

7090/7094 DIAGNOSTIC ENGINEERING
DIAGNOSTIC BULLETIN RELEASE

DIAGNOSTIC BULLETIN NUMBER 4

DATED - April 15, 1963

DIAGNOSTIC PROGRAM(S) - 9M71/76B

TITLE(S) - 7094 Main Frame Instruction Checkout and Reliability Program

C O M M E N T S

All 9M71/76B binary decks received by an installation after the date of this bulletin will have the binary corrections included in them.

9M71/76B is not to be updated until EC 252603 is installed on the machine.

DISTRIBUTION - All 7094 installations

ENCLOSURES - 40 PAGE(S)

55 CARD(S)

REQUESTS FOR DATA SYSTEMS DIVISION SERIES DIAGNOSTIC WRITE-UPS,
LISTINGS, AND/OR CARDS (INCLUDING OPTIONAL AND SPECIAL FEATURES)
SHOULD BE DIRECTED TO---

PRODUCT RELIABILITY AND SERVICEABILITY ENGINEERING
DEPARTMENT 855, BUILDING 990
POUGHKEEPSIE, NEW YORK

-----INCLUDE CUSTOMER'S NAME AND INSTALLATION NUMBER-----

7090 / 7094 D I A G N O S T I C E N G I N E E R I N G
D I A G N O S T I C B U L L E T I N

DIAGNOSTIC BULLETIN NUMBER 4

DATED- April 15, 1963

DIAGNOSTIC PROGRAM - 9M71/76B

TITLE - 7094 Main Frame Instruction Checkout and Reliability Program

- A. The primary purpose for this bulletin is to test the altered machine configuration produced by EC 252603. This EC enables DFDP instructions to produce normalized quotients regardless of whether the divisor and dividend are normalized.

Routines to check other portions of the machine which were not previously checked are also included.

Also included is the Floating Point Error Indicators chart which was omitted on the original release of 9M71B.

- B. Directions for updating card deck -

1. Replace card M71B0770 with corresponding attached card,
2. Replace cards M71B0991 - M71B0994 with corresponding attached cards.
3. Replace cards M71B1193 - M71B1236 with corresponding attached cards.
4. Replace cards M71B1388 - M71B1391 with corresponding attached cards.
5. Replace cards M71B1401 - M71B1402 with corresponding attached cards.

- C. Directions for updating program listing -

1. Replace pages 29 - 30 with corresponding attached pages.
2. Replace pages 617 - 618 with corresponding attached pages.
3. Replace pages 775 - 778 with corresponding attached pages.
4. Replace pages 911 - 938 with corresponding attached pages.
5. Replace pages 1025 - 1028 with corresponding attached pages.

Note: This update is not to be installed until EC 252603 is installed on the machine.

N. 4. Program Deck

9M76B	001 - 486	Program deck
	487 - 488	Two blank cards

5. Printouts

All references to 9M71 in any of printouts have been changed to 9M76.

6. Card Deck Format

The 9M76 binary deck consists of 24 words per card instead of the normal 22 words per card as provided in the 9M71 binary deck.

FLOATING POINT ERROR INDICATORS CHART

0	ACC SIGN
1	ACC Q
2	ACC P
3	ACC 1-35
4	MQ S, 1-35
5	FP TRAP
6	POS 14 LOC 0
7	POS 15 LOC 0
8	POS 16 LOC 0
9	POS 17 LOC 0
10	ADR LOC 0
11	PREFIX LOC 0
12	TAG LOC 0
13	ACC OV.FLO IND
14	TRAP TO LOC 1
15	DCT IND
16	MQ OV.FLO IND
17	POS 12 LOC 0
18	SI 0-35

SECTION THREE

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SUBROUTINE USED TO CLEAR SI REG BEFORE LDI BZERO IS CHECKED.
FOUR SI INST AND TWO COMM LINES ARE USED TO FURTHER
ASSURE THAT ALL SI COLS CAN BE CLEARED.

40724	-0500	00	0	45101	SICL2	CAL	BS135	ONES- ACC P-35
40725	-0042	00	0	00000		RIA		
40726	-0046	00	0	00000		PIA		IND TO ACC FOR CHECK
40727	0100	00	2	00001		TZE	1,2	RETURN
40730	-0754	00	0	00000		PXD		CLEAR ACC
40731	0044	00	0	00000		PAI		
40732	-0046	00	0	00000		PIA		IND TO ACC FOR CHECK
40733	0100	00	2	00001		TZE	1,2	RETURN
40734	0445	00	0	45101		RIS	BS135	
40735	-0046	00	0	00000		PIA		IND TO ACC FOR CHECK
40736	0100	00	2	00001		TZE	1,2	RETURN
40737	0441	00	0	45100		LDI	BZERO	
40740	-0046	00	0	00000		PIA		IND TO ACC FOR CHECK
40741	0100	00	2	00001		TZE	1,2	
40742	0602	00	0	45135		SLW	LIES	
40743	0634	00	2	45143		SXA	LIES+6,2	SAVE XRB
40744	0535	00	2	45143		LAC	LIES+6,2	GET 2S COMPLEMENT TO
40745	0634	00	2	45144		SXA	LIES+7,2	GIVE TRUE ADDRESS
40746	0500	00	0	45135		CLA	LIES	
40747	0560	00	0	45144		LDQ	LIES+7	ERROR ADDR TO MQ
40750	0534	00	2	45143		LXA	LIES+6,2	RESET XRB
40751	0020	00	0	40753		TRA	*+2	
40752	623123435102					BCD	1SICLR2	
40753	0074	00	4	00104		TSX	ERROR-1,4	
40754	0761	00	0	40753		NOP	*-1	
40755	0020	00	2	00001		TRA	1,2	

WITH THE USE OF FOUR SI INST AND TWO COMM LINES, THE SI REG
WAS NOT FULLY CLEARED.

ACC P-35 CONTAINS THE SI COLS THAT WERE NOT CLEARED.

MQ 21-35 CONTAINS THE ADDRESS OF TEST USING SICL2.

WITH AT LEAST ONE OF THESE COMM LINES FUNCTIONAL, THE FAULT
LIES WITHIN THE SI REG COLS. -- 2.06 PAGES.

40756	0074	00	4	00106		TSX	OK,4
40757	0020	00	0	40667		TRA	SI18

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BEGIN TESTING OF SI INST AND COMMAND LINES
FOR THE FOLLOWING TESTS---

- A- EACH SI REG COL SHOULD BE ABLE TO BE LOADED
- B- EACH SI REG COL SHOULD BE ABLE TO BE CLEARED
- C- EACH SI REG COL OUTPUT SHOULD BE ABLE TO BE GATED TO SR BY SI INST PIA OR STI.
- D- BOTH PIA AND STI SHOULD BE COMPLETELY FUNCTIONAL.

IN THE FOLLOWING TESTS---

- 1- THE COMMAND LINE WILL BE TESTED FOR OPERATION, USING ALL INST USING THAT SUCH COMMAND, EXCEPT THE RT AND LFT HALF SI INSTRUCTIONS.
- 2- THEN THE INDIVIDUAL EXECUTION LINES TO THE ASSUMED FUNCTIONAL COMM LINE IS TESTED FOR OPER.

TESTING SET SI COMMAND LINES (2.12.64)

40760	636231020060		BCD ITS120	
40761	0074 00 4 45152	SI20	TSX CLEAR,4	
40762	0074 00 2 40724		TSX SICL2,2	
40763	0774 00 1 00004		AXT 4,1	LOADING XRA FOR XEC INST.
40764	-0500 00 0 45101		CAL BS135	
40765	0522 00 1 54132		XEC LOAD+4,1	XEC FOUR SI INST
40766	-0046 00 0 00000		PIA	
40767	-0602 00 0 45135		ORS LIES	
40770	2 00001 1 40764		TIX SI20+3,1,1	
40771	-0500 00 0 45135		CAL LIES	
40772	0760 00 0 00006		COM	
40773	0767 00 0 00001		ALS 1	DROP EXISTING Q BIT.
				DID WE SET ALL SI REG COLS...
40774	0100 00 0 40777		TZE +3	YES OK-GO ON
40775	0500 00 0 45135		CIA LIES	NO ERROR
40776	0074 00 4 00105		TSX ERROR,4	
40777	0074 00 4 00106		TSX OK,4	CONTINUE TEST
41000	0020 00 0 40761		TRA SI20	REPEAT TEST

USING ITS FOUR INPUTS, THE SET SI COMMAND LINES FAILED

TO SET ALL ONES INTO SI REG.

TESTING LDI TO CONDITION SI SET COMMAND LINES. (2.12.64)

41001	432431606060		BCD 1LDI	
41002	0074 00 4 45152	SI21	TSX CLEAR,4	
41003	0074 00 2 40724		TSX SICL2,2	
41004	0560 00 0 45101		LDQ BS135	CORR CON OF SI REG..
41005	0441 00 0 45101		LDI BS135	ALL ONES
41006	-0046 00 0 00000		PEA	
41007	0602 00 0 45135		SLW LIES	
41010	0760 00 0 00006		COM	
41011	0767 00 0 00001		ALS 1	DROP EXISTING Q BIT
				DID WE LOAD ALL ONES...
41012	0100 00 0 41015		TZE +3	YES-OK-GO ON
41013	0500 00 0 45135		CIA LIES	NO-ERROR
41014	0074 00 4 00105		TSX ERROR,4	
41015	0074 00 4 00106		TSX OK,4	CONTINUE TEST
41016	0020 00 0 41002		TRA SI21	REPEAT TEST

LDI FAILED TO CONDITION THE SET SI COMMAND LINES TO
SET ALL ONES INTO SI REG. (2.12.63)

SECTION FOUR
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CONVERT A BLOCK OF 24 WORDS FROM ROW BINARY TO COLUMN BINARY AND
RECONSTRUCT FROM THIS ORIGINAL ROW BINARY BLOCK. CHECK.

52172	234643223145		BCD 1COLBIN	
52173	0774 00 5 00147	BINA	AXT 103,5	
52174	0020 00 0 52263		TRA BIND	
52175	-0760 00 0 00016	BINB	EMTM	SET THREE XR MODE
52176	0774 00 4 00030		AXT 24,4	BLOCK OF 24 WORDS
52177	0774 00 1 00001		AXT 1,1	SET XRA FOR LEFT SIDE
52200	-0500 00 0 56701		CAL B\$MZE	P BIT TO ACCUMULATOR
52201	0560 00 4 56405		LDQ POT+24,4	ROW BINARY WORD TO MQ
52202	0600 00 4 56405		STZ POT+24,4	CLEAR FOR RECONSTRUCT
52203	0634 00 4 52215		SXA *+10,4	SAVE XRC
52204	0774 00 2 00003		AXT 3,2	THREE COLUMNS PER WORD
52205	0774 00 4 00002		AXT 2,4	SET FOR TWELVE RCW
52206	0162 00 0 52210		TQP *+2	ZERO FOR ZERO
52207	-0602 00 5 56436		ORS POT+49,5	ONE FOR ONE
52210	-0773 00 0 00001		RQL 1	POSITION NEXT BIT
52211	3 00026 4 52213		TXH *+2,4,22	TEST FOR NINE ROW
52212	1 00002 4 52206		TXI *-4,4,2	STEP FOR NEXT ROW
52213	0771 00 0 00001		ARS 1	SHIFT C ACC FOR NEXT COL
52214	2 00001 2 52205		TIX *-7,2,1	
52215	0774 00 4 00000		AXT **,4	
52216	0100 00 0 52220		TZE *+2	TIME FOR NEW MASK
52217	2 00001 4 52201		TIX *-14,4,1	LOOP BACK FOR NEXT WORD
52220	-3 00000 1 52223		TXL *+3,1,0	COL BIN BLOCK COMPLETED
52221	-0501 60 0 52200		ORA* BINB+3	SET ACCUMULATOR P
52222	1 77777 1 52217		TXI *-3,1,-1	SET FOR RIGHT SIDE
52223	0774 00 4 00030		AXT 24,4	START BACK
52224	0774 00 2 00003		AXT 3,2	THREE COLUMNS PER WORD
52225	0774 00 1 00002		AXT 2,1	SET FOR TWELVE RCW
52226	-0500 00 1 56435	BINC	CAL POT+43,1	EXTRACT
52227	0560 00 1 56436		LDQ POT+47,1	LEFTMOST
52230	-0763 00 0 00001		LGL 1	BIT AND
52231	0602 00 1 56435		SLW POT+43,1	SAVE THE
52232	-0600 00 1 56436		STQ POT+47,1	REST
52233	0771 00 0 00044		ARS 36	LEFTMOST BIT TO ACC 35
52234	-0501 60 0 52236		ORA* *+2	PLUG IT IN
52235	0767 00 0 00001		ALS 1	LEAVE ROOM FOR NEXT BIT
52236	0602 00 4 56405		SLW POT+24,1	
52237	3 00026 1 52241		TXH *+2,1,22	TEST FOR NINE ROW
52240	1 00002 1 52226		TXI BINC,1,2	STEP FOR NEXT ROW
52241	2 00001 2 52225		TIX BINC-1,2,1	STEP TO NEXT COLUMN
52242	0771 00 0 00001		ARS 1	ADJUST COMPLETED WORD
52243	0602 00 4 56405		SLW POT+24,1	SAVE IT
52244	2 00001 4 52224		TIX BINC-2,1,1	START NEXT WORD
52245	0760 00 0 00016		EMTM	SET SEVEN XR MODE
52246	0754 00 5 00000		PXA ,5	
52247	0734 00 1 00000		PAX ,1	

