



**DATA GENERAL
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PROGRAM

Memory Checkerboard III

TAPES

Binary: 095-000031

ABSTRACT

Checkerboard III is a maintenance program designed to produce worst case noise conditions on the sense/inhibit wires. The program should be run to insure proper operation of sense amps, inhibit drivers, and memory currents.

CHECKERBOARD III

11. ABSTRACT
 / CHECKERBOARD III IS A MAINTENCE PROGRAM DESIGNED
 / TO PRODUCE WORST CASE NOISE CONDITIONS ON THE
 / SENSE/INHIBIT WIRES. THE PROGRAM SHOULD BE RUN
 / TO INSURE PROPER OPERATION OF SENSE AMPS,INHIBIT
 / DRIVERS, AND MEMORY CURRENTS.

12. MACHINE REQUIREMENTS
 12.1 NOVA/SUPERNOVA PROCESSOR
 12.2 4K READ/WRITE MEMORY

13. SWITCH SETTINGS
 13.1 STARTING ADDRESS =000002
 13.2 SWITCH 0(1) =1024 READ/WRITE DISTURB
 13.3 SWITCH 15(1) =INHIBIT HALT ON ERROR

14. OPERATING PROCEEDURE
 14.1 LOAD THE PROGRAM VIA THE BINARY LOADER
 14.2 SET SWITCHES TO 000002
 14.3 PRESS START
 14.3.1 THE PROGRAM WILL PRINT THE HIGHEST
 / LOCATION THE PATTERN IS TO USE.
 14.4 IF THE FAILURES ARE MARGINAL, SETTING SWITCH
 / 0 MAY AID IN INDUCING A FAILURE TO OCCURE.
 14.5 WHEN SCOPING OR ADJUSTING CURRENTS, SETTING
 / SWITCH 15 WILL INHIBIT THE ERROR HALT. THE
 / BELL WILL STILL BE RUNG.
 14.6 PROGRAM MODIFICATIONS
 14.6.1 C(3)=ADR THE STARTING PATTERN ADD
 14.6.2 C(5)=INHIBIT INHIBIT THE CHECKERBOARD
 / PATTERN ON CLEARED BITS.

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RESS

15. PROGRAM OUTPUT/ERROR DISCRIPTION
15.1 AT EACH OCCURANCE OF ERROR, IF THE TELETYPE IS N
| BUSY THE BELL WILL BE RUNG. IF SWITCH (15) IS "
| THE PROGRAM WILL HALT AT LOCATION "ER".
15.2 WHEN A ERROR HALT OCCURES:
| C(1)=THE ERROR WORD
| C(2)=THE ERROR ADDRESS
| C(3)=ADDRESS OF PROGRAM
15.3 SET SWITCH (15) IF SCOPING,PRESS CONTINUE.
15.4 SYNC PULSES
| A "P" PULSE (A74) IN STORE CYCLE.
| A "S" PULSE (A52) CHECK ONES PATTERN WOR
| A "C" PULSE (A50) CHECK ZEROS PATTERN WO

16. PROGRAM DISCRIPTION
16.1 STORE THE CHECKERBOARD PATTERN
16.2 IF SWITCH 0(1) DISTURB THE CONTENTS OF MEMORY BY
| REFFERANCING LOCATIONS 0101,0202,0303,ETC. 512
| TIMES. THIS PRODUCES 1024 READ/WRITE DISTURBS.
16.3 CHECK THE PATTERN WORD
16.4 COMPLEMENT AND CHECK THE WORD
16.5 RESTORE THE WORD
16.6 WHEN THE END OF THE PATTERN IS REACHED THE
| PROGRAM COMPLEMENTS THE PATTERN WORD AND RE-
| TURNS TO STEP 6.1 .

