SYSTEMS ENGINEERING LABORATORIES PROGRAM LIBRARY

PROGRAM DESCRIPTION

IDENTIFICATION: Inter-Map Verification Check Program

AUTHOR: Systems Engineering Laboratories

ACCEPTED: August 30, 1967

PURPOSE: This program is designed to verify the proper execution of specific memory reference instructions which are located on the memory boundary between Map 2 and Map 3.

COMPUTER CONFIGURATION: SEL 810A Computer

SUBROUTINES REQUIRED: Not applicable.

STORAGE: '02470-'2515, '2773-'3005, '3470-'3505, '4000-'4504, '5000-'5372 locations.

TIMING: Not applicable.

LOADING PROCEDURE:

1. Load the program into memory by using the Standard Relocatable Loader. When loading is complete the computer will halt. The program should not be relocated.

2. Enter the starting address of the program ('05000) into the program counter.

3. Press the START switch on the console twice.

4. The program will remain in a test loop until a program halt is detected or the CPU is manually halted. The program performs all 18 tests listed in the Method section of this document.

USE: The program is designed to check the proper execution of specific memory reference instructions located on the map boundary between Map 2 and Map 3. The program also checks several skip instructions to determine if the CPU has functioned correctly.

METHOD:

1. INSTRUCTIONS

The following list shows the instructions used by the program to verify the proper execution of the CPU on the map boundary and the halt locations associated with each test.

Test No.	Halt (PC location)	Instruction
Test 1	'5022	Store B accumulator
" 2	'5040	Store A accumulator
" 3	'5051	Load A accumulator
" 4	'5063	Load B accumulator
" 5	'5076	Add memory to A
" 6	'5111	Add memory to B
" 7	'5122	Subtract memory from A accumulator
" 8	'3002	Skip A zero (A NQ zero)
		B accumulator equal 1
" 9	'3002	Skip A negative (A not negative)
		B accumulator equal 2
" 10	'3002	Skip A positive (A not positive)
		B accumulator equal 3
" 11	'3006	Skip A negative (A not negative)
		B accumulator equal 4
" 12	'3006	Skip A positive (A not positive)
		B accumulator equal 5
" 13	'3006	Skip A zero (A NQ zero)
		B accumulator equal 6
" 14	'5225	Add memory to A accumulator (Indirect)
		B accumulator equal 7
" 15	'5241	Subtract memory from A accumulator (Indirect)
		B accumulator equal 10
" 16	'3003	Increment memory and skip
	'5265	B accumulator equal 11
" 17	'3474	Store place and branch
		B accumulator equal 12
" 18	'3003	Skip no overflow
	'5311	B accumulator equal 13

2. TEST DESCRIPTION

The program is designed to use locations '2774 thru '3004 as test locations. The program will insert the operands that are to be checked into the test locations from the main program starting at location '5000.

The primary purpose of the program is to ensure that memory reference instructions on a map boundary use the memory location within the same map as the

METHOD (CONT'D):

2. TEST DESCRIPTION (CONT'D)

instruction itself. A malfunction will be detected if the memory address accessed is in the next map instead of the map containing the instruction.

Test 1. Store B Accumulator.

The program will execute a Store B Accumulator instruction with the memory reference address in the same map as the instruction. The program location of the Store B Accumulator command is location '02777 and the memory address is '02504. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction.
'02777	STB	T5	T5 location is '02504
'03000	BRU*	Test	Return to main program

Halt Location.

If the CPU has functioned properly the program will proceed to Test 2, otherwise a halt will occur at location '05022. This indicates that the memory address of the Store B instruction was in location '03505 of the next map rather than in location '02504 of the map that contained the instruction.

The A accumulator contains the data from location '02504, the B accumulator contains the data from location '03504.

Test 2. Store A Accumulator.

The program will execute a Store A Accumulator instruction with the memory reference address in the same map as the instruction. The program will Store the contents of the A accumulator from location '02777. The memory address is '02504. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	STA	T5	T5 location is '2504
'03000	BRU*	Test	Return to main program

Halt Condition.

If the CPU has functioned properly the program will proceed to Test 3, otherwise a halt will occur at location '05040. This indicates that the memory address of

METHOD (CONT'D):

Test 2. Store A Accumulator (Cont'd)

the Store A instruction was in location '3504 of the next map rather than in location '2504 of the map that contained the instruction.