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52250	0774	00	2	00030	AXT	24,2	
52251	-0500	00	2	56405	CAL	POY+24,2	RECONSTRUCTED WORD
52252	-0340	00	1	56601	LAS	RAN+100,1	SHOULD COMPARE EQUAL
52253	0020	00	0	52255	TRA	*+2	NO GOOD
52254	0020	00	0	52260	TRA	*+4	OKAY
52255	0560	00	1	56601	LDC	RAN+100,1	ORIGINAL WORD TO MQ
52256	0074	00	4	00104	TSX	ERROR-1,4	INDICATE ERROR
52257	0761	00	0	52173	NOP	BINA	
52260	2 00001	1		52261	TIX	*+1,1,1	SET XRS FOR NEXT
52261	2 00001	2		52251	TIX	*-8,2,1	COMPARE, IF ANY

52262	0760	00	0	00161	SWT	1	REPEAT WITH SAME DATA
52263	1 77742	5		52264	BIND TXL	*+1,5,-30	SET FOR ANOTHER BLOCK
52264	0754	00	5	00000	PXA	,5	
52265	0734	00	6	00000	PAX	,6	
52266	0774	00	7	00030	AXT	24,7	
52267	-0500	00	6	56601	CAL	RAN+100,6	MOVE
52270	0600	00	7	56435	STZ	POT+48,7	IT TO
52271	0602	00	7	56405	SLH	POT+24,7	TEMPORARY
52272	-2 00001	7		52175	TNX	BIN3,7,1	STORAGE
52273	2 00001	6		52267	TIX	*-4,6,1	
52274	0074	00	4	52725	TSX	ALBIT,4	
52275	0074	00	4	00106	TSX	OK,4	
52276	0020	00	0	52173	TRA	BINA	

TEST THAT SHIFT COUNT OF SIX OR LESS IS PROPERLY
DECODED IN THE ADDRESS REGISTER

52277	432743606060	BCD	1LGL	
52300	0774 00 1 00005	AXT	5,1	
52301	0140 00 0 52301	TOV	*	RESET OVERFLOW TGR
52302	0441 00 1 52317	LDI	*+13,1	
52303	0500 00 0 56613	CLA	B1+10	
52304	0604 00 0 52305	STI	*+1	
52305	000 00 0 00000	***	**	SHIFT
52306	0140 00 0 52311	TOV	*+3	SHOULD TRANSFER
52307	0074 00 4 00104	TSX	ERROR-1,4	DIDNT SHIFT FAR ENOUGH
52310	0020 00 0 52300	TRA	*-8	
52311	2 00001 1 52301	TIX	*-8,1,1	
52312	-0763 00 0 00014	LGL	12	
52313	-0763 00 0 00024	LGL	20	CONSTANTS
52314	-0763 00 0 00044	LGL	36	
52315	-0763 00 0 00104	LGL	68	
52316	-0763 00 0 00204	LGL	132	
52317	0074 00 4 00106	TSX	OK,4	
52320	0020 00 0 52300	TRA	*-16	

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52321	623031266360		BCD 1SHIFT	
52322	-0760 00 0 00016	SHFT	ENTM	ENTER 3 XR MODE
52323	-0774 00 7 00012		AXC 10,7	-10 TO XR A,B,C,
52324	0754 00 0 00000		PXA	CLEAR AC
52325	0560 00 0 56614		LDQ B1+11	BIT TO PSN 12 IN MQ
52326	-0763 00 4 00006		LGL 6,4	SHOULD
52327	-0763 00 2 00006		LGL 6,2	SHIFT TO
52330	-0763 00 1 00006		LGL 6,1	PSN P
52331	-0760 00 0 00001		PBT	SHOULD SKIP
52332	0074 00 4 00105		TSX ERROR,4	
52333	0074 00 4 00106		TSX OK,4	
52334	0020 00 0 52322		TRA SHFT	LOOP ROUTINE

CHECK THAT CAL BIT TO PSN P DOES NOT SET OVERFLOW TGR.

52335	466526434660		BCD 1OVFLO
52336	0140 00 0 52336		TOV *
52337	-0500 00 0 56701		CAL B\$MZE
52340	0760 00 0 00016		LMTM
52341	-0140 00 0 52343		TNO **2
52342	0074 00 4 00105		TSX ERROR,4
52343	0074 00 4 00106		TSX OK,4
52344	0020 00 0 52336		TRA *-6

TEST ACL WITH NO CARRIES

52345	212343606000		BCD 1ACL	
52346	-0754 00 0 00000	RACL	PXD	CLEAR ACC
52347	-0760 00 0 00003		SSM	
52350	0601 00 0 56236	RACA	STO TEMP	
52351	-0500 00 0 56236		CAL TEMP	
52352	0760 00 0 00006		COM	ALL BITS BUT ONE TO ACC
52353	0361 00 0 56236		ACL TEMP	ADD THAT ONE
52354	0760 00 0 00006		COM	
52355	0100 00 0 52361		TZE **4	SHOULD TRANSFER
52356	0560 00 0 56225		LDQ PZE	ZERO TO MQ
52357	0074 00 4 00104		TSX ERROR-1,4	
52360	0020 00 0 52346		TRA RACL	
52361	-0500 00 0 56236		CAL TEMP	
52362	0760 00 0 00001		LBT	TERMINATE IF ACC 35
52363	0020 00 0 52365		TRA **2	IS A ONE
52364	0020 00 0 52367		TRA **3	
52365	0771 00 0 00001		ARS 1	
52366	0020 00 0 52350		TRA RACA	
52367	0074 00 4 00106		TSX OK,4	
52370	0020 00 0 52346		TRA RACL	LOOP THIS ROUTINE
52371	0761 00 0 52725		NOP 21973	
52372	0020 00 0 52734		TRA ALT	

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RELIABILITY

ALTER LOCATION *INDEX* AND CHECK FOR EXTENDED RELIABILITY

52725				ORG	21973	
52725	0774	00 1	00000	ALBIT	AXT	0,1
52726	0774	00 2	00000		AXT	0,2
52727	0774	00 3	00000		AXT	0,3
52730	0774	00 5	00000		AXT	0,5
52731	0774	00 6	00000		AXT	0,6
52732	0774	00 7	00000		AXT	0,7
52733	0020	00 4	00001		TRA	1,4
52734	0534	00 1	56354	ALT	LXA	INDEX,1
52735	1 00001	1	52736		TXI	**+1,1,1
52736	-3 00000	1	52741		TXL	**+3,1,0
52737	0634	00 1	56354		SXA	INDEX,1
52740	0020	00 0	52743		TRA	**+3
52741	1 77470	1	52742		TXI	**+1,1,-200
52742	0634	00 1	56354		SXA	INDEX,1
52743	0600	00 0	00112		SYZ	RELTY
52744	0500	00 0	56231		CLA	IX3 RESTORE
52745	0601	00 0	00203		SYO	OKAY+6 MONITOR
52746	0760	00 0	00164		SWT	4 EXTENDED RELIABILITY
52747	0020	00 0	52752		TRA	**+3 NO
52750	0020	00 0	52753		TRA	**+3 YES
52751	0 00000	0	00004		PZE	4
52752	0074	00 4	00111		TSX	LOOP,4
52753	-0625	00 0	00112		STL	RELTY
52754	-0774	00 4	52755		AXC	**+1,4
52755	0634	00 4	00101		SXA	SVXR4,4
52756	0020	00 0	52760		TRA	SXA

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DOUBLE PRECISION ROUTINES

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CHECK THAT DFDP WITH SIGNS ALIKE, DIVISOR AND DIVIDEND NORMALIZED.
PRODUCES A NORMALIZED QUOTIENT

63137	242624476045		BCD 1DFDP N	
63140	0074 00 4 66227	DP43	TSX CLEAR, 4	
63141	0443 00 0 67056		DLD DV19	
			+233.400000000	+200.000000001
63142	-0241 00 0 67060		DFDP DV20	
			+233.400000000	+200.000000002
63143	0074 00 2 66060		TSX CHECK, 2	
63144	0 00000 0 00000		PZE	IND CW
63145	+200777777777		OCT 200777777777	ACC
63146	+145777777774		OCT 145777777774	MQ
63147	+201400000000		OCT 201400000000	SI
63150	0 00000 0 00000		PZE	LOC ZERO
63151	0074 00 4 00105		TSX ERROR, 4	
63152	0074 00 4 00106	OK43	TSX OK, 4	
63153	0020 00 0 63140		TRA DP43	
63154	242624474502		BCD 1DFDPN2	
63155	0074 00 4 66227	DP43A	TSX CLEAR, 4	
63156	0443 00 0 67062		DLD DV21	
			-200.400000000	+145.000000001
63157	-0241 00 0 67064		DFDP DV22	
			+346.400000000	+313.000000002
63160	0074 00 2 66060		TSX CHECK, 2	
63161	-010400000000		OCT 410400000000	IND CW
63162	+032777777777		OCT 032777777777	AC
63163	-377777777774		OCT 777777777774	MQ
63164	-033400000000		OCT 433400000000	SI
63165	0 00000 0 63160		PZE DP43A+3	LOC ZERO
63166	0074 00 4 00105		TSX ERROR, 4	
63167	0074 00 4 00106	OK43A	TSX OK, 4	
63170	0020 00 0 63155		TRA DP43A	

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SECTION FIVE
DOUBLE PRECISION ROUTINES

TEST UNDERFLOW, OVERFLOW, AND FLOATING POINT
TRAP WITH DOUBLE PRECISION INSTRUCTIONS

TEST DFAD WITH AC EXPONENT OVERFLOW

63171	634721240160		BCD	ITPAD1
63172	0074 00 4 66227	DP44	TSX	CLEAR,4
63173	0443 00 0 66664		DLD	ONEZ

-377 77777777 -377 77777777

63174	0301 00 0 66664		DFAD	ONEZ
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-377 77777777 -377 77777777

63175	0074 00 2 66060		TSX	CHECK,2
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63176	-113000000000		OCT	513000000000	IND	CW
63177	+000777777777		OCT	000777777777	AC	
63200	-345777777777		OCT	745777777777	MQ	
63201	-377777777777		OCT	777777777777	SI	
63202	0000 00 0 63175		HTR	DP44+3	LOC	ZERO

63203	0074 00 4 00105		TSX	ERROR,4
63204	0074 00 4 00106		TSX	OK,4
63205	0020 00 0 63172		TRA	DP44

TEST DFAD MQ UNDERFLOW TRAP

63206	634721240260		BCD	ITPAD2
63207	0074 00 4 66227	DP45	TSX	CLEAR,4
63210	0443 00 0 67072		DLD	TAD3

+031 22222222 +000 22222222

63211	0301 00 0 67074		DFAD	TAD4
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+031 11111111 +000 11111111

63212	0074 00 2 66060		TSX	CHECK,2
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63213	+010400000000		OCT	010400000000	IND	CW
63214	+030666666666		OCT	030666666666	AC	
63215	+375666666666		OCT	375666666666	MQ	
63216	+031111111111		OCT	031111111111	SI	
63217	0000 00 0 63212		HTR	DP45+3	LOC	ZERO

63220	0074 00 4 00105		TSX	ERROR,4
63221	0074 00 4 00106		TSX	OK,4
63222	0020 00 0 63207		TRA	DP45

S E C T I O N F I V E
DOUBLE PRECISION ROUTINES

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CHECK THAT DLD INSTRUCTION IN THE INSTRUCTION REGISTER CAUSES NO
ODD LOCATION TRAP DUE TO DLA AND SWITCH IN PODS AT E7 TIME.

