

TAPE DATA

IDENTIFICATION

PRODUCT CODE: MAINDEC-12-D3FB-D
PRODUCT NAME: PDP-12 TAPE DATA TEST
DATE CREATED: NOVEMBER, 1 1970
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: WALTER MANTER

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CORPORATION
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WALTER MANTER
NOV 1 1970

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1. ABSTRACT

The tape data test is designed to:

- A) Test tape read and write ability in both pause and no pause mode.
- B) Test read-write amplifier recovery.
- C) Test a worst case read-write condition.
- D) Provide a long read-write scope loop over blocks 0-777 using WRI and RDE instructions.
- E) Provide scope loops on all tests

2. REQUIREMENTS

2.1 Equipment

- A) A standard PDP-12
- B) A TC-12, PDP-12 linc-tape controller
- C) A ASR-33 teletype on equivalent

2.2 Preliminary Programs

Tape Data test should be preceded by tape control test parts I and II and followed by tape Exerciser test.

2.3 Storage

This program uses instructions field 2 and data field 3 of core. (locations 40000 to 7777)

3. LOADING PROCEDURE

3.1 Method

This program must be loaded with the binary loader.

- A) Set the teletype reader switch to FREE.
- B) Open the teletype reader and insert the program tape so that the arrows on the ~~tape~~ are visible to and pointing toward the operator.
- C) Close the reader and set the reader switch to START
- D) Set the teletype front panel switch to ON LINE

- E) Set the LEFT switches to 7777.
- F) Set the RIGHT switches to 4000.
- G) Set the MODE switch to 8 mode.
- H) Depress I/O preset
- I) Depress START LS
- J) When the program tape has been read the ACCUMULATOR must be 0000. If it is not, a read in error has occurred and one might try reloading the binary loader.
- K) Remove the program tape from the reader

4. STARTING PROCEDURE

The setting of the LEFT, RIGHT and SENSE switches for normal operation is all switches 0.

- A) Set the mode switch to L-MODE
- B) Depress I/O Preset.
- C) Depress START 20

*Mount tape?
Unit # ? 1*

The program is running; consult the listing for test descriptions.

5. CONTROL SWITCH SETTINGS

5.1 Sense Switch Settings

- A) SNS 0 = 1 Ignore any error
- B) SNS 1 = 1 Loop on particular test
- C) SNS 2 = 1 Loop on Write portion of test
- D) SNS 3 = 1 Loop on read portion of test
- E) SNS 4 = 0 Fixed data pattern (left and right switches)
- F) SNS 4 = 1 Random Data pattern (left and right switches not both zero)
- G) SNS 5 = 1 long Scope loop test

Takes 5+20 ; rings bell

5.2 Left and Right Switches

Control fixed data pattern and determine starting point of random data pattern.

6. ERRORS

6.1 Error Halts

Correct interpretation of error halts must be done utilizing the program listing. All error halts are documented and easily interpreted in the program listing.

