

IDENTIFICATION

PRODUCT CODE: AC-7994E-MC
PRODUCT NAME: CEQCEO 11/70 INSTRUCTION EXERCISER
DATE CREATED: MAY, 1980
MAINTAINER: DIAGNOSTIC ENGINEERING
AUTHOR(S): DONALD W. MONROE-REV B
JOHN ADAMS-REV A

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REVISION HISTORY

- REV E0: 1)ADDED SUPPORT CODE TO PROVIDE FULL APT SCRIPT-MODE COMPATIBILITY.
- 2)REVISED TEST 76 AS DESCRIBED IN TEST DESCRIPTION TO PREVENT INTERMITTENT FAILURES.
- 3)ADDED 'CLR \$ERFLG' TO RELOCATION MONITOR TO PREVENTT ENDLESS LOOPING THERE ON OCCURENCE OF DEVICE ERROR.
- 4)RAISED PRIORITY OF MBT SERVICE ROUTINE FROM 5 TO 7 TO PREVENT INTERMITTENT FAILURES.

1.0 ABSTRACT

This program is designed to be a comprehensive check of the PDP-11/70 cpu cluster. The program executes each instruction in all address modes and includes tests for traps, interrupts, the mapping box, memory management, memory, the Unibus, and the Mass Bus. If NOT DESELECTED, the program relocates the test code throughout memory (0-2m). Also, if SELECTED, the program will relocate using available disks (RP03, RK05, RP04, RS03/4). See section 9.5 for a description of relocation.

The main differences between revision A and revision B are routines to use the UBE and MBT (manufacturing only), worst case testing occurs with all switches down, standard SYSMAC macros, and floating point processor tests.

Also, the disk driver was rewritten to make each device have a modular driver and to cause I/O to occur concurrently on the available disks. (see section 9.5.4 for a description of disk drivers)

PRECAUTIONS must be taken to ensure the protection of user disks. Refer to section 7.0 for a description of warnings and exceptions.

2.0 REQUIREMENTS

2.1 Equipment

PDP-11/70 (KB11-B/C) Central Processor with 16K of memory, a line clock, and an LA30 (or equivalent) console.

NOTE: THIS DIAGNOSTIC SUPPORTS THE PDP-11/74, AN IN-HOUSE, EXPERIMENTAL PROCESSOR.

2.1.1 Optional Equipment Used

1. Unibus Exerciser
2. Mass Bus Tester
3. RP11/RP03, RK11/RK05, RH70/RP04, RH70/RS03/RS04
4. FP11-B, FP11-C

2.2 Storage

The program loads into the first 12K of memory and runs in all memory (exclusive of the XXDP monitor if running in chain mode).

2.3 Preliminary Programs

Although this program is a test of the CPU cluster, it is

advisable that the CPU cluster (and floating point) diagnostics run first. These consist of:

DEKBA	DEKBF
DEKBB	DEKBG
DEKBC	DEMJA
DEKBD	DEFPA
DEKBE	DEFPB

3.0 LOADING PROCEDURE

3.1 Method

The program is supplied on the diagnostic media. Refer to the XXDP operating manual for further information.

0 STARTING PROCEDURE

4.1 Console Switch Settings

See Section 5.1

4.2 Starting Addresses

The starting address for the exerciser is 200.

By starting at address 210, the switch register and display lights can be checked. This routine just moves the switches to the display register allowing the operator to toggle the switches and see the corresponding lights in the display register.

By starting at address 214, the micro-break register can be checked. This test requires a maintenance card. See Section 9.0 for further details.

START AT ADDRESS 230 AS AN AID TO CUTTING THE JUMPERS FOR THE PROCESSOR ID REGISTER.

4.3 Program and Operator Action

1. Load program into memory (See Section 3)
2. Check for any system disk packs or configuration exceptions as described in section 7.0.
3. Load address 200
4. Set switches (See Section 5.1)
5. Press Start

6. The program will loop and messages will be typed at the end of each sub-pass and each pass. (see section 8.3 for a description of the messages)

G 1

SEQ 0006

5.0 OPERATING PROCEDURE

5.1 Operational Switch Settings

SW15	HALT ON ERROR	This switch when set will halt the processor when an error is detected. Pressing continue will cause an error message to be typed and the processor will again halt. Pressing continue again will resume testing.
SW14	LOOP ON TEST	This switch when set will cause the program to loop on the current subtest.
SW13	INHIBIT ERROR TYPEOUT	This switch when set inhibits the error typeout.
SW12	INHIBIT UBE	This switch when set inhibits the initialization of the Unibus Exerciser. See section 9.2 for a description of the UBE function.
SW11	INHIBIT SUB- TEST ITERATION	This switch when set inhibits subtest iteration after the first pass. Each subtest is executed 10 times before the next subtest is run. Setting SW11 causes each test to be executed once before starting the next subtest.
SW10	RING BELL ON ERROR	This switch when set will ring the bell when an error is detected.
SW9	LOOP ON ERROR	This switch when set will cause the program to loop on the first failure even if the failure is intermittent. See section 6.1 for a description of looping on relocation errors.
SW8	RELOCATE WITH DISK	This switch when set will CAUSE RELOCATION TO BE DONE BY A DISK INSTEAD OF THE CPU. See section 9.5 for a description of relocation.

SW7	INHIBIT SYSTEM SIZE TYPEOUT	This switch when set will inhibit the typeout of the switch definitions and the disks that will be used for relocation. (Typeout only occurs when the program is dumped)
SW6	INHIBIT RELOCATION	This switch when set will inhibit all relocation. Do not change this switch while the program is running.
SW5	INHIBIT ROUND ROBIN	This switch when set will only relocate using the device selected by switches <2:0> rather than all available devices.
SW4	INHIBIT RANDOM DISK ADDRESS	This switch when set will cause relocation to always start at address 0 on the disk(s).
SW3	INHIBIT MBT	This switch when set inhibits the initialization of the Mass Bus Tester. See section 9.3 for a description of the MBT function.
SW2-SW0	DEVICE CODES	These switches (along with SW5) cause the program to relocate the test code using the device specified below:

VALUE	DEVICE
0	RP11/rp03
1	RK05
2	Not used
3	Not used
4	RH70/RP04
5	RH70/RS03/RS04
6	Not used
7	Not used

NOTE

When relocating via a specific device, set in the value(SW<2:0>) to select the device then set switch 5.

Unit 0 of the load device is marked not present if program was loaded in chair.

mode, and therefore will not be used to relocate.

5.2 Display Register

While the program is running, the low byte of the display register contains the subtest number and the high byte contains bits <14:7> of KERNEL PAR0. These bits, of kernel par0, correspond to bits <20:13> of the physical address of the relocated code. When an error is detected and loop on error is selected, the high byte contains the error count.

5.3 Operator Action

When the program is loaded* and started with switch 7 on a zero the program will typeout the disks and unit numbers that will be used for relocation and then wait for the operator to type a character. This is to allow the operator to write protect any drive that is not to be used. If there are no devices available for relocation, operator action is not required.

If the program is loaded via ACT11 in QV or AA or with XXDP in chain mode no operator action is required and all disks not write protected (except for the XXDP media) will be used for relocation.

*Except chain mode, QV(manufacturing only), or Auto Accept (manufacturing only)

6.0 ERRORS

6.1 Error Halts and Description

If an error is detected, the program will trap to the error handling routine (\$ERROR). If halt on error is enabled, the processor will halt. Pressing continue will cause an error message to be typed and the processor will halt again.

There are many different types of errors. No matter which type occurs a minimum set of information is typed as follows:

```
HHH:MM:SS  
ERRORPC PHYSC PC   PSW   MAINT  TEST NO SUB-PASS CNT  
UUUUUU VVVVVVVV WWWWWW XXXXXX YYYYYY SSSSSS PPPPPP
```

where:

```
UUUUUU   = Virtual PC of the error call.  
VVVVVVVV = Physical PC of the error call.  
WWWWW    = PSW at the time of the error call.
```


XXXXXX = Contents of the maintenance register(17777750).^{J 1}
 YYYYYY = Test number.
 SSSSSS = Sub-pass count (0 thru 5)
 PPPPPP = Pass count

HH:MM:SS Represents the elapsed run time of the program, since the most previous start, where: HH = hours, MM = minutes, and SS = seconds.

The Virtual PC is the 16 bit word that was pushed on the stack when the error call was made. The physical PC is calculated in one of two ways:

1. If memory management is off the contents of location 'FACTOR' is subtracted from the Virtual PC. This generates the corresponding PC for the non-relocated code.
2. If memory management is on the contents of the appropriate PAR is shifted and added to the Virtual PC to generate a physical 22 bit address. In this case the virtual PC corresponds to the non-relocated code.

The contents of the maintenance register will indicate what memory margin was being performed when the error occurred.

Depending on the type of error additional information is typed as described below.

6.1.1 Unexpected Trap to 4

PCOFTP	PHYSPC	PSW	CPUERR
VVVVVV	PPPPPPP	YYYYYY	ZZZZZZ

VVVVVV = Virtual PC that was pushed on the stack when the trap occurred.
 PPPPPPPP = Physical PC calculated as described above.
 YYYYYY = PSW that was pushed on the stack.
 ZZZZZZ = Contents of the CPU error register(17777766).

6.1.2 Unexpected Trap to 114

PCOFTP	PHYSPC	PSW	ERRREG	ERR ADR REG
VVVVVV	PPPPPPP	YYYYYY	ZZZZZZ	EEEEEEEE

V, P, and Y = are the same as described in 6.1.1.
 ZZZZZZ = Contents of the memory error register (777744).
 EEEEEEEE = Contents of the error address registers combined into a 22 bit address (777740 & 777742).

6.1.3 Parity Error During Data Check

This error can only occur during the data check that is made on the relocated test code before it is executed. This check is made by comparing the unrelocated code with the relocated code. The source data refers to the unrelocated code and the

destination data to the relocated code.

```
SRCADR  DSTADR  EADRREG  MEM ERR REG
SSSSSS  DDDDDDDD EEEEEEEE  ZZZZZZ
```

SSSSSS = Virtual address of the source data.
 DDDDDDDD = Physical address of the destination data.
 EEEEEEEE = Contents of the error address registers.
 ZZZZZZ = Contents of memory error register (777744).

6.1.4 Error During Data Check-Reloc was by CP

This error is similar to 6.1.3 except instead of a parity error, it is a data comparison error. Refer to section 9.5.3 for a description of CP relocation.

Loop on error (SW<9>) has the following effect:

1. Memory Management Off- If switch<9> is set, looping will be performed on the section relocation (see section 9.5.1). If SW<9> is not set, execution will continue at the beginning of the next section.
2. Memory Management On- If SW<9> is set, looping will be performed on the program relocation (see section 9.5.2) to the same memory space that failed. If SW<9> is not set, program relocation will be retried in the same memory space.

6.1.5 Error During Data Check-Reloc was by I/O

This error is the same as 6.1.4 except relocation was performed via a disk rather than the CP. The error printout will identify which device and drive number transferred the particular word that failed. Refer to section 9.5.4 for a description of I/O relocation.

Loop on error (SW<9>) has the following effect:

1. If SW<9> is set, the device that relocated the word (that caused the data check error) is initiated to do the same transfer with the same disk address and memory addresses. This transfer will continually be initiated and checked until SW<9> is not set.

6.1.6 Device Error

This error occurs if a device error occurs while the device is doing a transfer. The device and drive number are identified and the contents of the device registers are typed.

When SWK9> (loop on error) is set, the device that failed is continually restarted with the same disk address, memory address, and function that caused the error. L 1

6.1.7 Unibus Exerciser Failed

CC BUSADR CR2 CR1 PHYS BUS ADR
 XXXXXX VVVVVV WWWWWW YYYYYY ZZZZZZZZ

XXXXXX = Cycle count.
 VVVVVV = Virtual bus address that the UBE failed at
 WWWWWW = Control register number 2
 YYYYYY = Control register number 1
 ZZZZZZZZ = Physical memory address that the UBE failed at

The physical memory address is calculated by adding the appropriate map register to the virtual bus address, forming a real 22 bit memory address.

6.1.8 UBE Non-Existant Memory Error

This error only occurs when the 'NO SLAVE SYNC' error occurs in the unibus exerciser. Only the physical address that timed out is typed. This error might indicate that there is a hole in memory or that the size register (777760) is set wrong.

6.1.9 Mass Bus Tester Failed

CS1 WRDCNT BUSADR BADREX MR2 CS2 ST
 AAAAAA BBBBBB CCCCCC DDDDDD EEEEEE FFFFFF GGGGGG

ER CS3
 HHHHHH JJJJJJ

AAAAAA = Control and status register #1 (760100).
 BBBBBB = Word count register (760102).
 CCCCCC = Bus address register (760104).
 DDDDDD = Bus address extended register (760174).
 EEEEEEE = Maintenance register #2 (760106).
 FFFFFFF = Control and status register #2 (760110).
 GGGGGG = Status register (760112).
 HHHHHH = Error register (760114).
 JJJJJJ = Control and status register #3 (760176).

6.1.10 MBT Non-Existant Memory Error

This is the same as 6.1.7 except that it is detected by the NEXM bit in CS2 of the MBT.

6.1.11 Floating Point Error

This error will only occur if the left and right hand sides of the floating point identities do not agree within the expected tolerance. The value of the calculations are typed out.

This error should only be a function of the Floating Point Processor and the FPP diagnostics (DEFPA DEFPB) should be used to isolate the problem.

6.1.12 Device Hung

This error will occur if a device does not finish its relocation function within 2 seconds after its initiation. If a line clock is not installed, a hung device will hang the program. Refer to section 9.5.4.4 to determine which device and drive is hung.

6.2 Error Recovery

Different types of errors recover in different ways as described below.

6.2.1 Errors Within Subtests

Execution starts with the instruction following the error call.

6.2.2 Relocation with Memory Mgmt. Off

Execution starts at the beginning of the next section.

6.2.3 Device Error or CP Relocation with Memory Mgmt. On

Relocation is restarted.

6.2.4 Unexpected Traps Except Parity (4,10,250)

Execution starts at the address pointed to by location '\$LPERR'. This location contains the address+2 of the most recently executed 'SCOPE' instruction.

6.2.5 Unexpected Parity Error

If the parity error is fatal (Bit 2 or 3 set in error reg) the program types a restart message at restarts. Otherwise, execution starts as in 6.2.4.

7.0 WARNINGS AND EXCEPTIONS

7.1 Warnings

Any drive that is not 'write protected' will be written on (except unit 0 of the XXDP load device in chain mode).

When the program is dumped (see section 5.3) and SW<7> is set, the devices and drives that are not write protected will be identified on the terminal. Before typing a character to continue, a drive can be write protected without causing an error because, the system is sized again.

7.2 Exceptions

If any of the devices is located at a non-standard address (see below), the device register address tables (in 'common tags') should be changed to the correct addresses. Following is the default address of the control and status register of each device:

RP03----176714
 RK05----177404
 RP04----176700
 RS03/4--172040

If the system has both an RP03 and an RP04, the branch instruction at 100\$, in the 'size routine' must be replaced by a nop (240) for both devices to be used. This branch is approximately at address 4552.

8.0 MISCELLANEOUS8.1 Execution Time

The execution time is dependent on the amount of memory on the system. Following are two typical run times:

1. Manufacturing Basic Line-32K memory, UBE, MBT, and no disks---3 minutes.
2. System-128K memory, 2 RK05's, RP04, and 2 RS04's---9 minutes.

8.2 Stack Pointer

The stack pointer is set to 700.

NOTE

When the program is running in either user or supervisor mode, the user/supervisor stack pointer is set to 700 and the Kernel stack pointer is set to 1200. The Kernel stack pointer is used only for the Error and Interrupt Service routines. routines.

8.3 Pass Count

There are two words used for effective pass count. Location 'SUBPASS' and 'SPASS'. Subpass contains the ASCII representation of the subpass count. This is used to index the PSW table and margin table (see section 8.7).

Six subpasses are executed for each pass. This allows all margins and PSW combinations to be tested before reporting end of pass.

At the end of each subpass the subpass number (that is being started) is typed followed by 'THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 0123456789'. If running on ACT11 QV or AA, only the sub-pass number is typed. At the end of each pass the elapsed run time and the message 'END PASS X TOTAL ERRORS SINCE LAST REPORT Y' is typed.

8.4 Iterations

Sub-test iterations are not performed until the pass count (\$PASS) is non-zero. This makes a QV pass as short as possible.

After the first pass, full 10 octal iterations are performed on each subtest.

8.5 T-Bit Trapping

T bit trapping is controlled by the PSW table. The default condition is to run with the T-Bit on during subpasses 2, 4, and 6.

8.6 ACT-11 Compatability

The program is fully ACT-11 compatable.

8.7 PSW and Margin Tables

At the end of the program, just before the messages, are the PSW and margin tables. These tables control what mode and register set and which memory margin will be executed on a subpass. Refer to section 9.5.2 for a description of how these tables are used by the program. These tables may be modified if desired.

8.8 I/O Device Address Modification

To modify the program address of the I/O devices patch the appropriate device table (in the common tags area) to the desired addresses.

If you are patching the RP03 or RP04 see section 7.2.

8.9 Power Fail

If a power fail occurs (followed by a power up), the word 'POWER' is typed on the terminal and the program restarts.

The program is divided into 9 sections of position independent relocatable test code. Each section is approximately 1K words long.

When the program is initially loaded and started it will identify itself and type the function of the switch register and the devices and drives that will be used for relocation, if SW7=0. It will also type the CP options available indicator word (OPT.CP). The contents of OPT.CP contain the following indicators:

Bit15	=	Not used
Bit14	=	Not used
Bit13=1/0	=	FPP available/not available
Bit12	=	Not used
Bit11	=	Not used
Bit10=1/0	=	MBT available/not available
Bit09=1/0	=	KW11-L available/not available
Bit08=1/0	=	Console tty available/not available
Bit07=1/0	=	UBE available/not available
Bits06-00	=	Not used

Following is a brief description of each section:

- Section 0 This section causes a 256 word 3 Xor 9 test pattern to be relocated throughout memory 0 - 28K.
NOTE: This should not be construed to be a complete memory test.
- Section 1 This section tests the unary instruction set executing each unary instruction in each address mode (excluding unary instructions using address mode 7).
- Section 2 This section tests the unary instructions using address mode 7 and binaries in all address modes (excluding binary byte ops using address mode 7).
- Section 3 This section tests binary byte ops using address mode 7, JMP, JSR and program trap (IOT, TRAP, and EMT) instruction.
- Section 4 This section checks that each bit in the processor status word (PSW) can be set cleared, reserved instructions, and odd address traps.
- Section 5 This section checks the SXT, XOR, SOB, MARK, RTT and RTT instructions.
- Section 6 This section checks the ASH, ASHC, MUL, DIV, SPL instructions and the program interrupt request (PIRQ) logic.

D 2

Section 7 This section checks the stack limit register memory management abort logic, the memory management registers, and the mapping box registers.

Section 8 This section checks the floating point option, (FP11-B or FP11-C) if available.

Following section 8 are two routines to check the teletype printer logic and a routine to start the KW11-L clock. If the KW11-L is available the priority arbitration logic is tested.