63223	244324606060		BCD 1DLD	
63224	0074 00 4 66227	DP45A	TSX	CLEAR,1
63225	0761 00 0 00000		NOP	
63226	0443 00 0 66714		DLD	AD11
63227	0401 00 0 66715		ADM	AD11+1
63230	0074 00 2 66060		TSX	CHECK,2
63231	0 00000 0 00000		PZE	IND CONTROL WORD
63232	0 00000 0 00000		PZE	AC
63233	0 00000 0 00000		PZE	MQ
63234	0 00000 0 00000		PZE	SI
63235	0 00000 0 00000		PZE	LOC ZERO
63236	0074 00 4 00105		TSX	ERROR,1
63237	0074 00 4 00106		TSX	OK,4
63240	0020 00 0 63224		TRA	DP45A

CHECK THAT AN ODD REFERENCE ON A DLA OVERLAPPED DLD WILL BE
DETECTED AND A TRAP OCCUR

63241	244324606060		BCD 1DLD	
63242	0074 00 4 66227	DP45B	TSX	CLEAR,4
63243	0761 00 0 00000		NOP	
63244	0500 00 0 66513		CLA	ONES
63245	0443 00 0 66715		DLD	AD11+1
63246	0074 00 2 66060		TSX	CHECK,2
63247	+010001000000		OCT	010001000000 IND CONTROL WORD
63250	0 00000 0 00000		PZE	AC
63251	0 00000 0 00000		PZE	MQ
63252	0 00000 0 00000		PZE	SI
63253	0 00000 0 63246		PZE	DP45B+4 LOC ZERO
63254	0074 00 4 00105		TSX	ERROR,4
63255	0074 00 4 00106		TSX	OK,4
63256	0020 00 0 63242		TRA	DP45B

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TEST DFAD ODD REFERENCE TRAP

63257	634721240360		BCD	1TPAD3	
63260	0074 00 4 66227	DP46	TSX	CLEAR,4	
63261	0443 00 0 67070		DLD	TAD2	
				+377 163210533	+344 163210533
63262	0301 00 0 67071		DFAD	TAD2+1	
				+344 163210533	+344 163210533
63263	0074 00 2 66060		TSX	CHECK,2	
63264	+010001000000		OCT	010001000000	IND CW
63265	+377163210533		OCT	377163210533	AC
63266	+344163210533		OCT	344163210533	MQ
63267	0 00000 0 00000		PZE		SI
63270	0000 00 0 63263		HTR	DP46+3	LOC ZERO
63271	0074 00 4 00105		TSX	ERROR,4	
63272	0074 00 4 00106		TSX	OK,4	
63273	0020 00 0 63260		TRA	DP46	

TEST DFMP AC AND MQ UNDERFLOW

63274	634744470160		BCD	1TPMP1	
63275	0074 00 4 66227	DP47	TSX	CLEAR,4	
63276	0443 00 0 67076		DLD	TMP1	
				+100 700000000	+000 000000000
63277	0261 00 0 67100		DFMP	TMP2	
				+077 700000000	+000 000000000
63300	0074 00 2 66060		TSX	CHECK,2	
63301	+311400000000		OCT	311400000000	IND CW
63302	+377610000000		OCT	377610000000	AC
63303	+344000000000		OCT	344000000000	MQ
63304	0 00000 0 00000		PZE		SI
63305	0000 00 0 63300		HTR	DP47+3	LOC ZERO
63306	0074 00 4 00105		TSX	ERROR,4	
63307	0074 00 4 00106		TSX	OK,4	
63310	0020 00 0 63275		TRA	DP47	

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TEST DFMP ODD REFERENCE TRAP

63311	634744470260		BCD	ITPMP2	
63312	0074 00 4 66227	DP48	TSX	CLEAR,1	
63313	0443 00 0 67070		DLD	TA02	
				+377 163210533	+344 163210533
63314	0261 00 0 67071		DFMP	TA02+1	
				+344 163210533	+344 163210533
63315	0074 00 2 66060		TSX	CHECK,2	
63316	+010001000000		OCT	010001000000	IND CW
63317	+377163210533		OCT	377163210533	AC
63320	+344163210533		OCT	344163210533	MQ
63321	0 00000 0 00000		PZE		SI
63322	0000 00 0 63315		HTR	DP48+3	LOC ZERO
63323	0074 00 4 00105		TSX	ERROR,1	
63324	0074 00 4 00106		TSX	OK,4	
63325	0020 00 0 63312		TRA	DP48	
TEST DFDP MQ UNDERFLOW, SIGNS ALIKE-MINUS, R1 LESS THAN Q1 TIMES D, Q1 AND Q2 OVERLAP WITH SIGNS UNLIKE					
63326	242624476060		BCD	1DFDP	
63327	0074 00 4 66227	DP49A	TSX	CLEAR,1	
63330	0443 00 0 67042		DLD	DV13	
				-130 530134466	-075 202023736
63331	-0241 00 0 67044		DFDP	DV14	
				-300 713332366	-245 577441743
63332	0074 00 2 66060		TSX	CHECK,2	
63333	+010400000000		OCT	010400000000	IND CW
63334	+030577441742		OCT	030577441742	AC
63335	+375741466727		OCT	375741466727	MQ
63336	+030577441743		OCT	030577441743	SI
63337	0000 00 0 63332		HTR	DP49A+3	LOC ZERO
63340	0074 00 4 00105		TSX	ERROR,4	
63341	0074 00 4 00106		TSX	OK,4	
63342	0020 00 0 63327		TRA	DP49A	

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TEST DFDP WITH AC OVERFLOW , Q2 ADD TO Q1)

63343	242624476060	BCD	1DFDP	
63344	0074 00 4 66227	DP49B	TSX	CLEAR,4
63345	0443 00 0 67046	DLD	DV15	
-332 415324200 -277 714137104				
63346	-0241 00 0 67050	DFDP	DV16	
+100 773225522 +045 417724256				
63347	0074 00 2 66060	TSX	CHECK,2	
63350	-113000000000	OCT	513000000000	IND CW
63351	+032417724257	OCT	032417724257	AC
63352	-377417123424	OCT	777417123424	MQ
63353	-032417724257	OCT	432417724257	SI
63354	0000 00 0 63347	HTR	DP49B+3	
63355	0074 00 4 00105	TSX	ERROR,4	
63356	0074 00 4 00106	TSX	OK,4	
63357	0020 00 0 63344	TRA	DP49B	

TEST DFDP WITH AC AND MQ UNDERFLOW.

63360	242624476060	BCD	1DFDP	
63361	0074 00 4 66227	DP49C	TSX	CLEAR,4
63362	0443 00 0 67052	DLD	DV17	
-033 070115777 -000 220065144				
63363	-0241 00 0 67054	DFDP	DV18	
+361 376744133 +000 160611624				
63364	0074 00 2 66060	TSX	CHECK,2	
63365	-311400000000	OCT	711400000000	IND CW
63366	+250703047124	OCT	250703047124	AC
63367	-215103531330	OCT	615103531330	MQ
63370	-252160611625	OCT	652160611625	SI
63371	0000 00 0 63364	HTR	DP49C+3	LOC ZERO
63372	0074 00 4 00105	TSX	ERROR,4	
63373	0074 00 4 00106	TSX	OK,4	
63374	0020 00 0 63361	TRA	DP49C	

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TEST DFDP WITH AC AND MQ OVERFLOW TRAP.

63375 244763470160 BCD 1DPTP1
63376 0074 00 4 66227 DP49 TSX CLEAR,4
63377 0443 00 0 67102 DLD TDV1

+267 200000000 +000 000000000

63400 -0241 00 0 67104 DFDP TDV2

+033 400000000 +000 000000000

63401 0074 00 2 66060 TSX CHECK,2

63402 +113400000000 OCT 113400000000 IND CW
63403 +034400000000 OCT 034400000000 AC
63404 +001000000000 OCT 001000000000 MQ
63405 +034400000000 OCT 034400000000 SI
63406 0000 00 0 63401 HTR DP49+3 LOC ZERO

63407 0074 00 4 00105 TSX ERROR,4
63410 0074 00 4 00106 TSX OK,4
63411 0020 00 0 63376 TRA DP49

TEST DFDP ODD REFERENCE TRAP

63412 244763470260 BCD 1DPTP2
63413 0074 00 4 66227 DP50 TSX CLEAR,4
63414 0443 00 0 67070 DLD TAD2

+377 163210533 +344 163210533

63415 -0241 00 0 67071 DFDP TAD2+1

+344 163210533 +344 163210533

63416 0074 00 2 66060 TSX CHECK,2

63417 +010001000000 OCT 010001000000 IND CW
63420 +377163210533 OCT 377163210533 AC
63421 +344163210533 OCT 344163210533 MQ
63422 0 00000 0 00000 FZE SI
63423 0000 00 0 63416 HTR DP50+3 LOC ZERO

63424 0074 00 4 00105 TSX ERROR,4
63425 0074 00 4 00106 TSX OK,4
63426 0020 00 0 63413 TRA DP50

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TEST DOUBLE PRECISION INSTRUCTIONS WITH
INDEXING AND INDIRECT ADDRESSING

TEST DLD WITH INDEXING

63427	316724432460		BCD	11XDLD	
63430	0074 00 4 66227	DP51	TSX	CLEAR,4	
63431	0774 00 1 00002		AXT	2,1	
63432	0443 00 1 66724		DLD	AD15,1	
-177 766666667 -144 222222223					
63433	0074 00 2 66060		TSX	CHECK,2	
63434	-0 00000 0 00000		MZE		IND CW
63435	+177766666667		OCT	177766666667	AC
63436	-144222222223		OCT	544222222223	MQ
63437	0 00000 0 00000		PZE		SI
63440	0000 00 0 00000		HTR		LOC ZERO
63441	0074 00 4 00105		TSX	ERROR,4	
63442	0074 00 4 00106		TSX	OK,4	
63443	0020 00 0 63430		TRA	DP51	