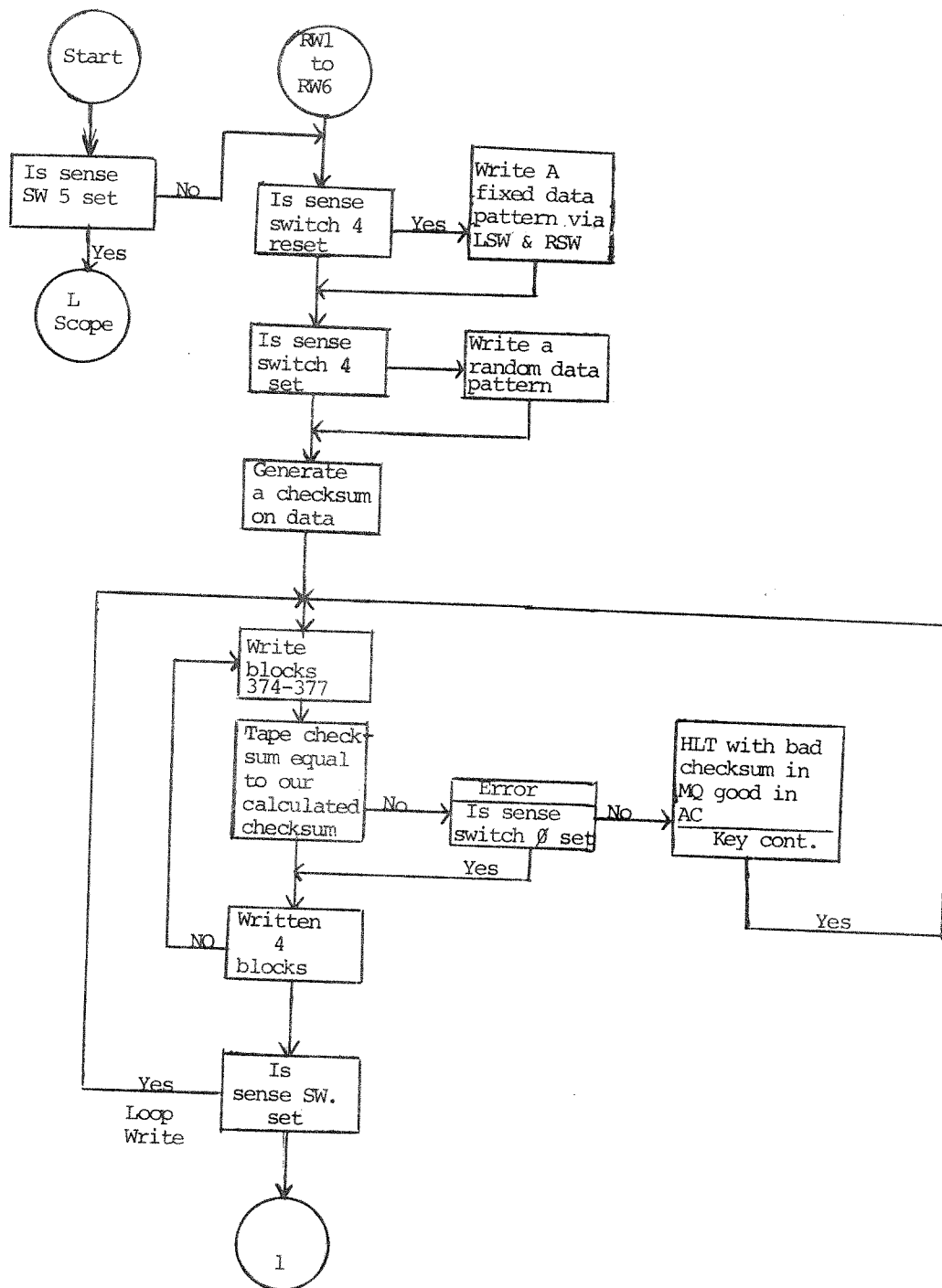
6.2 Error Printouts

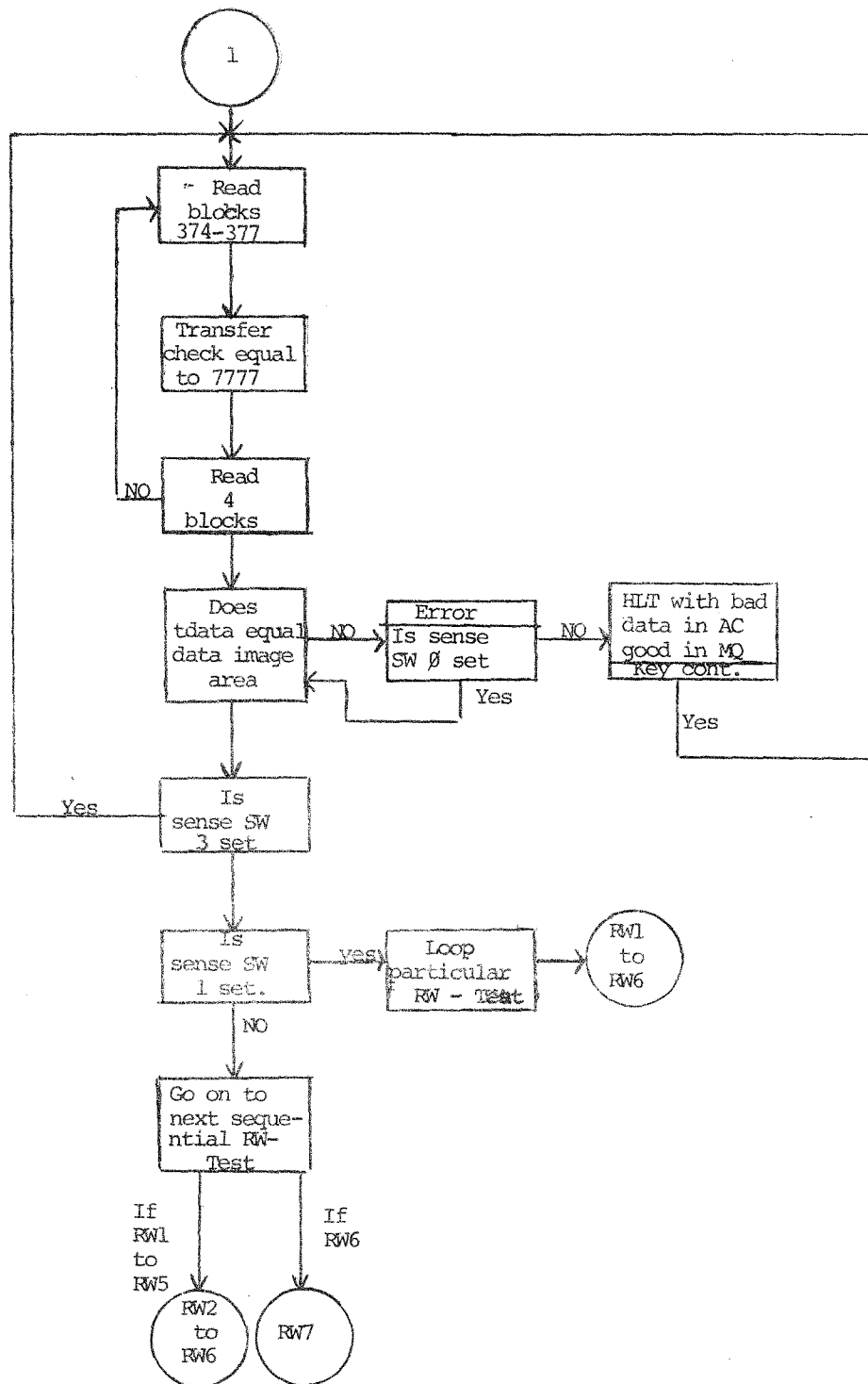
None

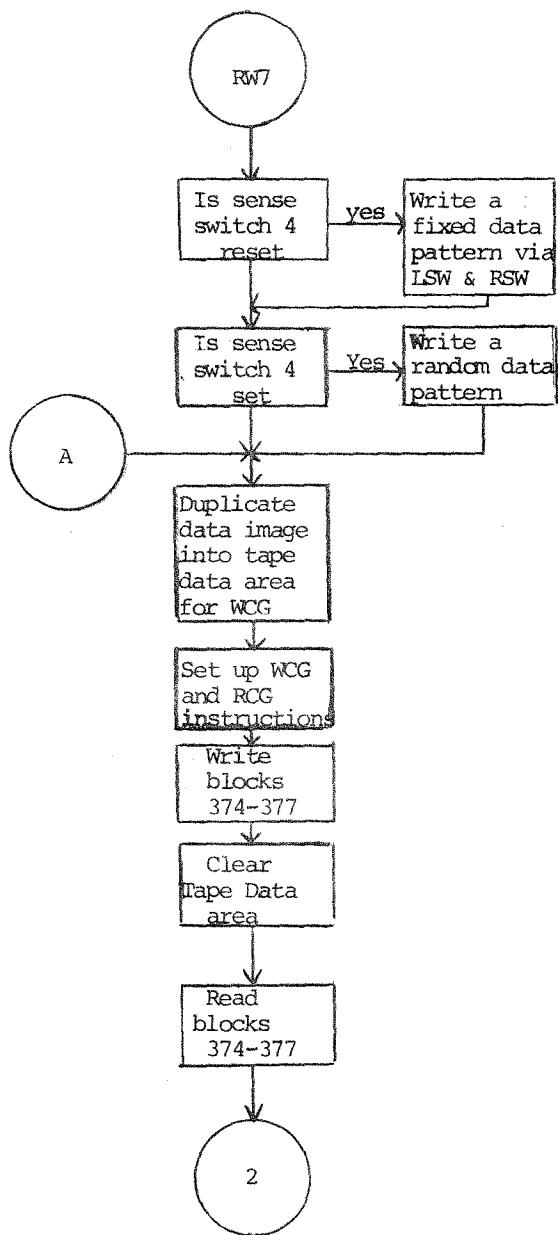
6.3 Error Recovery

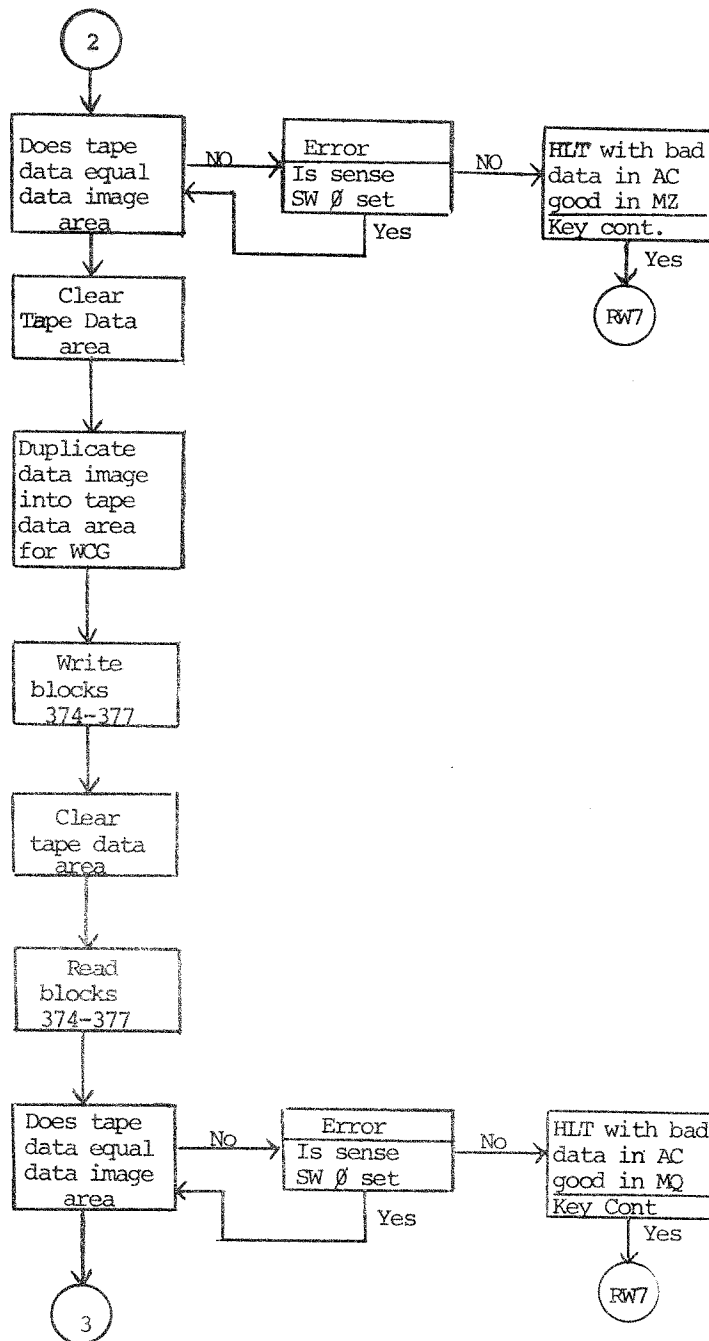
- A) KEY CONTINUE puts you back in the main program at the start of test which failed.
- B) If SENSE SWITCH $\emptyset$ is set (depressed) the error is ignored and program continues in normal sequence.