9.1 Micro-Break Test

The micro-break test is used to test the micro break comparators and the stop on micro match function of the maintenance card. To run this test the operator must have a maintenance card installed and start the program at address 214.

The program asks the operator to turn on the stop on micro match switch. It then checks certain bit patterns in the micro break register to ensure the processor does not stop when it is not supposed to.

The processor will then stop with zero in the micro address lights. The operator then hits continue, and the processor will stop with one (1) in the lights. This sequence continues with 2, 4, 10, 20, 40, and 200 appearing in the lights. The program types done when it is finished.

9.2 Unibus Exerciser(UBE)

Any one of 4 UBE's will be used. The program looks for a UBE at addresses 17770004, 17770024, 17770034, and 17770044.

Test 77 will initiate the unibus exerciser if it is present. This is only done on pass 1 - subpass 1, since from that point on, the service routine takes care of restarting it.

The UBE is Set up with a bus address of 0. The function that is loaded is 'DATA IN PAUSE-DATA OUT BYTE'. The word count is set for ABOUT 1.3K WORDS. It is also set to interrupt on level 5.

When an interrupt occurs a check is made to see if it was caused by an error. If there was no error, 0 is loaded as the bus address and the UBE is started again.

When an error occurs a check is made to see if it was caused by a memory timeout. If it was, the address in the UBE bus address register is compared with the address in the system size registers. If they are the same (no holes in memory) the UBE is restarted at address 0 and the above sequence is repeated. If the addresses are not the same a memory-hole error is reported.

If the error was not due to a timeout a UBE error is reported.

9.3 Mass Bus Tester(MBT)

Any one of 4 MBT's will be used. The program looks for an MBT at addresses 17770100, 17770200, 17770300, and 17770400. If an MBT is found, the drive type register (17770X26) is checked to make sure that it really is an MBT.

Test 77 also initiates the mass bus tester. Again, this is only done on Pass 1 - subpass 1 since the service routine keeps it running.

The bus address register is initially set to 0, the word count to 2K words, and a read function is initiated.

When an interrupt occurs an error check is made. This error check is the same as that described for the UBE. If there was no error, the word count is reloaded and the function is issued. The bus address register is not changed so it will continue from where it left off.

9.4 Line Clock Initialization

Test 76 turns on the line clock. Two locations in 'common tags' keep track of the elapsed run time of the program. When the clock interrupts, the low byte of location 'lticks' is incremented. When this byte gets to 60(decimal) it is cleared and the high byte is incremented(seconds). When the second count gets to 60(decimal) location 'mticks' is incremented and lticks is cleared. This gives the timer a 64K decimal minute range.

NOTE

For the UBE, MBT, and Line Clock, when an interrupt occurs, program execution returns to Kernel mode and the Kernel PAR's are mapped down to the 0-12K bank of memory. Upon returning from the interrupt the PAR's are mapped back to where they were and the previous processor mode is restored.

9.5 Relocation Algorithm

9.5.1 Section Relocation

As each section is entered the virtual start address is saved in location 'FRSTAD' and the relocation factor (byte offset from non-relocated code) is calculated and saved in location 'FACTOR'. The test code is then executed.

At the end of each section, control is transferred to the "relocation routine". If SW<8> is CLEAR, this routine will relocate the section via the CP (see 9.5.3). If SW<8> is set, the length of the section is calculated, saved as a word count, and control is transferred to the "I/O monitor" (see section 9.5.4) which relocates the section by using a disk.

Each section is initially relocated to the end address of the program. Subsequent relocations start at the end of the previous relocation. For example: if section 0 is 1000 bytes long and the end address of the program is 60000, the first relocation starts at address 60000, the second at 61000, the third at 62000, etc. This continues until 28k has been reached at which time execution goes to the start of the next section and the process repeats with the new section.

Each section is written in position independent code so that it can be relocated and executed without the use of memory management.

9.5.2 Program Relocation

When all nine sections have been relocated and executed thru 28k (see section 9.5.1), memory management is setup according to the value in location 'NEXPAR'. This value is initialized to 600 (or 1600 if running under the XXDP monitor), making relocation start at address 60000 (or 160000). The "I/O monitor" is then entered (see section 9.5.4) to relocate the program. When the I/O monitor completes the relocation, execution is transferred to the start of the program at the relocated position.

Each section is executed only once with memory management on. At the end of section 8, 77 is added to 'NEXPAR' and relocation is performed again. This causes the next relocation to move up by 7700 bytes. For example: If nexpar=1600 the first relocation starts at address 160000, the second at address 167700, the third at 177600, etc.

This continues until the end of memory is reached and constitutes a sub-pass. The PSW and maintenance register (for memory margins) are then setup for the next sub-pass and the program restarts.

The value for the PSW and maintenance registers is taken from

the tables (see section 8.7). The particular entry that is used is obtained by indexing the table by the sub-pass number (see section 8.3). For example, sub-pass 3 uses word 3 (the first word is counted as zero) of each table. Therefore, to change the value in the PSW or maintenance register only requires changing the value in the appropriate table.

The completion of 6 sub-passes constitutes a pass and an end of pass message is typed. The program then restarts in pass 2, sub-pass 0.

5.3 Relocation VIA CP

If SW<8> is CLEAR, both section and program relocation (see sections 9.5.1 and 9.5.2), are performed by an instruction move loop rather than a disk. For example:

```
1$: MOV (R0)+,(R2)+
    CMP R0,R3
    BNE 1$
```

where R0 is the address of the code being moved, R2 is the address that it is being moved to, and R3 is the last address that is to be moved.

When this is finished, the relocated data is checked by an instruction compare loop to ensure that the relocation was performed correctly.

9.5.4 Relocation VIA I/O

If SW<8> is set, both section and program relocation (see section 9.5.1 and 9.5.2), are performed by writing the data to a disk and reading it back to the relocated position. This relocation is controlled by the 'I/O Monitor'.

9.5.4.1 Section Relocation

When the I/O monitor is entered from the 'relocation routine' (see section 9.5.1) a device is selected (see 9.5.4.3), the memory addresses (from and to) and word count are passed to the device handler (see section 9.5.4.4), and the handler is called. When the handler finishes, the I/O monitor checks the relocated data with an instruction compare loop to ensure the relocated data is correct, and returns to the 'relocation routine' (see 9.5.1).

9.5.4.2 Program Relocation

When the I/O monitor is entered for program relocation (see section 9.5.2) the base address for the relocation is calculated from the contents of kernel par3 which was set up with memory management (see 9.5.2). If SW<8> is CLEAR, relocation is performed VIA the CP (see section 9.5.3).

If SW<8> is set, a device is selected (see 9.5.4.3), the word count is set to 2K, and the memory addresses (from and to) and word count are passed to the device handler (see 9.5.4.4), and the handler is called. The I/O monitor then adds 2K to the memory addresses, selects another device, passes the addresses to the device handler, and calls the handler. This continues until all 12K has been relocated. The relocated data is then checked with an instruction compare loop. The relocated program is then executed as described in 9.5.2.

9.5.4.3 Device Selection

If SW<5> is not set, an index is picked up from location 'DEVINDX'. This index is used to index the system size table. The system size table consists of 8 words (one for each device type). Bits <7:0> of each word are used to indicate the drive numbers that are available on the device, and are initialized in the size routine. Bits <15:8> of each word are used to indicate whether the drive has been used for a data transfer (unit used bit).

The system size table is then searched, using the index described above, for a drive that has not been used. When a drive is found, the 'unit used bit' is set, the current index is put back in location DEVINDX, and execution continues as described in 9.5.4.1 or 9.5.4.2.

If an unused unit is not found, all the 'unit used' bits are cleared and the search is restarted. If the search finds the system size table empty (no devices on the system), the message 'NO I/O DEVICES' is typed and relocation is performed via the CP as described in 9.5.3.

If SW<5> is set, SW's<2:0> are used to index the system size table. In this case only one word of the table is used corresponding to the device being selected by SW's<2:0> (see section 5.1). In this mode, a round robin selection is performed on the drives of the selected device.

9.5.4.4 Device Handlers

Each device that is used for relocation has a handler. These handlers are functionally the same.

The handler is called by the I/O Monitor (see section 9.5.4). It first clears the done bit (bit 7) in the handler status word. This prevents the monitor from calling this handler again before it is finished.

If a 'device hung' error (see section 6.1.12) is detected, the handler status words can be examined to determine which device did not finish (set bit 7). The drive can then be determined by looking in the 'device handler unit number' table. The handler status words and device handler unit number tables,

are located in the 'common tags' area of the listing.

Then the handler calculates a disk address. This address is either generated from a random number (SW4=0) or is set to zero (SW4=1). The device ID, unit number, and cylinder address are combined and placed in the 'RUN TABLE' (RUNTBL). The position in the run table corresponds to which 2K block of the program is being transferred (i.e. the first 2K block is identified by word 1, the second 2K by word 2, etc.). The bit configuration of each word in the run table is as follows:

<15:13> = Device ID
<12:10> = Unit Number
<9> = not used
<8:0> = Cylinder Address

The track-sector address of the transfer is saved in the 'RUN TRACK TABLE' (RUNTRAK). The position in this table is as described above. The bit configuration of each word is the same as that for the disk address register for the particular device. Bit 15 is used to indicate a device error. It is set by the device service routine. (see section 9.5.4.5)

The handler then initializes the device registers with all the appropriate information and starts a write function. Execution then returns to the I/O Monitor at the point where the handler was called.

9.5.4.5 Device Service Routines

Each device that is used for relocation has a service routine. These routines are all functionally the same.

The routine is entered by a device interrupt. The device is checked for any errors. If no error occurred the device registers are loaded and the next function to perform is initiated. Three functions are executed: Write, Write Check, and Read. All the necessary bus address information is calculated by the I/O Monitor, so the service routine just takes care of the device.

When the read function has been completed successfully, the done bit (bit 7) in the handler status word is set.

Upon initiation of a function, or completion of all three functions, the service routine returns execution to where it was when it was interrupted.

If an error is detected, the function that failed is retried two more times. If the error is still present the done bit and the error bit (bit 15) is set in the handler status word along with bit 15, in the appropriate entry, in the RUN TRACK TABLE, and the routine exits as described above.

5360	OPERATIONAL SWITCH SETTINGS
5373	BASIC DEFINITIONS
(1)	CACHE REGISTER DEFINITIONS
(1)	CPU REGISTER DEFINITIONS
(1)	MEMORY MANAGEMENT DEFINITIONS
(1)	UNIBUS MAP REGISTER DEFINITIONS
5444	CIS OPCODE DEFINITIONS
5512	TRAP CATCHER
(1)	STARTING ADDRESS(ES)
5524	ACT11 HOOKS
5946	COMMON TAGS
(3)	DEVICE HANDLER STATUS WORDS
(3)	DEVICE HANDLER WORD COUNTS
(3)	DEVICE HANDLER OLD BASE ADDRESS
(3)	DEVICE HANDLER NEW BASE ADDRESSES
(3)	DEVICE HANDLER UNIT NUMBER
(3)	ADDRESS OF THE DEVICE HANDLERS
(3)	DEVICE HANDLER DISK ADDRESS TABLE
(3)	DEVICE HANDLER FUNCTION TABLE
(3)	DEVICE HANDLER RETRY COUNT
(3)	DEVICE REGISTER TABLES
(3)	RP11/RP03 REGISTERS
(3)	RK11/RK05 REGISTERS
(3)	RH70/RP04 REGISTERS
(3)	RH70/RS04 REGISTERS
(3)	UNIBUS EXERCISER REGISTER ADDRESS TABLE
(3)	MASS BUS TESTER REGISTER ADDRESSES
(1)	ERROR POINTER TABLE
6057	PROGRAM INITIALIZATION
6060	MICRO-BREAK REGISTER TEST
6513	SYSTEM SIZER
6686	T1 MEMORY VERIFICATION TEST
6687	START OF SECTION 0
6696	T2 CHECK BRANCH INSTRUCTIONS
6697	START OF SECTION 1
6740	T3 TEST UNIARY CONDITION CODES
6852	T4 CHECK REGISTER SELECTION
6970	T5 TEST UNIARY WORD INSTRUCTIONS USING ADDRESS MODE 1
7089	T6 CHECK UNIARY BYTE INSTRUCTIONS USING ADDRESS MODE 1
7236	T7 CHECK UNIARY WORD OPS USING ADDRESS MODES 2 & 4
7334	T10 CHECK UNIARY BYTE OPS USING ADDRESS MODES 2 & 4
7451	T11 CHECK UNIARY WORD OPS USING ADDRESS MODES 3 & 5
7531	T12 CHECK UNIARY BYTE OPS USING ADDRESS MODES 3 & 5
7608	T13 CHECK UNIARY WORD OPS USING ADDRESS MODE 6 (PC)
7688	T14 CHECK UNIARY BYTE OPS (EVEN/ODD) USING ADDRESS MODE 6 (PC)
7800	T15 CHECK UNIARY WORD OPS USING ADDRESS MODE 7
7801	START OF SECTION 2
7902	T16 CHECK UNIARY BYTE OPS USING ADDRESS MODE 7
7987	T17 CHECK BINARY OPS USING ADDRESS MODE 0
8106	T20 CHECK BINARY OPS USING ADDRESS MODE 1
8222	T21 CHECK BINARY BYTE OPS USING ADDRESS MODE 1
8339	T22 CHECK BINARY WORD OPS USING ADDRESS MODE 2 & 4
8423	T23 CHECK BINARY BYTE OPS USING ADDRESS MODE 2 & 4
8490	T24 CHECK BINARY WORD OPS USING ADDRESS MODES 3 & 5
8549	T25 CHECK BINARY BYTE OPS USING ADDRESS MODES 3 & 5
8601	T26 CHECK BINARY OPS USING ADDRESS MODE 6

8658	T27	CHECK BINARY BYTE OPS USING ADDRESS MODE 6
8698	T30	CHECK BINARY WORD OPS USING ADDRESS MODE 7
8759	T31	SOME MISCELLANEOUS OPERATIONS INVOLVING THE PC
8787	T32	CHECK BINARY BYTE OPS USING ADDRESS MODE 0
8788		START OF SECTION 3
8821	T33	CHECK BINARY BYTE OPS USING ADDRESS MODE 7
8945	T34	CHECK JUMP INSTRUCTIONS
9032	T35	CHECK JSR INSTRUCTIONS
9133	T36	CHECK IOT TRAP (AND ROLB/ASLB)
9195	T37	CHECK EMT TRAP SEQUENCE
9247	T40	CHECK TRAP INSTRUCTION TRAP SEQUENCE
9285	T41	CHECK STACK OVERFLOW
9286		START OF SECTION 4
9387	T42	CHECK THAT ALL RESERVED INSTRUCTIONS TRAP
9471	T43	CHECK THAT ALL BITS IN THE PSW CAN BE SET AND CLEARED
9517	T44	CHECK THAT ALL BITS IN THE CURRENT STACK PTR CAN BE SET CLEARED
9579	T45	CHECK THAT 'C' BIT SETS/CLEARs PROPERLY
9617	T46	CHECK EXTENDED INSTRUCTION SET
9618		START OF SECTION 5
9773	T47	SOB TEST
9858	T50	CHECK THE MARK INSTRUCTION
9906	T51	RTT/RTI TEST
9945	T52	SECOND RTT TEST
10000	T53	CHECK ASH, ASHC, MUL, AND DIV INSTRUCTIONS
10001		START OF SECTION 6
10101	T54	CHECK MUL
10150	T55	CHECK THE DIV INSTRUCTION
10232	T56	DIVIDE AGAIN
10251	T57	CHECK SPL INSTRUCTION
10292	T60	CHECK PIRQ LOGIC
10342	T61	CHECK MICRO-BREAK REGISTER
10360	T62	CHECK MFPI/MTPI INSTRUCTIONS
10401	T63	CHECK ILLEGAL HALT
10417	T64	CHECK RESET IN SUPER/USER MODE
10427	T65	TEST STACK LIMIT REGISTER
10428		START OF SECTION 7
10504	T66	MEMORY MANAGEMENT REGISTER TESTS
10540	T67	PAR TEST
10596	T70	CHECK KT ABORT LOGIC
10652	T71	MAPPING REGISTER TESTS
10721	T72	FLOATING POINT TEST 1
10723		START OF SECTION 8
10883	T73	FLOATING POINT TEST 2
11042		FLOATING POINT MULTIPLY ROUTINE
11054		FLOATING POINT DIVIDE ROUTINE
11065		FLOATING POINT ADD ROUTINE
11126	T74	CHECK MFPT INSTRUCTION (KB11-E/EM ONLY)
11127		START OF SECTION 9
11145	T75	COMMERCIAL INSTRUCTION SET TEST
11685	T76	TELETYPE AND CLOCK TESTS
11762	T77	TURN ON UBE AND MBT
11797		STMM ROUTINE
11885		RELOCATION ROUTINE
11942		I/O RELOCATION MONITOR
12244		END OF SUB-PASS ROUTINE
12286		END OF PASS ROUTINE

12288	RP11/RP03 HANDLER
12365	RK11/RK05 HANDLER
12439	RH70/RP04 HANDLER
12508	RH70/RS04 HANDLER
12563	RP11/RP03 SERVICE ROUTINE
12680	RK11/RK05 SERVICE ROUTINE
12807	RH70/RP04 SERVICE ROUTINE
12906	RH70/RS04 SERVICE ROUTINE
13001	UNIBUS EXERCISER SERVICE ROUTINE
13080	MASS BUS TESTER SERVICE ROUTINE
13140	LINE CLOCK SERVICE ROUTINE
13163	SCOPE HANDLER ROUTINE
13164	ERROR HANDLER ROUTINE
13166	ERROR MESSAGE TYPEOUT ROUTINE
13439	TYPE ROUTINE
13441	ROUTINE TO TYPE THE ELAPSED RUN TIME OF THE PROGRAM
13501	ROUTINE TO TYPE THE AVAILABLE DEVICES AND UNIT NUMBERS
13533	BINARY TO OCTAL (ASCII) AND TYPE
13534	CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
13535	DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
13536	SAVE AND RESTORE R0-R5 ROUTINES
13538	CONVERT FLOATING BINARY TO OCTAL ASCII
13611	CONVERT FLOATING DOUBLE BINARY TO OCTAL ASCII
13663	RANDOM NUMBER GENERATOR ROUTINE
13665	FLOATING POINT NUMBER GENERATOR
13700	FLOATING POINT EXPONENT EXTENSION
13757	POWER DOWN AND UP ROUTINES
13758	TTY INPUT ROUTINE
13759	READ A DECIMAL NUMBER FROM THE TTY
13760	ROUTINE TO SIZE MEMORY
13761	TRAP DECODER
(3)	TRAP TABLE
13765	UNIBUS EXERCISER INITIALIZATION ROUTINE
13790	CONVERT UNIBUS VIRTUAL ADDRESS TO PHYSICAL ADDRESS
13819	CONVERT A VIRTUAL ADDRESS TO A PHYSICAL ADDRESS
13860	ROUTINE TO CHECK RELOCATED DATA
13902	ROUTINE TO GET A MAP REGISTER
13981	GIVE MAP SUBROUTINE
13992	ROUTINE TO CLEAR 'T' BIT
13999	ROUTINE TO RESTORE THE T BIT
14010	KEYBOARD INT SERV ROUTINE
14077	TELETYPE INTERRUPT SERVICE ROUTINE
14090	PARITY ERROR SERVICE
14143	CONTEXT SWITCH DOWN SUBROUTINE
14171	CONTEXT SWITCH UP SUBROUTINE
14191	KT ABORT SUBROUTINE
14207	RESERVED INSTRUCTION ROUTINE
14220	TRAP TO 4 SERVICE ROUTINE