The A accumulator contains the contents of location '2504 which should be '177777. The B accumulator contains the contents of location '3504 which should be '000000. If the data in A is '000000 and the B accumulator contains '177777 the CPU has a malfunction.

Test 3. Load A Accumulator.

The program will execute a Load A Accumulator instruction with the memory reference address in the same map as the instruction. The A accumulator should contain 177777. If the memory address was in the next map the A accumulator will contain zero's which indicate a CPU malfunction. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	LAA	Tl	Tl location is '2500
'03000	BRU*	Test	Return to main program

Halt Location.

If the CPU has functioned properly the program will proceed to Test 4, otherwise the program will halt at location '05051.

This indicates that the memory address of the Load A instruction was in location '3500 of the next map rather than in location '02500 of the map that contained the instruction. The A accumulator has the incorrect data.

Test 4. Load B Accumulator.

The program will execute a Load B Accumulator instruction with the memory reference address in the same map as the instruction. The B accumulator should contain '177777. If the memory address was in the next map the B accumulator will contain zeros which indicate a CPU malfunction. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	LBA	Tl	Tl location is '3500
'03000	BRU*	Test	Return to main program

METHOD (CONT'D):

Test 4. Load B Accumulator (Cont'd)

Halt Location.

If the CPU has functioned properly the program will proceed to Test 5, otherwise the program will halt at location '05063.

This indicates that the memory address of the Load B Accumulator instruction was in location '3500 of the next map rather than in location '2500 of the map that contained the instruction. The A accumulator has the incorrect data.

Test 5. Add Memory to A Accumulator.

The program will execute an Add Memory to A Accumulator instruction with the memory reference address in the same map as the instruction. The A accumulator should contain '177777. If the memory address was from the next map the A accumulator will contain '077777.

Halt Location.

If the CPU has functioned properly the program will proceed to Test 6, otherwise the program will halt at location '05076. This indicates that the memory address of the Add Memory to A accumulator was in location '03502 of the next map rather than in location '02502 of the map that contained the instruction. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	AMA	T3	T3 EQ Tl 000001
'03000	BRU*	Test	

Test 6. Add Memory to B Accumulator.

The program will execute an Add Memory to B Accumulator instruction with the memory address in the same map as the instruction. The B accumulator after execution of the instruction should contain '177777. If the memory address was in the next map, the B accumulator will contain '077777 indicating a malfunction in the CPU. The test locations are as follows:

Location	OP Code	Address	Comment
02776	NOP		Augmented instruction
02777	AMB	T3	T3 EQ 000001
03000	BRU*	Test	Return

METHOD (CONT'D):

Test 6. Add Memory to B Accumulator (cont'd).

Halt Location.

If the CPU has functioned properly, the program will proceed to Test 7, otherwise a halt will occur at location '05111. The A accumulator will contain the incorrect data.

Test 7. Subtract Memory from A Accumulator.

The program will execute Subtract Memory from A Accumulator instruction with the memory address in the same map as the instruction. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		A contains 177777
'02777	SMA	T4	T4 EQ to '100000
'03000	BRU*	Test	Return

Halt Location.

If the CPU has functioned properly the program will proceed to Test 8, otherwise a halt will occur at location '05122. The A accumulator will display the incorrect data value of '177777. The correct data value is '077777.

Test 8. Skip A Zero.

The augmented instruction SAZ will be executed from location '02776. The data in the A accumulator is not equal to zero, therefore the program should not cross the map boundary.

Halt Locations.

If the CPU has functioned peoperly the program will proceed to Test 9, otherwise a halt will occur at location '03002. This indicates that the CPU has crossed the map boundary which is an error. The B accumulator will contain '000001 indicating the error number.

Test 9. Skip A Negative.

The augmented instruction SAN will be executed from location '02776. The data in the A accumulator is not negative, therefore the program should not cross the map boundary.

METHOD (CONT'D):

Test 9. Skip A Negative (cont'd).

Halt Locations.

If the CPU has functioned properly the program will proceed to Test 10, otherwise a halt will occur at location '03002. This indicates that the CPU has crossed the map boundary which is an error. The B accumulator will contain '000002 indicating the error number.

Test 10. Skip A Positive.

The augmented instruction SAP will be executed from location '02776. The data in the A accumulator is not positive, therefore the program should not cross the map boundary.

Halt Location.