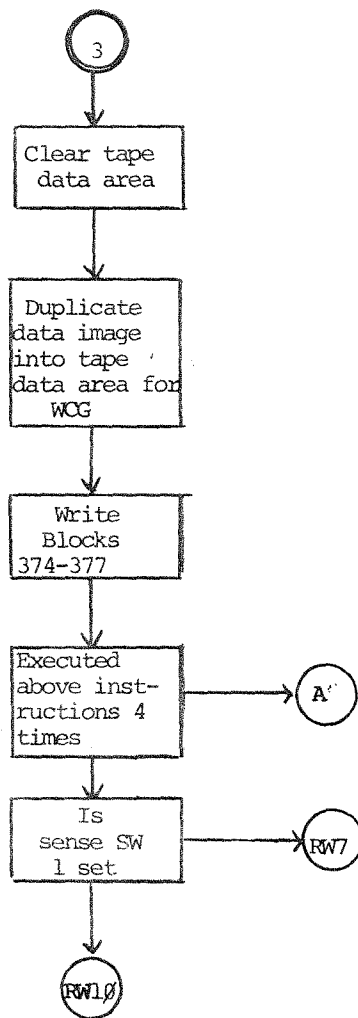
FLOW CHARTS FOR TAPE DATA TEST

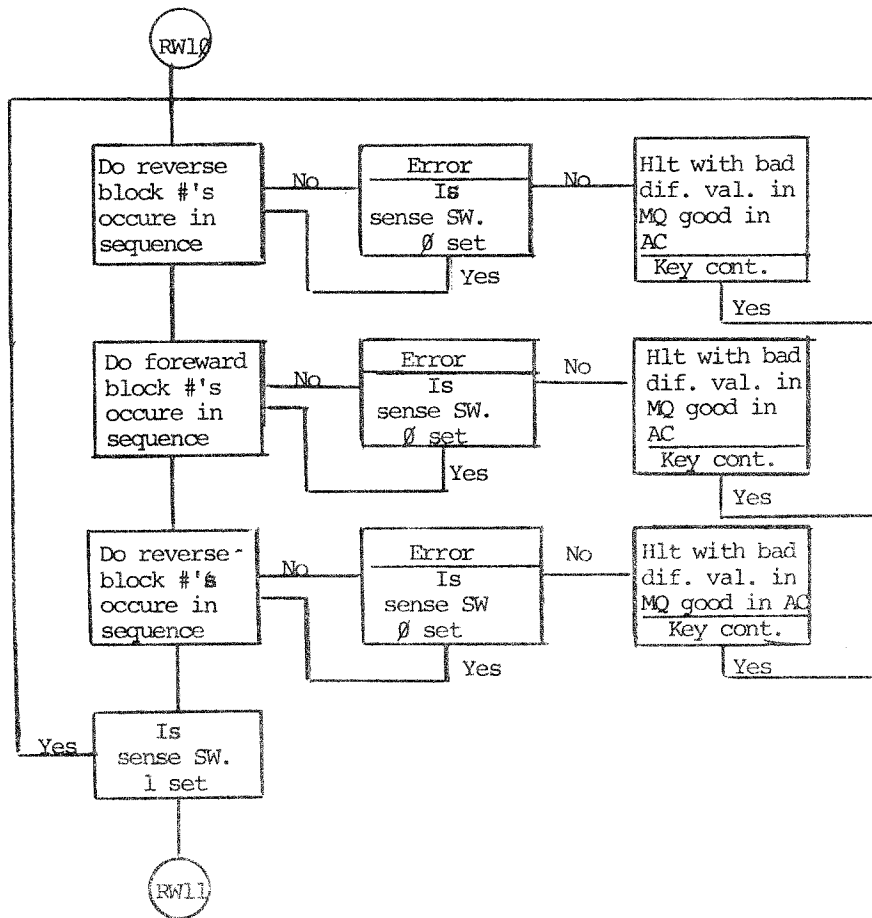


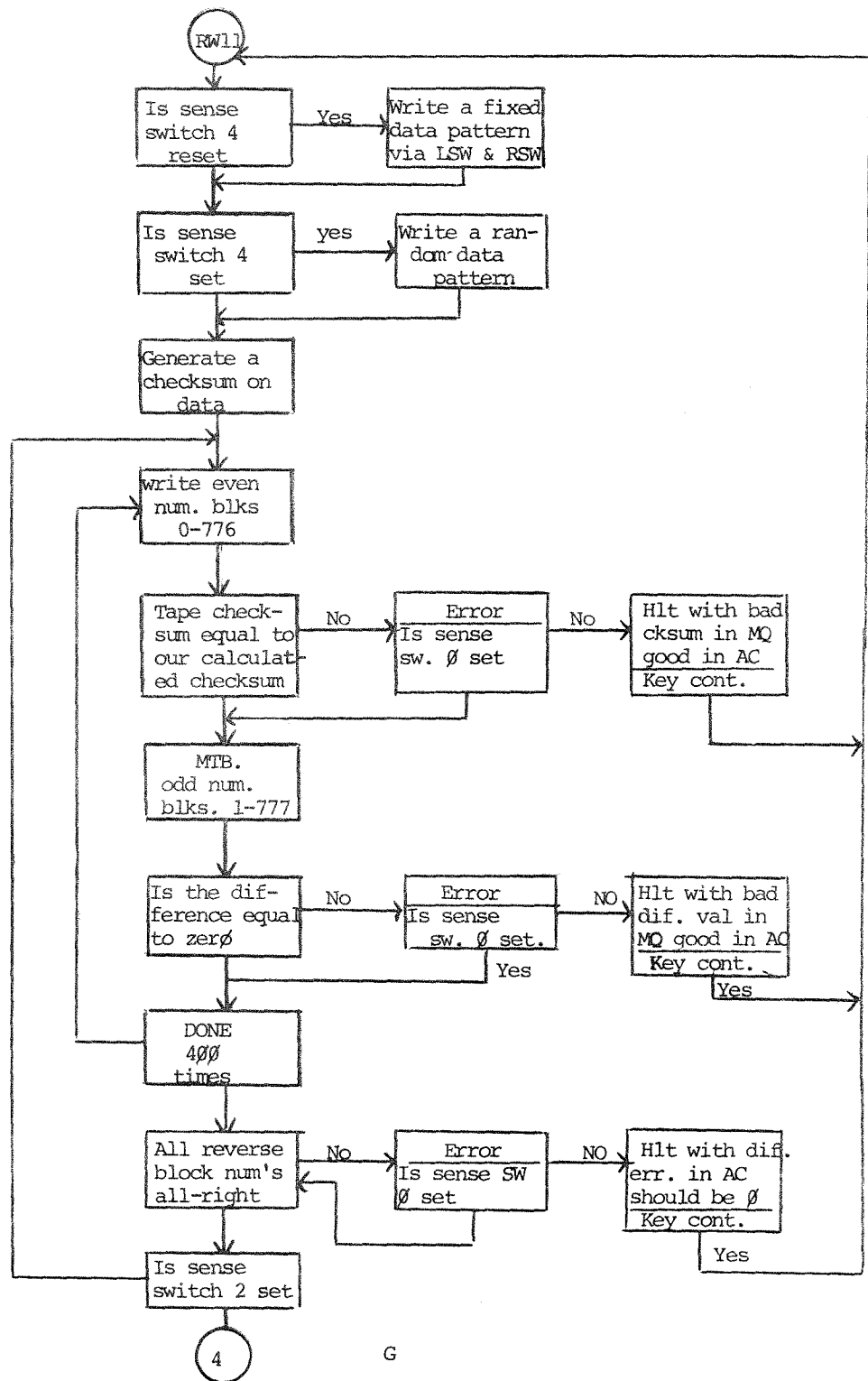


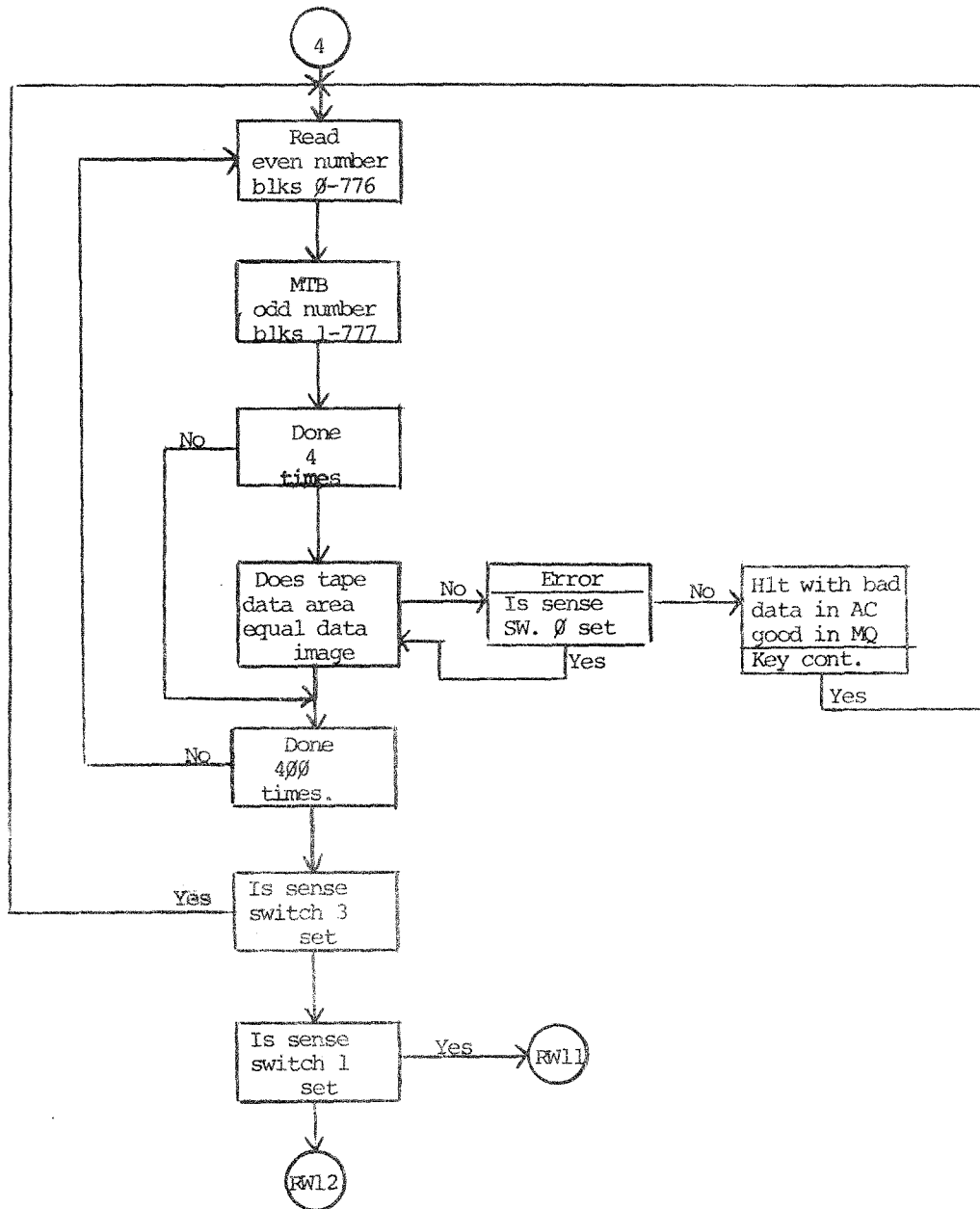


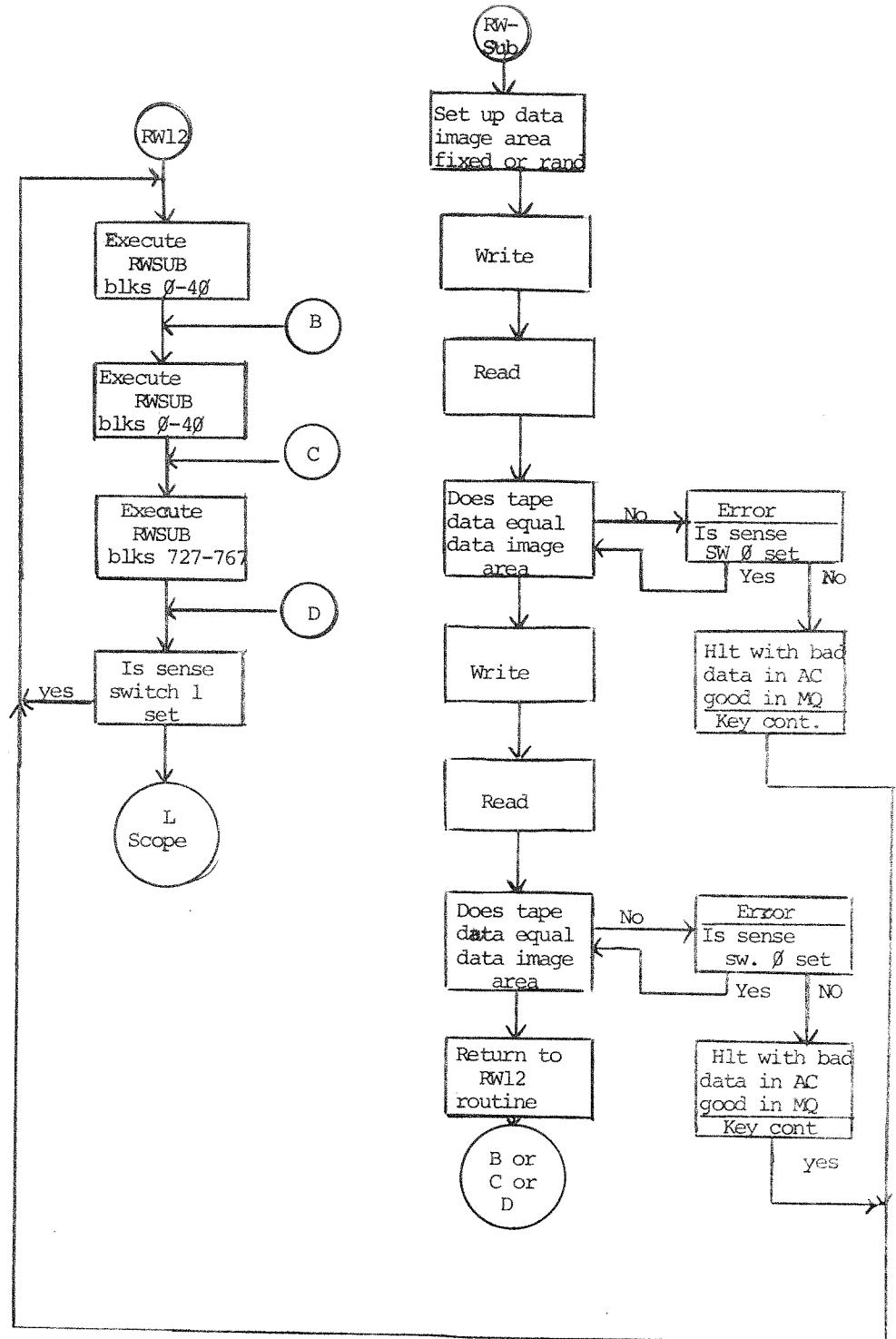


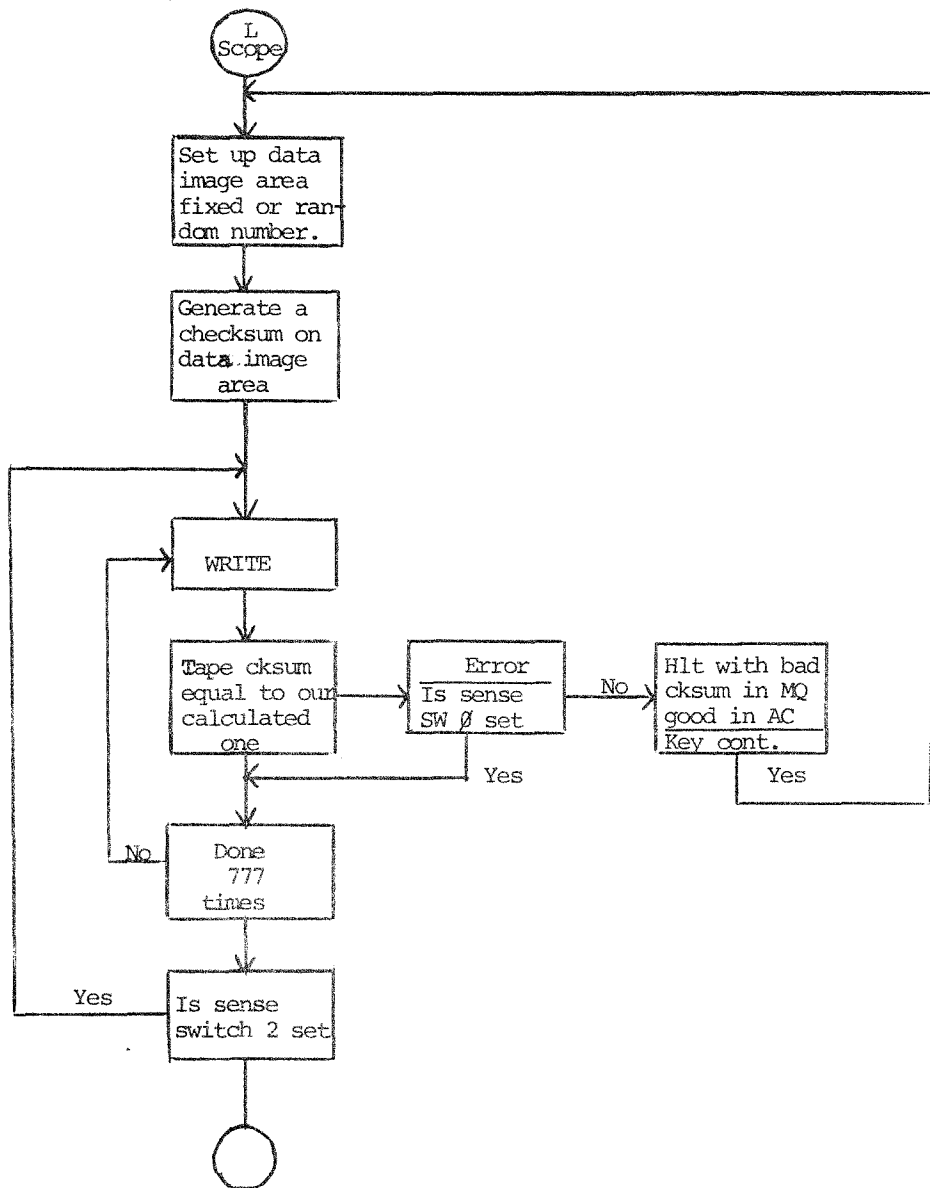




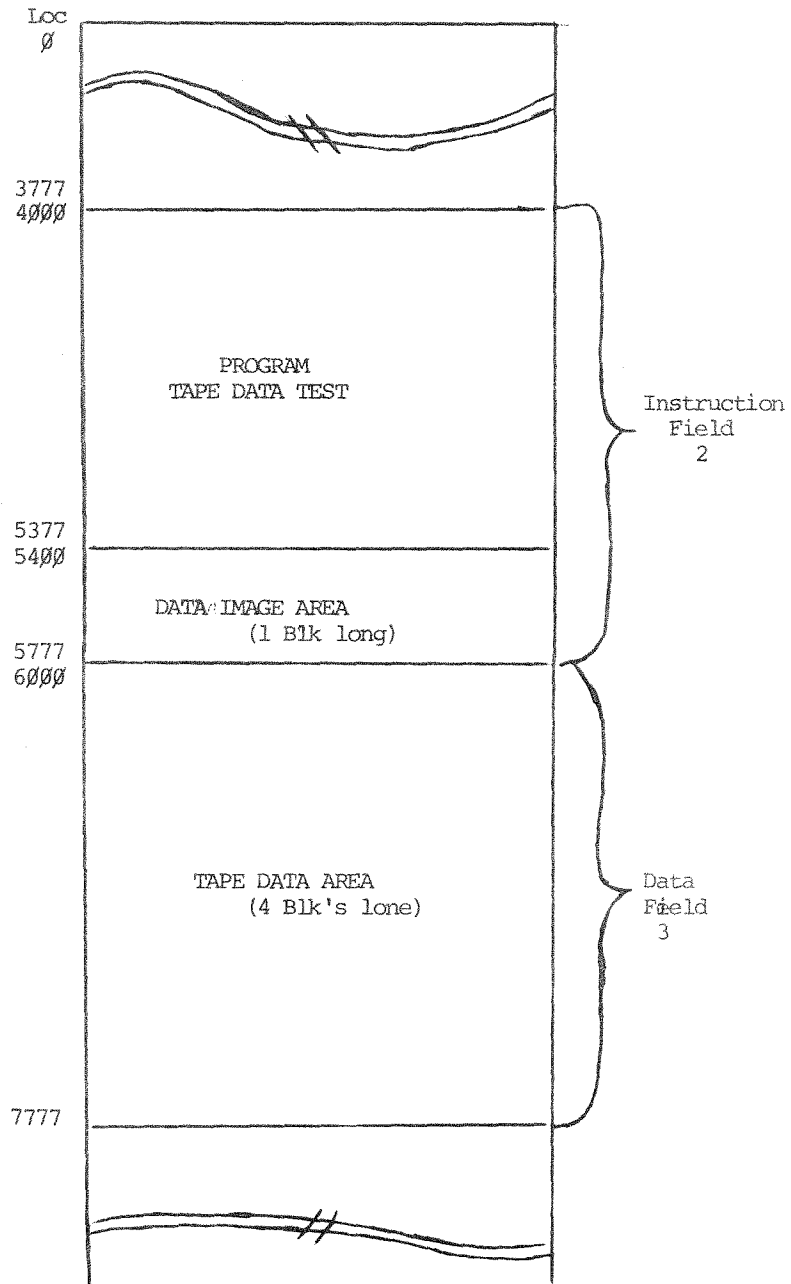








APPENDIX A
MEMORY MAP




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0001 *20
0002
0003 /TDATA - TAPE DATA TEST MAINDEC 12-D3FA-A
0004 /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
0005 /MAINTAINER - DIAGNOSTIC GROUP
0006 /AUTHOR - WALTER MANIER
0007 /
0008 /TDATA1 TESTS:
0009 / TAPE READ AND WRITE ABILITY IN BOTH PAUSE AND NO PAUSE MODES
0010 / WRITE-READ AMPLIFIER RECOVERY
0011 / WORST CASE READ-WRITE CONDITIONS
0012 / LONG READ-WRITE SCOPE LOOP OVER BLOCKS 0 TO 777
0013 /
0014 /SCOPE LOOPS ARE PROVIDED VIA THE SENSE SWITCHES FOR ALL TESTS
0015 /
0016 /SENSE SWITCH SETTINGS ARE:
0017 / SNS 0 = 1 IGNORE ANY ERROR
0018 / SNS 1 = 1 LOOP ON PARTICULAR TEST
0019 / SNS 2 = 1 LOOP ON WRITE PORTION OF TEST
0020 / SNS 3 = 1 LOOP ON READ PORTION OF TEST
0021 / SNS 4 = 1 FIXED DATA PATTERN (LEFT AND RIGHT SWITCHES)
0022 / SNS 5 = 1 RANDOM DATA PATTERN
0023 / SNS 5 = 1 LONG SCOPE LOOP TEST
0024 /
0025 /NOTE: THIS PROGRAM WRITES OVER BLOCKS 0 TO 777 (USE A SCRATCH TAPE)
0026 /
0027 /START LOCATION 20
0028
0029 LMODE
0030
0031 *20
0032
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0034
0035
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0084
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0089
0090
0091
0092
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0099
0100