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.TITLE CEQKC-E PDP 11/70 CPU EXERCISER
:*COPYRIGHT (C) 1975, 1980
:*DIGITAL EQUIPMENT CORP.
:*MAYNARD, MASS. 01754
:*
:*PROGRAM BY DONALD W. MONROE
:*
:*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
:*PACKAGE (MAINDEC-11-DZQAC-A5-1).
:*

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```
.SBTTL OPERATIONAL SWITCH SETTINGS
:*
:* SWITCH USE
:* -----
:* 15 HALT ON ERROR
:* 14 LOOP ON TEST
:* 13 INHIBIT ERROR TYPEOUTS
:* 12 INHIBIT UBE
:* 11 INHIBIT ITERATIONS
:* 10 BELL ON ERROR
:* 9 LOOP ON ERROR
:* 8 ALLOW RELOCATION VIA I/O DEVICE
:* 7 INHIBIT SYSTEM SIZE TYPEOUT
:* 6 INHIBIT RELOCATION
:* 5 INHIBIT ROUND ROBIN
:* 4 INHIBIT RANDOM DISK ADDRESS
:* 3 INHIBIT MBT
:* 2 THESE THREE SWITCHES
:* 1 ARE ENCODED TO SELECT RELOCATION
:* 0 ON THE FOLLOWING DEVICES:
:* 0...RP11/RP03
:* 1...RK11/RK05
:* 2...NOT USED
:* 3...NOT USED
:* 4...RH70/RP04
:* 5...RH70/RS04
:* 6...NOT USED
:* 7...NOT USED
```

5373

```

(1) .SBTTL BASIC DEFINITIONS
(1)
(1) ;*INITIAL ADDRESS OF THE STACK POINTER *** 1200 ***
(1) 001200 STACK= 1200 ;:FIRST ADDRESS OF THE STACK
(1) 001200 KERSTK= STACK ;:KERNEL STACK
(1) 000700 SUPSTK= STACK-300 ;:SUPERVISOR STACK
(1) 000600 USESTK= STACK-400 ;:USER STACK
(1) .EQUIV EMT,ERROR ;:BASIC DEFINITION OF ERROR CALL
(1) .EQUIV IOT,SCOPE ;:BASIC DEFINITION OF SCOPE CALL
(1) 177776 PS= 177776 ;:PROCESSOR STATUS WORD
(1) .EQUIV PS,PSW
(1) 177774 STKLMT= 177774 ;:STACK LIMIT REGISTER
(1) 177772 PIRQ= 177772 ;:PROGRAM INTERRUPT REQUEST REGISTER
(1) 177570 SWR= 177570 ;:SWITCH REGISTER
(1) 177570 DISPLAY=SWR
(1)
(1) ;*MISCELLANEOUS DEFINITIONS
(1) 000011 HT= 11 ;:CODE FOR HORIZONTAL TAB
(1) 000012 LF= 12 ;:CODE LINE FEED
(1) 000015 CR= 15 ;:CODE CARRIAGE RETURN
(1) 000200 CRLF= 200 ;:CODE FOR CARRIAGE RETURN-LINE FEED
(1)
(1) ;*GENERAL PURPOSE REGISTER DEFINITIONS
(1) 000000 R0= %0 ;:GENERAL REGISTER
(1) 000001 R1= %1 ;:GENERAL REGISTER
(1) 000002 R2= %2 ;:GENERAL REGISTER
(1) 000003 R3= %3 ;:GENERAL REGISTER
(1) 000004 R4= %4 ;:GENERAL REGISTER
(1) 000005 R5= %5 ;:GENERAL REGISTER
(1) 000006 R6= %6 ;:GENERAL REGISTER
(1) 000007 R7= %7 ;:GENERAL REGISTER
(1) .EQUIV R0,R10 ;:GENERAL REGISTER
(1) .EQUIV R1,R11 ;:GENERAL REGISTER
(1) .EQUIV R2,R12 ;:GENERAL REGISTER
(1) .EQUIV R3,R13 ;:GENERAL REGISTER
(1) .EQUIV R4,R14 ;:GENERAL REGISTER
(1) .EQUIV R5,R15 ;:GENERAL REGISTER
(1) 000006 SP=%6 ;:GENERAL REGISTER
(1) .EQUIV SP,KSP ;:KERNEL STACK POINTER
(1) .EQUIV SP,SSP ;:SUPERVISOR STACK POINTER
(1) .EQUIV SP,USP ;:USER STACK POINTER
(1) 000007 PC=%7
(1)
(1) ;*PRIORITY LEVEL DEFINITIONS
(1) 000000 PRO= 0 ;:PRIORITY LEVEL 0
(1) 000040 PR1= 40 ;:PRIORITY LEVEL 1
(1) 000100 PR2= 100 ;:PRIORITY LEVEL 2
(1) 000140 PR3= 140 ;:PRIORITY LEVEL 3
(1) 000200 PR4= 200 ;:PRIORITY LEVEL 4
(1) 000240 PR5= 240 ;:PRIORITY LEVEL 5
(1) 000300 PR6= 300 ;:PRIORITY LEVEL 6
(1) 000340 PR7= 340 ;:PRIORITY LEVEL 7
(1)
(1) ;*'SWITCH REGISTER' SWITCH DEFINITIONS
(1) 100000 SW15= 100000
    
```

```

(1)      040000      SW14= 40000
(1)      020000      SW13= 20000
(1)      010000      SW12= 10000
(1)      004000      SW11= 4000
(1)      002000      SW10= 2000
(1)      001000      SW09= 1000
(1)      000400      SW08= 400
(1)      000200      SW07= 200
(1)      000100      SW06= 100
(1)      000040      SW05= 40
(1)      000020      SW04= 20
(1)      000010      SW03= 10
(1)      000004      SW02= 4
(1)      000002      SW01= 2
(1)      000001      SW00= 1
(1)      .EQUIV SW09,SW9
(1)      .EQUIV SW08,SW8
(1)      .EQUIV SW07,SW7
(1)      .EQUIV SW06,SW6
(1)      .EQUIV SW05,SW5
(1)      .EQUIV SW04,SW4
(1)      .EQUIV SW03,SW3
(1)      .EQUIV SW02,SW2
(1)      .EQUIV SW01,SW1
(1)      .EQUIV SW00,SW0
(1)      ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
(1)      100000      BIT15= 100000
(1)      040000      BIT14= 40000
(1)      020000      BIT13= 20000
(1)      010000      BIT12= 10000
(1)      004000      BIT11= 4000
(1)      002000      BIT10= 2000
(1)      001000      BIT09= 1000
(1)      000400      BIT08= 400
(1)      000200      BIT07= 200
(1)      000100      BIT06= 100
(1)      000040      BIT05= 40
(1)      000020      BIT04= 20
(1)      000010      BIT03= 10
(1)      000004      BIT02= 4
(1)      000002      BIT01= 2
(1)      000001      BIT00= 1
(1)      .EQUIV BIT09,BIT9
(1)      .EQUIV BIT08,BIT8
(1)      .EQUIV BIT07,BIT7
(1)      .EQUIV BIT06,BIT6
(1)      .EQUIV BIT05,BIT5
(1)      .EQUIV BIT04,BIT4
(1)      .EQUIV BIT03,BIT3
(1)      .EQUIV BIT02,BIT2
(1)      .EQUIV BIT01,BIT1
(1)      .EQUIV BIT00,BIT0
(1)      ;*BASIC 'CPU' TRAP VECTOR ADDRESSES
(1)      000004      ERRVEC- 4 ;:TIME OUT AND OTHER ERRORS
    
```

```
(1) 000010 RESVEC= 10      ;;RESERVED AND ILLEGAL INSTRUCTIONS
(*) 000014 TBITVEC=14     ;;'T' BIT
(1) 000014 TRTVEC= 14     ;;TRACE TRAP
(1) 000014 BPTVEC= 14     ;;BREAKPOINT TRAP (BPT)
(1) 000020 IOTVEC= 20     ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
(1) 000024 PWRVEC= 24     ;;POWER FAIL
(1) 000030 EMTVEC= 30     ;;EMULATOR TRAP (EMT) **ERROR**
(1) 000034 TRAPVEC=34     ;;'TRAP' TRAP
(1) 000060 TKVEC= 60      ;;TTY KEYBOARD VECTOR
(1) 000064 TPVEC= 64      ;;TTY PRINTER VECTOR
(1) 000114 CACHVEC=114    ;;CACHE ERROR INTERRUPT VECTOR
(1) 000240 PIRQVEC=240   ;;PROGRAM INTERRUPT REQUEST VECTOR
(1) 000250 MMVEC= 250    ;;MEMORY MANAGEMENT VECTOR
```

.SBTTL CACHE REGISTER DEFINITIONS

```
(1) 177740 LOADRS - 177740 ;;LOWER 16 BITS OF ADDRESS THAT CAUSED ERROR
(1) 177742 HIADRS = 177742 ;;UPPER SIX BITS OF ADDRESS THAT CAUSED ERROR
(1) 177744 MEMERR = 177744 ;;CACHE ERROR REGISTER
(1) 177746 CONTRL = 177746 ;;MEMORY CONTROL REGISTER
(1) 177750 MAINT = 177750 ;;MEMORY MAINTENANCE REGISTER
(1) 177752 HITMIS = 177752 ;;HIT MISS REGISTER '1' IMPLIES HIT IN CACHE
```

.SBTTL CPU REGISTER DEFINITIONS

```
(1) 177760 SIZELO = 177760 ;;MEMORY SIZE REGISTER NUMBER TO PUT INTO A PAR
(1) 177762 SIZEHI = 177762 ;;TO GET TO THE LAST 32 WORDS OF MEMORY
(1) 177764 SYSTID - 177764 ;;HIGH SIZE REGISTER, RESERVED FOR FUTURE USE
(1) 177766 CPUERR = 177766 ;;CURRENTLY ALL ZERO
(1) 177766 CPUERR = 177766 ;;SYSTEM ID REGISTER
(1) 177766 CPUERR = 177766 ;;CPU ERROR REGISTER HOLDS CONDITION THAT CAUSED
(1) 177766 CPUERR = 177766 ;;THE TRAP TO ERRVEC (000004)
```

.SBTTL MEMORY MANAGEMENT DEFINITIONS

;*MEMORY MANAGEMENT STATUS REGISTER ADDRESSES

```
(1) 177572 MMR0= 177572
(1) 177574 MMR1= 177574
(1) 177576 MMR2= 177576
(1) 172516 MMR3= 172516
(1) .EQUIV MMR0,SR0
(1) .EQUIV MMR1,SR1
(1) .EQUIV MMR2,SR2
(1) .EQUIV MMR3,SR3
```

;*USER 'I' PAGE DESCRIPTOR REGISTERS

```
(1) 177600 UIPDR0- 177600
```

```
(1) 177602 UIPDR1= 177602
(1) 177604 UIPDR2= 177604
(1) 177606 UIPDR3= 177606
(1) 177610 UIPDR4= 177610
(1) 177612 UIPDR5= 177612
(1) 177614 UIPDR6= 177614
(1) 177616 UIPDR7= 177616
(1)
(1) ;*USER 'D' PAGE DESCRIPTOR REGISTORS
(1)
(1) 177620 UDPDR0= 177620
(1) 177622 UDPDR1= 177622
(1) 177624 UDPDR2= 177624
(1) 177626 UDPDR3= 177626
(1) 177630 UDPDR4= 177630
(1) 177632 UDPDR5= 177632
(1) 177634 UDPDR6= 177634
(1) 177636 UDPDR7= 177636
(1)
(1) ;*USER 'I' PAGE ADDRESS REGISTERS
(1)
(1) 177640 UIPAR0= 177640
(1) 177642 UIPAR1= 177642
(1) 177644 UIPAR2= 177644
(1) 177646 UIPAR3= 177646
(1) 177650 UIPAR4= 177650
(1) 177652 UIPAR5= 177652
(1) 177654 UIPAR6= 177654
(1) 177656 UIPAR7= 177656
(1)
(1) ;*USER 'D' PAGE ADDRESS REGISTERS
(1)
(1) 177660 UDPAR0= 177660
(1) 177662 UDPAR1= 177662
(1) 177664 UDPAR2= 177664
(1) 177666 UDPAR3= 177666
(1) 177670 UDPAR4= 177670
(1) 177672 UDPAR5= 177672
(1) 177674 UDPAR6= 177674
(1) 177676 UDPAR7= 177676
(1)
(1) ;*SUPERVISOR 'I' PAGE DESCRIPTOR REGISTERS
(1)
(1) 172200 SIPDR0= 172200
(1) 172202 SIPDR1= 172202
(1) 172204 SIPDR2= 172204
(1) 172206 SIPDR3= 172206
(1) 172210 SIPDR4= 172210
(1) 172212 SIPDR5= 172212
(1) 172214 SIPDR6= 172214
(1) 172216 SIPDR7= 172216
(1)
(1) ;*SUPERVISOR 'D' PAGE DESCRIPTOR REGISTERS
(1)
(1) 172220 SDPDR0= 172220
(1) 172222 SDPDR1= 172222
```

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(1) 172224 SDPDR2= 172224
(1) 172226 SDPDR3= 172226
(1) 172230 SDPDR4= 172230
(1) 172232 SDPDR5= 172232
(1) 172234 SDPDR6= 172234
(1) 172236 SDPDR7= 172236
(1)
(1) ;*SUPERVISOR 'I' PAGE ADDRESS REGISTERS
(1)
(1) 172240 SIPAR0= 172240
(1) 172242 SIPAR1= 172242
(1) 172244 SIPAR2= 172244
(1) 172246 SIPAR3= 172246
(1) 172250 SIPAR4= 172250
(1) 172252 SIPAR5= 172252
(1) 172254 SIPAR6= 172254
(1) 172256 SIPAR7= 172256
(1)
(1) ;*SUPERVISOR 'D' PAGE ADDRESS REGISTERS
(1)
(1) 172260 SDPAR0= 172260
(1) 172262 SDPAR1= 172262
(1) 172264 SDPAR2= 172264
(1) 172266 SDPAR3= 172266
(1) 172270 SDPAR4= 172270
(1) 172272 SDPAR5= 172272
(1) 172274 SDPAR6= 172274
(1) 172276 SDPAR7= 172276
(1)
(1) ;*KERNEL 'I' PAGE DESCRIPTOR REGISTERS
(1)
(1) 172300 KIPDR0= 172300
(1) 172302 KIPDR1= 172302
(1) 172304 KIPDR2= 172304
(1) 172306 KIPDR3= 172306
(1) 172310 KIPDR4= 172310
(1) 172312 KIPDR5= 172312
(1) 172314 KIPDR6= 172314
(1) 172316 KIPDR7= 172316
(1)
(1) ;*KERNEL 'D' PAGE DESCRIPTOR REGISTERS
(1)
(1) 172320 KDPDR0= 172320
(1) 172322 KDPDR1= 172322
(1) 172324 KDPDR2= 172324
(1) 172326 KDPDR3= 172326
(1) 172330 KDPDR4= 172330
(1) 172332 KDPDR5= 172332
(1) 172334 KDPDR6= 172334
(1) 172336 KDPDR7= 172336
(1)
(1) ;*KERNEL 'I' PAGE ADDRESS REGISTERS
(1)
(1) 172340 KIPAR0= 172340
(1) 172342 KIPAR1= 172342
(1) 172344 KIPAR2= 172344
```

(1) 172346 KIPAR3= 172346
(1) 172350 KIPAR4= 172350
(1) 172352 KIPAR5= 172352
(1) 172354 KIPAR6= 172354
(1) 172356 KIPAR7= 172356

; *KERNEL 'D' PAGE ADDRESS REGISTERS

(1) 172360 KDPAR0= 172360
(1) 172362 KDPAR1= 172362
(1) 172364 KDPAR2= 172364
(1) 172366 KDPAR3= 172366
(1) 172370 KDPAR4= 172370
(1) 172372 KDPAR5= 172372
(1) 172374 KDPAR6= 172374
(1) 172376 KDPAR7= 172376

.SBTTL UNIBUS MAP REGISTER DEFINITIONS

; *THE LOWER 16 BITS OF THE MAP REGISTERS ARE LABELED 'MAPLXX'
; *THE UPPER 6 BITS OF THE MAP REGISTERS ARE LABELED 'MAPHXX'

(1) 170200 MAPL00 = 170200
(1) 170202 MAPH00 = 170202
(1) 170204 MAPL01 = 170204
(1) 170206 MAPH01 = 170206
(1) 170210 MAPL02 = 170210
(1) 170212 MAPH02 = 170212
(1) 170214 MAPL03 = 170214
(1) 170216 MAPH03 = 170216
(1) 170220 MAPL04 = 170220
(1) 170222 MAPH04 = 170222
(1) 170224 MAPL05 = 170224
(1) 170226 MAPH05 = 170226
(1) 170230 MAPL06 = 170230
(1) 170232 MAPH06 = 170232
(1) 170234 MAPL07 = 170234
(1) 170236 MAPH07 = 170236
(1) 170240 MAPL10 = 170240
(1) 170242 MAPH10 = 170242
(1) 170244 MAPL11 = 170244
(1) 170246 MAPH11 = 170246
(1) 170250 MAPL12 = 170250
(1) 170252 MAPH12 = 170252
(1) 170254 MAPL13 = 170254
(1) 170256 MAPH13 = 170256
(1) 170260 MAPL14 = 170260
(1) 170262 MAPH14 = 170262
(1) 170264 MAPL15 = 170264
(1) 170266 MAPH15 = 170266
(1) 170270 MAPL16 = 170270