17. LIMITATIONS
| NONE

A 0003 .MAIN

```
000002 .LOC 2
00002 000164 JMP MSIZ

00003 000620 ADR: 620 ;PATTERN STARTING ADDRESS
00004 007577 FINAL: 7577 ;PATTERN FINAL ADDRESS
00005 177777 INH: -1 ;MASK FOR INHIBITED BITS
00006 000000 PATT: 0 ;PATTERN WORD
00007 000000 ERET: 0

000040 .LOC 40

00040 000017 C17: 17
00041 000400 C400: 400
00042 000077 C77: 77
00043 007777 C7777: 7777
00044 000207 C207: 207
00045 000101 C101: 101
00046 060200 CNIOC: NIOC 0
00047 060100 CNIOS: NIOS 0
00050 070000 C070000: 070000
00051 000000 MODUAL: 0
00052 000000 EDIST: 0
00053 001000 K1000: 1000
00054 177577 M201: -201
00055 000224 CMA: MMA2
00056 177625 PSIZE: BEGIN=CEND
00057 000000 PLOC: 0
00060 000000 BPROG: 0
00061 000000 EPROG: 0
00062 012345 RANDOM: 12345
00063 177700 M20: -20
00064 000020 C20: 20
00065 000432 CBEG: BEGIN
00066 000000 RETURN: 0

00067 004126 SEND: JSR ,RAND ;GET A RNADOM #
00070 000062 RANDOM
00071 024004 LDA 1,FINAL
00072 030056 LDA 2,PSIZE
00073 147000 ADD 2,1
00074 101220 MOVZR 0,0
00075 122422 SUBZ 1,0,SZC
00076 000075 JMP ,=1
00077 123000 ADD 1,0 ;AC0** MODULO C(FINAL).
00100 024063 LDA 1,M20
00101 123400 AND 1,0
00102 024003 LDA 1,ADR
00103 122433 SUBZ# 1,0,SNC ;IF # TO SMALL USE
00104 121000 MOV 1,0 ;C(ADR) FOR STARTER.

00105 040057 STA 0,PLOC
00106 034063 LDA 3,M20
00107 117000 ADD 0,3
00110 054060 STA 3,BPROG
00111 142400 SUB 2,0
00112 040061 STA 0,EPROG
```

A 0004 .MAIN

00113	145000	MOVE1	MOV 2,1	
00114	030065		LDA 2,CBEG	
00115	021000		LDA 0,0,2	IMOVE A COPY OF
00116	041420		STA 0,20,3	ICHECKERBOARD TO
00117	175400		INC 3,3	ISELECTED SPOT.
00120	151400		INC 2,2	
00121	125404		INC 1,1,3ZR	ITEST FOR LAST REG
00122	000115		JMP MOVE+2	ITO BE MOVED.
00123	034057		LDA 3,PLOC	
00124	005401		JSR 1,3	IEXIT TO PROG.
00125	000212		JMP MMA	

00126	054160	.RAND1	STA 3,.UD03	IGENERATE A RANDOM #
00127	010160		ISZ .UD03	
00130	044156		STA 1,.UD01	
00131	050157		STA 2,.UD02	
00132	031400		LDA 2,0,3	
00133	021000		LDA 0,0,2	
00134	004143		JSR .UD50	
00135	034162		LDA 3,.UD20	
00136	163000		ADD 3,0	
00137	041000		STA 0,0,2	
00140	024156		LDA 1,.UD01	
00141	030157		LDA 2,.UD02	
00142	002160		JMP 0,.UD03	IRETURN

00143	024163	.UD501	LDA 1,.UD21	
00144	044161		STA 1,.UD10	
00145	105120		MOVZL 0,1	
00146	125120		MOVZL 1,1	
00147	014161		DSZ .UD10	
00150	000146		JMP .-2	
00151	107000		ADD 0,1	
00152	125120		MOVZL 1,1	
00153	125120		MOVZL 1,1	
00154	123000		ADD 1,0	
00155	001400		JMP 0,3	

00156	000000	.UD011	0	
00157	000000	.UD021	0	
00160	000000	.UD031	0	
00161	000000	.UD101	0	
00162	033031	.UD201	33031	
00163	000010	.UD211	10	