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ADDRESS	DATA	INSTRUCTIONS	PAUSE MODE
0146	0076	RW2,	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0147	0077	7033	/GENERATE CHECKSUM FOR DATA IMAGE AREA
0150	0100	0011	/WRITE
0151	0101	0716	/TAC TO AC
0152	0102	3374	/IS IT EQUAL TO
0153	0103	0003	/OUR CALCULATED CHECKSUM
0154	0104	1440	/NO-ERROR
0155	0105	1044	/SNS SW 2 SET
0156	0106	7304	/YES-LOOP ON WRI
0157	0107	0462	/READ
0160	0110	6100	/IS THE TRANSFER CHECK
0161	0111	0011	/EQUAL TO 7777
0162	0112	0712	/NO-ERROR
0163	0113	4374	/COMPARE TAPE DATA WITH DATA IMAGE AREA
0164	0114	1460	/SNS SW 3 SET
0165	0115	7777	/YES-LOOP RDE
0166	0116	7313	/SNS SW 1 SET
0167	0117	7136	/YES-LOOP READ-WRITE TEST
0170	0120	0463	
0171	0121	6111	
0172	0122	0461	
0173	0123	6076	
0174			
0175			
0176			
0177			
0200			
0201			
0202			
0203			
0204			
0205			
0206			
0207			
0210			