TEST DST WITH INDEXING

63444	016724626360		BCD	11XDST	
63445	0074 00 4 66227	DP52	TSX	CLEAR,4	
63446	0774 00 1 00012		AXT	10,1	
63447	0443 00 0 66670		DLD	AD1	
+100 252525252 +045 323232323					
63450	-0603 00 1 66664		DST	ONEZ,1	
63451	0443 00 0 66652		DLD	TEMP	
63452	0074 00 2 66060		TSX	CHECK,2	
63453	0 00000 0 00000		PZE		IND CW
63454	+100252525252		OCT	100252525252	AC
63455	+045323232323		OCT	045323232323	MQ
63456	0 00000 0 00000		PZE		SI
63457	0000 00 0 00000		HTR		LOC ZERO
63460	0074 00 4 00105		TSX	ERROR,4	
63461	0074 00 4 00106		TSX	OK,4	
63462	0020 00 0 63445		TRA	DP52	

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TEST DFAD WITH INDEXING

63463	672426212460		BCD 1XDFAD	
63464	0074 00 4 66227	DP53	TSX CLEAR,4	
63465	0774 00 1 00004		AXT 4,1	
63466	0443 00 0 66774		DLD MP11	
			+200 777770000 +145 700000000	
63467	0301 00 1 66776		DFAD MP12,1	
			+200 777770000 +145 040000000	
63470	0074 00 2 66060		TSX CHECK,2	
63471	0 00000 0 00000		PZE	IND CW
63472	+201777770000		OCT 201777770000	AC
63473	+146360000000		OCT 146360000000	MQ
63474	+200777770000		OCT 200777770000	SI
63475	0000 00 0 00000		HTR	LOC ZERO
63476	0074 00 4 00105		TSX ERROR,4	
63477	0074 00 4 00106		TSX OK,4	
63500	0020 00 0 63464		TRA DP53	

TEST DFMP WITH INDEXING

63501	672426444760		BCD 1XDFMP	
63502	0074 00 4 66227	DP54	TSX CLEAR,4	
63503	0774 00 1 00004		AXT 4,1	
63504	0443 00 0 67032		DLD DV9	
			-200 400000000 -145 200000000	
63505	0261 00 1 67032		DFMP DV9,1	
			+200 200000000 +145 400000000	
63506	0074 00 2 66060		TSX CHECK,2	
63507	-0 00000 0 00000		MZE	IND CW
63510	+177200000000		OCT 177200000000	AC
63511	-144500000000		OCT 544500000000	MQ
63512	+000040000000		OCT 000040000000	SI
63513	0000 00 0 00000		HTR	LOC ZERO
63514	0074 00 4 00105		TSX ERROR,4	
63515	0074 00 4 00106		TSX OK,4	
63516	0020 00 0 63502		TRA DP54	

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TEST DFDP WITH INDEXING

63517	672426244760		BCD	1XDFDP	
63520	0074 00 4 66227	DP55	TSX	CLEAR,4	
63521	0774 00 1 00002		AXT	2,1	
63522	0443 00 0 67024		DLD	DV6	
				+200 140000000	+000 000000000
63523	-0241 00 1 67030		DFDP	DV8,1	
				+200 200000000	+145 400000000
63524	0074 00 2 66060		TSX	CHECK,2	
63525	0 00000 0 00000		PZE		IND CW
63526	+200577777776		OCT	200577777776	AC
63527	+145400000000		OCT	145400000000	MQ
63530	+200600000000		OCT	200600000000	SI
63531	0000 00 0 00000		HTR		LOC ZERO
63532	0074 00 4 00105		TSX	ERROR,4	
63533	0074 00 4 00106		TSX	OK,4	
63534	0020 00 0 63520		TRA	DP55	

TEST DLD WITH INDIRECT ADDRESSING

63535	312124432460		BCD	1IADLD	
63536	0074 00 4 66227	DP56	TSX	CLEAR,4	
63537	0443 60 0 63056		DLD*	DP39+2	
				+200 200000000	+145 400000000
63540	0074 00 2 66060		TSX	CHECK,2	
63541	0 00000 0 00000		PZE		IND CW
63542	+200200000000		OCT	200200000000	AC
63543	+145400000000		OCT	145400000000	MQ
63544	0 00000 0 00000		PZE		SI
63545	0000 00 0 00000		HTR		LOC ZERO
63546	0074 00 4 00105		TSX	ERROR,4	
63547	0074 00 4 00106		TSX	OK,4	
63550	0020 00 0 63536		TRA	DP56	

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TEST DLD WITH INDIRECT ADDRESSING
AND INDEXING

63551	312124432401		BCD 11ADLD1
63552	0074 00 4 66227	DP57	TSX CLEAR,4
63553	0774 00 1 00002		AXT 2,1
63554	0443 60 1 63434		DLD* DP51+4,1
-177 766666667 -144 222222223			
63555	0074 00 2 66060		TSX CHECK,2
63556	-0 00000 0 00000		MZE
63557	+177766666667		OCT 177766666667
63560	-144222222223		OCT 544222222223
63561	0 00000 0 00000		PZE
63562	0000 00 0 00000		HTR
63563	0074 00 4 00105		TSX ERROR,4
63564	0074 00 4 00106		TSX OK,4
63565	0020 00 0 63552		TRA DP57
IND CW AC MQ SI LOC ZERO			

TEST DFAD WITH IND ADDR AND INDEXING

63566	312426212460		BCD 11DFAD
63567	0074 00 4 66227	DP58	TSX CLEAR,4
63570	0774 00 1 00002		AXT 2,1
63571	0443 00 0 66774		OLD MP11
+200 777770000 +145 700000000			
63572	0301 60 1 63471		DFAD* DP53+5,1
+200 777770000 +145 700000000			
63573	0074 00 2 66060		TSX CHECK,2
63574	0 00000 0 00000		PZE
63575	+201777770000		OCT 201777770000
63576	+146700000000		OCT 146700000000
63577	+200777770000		OCT 200777770000
63600	0000 00 0 00000		HTR
63601	0074 00 4 00105		TSX ERROR,4
63602	0074 00 4 00106		TSX OK,4
63603	0020 00 0 63567		TRA DP58
IND CW AC MQ SI LOC ZERO			

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TEST DFMP WITH IND ADDR AND INDEXING

63604	312426444760		BCD	1IDFMP	
63605	0074 00 4 66227	DP59	TSX	CLEAR,4	
63606	0774 00 1 00004		AXT	4,1	
63607	0443 00 0 67032		DLD	DV9	
-200 400000000 -145 200000000					
63610	0261 60 1 63511		DFMP*	DP54+7,1	
+200 200000000 +145 400000000					
63611	0074 00 2 66060		TSX	CHECK,2	
63612	-0 00000 0 00000		MZE		IND CW
63613	+177200000000		OCT	177200000000	AC
63614	-144500000000		OCT	544500000000	MQ
63615	+000040000000		OCT	000040000000	SI
63616	0000 00 0 00000		HTR		LOC ZERO
63617	0074 00 4 00105		TSX	ERROR,4	
63620	0074 00 4 00106		TSX	OK,4	
63621	0020 00 0 63605		TRA	DP59	

TEST DFDP WITH IND ADDR AND INDEXING

63622	312426244760		BCD	1IDFDP	
63623	0074 00 4 66227	DP60	TSX	CLEAR,4	
63624	0774 00 1 00002		AXT	2,1	
63625	0443 00 0 67024		DLD	DV6	
+200 140000000 +000 000000000					
63626	-0241 60 1 63525		DFDP*	DP55+5,1	
+200 200000000 +145 400000000					
63627	0074 00 2 66060		TSX	CHECK,2	
63630	0 00000 0 00000		PZE		IND CW
63631	+200577777776		OCT	200577777776	AC
63632	+145400000000		OCT	145400000000	MQ
63633	+200600000000		OCT	200600000000	SI
63634	0000 00 0 00000		HTR		LOC ZERO
63635	0074 00 4 00105		TSX	ERROR,4	
63636	0074 00 4 00106		TSX	OK,4	
63637	0020 00 0 63623		TRA	DP60	

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THIS ROUTINE WILL DO 50 DFADS AND SIMULATE EACH IN FIXED POINT

63640	606024262124		BCD 1	DFAD	
63641	-0625 00 0 67636	DFADS	STL	LOCT	
63642	-0625 00 0 66475		STL	DBL	
63643	0774 00 1 00314		AXT	204,1	
63644	-2 00004 1 63703	DINT	TNX	FNXT,1,4	
63645	0074 00 4 66227		TSX	CLEAR,4	
63646	0443 00 1 67570		DLD	TABLE,1	
63647	-0603 00 0 67234		DST	COM	LOAD NEW VALUES
63650	-0603 00 0 67240		DST	COM+4	
63651	0443 00 1 67572		DLD	TABLE+2,1	
63652	-0603 00 0 67236		DST	COM+2	
63653	-0603 00 0 67242		DST	COM+6	
63654	0634 00 1 67641		SXA	TSAVE,1	
63655	0074 00 4 65320		TSX	DOFIX,4	SIMULATE IN FIXED POINT
63656	0443 00 0 67234		DLD	COM	DO HARDWARE INSTRUCTION
63657	0301 00 0 67236		DFAD	COM+2	
63660	-0603 00 0 67252		DST	COM+14	
63661	0500 00 0 00000		CLA	0	SAVE LOC ZERO
63662	0622 00 0 67254		STD	COM+16	
63663	0074 00 4 65664		TSX	COMP,4	TO COMPARE ROUTINE
63664	0020 00 0 63677		TRA	SWT10	SUCCESS RETURN
63665	0760 00 0 00162		SWT	2	CHECK FOR BYPASS ERROR
63666	0020 00 0 63670		TRA	*+2	
63667	0020 00 0 63677		TRA	SWT10	
63670	0760 00 0 00163		SWT	3	CHECK FOR PRINT
63671	0020 00 0 63674		TRA	*+3	
63672	0443 00 0 67252		DLD	COM+14	NO
63673	0000 00 0 63677		HTR	SWT10	ERROR-DFAD ANS IN AC+MQ
63674	0500 00 0 63640		CLA	DFADS-1	
63675	0601 00 0 65730		STO	ORIG	
63676	0074 00 4 65703		TSX	SEPR,4	PRINT ERROR MESSAGE
63677	0534 00 1 67641	SWT10	LXA	TSAVE,1	
63700	0760 00 0 00161		SWT	1	CHECK FOR LOOPING
63701	0020 00 0 63644		TRA	DINT	NO
63702	0020 00 0 63645		TRA	DINT+1	YES
63703	0074 00 4 00106	FNXT	TSX	OK,4	
63704	0020 00 0 63641		TRA	DFADS	

