL HARDWARE NOW.
1711 006002 012737 000007 175610      MOV      #7,DL11IS          ;INITIALIZE DL-11 INPUT NOW.
1712 006010 012706 007776          MOV      #TMPEND,SP          ;ESTABLISH A GOOD TEMPORARY STACK
1713                                ;POINTER FOR CORE SEARCH.
1714 006014 005237 175614          INC      DL1105          ;SET BREAK BIT
1715 006020 004337 166652          JSR      SCAN,OUTLIT!160000      ;FOR 2 CHARACTER TIMES
1716 006024 000000          .WORD 0          ;SEND TWO ZERO'S
1717
1718 006026 012703 000004          MOV      #CORSTR,SCAN          ;GET ADDRESS OF BAD CORE TRAP VECTOR.
1719 006032 012723 166042          MOV      #NOTHERE!160000,(SCAN)+ ;AND INSERT A POINTER TO US THERE.
1720
1721 006036 005023          ENDCOR: CLF      (SCAN)+          ;NOW CLEAR ALL OF MEMORY BEYOND THE POINTER.
1722 006040 000776          BR          ENDCOR          ;UNTIL WE RUN OUT OF MEMORY AND TRAP.
1723
1724
1725 006042 005743          NOTHER: TST      -(SCAN)          ;WHEN WE TRAP OUT, WE COME HERE.
1726                                ;WE BACK UP POINTER TO GOOD CORE.
1727                                ;NOTE THAT IF WE TRAP OUT AGAIN, IT
1728                                ;IS STILL OK, BECAUSE WE WILL LOOP
1729                                ;UNTIL WE GET A GOOD CORE ADDRESS.
1730 006044 010306          MOV      SCAN,SP          ;WHEN WE GET ONE, THAT IS LAST LOCATION
1731                                ;IN THE MACHINE, AND HENCE OUR SP.
1732 006046 105737 175614          IS:   TSTB   DL1105          ;SEE IF BREAK IS DONE
1733 006052 100375          BPL      IS          ;NO GO BACK
1734 006054 005037 175614          CLR      DL1105          ;CLEAR BREAK BIT
1735
1736
1737
1738
1739
1740
1741          :          RESTART INITIALIZATION CODE WHEN COMMUNICATIONS IS WORKING.
1742          :          -----

```

K03

SCROLLING ROM BOOTSTRAP FOR THE 3740
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INITIALIZATION AND RESTART CODE

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1743
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1745
1746 006060 052706 007776      RESTRT: BIS      #TMPEND,SP      ;FORCE THE SP TO LIMIT OF EXISTING CORE.
1747
1748
1749 006064 012703 006700      MOV      #BLIMIT-NUMLIN-NUMLIN,SCAN      ;NOW WE WILL FILL THE KEY AREAS OF THE
1750 006070 012702 000040      MOV      #NUMLIN,TABCNT      ;DISPLAY BUFFER WITH INITIAL CR-LF'S.
1751
1752 006074 012723 005015      SETLP1: MOV      #CR_LF,(SCAN)+      ;INSERT A CR LF NOW.
1753 006100 005302      DEC      TABCNT      ;AND LOOP UNTIL DONE.
1754 006102 003374      BGT      SETLP1      ;THUS DISPLAY CORE IS ALMOST CORRECT.
1755
1756
1757 006104 012703 166432      MOV      #SETUP!160000,SCAN      ;NOW WE WILL INITIALIZE CORE FOR THE
1758      ;DISPLAY. PICK UP POINTER TO LIST.
1759
1760 006110 012302      SETLP2: MOV      (SCAN)+,TABCNT      ;GET NUMBER OF ITEMS TO INSERT.
1761 006112 001405      BEQ      SETDUN      ;IF ZERO, WE ARE DONE.
1762 006114 012301      MOV      (SCAN)+,POINTR      ;PICK UP FIRST CORE ADDRESS POINTER.
1763
1764 006116 012321      SETLP3: MOV      (SCAN)+,(POINTR)+      ;MOVE OVER A DATA ITEM NOW.
1765 006120 005302      DEC      TABCNT      ;ALL DONE?
1766 006122 003375      BGT      SETLP3      ;NOPE. MOVE OVER THE NEXT.
1767 006124 000771      BR      SETLP2      ;YES. GET NEXT MAJOR LIST TO INSERT.
1768
1769
1770 006126 012701 006776      SETDUN: MOV      #BLIMIT-2,POINTR      ;ESTABLISH THE BUFFER POINTER NOW.
1771
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1773
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```

.SBTTL VT05 SIMULATOR

VTOS (SCROLLING) PORTION OF THE BOOTSTRAP

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1783
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1791 006132 004737 166564      NXTCHR: JSR      PC,GETCHR!160000      ;GET A CHARACTER NOW.
1792 006136 020027 000177      CMP      CHAR,#177      ;IS IT OUT OF RANGE?
1793 006142 002373      BGE      NXTCHR      ;YEP. GET ANOTHER ONE.
1794 006144 020027 000040      CMP      CHAR,#40      ;IS IT A PRINTING CHARACTER?
1795 006150 002020      BGE      NORMAL      ;YES. IT'S A NORMAL PRINTING CHARACTER.
1796 006152 010003      MOV      CHAR,SCAN      ;MOVE IT OVER SO WE CAN PLAY WITH IT.
1797 006154 162703 000007      SUB      #7,SCAN      ;BIAS SO THAT BELL !7! IS ZERO.
1798 006160 020327 000007      CMP      SCAN,#7      ;IF CHARACTER IS LESS THEN BELL OR
1799 006164 103362      BHIS     NXTCHR      ;GREATER THEN CR, THEN IGNORE.
1800 006166 006303      ASL      SCAN      ;IF GOOD, MAKE IT WORD INDEX.
1801 006170 060307      ADD      SCAN,PC      ;AND GO TO THE CORRECT ROUTINE.
1802
1803 006172 000426      BR      BELL      ;7=BELL
1804 006174 000406      BR      NORMAL      ;10=BACKSPACE
1805 006176 000411      BR      TAB      ;11=TAB
1806 006200 000437      BR      LF      ;12=LINE FEED !LF!
1807 006202 000420      BR      VT      ;13=VERTICAL TAB !VT!
1808 006204 000424      BR      FF      ;14=FORM FEED !FF!
1809
1810
1811
1812 006206 012702 177777      CR:      MOV      #-1,TABCNT      ;RESET TAB POSITION ON A CR, AND
1813
1814
1815
1816 006212 004737 166350      NORMAL: JSR      PC,INSERT!160000      ;INSERT THE CHARACTER IN THE BUFFER.
1817 006216 005202      INC      TABCNT      ;UPDATE TAB POSITION NOW.
1818 006220 000744      BR      NXTCHR      ;AND GET NEXT CHARACTER.
1819
1820
1821
1822
1823 006222 012700 000040      TAB:      MOV      #40,CHAR      ;ON A TAB, INSERT BLANKS UNTIL THE
1824 006226 004737 166350      JSR      PC,INSERT!160000      ;NEXT CHARACTER POSITION IS A MULTIPLE
1825 006232 005202      INC      TABCNT      ;OF 8.
1826 006234 032702 000007      BIT      #7,TABCNT      ;ARE WE DONE YET?
1827 006240 001370      BNE      TAB      ;NOPE.
1828 006242 000733      BR      NXTCHR      ;YES.
1829
1830
1831 006244 111705      VT:      MOVB     (PC),COUNTR      ;THIS PUTS THE LOW BYTE OF THE
1832
1833 006246 000405      BR      FFLOOP      ;BRANCH CODE IN COUNTR-SAVE A WORD
1834
1835
1836 006250 005037 172002      BELL:     CLR      GT40SR      ;RING BELL -WRITE IN GT40SR
1837 006254 000726      BR      NXTCHR      ;AND LOOP BACK
1838
1839 006256 012705 000040      FF:      MOV      #NUMLIN,COUNTR      ;FORM FEED IS DONE BY INSERTING LF'S.

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1839
1840 006262 012700 000012      FFLOOP: MOV      #12,CHAR      ;MAKE THE CHARACTER A LINEFEED.
1841 006266 004737 166304      JSR      PC,LFSUB!160000 ;DO A LINEFEED.
1842 006272 005305              DEC      COUNTR      ;DONE?
1843 006274 003372              BGT      FFLOOP      ;NOPE. KEEP SENDING THEM.
1844 006276 000715              BR       NXTCHR      ;YES. NOW RETURN. DO NOT FALL THROUGH.
1845
1846
1847 006300 012746 166132      LF:      MOV      #NXTCHR!160000,-(SP) ;RETURN TO NXTCHR AFTER PROCESSING