13363

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0211 /RW3 TESTS WRI AND RDE INSTRUCTIONS IN NO PAUSE MODE
0212 /WITH THE I BIT (7) SET LEAVING TAPE MOVING IN THE DIRECTION
0213 /IT WAS GOING AT COMPLETION OF THE INSTRUCTION
0214 /USES BLOCKS 374-377
0215
0216
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0218
0219
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0221
0222
0223
0224
0225
0226
0227
0228
0229
0230
0231
0232
0233
0234
0235
0236
0237
0238
0239
0240
0241
0242
0243
0244
0245
0246
0247
0248
0249
0250
0251
0252
0253
0254
0255
0256
0257
0258
0259
0260
0261
0262
0263
0264

```

0124	1020	RW3,	LDA I	/SET BIT 8 IN AC
0125	0010		10	
0126	0001		AXO	/AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
0127	6752		JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0130	7033		JMP GCKSUM	/GENERATE CHECKSUM FOR DATA IMAGE AREA
0131	0011	T6,	CLR	
0132	3373		ADD C3374	/SET UP SECOND WORD OF WRI INST
0133	4137		STC X6	
0134	0061		SET I 1	/WANT TO WRITE 4 BLOCKS
0135	7773		-4	
0136	0736		WRI I U	/WRITE
0137	0000	X6,	0	
0140	0021		XOA	/EXTENDED OPERATIONS BUFFER TO AC
0141	1560		BCL I	/MASK
0142	7767		7767	/ALL BUT NO PAUSE BIT
0143	0450		AZE	/SKIP IF NO PAUSE MODE
0144	0000		HLT	/ERROR-NO PAUSE NOT SET
0145	0416		STD	/SKIP ON TAPE DONE
0146	6145		JMP -1	/NOT DONE WAIT
0147	0003		TAC	/TAC TO AC
0150	1440		SAE	/IS IT EQUAL TO OUR CALCULATED CHECKSUM
0151	1044		CKSUM	
0152	7317		JMP E6	/NO-ERROR
0153	1000		LDA	/UPDATE TBLK
0154	0137		X6	
0155	3367		ADD C1	/BY A COUNT OF 1
0156	4137		STC X6	
0157	0221		XSK I 1	/WRITTEN 4 BLOCKS
0160	6136		JMP X6-1	/NO-DO IT AGAIN
0161	0462		SNS I 2	/SNS SW 2 SET
0162	6131		JMP T6	/YES-LOOP WRI

/3
EJECT

ADDRESS	INSTR	COMMENT
0330		
0331		
0332		
0333		
0334		
0335		
0336		
0337		
0340		
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0342		
0343		
0344		
0345		
0346		
0347		
0350		
0351		
0352		
0353		
0354		
0355		
0356		
0357		
0360		
0361		
0362		
0363		
0364		
0365		
0366		
0367		
0370		
0371		
0372		
0373		
0374		
0375		
0376		
0377		
0400		
0401		
0402		
0403		
0404		
0405		
0406		
0407		
0410		

1337

0472
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0557
0560

0326	1020	RW6,	LDA I	/SET BIT 8 IN THE AC
0327	0010		10	
0330	0001		AXO	/AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
0331	0752		JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0332	0011	T14,	CLR	/SET UP SECOND WORD OF WRC INST
0333	3373		ADD C3374	
0334	4340		STC X14	
0335	0061		SET I 1	/WANT TO WRITE 4 BLKS
0336	7773		-4	
0337	0734		WRC I U	/WRITE
0340	0000	X14,	0	
0341	0416		STD	/SKIP IF TAPE DONE
0342	6341		JMP ,=1	/WAIT
0343	1000		LDA	/UPDATE TBLK BY
0344	0340		X14	/A COUNT OF 1
0345	3367		ADD C1	
0346	4340		STC X14	
0347	0221		XSK I 1	/WRITTEN 4 BLOCKS
0350	6337		JMP X14-1	/NO-DO IT AGAIN
0351	0462		SNS I 2	/SNS SW 2 SET
0352	6332		JMP T14	/YES-LOOP WRC TEST
0353	0011	T15,	CLR	
0354	3374		ADD C4374	/SET UP SECOND WORD OF RDC INST
0355	4361		STC X15	
0356	0061		SET I 1	/WANT TO READ 4 BLOCKS
0357	7773		-4	
0360	0730		RDC I U	/READ
0361	0000	X15,	0	
0362	0416		STD	/SKIP ON TAPE DONE
0363	6362		JMP ,=1	/WAIT
0364	1000		LDA	/UPDATE MBLK AND TBLK BY
0365	0361		X15	
0366	3372		ADD C1001	/A COUNT OF 1
0367	4361		STC X15	
0370	0221		XSK I 1	/READ 4 BLOCKS
0371	6360		JMP X15-1	/NO-DO IT AGAIN
0372	7141		JMP CMPR	/COMPARE TAPE DATA WITH DATA IMAGE AREA
0373	0463		SNS I 3	/SNS SW 3 SET
0374	6353		JMP T15	/YES-LOOP RDC INST
0375	0461		SNS I 1	/SNS SW 1 SET
0376	6326		JMP RW6	/YES-LOOP READ-WRITE TEST

/7

EJECT

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/RW7 TESTS WCG AND RCG INSTRUCTIONS NO PAUSE MODE
/WITH THE I BIT (7) SET LEAVING TAPING IN THE DIRECTION
/IT WAS GOING AT COMPLETION OF THE INSTRUCTION
/USES BLOCKS 374-377

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0377	1020	RW7,	LDA I	/SET BIT 8 IN THE
0400	0010		10	/AC
0401	0001		AXO	/AC TO EXTENDED OPERATIONS BUFFER SETTING NO PAUSE MODE
0402	6752		JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0403	7107		JMP DUPDAT	/SET TAPE DATA AREA EQUAL TO DATA IMAGE AREA
0404	0061		SET I 1	/WANT TO EXECUTE TEST 4 TIMES
0405	7773		-4	
0406	0735	T16,	WCG I U	/WRITE
0407	3374		3374	
0410	0416		STD	/SKIP ON TAPE DONE
0411	6410		JMP ,=1	
0412	7075		JMP CLTDAT	/CLEAR OUT TAPE DATA AREA
0413	0731		RCG I U	/READ
0414	3374		3374	
0415	0416		STD	/SKIP ON TAPE DONE
0416	6415		JMP ,=1	
0417	7141		JMP CMPR	/COMPARE DATA IMAGE AREA WITH TAPE DATA
0420	7063		JMP CLEAR	/CLEAR DATA IMAGE AREA
0421	7107		JMP DUPDAT	/DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA FOR WCG
0422	6424		JMP ,+2	/SKIP THE NEXT INSTRUCTION
0423	6377		JMP RW7	/ERROR RETURN FROM COMPARE ROUTINE IF KEY CONTINUE IS HIT
0424	0735		WCG I U	/WRITE
0425	3374		3374	
0426	0416		STD	/SKIP ON TAPE DONE
0427	6426		JMP ,=1	
0430	6752		JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0431	7107		JMP DUPDAT	/DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA
0432	0715		WCG U	/WRITE
0433	3374		3374	
0434	0416		STD	/SKIP ON TAPE DONE
0435	6434		JMP ,=1	
0436	7075		JMP CLTDAT	/CLEAR OUT TAPE DATA AREA
0437	0711		RCG U	/READ
0440	3374		3374	
0441	0416		STD	/SKIP ON TAPE DONE
0442	6441		JMP ,=1	
0443	7141		JMP CMPR	/COMPARE DATA IMAGE AREA WITH TAPE DATA
0444	7063		JMP CLEAR	/CLEAR OUT DATA IMAGE AREA
0445	7107		JMP DUPDAT	/DUPLICATE DATA IMAGE AREA INTO TAPE DATA AREA FOR WCG 4 BLKS LONG
0446	6450		JMP ,+2	/SKIP NEXT INSTRUCTION
0447	6377		JMP RW7	/ERROR RET FROM COMPARE ROUTINE IF KEY CONTINUE HIT
0450	0715		WCG U	/WRITE
0451	3374		3374	
0452	0416		STD	/SKIP ON TAPE DONE
0453	6452		JMP ,=1	
0454	0221		XSK I 1	/EXECUTED TEST 4 TIMES
0455	6406		JMP T16	/NO-DO IT AGAIN
0456	0461		SNS I 1	/IS SNS SW 1 SET
0457	6377		JMP RW7	/YES-LOOP READ WRITE TESTS AGAIN

0660	/TEST BLOCK NUMBERS				
0661	/CHECKS ALL FORWARD AND REVERSE BLOCK NUMBERS AND THE SEQUENCE THEY OCCUR IN				
0662	/USES BLOCKS 0-777				
0663					
0664					
0665					
0666					
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0670					
0671					
0672					
0673					
0674					
0675					
0676					
0677					
0700					
0701					
0702					
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0704					
0705					
0706					
0707					
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0746					

0460	0011	CLR	/CLEAR
0461	0001	AXO	/EXTENDED OPERATIONS BUFFER
0462	7202	JMP REVBK	/CK REV BK NUMBERS TO 0
0463	7233	JMP FWOBK	/CK FWD BK NUMBERS FROM APPROXIMATELY 0 TO 777
0464	7202	JMP REVBK	/CK REV BK NUMBERS FROM APPROXIMATELY 777 TO 0
0465	0461	SNS I 1	/SNS SW 1 SET
0466	6463	JMP T17	/YES-LOOP BLOCK NUMBER TEST

/READ-WRITE AMPLIFIER RECOVERY TEST			
/WRITES A BLOCK THAN MOVES TOWARD THE NEXT BLOCK (MTB) ETC			
/USES BLOCKS 0-777			

0467	6752	JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0470	7033	JMP GCKSUM	/GENERATE CHECKSUM FOR DATA IMAGE AREA
0471	1020	LDA I	/FORMAT FOR SECOND WORD OF WRI INST
0472	3000	STC X20	/STORE IT
0473	4477	SET I 1	/WANT TO WRI AND MOVE TOWARD BLOCK 400 TIMES
0474	0061	-400	/WRITE
0475	7377	WRI I U	
0476	0736	0	
0477	0000	TAC	/TAC TO AC
0500	0003	SAE	/IS IT EQUAL TO
0501	1440	CKSUM	/OUR CALCULATED CHECKSUM
0502	1044	JMP E20	/NO-ERROR
0503	7332	LDA	/UPDATE X20 AND SET UP X20A
0504	1000	X20	
0505	0477	ADD C1	/UPDATE TBLK FOR MTB INST BY A COUNT OF 1
0506	3367	STA	/STORE IT
0507	1040	X20A	
0510	0514	ADD C1	/UPDATE TBLK FOR WRI INST BY COUNT OF 2
0511	3367	STC X20	
0512	4477	MTB I U	/MOVE TOWARD BLOCK
0513	0733	0	/IS THE DIFFERENCE VALUE ZERO
0514	0000	AZE	/NO-ERROR
0515	0450	JMP E20A	/WRITTEN AND MTB 400 TIMES
0516	7341	XSK I 1	/NO-DO IT AGAIN
0517	0221	JMP X20-1	/CK REV BK NUMBERS FROM APPROXIMATELY 777 TO 0
0520	6476	JMP REVBK	/SNS SW 2 SET
0521	7202	SNS I 2	/YES-LOOP WRITE MTB REV TEST
0522	0462	JMP T20	
0523	6471		

0741	0741		
0742	0742		
0743	0743		
0744	0744		
0745	0745		
0746	0746		

EJECT

0747	0524	1020	T21,	LDA I	/FORMAT FOR -COND WORD OF RDE INST