If the CPU has functioned properly the program will proceed to Test 11, otherwise a halt will occur at location '03002. This indicates that the CPU has crossed the map boundary which is an error. The B accumulator will contain '000003 indicating the error number.

Test 11. Skip A Negative.

The augmented instruction SAN will be executed from location '02777. The data in the A accumulator will be a positive number, therefore the program will cross the map boundary to the first location of the next map.

Halt Location.

If the CPU has functioned properly the program will proceed to Test 12, otherwise a halt will occur at location '03006. This indicates that the CPU has crossed the map boundary but skipped incorrectly. The B accumulator will contain '000004 indicating the error number.

Test 12. Skip A Positive.

The augmented instruction SAP will be executed from location '02777. The data in the A accumulator will be negative, therefore the program will cross the map boundary and execute the first instruction of the next map.

Halt Location.

If the CPU has functioned properly the program will proceed to Test 13, otherwise a halt will occur at location '03006. This indicates that the CPU has skipped on A positive when the data in A was negative. The B accumulator will contain '000005 indicating the error number.

METHOD (CONT'D):

Test 13. Skip A Zero.

The augmented instruction SAZ will be executed from location '027777. The data in the A accumulator will not be zero, therefore the program will cross the map boundary and execute the first instruction of the next map.

Halt Location.

If the CPU has functioned properly the program will proceed to Test 14, otherwise a halt will occur at location '03006. This indicates that the CPU has skipped on A zero when the data in A was positive. The B accumulator will contain 000006 indicating the error number.

Test 14. Add Memory to A (Indirect)

The program will execute an Add Memory to A Accumulator instruction with the indirect-bit set. The memory address will be indirect thru the map which contains the instruction. When the command has been executed the value in A should be '177777. If the memory address was in the next map the value in A will be '100000. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	AMA*	T2	A EQ 177777
'03000	BRU*	Test	Return

Halt Location.

If the CPU has functioned properly the program will proceed to Test 15, otherwise a halt will occur at location '05225. The operator may visually observe the contents of A accumulator. The data value should be '177777. Any other value indicates an error. The B accumulator will contain 000007 indicating the error number.

Test 15. Subtract Memory from A (Indirect).

The program will execute a Subtract Memory from A Indirect instruction with the indirect address in the same map as the instruction. When the command has been executed, the data in the A accumulator should be '077777. If the memory address was in the next map the value will be '177777. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	FRA		A EQ 177777
'02777	SMA*	T4	T4 EQ 100000
'03000	BRU*	Test	Return

METHOD (CONT'D):

Test 15. Subtract Memory from A (Indirect) (cont'd)

Halt Location.

If the CPU has functioned properly the program will proceed to Test 16, otherwise a halt will occur at location '05241. The operator may visually observe the contents of the A accumulator. The data should be '077777. Any other data indicates an error. The B accumulator will contain 000010 indicating the error number.

Test 16. Increment Memory and Skip.

The program will execute an Increment Memory and Skip instruction with the memory address in the same map as the instruction. The A accumulator after execution of the instruction should contain 000000. If the memory address was in the next map, the data in A will be 000001. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented Code
'03000	IMS	T6	T6 EQ 177777
'03001	HLT		
'03002	BRU*		

Halt Location.

If the CPU has functioned properly the program will proceed to test 17, otherwise a halt will occur at location '03003 or '05265. The B accumulator contains the error number count which is equal to 000011. The halt at '03003 indicates that the IMS instruction didnot skip properly. The halt at '05265 indicates that the incremented memory address was in the next map rather than in the same map as the instruction.

Test 17. Store Place and Branch.

The program will execute a Store Place and Branch instruction with the branch location in the same map as the SPB instruction. The subroutine in the same map will clear the A accumulator indicating that the subroutine was entered. The test locations are as follows:

Location	OP Code	Address	Comment
'02776	NOP		Augmented instruction
'02777	SPB	THMP	location is 2470
'03000	BRU*	Test	Return

METHOD (CONT'D):

Test 17. Store Place and Branch (cont'd).

Halt Location.

If the CPU has functioned properly the program will proceed to Test 18, otherwise a halt will occur at location '03474. The operator may visually observe the contents of the A accumulator. The data value should be 177777, which indicates an error. The B accumulator should have a value of 000012. This verifies that the SPB test is the one which caused the failure.

Test 18. Skip No Overflow Test.