1848                                     ;THE LF BY FAKING A JSR.
1849
1850 006304 013703 007012      LFSUB:  MOV      JMPADD,SCAN ;GET POINTER TO FIRST CHAR ON SCREEN
1851
1852 006310 122300              LFLOOP:  CMPB     (SCAN)+,CHAR ;AND LOOK FOR A LINEFEED.
1853 006312 001406              BEQ      LFOUND      ;GOT IT. SEARCH HAS ENDED.
1854 006314 020327 007000      CMP      SCAN,#BLIMIT ;ARE WE AT END OF BUFFER?
1855 006320 103773              BLO      LFLOOP      ;NOPE. KEEP ON LOOKING.
1856 006322 012703 001000      MOV      #BSTART,SCAN ;IF AT TOP, RESET TO BOTTOM OF BUFFER
1857 006326 000770              BR       LFLOOP      ;AND KEEP ON LOOKING.
1858
1859 006330 005203              LFOUND:  INC      SCAN      ;WE'VE GOT THE LINE FEED. STOP SHOWING
1860 006332 042703 000001      BIC      #1,SCAN      ;FIRST LINE BY CHANGING THE "DISJMP"
1861 006336 010337 007012      MOV      SCAN,JMPADD ;INSTRUCTION TO FIRST CHAR BEYOND LF.
1862 006342 004737 166350      JSR      PC,INSERT!160000 ;INSERT THE LF IN THE BUFFER.
1863 006346 005000              CLR      CHAR      ;AND THEN INSERT ONE NULL CHARACTER BECAUSE
1864                                     ;THE "DISJMP" ADDRESS MUST BE EVEN, AND
1865                                     ;THIS GUARANTEES WE WILL NOT LOSE A
1866                                     ;A GOOD DATA CHARACTER. WE FALL THROUGH
1867                                     ;TO INSERT THE NULL IN THE BUFFER.
1868
1869
1870 006350 110021              INSERT:  MOVB     CHAR,(POINTR)+ ;STICK IN THE CHARACTER NOW.
1871 006352 032701 000001      BIT      #1,POINTR ;IS NEXT POSITION EVEN OR ODD?
1872 006356 001021              BNE      INSRTX      ;ODD. NO PROBLEMS. SPACE IS ALLOCATED.
1873 006360 020127 007000      CMP      POINTR,#BLIMIT ;EVEN. ARE WE AT THE END OF THE BUFFER?
1874 006364 103410              BLO      INSRTL      ;NO. JUST MAKE ROOM FOR ANOTHER WORD.
1875 006366 010103              MOV      POINTR,SCAN ;AT THE END. MOVE THE STUFF TO THE
1876 006370 012701 001000      MOV      #BSTART,POINTR ;BEGINNING OF THE BUFFER.
1877 006374 004737 166406      JSR      PC,INSRTL!160000 ;CALL THE ROUTINE TO SAVE SPACE.
1878 006400 005023              CLR      (SCAN)+      ;AND CLEAR UP THE INSTRUCTIONS AT THE
1879 006402 005013              CLR      (SCAN)      ;END OF THE BUFFER.
1880 006404 000207              RTS      PC      ;AND THEN RETURN.
1881
1882 006406 022121              INSRTL:  CMP      (POINTR)+,(POINTR)+ ;BYPASS THE "DISJMP" BY ADDING 4 TO POINTR.
1883 006410 012711 166474      MOV      #HEADER!160000,(POINTR) ;NOW INSERT THE DISJMP INSTRUCTION TO OUR HEADER
1884 006414 012741 160000      MOV      #DISJMP,-(POINTR) ;AND IT'S ADDRESS (PUT THEM IN BACKWARDS).
1885 006420 005041              CLR      -(POINTR) ;MAKE AVAILABLE A NEW CHARACTER SPOT.
1886
1887 006422 000207              INSRTX:  RTS      PC      ;FINALLY RETURN TO THE CALLER.
1888
1889
1890
1891
1892
1893 006424 012737 001000 172000 GTBUSE: MOV      #BSTART,GT40PC ;ON A BUS ERROR, WE MERELY RESTART THE GT40 AT
1894

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SCROLLING ROM BOOTSTRAP FOR THE GT40
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VTOS SIMULATOR

:THE RTI FOR THIS ROUTINE
:IS THE FIRST WORD OF THE TABLE
:BELOW-IT SAVES A WORD!

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:
: INITIALIZATION TABLE FOR THE SCROLLER
:-----

1914	006432	000002	SETUP:	.WORD	2	:INITIALIZE 2 WORDS.--ALSO RTI FROM ABOVE
1915	006434	000230		.WORD	330	:STARTING AT LOCATION 330
1916	006436	166424		.WORD	GTBUSE!160000	:FIRST WORD IS POINTER TO BUS ERROR ROUT
1917	006440	000200		.WORD	200	:SECOND WORD IS NEW STATUS WORD ON INTERRUPT.
1919	006442	000007		.WORD	7	:INITIALIZE THE END OF THE BUFFER TO
1920	006444	006776		.WORD	BLIMIT-2	:A CLEAR SPACE TO INSERT THE CHARACTER.
1921	006446	000000		.WORD	0	:THIS IS THE "RUNNING" START. THIS IS
1922	006450	160000	166474	.WORD	DISJMP,HEADER!160000	:FOLLOWED BY A DISJMP TO OUR HEADER BLCC
1923	006454	160000	001000	.WORD	DISJMP,BSTART	:AND THEN A DISJMP TO THE START OF THE BUFFER
1924	006460	160000	006700	.WORD	DISJMP,BLIMIT-NUMLIN-NUMLIN	:AND A DISJMP TO THE FIRST CHAR ON SCREE
1926	006464	000001		.WORD	1	:FINALLY START THE GT40 GCING AT
1927	006466	172000		.WORD	GT40PC	:THE POSITION INSTRUCTION IN THE
1928	006470	166474		.WORD	HEADER!160000	:HEADER BLOCK.
1930	006472	000000		.WORD	0	:END OF INIT CODE

:
: HEADER BLOCK FOR THE SCROLLER

1934	006474	103334	HEADER:	.WORD	103334	:ENABL CHAR MODE,BLINKING
1935	006476	000177		.WORD	177	:A BLINKING BOX-RUB OUT!
1936	006500	116124		.WORD	116124	:GO TO POINT MODE
1937	006502	171340		.WORD	171340	:LOAD STATUS REGISTER
1938	006504	000000	001352	.WORD	0,1352	:POINT TO UPPER LEFT
1939	006510	103324		.WORD	103324	:BACK TO CHAR MODE
1940	006512	160000	007010	.WORD	DISJMP,JMPADD-2	:AND TO THE CHANGING JMP INST.
1941				.SBTTL	COMMUNICATIONS AND MISC. SUPPORT ROUTINES	

COMMUNICATIONS HANDLING ROUTINES
-----THE DL-11 HANDLER

006516	105737	175610	GETDL:	TSTB	DL11IS	:CHECK THE HOST INPUT STATUS.
006522	100011			BPL	GETDL1	:HOST DID NOT SEND ANYTHING. YET.
006524	113700	175612		MOVB	DL11IB,CHAR	:HOST SENT US A CHARACTER. PROCESS IT.
006530	012737	000007		MOV	#7,DL11IS	:REENABLE THE HOST TELECOMMUNICATIONS.
006536	042700	177600		BIC	#-200,CHAR	:MAKE CHARACTER JUST SEVEN BITS.
006542	001765			BEQ	GETDL	:IF NULL, IGNORE IT.
006544	000207			RTS	PC	:ELSE RETURN NOW.
006546	105737	177560	GETDL1:	TSTB	KBOIS	:DID USER TYPE A CHARACTER?
006552	100361			BPL	GETDL	:NO. GO BACK AND CHECK HOST MACHINE.
006554	113737	177562		MOVB	KBOIB,DL110B	:MOVE THE CHARACTER TO THE HOST.
006562	000755	175616		BR	GETDL	:AND CHECK AGAIN FOR INPUT.

THE "GET CHARACTER" ROUTINE

006564	004737	166516	GETCHR:	JSR	PC,GETDL:160000	:GET A CHARACTER FROM THE HOST NOW.
006570	020027	000175		CMP	CHAR,#ALTMOD	:IS IT AN "ALTMODE"
006574	001025			BNE	GETEXT	:NO. EXIT NOW.
006576	004737	166516		JSR	PC,GETDL:160000	:YES. GET ANOTHER ONE NOW.
006602	020027	000114		CMP	CHAR,#'L	:IS IT AN "L"
006606	001501			BEQ	LOADER	:YES. START LOADING NOW.
006610	020027	000122		CMP	CHAR,#'R	:IS IT AN "R"
006614	001015			BNE	GETEXT	:NO. IGNORE THE ALTMODE AND JUST RETURN THE CHAR
006616	012737	173000		MOV	#DISTOP JMPADD-2	:YES. RESET. STOP DISPLAY BY INSERTING A "DISTOP
006624	000137	166060	PRESR:	JMP	RESTR:160000	:INSTRUCTION IN THE BUFFER, AND RESTART.

THE "GET A SIX BIT CHARACTER" ROUTINE

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006630 004737 166564
006634 020227 000040
006640 002517
006642 020027 000137
006646 003114

GETSIX: JSR PC,GETCHAR!160000
CMP CHAR,#40
BLT L,BAC
CMP CHAR,#137
BGT L,BAC

:GET A CHARACTER NOW.
:IS IT A LEGAL PRINTING CHARACTER?
:NOPE. ABORT
:IT'S BIG ENOUGH. IS IT TOO BIG?
:YEP. ABORT.

006650 000207