A 0005 .MAIN

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00164 020053 MSIZ1 LDA 0,K1000 JSIZE THE MEMORY
00165 115000 MOV 0,3
00166 031400 MSIZ1: LDA 2,0,3 JSAVE C(MEM)
00167 055400 STA 3,0,3
00170 025400 LDA 1,0,3
00171 051400 STA 2,0,3 IRESTORE MEMORY

00172 125014 MOV# 1,1,8ZR
00173 124015 COM# 1,1,8NR
00174 000202 JMP MSIZ2 IEND OF MEMORY
00175 136414 SUB# 1,3,8ZR IAC1#BAD, AC3#GOOD
00176 063077 HALT IMEMORY FAILED.
00177 117000 ADD 0,3
00200 175113 MOVL# 3,3,SNC IINCREMENT MEMORY ADDRESS.
00201 000166 JMP MSIZ1 ITEST FOR 32K.

00202 020054 MSIZ2: LDA 0,M201
00203 103000 ADD 3,0
00204 040004 STA 0,FINAL
00205 004372 JSR CRLF
00206 004247 JSR MESS
00207 000234 MESIZE
00210 024004 LDA 1,FINAL
00211 004266 JSR POCT

00212 063611 MMA: SKPDN TTO
00213 000212 JMP .-1 IWAIT FOR TTO DONE.
00214 020055 LDA 0,CMA
00215 040001 STA 0,1 ISET INTERRUPT RETURN.
00216 152520 SUBZL 2,2 ITHIS PROG TEST FOR INTERRUPT
00217 102000 MMA1: ADC 0,0 IABILITY TO CLEAR MA.
00220 040000 STA 0,0
00221 025000 LDA 1,0,2
00222 060177 NIOS CPU IENABLE INTERRUPT
00223 005000 JSR 0,2 ISET BIT INTO MA
00224 045000 MMA2: STA 1,0,2
00225 020000 LDA 0,0
00226 112414 SUB# 0,2,8ZR IAC0#PC STORED
00227 063077 HALT IAC2#CORRECT. MEMORY FAILED!
00230 151120 MOVZL 2,2
00231 151113 MOVL# 2,2,SNC
00232 000217 JMP MMA1
00233 000067 JMP SEND

MESIZE: .TXTE I
LAST LOCATION TESTED I
00234 040714
00235 152123
00236 146240
00237 141717
00240 152101
00241 147711
00242 120116
00243 142724
00244 152123
00245 042305
00246 000240
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ITTO NON INTERRUPT PACKAGE

;"MESS" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLR
 ;"CHAR" PRINTS ASCII CHARACTER, C(0)R,C(0)L MUST BE 0
 ;WILL RETURN +2 IF C(0)R=0,CORRECTS THE PARITY,33 SIMULATE
 ;"TYPE" PRINTS C(0)R. MUST HAVE PROPER PARITY. RETURN IS
 ;TO CALL+1,REPLACE THIS ROUTINE WITH INTERRUPT TYPE IF DESIRED.
 ;"CRLF" PRINTS A CARRIAGE RETURN
 ;"POCT" PRINTS C(1) IN OCTAL FOLLEOWED BY A TAB
 ;"PDEC" PRINTS C(1) IN DECIMAL,LEADONG ZEROS SUPPRESSED,
 ;FOLLOWED BY A TAB.