The program will execute a Skip No Overflow instruction. The skip instruction crosses an intermap boundary. The overflow latch is not set. The test locations are as follows:

Location	OP Code	Address	Comment
02776	SOF		Overflow not set
02777	HLT		Incorrect skip
03000	BRU*	Test	Return

Halt Location.

If the CPU has functioned properly, the progra will reset all counters and begin with Test 1, otherwise the program will halt at location '3003 or '05311. The B accumulator should contain a value of 000013. The halt at location '03003 indicates that the SOF didnot skip properly to the next map.

```
00000 00000000 ***      INTER-MAP VERIFICATIØN CHECK PRØGRAM 810A        303014A
00000 00000000 ***      J.B. BØYER    AUG 30, 1967
02470 60002470      ØRG  '2470
02470A00000000 THMP ZZZ                THIS MAP
02471 00000033      NØP
02472 00000003      CLA
02473 11202470      BRU* THMP
02500 60002500      ØRG  '2500
02500 00177777 T1   DATA '177777
02501 00077777 T2   DATA '077777
02502 00000001 T3   DATA '000001
02503 00100000 T4   DATA '100000
02504 00000000 T5   DATA 0
02505 00000000 T6   DATA 0             SAME MAP
02506 14002505 IMS  IMS  T6
02507 05202510 AMAA AMA* T6D
02510 25402502 T6D  DAC  T3
02511 06202512 SMAA SMA* T7D
02512 25402503 T7D  DAC  T4
02513 12002470 SPB  SPB  THMP
02514 11002515 BRUB BRU  T7
02515 11202773 T7   BRU* TEST
02773 60002773      ØRG  '2773
02773 00000000 TEST ZZZ  **
02774 00000033      NØP                LØCATIØN 2774
02775 00000033      NØP                LØCATIØN 2775
02776 00000033      NØP                LØCATIØN 2776
02777 00000033      NØP                LØCATIØN 2777
03000 00000033      NØP                LØCATIØN 3000
03001 00000033      NØP                LØCATIØN 3001
03002 00000033      NØP                LØCATIØN 3002
03003 00000033      NØP                LØCATIØN 3003
03004 00000033      NØP                LØCATIØN 3004
03005 00000000 *
03005 11202773      BRU* TEST
03006 11202773 BRUA BRU* TEST
03007 00002777 TES1 EQU  TEST+4
03470 60003470      ØRG  '3470
03470A00000000 NTMP ZZZ                NEXT MAP IF PRØGRAM CØUNTER ADVANCED
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```
03471 00000033        NØP
03472 00000000        HLT                   INDICATES INCØRRECT BRANCH
03473 11203470        BRU* NTMP
03500 60003500        ØRG  '3500
03500 00000000 TA     DATA 0
03501 00000000 TB     DATA 0
03502 00000000 TC     DATA 0
03503 00000000 TD     DATA 0
03504 00000000 TE     DATA 0
03505E00000000 TF     DATA                  NEXT MAP
04000 60004000        ØRG  '4000
04000 01004500 LAA    LAA  T1D              T1D EQ 177777
04001 02004500 LBA    LBA  T1D
04002 05004502 AMA    AMA  T3D              T3D EQ 000001
04003 16004502 AMB    AMB  T3D              T3D EQ 000001
04004 06004503 SMA    SMA  T4D              T4D EQ 100000
04005 04004504 STB    STB  T5D
04006 03004504 STA    STA  T5D              T5D EQ 0
04007 00000022 SAZA   SAZ
04010 00000024 SAP    SAP
04011 00000023 SAN    SAN
04012 00001712 FRA    FRA  15
04013 00001716 LSL    LSL  15
04014 00000025 SØF    SØF
04015 25405372 LC04   DAC  L304+1
04016 25405365 LC00   DAC  L300
04500 60004500        ØRG  '4500
04500 00177777 T1D    DATA '177777
04501 00077777 T2D    DATA '077777
04502 00000001 T3D    DATA '000001
04503 00100000 T4D    DATA '100000
04504 00000000 T5D    DATA '0
05000 60005000        ØRG  '5000
05000 12005335 TAR    SPB  STBS
05001 00000000 ****S                        STØRE B INSTRUCTIØN
05001 00000003        CLA
05002 03005332        STA  CNT                COUNTER
05003 01004005        LAA  STB              STB INSTRUCTIØN
05004 03002777        STA  TES1             STØRED INTØ TEST LØCATIØN
05005 00000003        CLA
```

```
05006 03002504       STA  T5        LØCATIØN IN SAME MAP AS STB
05007 03003504       STA  TE        LØCATIØN IN NEXT MAP
05010 14005332       IMS  CNT       CØUNTER
05011 02002500       LBA  T1        T1 EQ TØ 177777
05012 12002773       SPB  TEST      TEST SUBRØUTINE