GETEXT: RTS PC

:RETURN TO THE CALLER.

THIS OUTPUTS TWO CHARACTERS VIA A
JSR SCAN,OUTLIT
'TWO CHARACTERS'

006652 112337 175616
006656 112337 175616
006662 000203

OUTLIT: MOVB (SCAN)+,DL110B
MOVB (SCAN)+,DL110B
RTS SCAN

:DOUBLE BUFFERED
:RETURN

THE "GET AN EIGHT BIT CHARACTER" ROUTINE
--- --- --- --- ---

THIS ROUTINE DIFFERS FROM THE PREVIOUS ROUTINES
IN THAT IT WILL TAKE SIX BIT CHARACTERS AND ASSEMBLE
THEM FOR THE LOADER TO USE. NOTE THAT FROM THIS POINT
ON WE WILL SWITCH TO THE LOADER DEFINITIONS OF THE
REGISTERS. THUS THE CHARACTER IS RETURNED IN
REGISTER "L.BYT" RATHER THAN CHAR (THOUGH THEY ARE
PHYSICALLY THE SAME).

006664 004737 166630
006670 010046
006672 005723
006674 000163 166676

GETB: JSR PC,GETSIX!160000
MOV L,BYT,-(SP)
TST (INDEX)+
JMP GETBTB-2!160000(INDEX)

:GET A SIXBIT CHARACTER.
:SAVE IT ON THE STACK.
:UPDATE INDEX TO NEXT ITEM (ALL ARE #2)
:AND DISPATCH ACCORDING TO THE INDEX.

006700 000404
006702 000416
006704 000432

GETBTB: BR GETB1
BR GETB2
BR GETB3

:INDEX=2: ASSEMBLE FIRST CHAR
:INDEX=4: ASSEMBLE SECOND CHAR
:INDEX=6: ASSEMBLE THIRD AND LAST CHAR
:INDEX=8: RESET INDEX TO 0 [2] AND RETRY.

006706 012703 000002

GETB4: MOV #2,INDEX

:THE FOURTH INDEX IS THE SAME AS THE FIRST
:INDEX. JUST RESET IT AND FALL THROUGH.

SEARCHING FOR BOOTSTRAP FOR THE 3740
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 COMMUNICATIONS AND MISC. SUPPORT ROUTINES

00000000 006712 004737 166630
 00000001 006716 000000
 00000002 006720 006300
 00000003 006724 006300
 00000004 006728 106116
 00000005 006732 106300
 00000006 006736 106116
 00000007 006740 012600
 00000008 006744 000207

GETB1: JSR PC,GETSIX!160000
 MOV L,BYT,HOLD
 ASL L,BYT
 ASL L,BYT
 ASLB L,BYT
 ROLB (SP)
 ASLB L,BYT
 ROLB (SP)
 MOV (SP)+,L,BYT
 RTS PC

:GET ANOTHER CHARACTER NOW.
 :AND PRESERVE IT FOR NEXT TIME THROUGH.
 :NOW THROW AWAY LEFT MOST BITS OF
 :THE 8 BIT CHARACTER. NOW MERGE IN
 :THE LEFT TWO BITS OF THE
 :NEW SIX BIT CHARACTER WITH THE SIX
 :BITS FROM THE CHARACTER ON THE
 :STACK. 1ST CHARACTER IS NOW ASSEMBLED.
 :SO WE'LL RETURN IT TO THE USER.
 :AND THEN WE SHALL RETURN TO HIM.

00000009 006748 006300
 00000010 006752 006300
 00000011 006756 106104
 00000012 006760 106300
 00000013 006764 106104
 00000014 006768 106300
 00000015 006772 106104
 00000016 006776 010400
 00000017 006780 012604
 00000018 006784 000207

GETB2: ASL L,BYT
 ASL L,BYT
 ASLB L,BYT
 ROLB HOLD
 ASLB L,BYT
 ROLB HOLD
 ASLB L,BYT
 ROLB HOLD
 ASLB L,BYT
 ROLB HOLD
 MOV HOLD,L,BYT
 MOV (SP)+,HOLD
 RTS PC

:THE SECOND CHARACTER IS CREATED FROM
 :THE 4 RIGHT BITS OF THE PREVIOUS CHARACTER
 :AND THE FOUR MIDDLE BITS OF THE PRESENT
 :8 BIT CHARACTER.
 :WE WILL CREATE THE NEW 8 BIT
 :IN THIS REGISTER, SINCE IT
 :MORE CONVENIENT. WE WILL MOVE OVER THE
 :ANSWER AT THE END.
 :ONE MORE TO GO
 :DONE.
 :BRING OVER THE VALUE.
 :AND REMEMBER THE LAST CHARACTER WE RECEIVED.
 :AND RETURN TO THE CALLER.

00000019 006788 006100
 00000020 006792 106100
 00000021 006796 006004
 00000022 007000 106300
 00000023 007004 006004
 00000024 007008 106000
 00000025 007012 005726
 00000026 007016 000207

GETB3: ROL L,BYT
 ROLB L,BYT
 ROR HOLD
 RORB L,BYT
 ROR HOLD
 RORB L,BYT
 TST (SP)+
 RTS PC

:FINAL CHARACTER IS EASY. JUST A
 :SIMPLE MERGER OF LEFT TWO BITS OF
 :PREVIOUS VALUE WITH RIGHT SIX BITS
 :OF LAST (4TH) CHARACTER RECEIVED.

:AND WE ARE DONE.
 :FINALLY THROW AWAY STACK.
 :AND RETURN TO THE CALLER.

.SBTTL THE LOADER

: THE LOADER
: -----

007012	012737	173000	007010	LOADER: MOV	#DISTOP, JMPADD-2	;STOP THE GT40 BY INSERTING A "DISTOP" IN THE LI
007020	005003			CLR	INDEX	;RESET THE 8 BIT ASSEMBLER TO THE FIRST CHAR
007022	005005		L.LD2:	CLR	L.CKSM	;CLEAR THE CHECKSUM
007024	004737	167114		JSR	PC, L.PTR!160000	;GET A BYTE NOW.
007030	105300			DECB	L.BYT	;IS IT A ONE (HEADER)?
007032	001373			BNE	L.LD2	;NO. WAIT FOR THE ONE.
007034	004737	167114		JSR	PC, L.PTR!160000	;YES. SKIP OVER THE NEXT CHARACTER NOW.
007040	004737	167126		JSR	PC, L.GWRD!160000	;ASSEMBLE A WORD NOW.
007044	010002			MOV	L.BYT, L.BC	;MOVE OVER TO THE COUNTER.
007046	162702	000004		SUB	#4, L.BC	;REDUCE TO ACTUAL DATA COUNT.
007052	022702	000002		CMP	#2, L.BC	;ANY DATA AT ALL?
007056	001433			BEQ	L.JMP	;NO. MUST BE END
007060	004737	167126		JSR	PC, L.GWRD!160000	;YES. ASSEMBLE A DATA WORD NOW.
007064	010001			MOV	L.BYT, L.ADR	;AND THIS MUST BE THE FIRST ADDRESS.
007066	004737	167114	L.LD3:	JSR	PC, L.PTR!160000	;GET A BYTE OF DATA NOW.
007072	002006			BGE	L.LD4	;ALL DONE?
007074	105705			TSTB	L.CKSM	;YEP. COUNTER IS MINUS. CHECK CHECKSUM.
007076	001751			BEQ	L.LD2	;CHECKSUM GOOD. GET NEXT COMMAND.
007100	004337	166652	L.BAD:	JSR	SCAN, OUTLIT!160000	;BAD LOAD INFORM HOST
007104	175	102		.BYTE	ALTMOD, 'B	;SEND ALTMODE B
007106	000646			BR	PRESTR	;AND RESTART THE DISPLAY.
007110	110021		L.LD4:	MOVB	L.BYT, (L.ADR)+	;INSERT BYTE INTO MEMORY.
007112	000765			BR	L.LD3	;AND GET THE NEXT BYTE.
007114	004737	166664	L.PTR:	JSR	PC, GETB!160000	;ASSEMBLE AN 8 BIT CHARACTER NOW.
007120	060005			ADD	L.BYT, L.CKSM	;UPDATE THE CHECKSUM NOW.
007122	005302			DEC	L.BC	;DECREMENT THE CHARACTER COUNTER.
007124	000207			RTS	PC	;AND RETURN TO THE CALLER NOW.
007126	004737	167114	L.GWRD:	JSR	PC, L.PTR!160000	;ASSEMBLE A WORD. FIRST GET A CHARACTER
007132	010046			MOV	L.BYT, -(SP)	;AND SAVE IT.
007134	004737	167114		JSR	PC, L.PTR!160000	;AND THEN GET ANOTHER ONE.

F04

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTCC.P11 05-NOV-76 10:20

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THE LOADER

2160	007140	000300		SWAB	L.BYT	:AND THEN REASSEMBLE THE MESS.
2161	007142	052600		BIS	(SP)+,L.BYT	:WITH THE FEARSOME POWER OF THE 11.
2162	007144	000207		RTS	PC	:AND RETURN TO THE CALLER.
2163						
2164						
2165						
2166						
2167	007146	004737	167126	L.JMP:	JSR PC,L.GWRD!160000	:ALL DONE WITH THE LOAD. ASSEMBLE
2168	007152	010046		MOV	L.BYT, -(SP)	:THE STARTING ADDRESS NOW.
2169	007154	004737	167114	JSR	PC,L.PTR!160000	:AND DON'T FORGET TO CHECKSUM IT.
2170	007160	105705		TSTB	L.CKSM	
2171	007162	001346		BNE	L.BAD	:A BAD CHECKSUM. ALL IS EVIL.
2172						
2173	007164	004337	166552	JSR	SCAN,OUTLIT!160000	:GOOD CHKSUM, INFORM HOST
2174	007170	175	107	.BYTE	ALTM00,'G	:WITH ALTM00 G
2175						
2176	007172	032716	000001	BIT	#1,(SP)	:DO WE WANT TO START EXECUTION?
2177	007176	001401		BEQ	L.JMP1	:YES. AWAY WE GO.
2178						
2179	007200	000000		L.HALT:	HALT	:IF NOT, HALT.
2180						
2181	007202	000136		L.JMP1:	JMP 2(SP)+	:IF GO, THEN GO ALREADY. WHEEEE!
2182						
2183						
2184						
2185						
2186						
2187						
2188						
2189						
2190						
2191						
2192						
2193						
2194						
2195						
2196						
2197						
2198						
2199						

.SBTTL THE SELF TEST

SCROLLING ROM BOOTSTRAP FOR THE J740
DOGTEC.P11 05-NOV-76 10:20

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THE SELF TEST