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THIS ROUTINE WILL DO 50 DFMPs AND SIMULATE EACH IN SINGLE PRECISION

63705	242644476260		BCC	DFMPs	
63706	0774 00 1 00314	DFMPs	AXT	204,1	
63707	-0625 00 0 66475		STL	DBL	
63710	-0625 00 0 67636		STL	LOCT	
63711	0500 00 0 63705		CLA	DFMPs-1	
63712	0601 00 0 65730		STO	CRIG	
63713	0634 00 1 67641		SXA	TSAVE,1	
63714	0020 00 0 64054		TRA	INT	
63715	0534 00 1 67641	LOAD	LXA	TSAVE,1	RESTORE VALUE CTR.
63716	-2 00004 1 64112		TIX	NXT,1,4	
63717	0443 00 1 67570		DLD	TABLE,1	
63720	-0603 00 0 67234		DST	COM	
63721	0443 00 1 67572		DLD	TABLE+2,1	
63722	-0603 00 0 67236		DST	COM+2	
63723	0634 00 1 67641		SXA	TSAVE,1	
63724	0500 00 0 67234	ERED	CLA	COM	CHECK FOR EARLY END CONDITIONS
63725	-0320 00 0 66445		ANA	ELIM5	
63726	-0100 00 0 63736		TNZ	*+8	
63727	0520 00 0 67236		ZET	COM+2	
63730	0020 00 0 63732		TRA	*+2	A+C EQUAL ZERO
63731	0020 00 0 64065		TRA	FEND	
63732	0500 00 0 67235		CLA	COM+1	
63733	-0320 00 0 66445		ANA	ELIM5	A+B EQUAL ZERO
63734	0100 00 0 64065		TZE	FEND	
63735	0020 00 0 63743		TRA	ARITH	
63736	0520 00 0 67236		ZET	COM+2	
63737	0020 00 0 63743		TRA	ARITH	
63740	0520 00 0 67237		ZET	COM+3	
63741	0020 00 0 63743		TRA	ARITH	
63742	0020 00 0 64065		TRA	FEND	C+D EQUAL ZERO
63743	0500 00 0 67235	ARITH	CLA	COM+1	SET CHAR OF LO-ORDER NUMBERS GENERATED TO 200 OCTAL
63744	-0320 00 0 66445		ANA	ELIM5	
63745	-0501 00 0 67635		ORA	TWOH	
63746	0601 00 0 67235		STO	COM+1	
63747	0500 00 0 67237		CLA	COM+3	
63750	-0320 00 0 66445		ANA	ELIM5	
63751	-0501 00 0 67635		ORA	TWOH	
63752	0601 00 0 67237		STO	COM+3	
63753	0560 00 0 67237		LDR	COM+3	D
63754	-0260 00 0 67234		UFM	COM	A
63755	0601 00 0 67240		STO	COM+4	A*D
63756	0560 00 0 67236		LDR	COM+2	C
63757	-0260 00 0 67235		UFM	COM+1	B
63760	0601 00 0 67242		STO	COM+6	B*C
63761	0560 00 0 67236		LDR	COM+2	C
63762	-0260 00 0 67234		UFM	COM	A
63763	0601 00 0 67244		STO	COM+8	A*C HIGH ORDER
63764	-0600 00 0 67245		STO	COM+9	A*C LOW ORDER

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63765	0500	00	0	67240	CLA	COM+4	A*D
63766	-0320	00	0	66445	ANA	ELIM5	DELETE EXP.
63767	0601	00	0	66652	STO	TEMP	
63770	0500	00	0	67242	CLA	COM+6	B*C
63771	-0320	00	0	66445	ANA	ELIM5	DELETE EXP
63772	0400	00	0	66652	ADD	TEMP	A*D FRAC.
63773	0601	00	0	66652	STO	TEMP	
63774	0500	00	0	67245	CLA	COM+9	A*C LO-ORDER
63775	-0320	00	0	66445	ANA	ELIM5	DELETE EXP
63776	0400	00	0	66652	ADD	TEMP	A*D + B*C
63777	0601	00	0	66652	STO	TEMP	TOTAL LO-ORDER SUM
64000	-0320	00	0	66444	ANA	ELIM4	DELETE FRACTION
64001	0771	00	0	00033	ARS	27	ADD LO-ORDER CARRY
64002	0401	00	0	67244	ADM	COM+8	TO HI-ORDER A*C
64003	0601	00	0	66653	STO	TEMP+1	
64004	0767	00	0	00011	ALS	9	CHECK IF NORMALIZED
64005	-0760	00	0	00001	PBT		
64006	0020	00	0	64010	TRA	*+2	NONE
64007	0020	00	0	64046	TRA	NORM	
64010	0500	00	0	66652	CLA	TEMP	
64011	-0320	00	0	66445	ANA	ELIM5	DELETE CARRY
64012	0131	00	0	00000	XCA		
64013	0500	00	0	66653	CLA	TEMP+1	NORMALIZR FRACTIONS
64014	0763	00	0	00012	LLS	10	
64015	0765	00	0	00002	LRS	2	
64016	0771	00	0	00010	ARS	8	
64017	0763	00	0	00001	LLS	1	
64020	-0773	00	0	00034	RQL	28	
64021	-0603	00	0	67250	DST	COM+12	STORE FRACTION ANS
64022	-0760	00	0	00141	SLT	1	TURN OFF SLT 1
64023	0761	00	0	00000	NOP		
64024	0500	00	0	67155	CLA	LAST	
64025	0601	00	0	00000	STO	0	
64026	0560	00	0	67234	LDQ	COM	
64027	0260	00	0	67236	FMP	COM+2	A*C
64030	0601	00	0	66652	STO	TEMP	
64031	-0500	00	0	66652	CAL	TEMP	
64032	-0320	00	0	66444	ANA	ELIM4	DELETE FRAC AND
64033	-0602	00	0	67250	ORS	COM+12	
64034	-0130	00	0	00000	XCL		AND SIGNS WITH FINAL
64035	-0320	00	0	66444	ANA	ELIM4	PRODUCTS
64036	-0602	00	0	67251	ORS	COM+13	PLACE CORRECT CHAR
64037	-0760	00	0	00141	SLT	1	CHECK FOR TRAP
64040	0020	00	0	64070	TRA	DEMP	NO
64041	0500	00	0	00000	CLA		
64042	0622	00	0	67255	STD	COM+17	STORE FLAG BITS
64043	0500	00	0	67155	CLA	LAST	
64044	0601	00	0	00000	STO	0	
64045	0020	00	0	64070	TRA	DEMP	

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64046	0500	00	0	66652	NORM	CLA	TEMP	
64047	-0320	00	0	66445		ANA	ELINS	
64050	0131	00	0	00000		XCA		
64051	0500	00	0	66653		CLA	TEMP+1	
64052	-0320	00	0	66445		ANA	ELINS	
64053	0020	00	0	64021		TRA	A+1	
64054	0774	00	1	00024	INT	AXT	20,1	
64055	0600	00	1	67260		STZ	COM+20,1	
64056	2 00001	1	1	64055		TIX	-1,1,1	
64057	0600	00	0	66652		STZ	TEMP	
64060	0600	00	0	66653		STZ	TEMP+1	
64061	0760	00	0	00161		SWT	1	
64062	0020	00	0	63715		TRA	LOAD	
64063	0534	00	1	67641		LXA	TSAVE,1	
64064	0020	00	0	63717		TRA	LOAD+2	
64065	0560	00	0	67234	FEND	LDQ	COM	STORE PROPER ANS
64066	0260	00	0	67236		FMP	COM+2	IF EARLY END OP
64067	-0603	00	0	67250		DST	COM+12	
64070	0443	00	0	67234	DFMP	DLD	COM	DO HARDWARE DFMP
64071	0261	00	0	67236		DFMP	COM+2	
64072	-0603	00	0	67252		DST	COM+14	
64073	-0760	00	0	00141		SLT	1	CHECK FOR TRAP
64074	0020	00	0	64077		TRA	**3	
64075	0500	00	0	00000		CLA	0	
64076	0622	00	0	67254		STD	COM+16	
64077	0074	00	4	65664		TSX	COMP,4	
64100	0020	00	0	64054		TRA	INT	
64101	0760	00	0	00162	OUT1	SWT	2	TEST ERROR BYPASS
64102	0020	00	0	64104		TRA	**2	
64103	0020	00	0	64054		TRA	INT	
64104	0443	00	0	67250		DLD	COM+12	DFMP ANS IN AC+MQ
64105	0760	00	0	00163		SWT	3	TEST NO PRINT
64106	0020	00	0	64110		TRA	**2	
64107	0000	00	0	64054		HER	INT	
64110	0074	00	4	65703		TSX	SEPR,4	
64111	0020	00	0	64054		TRA	INT	
64112	0074	00	4	00106	NXT	TSX	OK,4	
64113	0020	00	0	63706		TRA	DFMPS	

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THIS ROUTINE WILL DO 50 DFDPS AND SIMULATE EACH IN SINGLE PRECISION

64114	242624476260		BCD	1DFDPS	
64115	0774 00 1 00314	DFDPS	AXT	204.1	
64116	-0625 00 0 67636		STL	LCCT	
64117	-0625 00 0 66475		STL	DBL	
64120	0500 00 0 64114		CLA	DFDPS-1	
64121	0601 00 0 65730		STO	ORIG	
64122	0634 00 1 67641		SXA	TSAVE.1	
64123	0020 00 0 64463		TRA	INIT	GO TO INITIALIZE
64124	0534 00 1 67641	PROC	LXA	TSAVE.1	
64125	-2 00004 1 64504		TNX	NEXT.1,4	TEST FOR MORE VALUES
64126	0443 00 1 67570		DLD	TABLE.1	MOVE CURRENT VALUES
64127	-0603 00 0 67234		DST	COM	
64130	0443 00 1 67572		DLD	TABLE+2.1	INTO WORKING CELLS
64131	-0603 00 0 67236		DST	COM+2	
64132	0634 00 1 67641		SXA	TSAVE.1	
64133	0560 00 0 66477		LDQ	ZERO	
64134	0441 00 0 66477		LDI	ZERO	
64135	0774 00 2 00004	CADJ	AXT	4.2	
64136	0500 00 2 67240		CLA	COM+4.2	
64137	-0320 00 0 66444		ANA	ELIM4	DELETE FRACTION
64140	-0300 00 2 67240		UFA	COM+4.2	FIND MQ CHAR
64141	-0760 00 0 00141		SLT	1	DID IT TRAP
64142	0020 00 0 64144		TRA	*+2	NO GO ON
64143	0020 00 0 64463		TRA	INIT	YES GET NEW NUMBER
64144	0500 00 0 66445		CLA	ELIMS	GET MASK
64145	0320 00 2 67241		ANS	COM+5.2	DELETE CHAR
64146	0131 00 0 00000		XCA		MOVE CHAR TO AC
64147	-0602 00 2 67241		ORS	COM+5.2	PLACE IN WORD
64150	0500 00 2 67240		CLA	COM+4.2	
64151	0760 00 0 00000		CLM		
64152	-0501 00 2 67241		ORA	COM+5.2	
64153	0601 00 2 67241		STO	COM+5.2	
64154	2 00002 2 64136		FIX	CADJ+1.2.2	
64155	0500 00 0 67234	CALC	CLA	COM	DIVIDE A BY C
64156	0241 00 0 67236		FDP	COM+2	
64157	-0600 00 0 67240		STQ	COM+4	
64160	0601 00 0 67242		STO	COM+6	
64161	0760 00 0 00012		DCT		DIVIDE CHECK
64162	0020 00 0 64306		TRA	FDCT	YES
64163	-0760 00 0 00141		SLT	1	CHECK FOR TRAP
64164	0020 00 0 64207		TRA	*+19	NO
64165	0441 00 0 00000		LDI		
64166	-0056 00 000004		LNT	4	CHECK IF OVERFLOW
64167	0020 00 0 64202		TRA	UND	NO UNDERFLOW
64170	0500 00 0 67632		CLA	B1516	SET BITS 15 AND 16
64171	-0602 00 0 67255		ORS	COM+17	
64172	0500 00 0 67240		CLA	COM+4	CHECK FOR MQ OVERFLOW
64173	0760 00 0 00003		SSP		AND IF SO STORE
64174	0402 00 0 66440		SUE	E33	BIT 17
64175	0120 00 0 64177		TPL	*+2	
64176	0020 00 0 64204		TRA	*+6	
64177	0500 00 0 67633		CLA	B17	
64200	-0602 00 0 67255		ORS	COM+17	
64201	0020 00 0 64204		TRA	*+3	