(1)	170272	MAPH16 = 170272
(1)	170274	MAPL17 = 170274
(1)	170276	MAPH17 = 170276
(1)	170300	MAPL20 = 170300
(1)	170302	MAPH20 = 170302
(1)	170304	MAPL21 = 170304
(1)	170306	MAPH21 = 170306
(1)	170310	MAPL22 = 170310
(1)	170312	MAPH22 = 170312
(1)	170314	MAPL23 = 170314
(1)	170316	MAPH23 = 170316
(1)	170320	MAPL24 = 170320
(1)	170320	MAPH24 = 170320
(1)	170324	MAPL25 = 170324
(1)	170326	MAPH25 = 170326
(1)	170330	MAPL26 = 170330
(1)	170332	MAPH26 = 170332
(1)	170334	MAPL27 = 170334
(1)	170336	MAPH27 = 170336
(1)	170340	MAPL30 = 170340
(1)	170342	MAPH30 = 170342
(1)	170344	MAPL31 = 170344
(1)	170346	MAPH31 = 170346
(1)	170350	MAPL32 = 170350
(1)	170352	MAPH32 = 170352
(1)	170354	MAPL33 = 170354
(1)	170356	MAPH33 = 170356
(1)	170360	MAPL34 = 170360
(1)	170362	MAPH34 = 170362
(1)	170364	MAPL35 = 170364
(1)	170366	MAPH35 = 170366
(1)	170370	MAPL36 = 170370
(1)	170372	MAPH36 = 170372
(1)	170374	MAPL37 = 170374
(1)	170376	MAPH37 = 170376
(1)		.EQUIV MAPL00,MAPL0
(1)		.EQUIV MAPH00,MAPH0
(1)		.EQUIV MAPL01,MAPL1
(1)		.EQUIV MAPH01,MAPH1
(1)		.EQUIV MAPL02,MAPL2
(1)		.EQUIV MAPH02,MAPH2
(1)		.EQUIV MAPL03,MAPL3
(1)		.EQUIV MAPH03,MAPH3
(1)		.EQUIV MAPL04,MAPL4
(1)		.EQUIV MAPH04,MAPH4
(1)		.EQUIV MAPL05,MAPL5
(1)		.EQUIV MAPH05,MAPH5
(1)		.EQUIV MAPL06,MAPL6
(1)		.EQUIV MAPH06,MAPH6
(1)		.EQUIV MAPL07,MAPL7
(1)		.EQUIV MAPH07,MAPH7

```

5375      000001      AC1=  %1
5376      000002      AC2=  %2
5377      000003      AC3=  %3
5378      000004      AC4=  %4
5379      000005      AC5=  %5
5380
5381      ;LINE CLOCK AND PROGRAMMABLE LINE CLOCK REGISTERS
5382      172540      PLKCSR=172540
5383      172542      PLKCSB=172542
5384      000104      PLKVEC=104
5385
5386      177546      LKS=177546
5387      000100      LKVEC=100
5388
5389      ;UNIBUS EXERCISER REGISTER
5390      170000      UBEDB= 170000      ;DATA BUFFER
5391      170002      UBECB= 170002      ;CYCLE COUNT
5392      170004      UBEBA= 170004      ;BUS ADDRESS
5393      170006      UBECR1= 170006     ;CONTROL REGISTER 1
5394      170010      UBECR2= 170010     ;ERROR CLEAR
5395      170014      UBEGO= 170014      ;MULTI-EXERCISER GO
5396      170016      UBECR2= 170016     ;CONTROL REGISTER 2
5397      000510      UBEVEC= 510      ;INTERRUPT VECTOR
5398
5399      ;MASS BUS TESTER REGISTERS
5400      160100      MBTCS1= 160100
5401      160102      MBTWC= 160102
5402      160104      MBTBA= 160104
5403      160106      MBTMR2= 160106
5404      160110      MBTCS2= 160110
5405      160112      MBTST= 160112
5406      160114      MBTER= 160114
5407      160116      MBTAS= 160116
5408      160120      MBTDB= 160120
5409      160124      MBTMR1= 160124
5410      160126      MBTDT= 160126
5411      160174      MBTBAE= 160174
5412      160176      MBTCS3= 160176
5413      000774      MBTVEC= 774
5414      000776      MBTPSW= 776
5415
5416      ;MISCELLANEOUS BIT ASSIGNMENTS (USED IN OPT.CP)
5417      100000      KTOPT= 100000      ;BELOW BIT ASSIGNMENTS ARE USED
5418      040000      EISOPT= 040000      ;IN THE CPCHK ROUTINE
5419      020000      FPOPT= 020000      ;A BIT FOR EACH OPTION PRESENT
5420      010000      CISOPT= 010000      ;1174 CIS OPTION PRESENT BIT
5421      002000      MBTOPT= 002000
5422      001000      LKOPT= 001000
5423      000400      TTOPT= 000400
5424      000200      UBEOPT= 000200
5425      .EQUIV ERROR,HLT
5426      .EQUIV BIT14,SM
5427      .EQUIV BIT12,PSM
5428      .EQUIV BIT11,REG
5429      000010      CALLHANDLER=10
5430      000000      KM-0
    
```

5431	140000	UM=140000
5432	000000	PKM=0
5433	030000	PUM=30000
5434	177770	UBREAK=177770

:OPCODES USED IN 1174 CISP TESTS

5435			
5436			
5437			
5438	076020	L2D0= 076020	:LOAD 2 DESCRIPTORS @R0 OPCODE
5439	076061	L3D1= 076061	:LOAD 3 DESCRIPTORS @R1 OPCODE
5440	076601	MED74C= 076601	:CISP DIAGNOSTIC ENTRY OPCODE
5441	006600	CISTST= 6600	:ADDRESS OF A U-DIAGNOSTIC INSTRUCTION
5442	000007	MFPT=7	:OPCODE FOR MFPT INSTRUCTION USED FOR 1174 ONLY

.SBTTL CIS_OPCODE_DEFINITIONS

5444		L2D1	=076021
5445		L2D2	=076022
5446	076021	L2D3	=076023
5447	076022	L2D4	=076024
5448	076023	L2D5	=076025
5449	076024	L2D6	=076026
5450	076025	L2D7	=076027
5451	076026	MOV C	=076030
5452	076027	MOV RC	=076031
5453	076030	MOV TC	=076032
5454	076031	LOCC	=076040
5455	076032	SKPC	=076041
5456	076040	SCANC	=076042
5457	076041	SPANC	=076043
5458	076042	CMPC	=076044
5459	076043	MATC	=076045
5460	076044	ADDN	=076050
5461	076045	SUBN	=076051
5462	076050	CMPCN	=076052
5463	076051	CVTNL	=076053
5464	076052	CVTPN	=076054
5465	076053	CVTNP	=076055
5466	076054	ASHN	=076056
5467	076055	CVTLN	=076057
5468	076056	L3D0	=076060
5469	076057	L3D2	=076062
5470	076060	L3D3	=076063
5471	076062	L3D4	=076064
5472	076063	L3D5	=076065
5473	076064	L3D6	=076066
5474	076065	L3D7	=076067
5475	076066	ADDP	=076070
5476	076067	SUBP	=076071
5477	076070	CMPP	=076072
5478	076071	CVTPL	=076073
5479	076072	MULP	=076074
5480	076073	DIVP	=076075
5481	076074	ASHP	=076076
5482	076075	CVTLP	=076077
5483	076076	MOVCI	=076130
5484	076077	MOVRCI	=076131
5485	076130	MOVTCI	=076132
5486	076131	LOCCI	=076140
5487	076132	SKPCI	=076141
5488	076140	SCANCI	=076142
5489	076141	SPANCI	=076143
5490	076142	CMPCI	=076144
5491	076143	MATCI	=076145
5492	076144	ADDNI	=076150
5493	076145	SUBNI	=076151
5494	076150	CMPCNI	=076152
5495	076151	CVTNLI	=076153
5496	076152	CVTPNI	=076154
5497	076153	CVTNPI	=076155
5498	076154		
5499	076155		

5500	076156	ASHNI	=076156
5501	076157	CVTLNI	=076157
5502	076170	ADDPI	=076170
5503	076171	SUBPI	=076171
5504	076172	CMPPPI	=076172
5505	076173	CVTPLI	=076173
5506	076174	MULPI	=076174
5507	076175	DIVPI	=076175
5508	076176	ASHPI	=076176
5509	076177	CVTLPI	=076177
5510	076600	MED6X	=076600

```

5511 (1)
5512 (1)
(1) .SBTTL TRAP CATCHER
(1)
(1) 000000 . = 0
(1) ; *ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A '+2,HALT'
(1) ; *SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
(1) ; *LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
(1)
(1) .SBTTL STARTING ADDRESS(ES)
(1) 000200 . = 200
(1)
(1) 000200 000137 003612 . = 210 JMP @#START ; JUMP TO STARTING ADDRESS OF PROGRAM
5513 000210 000210
5514 000210 000137 002614 JMP @#START1
5515 000214 000137 002624 JMP @#START2
5516 ; **26-APR-78,G.W.**
5517 000220 000137 003400 JMP @#START3 ; ENTRY FOR PID REG. CUTTING AID
5518 ; *****
5519 SAV=.
5520
5521 . = 44
5522 000044 $APTHE
5523 000224 . = SAV
5524 ; *****
(1)
(1) .SBTTL ACT11 HOOKS
(1)
(1) ; *THE FOLLOWING LOCATIONS ARE SETUP TO BE USED WITH ACT11
(1) ; *
(1) ; *LOCATION 46 WILL CONTAIN THE ADDRESS OF THE LOGICAL
(1) ; *END OF THE PROGRAM.
(1) ; *LOCATION 52 IS USED TO SPECIFY PROGRAM OPERATING REQUIREMENTS
(1) ; *AND/OR RESTRICTIONS. THIS IS ACCOMPLISHED BY SETTING VARIOUS BITS
(1) ; *TO A ONE OR A ZERO. THE BITS USED AND THERE MEANING ARE:
(1) ; *
(1) ; * BIT 15=1 PROGRAM SHOULD BE POWER FAILED WHILE RUNNING
(1) ; * =0 NO POWER FAIL DESIRED
(1) ; *
(1) ; * BIT 14=1 PROGRAM RUN TIME IS MEMORY SIZE DEPENDENT
(1) ; * =0 RUN TIME IS NOT MEMORY SIZE DEPENDENT
(1) ; *
(1) ; * BITS 13-0 MUST BE ZERO'S
(1)
(1) 000224 $SVPC. ; SAVE LOCATION COUNTER
    
```

```

(1)          000046          . =46          ;; SET LOCATION COUNTER
(1) 000046 046652          .WORD $ENDAD   ;; SET LOC.46 TO ADDRESS $ENDAD
(1)          000052          . =52          ;; SET LOCATION COUNTER
(1) 000052 040000          .WORD 40000    ;; SET LOC.52 TO 40000
(1)          000224          .=$SVPC        ;; RESTORE LOCATION COUNTER
5536
5920          001200          . 1200
5921          ;*APT MAILBOX
5922          ;*****
5923 001200 000000          $APTHE: .WORD 0
5924 001202 001214          $MBADR: $MAIL
5925 001204 002734          $STMT: .WORD 1500.
5926 001206 002734          $PASTM: .WORD 1500.
5927 001210 000000          $UNITM: .WORD 0
5928 001212 000014          $MBLTH: .WORD 14
5929
5930
5931          $MAIL:
5932 001214 000000          $MSGTY: .WORD 0
5933 001216 000000          $FATAL: .WORD 0          ;CONTAINS ERROR PC
5934 001220 000000          $TESTN: .WORD 0
5935 001222 000000          $PAS: 0
5936 001224 000000          $DEVCT: 0
5937 001226 000000          $UNIT: 0
5938 001230 000000          $MSGAD: 0
5939 001232 000000          $MSGLG: 0
5940 001234          000          $ENV: .BYTE 0
5941 001235          000          $ENVM: .BYTE 0
5942 001236 000000          $APTSW: .WORD 0
5943 001240 000000          $USWR: 0
5944 001242 000006          $CPUOP: 6
5945 001244 177570          $SWRP: 177570
    
```

```

5946      ;:*****
(1)      ;.SBTTL  COMMON TAGS
(1)      ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
(1)      ;*USED IN THE PROGRAM.
(1)      001250      .-1250
(1)      001250      $CMTAG:      ;;START OF COMMON TAGS
(1)      001250 000000      $PASS: .WORD 0      ;;CONTAINS PASS COUNT
(1)      001252 000000      $STSTM: .WORD 0      ;;CONTAINS THE TEST NUMBER
(1)      001254 000      $ERFLG: .BYTE 0      ;;CONTAINS ERROR FLAG
(1)      001256      .EVEN
(1)      001256 000000      $ICNT: .WORD 0      ;;CONTAINS SUBTEST ITERATION COUNT
(1)      001260 000000      $LPADR: .WORD 0      ;;CONTAINS SCOPE LOOP 1250
(1)      001262 000000      $LPERR: .WORD 0      ;;CONTAINS SCOPE RETURN FOR ERRORS
(1)      001264 000000      $ERTTL: .WORD 0      ;;CONTAINS TOTAL ERRORS DETECTED
(1)      001266 000      $ITEMB: .BYTE 0      ;;CONTAINS ITEM CONTROL BYTE
(1)      001267 001      $ERMAX: .BYTE 1      ;;CONTAINS MAX. ERRORS PER TEST
(1)      001270 000000      $ERRPC: .WORD 0      ;;CONTAINS PC OF LAST ERROR INSTRUCTION
(1)      001272 000000      $GDADR: .WORD 0      ;;CONTAINS 1250 OF 'GOOD' DATA
(1)      001274 000000      $BDADR: .WORD 0      ;;CONTAINS 1250 OF 'BAD' DATA
(1)      001276 000000      $GDDAT: .WORD 0      ;;CONTAINS 'GOOD' DATA
(1)      001300 000000      $BDDAT: .WORD 0      ;;CONTAINS 'BAD' DATA
(1)      001302 000000 000000 000000      .WORD 0,0,0      ;;RESERVED--NOT TO BE USED
(1)      001310 177560      $TKS: 177560      ;;TTY KBD STATUS
(1)      001312 177562      $TKB: 177562      ;;TTY KBD BUFFER
(1)      001314 177564      $TPS: 177564      ;;TTY PRINTER STATUS REG. 1250
(1)      001316 177566      $TPB: 177566      ;;TTY PRINTER BUFFER REG. 1250
(1)      001320 000      $NULL: .BYTE 0      ;;CONTAINS NULL CHARACTER FOR FILLS
(1)      001321 002      $FILLS: .BYTE 2      ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
(1)      001322 012      $FILLC: .BYTE 12      ;;INSERT FILL CHARS. AFTER A 'LINE FEED'
(1)      001323 000      $TPFLG: .BYTE 0      ;;'TERMINAL AVAILABLE' FLAG (BIT<07>-0=YES)
(1)      001324 000000      $REGAD: .WORD 0      ;;CONTAINS THE 1250 FROM
(1)      ;WHICH ($REGO) WAS OBTAINED
(3)      001326 000000      $REG0: .WORD 0      ;;CONTAINS (($REGAD)+0)
(3)      001330 000000      $REG1: .WORD 0      ;;CONTAINS (($REGAD)+2)
(3)      001332 000000      $REG2: .WORD 0      ;;CONTAINS (($REGAD)+4)
(3)      001334 000000      $REG3: .WORD 0      ;;CONTAINS (($REGAD)+6)
(3)      001336 000000      $REG4: .WORD 0      ;;CONTAINS (($REGAD)+10)
(3)      001340 000000      $REG5: .WORD 0      ;;CONTAINS (($REGAD)+12)
(3)      001342 000000      $REG6: .WORD 0      ;;CONTAINS (($REGAD)+14)
(3)      001344 000000      $REG7: .WORD 0      ;;CONTAINS (($REGAD)+16)
(3)      001346 000000      $REG10: .WORD 0      ;;CONTAINS (($REGAD)+20)
(3)      001350 000000      $REG11: .WORD 0      ;;CONTAINS (($REGAD)+22)
(3)      001352 000000      $TMP0: .WORD 0      ;;USER DEFINED
(3)      001354 000000      $TMP1: .WORD 0      ;;USER DEFINED
(3)      001356 000000      $TMP2: .WORD 0      ;;USER DEFINED
(3)      001360 000000      $TMP3: .WORD 0      ;;USER DEFINED
(3)      001362 000000      $TMP4: .WORD 0      ;;USER DEFINED
(3)      001364 000000      $TMP5: .WORD 0      ;;USER DEFINED
(3)      001366 000000      $TMP6: .WORD 0      ;;USER DEFINED
(3)      001370 000000      $TMP7: .WORD 0      ;;USER DEFINED
(3)      001372 000000      $TMP10: .WORD 0      ;;USER DEFINED
(3)      001374 000000      $TMP11: .WORD 0      ;;USER DEFINED
    
```

(1)	001376	000000		\$TIMES: 0		::MAX. NUMBER OF ITERATIONS
(1)	001400	000000		\$ESCAPE: 0		::ESCAPE ON ERROR 1250
(1)	001402	177607	000377	\$BELL: .ASCIZ <207><377><377>		::CODE FOR BELL
(1)	001406	077		\$QUES: .ASCII /?/		::QUESTION MARK
(1)	001407	015		\$CRLF: .ASCII <15>		::CARRIAGE RETURN
(1)	001410	000012		\$LF: .ASCIZ <12>		::LINE FEED
(3)	001412	000000		ERRRTN: .WORD		
(3)	001414	000044		\$FLBUFF: .BLKB 44		::BUFFER FOR FLOATING POINT CONVERSION
(3)	001460	000000		\$BUFF: .WORD		
(3)	001462	000000		\$ACO: .WORD		::EXTENDED EXPONENT VALUES
(3)	001464	000000		\$AC1: .WORD		::FOR THE SIX FLOATING POINT
(3)	001466	000000		\$AC2: .WORD		::ACCUMULATORS
(3)	001470	000000		\$AC3: .WORD		
(3)	001472	000000		\$AC4: .WORD		
(3)	001474	000000		\$AC5: .WORD		
(3)	001476	000000		\$\$TMP4: .WORD		
(3)	001500	000000		\$\$TMP6: .WORD		
(3)	001502	000004		FLTMP0: .BLKW 4		::FLOATING POINT DBL PREC BUFFER
(3)	001512	000004		FLTMP1: .BLKW 4		
(3)	001522	001524		TKBFRP: .WORD	TKBFR	::POINTER FOR KEYBOARD BUFFER
(3)	001524	000011		TKBFR: .BLKW 11		::KEYBOARD BUFFER
(3)	001546	000000		NOTYPE: .WORD		::NO TYPEOUT FLAG (INHIBIT WHEN SET)
(3)	001550	000000		OPT.CP: .WORD		::CPU OPTION FLAGS
(3)	001552	000		KB11E: .BYTE 0		:: WITHOUT MP CACHE
(3)	001553	000		KB11EM: .BYTE 0		:: WITH MP CACHE
(3)	001554	000		KB11CM: .BYTE 0		::KB11CM FLAG (1170 WITH MP MODS)
(3)	001555	000		CISP: .BYTE 0		::CISP OPTION PRESENT FLAG
(3)	001556	000004		\$\$AVPAR: .BLKW 4		::USED BY INTERRUPT SERVICE ROUTINE
(3)	001566	000000		\$\$AVPSW: .WORD		::DITTO
(3)	001570	000006		\$RTRN: .RTT		::RETURN FOR T-BIT TRAP
(3)	001572	000000		VADR: .WORD		::BUFFER FOR VIRTUAL ADDRESS
(3)	001574	000000		PA1500: .WORD		::BUFFER FOR PHYSICAL ADDRESS BITS<15:00>
(3)	001576	000000		PA2116: .WORD		::PHYSICAL ADDRESS BITS<21:16>
(3)	001600	000		NEXEC: .BYTE		::NO EXECUTE FLAG(NO TEST EXECUTION WHEN SET)
(3)	001601	000		MMON: .BYTE		::MEMORY MGMT FLAG(MGMT IS ON WHEN NON-ZERO)
(3)	001602	000		QV: .BYTE		::QV FLAG(QV PASS WHEN SET)
(3)	001603	000		AA: .BYTE		::AUTO ACCEPT FLAG (AA PASS WHEN SET)
(3)	001604	000000		FACTOR: .WORD		::RELOCATION FACTOR(NUMBER OF
(3)	001606	000000		\$FACTOR: .WORD		::BYTES ABOVE BASE CODE)
(3)	001610	000000		FRSTAD: .WORD		::FIRST ADDRESS OF SECTION BEING EXECUTED
(3)	001612	000000		FRSTMEM: .WORD		::ADDRESS OF FIRST FREE MEMORY
(3)	001614	000000		LSTMEM: .WORD		::ADDRESS OF LAST FREE MEMORY(IN 28K)
(3)	001616	000000		NEXPAR: .WORD		::NEXT VALUE TO PUT IN PARO
(3)	001620	123456		\$LONUM: .WORD 123456		::LOW 16 BITS OF RANDOM NUMBER
(3)	001622	065432		\$HINUM: .WORD 65432		::HIGH 16 BITS OF RANDOM NUMBER
(3)	001624	377	377	\$NULLS: .BYTE 377,377,377,0		::BUFFER FOR PRINTER TEST
(3)	001627	000				
(3)	001630	000060		SUBPASS: .WORD 60		::SUB-PASS COUNT IN ASCII
(3)	001632	000000		\$ERPSW: .WORD		::ERROR PSW FOR TYPEOUT
(3)	001634	000000		EXITFL: .WORD		
(3)	001636	000000		OLDBASE: .WORD		::SOURCE BASE ADDRESS FOR DEVICE RELOCATION
(3)	001640	000000		NWBASL: .WORD		::DEST ADDRESS FOR DEVICE RELOC BITS<15:00>
(3)	001642	000000		NWBASH: .WORD		::DEST ADDRESS FOR DEVICE RELOC BITS<21:16>
(3)	001644	000000		IOWC: .WORD		::TWO'S COMPLIMENT WORD COUNT FOR DEVICE RELOC
(3)	001646	000000		DEVICE: .WORD		
(3)	001650	000000		DEVINDX: .WORD		::DEVICE INDEX (0 TO 7)