```

;THIS IS GT40 QUICK TEST
;GIVES QUICK VISUAL TEST
;OF CONDITION OF MACHINE
;WITHOUT READING IN DIAG.

```

: BRIGHTEST

```
:STOP INTERRUPT
```

```

:ITALICS OFF
: "      ON
:SYNC ON

```

```

;LOAD GRAPH INCR
;INTENSIFY BIT
;BIGGEST X VECTOR
;BIGGEST Y VECTOR
;THE MINUS BIT

;BIGGEST X IN SHORTVEC
;      Y IN
;MINUS BIT FOR Y IN SHORTVEC

```

H04

SCROLLING ROM BOOTSTRAP FOR THE GT40
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THE SELF TEST

2254	007204	012737	167214	172000	MOV	#FILED!160000,GT40PC		:START THE GT40
2255	007212	000001			WAIT			:AND WAIT
2256								
2257	007214	114020			FILED:	POINT!BLKOFF		:POINT--INVISIBLE
2258	007216	000000			0			
2259	007220	001377			MAXY			
2260								
2261	007222	112004			LONGV!INT0!LINE0			:DRAW TOP LINE
2262	007224	041777			INTX!MAXX			
2263	007226	000000			0			
2264								
2265	007230	112405			LONGV!INT2!LINE1			
2266	007232	040000			INTX			:DRAW LINE TO RIGHT
2267	007234	021377			MINUSX!MAXY			
2268								
2269	007236	113006			LONGV!INT4!LINE2			
2270	007240	061777			INTX!MINUSX!MAXX			:DRAW BOTTOM LINE
2271	007242	000000			0			
2272								
2273	007244	113407			LONGV!INT6!LINE3			
2274	007246	040000			INTX			
2275	007250	001377			MAXY			:DRAW LINE TO LEFT
2276								
2277	007252	114000			POINT			
2278	007254	000400			400			
2279	007256	000500			500			
2280	007260	106200			SHORTV!INT1			
2281	007262	057677			57677			:+X+Y
2282	007264	106600			SHORTV!INT3			
2283	007266	077677			77677			:+X-Y
2284	007270	107200			SHORTV!INT5			
2285	007272	077777			77777			: -X-Y
2286	007274	107600			SHORTV!INT7			
2287	007276	057777			57777			: -X+Y
2288								
2289	007300	114000			POINT			
2290	007302	001400			1400			
2291	007304	000500			500			
2292	007306	133030			RELATV!INT4!BLKON			
2293	007310	057677			57677			:+X+Y
2294	007312	077677			77677			:+X-Y
2295	007314	077777			77777			: -X-Y
2296	007316	057777			57777			: -X+Y
2297								
2298	007320	114000			POINT			
2299	007322	000400			400			
2300	007324	000100			100			
2301	007326	174120			STATSB!INCR+20			:TRY GRAPH MODES
2302	007330	114000			POINT			
2303	007332	001000			1000			
2304	007334	000200			200			
2305								
2306	007336	120000			GRAPHX			
2307	007340	001010			1010			
2308	007342	001020			1020			
2309	007344	001030			1030			

SCROLLING ROM BOOTSTRAP FOR THE GT40
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THE SELF TEST

2310	007346	001040	1040
2311	007350	001050	1050
2312			
2313	007352	114000	POINT
2314	007354	001000	1000
2315	007356	001200	1200
2316			
2317	007360	124000	GRAPHY
2318	007362	001020	1020
2319	007364	001030	1030
2320	007366	001040	1040
2321	007370	001050	1050
2322	007372	001060	1060
2323			
2324	007374	160000	DJMP
2325	007376	167214	FILE0!160000
2326			
2327			.SBTTL PAPER TAPE BOOT

```

2328
2329
2330
2331      177550
2332      177560
2333
2334
2335      007400 012701 160000
2336      007404 012702 000004
2337      007410 012703 167500
2338      007414 010712
2339      007416 012706 000024
2340      007422 014304
2341      007424 005714
2342      007426 100775
2343      007430 010712
2344      007432 012706 000024
2345      007436 010441
2346
2347      007440 040601
2348      007442 010111
2349      007444 011102
2350      007446 005214
2351      007450 105714
2352      007452 100376
2353      007454 116412 000002
2354      007460 005211
2355      007462 120227 000375
2356      007466 001366
2357      007470 105222
2358      007472 000142
2359
2360
2361
2362      007474 177560
2363      007476 177550
2364
2365

```

```

: PAPER TAPE BOOT
HSR=177550      ;HIGH SPEED READER ADDRESS
LSR=177550      ;LOW SPEED READER ADDRESS
:
:      .=ORIGIN+1400
PTBOOT: MOV      #160000,R1      ;SET MEMORY CHECK LIMITS
:      #4,R2      ;TRAP ADDRESS IS LOC. 4
:      #DEV+4!160000,R3      ;POINTER TO DEVICE ADDRESSES
:      PC,R2      ;PRESET TRAP ADDRESS IN LOC. 4
:      #24,SP      ;STACK SET UP AT SPECIAL ADDRESS
DEV1:  MOV      -(R3),R4      ;GET DEVICE ADDRESS
:      TST      R4      ;CHECK AVAILABILITY OF DEVICE
:      BMI      DEV1      ;CHECK DEVICE FOR ERRORS
:      MOV      PC,R2      ;RESET TRAP ADDRESS AT LOC. 4
:      #24,SP      ;SPECIAL ADDRESS USED AS MASK LATER
:      MOV      R4,-(R1)      ;DO MEM CHK:READER STATUS ADDRESS
:      IS MOVED
:      SET R1=X7752,MASK IN SP=24
:      STORE OWN ADDRESS IN POINTER
LOOP:  MOV      R1,R2      ;GET BYTE POINTER
:      INC      R4      ;ENABLE READER
:      TSTB     R4      ;TEST DONE BIT
:      BPL      #-2      ;WAIT UNTIL READY
:      MOVB     2(R4),R2      ;THEN PICK IT UP AND STORE IT
:      INC      R1      ;BUMP POINTER
:      CMPB     R2,#375      ;STORED JUMP OFFSET?
:      BNE      LOOP      ;NOT YET
:      INCB     (R2)+      ;YES,ALL DONE
:      JMP      -(R2)      ;GO EXECUTE AS BRANCH
:
: DEVICE ADDRESSES FOLLOW - DO NOT CHANGE THE ORDER
DEV:   LSR      ;LOW SPEED READER
:      HSR      ;HIGH SPEED READER
:
: .SBTTL CASSETTE BOOT

```

```

2366
2367
2368
2369      177500
2370
2371      007500      012700      177500
2372      007504      005010
2373      007506      010701
2374      007510      062701      000052
2375      007514      012702      000375
2376      007520      112103
2377
2378      007522      112110
2379      007524      100413
2380      007526      130310
2381      007530      001776
2382      007532      105202
2383      007534      100772
2384      007536      116012      000002
2385      007542      120337      000000
2386      007546      001767
2387      007550      003000
2388      007552      000755
2389
2390      007554      005710
2391      007556      100774
2392      007560      005007
2393
2394      007562      017640
2395
2396      007564      002415
2397
2398      007566      112024
2399
2400      007570      000000      000000
2401      007574      167500
2402      007576      000340
2403
2404
2405

; CASSETTE BOOT
TACS=177500
TABOOT: . =ORIGIN+1500
RES:    MOV     #TACS,R0
        CLR     (R0)
        MOV     PC,R1
        ADD     #TABLE--,R1
        MOV     #375,R2
        MOV     (R1)+,R3

LOOP1:  MOV     (R1)+,(R0)
        BMI     DONE
        BIT     R3,(R0)
        BEQ     LOOP2
        INCB    R2
        BMI     LOOP1
        MOV     2(R0),(R2)
        CMP     R3,#0
        BEQ     LOOP2
        STOP:   HALT
        BR      RES

DONE:   TST     (R0)
        BMI     STOP
        CLR     PC

TABLE:  .WORD    17640
        .WORD    2415
        .WORD    112024
        .WORD    0,0
        .WORD    TABOOT+160000
        .WORD    340