05013 01002504       LAA  T5        T5 IS IN SAME MAP AS STB
05014 15002500       CMA  T1        T1 EQ 177777
05015 11005017       BRU  *+2       NØ
05016 11005021       BRU  ØT        YES GØ TØ NEXT TEST
05017 02003504       LBA  TE        GET VALUE INTØ B
05020 00000000       HLT            A CØNTAINS DATA ØF SAME MAP LØCATIØN
05021 00000000 *                    B CØNTAINS DATA ØF NEXT MAP LØCATIØN
05021 00000000 *                    CØRRECT DATA VALUE SHØULD BE 177777
05021 01004006 ØT    LAA  STA       STØRE A INSTRUCTIØN
05022 03002777       STA  TES1
05023 00000000 *****                CHECK STØRE A INSTRUCTIØN
05023 00000003       CLA
05024 03002504       STA  T5        SAME MAP AS STA
05025 03003504       STA  TE        NEXT MAP
05026 14005332       IMS  CNT       CØUNTER INCREMENTED
05027 01002500       LAA  T1        T1 EQ TØ 177777
05030 12002773       SPB  TEST
05031 01002504       LAA  T5        CHECK SAME MAP FØR DATA
05032 15002500       CMA  T1        T1 EQ 177777
05033 11005035       BRU  *+2
05034 11005037       BRU  ØA
05035 02003504       LBA  TE
05036 00000000       HLT            A CØNTAINS VALUE FRØM SAME MAP AS STA
05037 00000000 ****                 B CØNTAINS DATA FRØM NEXT MAP
05037 00000033 ØA    NØP
05040 01004000       LAA  LAA
05041 03002777       STA  TES1      LAA SET TØ LØAD FRØM SAME MAP
05042 14005332       IMS  CNT       CØUNTER
05043 00000003       CLA
05044 03003504       STA  TE
05045 12002773       SPB  TEST      TEST SUBRØUTINE
05046 00000023       SAN
05047 00000000       HLT
05050 14005332       IMS  CNT       CØUNTER INCREMENTED
05051 01004001       LAA  LBA       LBA CHECK
```

```
0120  05052 03002777       STA  TES1         SET TEST LØCATIØN TØ LBA INSTRUCTIØN
0121  05053 00000003       CLA               SET A+B TØ ZERØS
0122  05054 03003504       STA  TE
0123  05055 00000005       TAB
0124  05056 12002773       SPB  TEST         TEST SUBRØUTINE
0125  05057 00000004       TBA
0126  05060 00000023       SAN               CHECK A FØR NEGATIVE VALUE
0127  05061 00000000       HLT
0128  05062 00000000 ****$                   CHECK ADD MEMØRY TØ A
0129  05062 01004002       LAA  AMA
0130  05063 03002777       STA  TES1         STØRE AMA INSTRUCTIØN INTØTEST LØCATIØN
0131  05064 14005332       IMS  CNT          CØUNTER FØR INSTRUCTIØN
0132  05065 01002501       LAA  T2           T2 EQUAL TØ 077777
0133  05066 12002773       SPB  TEST         TEST
0134  05067 00000025       SØF
0135  05070 11005071       BRU  *+1          TURN ØFF ØVERFLØW
0136  05071 15002503       CMA  T4           T4 EQ 100000
0137  05072 11005074       BRU  *+2
0138  05073 11005075       BRU  *+2
0139  05074 00000000       HLT               VALUE ØF INCØRRECT DATA IS IN A ACCUMULATØR
0140  05075 00000000 *****                   CHECK ADD MEMØRY TØ B
0141  05075 14005332       IMS  CNT          CØUNTER
0142  05076 01004003       LAA  AMB          AMB INSTRUCTIØN USES T3 EQ TØ
0143  05077 03002777       STA  TES1         STØRE AMB INSTRUCTIØN INTØ TEST LØCATIØN
0144  05100 00000003       CLA
0145  05101 02002501       LBA  T2           T2 VALUE IS 077777
0146  05102 12002773       SPB  TEST         TEST RØUTINE
0147  05103 00000004       TBA
0148  05104 15002503       CMA  T4           T4 EQ TØ 100000
0149  05105 11005107       BRU  *+2
0150  05106 11005110       BRU  *+2
0151  05107 00000000       HLT
0152  05110 00000000 *****                   CHECK SMA INSTRUCTIØN
0153  05110 01004004       LAA  SMA          SMA USES T4 EQ TØ 100000
0154  05111 03002777       STA  TES1         STØRE SMA INTØ TEST LØCATIØN
0155  05112 14005332       IMS  CNT
0156  05113 01002500       LAA  T1           T1 VALUE IS 177777
0157  05114 12002773       SPB  TEST         TEST SUBRØUTINE
0158  05115 15002501       CMA  T2           T2 VALUE IS 077777
0159  05116 11005120       BRU  *+2
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```
05117 11005121      BRU  *+2
05120 00000000      HLT                A CØNTAINS INCØRRECT VALUE SHØULD BE 077777