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(3) 001652 000000 UNITNO: .WORD ;DEVICE UNIT NUMBER
(3) 001654 000000 RNTBINX: .WORD ;INDEX TO RUN TABLE
(3) 001656 000000 MXMMHI: .WORD ;BITS<21:16> OF LAST MEM ADDRESS ON SYSTEM
(3) 001660 000000 MXMMLO: .WORD ;BITS<15:00> OF LAST MEM ADDRESS ON SYSTEM
(3) 001662 000000 RP310: .WORD ;DATA TO LOAD INTO RP03 CS REGISTER
(3) 001664 000000 RP311: .WORD ;RP03 FLAG FOR FIRST 2K OF PROGRAM
(3) 001666 000000 RK10: .WORD ;DATA TO LOAD INTO RK05 CS REGISTER
(3) 001670 000000 RK11: .WORD ;RK05 FLAG FOR FIRST 2K OF PROGRAM
(3) 001672 000000 RP411: .WORD ;RP04 FLAG FOR FIRST 2K OF PROGRAM
(3) 001674 000000 RS11: .WORD ;RS04 FLAG FOR FIRST 2K OF PROGRAM
(3) 001676 000000 MTICKS: .WORD ;ELAPSED RUN TIME IN MINUTES
(3) 001700 000000 LTICKS: .WORD ;LOW BYTE=NUMBER OF CLOCK INTERRUPTS (0 TO 59)
(3) ;HIGH BYTE=ELAPSED RUN TIME IN SECONDS(0 TO 59)
(3) ;NEXT 3 WORDS USED FOR CISP DETECTION
(3) 001702 000000 LD2PNT: .WORD 0
(3) 001704 000000 LD2PT1: .WORD 0
(3) 001706 000000 LD3PNT: .WORD 0
(3) 001710 000000 $MAINT: .WORD ;CURRENT VALUE IN MAINTENANCE REGISTER
(3) 001712 000010 SYSSIZE: .BLKW 10 ;SYSTEM SIZE TABLE(ONE ENTRY FOR EACH DEVICE)
(3) 001732 000007 RUNTBL: .BLKW 7 ;RUN TIME TABLE(ONE ENTRY FOR EACH 2K BLOCK)
(3) 001750 000007 RUNTRAK: .BLKW 7 ;RUN TRACK TABLE(ONE ENTRY FOR EACH 2K BLOCK)
(3) 001766 177777 MAPTBL: .WORD -1 ;MAP TABLE(ONE BYTE FOR EACH UNIBUS DEVICE)
(3) 001770 177777 .WORD -1 ;UNUSED=377, USED=LOW 5 BITS OF MAP ADDRESS
(3) 001772 000002 UBESAV: .BLKW 2 ;BASE ADDRESS OF UBE TRANSFER IN PROGRESS
(3) 001776 000002 UBEADR: .BLKW 2 ;ADDRESS THAT GETS LOADED INTO UBE BA REG
(3) 002002 000002 ERRBA: .BLKW 2 ;18 BIT UNIBUS ADDRESS WHEN DEVICE DETECTED AN ERROR
(3) .SBTTL DEVICE HANDLER STATUS WORDS
(3) ;* EACH WORD HAS THE FOLLOWING BIT ASSIGNMENTS:
(3) ;* 7 HANDLER READY
(3) ;* 8 REPEAT LAST FUNCTION
(3) ;* 15 ERROR
(3) 002006 000200 RP3HSTAT: .WORD 200 ;RP03
(3) 002010 000200 RKHSTAT: .WORD 200 ;RK05
(3) 002012 000200 SPARE0: .WORD 200
(3) 002014 000200 SPARE1: .WORD 200
(3) 002016 000200 RP4HSTAT: .WORD 200 ;RP04
(3) 002020 000200 RSHSTAT: .WORD 200 ;RS04
(3) 002022 000200 .WORD 200 ;SPARE
(3) 002024 000200 .WORD 200 ;SPARE
(3)
(3) .SBTTL DEVICE HANDLER WORD COUNTS
(3) ;* THIS TABLE GETS LOADED BY THE I/O
(3) ;* RELOCATION ROUTINE WITH THE TWO'S COMPLIMENT WORD
(3) ;* COUNT FOR THE TRANSFER FOR THE PARTICULAR DEVICE.
(3) 002026 000000 RP3HWC: .WORD ;RP03
(3) 002030 000000 RKHWC: .WORD ;RK05
(3) 002032 000000 .WORD ;SPARE
(3) 002034 000000 .WORD ;SPARE
(3) 002036 000000 RP4HWC: .WORD ;RP04
(3) 002040 000000 RSHWC: .WORD ;RS04
(3)
(3) .SBTTL DEVICE HANDLER OLD BASE ADDRESS
(3) ;* THIS TABLE GETS LOADED BY THE I/O RELOCATION ROUTINE
(3) ;* WITH THE BASE ADDRESS OF THE SOURCE DATA FOR THE
(3) ;* DEVICE THAT IS GOING TO TRANSFER THE DATA.
(3) 002042 000000 RP3OLD: .WORD ;RP03
(3) 002044 000000 .WORD

```

DEVICE HANDLER OLD BASE ADDRESS

(3)	002046	000000	RKOLD:	.WORD	:RK05
(3)	002050	000000		.WORD	
(3)	002052	000000		.WORD	:SPARE
(3)	002054	000000		.WORD	:SPARE
(3)	002056	000000		.WORD	
(3)	002060	000000		.WORD	:SPARE
(3)	002062	000000	RP4OLD:	.WORD	:RP04
(3)	002064	000000		.WORD	
(3)	002066	000000	RSOLD:	.WORD	:RS04
(3)	002070	000000		.WORD	

.SBTTL DEVICE HANDLER NEW BASE ADDRESSES
 ;* THIS TABLE GETS LOADED BY THE I/O RELOCATION ROUTINE
 ;* WITH THE BASE ADDRESS OF THE DESTINATION FOR THE
 ;* PARTICULAR DEVICE THAT IS GOING TO DO THE TRANSFER.

(3)	002072	000000	RP3NWL:	.WORD	:RP03
(3)	002074	000000	RP3NWH:	.WORD	
(3)	002076	000000	RKNEWL:	.WORD	:RK05
(3)	002100	000000	RKNEWH:	.WORD	
(3)	002102	000000		.WORD	:SPARE
(3)	002104	000000		.WORD	
(3)	002106	000000		.WORD	:SPARE
(3)	002110	000000		.WORD	
(3)	002112	000000	RP4NWL:	.WORD	:RP04
(3)	002114	000000	RP4NWH:	.WORD	
(3)	002116	000000	RSNEWL:	.WORD	:RS04
(3)	002120	000000	RSNEWH:	.WORD	

.SBTTL DEVICE HANDLER UNIT NUMBER
 ;* THIS TABLE GETS LOADED BY THE I/O RELOCATION ROUTINE.
 ;* IT TELLS THE DEVICE HANDLER WHICH UNIT NUMBER IS
 ;* TO DO THE TRANSFER.

(3)	002122	000000	RP3UNIT:	.WORD	:RP03
(3)	002124	000000	RKUNIT:	.WORD	:RK05
(3)	002126	000000		.WORD	:SPARE
(3)	002130	000000		.WORD	:SPARE
(3)	002132	000000	RP4UNIT:	.WORD	:RP04
(3)	002134	000000	RSUNIT:	.WORD	:RS04

.SBTTL ADDRESS OF THE DEVICE HANDLERS
 ;* THIS TABLE CONTAINS THE ADDRESS OF THE DEVICE HANDLER
 ;* ROUTINES. IT IS USED BY THE I/O RELOCATION ROUTINE
 ;* TO TRANSFER CONTROL TO THE DEVICE HANDLER.

(3)	002136	046672	RP3HANA:	.WORD	RP3DRV :RP03
(3)	002140	047310	RKHANA:	.WORD	RKDRV :RK05
(3)	002142	000000		.WORD	:SPARE
(3)	002144	000000		.WORD	:SPARE
(3)	002146	047704	RP4HANA:	.WORD	RP4DRV :RP04
(3)	002150	050254	RSHANA:	.WORD	RSDRV :RS04

.SBTTL DEVICE HANDLER DISK ADDRESS TABLE
 ;* THIS TABLE GETS LOADED BY THE DEVICE HANDLER WITH THE
 ;* DISK ADDRESS(SECTOR AND CYLINDER) OF THE CURRENT
 ;* TRANSFER.

(3)	002152	000000	RP3HDA:	.WORD	:RP03 DISK ADDRESS
(3)	002154	000000	RP3HDC:	.WORD	:RP03 DESIRED CYLINDER

DEVICE HANDLER DISK ADDRESS TABLE

(3)	002156	000000	RKHDA:	.WORD	:RK05 DISK ADDRESS
(3)	002160	000000		.WORD	:SPARE
(3)	002162	000000	RP4HDA:	.WORD	
(3)	002164	000000	RP4HDC:	.WORD	:RP04 DESIRED CYLINDER
(3)	002166	000000	RSHDA:	.WORD	:RS04 DISK ADDRESS

(3) .SBTTL DEVICE HANDLER FUNCTION TABLE
 (3) ;* THIS TABLE GETS LOADED BY THE DEVICE HANDLERS
 (3) ;* AND THE DEVICE SERVICE ROUTINES. IT TELLS THE ROUTINES
 (3) ;* WHICH FUNCTION TO DO NEXT.

(3)	002170	000000	RP3FUN:	.WORD	:RP03
(3)	002172	000000	RKFUN:	.WORD	:RK05
(3)	002174	000000		.WORD	:SPARE
(3)	002176	000000	RP4FUN:	.WORD	:RP04
(3)	002200	000000	RSFUN:	.WORD	:RS04

(3) .SBTTL DEVICE HANDLER RETRY COUNT
 (3) ;* THIS TABLE GETS LOADED BY THE DEVICE HANDLERS AND IS USED
 (3) ;* BY THE DEVICE SERVICE ROUTINES. IF AN ERROR OCCURS
 (3) ;* THE DEVICE SERVICE ROUTINE WILL RETRY THE FUNCTION UNTIL
 (3) ;* THE BYTE IN THIS TABLE GOES TO ZERO. IT IS INITIALIZED
 (3) ;* TO A -3.

(3)	002202	000	RP3TRY:	.BYTE	:RP03
(3)	002203	000	RKTRY:	.BYTE	:RK05
(3)	002204	000		.BYTE	:SPARE
(3)	002205	000	RP4TRY:	.BYTE	:RP04
(3)	002206	000	RSTRY:	.BYTE	:RS04
(3)		002210		.EVEN	

(3) .SBTTL DEVICE REGISTER TABLES
 (3) ;* THE FOLLOWING TABLES CONTAIN THE STANDARD ADDRESS FOR
 (3) ;* THE DEVICES USED BY THIS PROGRAM. IF A DEVICE IS PLACED
 (3) ;* AT A NON-STANDARD ADDRESS THE APPROPRIATE TABLE CAN BE
 (3) ;* CHANGED AND THE PROGRAM WILL OPERATE THAT DEVICE.

(3) ;* EXCEPTION--SEE DOCUMENTATION FOR RP03 AND RP04 PROBLEMS.

(3) .SBTTL RP11/RP03 REGISTERS

(3)	002210	176710	RP3DS:	.WORD	176710 ;DRIVE STATUS
(3)	002212	176712	RP3ER:	.WORD	176712 ;ERROR REGISTER
(3)	002214	176714	RP3CS:	.WORD	176714 ;CONTROL AND STATUS
(3)	002216	176716	RP3WC:	.WORD	176716 ;WORD COUNT
(3)	002220	176720	RP3BA:	.WORD	176720 ;BUS ADDRESS
(3)	002222	176724	RP3DA:	.WORD	176724 ;DISK ADDRESS
(3)	002224	176722	RP3DC:	.WORD	176722 ;DESIRED CYLINDER
(3)	002226	000254	RP3VEC:	.WORD	254 ;INTERRUPT VECTOR
(3)	002230	000256	RP3PSW:	.WORD	256 ;INTERRUPT VECTOR+2

(3) .SBTTL RK11/RK05 REGISTERS

(3)	002232	177400	RKDS:	.WORD	177400 ;DRIVE STATUS
(3)	002234	177402	RKER:	.WORD	177402 ;ERROR REGISTER
(3)	002236	177404	RKCS:	.WORD	177404 ;CONTROL AND STATUS
(3)	002240	177406	RKWC:	.WORD	177406 ;WORD COUNT
(3)	002242	177410	RKBA:	.WORD	177410 ;BUS ADDRESS
(3)	002244	177412	RKDA:	.WORD	177412 ;DISK ADDRESS
(3)	002246	000220	RKVEC:	.WORD	220 ;INTERRUPT VECTOR
(3)	002250	000222	RKPSW:	.WORD	222 ;INTERRUPT VECTOR+2

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(3)
(3) .SBTTL RH70/RP04 REGISTERS
(3) 002252 176700 RP4CS1: .WORD 176700 ;CONTROL AND STATUS #1
(3) 002254 176702 RP4WC: .WORD 176702 ;WORD COUNT
(3) 002256 176704 RP4BA: .WORD 176704 ;BUS ADDRESS
(3) 002260 176750 RP4BAE: .WORD 176750 ;BUS ADDRESS EXTENDED
(3) 002262 176706 RP4DA: .WORD 176706 ;DISK ADDRESS
(3) 002264 176710 RP4CS2: .WORD 176710 ;CONTROL AND STATUS #2
(3) 002266 176752 RP4CS3: .WORD 176752 ;CONTROL AND STATUS #3
(3) 002270 176712 RP4DS: .WORD 176712 ;DRIVE STATUS
(3) 002272 176714 RP4ER1: .WORD 176714 ;ERROR REG #1
(3) 002274 176734 RP4DC: .WORD 176734 ;DESIRED CYLINDER
(3) 002276 176740 RP4ER2: .WORD 176740 ;ERROR REG #2
(3) 002300 176742 RP4ER3: .WORD 176742 ;ERROR REG #3
(3) 002302 176736 RPCC: .WORD 176736 ;CURRENT CYLINDER
(3) 002304 176732 RP4OF: .WORD 176732 ;OFFSET REGISTER
(3) 002306 000254 RP4VEC: .WORD 254 ;INTERRUPT VECTOR
(3) 002310 000256 RP4PSW: .WORD 256 ;INTERRUPT VECTOR+2
```

```
(3)
(3) .SBTTL RH70/RS04 REGISTERS
(3) 002312 172040 RSCS1: .WORD 172040 ;CONTROL AND STATUS #1
(3) 002314 172042 RSWC: .WORD 172042 ;WORD COUNT
(3) 002316 172044 RSBA: .WORD 172044 ;BUS ADDRESS
(3) 002320 172070 RSBAE: .WORD 172070 ;BUS ADDRESS EXTENDED
(3) 002322 172046 RSDA: .WORD 172046 ;DISK ADDRESS
(3) 002324 172050 RSCS2: .WORD 172050 ;CONTROL AND STATUS #2
(3) 002326 172072 RSCS3: .WORD 172072 ;CONTROL AND STATUS #3
(3) 002330 172052 RSDS: .WORD 172052 ;DRIVE STATUS
(3) 002332 172054 RSER: .WORD 172054 ;ERROR REG
(3) 002334 000204 RSVEC: .WORD 204 ;INTERRUPT VECTOR
(3) 002336 000206 RSPSW: .WORD 206 ;INTERRUPT VECTOR+2
```

```
(3)
(3) .SBTTL UNIBUS EXERCISER REGISTER ADDRESS TABLE
(3) ;* THIS TABLE IS ASSEMBLED FOR UBE #0. IF THE UBE
(3) ;* ADDRESSES ARE CUT FOR OTHER THAN UNIT #0, THE PROGRAM
(3) ;* WILL CHANGE THIS TABLE. THE PROGRAM LOOKS FOR A
(3) ;* UBE AT ADDRESSES 770002, 770022, 770032, AND 770042.
(3) UBETBL: .WORD UBEC ;CYCLE COUNT
(3) 002340 170002 .WORD UBEB ;BUS ADDRESS REG
(3) 002342 170004 .WORD UBECR2 ;CONTROL REGISTER #2
(3) 002344 170016 .WORD UBECR1 ;CONTROL REGISTER #1
(3) 002346 170006 .WORD UBECCL ;UBE CLEAR ADDRESS
(3) 002350 170010 .WORD UBEEC ;INTERRUPT VECTOR
(3) 002352 000510 .WORD UBEEC+2 ;INTERRUPT VECTOR +2
(3) 002354 000512
```