; TA-11 CONTROL AND STATUS REGISTER
; SELECT UNIT #0
; USE FOR PIC
; R1 HOLDS ADDR. OF COMMAND TABLE
; MEMORY PTR. AND DATA FLAG
; TEST BITS

; COMMAND FROM TABLE TO TACS
; WHEN COMMAND CODE NEG. QUIT
; TEST READY AND T-REG BITS IN TACS
; LOOP 'TIL SOMETHING COMES UP
; ADVANCE MEMORY POINTER
; IF MINUS, TRY NEXT COMMAND
; READ DATA INTO MEMORY
; FIRST BYTE READ SHOULD BE '240'
; IF C.K., GO READ ANOTHER BYTE
; HALT ON ERROR
; RESTART ON CONTINUE

; CHECK FOR ERROR
; HALT ON ERROR
; = 'JMP #0'

; .BYTE 240: READY+T-REQ.
; .BYTE 37:  ILBS+READY+GO
; .BYTE 15:  SFB+GO
; .BYTE 5:   READ+GO
; .BYTE 24:  READ+ILBS
; .BYTE 224: READ+ILBS+E.O.TABLE
; THESE ARE FILLER WORDS
; POWER UP VECTOR AND PRIORITY
;

.SBTTL  MP11-DB BOOT

```

SCROLLING ROM BOOTSTRAP FOR THE GT40
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MR11-DB BOOT

;MR11-DB BULK STORAGE PROGRAM LOADER LISTING

: .=ORIGIN+1600 ;KEEP TRACK OF ORIGIN

RF11: MOV PC,R2 ;FIXED HEAD DISK (256 KW)

BR OTHER
177462
5

RK11: MOV PC,R2 ;MOVING HEAD DISK (CARTRIDGE)

BR OTHER
177406
5

TC11: MOV PC,R2

BR TAPES
177344
5

;ADDRESS OF WORD COUNT
;LAST COMMAND
;FIRST COMMAND
;DONE MASK
;ERROR MASK

4003
100000
24000

TM11: MOV PC,R2

BR TAPES
172524
60003
60011
200
100000

;ADDRESS OF BYTE COUNT
;LAST COMMAND
;FIRST COMMAND
;DONE MASK
;ERROR MASK

RF11: MOV PC,R2

BR OTHER
176716

;MOVING HEAD DISK (PACK)

TAPES: RESET

MOV R2,R0
TST (0)+
MOV (0)+,R1
DEC (1)
TST (0)+
MOV (0)+,-(1)
BIT (0),(1)
BEQ .-2
TST (0)+
BIT (0),-(1)
BEQ OTHER
AGAIN: JMP (2)

;GET THE ADDRESS OF THE BRANCH
;R0 TO POINT AT LAST COMMAND
;GET THE WORD COUNT ADDRESS
;SET UP FOR ADVANCE 1 RECORD
;MOVE R0 TO FIRST COMMAND
;COMMAND WORD TO COMMAND REG.
;LOOK FOR DONE INDICATORS
;NONE SET, TRY AGAIN
;DONE FIRST COMMAND, CHECK FOR ERROR
;LOOK FOR SET ERROR BITS
;NO ERRORS - TRY THE READ
;RERUN FOR ERRORS

RFVEC: RF11!160000
340

;RF11 POWER UP VECTOR

2406
2407
2408
2409
2410 007600 010702
2411 007602 000451
2412 007604 177462
2413 007606 000005
2414
2415 007610 010702
2416 007612 000445
2417 007614 177406
2418 007616 000005
2419
2420
2421 007620 010702
2422 007622 000417
2423 007624 177344
2424 007626 000005
2425 007630 004003
2426 007632 100000
2427 007634 024000
2428
2429
2430 007636 010702
2431 007640 000410
2432 007642 172524
2433 007644 060003
2434 007646 060011
2435 007650 000200
2436 007652 100000
2437
2438
2439 007654 010702
2440 007656 000423
2441 007660 176716
2442
2443
2444 007662 000005
2445 007664 010200
2446 007666 005720
2447 007670 012001
2448 007672 005311
2449 007674 005720
2450 007676 012041
2451 007700 031011
2452 007702 001776
2453 007704 005720
2454 007706 031041
2455 007710 001406
2456 007712 000112
2457
2458
2459 007714 167600
2460 007716 000340
2461

M04

SCROLLING ROM BOOTSTRAP FOR THE 3740
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MR11-DB BOOT

```

2462 007720 010702
2463 007722 000401
2464 007724 177450
2465
2466
2467 007726 000005
2468 007730 010200
2469 007732 005720
2470 007734 012001
2471 007736 012711 177000
2472 007742 011041
2473 007744 032711 100200
2474 007750 001775
2475 007752 100757
2476 007754 005007
2477
2478 007756 000000
2479 007760 167610
2480 007762 000340
2481 007764 167720
2482 007766 000340
2483 007770 167654
2484 007772 000340
2485 007774 167620
2486 007776 000340
2487
2488

```

```

RC11:  MOV PC,R2          ;FIXED HEAD DISK 164Kw.
        BR OTHER          ;ADRS OF WORD COUNT 10COMMAND-2
        177450           ;COMMAND WORD (5) IS THE RESET

OTHER:  RESET
        MOV R2,R0         ;RD TO POINT AT WORD COUNT ADRS
        TST (0)+          ;POINT TO ADDRESS
        MOV (0)+,R1       ;WORD COUNT ADDRESS TO R1
        MOV #-1000,(1)    ;LOAD WORD COUNT
        MOV (0)-,(1)      ;COMMAND TO COMMAND REGISTER
        BIT #100200,(1)   ;CHECK FOR ERROR OR DONE
        BEQ .-4           ;IF NEITHER, KEEP LOOKING
        BMI AGAIN        ;ERROR, TRY AGAIN
        CLR PC