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64202	0500	00	0	67634	UND	CLA	B1617	STORE BITS 16 +17
64203	-0602	00	0	67255		ORS	COM+17	
64204	0500	00	0	67155		CLA	LAST	
64205	0601	00	0	00000		STO	0	
64206	0500	00	0	67242		CLA	COM+6	R1
64207	-0320	00	0	66444		ANA	ELIM4	DELETE FRAC.
64210	0601	00	0	66652		STO	TEMP	
64211	0500	00	0	67235		CLA	COM+1	B
64212	-0320	00	0	66444		ANA	ELIM4	
64213	0340	00	0	66652		CAS	TEMP	
64214	0761	00	0	00000		NOP		
64215	0020	00	0	64217		TRA	++2	
64216	-0625	00	0	66437		STL	OFL	
64217	0500	00	0	67242		CLA	COM+6	R1
64220	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64221	0601	00	0	66652		STO	TEMP	
64222	0500	00	0	67235		CLA	COM+1	
64223	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64224	0520	00	0	66437		ZET	OFL	
64225	0771	00	0	00001		ARS	1	
64226	0600	00	0	66437		STZ	OFL	
64227	0400	00	0	66652		ADD	TEMP	
64230	0765	00	0	00043		LRS	35	
64231	0500	00	0	67236		CLA	COM+2	C
64232	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64233	0601	00	0	66652		STO	TEMP	
64234	-0754	00	0	00000		PKD	0,0	
64235	0221	00	0	66652		DVP	TEMP	R1+B/C
64236	0601	00	0	66652		STO	TEMP	R1 FINAL FRAC
64237	-0600	00	0	66653		STQ	TEMP+1	Q ADJUST FRAC
64240	-0500	00	0	66444		CAL	ELIM4	
64241	0320	00	0	67242		ANS	COM+6	DELETE FRACTION
64242	0500	00	0	66652		CLA	TEMP	R1
64243	-0602	00	0	67242		ORS	COM+6	ADD FRAC
64244	0500	00	0	66653		CLA	TEMP+1	Q1 ADJUST
64245	0401	00	0	67240		ADM	COM+4	ADJUST Q1
64246	0601	00	0	66652		STO	TEMP	
64247	-0500	00	0	66444		CAL	ELIM4	PUT FRAC WITH
64250	0320	00	0	67240		ANS	COM+4	CHAR
64251	0500	00	0	66652		CLA	TEMP	
64252	-0602	00	0	67240		ORS	COM+4	

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64253	0560	00	0	67240	MUL	LDQ	CON+4	Q1
64254	-0260	00	0	67237		UFM	CON+3	D
64255	0601	00	0	66652		STO	TEMP	
64256	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64257	0601	00	0	67244		STO	CON+8	Q1*D
64260	0500	00	0	67242		CLA	CON+6	R1
64261	-0320	00	0	66444		ANA	ELIM4	DELETE FRAC.
64262	-0602	00	0	67244		ORS	CON+8	PUT CHAR WITH Q1*D
64263	0500	00	0	66652		CLA	TEMP	
64264	0120	00	0	64267		TPL	*+3	
64265	-0500	00	0	67650		CAL	SIGN	
64266	-0602	00	0	67244		ORS	CON+8	
64267	0500	00	0	67242		CLA	CON+6	R1
64270	-0302	00	0	67244		UFS	CON+8	Q1*D
64271	0601	00	0	67246		STO	CON+10	R1 - Q1*D
64272	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64273	0601	00	0	66652		STO	TEMP	
64274	0500	00	0	67236		CLA	CON+2	C
64275	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64276	-0400	00	0	66652		SEM	TEMP	CHECK FOR DIVIDEND
64277	-0120	00	0	64440		THI	GOO	
64300	0500	00	0	67246	C	CLA	CON+10	
64301	0241	00	0	67236		FDP	CON+2	C
64302	-0600	00	0	66652		STQ	TEMP	Q2
64303	0760	00	0	00012		DCT		DIVIDE CHECK
64304	0020	00	0	64314		TRA	SDCT	YES
64305	0020	00	0	64326		TRA	FADD	
64306	-0625	00	0	67640	FDCT	STL	FDC	SET INDICATOR
64307	0500	00	0	67234		CLA	CON	STORE CORR RESULTS FOR
64310	0601	00	0	67250		STO	CON+12	FIRST DIVIDE CHECK
64311	0500	00	0	67235		CLA	CON+1	
64312	0601	00	0	67251		STO	CON+13	
64313	0020	00	0	64416		TRA	DPA	
64314	-0625	00	0	67637	SDCT	STL	SDC	ST INDICATOR FOR PRINT
64315	0600	00	0	67255		STZ	CON+17	CLEAR ZERO FLAGS
64316	-0320	00	0	66445		ANA	ELIM5	DELETE CHAR
64317	0601	00	0	67250		STO	CON+12	
64320	0500	00	0	67246		CLA	CON+10	
64321	0120	00	0	64416		TPL	DPA	WITH R1 - Q1*D
64322	-0500	00	0	67650		CAL	SIGN	
64323	-0602	00	0	67250		ORS	CON+12	
64324	-0602	00	0	67251		ORS	CON+13	
64325	0020	00	0	64416		TRA	DPA	

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64326	0131	00	0	00000	FADD	XCA		
64327	-0320	00	0	66445	ANA	ELIM5	DELETE CHAR	
64330	-0520	00	0	66436	NIT	ADJ	CHECK FOR DIV SHIFT	
64331	0020	00	0	64334	TRA	#+3	NO	
64332	-0501	00	0	66435	ORA	Q2P1	ADJUST Q2 CHAR FOR	
64333	0020	00	0	64335	TRA	#+2	OVERLAP OR NO OVERLAP	
64334	-0501	00	0	66434	ORA	Q2P	ON Q1	
64335	0601	00	0	66653	STO	TEMP+1		
64336	0500	00	0	66652	CLA	TEMP		
64337	0120	00	0	64342	TPL	#+3		
64340	-0500	00	0	67650	CAL	SIGN	RESTORE PROPER SIGN	
64341	-0602	00	0	66653	ORS	TEMP+1		
64342	0500	00	0	67240	CLA	COM+4		
64343	-0320	00	0	66445	ANA	ELIM5		
64344	-0501	00	0	66433	ORA	Q1P		
64345	0601	00	0	66652	STO	TEMP		
64346	0500	00	0	67240	CLA	COM+4		
64347	0120	00	0	64352	TPL	#+3		
64350	-0500	00	0	67650	CAL	SIGN		
64351	-0602	00	0	66652	ORS	TEMP		
64352	0500	00	0	66652	CLA	TEMP		
64353	0300	00	0	66653	FAD	TEMP+1	Q1+Q2	
64354	-0320	00	0	66445	ANA	ELIM5	DELETE CHAR	
64355	0601	00	0	67250	STO	COM+12		
64356	0131	00	0	00000	XCA			
64357	-0320	00	0	66445	ANA	ELIM5	DELETE CHAR	
64360	0601	00	0	67251	STO	COM+13		
64361	-0760	00	0	00141	SLT	1		
64362	0761	00	0	00000	NOP			
64363	0500	00	0	67155	CLA	LAST		
64364	0601	00	0	00000	STO	0		
64365	0500	00	0	67240	CLA	COM+4	Q1	
64366	-0320	00	0	66444	ANA	ELIM4	DELETE FRAC.	
64367	0300	00	0	67240	FAD	COM+4	FIND CHAR OF LO-ORDER	
64370	0601	00	0	66652	STO	TEMP		
64371	-0760	00	0	00141	SLT	1		
64372	0020	00	0	64407	TRA	#+13		
64373	0441	00	0	67255	LDI	COM+17		
64374	-0056	00	0	000004	LNT	4		
64375	0020	00	0	64403	TRA	#+6		
64376	0445	00	0	00000	RIS	0		
64377	0600	00	0	67255	STZ	COM+17		
64400	-0054	00	0	000003	LFT	3		
64401	0604	00	0	67255	STI	COM+17		
64402	0020	00	0	64407	TRA	#+5		
64403	0500	00	0	00000	CLA	0		
64404	0622	00	0	67255	STD	COM+17		
64405	-0054	00	0	000002	LFT	2		
64406	0604	00	0	67255	STI	COM+17		

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64407	-0500	00	0	66652		CAL	TEMP	
64410	-0320	00	0	66444		ANA	ELIM4	DELETE FRAC.
64411	-0602	00	0	67250		CRS	COM+12	SET CHAR FINAL IANS
64412	-0130	00	0	00000		DEL		
64413	-0320	00	0	66444		ANA	ELIM4	DELETE FRAC.
64414	-0602	00	0	67251		CRS	COM+13	
64415	0020	00	0	64416		TRA	DPA	
64416	-0760	00	0	00141	DPA	SLT	1	
64417	0761	00	0	00000		POP		
64420	0443	00	0	67234		CLD	COM	DO HARDWARE DFDP
64421	-0241	00	0	67236		DFDP	COM+2	
64422	-0603	00	0	67252		CRS	COM+14	
64423	-0760	00	0	00141		SLT	1	CHECK FOR TRAP
64424	0020	00	0	64427		TRA	++3	
64425	0500	00	0	00000		CLA		
64426	0622	00	0	67254		STD	COM+16	
64427	0074	00	4	65664		TSK	COMP,4	
64430	0020	00	0	64463		TRA	INIT	
64431	0443	00	0	67252		CLD	COM+14	
64432	0760	00	0	00162		SWT	2	BYPASS ERROR
64433	0020	00	0	64435		TRA	++2	
64434	0020	00	0	64463		TRA	INIT	
64435	0760	00	0	00163		SWT	3	PRINT
64436	0020	00	0	64442		TRA	OUT	YES
64437	0000	00	0	64463		STR	INIT	NO
64440	-0625	00	0	66436	G00	STL	ADJ	SET INDICATOR
64441	0020	00	0	64300		TRA	C	

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64442	0074 00 4 65703	OUT	TSX	SEPR,4	PRINT ERROR
64443	-0520 00 0 67637		NZT	SDC	
64444	0020 00 0 64453		TRA	*+7	
64445	0074 00 4 74300		TSX	SPLAT,4	
64446	0 00014 0 00004		PZE	4,0,12	
64447	622523464524		BCD	4SECOND DIVIDE CHECK	
64450	602431653124				
64451	256023302523				
64452	426060606060				
64453	-0520 00 0 67640		NZT	FDC	
64454	0020 00 0 64463		TRA	*+7	
64455	0074 00 4 74300		TSX	SPLAT,4	
64456	0 00014 0 00004		PZE	4,0,12	
64457	263151626360		BCD	4FIRST DIVIDE CHECK	
64460	243165312425				
64461	602330252342				
64462	606060606060				
64463	0774 00 1 00024	INIT	AXT	20,1	
64464	0774 00 2 00012		AXT	10,2	
64465	0600 00 1 67260		STZ	COM+20,1	
64466	0600 00 2 66664		STZ	TEMP+10,2	
64467	2 00001 2 64470		TIK	*+1,2,1	
64470	2 00001 1 64465		TIK	*-3,1,1	
64471	0600 00 0 67640		STZ	FDC	CLEAR INDICATORS
64472	0600 00 0 67637		STZ	SDC	
64473	0760 00 0 00012		DCT		
64474	0761 00 0 00000		NOP		
64475	-0760 00 0 00141		SLT	1	
64476	0761 00 0 00000		NOP		
64477	0600 00 0 66436		STZ	ADJ	
64500	0760 00 0 00161		SWT	1	
64501	0020 00 0 64124		TRA	PROC	
64502	0534 00 1 67641		LXA	TSAVE,1	
64503	0020 00 0 64126		TRA	PROC+2	
64504	0074 00 4 00106	NEXT	TSX	OK,4	
64505	0020 00 0 64115		TRA	DFDPS	

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THIS ROUTINE CHECKS CONSECUTIVE DOUBLE PRECISION INSTRUCTIONS
USES DIFFERENT NUMBERS ON EACH PASS.