00247	054546	MESS:	STA 3,MESSR	;PRINT A TEXT MESSAGE
00250	010545		ISZ MESSR	
00251	031400		LDA 2,0,3	;C(2) POINTS TO MESSAGE
00252	024542		LDA 1,C377	;A 8 BIT MASK
00253	021000		LDA 0,0,2	;C(2)=DATA WORD
00254	125112		MOVL# 1,1,SZC	
00255	123701		ANDS 1,0,SKP	
00256	123401		AND 1,0,SKP	;C(0)=DATA CHARACTER RIGHT
00257	151400		INC 2,2	;INC TO NEXT WORD
00260	124000		COM 1,1	;FLIP MASK
00261	004343		JSR CHAR	;PRINT
00262	000253		JMP MESS+4	;ANOTHER
00263	002532		JMP 0MESSR	;LAST
00264	020525	ZOCT:	LDA 0,CH240	
00265	101001		MOV 0,0,SKP	
00266	020525	POCT:	LDA 0,C60	
00267	030322		LDA 2,OCTAB	;PRINT C(1) IN OCTAL
00270	000273		JMP .+3	
00271	030332	PDEC:	LDA 2,DECTB	;PRINT C(1) IN DECIMAL
00272	020517		LDA 0,CH240	;SUPPRESS LEADING ZEROS
00273	054342		STA 3,RADRET	;BOTH ENTRYS PRINT NUMBER
00274	040341		STA 0,ZSUPP	;THEN TAB TO NEXT POSITION
00275	050276		STA 2,+.1	
00276	000000	DECOCT:	0	;A"LDA 2,TABLE" INSTRUCTION
00277	010276		ISZ .-1	
00300	034342		LDA 3,RADRET	;SETUP "TAB" AT END
00301	020503		LDA 0,CHTAB	
00302	151005		MOV 2,2,SNR	;IF TABLE ENTRY=0
00303	000343		JMP CHAR	;EXIT WITH TAB
00304	034341		LDA 3,ZSUPP	;ZEROS SUPPRESS STUP
00305	102400		SUB 0,0	
00306	146512	DECOT:	SUBL# 2,1,SZC	
00307	000314		JMP DECP	
00310	146400		SUB 2,1	;FORM THE DIGIT
00311	034502		LDA 3,C60	
00312	101400		INC 0,0	
00313	000306		JMP DECOT	
00314	151235	DECP:	MOVZR# 2,2,SNR	
00315	034476		LDA 3,C60	
00316	054341		STA 3,ZSUPP	;C(0)=DIGIT
00317	103000		ADD 3,0	;MAKE ASCII
00320	004343		JSR CHAR	;PRINT
00321	000276		JMP DECOCT	;GET NEXT DIGIT

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00322 030323 OCTAB: LDA 2, .+1
00323 100000          100000
00324 010000          10000
00325 001000          1000
00326 000100          100
00327 000010          10
00330 000001          1
00331 000000          0

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00332 030333 DECTB: LDA 2, .+1
          000012 .RDX 10
00333 023420          10000
00334 001750          1000
00335 000144          100
00336 000012          10
00337 000001          1
00340 000000          0
          000010 .RDX 8

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00341 000000 ZSUPP: 0
00342 000000 RADRET: 0

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00343 054442 CHAR: STA 3, CHRET          ;PRINT C(0) RIGHT
00344 101325          MOVZ8 0,0,SNR          ;RETURN +2 IF NULL
00345 001401          JMP 1,3
00346 040440          STA 0, CHSAV
00347 170000          ADC 3,3          ;COMPUTE THE PARITY
00350 117000          ADD 0,3
00351 103404          AND 3,0, SZR
00352 000347          JMP .-3
00353 176600          SUBCR 3,3          ;COMBIND PARITY WITH CHAR
00354 020432          LDA 0, CHSAV
00355 103300          ADD8 3,0

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00356 034426 CHAR1: LDA 3, CHTAB          ;IS THIS A TAB
00357 116405          SUB 0,3,SNR
00360 000363          JMP .+3          ;YES
00361 004435          JSR TYPE          ;NO PRINT IT
00362 002423          JMP 0CHRET          ;EXIT

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00363 020424          LDA 0, CHORZ          ;SIMULATE A TAB
00364 034424          LDA 3, CHAR7          ;VIA 1 TO 8 SPACES
00365 117405          AND 0,3,SNR
00366 002417          JMP 0CHRET
00367 020422          LDA 0, CH240
00370 004426          JSR TYPE
00371 000363          JMP .-6