0750	0525	4000		4000	
0751	0526	4534		STC X21	/STORE IT
0752	0527	0061		SET I 1	/EXECUTE RDE AND MTB 400 TIMES
0753	0530	7377		-400	
0754	0531	0062		SET I 2	/AFTER 4 RDE INST CK DATA
0755	0532	7773		-4	
0756	0533	0732		RDE I U	/READ
0757	0534	0000	X21,	0	
0760	0535	1000		LDA	
0761	0536	0534		X21	/UPDATE TBLK OF 2 WORD OF MTB INST BY A COUNT OF 1
0762	0537	3367		ADD C1	
0763	0540	1040		STA	
0764	0541	0546		X21A	
0765	0542	1100		ADA	/ALSO TBLK AND MBLK OF SECOND WORD OF RDC INST
0766	0543	1372		C1001	/BY A COUNT OF 2AND 1 RESPECTIVELY
0767	0544	4534		STC X21	
0770	0545	0733		MTB I U	/MOVE TOWARD BLOCK
0771	0546	0000	X21A,	0	
0772	0547	0450		AZE	/ARE WE THERE
0773	0550	7345		JMP E21A	/NO-ERROR
0774	0551	0222		XSK I 2	/DONE 4 TIMES
0775	0552	6570		JMP DONE	/NO-UPDATE EXECUTION CNTR
0776	0553	7141		JMP CMPR	/YES-COMPARE DATA IMAGE AREA WITH TAPE DATA
0777	0554	0062		SET I 2	/SET UP NEXT COMPARE AFTER READING 4 MORE BLOCKS
1000	0555	7773		-4	
1001	0556	6560		JMP .+2	/SKIP THE NEXT INSTRUCTION
1002	0557	6467		JMP RW11	/ERROR RETURN FROM COMPARE ROUTINE IF KEY CONTINUE HIT
1003	0560	1000		LDA	/SET UP TBLK AND MBLK FOR NEXT 4 PASSES
1004	0561	0534		X21	
1005	0562	3370		ADD C1M	/BY SUBTRACTING 1 FROM TBLK
1006	0563	1560		BCL I	/AND CLEARING BITS 0-2 OF AC <MBLK>
1007	0564	7000		7000	
1010	0565	1620		BSE I	/SET MBLK EQUAL TO 4
1011	0566	4000		4000	
1012	0567	4534		STC X21	/NOW DATA WILL BE READ FROM TAPE INTO START OF TAPE DATA AREA
1013	0570	0221	DONE,	XSK I 1	/ARE WE AT BLK 777 YET <FINISHED>
1014	0571	6533		JMP X21-1	/NO-DO IT AGAIN
1015	0572	0463		SNS I 3	/IS SNS SW 3 SET
1016	0573	6524		JMP T21	/YES-LOOP READ AND MTB INSTRUCTIONS
1017	0574	0461		SNS I 1	/IS SNS SW 1 SET
1020	0575	6467		JMP RW11	/YES-LOOP WRITE READ TESTS
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EJECT

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/A WORST CASE READ-WRITE TEST
/USES BLOCKS 366-401, 0-14, AND 750-764

0576	6752	RW12,	JMP DATSET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
0577	0061		SET I 1	/EXECUTE 14 TIMES
0600	7762		-15	
0601	1020		LDA I	/SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 366)
0602	3365			
0603	0221		XSK I 1	/EXECUTED RWSUB 14 TIMES
0604	6631		JMP RWSUB	/NO-EXECUTE READ WRITE SUBROUTINE AGAIN
0605	0061		SET I 1	/EXECUTE 14 TIMES
0606	7762		-15	
0607	1020		LDA I	/SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 1)
0610	3000			
0611	0221		XSK I 1	/EXECUTED RWSUB 14 TIMES
0612	6631		JMP RWSUB	/NO-EXECUTE READ WRITE SUBROUTINE AGAIN
0613	0061		SET I 1	/EXECUTE 14 TIMES
0614	7762		-15	
0615	1020		LDA I	/SET UP WRC AND RDC INSTRUCTIONS (START AT BLK 750)
0616	3747			
0617	0221		XSK I 1	/EXECUTED RWSUB 14 TIMES
0620	6631		JMP RWSUB	/NO EXECUTE READ WRITE SUBROUTINE AGAIN
0621	7202		JMP REV BK	/CK REV BLK NUMBERS
0622	7233		JMP FWD BK	/CK FWD BLK NUMBERS
0623	0461		SNS I 1	/SNS SW 1 SET
0624	6576		JMP RW12	/YES-LOOP READ WRITE TEST
0625	1020		LDA I	
0626	0207		207	/SET UP AC TO RING BELL IN TYPE ROUTINE
0627	7056		JMP TYPE	
0630	6020		JMP START	/GO BACK TO BEGINNING OF PROGRAM AND START OVER

/11

EJECT

1076	0631	3367	RWSUB,	ADD C1	/ADD 1 TO LOC
1077	0632	1040		STA	/STORE IN SECOND WORD OF FIRST WRC
1100	0633	0657	X22		
1101	0634	3367		ADD C1	/ADD 1 TO TBLK
1102	0635	1040		STA	/STORE IN SECOND WORD OF SECOND WRC
1103	0636	0664	X22B		
1104	0637	1000	LDA		/LOAD SECOND WORD OF FIRST WRC INTO AC FOR
1105	0640	0657	X22		/MODIFICATION OF MBLK PORTION TO SET UP RDC INSTRUCTIONS
1106	0641	1560	BCL I		/CLEAR OUT AC BITS 0-2 LEAVING REST ALONE
1107	0642	7000	7000		
1110	0643	1620	BSE I		/INSERT 4 IN BITS 0-2 OF AC LEAVING REST ALONE
1111	0644	4000	4000		
1112	0645	1040	STA		/STORE IN SECOND WORD OF FIRST RDC INSTRUCTION
1113	0646	0661	X22A		
1114	0647	3367	ADD C1		/ADD 1 TO TBLK
1115	0650	4670	STC X22C		/STORE IN SECOND WORD OF SECOND RDC INSTRUCTION
1116	0651	1000	LDA		/SET UP RET JUMP FROM READ WRITE SUBROUTINE
1117	0652	0000	0		
1120	0653	1120	ADA I		/BY SUBTRACTING 2 FROM CONTENTS OF LOC 0
1121	0654	7775	7775		
1122	0655	4006	STC 6		/AND STORING IN LOCATION 6 FOR RETURN JUMP
1123	0656	0734	WRC I U		/WRITE
1124	0657	0000	0		
1125	0660	0710	RDC U		/READ
1126	0661	0000	0		
1127	0662	7136	JMP CMPR1		/COMPARE TAPE DATA WITH DATA IMAGE AREA 1 BLK AT A TIME
1130	0663	0714	WRC U		/WRITE
1131	0664	0000	0		
1132	0665	6667	JMP ,+2		/SKIP THE NEXT INSTRUCTION
1133	0666	6576	JMP RW12		/ERROR RETURN FROM CMPR1 ROUTINE IF KEY CONTINUE HIT
1134	0667	0730	RDC I U		/READ
1135	0670	0000	0		
1136	0671	7136	JMP CMPR1		/COMPARE TAPE DATA WITH DATA IMAGE 1 BLK AT A TIME
1137	0672	1000	LDA		/SET UP INCREMENTING OF TBLK AT BEGINNING OF
1140	0673	0657	X22		/NEXT PASS THROUGH RWSUB IF NOT DONE
1141	0674	6006	JMP 6		/RETURN TO MAIN PROGRAM
1142	0675	6576	JMP RW12		/ERROR RETURN FROM CMPR1 IF KEY CONTINUE HIT

EJECT

/12

1152	0676	0011	LSCOPE, CLR	/CLEAR THE
1153	0677	0001	AXO	/EXTENDED OPERATIONS BUFFER
1154	0700	6752	JMP DA1SET	/SEL AND STORE DATA PATTERN IN DATA IMAGE AREA
1155	0701	7033	JMP GCKSUM	/GENERATE CHECKSUM FOR DATA IMAGE AREA
1156	0702	0061	SET I 1	/WANT TO WRITE 777 BLOCKS
1157	0703	7000	T23,	
1158	0704	1020	-777	
1159	0705	3000	LDA I	/SET UP SECOND WORD OF WRI INST
1160	0706	4710	STC X23	
1161	0707	0736	WRI I U	/WRITE
1162	0711	0003	TAC	/TAC TO AC
1163	0712	1440	SAE	/IS IT EQUAL TO
1164	0713	1044	CKSUM	/OUR CALCULATED CHECKSUM
1165	0714	7354	JMP E23	/NO-ERROR
1166	0715	1000	LDA	/UPDATE TBLK
1167	0716	0710	X23	
1168	0717	3367	ADD C1	/BY A COUNT OF 1
1169	0720	4710	STC X23	
1170	0721	0221	XSK I 1	/WRITTEN 777 BLOCKS
1171	0722	6707	JMP X23-1	/NO-DO IT AGAIN
1172	0723	0462	SNS I 2	/SNS SW 2 SET
1173	0724	6702	JMP T23	/YES-LOOP ON WRI
1174	0725	0061	SET I 1	/WANT TO READ 777 BLKS
1175	0726	7000	-777	
1176	0727	1020	LDA I	/SET UP SECOND WORD OF RDE INST
1177	0730	4000	STC X24	
1178	0731	4733	RDE I U	/READ
1179	0732	0732	X24,	
1180	0733	0000	SAE I	/IS THE TRANSFER CHECK
1181	0734	1460	7777	/EQUAL TO 7777
1182	0735	7777	JMP E24	/NO-ERROR
1183	0736	7363	LDA	/UPDATE TBLK
1184	0737	1000	X24	
1185	0740	0733	ADD C1	/BY A COUNT OF 1
1186	0741	3367	STC X24	
1187	0742	4733	XSK I 1	/READ 777 TIMES
1188	0743	0221	JMP X24-1	/NO-DO IT AGAIN
1189	0744	6732	SNS I 3	/SNS SW 3 SET
1190	0745	0463	JMP T24	/YES-LOOP ON RDE INST
1191	0746	6725	SNS I 1	/SNS SW 1 SET
1192	0747	0461	JMP LSCOPE	/YES-LOOP LONG SCOPE LOOP TEST
1193	0750	6676	JMP START	/GO BACK TO BEGINNING OF PROGRAM
1194	0751	6020		

EJECT

1241			/SENSE SWITCH 4 SELECTS EITHER A FIXED OR RANDOM DATA PATTERN
1242			
1243			
1244			
1245			/SET UP RET JUMP FROM LOC 7 TO MAIN PROG
1246	0752	0047	DATSET, SET 7
1247	0753	0000	0
1248	0754	0464	SNS I 4
1249	0755	6760	JMP FXDAT
1250	0756	0444	SNS 4
1251	0757	6776	JMP RDAT
1252			/RANDOM DATA PATTERN
1253			
1254			/FIXED NUMBER GENERATOR
1255			/STORES CONTENTS OF LEFT AND RIGHT SWITCHES ALTERNATLY
1256			/INTO DATA IMAGE AREA (LOCATIONS 1400-1777 INST FIELD 2)
1257			
1260			
1261	0760	0071	FXDAT, SET I 11
1262	0761	1377	DATA-1
1263	0762	0073	SET I 13
1264	0763	7377	-400
1265	0764	0516	FXLOAD, RSW
1266	0765	1071	STA I 11
1267	0766	0233	XSK I 13
1270	0767	6771	JMP .+2
1271	0770	6007	JMP 7
1272	0771	0517	LSW
1273	0772	1071	STA I 11
1274	0773	0233	XSK I 13
1275	0774	6764	JMP FXLOAD
1276	0775	6007	JMP 7
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/14

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115

EJECT

1356 /GENERATES A CHECKSUM OF DATA IMAGE .EA (1 BK LONG)
 1357 /WHICH IS COMPARED WITH THE CONTENTS OF THE TAC ON A WRI JUST
 1360 /THE CHECKSUM IS THE TWO'S COMPLIMENT OF <DATA SUM PLUS 7777>
 1361
 1362
 1363

1033	0073	GCKSUM, SET I 13	/EXECUTE 400 TIMES (1 BLOCK)
1034	7377	-400	
1035	0071	SET I 11	/STARTING ADDRESS OF DATA TABLE-1
1036	1377	DATA-1	
1037	0011	CLR	/AC INITIALLY CLEARED
1040	5044	SIC CKSUM	/ZERO LOC CKSUM
1041	1031	LOA I 11	/INC AND LOAD AC FROM DATA TABLE
1042	0006	DJR	/DISABLE JUMP RETURN SAVE