RKVEC:  0                  ;FILLER
        RK11!160000      ;RK POWER UP VECTOR
        340

RCVEC:  RC11!160000      ;RC POWER UP VECTOR
        340

RPVEC:  RP11!160000      ;RP POWER UP VECTOR
        340

TCVEC:  TC11!160000      ;TC11 POWER UP VECTOR
        340

```

.SBTTL ROM VERSION 1 VALUES

SCROLLING ROM BOOTSTRAP FOR THE GT40
DDGTEC.P11 05-NOV-76 10:20

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ROM VERSION 1 VALUES

.DSABL AMA

;DATA PATTERN STORED IN THE GT40 BOOTSTRAP VERSION 1

: ***** THIS IS A IMAGE LISTING OF THE GT40 (VT40) BOOTSTRAP *****
:
: THE DATA IS A MIRROR IMAGE OF THAT IN THE BOOTSTRAP ROMS
:
: ONLY THE ADDRESS FIELD IS CHANGED

;BOOTVT.S09 5/2/72 <SPECIAL>

; VT-40 BOOTSTRAP LOADER, VERSION S09, RELEASE R01, 5/2/72

: COPYRIGHT 1972, DIGITAL EQUIPMENT CORPORATION.
: 146 MAIN STREET
: MAYNARD, MASSACHUSETTS 01754

; WRITTEN BY JACK BURNES, SENIOR SYSTEMS ARCHITECT!

: THIS ROUTINE IS INTENDED TO BE LOADED IN THE ROM PORTION OF THE VT-40.

: REGISTER DEFINITIONS:

000000 R0=%0
000001 R1=%1
000002 R2=%2
000003 R3=%3
000004 R4=%4
000005 R5=%5
000006 R6=%6
000007 R7=%7

000006 SP=R6
000007 PC=R7

000000 RET1=R0
000001 INP1=R1
000002 INP2=R2
000003 WORK1=R3
000004 WORK2=R4
000005 SCR1=R5

000003 LCKSM=WORK1
000000 LBYT=RET1
000005 LBC=SCR1
000001 LADR=INP1

;RETURN OF VALUE REGISTER.
;ARGUMENT FOR CALLED FUNCTION
;SECOND ARGUMENT.
;FIRST WORK REGISTER.
;SECOND WORKING REGISTER.
;SCRATCH REGISTER.
;OVERLAPPING DEFINITIONS FOR LOADER PORTION.

2489
2490
2491
2492
2493
2494
2495
2496
2497
2498
2499
2500
2501
2502
2503
2504
2505
2506
2507
2508
2509
2510
2511
2512
2513
2514
2515
2516
2517
2518
2519
2520
2521
2522
2523
2524
2525
2526
2527
2528
2529
2530
2531
2532
2533
2534
2535
2536
2537
2538
2539
2540
2541
2542
2543
2544

SCROLLING ROM BOOTSTRAP FOR THE GT40
DDSTEC.F11 05-NOV-76 10:20

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ROM VERSION 1 VALUES

036000
166000

COREND=36000
ROMORG=166000

;FIRST LOCATION OF NON-CORE.
;WHERE THE ROM PROGRAM SHOULD GO.

000000
001360

STARTX=0
STARTY=1360

;WHERE TO START DISPLAYING THE X POSITIONS.
;WHERE TO START DISPLAYING THE Y.

036000
037000
038000
039000

VT40PC=172000-150000
KBDIS=27560
P100S=25614
P10IS=25610

;VT40 PROGRAM COUNTER.
;TTY INPUT STATUS.
;PDP-10 OUTPUT STATUS.
;PDP-10 INPUT STATUS.

027560
028512
029516

KBDIB=KBDIS+2
P10IB=P10IS+2
P10OB=P100S+2

;TTY INPUT BUFFER.
;PDP-10 INPUT CHARACTER.
;PDP-10 OUTPUT BUFFER.

045776
045772
015770

P100C=COREND-2+10000
P10IC=P100C-4
STKERT=P10IC-2-30000

;CHARACTER TO BE SENT TO THE PDP-10
;INPUT CHARACTER FROM 10 PLUS ONE SAVE CHARACTER
;FIRST LOCATION OF STACK.

160000

JMPDIS=160000

;THE VT-40 DISPLAY JUMP INSTRUCTION.

000024

PWRFAL=24

;POWER FAIL RESTART LOCATION.

016000

.=16000
.=ROMORG

;SET THE ORIGIN NOW!!!!

016000 012705 000026
016004 005015
016006 010745

STARTA: MOV #PWRFAL+2, SCR1
CLR 2SCR1
MOV PC, -(SCR1)

;PICK UP POINTER TO P.F. STATUS.
;CLEAR IT OUT TO BE SURE.
;SET UP THE RESTART LOCATION.

016010 000005

RESET

;RESET THE BUS.

016012 012767 000007 007570
016020 012767 000001 011532
016026 012767 000201 007560

MOV #7, P10IS
MOV #1, KBDIS
MOV #201, P100S

;INITIALIZE PDP-10 INPUT
;INITIALIZE TTY INPUT.
;INITIALIZE PDP-10 OUTPUT.

016034	012706	015770	RSTPT:	MOV	#STKSRT, SP	:SET UP THE STACK NOW!
016040	005001			CLR	LADR	:CLEAR ADDRESS POINTER.
016042	012702	160000		MOV	#JMPDIS, INP2	:PLACE A DISPLAY JUMP INSTRUCTION IN A REGISTER.
016046	010221			MOV	INP2, (LADR)+	:MOVE IT TO LOCATION 0.
016050	012711	166756		MOV	#DISPRG+150000, (LADR)	:MOVE ADDRESS POINTER INTO 2.
016054	012701	000030		MOV	#PWRPAL+4, LADR	:SET UP WHERE WE WILL STORE CHARACTERS.
016060	005000			CLR	RET1	:PREPARE TO INSERT A ZERO CHARACTER.
016062	004767	000022		JSR	PC, DOCHAR	:INSERT IT NOW.
016066	005067	003706		CLR	VT40PC	:CLEAR THE DISPLAY PROGRAM COUNTER AND START.
016072	004767	000210	MAJOR:	JSR	PC, GTCHR	:GT A CHARACTER NOW.
016076	000240			NOP		
016080	000240			NOP		
016082	000240			NOP		
016084	012746	156072		MOV	#MAJOR+150000, -(SP)	:INSERT IN DISPLAY BUFFER NOW.
016110	010105		DOCHAR:	MOV	LADR, SCR1	:GT CURRENT BUFFER POSITION NOW.
016112	022525			CMP	(SCR1)+, (SCR1)+	:BYPASS CURRENT DISPLAY JUMP.
016114	005025			CLR	(SCR1)+	:CLEAR FUTURE ADDRESS FOR JUMP.
016116	010225			MOV	INP2, (SCR1)+	:STICK IN TEMPORARY JUMP WHILE WE REPLACE CURREN
016120	005015			CLR	(SCR1)	:A DISPLAY JUMP TO ZERO.
016122	005011			CLR	(LADR)	:NOW REPLACE CURRENT DISPLAY JUMP BY THE CHARACT
016124	005021			BIS	RET1, (LADR)+	:IT'S DONE THIS WAY TO WASTE 2 CYCLES.
016126	010211			MOV	INP2, (LADR)	:TO AVOID TIMING PROBLEMS WITH THE VT40.
016130	000207			RTS	PC	:AND FINALLY RETURN.
016132	004767	000124	GT8:	JSR	PC, GTSIX	:GT SIX BITS NOW.
016136	010046			MOV	RET1, -(SP)	:SAVE THE CHARACTER NOW.
016140	000401			BR	GTP84	:BYPASS THE 8'ER
016142	005002		GT84:	CLR	INP2	:RESET THE MAGIC REGISTER NOW.
016144	005722		GTP84:	TST	(INP2)+	:INCREMENT WHERE TO GO.
016146	066207	166250		ADD	GT8TB+150000(INP2), PC	:UPDATE PC NOW.
016152			GT8P=.			
016152	004767	000104	GT81:	JSR	PC, GTSIX	:GT A CHARACTER NOW.
016156	010004			MOV	RET1, WORK2	:SAVE FOR A SECOND.
016160	006300			ASL	RET1	

SCROLLING ROM BOOTSTRAP FOR THE GT40
0027E0.P11 05-NOV-76 10:20

MACY11 27(1006) 05-NOV-76 12:10 PAGE 56
ROM VERSION 1 VALUES

2657	016162	006300	ASL	RET1	:SHIFT TO LEFT OF BYTE
2658	016164	006300	ASLB	RET1	
2659	016166	106116	ROLB	2SP	:PACK THEM IN.
2660	016170	006300	ASLB	RET1	
2661	016172	106116	ROLB	2SP	:A GOOD 8 BIT THING.
2662	016174	012600	MOV	(SP)+,RET1	:POP AND RETURN NOW.
2663	016176	000207	RTS	PC	
2664					
2665	016200	006300	GT82: ASL	RET1	:WORST CASE. SHIFT 4
2666	016202	006300	ASL	RET1	
2667	016204	106300	ASLB	RET1	
2668	016206	106104	ROLB	WORK2	
2669	016210	106300	ASLB	RET1	
2670	016212	106104	ROLB	WORK2	
2671	016214	106300	ASLB	RET1	
2672	016216	106104	ROLB	WORK2	
2673	016220	106300	ASLB	RET1	
2674	016222	106104	ROLB	WORK2	
2675	016224	010400	MOV	WORK2,RET1	
2676	016226	012604	MOV	(SP)+,WORK2	
2677	016230	000207	RTS	PC	
2678					
2679	016232	006100	GT83: ROL	RET1	
2680	016234	006100	ROL	RET1	
2681	016236	006004	ROR	WORK2	
2682	016240	106000	RORB	RET1	
2683	016242	006004	ROR	WORK2	
2684	016244	106000	RORB	RET1	:FINAL CHARACTER ASSEMBLED.
2685	016246	005726	TST	(SP)+	:FUDGE STACK.
2686	016250	000207	RTS	PC	:AND RETURN NOW.
2687					
2688		016250	GT8TB =	.-2	:PUSH ZERO CONDITION BACK INTO NEVER-NEVER LAND.
2689					
2690	016252	000000	.WORD	GT81-GT8P	
2691	016254	000026	.WORD	GT82-GT8P	
2692	016256	000060	.WORD	GT83-GT8P	
2693	016260	177770	.WORD	GT84-GT8P	
2694					
2695					
2696	016262	004767	000020	GT5IX: JSR	PC,GTCHR
2697	016266	020027	000040	CMP	RET1,#40
2698	016272	002546		BLT	LBAD
2699	016274	020027	000137	CMP	RET1,#137
2700	016300	003143		BGT	LBAD
2701	016302	000207		RTS	PC
2702					
2703					
2704					
2705	016304	005726	GTCHP: TST	(SP)+	:UPDATE THE STACK.
2706					
2707	016306	012700	015772	GTCHR: MOV	#P10IC-30000,RET1
2708	016312	004767	000064	GTCHL: JSR	PC,CHECK
2709	016316	005710		TST	2RET1
2710	016320	001774		BEQ	GTCHL
2711	016322	011046		MOV	2RET1,-(SP)
2712	016324	005020		CLR	(RET1)+

E05

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTEC.P11 05-NOV-76 10:20MACY11 27(1006) 05-NOV-76 12:10 PAGE 57
ROM VERSION 1 VALUES

2713	016326	042716	177600		BIC	#-200,(SP)	:CLEAR AWAY PARITY NOW.
2714	016332	001764			BEQ	GTCHP	:IF ZERO, GT ANOTHER
2715	016334	022716	000177		CMP	#177,(SP)	
2716	016340	001761			BEQ	GTCHP	:ALSO IGNORE RJBOLTS.
2717	016342	022710	000175		CMP	#175,ARET1	:WAS IT A "175"
2718	016346	001007			BNE	GTNP	:NOPE.
2719	016350	011610			MOV	(SP),ARET1	:YEP, RESET IN CASE OF ABORT.
2720	016352	021027	000122		CMP	ARET1,#122	:IS IT AN R
2721	016356	001626			BEQ	RSTRT	:YEP, RESTART
2722	016360	021027	000114		CMP	ARET1,#114	:IS IT AN L
2723	016364	001455			BEQ	LOAD	:YEP, LOAD.
2724							
2725	016366	011610		GTNP:	MOV	(SP),ARET1	:NOW DO THE FDUGING.
2726	016370	012600			MOV	(SP),ARET1	
2727	016372	020027	000175		CMP	ARET1,#175	
2728	016376	001743			BEQ	GTCHP	:IF ALTMODE, LOOP
2729	016400	000207			RTS	PC	
2730							
2731							
2732							
2733							
2734							
2735							
2736							
2737							
2738	016402	005767	027370	CHECK:	TST	P100C	:DO WE WANT TO OUTPUT?
2739	016406	001410			BEQ	CHECK1	:NO.
2740	016410	105767	007200		TSTB	P100S	:WE DO, IS THE IO READY?
2741	016414	100005			BPL	CHECK1	:NOT QUITE.
2742	016416	016767	027354	007172	MOV	P100C,P100B	:IT'S READY, SEND THE CHARACTER.
2743	016424	005067	027346		CLR	P100C	:AND THE SAVED CHARACTER.
2744							
2745	016430	105767	011124	CHECK1:	TSTB	KBDIS	:HEY, IS THE KEYBOARD READY?
2746	016434	100014			BPL	CHECK3	:NOPE, NO LUCK.
2747	016436	116746	011120		MOVB	KBDIB,-(SP)	:YEP, SAVE THE CHARACTER NOW.
2748	016442	012767	000001	011110	MOV	#1,KBDIS	:AND REENABLE THE COMMUNICATIONS DEVICE.
2749							
2750	016450	004767	177726	CHECK2:	JSR	PC,CHECK	:IS THE OUTPUT READY?
2751	016454	005767	027316		TST	P100C	
2752	016460	001373			BNE	CHECK2	:IF NOT, WAIT TILL DONE.
2753	016462	012667	007130		MOV	(SP)+,P100B	:AND THEN SEND OUT THE CHARACTER.
2754							
2755							
2756	016466	105767	007116	CHECK3:	TSTB	P101S	:IS THE IO TALKING TO ME.
2757	016472	100011			BPL	CHECK4	:NOPE, EXIT.
2758	016474	116767	007112	027270	MOVB	P101B,P101C	:GT THE CHARACTER NOW.
2759	016502	052767	177400	027262	BIS	#-400,P101C	:MAKE SURE IT'S NONE ZERO.
2760	016510	012767	000007	007072	MOV	#7,P101S	:REINITIALIZE COMMUNICATION LINE.
2761							
2762	016516	000207		CHECK4:	RTS	PC	:AND RETURN.
2763							
2764							
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016520 005302
016522 012712 172000
016526 012706 015770

016532 005303
016534 004767 000070
016540 105300
016542 001373
016544 004767 000050

016550 004767 000072
016554 010005
016556 162705 000004
016562 022705 000002
016566 001437
016570 004767 000052
016574 010001

016576 004767 000026
016602 002010
016604 105703
016606 001751

016610 012700

016612 102 175
016614 004767 000110
016620 000167 177210

016624 110021
016626 000763

016630 004767 177276
016634 060003
016636 042700 177400
016642 005305
016644 000207

016646 004767 177756
016652 010046
016654 004767 177750
016660 000300
016662 052600
016664 000207

; THE " L O A D E R

LOAD: CLR INP2 ; RESET TO FIRST 8 BIT CHARACTER.
MOV #172000, (INP2) ; AND ALSO CLEVERLY STOP THE VT40.
MOV #STKSRT, SP ; RESET STACK POINTER NOW.

LLD2: CLR LCKSM ; CLEAR THE CHECKSUM
JSR PC, LPTR ; GT A BYTE NOW.
DECB LBYT ; IS IT ONE?
BNE LLD2 ; NOPE. WAIT AWHILE
JSR PC, LPTR ; YEP. GT NEXT CHARACTER.

JSR PC, LGWRD ; GT A WORD.
MOV LBYT, LBC ; GT THE COUNTER NOW.
SJB #4, LBC ; CHOP OFF EXTRA STUFF.
CMP #2, LBC ; NULL?
BEQ LIMP ; YEP. MUST BE END.
JSR PC, LGWRD ; NOPE. GT THE ADDRESS.
MOV LBYT, LADR ; AND REMEMBER FOR OLD TIMES SAKE.

LLD3: JSR PC, LPTR ; GT A BYTE (DATA)
BGE LLD4 ; ALL DONE WITH THE COUNTER?
TSTB LCKSM ; YEP. GOOD CHECK SUM?
BEQ LLD2 ; NOPE. LOAD ERROR.

LBRD: MOV (PC)+, RET1 ; SEND OUT SOME CHARACTERS NOW.
; .BYTE 175, 102 ; "CTRL BAD"
; .BYTE 102, 175 ; "BAD CTRL"
JSR PC, SENDIT
JMP RSTRT

LLD4: MOVB LBYT, (LADR)+ ; PLACE THE BYTE IN CORE.
BR LLD3 ; GT ANOTHER ONE.

LPTR: JSR PC, GT8 ; GT 8 BITS NOW.
ADD LBYT, LCKSM ; UPDATE CHECKSUM
BIC #177400, LBYT ; CLEAN UP THE BYTE NOW.
DEC LBC ; UPDATE THE COUNTER.
RTS PC ; RETURN NOW.

LGWRD: JSR PC, LPTR ; GT A CHARACTER.
MOV LBYT, -(SP) ; SAVE FOR A SECOND.
JSR PC, LPTR ; GT ANOTHER CHARACTER.
SWAB LBYT ; NOW ASSEMBLE THE WORD.
BIS (SP)+, LBYT ; AND RETURN WITH A 16 BITER.
RTS PC

G05

SCROLLING ROM BOOTSTRAP FOR THE G*40
00000.P11 05-NOV-76 10:20

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ROM VERSION 1 VALUES