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00372 054420 CRLF1  STA 3,CRLF  )SAVE RETURN
00373 020410          LDA 0,C215
00374 004343          JSR CHAR  )PRINT CARRIAGE AND LF
00375 020405          LDA 0,C212
00376 004343          JSR CHAR
00377 102400          SUB 0,0
00400 040407          STA 0,CHORZ )CLEAR HORZ POSISTION
00401 002411          JMP 0CRLF  )EXIT

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00402 000212 C212: 212
00403 000215 C215: 215
00404 000011 CHTAB: 11
00405 000000 CHRET: 0
00406 000000 CHSAV: 0
00407 000000 CHORZ: 0
00410 000007 CHAR7: 7
00411 000240 CH240: 240
00412 000000 CRLF1: 0
00413 000050 C60: 50

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00414 000377 C377: 377
00415 000000 MESSR: 0
00416 054412 TYPE:  STA 3,TYPRET )TYPE THE C(0)R IF
00417 010770          ISZ CHORZ
00420 074477          READS 3      )SWITCH 1(0).
00421 175100          MOVL 3,3
00422 175102          MOVL 3,3,SZC
00423 002405          JMP 0TYPRET )INHIBIT TYPE EXIT.
00424 063511          SKPBZ TTD
00425 000777          JMP .-1
00426 061111          DOAS 0,TTD
00427 002401          JMP 0TYPRET
00430 000000 TYPRET: 0

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00431	063077		HALT		
00432	004401	BEGIN:	JSR ,+1		OPERATOR ERROR FIX C(ADR)
00433	054060		STA 3,RETURN		
00434	034003		LDA 3,ADR		
00435	030050		LDA 2,C070000		
00436	020004		LDA 0,FINAL		
00437	143400		AND 2,0		
00440	040052		STA 0,EDIST		
00441	173400		AND 3,2		
00442	050051		STA 2,MODUAL		THE MEMORY MODUAL
00443	030003	IPAT:	LDA 2,ADR		
00444	024041		LDA 1,C400		
00445	020006		LDA 0,PATT		PRESET PATTERN
00446	147404		AND 2,1,SZR		
00447	100000	IPAT1:	COM 0,0		
00450	024005		LDA 1,INH		
00451	123400		AND 1,0		MASK INHIBITED BITS
00452	024040		LDA 1,C17		
00453	060300	FILL:	NIOP 0		SYNC AT A74
00454	034060		LDA 3,BPROG		CODE TO AVOID OVERWRITE
00455	156436		SUBZ# 2,3,SEZ		OF THE PROGRAM.
00456	000403		JMP ,+3		PATT < PROGRAM BEGIN.
00457	034061		LDA 3,EPROG		
00460	172436		SUBZ# 3,2,SEZ		DONT SKIP IF > PROG END.
00461	041000		STA 0,0,2		
00462	034042		LDA 3,C77		
00463	151400		INC 2,2		PATTERN
00464	133414		AND# 1,2,SZR		SKIP EVERY 16 TIMES
00465	000760		JMP FILL		
00466	157414		AND# 2,3,SZR		SKIP EVERY 64 TIMES
00467	000760		JMP IPAT1		
00470	020004		LDA 0,FINAL		TEST FOR FINAL ADDRESS
00471	142432		SUBZ# 2,0,SZC		EVERY 64 LOC. 4K
00472	000752		JMP IPAT+1		FILL TIME=100MS.