05121 00000000 ****                    SAZ TEST A ACCUMULATØR NØT EQ ZERØ
05121 00000000 *                       SHØULD NØT CRØSS MAP BØUNDARY LAST LØCATIØN ØF
05121 00000000 *                       TEST MAP HAS A BRU* TEST WHICH SHØULD RETURN TØ
05121 00000000 *                       MAIN PRØGRAM
05121 00000000 *                       B ACC CØNTAINS ERRØR NUMBER
05121 01005334      LAA  HLT
05122 03205365      STA* L300          TEST LØCATIØN
05123 14005332      IMS  CNT           INCREMENT CØUNTER
05124 00000003      CLA
05125 00000005      TAB
05126 03005333      STA  STBT          STBT WILL BE TEMPØRARY STØRAGE FØR CØUNTER
05127 03005372      STA  L304+1        TEST LØCATIØN
05130 01004007      LAA  SAZA
05131 03205363      STA* L276          TEST LØCATIØN
05132 01003006      LAA  BRUA
05133 03205364      STA* L277          TEST LØCATIØN
05134 00000026      IBS                INCREMENT CØUNTER
05135 00000033      NØP
05136 04005333      STB  STBT          SAVE ERRØR CØUNTER
05137 12002773      SPB  TEST
05140 14005332      IMS  CNT
05141 00000000 ****      SAN TEST A ACCUMULATØR EQ PØSITIVE NUMBER
05141 00000000 *                       WHICH IS THE AUGMENTED INSTRUCTIØN
05141 12005353      SPB  BUPD          INCREMENT B SUBRØUTINE
05142 01004011      LAA  SAN
05143 03205363      STA* L276          TEST LØCATIØN
05144 12002773      SPB  TEST          TEST SUBRØUTINE
05145 00000000 ****                    SAP TEST A ACCUMULATØR EQ NEGATIVE NUMBER
05145 14005332      IMS  CNT           INCREMENT CØUNTER
05146 12005353      SPB  BUPD          INCREMENT B SUBRØUTINE
05147 01004010      LAA  SAP           SAP SET TØ TEST LØCATIØN
05150 03205363      STA* L276          TEST LØCATIØN
05151 01004503      LAA  T4D           T4D EQ 100000
05152 12002773      SPB  TEST          TEST SUBRØUTINE
05153 01005331      LAA  SAZ
05154 03205365      STA* L300
05155 01003006      LAA  BRUA          TEST LØCATIØN
05156 03205372      STA* L304+1
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05157 12005335        SPB  STBS          RESET CØUNTERS
05160 01004011        LAA  SAN
05161 03205364        STA* L277          TEST LØCATIØN
05162 01003006        LAA  BRUA
05163 03205365        STA* L300          NEXT MAP
05164 01005334        LAA  HLT           HALT
05165 03205371        STA* L304          HALT SHØULD ØCCUR
05166 12005353        SPB  BUPD          INCREMENT CØUNTER SUBRØUTINE
05167 01004011        LAA  SAN           PØSITIVE NUMBER IN A
05170 12002773        SPB  TEST
05171 00000000 *                         SAP TEST ØVEP MAP
05171 14005332        IMS  CNT           CØUNTER
05172 12005353        SPB  BUPD          INCREMENT B CØUNTER
05173 01004010        LAA  SAP
05174 03205364        STA* L277          TEST LØCATIØN
05175 01004503        LAA  T4D           T4D EQ 100000
05176 12002773        SPB  TEST          TEST SUBRØUTINE
05177 00000000 *
05177 14005332        IMS  CNT           CØUNTER
05200 12005353        SPB  BUPD          INCREMENT B CØUNTER
05201 01004007        LAA  SAZA
05202 03205364        STA* L277          TEST LØCATIØN
05203 01004503        LAA  T4D           T4D EQ 100000
05204 12002773        SPB  TEST          TEST SUBRØUTINE
05205 00000000 *
05205 12005335        SPB  STBS          RESET ALL TEST LØCATIØNS TØ NØP
05206 00000000 ****
05206 00000000 *                         MAP
05206 00000000 *****                     AMA* TEST INSTRUCTIØN IS LØCATED IN LAST
05206 00000000 *                         MEMØRY CELL ØF THE MAP
05206 14005332        IMS  CNT           INCREMENT CØUNTER
05207 12005353        SPB  BUPD
05210 01005331        LAA  SAZ
05211 03205363        STA* L276          RESET TEST LØCATIØN TØ NØP
05212 01002507        LAA  AMAA
05213 03002777        STA  TES1          TES1 IS THE TEST LØCATIØN
05214 01002501        LAA  T2            T2 EQ 077777
05215 12002773        SPB  TEST          GØ TØ TEST
05216 00000025        SØF
05217 00000033        NØP
```