```

2825 016666 004767 177754      JMP:   JSR   PC,LGWRD      ;GT A WORD
2826 016672 010346              MOV   LBYT, -(SP)      ;SAVE ON THE STACK.
2827 016674 004767 17773C      JSR   PC,LPTR      ;GT A CHARACTER.
2828 016700 105703              TSTB  LCKSM      ;IS IT ZERO?
2829 016702 001342              BNE   LBAD      ;YEP. WHAT CRAP.
2830 016704 032716 000001      BIT   #1, (SP)      ;IS IT ODD?
2831 016710 001406              BEQ   LJMP1      ;YEP. START PROGRAM GOING NOW.
2832 016712 012700              MOV   (PC)+, RET1    ;TELL PDP-10 WE'VE LOADED OK.
2833 016714 107 175              .BYTE 175, 107      ;"CTRL GOOD"
2834 016716 004767 000006      JSR   PC,SENDIT     ;"GOOD CTRL"
2835 016722 000000              HALT
2836 016724 000776              BR    .-2
2837 016726 000136      LJMP1:  JMP   2(SP)+      ;AND AWAY WE GO.
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2858 016730 004767 177446      SENDIT: JSR   PC,CHECK
2859 016734 005767 027036      TST   P100C
2860 016740 001373              BNE   SENDIT
2861 016742 010067 006650      MOV   RET1, P100B
2862 016746 105000              CLRB
2863 016750 000300              RETI
2864 016752 001366              SWAB
2865 016754 000207              RETI
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;POLL THE OUTPUT DEVICE NOW.
;OUTPUT CLEAR?
;NOPE. LOOP AWHILE LONGER.
;SEND OUT THE CHARACTER.
;CLEAR THE SYTE.
;AND SWAP THEM NOW.
;IF NOT EQUAL, REPEAT.

```

SCROLLING ROM BOOTSTRAP FOR THE G*40
DOGTREC.P11 05-NOV-76 10:20

MACY11 27(1006) 05-NOV-76 12:10 PAGE 60
ROM VERSION 1 VALUES

2881
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016756 170256
016760 115124
016762 000000
016764 001360
016766 100000
016770 160000
016772 000030
016774 000000
016776 000000

017000 000000

000001

: THIS IS THE INITIALIZING VT40 PROGRAM WHICH WILL
: JUMP TO THE PROGRAM AFTER THE POWER FAIL LOCATIONS
: WHICH WILL JUMP TO ZERO WHICH WILL JUMP BACK TO HERE.

DISPRG:	.WORD	170256	:LOAD STATUS REGISTER FOR NORMAL OPERATION.
	.WORD	115124	:SET POINT MODE, "NORMAL".
	.WORD	STARTX	:X COORDINATE
	.WORD	STARTY	:Y COORDINATE
	.WORD	100000	:SET CHARACTER MODE.
	.WORD	JMPDIS	:THEN JUMP TO THE POWERFAIL LOCATION.
	.WORD	PWRFAIL+4	:TO DISPLAY USERS CHARACTERS.
	.WORD	0	
	.WORD	0	

: STARTING FROM HERE TO THE TOP OF MEMORY
: A BACKGROUND WORSE CASE NOISE TASK WILL BE EXECUTED

BUFFER: 0.
.END

[illegible]

SCROLLING ROM BOOTSTRAP FOR THE GT40
DDGTEC.P11 05-NOV-76 10:20

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CROSS REFERENCE TABLE -- USER SYMBOLS

DSMR = 177570	449#	564				
ENOCOR 006036	1721#	1722				
ERRVEC= 000004	448#	562	563*	570*		
FF 006256	1808	1838#				
FFLOOP 006262	1833	1840#	1843			
FILEC 007214	2254	2257#	2325			
FILEOA 005722	580*	683*	687*	1516#		
FILEOB 005724	687	1517#				
FILEOC 005752	580	683	1516	1525#		
FILEOD 003012	529	843#	1527			
GETCHR 006564	1791	1981#	2003			
GETDL 006516	1959#	1964	1968	1970	1981	1985
GETDL1 006546	1960	1967#				
GETEXT 006650	1983	1989	2009#			
GETSIX 006630	2003#	2041	2056			
GETB 006664	2041#	2150				
GETBTB 006700	2044	2046#				
GETB1 006712	2046	2056#				
GETB2 006740	2047	2068#				
GETB3 006772	2048	2083#				
GETB4 006706	2052#					
GRAPHX= 120000	187#	1040	2206#	2306		
GRAPHY= 124000	187#	876	2207#	2317		
GRPINC 003074	581*	679*	680	682*	874#	
GTAOD 001000	459#	542				
GTBOL 001004	461#	574	576	578		
GTBUSE 006424	1893#	1916				
GTCHL 016312	2708#	2710				
GTCHP 016304	2705#	2714	2716			
GTCHR 016306	2614	2696	2707#	2728		
GTDLYC 001314	540#	579*	676*	578*		
GTDNE1 001170	503#	574*				
GTDONE 001166	502#	573*				
GTLPEN 002220	575	687#				
GTLPH 001172	505#	575*				
GTLPH1 001174	506#	576*				
GTNP 016366	2718	2725#				
GTFC 001146	492#	529*	541	684*	688*	
GTPB4 016144	2647	2649#				
GTSHIF 002236	577	691#				
GTSIX 016262	2645	2654	2696#			
GT50TM 001176	508#	577*				
GT50T1 001200	509#	578*				
GT5R 001150	493#	671	818*			
GTSTOP 002130	573	671#				
GTST1 002202	677	681	683#			
GTVCT 001002	460#	546				
GTXP05 001152	494#					
GTYP05 001154	495#					
GT40PC= 172000	1652#	1653	1893*	1927	2254*	
GT40SR= 172002	1653#	1835*				
GTB 016132	2645#	2813				
GTBP = 016152	2652#	2690	2691	2692	2693	
GTBTB = 016250	2650	2688#				
GTB1 016152	2654#	2690				
GTB2 016200	2665#	2691				

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTEC.P11 05-NOV-76 19:20

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CROSS REFERENCE TABLE -- USER SYMBOLS