1043	1220	LAM I	/2S COMPLIMENT ADD AC TO LOC CKSUM
1044	0000	Ø	
1045	0011	CLR	/CLEAR AC
1046	1031	LOA I 11	/INC AND LOAD AC FROM DATA TABLE
1047	0233	XSK I 13	/DONE 400 TIMES
1050	7042	JMP CKSUM-2	/NO-DO IT AGAIN
1051	0011	CLR	/CLEAR AC AND LINK
1052	0017	COM	/COMPLIMENT THE AC
1053	1200	LAM	/2S COMPLIMENT ADD AC
1054	1044	CKSUM	/TO LOC CKSUM
1055	6000	JMP Ø	/RET TO MAIN PROG

/ROUTINE TO RING THE TTY BELL AT END OF TEST

1056	0006	TYPE, DJR	/DISABLE JUMP RETURN
1057	0500	IOB	/EXECUTE 8 MODE INSTRUCTION
1060	6046	Ø46	/AC TO TTY AND PUNCH BUFFER AND CLEAR FLAG
1061	0011	CLR	
1062	6000	JMP Ø	/RETURN TO MAIN PROGRAM

/16

EJECT

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1425 /CLEAR OUT DATA IMAGE AREA (LOCATIONS 1400-1777 INST FIELD 2)
1426 /BY STORING ZEROS
1427
1430

1063	0071	CLEAR,	SET I 11	/STARTING ADDRESS OF DATA TABLE -1
1064	1377		DATA -1	
1065	0073		SET I 13	/EXECUTE 400 TIMES (400 LOC IN DATA TABLE)
1066	7377		-400	
1067	0011		CLR	/CLEAR AC
1070	0006	CL,	DJR	/DISABLE JUMP RETURN
1071	1071		STA I 11	/INC AND STORE AC IN DATA TABLE
1072	0233		XSK I 13	/DONE 400 TIMES
1073	7070		JMP CL	/NO-DO IT AGAIN
1074	6000		JMP 0	/RET TO MAIN PROG

/CLEAR OUT TDATA AREA (LOCATIONS 2000-3777 DATA FIELD 3)
/BY STORING ZEROS

1075	0072	CLTDAT,	SET I 12	/STARTING ADDRESS OF TAPE DATA TABLE
1076	3777		TDATA-1:2000	
1077	0073		SET I 13	/EXECUTE 2000 TIMES (2000 LOC IN TAPE DATA TABLE)
1100	6000		-1777	
1101	0011		CLR	/CLEAR AC
1102	0006		DJR	/DISABLE JUMP RETURN
1103	1072		STA I 12	/INC AND STORE ZERO AC INTO TAPE DATA TABLE
1104	0233		XSK I 13	/DONE 2000 TIMES
1105	7102		JMP -3	/NO-DO IT AGAIN
1106	6000		JMP 0	/RET TO MAIN PROG

/17

EJECT

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ADDRESS	INSTR	OPERAND	COMMENT
1471	WRITE	DATA IMAGE AREA (LOCATIONS 2000-3777)	DATA FIELD 2)
1472	INTO	DATA AREA (LOCATIONS 2000-3777)	DATA FIELD 3)
1473	FOR	EXECUTION OF WCG INSTRUCTION	
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/CMPARES DATA IMAGE OF DATA WRITTEN ON TAPE (LOCATIONS 1400-1777 INST FIELD 2)
/WITH DATA READ FROM TAPE AND STORED IN TDATA AREA (LOCATIONS 2000-3777 DATA FIELD 3)
/CMPR1 ROUTINE IS USED ONLY BY RW2 AND RW12 ROUTINES OF THE MAIN PROGRAM
/CMPR1 ALTERATION COMPARES 1 BLOCK OF TAPE DATA WITH DATA IMAGE AREA

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/COMPARE ERROR ROUTINE
/EXAMINE LOC 7 TO DETERMINE WHICH ROUTINE IN THE MAIN PROG HAD THE COMPARE ERROR
/EXAMINE LOC 13 TO DETERMINE WHICH WORD IS INCORRECT
/EXAMINE LOC 10 TO DETERMINE WHICH BLOCK ERROR IS IN

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619

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1637	/TESTS REVERSE BLOCK NUMBERS SEQUENTIALY
1638	/IF TAPE POSITIONED AT BLOCK 777 THIS TEST
1639	/CHECKS REVERSE BLOCK NUMBERS 777-0
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/TESTS FOWARD BLOCK NUMBERS SEQUENTIALLY
/IF TAPE POSITIONED AT BLOCK 0 THIS TEST
/CHECKS FOWARD BLOCK NUMBERS 0-777

1233	0047	FWD BK,	SET 7	/SET UP RET JUMP FROM LOC 7
1234	0000		0	
1235	0733	MTB I U		/MOVE TOWARD BLOCK 777 (GET TAPE MOVING IN RIGHT DIRECTION)
1236	0777	777		
1237	0733	MTB I U		/MOVE TOWARD BLOCK 777
1240	0777	777		
1241	1120	ADA I		/SUBTRACT 1 FROM DIFFERENCE BETWEEN
1242	7776	-1		/FIRST TAPE BLK NUMBER ENCOUNTERED AND TBLK
1243	1060	STA I		/STORE IN LOC FWDST
1244	0000			
1245	0733	MTB I U		/MOVE TOWARD BLOCK 777
1246	0777	777		
1247	1440	SAE		/IS THE DIFFERENCE EQUAL TO THE CONTENTS OF LOC FWDST
1250	1244	FWDST		
1251	7262	JMP EFWD		/NO ERROR
1252	1460	SAE I		/IS THE DIFFERENCE EQUAL TO 1
1253	0001	1		
1254	7241	JMP FWDST-3		/NO-DO IT AGAIN
1255	0733	MTB I U		/YES-THIS IS THE LAST MTB AS WE ARE AT BLK 776
1256	0777	777		
1257	0450	AZE		/AC ZERO (DIFFERENCE EQUAL TO ZERO)
1260	7262	JMP EFWD		/NO-ERROR
1261	6007	JMP 7		/RETURN TO MAIN PROGRAM

/FOREWARD BLOCK NUMBER ERROR
/THE BLOCK NUMBERS DID NOT OCCUR IN SEQUENCE
/DIFFERENCE=NUMBER OF BLOCKS BETWEEN PRESENT TAPE POSITION
/AND THE BLOCK NUMBER YOU ARE MOVING TOWARD
/MQ = INCORRECT DIFFERENCE
/AC = CORRECT DIFFERENCE

1262	0460	EFWD,	SNS I 0	/SNS SW 0 SET
1263	6000	JMP 0		/YES-IGNORE ERROR AND CONTINUE
1264	0314	ROR 14		/ROTATE INCORRECT DIFFERENCE INTO MQ REGISTER
1265	1000	LDA		/LOAD THE AC WITH THE DIFFERENCE
1266	1244	FWDST		
1267	0000	HLT		/HALT-UNTIL KEY CONTINUE HIT
1270	6007	JMP 7		/RET TO MAIN PROG AT START OF TEST WHICH FAILED

/21

EJECT


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/ERROR HALTS FROM MAIN PROGRAM
/SENSE SWITCH 0 IGNORS ERROR AND
/RETURNS YOU TO PROGRAM SEQUENCE
/LOCATION OF NEXT EXECUTABLE INSTRUCTION
/KEY CONTINUE RETURNS YOU TO THE MAIN PROGRAM
/AT THE START OF THE TEST WHICH FAILED
/E2 CORRESPONDS TO TEST T2 ETC

1271 0461 E2, SNS I 1 /IS SNS 0 SET
1272 6000 JMP 0 /YES-IGNORE ERROR RET TO NEXT INST IN PROG SEQUENCE
1273 0314 ROR 14 /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
1274 1000 LDA /PUT THE CALCULATED CHECKSUM INTO THE AC REGISTER
1275 1044 CKSUM
1276 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1277 6026 JMP T2 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1300 0460 E3, SNS I /IS SENSE SW 1 SET
1301 6000 JMP 0 /YES-IGNORE ERROR RET TO NEXT INST IN PROG SEQUENCE
1302 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1303 6051 JMP T3 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1304 0460 E4, SNS I 0 /IS SNS SW 0 SET
1305 6000 JMP 0 /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
1306 0314 ROR 14 /ROTATE THE BAD CHECKSUM INTO THE MQ REGISTER
1307 1000 LDA /LOAD THE AC WITH THE CALCULATED CHECKSUM
1310 1044 CKSUM
1311 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1312 6100 JMP T4 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1313 0460 E5, SNS I 0 /IS SNS SW 0 SET
1314 6000 JMP 0 /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1315 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1316 6111 JMP T5 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1317 0460 E6, SNS I 0 /IS SNS SW 0 SET
1320 6000 JMP 0 /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQ
1321 0314 ROR 14 /ROTATE THE BAD CHECKSUM INTO THE MQ REG
1322 1000 LDA /LOAD THE AC WITH THE CALCULATED CHECKSUM
1323 1044 CKSUM
1324 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1325 6131 JMP T6 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

1326 0460 E7, SNS I 0 /IS SNS SW 0 SET
1327 6000 JMP 0 /YES-IGNORE ERROR AND RET TO NEXT INST IN PROG SEQUENCE
1330 0000 HLT /HALT-UNTIL KEY CONTINUE IS HIT
1331 6163 JMP T7 /RET TO MAIN PROG AT START OF TEST WHICH FAILED

/22

EJECT

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123

EJECT

CKSU 044
CL 070
CLEAR 5063
CLIDAT 5075
CMR 5141
CMR1 5136
C1 5367
C1M 5370
C1001 5372
C3 5371
C3374 5373
C4374 5374
DATA 1400
DATSET 4752
DELAY 5130
DONE 4570
DUP 5121
DUPDAT 5107
ECMR 5167
EFWD 5262
EREV 5224
E2 5271
E20 5332
E20A 5341
E21A 5345
E23 5354
E24 5363
E3 5300
E4 5304
E5 5313
E6 5317
E7 5326
FWDBK 5233
FWDIST 5244
FXDAT 4760
FXLOAD 4764
GCKSUM 5033
LScope 4676
RADD 5026
RDAT 4776
REVBK 5202
REVIST 5213
RLOAD 5012
RNA 5024
RNB 5025

RWSUB	4631
RW1	4022
RW10	4460
RW11	4467
RW12	4576
RW2	4076
RW3	4124
RW4	4216
RW5	4262
RW6	4326
RW7	4377
START	4020
TBLK	0374
TDATA	2000
IST	5153
TYPE	5056
T10	4221
T11	4240
T12	4263
T13	4303
T14	4332
T15	4353
T16	4406
T17	4463
T2	4026
T20	4471
T21	4524
T23	4702
T24	4725
T3	4051
T4	4100
T5	4111
T6	4131
T7	4163
X0A	0021
X10	4227
X11	4246
X12	4271
X13	4311
X14	4340
X15	4361
X2	4034
X20	4477
X20A	4514
X21	4534
X21A	4546
X22	4657
X22A	4661
X22B	4664
X22C	4670
X23	4710
X24	4733
X3	4057
X6	4137
X7	4171

~~CONFIDENTIAL~~

2134					
2135					
2136					
2137					
2140					
2141	1367	0001	C1,	1	
2142	1370	7776	C1M,	7776	
2143	1371	0003	C3,	3	
2144	1372	1001	C1001,	1001	
2145	1373	3374	C3374,	3374	
2146	1374	4374	C4374,	4374	
2147				DATA=1400	
2150				TDATA=20000	
2151				TBLK=374	
2152				X0A=21	

/CONSTANTS USED IN PROGRAM