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05220 15002503        CMA   T4         T4 EQ 100000
05221 11005223        BRU   *+2
05222 11005224        BRU   *+2
05223 00000000        HLT              A HAS INCØRRECT DATA SHØULD RE 100000
05224 00000000 *****                   SMA* TEST
05224 00000000 *                       INSTRUCTIØN LØCATED IN LAST CELL ØF THE MAP
05224 12005353        SPB   BUPD
05225 01004012        LAA   FRA
05226 03002776        STA   TES1-1     SHIFT THRU ALL BITS
05227 01002511        LAA   SMAA
05230 03002777        STA   TES1       TEST LØCATIØN
05231 14005332        IMS   CNT        CØUNTER INCREMENT
05232 01004503        LAA   T4D        T4D EQ 100000
05233 00000000 *                       FRA WILL SET ALL BITS TØ N
05233 00000000 *                       FRA WILL SET ALL BITS TØ ØNES PRIØR TØ
05233 00000000 *                       SUBTRACT INDIRECT
05233 12002773        SPB   TEST       TEST SUBRØUTINE
05234 02005333        LBA   STBT
05235 15002501        CMA   T2
05236 11005240        BRU   *+2
05237 11005241        BRU   *+2        DATA EQ
05240 00000000        HLT              A EQ TØ INCØRRECT DATA
05241 01005331        LAA   SAZ
05242 03002776        STA   TES1-1
05243 00000000 ****                    IMS TEST
05243 12005353        SPB   BUPD
05244 01004500        LAA   T1D
05245 03002505        STA   T6         T6 EQ 177777
05246 00000003        CLA
05247 03003505        STA   TF         ZERØ IN TF
05250 00000000 *                       INCREMENT B CØUNTER
05250 03205365        STA*  L300       HLT WILL ØCCUR IF MEMØRY NØT ZERØ
05251 01002506        LAA   IMS
05252 03205364        STA*  L277
05253 14005332        IMS   CNT        CØUNTER
05254 01003006        LAA   BRUA       BRU* SET TØ 2ND LØCATIØN ØF MAP
05255 03205366        STA*  L301
05256 12002773        SPB   TEST       TEST SUBRØUTINE
05257 01002505        LAA   T6
05260 00000023        SAN
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0280  05261 11005270          BRU  ØPR
0281  05262 01002505          LAA  T6
0282  05263 00000000          HLT
0283  05264 01002505          LAA  T6
0284  05265 02003505          LBA  TF
0285  05266 00000033          NØP
0286  05267 02005333          LBA  STBT
0287  05270 00000003 ØPR      CLA
0288  05271 03002505          STA  T6              RESET TEST LØCATIØN TØ ZERØ
0289  05272 03003505          STA  TF              RESET
0290  05273 00000000 *                             A CØNTAINS SAME MAP LØCATIØN WHICH SHØULD BE
0291  05273 00000000 *                             ZERØ ØRIGINAL DATA WAS 177777
0292  05273 00000000 *                             CHECK FØR VALUE
0293  05273 00000000 *
0294  05273 00000000 ********                      SPB TEST RØUTINE
0295  05273 01004013          LAA  LSL             LSL 15 TØ LØCATIØN X776
0296  05274 03205363          STA* L276            NEXT TØ LAST LØCATIØN ØF THE MAP
0297  05275 01002513          LAA  SPB
0298  05276 03205364          STA* L277            SET SPB INSTRUCTIØN TØ TEST LØCATIØN
0299  05277 01005334          LAA  HLT