```
GT83      C16232
GT84      C16142
HEADER    006474
HSR       = 177550
IMAGE     001020
INCR      = 000100
INGT      001474
INITGT    001316
INSERT    006350
INSRTL    006406
INSRTX    006422
INTD      001566
INTE      001602
INTX      = 040000
```

[illegible]

INT0	=	002000
INT1	=	002200
INT2	=	002400
INT3	=	002600
INT4	=	003000
INT5	=	003200
INT6	=	003400
INT7	=	003600
ITAL0	=	000040
ITAL1	=	000060
JMPADD	=	007012
JMPDIS	=	160000
KBCBR		002626
KBDIB	=	027562
KBCIS	=	027560
KPIN		002440
KPNT		002624
KRBRL		001226
KREVT		001222
KREVT1		001224
LBAD		016610
LF		006300
LFLOOP		006310
LFOUNO		006330
LFSUB		006304
LGWRD		016646
LINE0	=	000004
LINE1	=	000005
LINE2	=	000006
LINE3	=	000007
LJMP		016666
LJMP1		016726
LLD2		016532
LLD3		016576
LLD4		016624
LOAD		016520
LOADER		007012

2288	2276	2274	2261				
187#	1442	2210#	2280				
187#	1436	2211#	2285				
187#	1430	2212#	2286				
187#	1424	2213#	2282				
187#	850	1418	1448	2214#	2269	2292	
187#	1412	2215#	2284				
187#	1406	2216#	2273				
187#	1400	2217#	2286				
187#	1290	1322	1358	1394	2236#		
187#	1305	1340	1376	2237#			
1660#	1850	1861*	1940	1991*	2113*		
2568#	2606	2896					
752*	753*	754	764	784#			
1650#	1969	2558#	2747				
1649#	1650	1967	2554#	2558	2599*	2745	2748*
597	744#						
536*	751	755*	756	758*	759	783#	
524#	578						
521#	577*						
522#	598*						
2698	2700	2804#	2830				
1806	1347#						
1852#	1855	1857					
1853	1859#						
1841	1850#						
2791	2796	2819#	2826				
187#	850	865	1400	2224#	2261		
187#	853	2225#	2265				
187#	856	2226#	2269				
187#	859	2227#	2273				
2795	2826#						
2832	2840#						
2785#	2788	2802					
2799#	2811						
2800	2810#						
2723	2781#						
1987	2113#						

MACY11 27(1006) 05-NOV-76 12:10 PAGE 65
CROSS REFERENCE TABLE -- USER SYMBOLS

[illegible]

M05

SCROLLING ROM BOOTSTRAP FOR THE J740
 DCGTEC.P11 05-NOV-76 10:20

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 CROSS REFERENCE TABLE -- USER SYMBOLS

PWRFL= 000024	2571*	2592	2609	2897					
PWRFL 001674	446	601*	605						
PWRUP 001704	601	604*							
PICIB = 025612	2559*	2758							
PICIC = 045772	2564*	2565	2707	2758*	2759*				
PIDIS = 025610	2556*	2559	2598*	2756	2760*				
P100B = 025616	2560*	2742*	2753*	2861*					
P100C = 045776	2563*	2564	2738	2742	2743*	2751	2859		
P100S = 025614	2555*	2560	2600*	2740					
RCVEC 007764	2481*								
RC11 007720	2462*	2481							
REDCMR 002436	723*	724*	725	738*					
RELATV= 130000	187*	1200	1212	2208*	2292				
RES 007506	2373*	2388							
RESTR 006060	1746*	1992							
RFVEC 007714	2459*								
RF11 007600	2410*	2459							
RKVEC 007760	2479*								
RK11 007610	2415*	2479							
ROMADD 001014	467*	799							
ROMORG= 166000	2547*								
RCTVAL 002052	643*	660							
RPNT 002432	535*	722	726*	727	729*	730	736*		
RPVEC 007770	2483*								
RP11 007654	2439*	2483							
RSTRT 016034	2604*	2721	2808						
SENDIT 016730	2807	2836	2858*	2860	2864				
SETDUN 006126	1761	1770*							
SETLP1 006074	1752*	1754							
SETLP2 006110	1760*	1767							
SETLP3 006116	1764*	1766							
SETUP 006432	1757	1914*							
SHORTV= 104000	187*	1224	1236	2203*	2280	2282	2284	2286	
SIZE 001312	539*	624*	625*	628					
START 006000	480	1710*							
STARTA 016000	483	2592*							
STARTB 001022	456	471*	606	674	692	699	719	747	836
STARTX= 000000	2549*	2893							
STARTY= 001360	2550*	2894							
STATSA= 170000	187*	1290	1305	1322	1340	1358	1376	1394	2231*
STATSB= 174000	187*	581	680	682	846	874	2241*	2301	
STKSRT= 015770	2565*	2604	2783						
STOP 007550	2387*	2391							
SWR 001230	475	477	526*	564*	565	569*			
SWREG 000170	452*	569							
SYNOFF= 000010	187*								
SYNON = 000004	187*	2238*							
TAB 006222	1805	1823*	1827						
TABLE 007562	2374	2394*							
TABOOT 007500	2371*	2401							
TACS = 177500	2369*	2371							
TAPES 007662	2422	2431	2444*						
TCVEC 007774	2485*								
TC11 007620	2421*	2485							
TKB 001214	517*	752							
TKS 001212	516*	532*	744						

SCROLLING ROM BOOTSTRAP FOR THE GT40 MACY11 27(1006) 05-NOV-76 12:10 PAGE 67
DOGTEC.P11 05-NOV-76 10:20 CROSS REFERENCE TABLE -- USER SYMBOLS

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTEC.P11 05-NOV-76 10:20

MACY11 27(1006) 05-NOV-76 12:10 PAGE 67
CROSS REFERENCE TABLE -- USER SYMBOLS

```

THEN                                002702
THPENO=                             007776
TN!!                                007636
TPB                                 001220
TPS                                 001216
VT                                  006244
VT4GPC=                             022000
WCFCS                               001016
XMLTP1                             002020
XMLTP2                             002024
XMLTP3                             002040
.                                  = 017002

```

[illegible]

SCROLLING ROM BOOTSTRAP FOR THE GT40
DOGTED.P11 05-NOV-76 10:20

MACY11 27 10061 05-NOV-76 12:10 PAGE 69
CROSS REFERENCE TABLE -- MACRO NAMES

[illegible]

C06

SCROLLING ROM BOOTSTRAP FOR THE 6740
2027C.P1: 05-NOV-76 10:20

MACY11 27(1006) 05-NOV-76 12:10 PAGE 70
CROSS REFERENCE TABLE -- MACRO NAMES

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. ABS. C17002 000

```

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

```

DDGTEC.BIN DDGTEC.SEG/50 ORF NL:TOC=DDGTEC.SML.DDGTEC.P11
RPT+TIME: RPT+CO: 12 SEC 500MS
CPE (SEC: 33 165 4125)

Spooler runtime 8 Seconds, 39 KCS, 210 disk reads, 3 disk writes, 67 pages

Approved for Release by NSA on 09-08-2013 pursuant to E.O. 13526

```

000000001111111112222222223333333344444444555555556666666677777777888888889999999900000000111111112222222233333333

```