A 0010 ,MAIN

00473	030051	DISTURB	LDA 2,MODUAL	1DISTURB MODULE SELECT
00474	020043		LDA 0,C7777	1DISTURB AT LOCATION
00475	024052		LDA 1,EDIST	10101,0202,0303,ETC.
00476	123000		ADD 1,0	
00477	024045		LDA 1,C101	1EVERY OTHER CORE IN MEMORY
00500	133000		ADD 1,2	1IS DISTURBED AT LEAST
00501	074477		READS 3	11024 TIMES+INHIBIT DISTURBS.
00502	175112		MOVL# 3,3,SZC	1BUT ONLY IF SWITCH 0
00503	142433		SUBZ# 2,0,SNC	1IS SET TO A ONE.
00504	000406		JMP ICHECK	1END OF DISTURB
00505	176400		SUB 3,3	
00506	025000		LDA 1,0,2	1REFERENCE MEMORY
00507	175704		INCS 3,3,SZR	
00510	000776		JMP .-2	
00511	000766		JMP DISTURB+4	
00512	030003	ICHECK:	LDA 2,ADR	1INITIALIZE CHECK CYCLE
00513	024041		LDA 1,C400	
00514	020006		LDA 0,PATT	1X LINE INIT PATTERN
00515	133414		AND# 1,2,SZR	
00516	100000	ICK:	COM 0,0	
00517	034005		LDA 3,INH	
00520	163400		AND 3,0	1MASK INHIBITED BITS
00521	024047		LDA 1,CN10S	1"S" PULSE
00522	114044		COMO 0,3,SZR	1"C" PULSE
00523	024046		LDA 1,CN10C	1ON 1/0 DISTURB SIGNALS
00524	044412		STA 1,CHECK	
00525	024060		LDA 1,BPROG	1CODE TO PREVENT PATTERN
00526	146436		SUBZ# 2,1,SEZ	1CHECK OF PROGRAM.
00527	000407		JMP CHECK	1PATT<PROGRAM BEGIN.
00530	024061		LDA 1,EPROG	
00531	132436		SUBZ# 1,2,SEZ	
00532	000404		JMP CHECK	1PATT>PROGRAM END
00533	024064		LDA 1,C20	
00534	133000		ADD 1,2	
00535	000416		JMP ECHECK	
00536	000000	CHECK:	0	1A SYNC PULSE ISSUED
00537	025000		LDA 1,0,2	1SIGNALS RWVZ,RWV1
00540	106414		SUB# 0,1,SZR	
00541	004427		JSR ERR1	
00542	055000		STA 3,0,2	
00543	025000		LDA 1,0,2	
00544	136414		SUB# 1,3,SZR	1SIGNALS UV1,UVZ
00545	004424		JSR ERR2	
00546	041000		STA 0,0,2	
00547	151400		INC 2,2	
00550	024040		LDA 1,C17	1COUNT 16 TIMES
00551	147414		AND# 2,1,SZR	
00552	000764		JMP CHECK	

A 0011 .MAIN

00553	034042	ECHECK:	LDA 3,C77	
00554	157414		AND# 2,3,SZR	ICHECK FOR END OF
00555	000741		JMP ICK	ILINE
00556	024004		LDA 1,FINAL	IEVERY 64 TIMES
00557	140432		SUBZ# 2,1,SZC	ICHECK FOR END OF CORE
00560	000733		JMP ICHECK+1	
00561	020000		LDA 0,PATT	ICOMP THE
00562	100000		COM 0,0	IPATTERN
00563	040000		STA 0,PATT	
00564	101004		MOV 0,0,SZR	
00565	000647		JMP BEGIN+2	
00566	034066		LDA 3,RETURN	
00567	001400		JMP 0,3	

00570	101020	ERR1:	MOVZ 0,0	IDISTURB ENTRY
00571	054007	ERR2:	STA 3,ERET	IUNDISTURB ENTRY
00572	034044		LDA 3,C207	IC(1)=ERROR WORD
00573	063411		SKPBN TTO	IC(2)=ERROR ADDRESS
00574	075111		DOAS 3,TTO	ISET SWITCH 1 TO
00575	074477		READS 3	IINHIBIT HALT
00576	175200		MOVR 3,3	
00577	034057		LDA 3,PLOC	
00600	054066		STA 3,RETURN	
00601	101003		MOV 0,0,SNC	
00602	063077	ERI:	HALT	IF TTY NOT BUSY
00603	114040		COMO 0,3	TURN OF TTY IF
00604	002007		JMP 0ERET	TO NOISEY.
00605	000605	CEND:	.	
		.END		