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(3)
(3) .SBTTL MASS BUS TESTER REGISTER ADDRESSES
(3) ;* THE PROGRAM IS ASSEMBLED WITH ADDRESSES FOR A MBT
(3) ;* AT 770100. IF THE MBT IS AT ANOTHER ADDRESS THE PROGRAM
(3) ;* WILL CHANGE THIS TABLE. THE PROGRAM LOOKS FOR A UBE
(3) ;* AT ADDRESSES 770100, 770200, 770300, AND 770400.
(3) MBTTBL: .WORD MBTCS1 ;CONTROL AND STATUS #1
(3) 002356 160100 .WORD MBTWC ;WORD COUNT
(3) 002360 160102 .WORD MBTBA ;BUS ADDRESS
(3) 002362 160104 .WORD MBTBAE ;BUS ADDRESS EXTENDED
(3) 002364 160174 .WORD MBTMR2 ;MAINTENANCE REGISTER #2
(3) 002366 160106 .WORD MBTCS2 ;CONTROL REGISTER #2
(3) 002370 160110
```

(3)	002372	160112	.WORD	MBTST	:STATUS REGISTER
(3)	002374	160114	.WORD	MBTER	:ERROR REGISTER
(3)	002376	160176	.WORD	MBTCS3	:CONTROL REGISTER #3
(3)	002400	000774	.WORD	MBTVEC	:INTERRUPT VECTOR
(3)	002402	000776	.WORD	MBTPSW	:INTERRUPT VECTOR+2
(3)	002404	160126	.WORD	MBTDT	:DRIVE TYPE REGISTER
(3)	002406	160200	MBTN2: .WORD	160200	:MASS BUS TESTER #2
(3)	002410	160300	MBTN3: .WORD	160300	:MASS BUS TESTER #3
(3)	002412	160400	MBTN4: .WORD	160400	:MASS BUS TESTER #4
(3)					

```

(2) ;:*****
(1)
(1) .SBTTL ERROR POINTER TABLE
(1) ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
(1) ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
(1) ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
(1) ;*NOTE1: IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
(1) ;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS.
(1)
(1) ;* EM ;:POINTS TO THE ERROR MESSAGE
(1) ;* DH ;:POINTS TO THE DATA HEADER
(1) ;* DT ;:POINTS TO THE DATA
(1) ;* DF ;:POINTS TO THE DATA FORMAT
(1)
(1) $ERRTB:
(1) 002414 ;:ITEM 1
5947 ;:EM1 ;:UNEXPECTED TRAP TO 4
5948 002414 065637 ;:DH1 ;:PCOFTP PHYSC PSW CPUERR
5949 002416 065664 ;:DT1 ;:VADR,VADR,$TMP0,$TMP2
5950 002420 065730 ;:DF1 ;:0,1,0,0,0
5951 002422 065723 ;:ITEM 2
5952 ;:EM2 ;:UNEXPECTED TRAP TO 10
5953 002424 065742 ;:DH2 ;:PCOFTP PHYSPC PSW
5954 002426 065770 ;:DT2 ;:VADR,VADR,$TMP0
5955 002430 066016 ;:DF1
5956 002432 065723 ;:ITEM 3
5957 ;:EM3 ;:UNEXPECTED TRAP TO 250(MGMT)
5958 002434 066026 ;:DH3 ;:PCOFTP PHYSPC PSW MMR0 MMR2
5959 002436 066063 ;:DT3 ;:VADR,VADR,$TMP0,, $TMP2,, $TMP3
5960 002440 066132 ;:DF1
5961 002442 065723 ;:ITEM 4
5962 ;:EM4 ;:UNEXPECTED TRAP TO 114
5963 002444 066146 ;:DH4 ;:PCOFTP PHYSPC PSW ERADREG MEMERRREG
5964 002446 066175 ;:DT3 ;:VADR,VADR,$TMP0,$TMP3,$TMP2
5965 002450 066132 ;:DF4 ;:0,1,0,2,0
5966 002452 066253 ;:ITEM 5
5967 ;:EM5 ;:PARITY ERROR DURING DATA CHECK
5968 002454 066260 ;:DH5 ;:SRCADR DSTADR ERRADREG MEM ERR REG
5969 002456 066317 ;:DT5 ;:$TMP0,PA1500,$TMP3,$TMP2
5970 002460 066370 ;:DF5
5971 002462 066364 ;:ITEM 6
5972 ;:EM6 ;:ERROR DURING CHECK OF RELOCATED DATA
5973 002464 066402 ;:DH6 ;:SRCADR DSTADR
5974 002466 066452 ;:DT6 ;:$TMP0,PA1500
5975 002470 066472 ;:DF4
5976 002472 066253 ;:ITEM 7
5977 ;:0
5978 002474 000000 ;:0
5979 002476 000000 ;:0
5980 002500 000000 ;:0
5981 002502 000000 ;:0
5982 ;:ITEM 10
5983 002504 066500 ;:EM10 ;:ERROR DURING DATA CHECK-RELOC WAS BY I/O
5984 002506 066551 ;:DH10 ;:SRCADR DSTADR DEVICE THAT DID XFER
5985 002510 066624 ;:DT10 ;:$TMP0,VADR,$TMP2,$TMP3
    
```

5986	002512	066620	DF10	:0,1,3,0
5987			:ITEM 11	
5988	002514	066636	EM11	:BIT(S) STUCK IN MICRO-BREAK REG
5989	002516	066703	DH11	:GOOD DAT BAD DAT
5990	002520	066726	DT11	:\$TMP0,\$TMP1
5991	002522	066724	DF11	:0,0
5992			:ITEM 12	
5993	002524	066734	EM12	:UNIBUS EXERCISER NON-EXISTANT MEMORY
5994	002526	066772	DH12	:PHYSICAL ADDRESS
5995	002530	067010	DT12	:PA1500
5996	002532	067006	DF12	:2
5997			:ITEM 13	
5998	002534	067014	EM13	:MASS BUS TESTER NON-EXISTANT MEMORY
5999	002536	067052	DH13	:PHYSICAL ADDRESS
6000	002540	067010	DT12	
6001	002542	067006	DF12	
6002			:ITEM 14	
6003	002544	067067	EM14	:FLOATING POINT ERROR
6004	002546	067114	DH14	: DATA1 DATA2
6005	002550	067134	DT14	:\$TMP4,\$REG2,\$TMP6,\$REG3
6006	002552	067146	DF14	:4,0,4,0
6007			:ITEM 15	
6008	002554	067152	EM15	:DEVICE HUNG
6009	002556	000000	0	
6010	002560	000000	0	
6011	002562	000000	0	
6012			:ITEM 16	
6013	002564	067067	EM14	:FLOATING POINT ERROR
6014	002566	067166	DH16	
6015	002570	067220	DT16	:FLTMP0,\$REG2,FLTMP1,\$REG3
6016	002572	067213	DF16	:5,0,5,0
6017			:ITEM 17	
6018	002574	067232	EM17	:RO FAILED TO LOAD CORRECTLY ON MFPT
6019	002576	066703	DH11	:GOOD DAT BAD DAT
6020	002600	066726	DT11	:\$TMP0,\$TMP1
6021	002602	066724	DF11	:0,0
6022				
6023			:ITEM 20	
6024	002604	067276	EM20	:CIS INSTRUCTION FAILURE
6025	002606	066452	DH6	
6026	002610	066726	DT11	
6027	002612	066724	DF11	

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6055 002614 013737 177570 177570 START1: MOV @#SWR,@#DISPLAY
6056 002622 000774 BR START1
6057 .SBTTL PROGRAM INITIALIZATION
6058
6059
6060 ;*****
6061 .SBTTL MICRO-BREAK REGISTER TEST
6062 ;*THIS TEST IS EXECUTED BY STARTING THE PROGRAM AT ADDRESS 214.
6063 ;*THIS TEST REQUIRES A MAINTENANCE CARD AND OPERATOR INTERVENTION.
6064 ;*THE PROCESSOR SHOULD STOP 8 TIMES. FOLLOWING IS THE DATA
6065 ;*THAT SHOULD BE IN THE MICRO-ADRESS DATA LIGHTS EACH TIME:
6066 ;*
6067 ;* 1 000
6068 ;* 2 001
6069 ;* 3 002
6070 ;* 4 004
6071 ;* 5 010
6072 ;* 6 020
6073 ;* 7 040
6074 ;* 8 200
6075 ;*****
6074 002624 012706 001100 START2: MOV #1100,SP ;SETUP THE SP
6075 002630 012737 062270 000034 MOV #STRAP,@#TRAPVEC ;SETUP TRAP VECTOR
6076 002636 012737 054710 000030 MOV #ERROR,@#EMTVEC ;SETUP EMT VECTOR
6077 002644 012700 000377 MOV #377,R0 ;PUT MICRO-BREAK DATA IN R0
6078 002650 005737 001552 TST @#KB11E ;IS THIS A KB11-E OR KB11-EM PROCESSOR?
6079 002654 001402 BEQ 1$ ;BR IF NOT. 8 BIT U-BREAK REGISTER
6080 002656 012700 177777 MOV #177777,R0 ;KB11-E AND KB11-EM HAVE 16 BIT U-BREAK REGISTER
6081 002662 010037 177770 1$: MOV R0,@#UBREAK ;LOAD U BREAK REG
6082 002666 020037 177770 CMP R0,@#UBREAK ;LOAD OK?
6083 002672 001036 BNE UBRERR ;BRANCH IF NO
6084 002674 005000 CLR R0
6085 002676 010037 177770 MOV R0,@#UBREAK
6086 002702 020037 177770 CMP R0,@#UBREAK
6087 002706 001030 BNE UBRERR
6088 002710 012700 000125 MOV #125,R0
6089 002714 005737 001552 TST @#KB11E ;IS THIS A KB11-E OR KB11EM PROCESSOR?
6090 002720 001402 BEQ 2$ ;BR IF NOT. 8 BIT U-BREAK REGISTER
6091 002722 012700 052525 MOV #52525,R0 ;KB11-E AND KB11-EM HAVE 16 BIT U-BREAK REGISTER
6092 002726 010037 177770 2$: MOV R0,@#UBREAK
6093 002732 020037 177770 CMP R0,@#UBREAK
6094 002736 001014 BNE UBRERR
6095 002740 012700 000252 MOV #252,R0
6096 002744 005737 001552 TST @#KB11E ;IS THIS A KB11-E OR KB11-EM PROCESSOR?
6097 002750 001402 BEQ 3$ ;BR IF NOT. 8 BIT U-BREAK REGISTER
6098 002752 012700 125252 MOV #125252,R0 ;KB11-E AND KB11-EM HAVE 16 BIT U-BREAK REGISTER
6099 002756 010037 177770 3$: MOV R0,@#UBREAK
6100 002762 020037 177770 CMP R0,@#UBREAK
6101 002766 001411 BEQ UBRK2
6102 002770 010067 176356 UBRERR: MOV R0,$TMP0
6103 002774 013737 177770 001354 MOV @#UBREAK,@#$TMP1
6104 003002 012737 002624 001262 MOV #START2,@#$LPERR
6105 003010 104011 ERROR 11
6106 ;TEST TO ENSURE U BREAK COMPARATORS DO NOT COME ON.
6107 003012 012737 000100 177770 UBRK2: MOV #100,@#UBREAK ;PUT SAFE VALUE IN REG
6108 003020 104400 003026 TYPE ,65$ ;;TYPE ASCIZ STRING
(1) 003024 000421 BR 64$ ;;GET OVER THE ASCIZ
(1) ;;65$: .ASCIZ /SET MAINT TO STOP ON MICRO-BREAK/<CRLF>
    
```



```

(1) 003070
6109 003070 104400 003076
(1) 003074 000407
(1)
(1) 003114
6110 003114 000000
6111 003116 012737 000012 000010
6112 003124 012737 000002 000012
6113 003132 012705 003172
6114 003136 012701 000010
6115 003142 012702 003347
6116 003146 112237 177770
6117 003152 000010
6118 003154 005037 177770
6119 003160 077106
6120 003162 012737 000125 177770
6121 003170 006400
6122 003172 005037 177770
6123 003176 012706 001100
6124 003202 012737 000006 000004
6125 003210 012737 000002 000006
6126 003216 052737 040000 177776
6127 003224 012706 000700
6128 003230 012746 003252
6129 003234 005000
6130 003236 012701 000007
6131 003242 012702 003362
6132 003246 012217
6133 003250 000000
6134 003252 077103
6135 003254 012737 000100 177770
6136 003262 005000
6137 003264 012702 003346
6138 003270 012703 003360
6139 003274 012701 000010
6140 003300 012746 003314
6141 003304 112237 177770
6142 003310 012317
6143 003312 000000
6144
6145 003314 077105
6146 003316 111237 177770
6147 003322 005037 177776
6148 003326 104400 003334
(1) 003332 000403
(1)
(1) 003342
6149 003342 000000
6150 003344 000522
6151 003346 000 001 002
003351 004 010 020
003354 040 200 100
6152 003360
6153 003360 000010 005010 005020
003366 005040 000000 005200
003374 000207 005010
    
```

64\$: TYPE ,67\$::TYPE ASCIZ STRING
 BR ,66\$::GET OVER THE ASCIZ
 ::67\$: .ASCIZ /HIT CONTINUE/<CRLF>
 66\$:
 HALT
 MOV #12,@#RESVEC
 MOV #2,@#RESVEC+2
 MOV #2\$,R5 ;SET UP R5 FOR MARK INSTR
 MOV #10,R1 ;SET SOB COUNT
 MOV #UBRTBL+1,R2 ;GET ADRS OF UBREAK DATA TABLE
 1\$: MOV#B (R2)+,@#UBREAK ;LOAD MICRO-BREAK FROM TABLE
 10 ;EXEC RES INSTR (ROM ADRS 000)
 CLR @#UBREAK
 SOB R1,1\$;CONTINUE
 MOV #125,@#UBREAK ;SET MICRO-BREAK DATA PATTERN
 MARK 0 ;EXEC MARK (ROM ADRS 252)
 2\$: CLR @#UBREAK
 MOV #1100,SP ;RESTORE SP
 MOV #6,@#ERRVEC
 MOV #2,@#ERRVEC+2
 BIS #BIT14,@#PSW ;GO TO SUPER MODE
 MOV #700,SP ;SET SUPER SP
 MOV #3\$,-(SP) ;SETUP STACK FOR JSR INSTR
 CLR R0 ;SETUP R0
 MOV #7,R1 ;SET SOB COUNT
 MOV #INSTBL+2,R2 ;GET ADRS OF TABLE OF INSTRUCTIONS
 4\$: MOV (R2)+,(PC) ;GET INSTRUCTION
 .WORD ;EXECUTE INSTRUCTION
 3\$: SOB R1,4\$;CONTINUE
 MOV #100,@#UBREAK ;PUT SAFE VALUE IN UBREAK REG
 CLR R0
 MOV #UBRTBL,R2
 MOV #INSTBL,R3
 MOV #10,R1
 MOV #5\$,-(SP)
 6\$: MOV#B (R2)+,@#UBREAK ;LOAD UBREAK REG FROM TABLE
 MOV (R3)+,(PC) ;GET INSTR FROM TABLE
 .WORD ;EXECUTE INSTR. PROCESSOR SHOULD STOP
 ;WITH THE CORRECT ROM ADR IN THE LIGHTS
 5\$: SOB R1,6\$;CONTINUE
 MOV#B (R2)+,@#UBREAK ;PUT SAFE VALUE IN UBREAK REG
 CLR @#PSW ;GO BACK TO KERNEL MODE
 TYPE ,69\$::TYPE ASCIZ STRING
 BR ,68\$::GET OVER THE ASCIZ
 ::69\$: .ASCIZ /DONE/<CRLF>
 68\$:
 HALT
 BR START
 UBRTBL: .BYTE 0,1,2,4,10,20,40,200,100
 INSTBL: .EVEN
 .WORD 10,5010,5020,5040,0,5200,207,5010

```

6155 003400 012706 001100          START3: MOV    #1100,SP          ;SET UP STACK
6156 003404 012737 062270 000034  MOV    #STRAP,@#TRAPVEC      ;SET UP TRAP VECTOR
6157 003412 104400 003420          TYPE    ,65$                ;;TYPE ASCIZ STRING
(1) 003416 000415          BR      64$                ;;GET OVER THE ASCIZ
(1)                                ;;65$: .ASCIZ <15><12>/PID REGISTER SETUP AID/
(1)                                64$:
6158 003452 104400 003460          TYPE    ,67$                ;;TYPE ASCIZ STRING
(1) 003456 000430          BR      66$                ;;GET OVER THE ASCIZ
(1)                                ;;67$: .ASCIZ <15><12>/TYPE IN THE DESIRED PROCESSOR SERIAL NUMBER: /
(1)                                66$:
6159 003540 104416          RDDEC   ;GET THE NUMBER.
6160 003542 104400 003550          TYPE    ,69$                ;;TYPE ASCIZ STRING
(1) 003546 000417          BR      68$                ;;GET OVER THE ASCIZ
(1)                                ;;69$: .ASCIZ <15><12>/THE OCTAL EQUIVALENT IS : /
(1)                                68$:
6161 003606 104402          TYPOC   ;TYPE THE NUMBER IN OCTAL
6162 003610 000673          BR      START3
6163
6164
6165                                ;;*****
6166 003612 012706 001200          START:  MOV    #KERSTK,SP    ;SET KERNEL STACK PTR
6167 003616 012737 076543 001622  MOV    #76543,@#SHINUM      ;INITIALIZE RANDOM NUM GEN
6168 003624 012737 123456 001620  MOV    #123456,@#SLONUM
6169
6170                                ;DETERMINE HOW PROGRAM WAS LOADED AND WHAT MODE (IF ACT11)
6171                                ;AND SET MEMORY PROTECTION.
6172 003632 005037 001602          CLR     @#QV                ;SET NOT QV NOR AA MODE
6173 003636 005027          CLR     (PC)+              ;SET NOT XXDP
6174 003640 000          XXDP:  .BYTE 0              ;XXDP INDICATOR
6175 003641 000          XXDPC: .BYTE 0              ;XXDP CHAIN MODE INDICATOR
6176 003642 005027          CLR     (PC)+              ;CLEAR MEMORY PROTECTION LIMIT
6177 003644 000000          PROT:  .WORD 0             ;WILL CONTAIN MEM PROT LIMIT
6178 003646 005737 001234          TST     @#SENV              ;APT MODE
6179 003652 001411          BEQ    15$                 ;NO
6180 003654 110637 001603          MOVB   SP,@#AA             ;SET UP FOR APT
6181 003660 105737 001235          TSTB   @#SENV              ;APT CONTROL
6182 003664 100023          BPL    3$                  ;NO
6183 003666 012737 001236 001244  MOV    #SAPTSW,@#SSWRP     ;USE APT SWR
6184 003674 000417          BR     3$
6185 003676 005737 046656          15$:   TST     @#SENDAD+4     ;BRANCH IF NOT QV
6186 003702 100003          BPL    1$                  ;NO
6187 003704 110637 001602          MOVB   SP,@#QV             ;SET ACT11 QV MODE
6188 003710 000411          BR     3$
6189
6190                                1$:   BNE    2$
6191 003714 110637 001603          MOVB   SP,@#AA             ;SET ACT11 AA MODE
6192 003720 000405          BR     3$
6193
6194                                2$:   TST     @#42              ;BRANCH IF NOT IN CHAIN MODE
6195 003726 001402          BEQ    3$
6196 003730 110637 003641          MOVB   SP,@#XXDPC          ;SET CHAIN MODE INDICATOR
6197
6198                                ;SET MEMORY PROTECTION LIMITS
6199 003734 005737 001602          3$:   TST     @#QV                ;BRANCH IF QV OR AA
6200 003740 001006          BNE    MEMSIZ              ;NO
6201 003742 005737 003640          TST     @#XXDP              ;BRANCH IF NOT VIA XXDP
    
```