0300  05300 03205366          STA* L301            SET HALT TØ
0301  05301 12005353          SPB  BUPD            INCREMENT CØUNTER FØR ERRØR DISPLAY
0302  05302 01003006          LAA  BRUA
0303  05303 03205365          STA* L300            RETURN BRU* ØUT ØF TEST PRØGRAM
0304  05304 01002500          LAA  T1              T1 EQ TØ 000001
0305  05305 12002773          SPB  TEST
0306  05306 00000022          SAZ
0307  05307 00000000          HLT                  CHECK B ACCUMULATØR FØR ERRØR NUMBER
0308  05310 00000000 *                             IF SPB FUNCTIØNED PRØPERLY A SHØULD BE CLEAR
0309  05310 00000000 *
0310  05310 00000003          CLA
0311  05311 03002470          STA  THMP            CLEAR SUBRØUTINE ENTRANCE LØCATIØN
0312  05312 03003470          STA  NTMP            CLEAR SUBRØUTINE ENTRANCE LØCATIØN
0313  05313 12005335 ØK1A     SPB  STBS
0314  05314 00000000 ********                      SØF TEST
0315  05314 12005353          SPB  BUPD            INCREMENT B CØUNT
0316  05315 12005335          SPB  STBS
0317  05316 01004014          LAA  SØF             ØVERFLØW CHECK ØVERFLØW WILL BE SET
0318  05317 03205363          STA* L276            2776 CØNTAINS SØF INSTRUCTIØN
0319  05320 00000003          CLA
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05321 03205364      STA* L277           SET TEST LØCATIØN 2777 TØ HALT
05322 01003006      LAA  BRUA
05323 03205365      STA* L300
05324 14005332      IMS  CNT            INCREMENT CØUNTER
05325 01002502      LAA  T3             T3 EQ 000001
05326 05002502      AMA  T3             NØ ØVERFLØW
05327 12002773      SPB  TEST
05330 11005000      BRU  TAR
05331 00000033 SAZ  NØP
05332 00000000 CNT  DATA 0
05333 00000000 STBT DATA 0              TEMP STØRAGE FØR ERRØR CØUNTER
05334 00000000 HLT  HLT
05335 00000000 STBS ZZZ  **
05336 04005333      STB  STBT
05337 02077773 STRT LBA  =-5
05340 01005331      LAA  SAZ
05341 03605372      STA* L304+1,1       SET TEST LØCATIØNS TØ NØP
05342 00000026      IBS
05343 11005340      BRU  *-3
05344 02077774      LBA  =-4
05345 01005331      LAA  SAZ
05346 03605365      STA* L300,1         SET TEST LØCATIØNS TØ MØP
05347 00000026      IBS
05350 11005345      BRU  *-3
05351 02005333      LBA  STBT
05352 11205335      BRU* STBS
05353 00000000 BUPD ZZZ  **             CØUNTER UPDATE SUBRØUTINE
05354 00000000 *
05354 02005333      LBA  STBT
05355 00000026      IBS                 INCREMENT ERRØR CØUNTER
05356 00000033      NØP
05357 04005333      STB  STBT           SAVE NEW ERRØR NUMBER
05360 11205353      BRU* BUPD
05361 00000000 *
05361 25402774 L274 DAC  '2774          LØCATIØNS TØ BE USED
05362 25402775 L275 DAC  '2775          TØ CHECK INTER MAP
05363 25402776 L276 DAC  '2776
05364 25402777 L277 DAC  '2777
05365 25403000 L300 DAC  '3000
05366 25403001 L301 DAC  '3001
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0360   05367 25403002 L302 DAC    '3002
0361   05370 25403003 L303 DAC    '3003
0362   05371 25403004 L304 DAC    '3004
0363   05372 25403005 L305 DAC    '3005
0364   05373 60400000      END
```