64506	455445614560		BCD	1N*N/N	
64507	0774 00 2 00310	DPR1	AXT	200,2	
64510	-0500 00 2 67573		CAL	TABLE+3,2	
64511	-0320 00 0 66522		ANA	ELIM7	
64512	0602 00 0 66652		SLW	TEMP	
64513	0500 00 0 66652		CLA	TEMP	
64514	0400 00 0 67635		ADD	TWOH	
64515	0300 00 0 67635		FAD	TWOH	
64516	0601 00 2 67573		STO	TABLE+3,2	
64517	2 00004 2 64510		TIX	4-7,2,4	
64520	0774 00 2 00310	DPR1A	AXT	200,2	
64521	0500 00 2 67573		CLA	TABLE+3,2	
64522	0560 00 2 67572		LDO	TABLE+2,2	
64523	-0603 00 0 66652		DST	TEMP	STORE N FACTOR
64524	0301 00 0 66652		DEAD	TEMP	N+N
64525	0261 00 0 67106		DEMP	HALF	
64526	0261 00 0 66652		DEMP	TEMP	N*N EQUAL N2
64527	-0241 00 0 66652		DEDP	TEMP	N2/N EQUAL N
64530	-0303 00 0 66652		DUPS	TEMP	N-N EQUAL ZERO
64531	0765 00 0 00003		LRS	3	
64532	0763 00 0 00003		LLS	3	CORRECT FOR LOST
64533	-0320 00 0 66445		ANA	ELIM5	PRECISION
64534	-0100 00 0 64541		TIX	4+5	CHECK HIGH ORDER
64535	0131 00 0 00000		XCA		
64536	-0320 00 0 66445		ANA	ELIM5	CHECK LO ORDER
64537	0100 00 0 64543		TZE	4+4	
64540	0131 00 0 00000		XCA		
64541	0074 00 4 00104		TSX	ERROR-1,4	PRINT ERROR
64542	0761 00 0 64507		NOP	DPR1	
64543	0760 00 0 00161		SHT	1	LOOP THIS VALUE
64544	0020 00 0 64546		TRA	4+2	
64545	0020 00 0 64521		TRA	DPR1A+1	
64546	2 00004 2 64521		TIX	DPR1A+1,2,4	
64547	0074 00 4 00106		TSX	OK,4	
64550	0020 00 0 64507		TRA	DPR1	

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SECTION FIVE DOUBLE PRECISION RELIABILITY

DOUBLE PRECISION SQUARE ROOT

THIS ROUTINE GENERATES NUMBERS FROM A TABLE, SQUARES THE NUMBER, THEN FINDS THE SQUARE ROOT USING THE NEWTON ITERATION METHOD AND CHECK IT AGAINST THE ORIGINAL. ERROR PRINT SHOWS CORRECT ROOT IN THE SI AND THE ROOT FOUND IN THE ACC AND MQ THE LOW ORDER OF THE ROOT SHOULD ALWAYS BE ZERO

64551	246250516360		ECD	1DSQRT	
64552	0774 00 1 00310	DPR2	AXT	200.1	
64553	0560 00 1 67573		LDQ	TABLE+3.1	
64554	-0600 00 0 66460		STQ	N	
64555	0260 00 0 66460		FMP	N	SQUARE NUMBER
64556	0074 00 4 64604		TSX	DSQRT.4	FIND SQ ROOT
64557	0020 00 0 64571		TRA	**10	ERROR RADICAND MINUS
64560	-0603 00 0 66654		EST	TEMP+2	
64561	0131 00 0 00000		XCA		
64562	0767 00 0 00012		ALS	10	CORRECT FOR LOST
64563	0100 00 0 64567		TZE	**4	PRECISION
64564	0131 00 0 00000		XCA		
64565	0400 00 0 66476		ADD	ONE	
64566	0020 00 0 64570		TRA	**2	
64567	0131 00 0 00000		XCA		
64570	0340 00 0 66460		CAS	N	CHECK ROOT
64571	0020 00 0 64573		TRA	**2	
64572	0020 00 0 64577		TRA	**5	
64573	0441 00 0 66460		LDI	N	SET UP FOR PRINT
64574	0443 00 0 66654		DLD	TEMP+2	
64575	0074 00 4 00104		TSX	ERROR-1.4	
64576	0761 00 0 64552		NOP	DPR2	
64577	0760 00 0 00161		SWT	1	
64600	0020 00 0 64602		TRA	**2	
64601	0020 00 0 64553		TRA	DPR2+1	LOOP
64602	2 00004 1 64553		TIX	DPR2+1.1.4	STEP TO NEXT NUMBER
64603	0020 00 0 64625		TRA	DPR3-3	

SECTION FIVE DOUBLE PRECISION RELIABILITY

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64604	0634	00	2	66656	DSQRT	SXA	TEMP+4,2	
64605	-0120	00	4	00001		THI	1,4	MINUS RADICAND
64606	0774	00	2	00010		AXT	3,2	
64607	-0603	00	0	66652		DST	TEMP	RADICAND EQU N
64610	0402	00	0	67635		SUB	TWOH	
64611	0771	00	0	00001		ARS	1	
64612	0402	00	0	66652		SUB	TEMP	
64613	-0501	00	0	66507		ORA	FRAC	
64614	0760	00	0	00003		SSP		
64615	-0603	00	0	66654		DST	TEMP+2	FIRST GUESS EQU X
64616	0443	00	0	66652		OLD	TEMP	N
64617	-0241	00	0	66654		DFDP	TEMP+2	N/X
64620	0301	00	0	66654		DFAD	TEMP+2	N/X+X
64621	0402	00	0	67206		SUB	HALPH	DIV BY 2
64622	2 00001	2		64615		TIX	*-5,2,1	REPEAT 32 TIMES
64623	0534	00	2	66656		LXA	TEMP+4,2	
64624	0020	00	4	00002		TRA	2,4	
64625	0074	00	4	00106		TSX	OK,4	
64626	0020	00	0	64552		TRA	DPR2	

QUADRATIC FORMULA-- MIXED SINGLE AND DOUBLE PRECISION

64627	506421246060				BCD	1QUAD	
64630	0774	00	1	00036	DPR3	AXT	30,1
64631	0020	00	0	64633		TRA	*+2
64632	506421246060				BCD	1QUAD	
64633	0560	00	1	67630	LDQ	SAL,1	A
64634	0260	00	1	67632	FMP	SAL+2,1	AXC
64635	0361	00	0	67630	ACL	SAL	X4
64636	-0603	00	0	66652	DST	TEMP	
64637	0560	00	1	67631	LDQ	SAL+1,1	B
64640	0260	00	1	67631	FMP	SAL+1,1	B**2
64641	0303	00	0	66652	DFSB	TEMP	-4AC
64642	-0603	00	0	66654	DST	TEMP+2	B2-4AC
64643	0340	00	1	67634	CAS	SAL+4,1	CHECK AC PORTION OF RADICAND
64644	0020	00	0	64646	TRA	*+2	
64645	0020	00	0	64651	TRA	*+4	
64646	0560	00	1	67634	LDQ	SAL+4,1	CORRECT AC IN MQ
64647	0074	00	4	00104	TSX	ERROR-1,4	
64650	0020	00	0	64633	TRA	DPR3+3	
64651	0500	00	0	66655	CLA	TEMP+3	GET LO-ORDER
64652	0340	00	1	67635	CAS	SAL+5,1	CHECK MQ PORTION OF RADICAND
64653	0020	00	0	64655	TRA	*+2	
64654	0020	00	0	64660	TRA	*+4	
64655	0560	00	1	67635	LDQ	SAL+5,1	CORR MQ TO MQ
64656	0074	00	4	00104	TSX	ERROR-1,4	
64657	0020	00	0	64633	TRA	DPR3+3	
64660	0020	00	0	64662	TRA	*+2	

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SECTION FIVE
DOUBLE PRECISION RELIABILITY

64661	506421246060		BCD	1QUAD	
64662	0443 00 1 67634	SQTX	DED	SAL+4,1	
64663	0443 00 1 67634		DED	SAL+4,1	
64664	0074 00 4 64604		TSX	DSQRT,4	GET SQ ROOT
64665	0020 00 0 64673		TRA	*+3	
64666	-0603 00 0 66654		DST	TEMP+2	
64667	0340 00 1 67636		CAS	SAL+6,1	CHECK HI-ORDER SQRT
64670	0020 00 0 64672		TRA	*+2	
64671	0020 00 0 64675		TRA	*+4	
64672	0560 00 1 67636		LDQ	SAL+6,1	
64673	0074 00 4 00104		TSX	ERROR-1,4	
64674	0020 00 0 64662		TRA	SQTX	
64675	0500 00 0 66655		CLA	TEMP+3	
64676	0340 00 1 67637		CAS	SAL+7,1	CHECK LO-ORDER SQRT
64677	0020 00 0 64701		TRA	*+2	
64700	0020 00 0 64704		TRA	*+4	
64701	0560 00 1 67637		LDQ	SAL+7,1	
64702	0074 00 4 00104		TSX	ERROR-1,4	
64703	0020 00 0 64662		TRA	SQTX	
64704	0020 00 0 64706		TRA	*+2	
64705	506421246060		BCD	1QUAD	
64706	0443 00 1 67636	DIV1	DED	SAL+6,1	GO ON WITH CORR SQRT
64707	0760 00 0 00012		DST		TURN OFF DC TGR
64710	0761 00 0 00000		NOP		
64711	-0603 00 0 66652		DST	TEMP	SAVE RESULT
64712	0560 00 1 67630		LDQ	SAL,1	A
64713	0260 00 0 67631		TRA	DTW	2A
64714	-0603 00 0 66654		DST	TEMP+2	SAVE
64715	0560 00 0 66477		LDQ	ZERO	CLEAR MQ
64716	0502 00 1 67631		CAS	SAL+1,1	-B
64717	0301 00 0 66652		DST	TEMP	-B+R
64720	-0241 00 0 66654		DST	TEMP+2	-B+R/2A
64721	0760 00 0 00012		DST		
64722	0020 00 0 64724		TRA	*+2	
64723	0020 00 0 64727		TRA	*+4	
64724	0441 00 1 67640		LDI	SAL+8,1	
64725	0074 00 4 00104		TSX	ERROR-1,4	DVD CHECK ERROR
64726	0020 00 0 64706		TRA	DIV1	
64727	-0603 00 0 66656		DST	TEMP+4	SAVE FIRST ROOT
64730	0340 00 1 67640		CAS	SAL+8,1	
64731	0020 00 0 64733		TRA	*+2	
64732	0020 00 0 64736		TRA	*+4	
64733	0560 00 1 67640		LDQ	SAL+8,1	
64734	0074 00 4 00104		TSX	ERROR-1,4	
64735	0020 00 0 64706		TRA	DIV1	
64736	0500 00 0 66657		CLA	TEMP+5	CHECK MQ PORTION
64737	0767 00 0 00014		ALS	32	
64740	0100 00 0 64743		TRA	*+3	
64741	0074 00 4 00104		TSX	ERROR-1,4	
64742	0020 00 0 64706		TRA	DIV1	
64743	0020 00 0 64745		TRA	*+2	

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DOUBLE PRECISION RELIABILITY

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64744	506421246060		BCD 1QUAD	
64745	0560 00 0 66477	DIV2	LDQ ZERO	
64746	0502 00 1 67631		CLS SAL+1,1	-B
64747	0303 00 0 66652		DFSB TEMP	-B-R
64750	-0241 00 0 66654		DFDP TEMP+2	-B-R/2A
64751	0760 00 0 00012		DCT	
64752	0020 00 0 64754		TRA **2	
64753	0020 00 0 64757		TRA **4	
64754	0441 00 1 67641		LDI SAL+9,1	
64755	0074 00 4 00104		TSX ERROR-1,4	DVD CHECK ERROR
64756	0020 00 0 64745		TRA DIV2	
64757	-0603 00 0 66656		DST TEMP+4	
64760	0340 00 1 67641		CAS SAL+9,1	
64761	0020 00 0 64763		TRA **2	
64762	0020 00 0 64766		TRA **4	
64763	0560 00 1 67641		LDQ SAL+9,1	
64764	0074 00 4 00104		TSX ERROR-1,4	
64765	0020 00 0 64745		TRA DIV2	
64766	0500 00 0 66657		CLA TEMP+5	CHECK MQ
64767	0767 00 0 00014		ALS 12	
64770	0100 00 0 64773		TZE **3	
64771	0074 00 4 00104		TSX ERROR-1,4	
64772	0020 00 0 64745		TRA DIV2	
64773	2 00012 1 64631		TIX DPR3+1,1,10	
64774	0074 00 4 00106		TSX OK,4	
64775	0020 00 0 64630		TRA DPR3	
64776	0 00000 0 00005		PZE 5	
64777	0074 00 4 00111		TSX LOOP,4	