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6202 003746 001403          BEQ  MEMSIZ
6203 003750 012737 005700 003644  MOV  #5700,@#PROT          ;PROTECT XXDP MONITOR
6204 003756 012737 157776 001614 MEMSIZ: MOV #157776,@#LSTMEM ;SET VALUE INTO LSTMEM
6205 003764 163737 003644 001614  SUB  @#PROT,@#LSTMEM      ;SET PROTECTION
6206 003772 012737 067330 001612  MOV  #ENDTAG+2,@#FRSTMEM ;SET FIRST RELOCATION ADDRESS
6207
6208 ;GET ADDRESS OF THE LAST MEMORY LOCATION ON THE SYSTEM
6209 ;SIZE MEMORY AND COMPARE IT WITH THE SYSTEM SIZE REGISTER
6210 ;PRINT A WARNING IF THEY DISAGREE.
6211
6212 004000 052767 000200 055742  BIS  #BIT07,$KT11
6213 004006 004767 055670          JSR  PC,$SIZE
6214 004012 062767 000037 056246  ADD  #37,$LSTBK
6215
6216 004020 016702 056242          MOV  $LSTBK,R2             ;COPY LAST BLOCK COUNT
6217 004024 023702 177760          CMP  @#SIZELO,R2         ;EQUAL?
6218 004030 001551          BEQ  OKSIZ
6219 004032 012737 062270 000034  MOV  #STRAP,@#TRAPVEC    ;SET UP TRAP VECTOR
6220 004040 104400 004046          TYPE ,65$                ;;TYPE ASCIZ STRING
(1) 004044 000433          BR   64$                  ;;GET OVER THE ASCIZ
(1) ;:65$: .ASCIZ <15><12>/WARNING- THE SIZE OF MEMORY IS DIFFERENT FROM THAT/
(1) 64$:
6221 004134 104400 004142          TYPE ,67$                ;;TYPE ASCIZ STRING
(1) 004140 000425          BR   66$                  ;;GET OVER THE ASCIZ
(1) ;:67$: .ASCIZ <15><12>/INDICATED BY THE SYSTEM SIZE REGISTER./
(1) 66$:
6222 004214 104400 004222          TYPE ,69$                ;;TYPE ASCIZ STRING
(1) 004220 000421          BR   68$                  ;;GET OVER THE ASCIZ
(1) ;:69$: .ASCIZ <15><12>/ SIZEHI SIZELO ACTUAL/
(1) 68$:
6223 004264 104400 001407          TYPE ,$CRLF
6224 004270 013746 177762          MOV  @#SIZEHI,-(SP)      ;;SAVE @#SIZEHI FOR TYPEOUT
(1) 004274 104404          TYPOS                      ;;GO TYPE--OCTAL ASCII
(1) 004276 006                .BYTE 6                   ;;TYPE 6 DIGIT(S)
(1) 004277 000                .BYTE 0                   ;;SUPPRESS LEADING ZEROS
6225 004300 104400 004306          TYPE ,71$                ;;TYPE ASCIZ STRING
(1) 004304 000404          BR   70$                  ;;GET OVER THE ASCIZ
(1) ;:71$: .ASCIZ / /
(1) 70$:
6226 004316 013746 177760          MOV  @#SIZELO,-(SP)      ;;SAVE @#SIZELO FOR TYPEOUT
(1) 004322 104404          TYPOS                      ;;GO TYPE--OCTAL ASCII
(1) 004324 006                .BYTE 6                   ;;TYPE 6 DIGIT(S)
(1) 004325 000                .BYTE 0                   ;;SUPPRESS LEADING ZEROS
6227 004326 104400 004334          TYPE ,73$                ;;TYPE ASCIZ STRING
(1) 004332 000404          BR   72$                  ;;GET OVER THE ASCIZ
(1) ;:73$: .ASCIZ / /
(1) 72$:
6228 004344 016746 055716          MOV  $LSTBK,-(SP)        ;;SAVE $LSTBK FOR TYPEOUT
(1) 004350 104404          TYPOS                      ;;GO TYPE--OCTAL ASCII
(1) 004352 006                .BYTE 6                   ;;TYPE 6 DIGIT(S)
(1) 004353 000                .BYTE 0                   ;;SUPPRESS LEADING ZEROS
6229
6230 ;FORM MXMMHI, MXMMLO, AND THE HIGHEST MEMORY ADDRESS BASED ON THE SIZE OF
6231 ;THE MEMORY
6232
6233 004354          OKSIZ:
    
```

6234	004354	005002		CLR	R2	
6235	004356	013703	062266	MOV	@#SLSTBK,R3	
6236	004362	073227	000006	ASHC	#6,R2	:SHIFT TO FORM CORRECT ADDRESS
6237	004366	052703	000077	BIS	#77,R3	:ENSURE LOWER SIX BITS SET
6238	004372	062703	000001	ADD	#1,R3	
6239	004376	005502		ADC	R2	
6240				;:*****		
6241	004400	010237	001656	MOV	R2,@#MXMHI	:SAVE UPPER SIX BITS
6242	004404	010337	001660	MOV	R3,@#MXMLO	:SAVE LOWER 16 BITS
6243						
6244	004410	012706	001200	MOV	#KERSTK,SP	:SET STACK PTR
6245	004414	005037	001250	CLR	@#SPASS	:CLEAR PASS COUNT
6246	004420	105037	001601	CLRB	@#MMON	:SET MEM MGMT ON IND=NOT ON
6247	004424	012737	000700	MOV	#700,@#NEXPAR	:SET FIRST 'PAR' VALUE
6248	004432	005737	003644	TST	@#PROT	
6249	004436	001403		BEQ	1\$	
6250	004440	012737	001600	MOV	#1600,@#NEXPAR	
6251	004446					1\$:
6252	004446	012700	000027	MOV	#27,R0	:SET SOB COUNT
6253	004452	005001		CLR	R1	:SETUP INDEX
6254	004454	005061	001676	CLR	MTICKS(R1)	:CLEAR TABLES
6255	004460	062701	000002	ADD	#2,R1	
6256	004464	077005		SOB	R0,2\$:CONTINUE
6257	004466	012737	177777	MOV	#-1,@#MAPTBL	:INITIALIZE MAP TABLE
6258	004474	012737	177777	MOV	#-1,@#MAPTBL+2	
6259	004502	012700	000010	MOV	#10,R0	:SET SOB COUNT
6260	004506	012701	002006	MOV	#RP3HSTAT,R1	:GET ADDRESS OF HANDLER STAT
6261	004512	012721	000200	MOV	#200,(R1)+	:INITIALIZE STATUS TABLE
6262	004516	077003		SOB	R0,3\$:CONTINUE
6263	004520	012737	000060	MOV	#60,@#SUBPASS	:INIT SUBPASS TO ASCII 0
6264	004526	012700	057060	MOV	#TIMEBUF,R0	:GET ADR OF TIME BUFIER
6265	004532	012701	000012	MOV	#12,R1	:SET SOB COUNT
6266	004536	112720	000060	MOVB	#60,(R0)+	:INIT TIME BUFFER
6267	004542	077103		SOB	R1,4\$	
6268	004544	105040		CLRB	-(R0)	:INSERT TERMINATOR
6269	004546	112737	000072	MOVB	#72,@#TIMEBUF+3	:INSERT COLON
6270	004554	112737	000072	MOVB	#72,@#TIMEBUF+6	
6271	004562	012737	000340	MOV	#340,@#PS	::LOCK OUT ALL INTERRUPTS
(1)	004570	012706	001250	MOV	#\$CMTAG,R6	::FIRST LOCATION TO BE CLEARED
(1)	004574	005026		CLR	(R6)+	::CLEAR MEMORY LOCATION
(1)	004576	022706	001310	CMP	#\$TKS,R6	::DONE?
(1)	004602	001374		BNE	.-6	::LOOP BACK IF NO
(1)	004604	012706	001200	MOV	#STACK,SP	:SETUP THE STACK POINTER
(1)	004610	012737	054456	MOV	#SCOPE,@#IOTVEC	::IOT VECTOR FOR SCOPE ROUTINE
(1)	004616	012737	000340	MOV	#340,@#IOTVEC+2	::LEVEL 7
(1)	004624	012737	054710	MOV	#ERROR,@#EMTVEC	::EMT VECTOR FOR ERROR ROUTINE
(1)	004632	012737	000340	MOV	#340,@#EMTVEC+2	::LEVEL 7
(1)	004640	012737	062270	MOV	#TRAP,@#TRAPVEC	::TRAP VECTOR FOR TRAP CALLS
(1)	004646	012737	000340	MOV	#340,@#TRAPVEC+2	:LEVEL 7
(1)	004654	012737	061206	MOV	#\$PWRDN,@#PWRVEC	::POWER FAILURE VECTOR
(1)	004662	012737	000340	MOV	#340,@#PWRVEC+2	::LEVEL 7
(1)	004670	016767	041622	MOV	\$ENDCT,\$EOPCT	::SETUP END-OF-PROGRAM COUNTER
(1)	004676	005067	174474	CLR	\$TIMES	:INITIALIZE NUMBER OF ITERATIONS
(1)	004702	005067	174472	CLR	\$ESCAPE	:CLEAR THE ESCAPE ON ERROR ADDRESS
(1)	004706	112767	000001	MOVB	#1,\$ERMAX	:ALLOW ONE ERROR PER TEST
(1)	004714	012767	004714	MOVB	#,,\$LPADR	:INITIALIZE THE LOOP ADDRESS FOR SCOPE

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(1) 004722 012767 004722 174332      MOV    #.,SLPERR      ;;SETUP THE ERROR LOOP ADDRESS
6272
6273      ;CLEAR PROGRAM INDICATORS
6274 004730 052777 000100 174352      BIS    #100,@STKS    ;SET IE BIT IN KEYBOARD STATUS REG
6275 004736 012737 063354 000060      MOV    #TKISR,@TKVEC ;SETUP KEYBOARD VECTOR
6276 004744 012737 000200 000062      MOV    #PR4,@TKVEC+2
6277 004752 012737 063566 000064      MOV    #TPISR,@TPVEC
6278 004760 012737 000200 000066      MOV    #PR4,@TPVEC+2
6279 004766 005037 001546      CLR    @NCTYPE      ;CLEAR 'NO TYPING' INDICATOR
6280
6281      ;THE BELOW ROUTINE ASCERTAINS WHICH CP & CP OPTIONS THE PROGRAM IS RUN-
6282      ;NING ON AND SETS AN INDICATOR IN OPT.CP ACCORDINGLY.
6283 004772 012737 000006 000004      CPCHK: MOV    #ERRVEC+2,@ERRVEC ;SET UP ERROR TRAP TO RETURN
6284 005000 012737 000002 000006      MOV    #2,@ERRVEC+2
6285 005006 012737 000012 000010      MOV    #RESVEC+2,@RESVEC ;AND ALSO RESERVED INST TRAP
6286 005014 012737 000002 000012      MOV    #2,@RESVEC+2
6287 005022 012702 144006      MOV    #144006,R2 ;SET 11/70 NON-OPTION BITS
6288 005026 000261      SEC
6289 005030 170500      TSTF   R0 ;WILL CLEAR CARRY IF 11/70 FLOATING POINT
6290 005032 170000      CFCC   ;IS AVAIL. COPY FLOATING CC'S INTO PSW
6291 005034 103402      BCS   6$ ;BRANCH IF NO FLOATING POINT
6292 005036 052702 020000      BIS   #FPOPT,R2 ;SET FP OPTION AVAIL INDICATOR
6293 005042 000261      6$: SEC
6294 005044 005737 177546      TST   @MLKS ;BRANCH IF NO KW11-L
6295 005050 103402      BCS   7$
6296 005052 052702 001000      BIS   #LKOPT,R2 ;SET OPTION INDICATOR
6297 005056 000261      7$: SEC
6298 005060 005777 174230      TST   @STPS ;BRANCH IF NO CONSOLE TTY
6299 005064 103402      BCS   9$
6300 005066 052702 000400      BIS   #TTOPT,R2
6301 005072 005003      9$: CLR   R3
6302 005074 000261      SEC
6303 005076 005737 170000      TST   @UBEDB ;IS UBE1 THERE?
6304 005102 103410      BCS   12$ ;BRANCH IF NO
6305 005104 105037 170006      CLRB  @UBECR1 ;IS THIS A TESTER OR EXERCISER?
6306 005110 105737 170006      TSTB  @UBECR1
6307 005114 100045      BPL   15$ ;BRANCH IF TESTER
6308 005116 052702 000200      16$: BIS   #UBEOPT,R2 ;SET INDICATOR
6309 005122 000425      BR    17$
6310 005124 000261      12$: SEC
6311 005126 005737 170020      TST   @UBEDB+20 ;IS UBE2 THERE?
6312 005132 103403      BCS   13$ ;BRANCH IF NO
6313 005134 012703 000020      MOV   #20,R3 ;SET OFFSET IN R3
6314 005140 000766      BR    16$
6315 005142 000261      13$: SEC
6316 005144 005737 170040      TST   @UBEDB+40 ;IS UBE3 THERE?
6317 005150 103403      BCS   14$ ;BRANCH IF NO
6318 005152 012703 000040      MOV   #40,R3 ;PUT OFFSET IN R3
6319 005156 000757      BR    16$
6320 005160 000261      14$: SEC
6321 005162 005737 170060      TST   @UBEDB+60 ;IS UBE4 THERE?
6322 005166 103420      BCS   15$ ;BRANCH IF NO
6323 005170 012703 000060      MOV   #60,R3 ;PUT OFFSET IN R3
6324 005174 000750      BR    16$
6325 005176 005227 177777      17$: INC   #-1
6326 005202 001012      BNE   15$
    
```

```

6327 005204 012704 002340      MOV      #UBETBL,R4      ;GET ADDRESS OF UBE TABLE
6328 005210 012705 000005      MOV      #5,R5          ;SET SOB COUNT
6329 005214 060324      18$:    ADD      R3,(R4)+       ;ADJUST UBE TABLE ENTRIES
6330 005216 077502      SOB      R5,18$        ;CONTINUE
6331 005220 006003      ROR      R3
6332 005222 006003      ROR      R3            ;ADJUST OFFSET FOR UBE VECTOR
6333 005224 060324      ADD      R3,(R4)+       ;ADJUST UBEVEC ENTRY
6334 005226 060314      ADD      R3,(R4)       ;ADJUST UBEVEC PSW ENTRY
6335 005230 005003      15$:    CLR      R3          ;INIT R3
6336 005232 000261      SEC
6337 005234 005777 175116      TST      @MBTTBL       ;IS MASS BUS TESTER THERE?
6338 005240 103403      BCS     20$           ;BRANCH IF NO
6339 005242 052702 002000      21$:    BIS      #MBOPT,R2  ;SET OPTION AVAILABLE
6340 005246 000422      BR      24$
6341 005250 005777 175132      20$:    TST      @MBTN2     ;IS MBT2 THERE?
6342 005254 103403      BCS     22$           ;BRANCH IF NO
6343 005256 012703 000100      MOV      #100,R3      ;SETUP R3
6344 005262 000767      BR      21$
6345 005264 005777 175120      22$:    TST      @MBTN3     ;IS MBT3 THERE?
6346 005270 103403      BCS     23$           ;BRANCH IF NO
6347 005272 012703 000200      MOV      #200,R3
6348 005276 000761      BR      21$
6349 005300 005777 175106      23$:    TST      @MBTN4     ;IS MBT4 THERE?
6350 005304 103427      BCS     30$           ;BRANCH IF NO
6351 005306 012703 000300      MOV      #300,R3
6352 005312 000753      BR      21$
6353 005314      24$:    NOP
6354 005314 000240      NOP
6355 005316 000240      NOP
6356 005320 000240      NOP
6357 005322 012704 002356      MOV      @MBTTBL,R4    ;GET ADDRESS OF MBT TABLE
6358 005326 012705 000011      MOV      #11,R5        ;SET SOB COUNT
6359 005332 060324      25$:    ADD      R3,(R4)+       ;ADJUST MBT TABLE
6360 005334 077502      SOB      R5,25$        ;CONTINUE
6361 005336 060337 002404      ADD      R3,@MBTTBL+26 ;ADJUST DRIVE TYPE ADDRESS
6362 005342 112777 000007 175020      MOVB    #7,@MBTTBL+12 ;SET UNIT NUMBER
6363 005350 122777 000040 175026      CMPB    #40,@MBTTBL+26 ;IS THIS REALLY A MBT?
6364 005356 001402      BEQ     30$           ;BRANCH IF YES
6365 005360 042702 002000      BIC     #MBOPT,R2     ;CLEAR OPTION AVAILABLE BIT
6366 005364 012737 064422 000004 30$:    MOV      #ERPRT,@ERRVEC ;RESTORE ERROR TRAP
6367      ;
6368      ;*** TEST FOR VARIOUS KB11 PROCESSORS ***
6369      ;
6370      ;*THIS ROUTINE POLES THE RESULTS OF ATTEMPTS TO SET TO ONE
6371      ;*CERTAIN CRITICAL BITS THAT ARE KNOWN TO BE OPERATIVE ON A KB11CM,
6372      ;*OR KB11EM PROCESSOR. IF TWO OUT OF FOUR OF THE TESTS ARE
6373      ;*POSITIVE THEN THE KB11CM OR KB11EM FLAG IS SET,IF LESS THAN TWO OF THE
6374      ;*TESTS ARE POSITIVE THEN THE KB11E FLAG OR NO FLAG IS SET. THE DETERMINATION
6375      ;*OF WHICH PAIR IS VALID IS BASED ON THE RESULTS OF EXECUTING AN MFPT OPCODE
6376      ;*(OPCODE 7). IF THIS INSTRUCTION TRAPS THIS IS AN KB11CM OR
6377      ;*A PLAIN 1170 (KB11-B OR KB11-C). IF THE INSTRUCTION DOES NOT TRAP THEN
6378      ;*THIS IS A KB11-E OR KB11-EM.
6379      ;
6380      ;
6381 005372 104420      SAVREG      ;SAVE GPRS R5-R0
6382 005374 105037 001554      CLRB     @#KB11CM    ;RESET THE MP FLAG
    
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6383 005400 005037 001552          CLR    @#KB11E          ;CLEAR KB11E AND KB11EM FLAGS
6384 005404 012737 005652 000010  MOV    @#MFPTTR,@#RESVEC ;SET UP TRAP ADDRESS FOR MFPT AT RESERV VECTOR
6385 005412 000007          MFPTR ;EXECUTE MFPT. WILL TRAP ON 1170 (KB11B/C) OR
6386                                     ;KB11CM (11/74 )
6387
6388 005414 012737 000001 001552  MOV    #1,@#KB11E      ;HERE IF KB11E OR KB11EM. SET FLAG
6389 005422 005037 177750          CLR    @#MAINT        ;CLEAR THE MAINTENANCE REGISTER
6390 005426 005005          CLR    R5            ;RESET THE TEST COUNTER
6391 005430 012700 177746          MOV    @#CONTRL,R0   ;GET THE ADDRESS OF...
6392 005434 012701 177750          MOV    @#MAINT,R1   ;CCR,MAINT,AND MAPH00...
6393 005440 012702 170202          MOV    @#MAPH00,R2  ;AND PLACE IN R0-R2
6394 005444 052710 040000          BIS    @#BIT14,(R0) ;TRY TO SET IVSS BIT
6395 005450 032710 040000          BIT    @#BIT14,(R0) ;DID IT SET?
6396 005454 001403          BEQ    T2            ;NO.GO TO NEXT TEST
6397 005456 042710 040000          BIC    @#BIT14,(R0) ;CLEAR IT.
6398 005462 005205          INC    R5            ;TEST IS POSITIVE
6399 005464 052711 000001          BIS    @#BIT0,(R1)  ;SET EDMA IN MAINT REGISTER
6400 005470 032711 000001          BIT    @#BIT0,(R1)
6401 005474 001410          BEQ    T3
6402 005476 052710 004000          BIS    @#BIT11,(R0) ;TRY TO SET DMA IN CCR
6403 005502 032710 004000          BIT    @#BIT11,(R0)
6404 005506 001403          BEQ    T3
6405 005510 042710 004000          BIC    @#BIT11,(R0)
6406 005514 005205          INC    R5
6407 005516 042711 000001          BIS    @#BIT0,(R1)  ;MAKE SURE EDMA IS CLEAR
6408 005522 052767 100000 164550  BIS    @#BIT15,KIPDRO ;TRY TO SET BYP ON A PDR
6409 005530 032767 100000 164542  BIT    @#BIT15,KIPDRO
6410 005536 001404          BEQ    T4
6411 005540 042767 100000 164532  BIC    @#BIT15,KIPDRO
6412 005546 005205          INC    R5
6413 005550 052712 100000          BIS    @#BIT15,(R2) ;TRY TO SET BYP ON UNIBUS MAP
6414 005554 032712 100000          BIT    @#BIT15,(R2)
6415 005560 001403          BEQ    T.END
6416 005562 042712 100000          BIC    @#BIT15,(R2)
6417 005566 005205          INC    R5
6418 005570 022705 000002          T.END: CMP    #2,R5        ;IS THE RESULT OF THE TEST >=2
6419 005574 101021          BHI    3$           ;BR IF NO,THIS IS A KB11E OR KB11-B/C (11/70)
6420 005576 005000          CLR    R0
6421 005600 005037 177746          CLR    @#CONTRL
6422 005604 013701 177746          MOV    @#CONTRL,R1
6423 005610 001402          BEQ    5$
6424 005612 005200          INC    R0
6425 005614 001373          BNE    4$
6426 005616          5$:
6427 005616 005737 001552          TST    @#KB11E      ;IS IS A KB11-E OR KB11-EM?
6428
6429 005622 001404          BEQ    1$
6430 005624 012737 000400 001552  MOV    @#BIT8,@#KB11E ;BR IF NEITHER. MUST BE KB11CM
;SET UPPER BYTE (KB11-EM)
6431
6432 005632 000405          BR     2$           ;DONE
6433 005634 105237 001554          1$: INCB @#KB11CM    ;YES, FLAG THIS AS A MODIFIED PROCESSOR
6434 005640 005737 001552          3$: TST    @#KB11E    ;IS THIS A KB11E?
6435 005644 001472          BEQ    RESTORE     ;BR IF NOT. THIS IS AN 1170
6436 005646 104422          2$: RESREG        ;RESTORE R5-R0
6437 005650 000403          BR     ENDKB       ;DONE DETERMINEING WHICH CPU
6438
    
```