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SECTION FIVE
SECTION FIVE SUBROUTINES

THIS ROUTINE SIMULATES FAD OR DFAD IN FIXED POINT. IT CHECKS
FOR TRAPS AND SIMULATES FLAGS STORED AT LOCATION ZERO
65320 000 27344

65320	0634	00	4	65662	DOFIX	SEA	LVE,4	
65321	0600	00	0	66442		STZ	CARR	
65322	0600	00	0	66443		STZ	RECOM	
65323	0600	00	0	66501		STZ	OVER	
65324	0600	00	0	67255		STZ	COM+17	
65325	0500	00	0	67234		CLA	COM	A
65326	-0320	00	0	66444		ANA	ELIM4	DELETE FRACTION AND SIGN
65327	0601	00	0	66652		STC	TEMP	
65330	0500	00	0	67236		CLA	COM+2	C
65331	-0320	00	0	66444		ANA	ELIM4	DELETE FRAC
65332	0402	00	0	66652		SUB	TEMP	GET CHAR DIFF
65333	0771	00	0	00033		ARS	27	
65334	0601	00	0	65352		STC	FACT1	
65335	0100	00	0	65372		TZE	EQU	
65336	-0120	00	0	65342		TRI	EXCH	LARGER IN AC
65337	0402	00	0	66441		SUB	FFOR	CHAR DIFF LESS 54
65340	0120	00	0	65647		TEL	FAC	CHAR DIFF TOO BIG
65341	0020	00	0	65353		TRA	FACT1+1	
65342	0774	00	2	00002	EXCH	AXT	2,2	
65343	0500	00	2	67236		CLA	COM+2,2	EXCHANGE SIMULATED AC
65344	0601	00	2	67244		STC	COM+8,2	
65345	0500	00	2	67240		CLA	COM+4,2	AND HQ
65346	0601	00	2	67242		STC	COM+6,2	
65347	2 00001	2		65343		TIX	#-4,2,1	
65350	0500	00	0	65352		CLA	FACT1	
65351	0020	00	0	65337		TRA	EXCH-3	

SECTION SEVEN

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TEST FOR DLA CAUSING EARLY END OP OF SHIFT INSTRUCTION

73614	-0500	00 0	74222	OL92	CAL	SIGN	P BIT TO ACC
73615	0600	00 0	00001		STZ	1	CLEAR LOCATION 00001
73616	0771	00 0	00043		ARS	35	*** MOVE ACC P TO 35
73617	0221	00 0	00001		DVP	1	*** SHOULD DIVIDE CHECK AND LEAVE ACC UNCHANGED
73620	0340	00 0	74200		CAS	ONE	
73621	0020	00 0	73623		TRA	**2	NO GOOD
73622	0020	00 0	73626		TRA	**4	OKAY
73623	0560	00 0	74200		LDQ	ONE	
73624	0760	00 0	00162		SWT	2	
73625	0420	00 0	00000		HPR		ERROR - ARS-DVP
73626	0760	00 0	00161		SWT	1	LOOP THIS TEST
73627	0020	00 0	73631		TRA	OL93	NO - GO ON
73630	0020	00 0	73614		TRA	OL92	GO BACK

TEST UFM-TSX OUT OF FLOATING TRAP MODE

73631	-0760	00 0	00004	OL93	LFTM		LEAVE TRAP MODE
73632	0161	00 0	73632		TQO	*	
73633	0761	00 0	00000		NOP		
73634	0560	00 0	74224		LDQ	ZERO	LOAD ZERO MULTIPLIER
73635	0500	00 0	74210		CLA	ONES	
73636	0771	00 0	00001		ARS	1	
73637	0601	00 0	74225		STO	TEMP	-177777777777
73640	-0260	00 0	74225		UFM	TEMP	***
73641	0074	00 4	73644		TSX	**3,4	***
73642	0760	00 0	00162		SWT	2	
73643	0420	00 0	00000		HPR		ERROR - UFM-TSX
73644	0761	00 0	00000		VOP		
73645	-0760	00 0	00002		EFTM		
73646	0760	00 0	00161		SWT	1	LOOP THIS TEST
73647	0020	00 0	73651		TRA	OL94	NO - GO ON
73650	0020	00 0	73631		TRA	OL93	GO BACK

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SECTION SEVEN

TEST STORE DIVIDE OVERLAP

73651	0754	00	0	00000	OL94	PXA	,,	CLEAR ACC
73652	0760	00	0	00012		DCT		TURN OFF DIVIDE CHECK
73653	0761	00	0	00000		HOP		IF ON
73654	0761	00	0	00000		HOP		
73655	0560	00	0	74200		LDO	ONE	ONE TO MQ 35
73656	-0600	00	0	74225		STQ	TEMP	SHOULD OVERLAP DVP
73657	0221	00	0	74204		DVP	NINE	DIVIDE BY 11
73660	0760	00	0	00012		DCT		SHOULD BE OFF
73661	0020	00	0	73663		TRA	++2	
73662	0020	00	0	73665		TRA	++3	
73663	0760	00	0	00162		SWT	2	
73664	0420	00	0	00000		HPR		** ERROR STORE DIVIDE **
73665	0760	00	0	00161		SWT	1	
73666	0020	00	0	73670		TRA	OL95	
73667	0020	00	0	73651		TRA	OL94	

CHECK I7 RESET TO Q CARRY TRIGGER

73670	0754	00	0	00000	OL95	PXA	,,	CLEAR ACC
73671	0560	00	0	74214		LDO	FAD1	
73672	0260	00	0	74215		FMP	FAD2	
73673	0402	00	0	74216		SUB	FAD3	
73674	0120	00	0	73677		TPL	++3	ACC SHOULD BE POSITIVE
73675	0760	00	0	00162		SWT	2	
73676	0420	00	0	00000		HPR		* ERROR FMP-SUB *
73677	0760	00	0	00161		SWT	1	
73700	0020	00	0	73702		TRA	OL96	
73701	0020	00	0	73670		TRA	OL95	

CHECK TRA-CAS-TRA (SKIP OF ONE)

73702	0500	00	0	74204	OL96	CLA	NINE	
73703	0020	00	0	73704		TRA	++1	
73704	0522	00	0	74231		XEC	CAS9	
73705	0020	00	0	73707		TRA	++2	
73706	0020	00	0	73711		TRA	++3	
73707	0760	00	0	00162		SWT	2	
73710	0420	00	0	00000		HPR		* ERROR TRA-CAS-TRA *
73711	0760	00	0	00161		SWT	1	
73712	0020	00	0	73714		TRA	OL97	
73713	0020	00	0	73702		TRA	OL96	

SECTION SEVEN

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73714	0760 00 0 00016	CL97	LMTM	SET SEVEN XR MODE
73715	-0774 00 1 00001		AXC	1,1
73716	-0774 00 2 00001		AXC	1,2
73717	-0774 00 3 00001		AXC	1,3
73720	-0774 00 5 00001		AXC	1,5
73721	-0774 00 6 00001		AXC	1,6
73722	-0774 00 7 00001		AXC	1,7
73723	0020 00 0 73725		TRA	+2
73724	0 00000 0 00007		PZE	7
73725	0074 00 4 00111		TSX	LOOP,4

	74200		ORG	30848
74200	+000000000001	ONE	OCT	1
74201	+000000000002	TWO	OCT	2
74202	+000000000004	FOR	OCT	4
74203	+000000000005	FVE	OCT	5
74204	+000000000011	NINE	DEC	9
74205	+000000000100	HUN	OCT	100
74206	+000000000200		OCT	200
74207	+000000000400	FUN	OCT	400
74210	-377777777777	ONES	OCT	777777777777
74211	0761 00 0 00000		NOP	
74212	-125252525252	MASK	OCT	525252525252
74213	-1 00000 0 00000	LAST	STR	**
74214	+200777000000	FAD1	OCT	200777000000
74215	+233777000000	FAD2	OCT	233777000000
74216	+200000000777	FAD3	OCT	200000000777
74217	+233000000777	FAD4	OCT	233000000777

74221	010101010101	DWONS	BCD	1111111
74222	-0 00000 0 00000	SIGN	MZE	
74223	0 00000 0 77777	B21T35	PZE	-1

74224	0 00000 0 00000	ZERO	PZE	
74225	0 00000 0 00000	TEMP	PZE	
74226	0 00000 0 00000		PZE	
74227	0021 00 0 71554	TTR	TTR	RET
74230	0021 00 0 72653		TTR	TRRT
74231	0340 00 0 74204	CAS9	CAS	NINE
	00111	LOOP	EQU	73
	71000	END	OL1	

S P L A T

S P L A T

INDEXABLE BCD PRINT SUBROUTINE

SENSE SWITCHES 2 AND 3 USED COMPATIBLY WITH 9DEPR

CALLING SEQUENCES-

1. THIS SEQUENCE PUTS THE TEXT IN THE BODY OF THE PROGRAM

A	TSX SPLAT,4	EXIT TO PRINT ROUTINE
A+1	PZE WC,0,COL	PRINT CONTROL WORD
A+2	BCD XTEXT TO BE PRINTED - 1-12 BCD WORDS.	
A+WC+2	OPN	RETURN ENTRY TO MAIN PROGRAM

WC -- BCD WORD COUNT 1-12, OF TEXT LINE.
COL -- FIRST COLUMN 1-72, TEXT IS TO BE PRINTED IN.
X -- STANDARD SHARE BCD FORMAT WORD COUNT. NO MORE
THAN 6 WORDS PER CARD DUE TO PUBLICATION
RESTRICTIONS ON LISTING PAGE WIDTH.

IF THE TEXT IS PLACED IN THE BODY OF THE PROGRAM IT
MAY BE MODIFIED BY 9IDD OR ANY OTHER SCANNING AND
MODIFICATION ROUTINE SINCE THE RANDOM PLACEMENT OF BCD
BITS MAY SIMULATE ANY OPERATION CODE.

2. THIS SEQUENCE PERMITS THE SAME TEXT TO BE PRINTED
BY SEVERAL PRINT ROUTINE ENTRIES.

A	TSX SPLAT,4	EXIT TO PRINT ROUTINE
A+1	PZE CW	NOTE ZERO DECREMENT
A+2	OPN	RETURN ENTRY TO MAIN PROGRAM

ZERO DECREMENT IN PRINT
CONTROL WORD IS REQUIRED
BY SPLAT TO RECOGNIZE THIS
REMOTE TEXT CONDITION.

CW	PZE WC,0,COL	REMOTE TEXT CONTROL WORD
CW+1	BCD XTEXT TO BE PRINTED	

3. THIS SEQUENCE PERMITS A CHOICE OF SEVERAL TEXTS TO BE
PRINTED FROM ONE PRINT SUBROUTINE ENTRY BY MODIFYING THE
CONTROL WORD ADDRESS WITH AN INDEX.

A	TSX SPLAT,4	EXIT TO PRINT ROUTINE
A+1	PZE CW,1	NOTE ZERO DECREMENT
A+2	OPN	RETURN ENTRY TO MAIN PROGRAM

T - AN INDEX REGISTER CONTAINING A VALUE TO MODIFY THE CW
LOCATION TO OBTAIN ANOTHER TEXT CONTROL WORD AND ITS
ACCOMPANYING TEXT.

CW	PZE WC,0,COL	REMOTE TEXT CONTROL WORD
CW+1	BCD XTEXT TO BE PRINTED	