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6439
6440 005652 MFPTTR: ;HERE IF MFPT TRAPPED. SEE IF 1170 OR KB11CM
6441 005652 012716 005422 MOV #T1,(SP) ;SET UP RTI RETURN ADDRESS
6442 005656 000002 RTI ;RETURN
6443 005660
6444
6445 ;SEE IF CISP IS PRESENT. TRY TO EXECUTE 3 CISP INSTRUCTIONS. IF TWO OUT
6446 ;OF THE THREE DON'T TRAP, IT IS ASSUMED THAT THE CISP OPTION IS PRESENT AND
6447 ;A FLAG IS SET TO INDICATE THIS. ALSO A BIT IS SET IN OPT.CP AND A MESSAGE
6448 ;IS PRINTED.
6449
6450
6451 005660 052702 010000 BIS #CISOPT,R2 ;SET CISP OPTION BIT FOR OPT.CP
6452 005664 104420 SAVREG ;SAVE R5-RO
6453 005666 012737 006016 000010 MOV #TRPRTN,@RESVEC ;SET UP TRAP ADDRESS AT RESERVED VECTOR
6454 005674 105037 001555 CLRB @CISP ;COUNT HOW MANY CIS OPCODES DON'T TRAP
6455 005700 012737 076020 006012 MOV #LD2D0,@CISOP ;CIS OPCODE TO TEST (LOAD 2 DESCRIPTORS @RO)
6456 005706 012700 001702 MOV #LD2PNT,RO ;RO MUST BE EVEN AND POINT TO A WORD WHICH IS ALSO EVEN
6457 005712 004737 006012 JSR PC,@CISOP ;TEST OPCODE FOR A TRAP
6458 005716 012737 076061 006012 MOV #LD3D1,@CISOP ;SET UP OPCODE FOR LOAD 3 DESCRIPTORS @R1
6459 005724 012701 001702 MOV #LD2PNT,R1 ;LOAD R1 WITH EVEN WORD AND POINT TO EVEN CONTENTS
6460 005730 004737 006012 JSR PC,@CISOP ;TEST OPCODE FOR TRAP
6461 005734 052737 100000 177770 BIS #BIT15,@UBREAK ;SET MAINT MODE IN U-BREAK REGISTER
6462 005742 012737 076601 006012 MOV #MED74C,@CISOP ;OPCODE FOR DIAGNOSTIC ENTRY
6463 005750 012705 006600 MOV #CISTST,R5 ;ADDRESS OF DIAGNOSTIC U-CODE
6464 005754 004737 006012 JSR PC,@CISOP ;TEST OPCODE FOR TRAP
6465 005760 104422 RESREG ;RESTORE R5-RO
6466 005762 122737 000002 001555 CMPB #2,@CISP ;IS RESULT >=2?
6467 005770 101404 BLOS 1$ ;BR IF CISP IS PRESENT
6468 005772 105037 001555 CLRB @CISP ;CLEAR CISP PRESENT FLAG
6469 005776 042702 010000 BIC #CISOPT,R2 ;AND ALSO IN OPT.CP
6470 006002 042737 100000 177770 1$: BIC #BIT15,@UBREAK ;CLEAR MAINT BIT IN U-BREAK REGISTER
6471 006010 000411 BR SETOP ;GO TO RESTORE VECTOR AND SET OPT.CP
6472
6473 CISOP: .WORD 0 ;CISP OPCODE WILL GO HERE FOR EXECUTION
6474 006014 000403 BR NOTRAP ;WILL COME HERE IF NO TRAP
6475 006016 012716 006030 TRPRTN: MOV #CISTRP,(SP) ;SET UP RTI RETURN ADDRESS
6476 006022 000002 RTI ;RETURN TO LOCATION FROM TRAP
6477 006024 105237 001555 NOTRAP: INCB @CISP ;INCREMENT CISP INDICATOR
6478 006030 000207 CISTRP: RTS ;RETURN
6479
6480 006032 104422 RESTOR: RESREG ;RESTORE R5-RO
6481 006034 SETOP:
6482 006034 012737 064350 000010 MOV #RESERR,@RESVEC ;AND ALSO RESERVED INST TRAP
6483 006042 010237 001550 MOV R2,@OPT.CP ;LOAD INDICATOR
6484 006046 005227 177777 INC #-1 ;:FIRST TIME?
(1) 006052 001031 BNE 64$ ;:BRANCH IF NO
(1) 006054 022737 046652 000042 CMP #SENDAD,@#42 ;:ACT-11?
(1) 006062 001425 BEQ 64$ ;:BRANCH IF YES
(1) 006064 104400 006072 TYPE ,65$ ;:TYPE ASCIZ STRING
(1) 006070 000422 BR 64$ ;:GET OVER THE ASCIZ
(1) ;:65$: .ASCIZ <CRLF>'CEQKC-E...PDP 11/70 CPU EXERCISER'<CRLF>
6485 006136 005227 177777 64$: INC #-1 ;:FIRST TIME?
6486 006142 001036 BNE 100$ ;:BR IF NO
6487 006144 104400 071227 TYPE ,MSG34 ;<15><12>CPU UNDER TEST FOUND TO BE A
    
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6488 006150 005737 001552      TST    @#KB11E      ;IS THIS A KB11-E OR KB11-EM?
6489 006154 001011              BNE    101$        ;BR IF EITHER ONE
6490 006156 105737 001554      TSTB   @#KB11CM    ;IS IT A 11/74      (KB11CM)
6491 006162 001003              BNE    1$          ;BR IF IT IS
6492 006164 104400 071267      TYPE   ,MSG35      ;KB11-B/C<15><12>
6493 006170 000423              BR     100$        ;SKIP OTHER MESSAGE
6494 006172 104400 071175      1$:    TYPE   ,MSG32 ;11/74      (KB11CM)<15><12>
6495 006176 000420              BR     100$        ;SKIP CISP MESSAGE
6496 006200 105737 001552      101$:  TSTB   @#KB11E ;IS IT A KB11-E?
6497 006204 001403              BEQ    102$        ;BR IF NOT. MUST BE KB11-EM
6498 006206 104400 071302      TYPE   ,MSG36      ;KB11-E<15><12>
6499 006212 000402              BR     104$        ;SKIP KB11-EM MESSAGE
6500 006214 104400 071163      102$:  TYPE   ,MSG31 ;KB11-EM<15><12>
6501 006220 105767 173331      104$:  TSTB   CISP   ;IS CISP PRESENT?
6502 006224 001003              BNE    103$        ;BR IF CISP PRESENT
6503 006226 104400 071313      TYPE   ,MSG37      ;CISP OPTION NOT FOUND<15><12>
6504 006232 000402              BR     100$        ;SKIP OTHER MESSAGE
6505 006234 104400 071343      103$:  TYPE   ,MSG38 ;CISP OPTION FOUND<15><12>
6506 006240
(1) 006240 104400 006246      TYPE   ,67$        ;;TYPE ASCIZ STRING
(1) 006244 000415              BR     66$        ;;GET OVER THE ASCIZ
(1)
(1) 006300      ;;67$: .ASCIZ <15><12>/PROCESSOR ID REGISTER =/
6507 006300 013746 177764      66$:    MOV     @#177764,-(SP) ;;SAVE @#177764 FOR TYPEOUT
(1) 006304 104402              TYPDC ;GO TYPE--OCTAL ASCII(ALL DIGITS)
6508 006306 104400 006314      TYPE   ,69$        ;;TYPE ASCIZ STRING
(1) 006312 000406              BR     68$        ;;GET OVER THE ASCIZ
(1)
(1) 006330      ;;69$: .ASCIZ / (OCTAL) /
6509 006330 013746 177764      68$:    MOV     @#177764,-(SP) ;;SAVE @#177764 FOR TYPEOUT
(1) 006334 104410              TYPDS ;GO TYPE--DECIMAL ASCII WITH SIGN
6510 006336 104400 006344      TYPE   ,71$        ;;TYPE ASCIZ STRING
(1) 006342 000406              BR     70$        ;;GET OVER THE ASCIZ
(1)
(1) 006360      ;;71$: .ASCIZ / (DECIMAL) /
6511 006360 104400 001407      70$:    TYPE   ,$CRLF
6512
6513      ;;*****
6514      .SBTTL SYSTEM SIZER
6515      ; THIS ROUTINE DETERMINES WHAT DRIVES ARE AVAILABLE ON
6516      ; THE FOLLOWING DEVICES: RK05, RP03, RP04, AND RS04. THE
6517      ; INFORMATION IS STORED IN THE TABLE 'SYSSIZE' IN THE FOLLOWING FORMAT:
6518      ; A. EACH DEVICE IS ASSIGNED A WORD
6519      ; B. THE LOW BYTE OF THIS WORD INDICATES WHICH DRIVES ARE AVAILABLE
6520      ; C. THE HIGH BYTE INDICATES WHICH DRIVES HAVE BEEN USED
6521      ; BY THE RELOCATION ROUTINE.
6522      ;;*****
6522 006364 012737 006476 000004  SIZE:  MOV     #21$,@#ERRVEC ;SETUP TIMEOUT VECTOR
6523 006372 005037 001352          CLR     @#STMP0      ;ENSURE STMP0 CLEAR
6524 006376 005000          CLR     R0           ;USED TO SET THE UNIT AVAIL BITS
6525 006400 012701 000010          MOV     #10,R1       ;SOB COUNT
6526 006404 013777 001352 173632  9$:    MOV     @#STMP0,@#RKDA ;SET UNIT NUMBER
6527 006412 012777 000015 173616          MOV     #15,@#RKS   ;SEND DRIVE RESET
6528 006420 032777 000200 173606          BIT     #BIT7,@#RKR ;NON EXISTANT DISK?
6529 006426 001011          BNE    7$           ;BRANCH IF YES
6530 006430 017702 173576          MOV     @#RKDS,R2   ;GET DRIVE STATUS
6531 006434 042702 177537          BIC    #177537,R2   ;GET BITS 5 & 7 ONLY
    
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6532 006440 022702 000200          CMP      #200,R2          ;IS DRIVE READY?
6533 006444 001002          BNE      7$              ;BRANCH IF NO
6534 006446 052700 000400          BIS      #BIT8,R0       ;SET UNIT AVAILABLE
6535 006452 006000          7$:   ROR      R0
6536 006454 012777 000001 173554  MOV      #1,@RKC5       ;CLEAR THE ERRORS
6537 006462 062737 020000 001352  ADD      #20000,@$TMP0  ;SELECT NEXT UNIT
6538 006470 077133          SOB      R1,9$          ;CONTINUE
6539 006472 110037 001714          MOVB    R0,@$SYSSIZE+2 ;STORE IN TABLE
6540
6541
6542          ;:*****
6543          ;:THIS CODE DETERMINES IF THERE IS AN RPO3 OR AN RPO4 OR BOTH.
6544          ;:IF BOTH ARE ON THE SYSTEM, THE OPERATOR MUST CHANGE THE RPO4
6545          ;:ADDRESSES IN THE TABLE IN 'COMMON TAGS' AND 'NOP' THE BRANCH
6546          ;:AT '100$'.
6547 006476 012737 007104 000004 21$:   MOV      #11$,@WERRVEC ;SET THE ERROR VECTOR
6548 006504 005737 176710          TST      @#176710      ;IS THERE AN RP ON THE SYSTEM?
6549          ;:STAY HERE IF YES
6550 006510 012737 006524 000004          MOV      #1$,@WERRVEC
6551 006516 005777 173530          TST      @RP4CS1      ;IS THERE AN RPO4 ON SYSTEM?
6552 006522 000441          100$:  BR       10$         ;BRANCH IF YES
6553          ;:*****
6554
6555          ;:*****
6556 006524 012737 006626 000004 1$:   MOV      #10$,@WERRVEC ;SETUP TIMEOUT VEC FOR RPO3 TEST
6557 006532 012737 000001 001352  MOV      #1,@$TMP0     ;SETUP TEMPO
6558 006540 005000          CLR      R0            ;USED TO SET UNIT AVAILABLE BITS
6559 006542 012701 000010          MOV      #10,R1       ;SOB COUNT
6560 006546 013777 001352 173440 3$:   MOV      @$TMP0,@RP3CS ;SET FUNCTION IDLE WITH UNIT NO
6561 006554 005777 173434          TST      @RP3CS       ;WAS THERE AN ERROR?
6562 006560 100006          BPL      6$           ;BRANCH IF NO
6563 006562 006000          4$:   ROR      R0            ;UNIT NOT AVAILABLE
6564 006564 062737 000400 001352  ADD      #400,@$TMP0   ;SELECT NEXT UNIT
6565 006572 077113          SOB      R1,3$        ;CONTINUE
6566 006574 000412          BR       5$
6567 006576 017702 173406          6$:   MOV      @RP3DS,R2    ;GET STATUS REGISTER
6568 006602 042702 037777          BIC      #37777,R2    ;GET BITS 14, 15 ONLY
6569 006606 022702 140000          CMP      #140000,R2  ;IS DRIVE READY?
6570 006612 001363          BNE      4$           ;BRANCH IF NO
6571 006614 052700 000400          BIS      #BIT8,R0     ;SET DRIVE AVAILABLE BIT
6572 006620 000760          BR       4$           ;CONTINUE
6573 006622 110037 001712          5$:   MOVB    R0,@$SYSSIZE ;STORE IN TABLE
6574
6575          ;:*****
6576 006626 012737 007104 000004 10$:  MOV      #11$,@WERRVEC ;SETUP ERROR VEC FOR RPO4 TEST
6577 006634 005037 001352          CLR      @$TMP0
6578 006640 005000          CLR      R0            ;UNIT AVAILABLE WORD
6579 006642 012701 000010          MOV      #10,R1       ;SOB COUNT
6580 006646 113777 001352 173410 14$:  MOVB    @$TMP0,@RP4CS2 ;SET UNIT NUMBER
6581 006654 012777 000021 173370  MOV      #21,@RP4CS1  ;TRY READ-IN-PRESET
6582 006662 032777 010000 173374  BIT      #BIT12,@RP4CS2 ;NON EXISTANT DRIVE?
6583 006670 001071          BNE      12$          ;BRANCH IF YES
6584 006672 017702 173372          MOV      @RP4DS,R2    ;GET DRIVE STATUS
6585 006676 032702 001000          BIT      #BIT9,R2     ;IS DRIVE IN PROGRAMMABLE MODE?
6586 006702 001455          BEQ      8$           ;NO
6587 006704 104400 006712          TYPE    ,65$         ;:TYPE ASCII STRING
    
```

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(1) 006710 000410          BR      64$          ::GET OVER THE ASCIZ
(1)          ::65$: .ASCIZ <15><12>/RPO4 DRIVE #/
(1) 006732          64$:          MOV      @#STMP0,-(SP)  ::SAVE @#STMP0 FOR TYPEOUT
6588 006732 013746 001352  TYPOC          ::GO TYPE--OCTAL ASCII(ALL DIGITS)
(1) 006736 104402          TYPE          ::TYPE ASCIZ STRING
6589 006740 104400 006746  BR      67$          ::GET OVER THE ASCIZ
(1) 006744 000433          ::67$: .ASCIZ / FOUND IN PROGRAMMABLE MODE-DRIVE WILL NOT BE USED/<15><12>
(1) 007034          66$:          BR      12$
6590 007034 000407          BIC      #163277,R2  :GET BITS 12, 11, 8, & 6 ONLY
6591 007036 042702 163277  CMP      #10500,R2  :IS DRIVE READY?
6592 007042 022702 010500  BNE      12$        :BRANCH IF NO
6593 007046 001002          BIS      #BIT8,R0   :SET UNIT AVAILABLE
6594 007050 052700 000400  ROR      R0
6595 007054 006000          12$:          ROR      R0
6596 007056 052777 000040 173200  BIS      #BIT5,@R4CS2 :CLEAR ERROR BITS
6597 007074 005237 001352  INC      @#STMP0     :SELECT NEXT DRIVE
6598 007070 005301          DEC      R1
6599 007072 001402          BEQ     .+6
6600 007074 000167 177546  JMP      14$
6601 007100 110037 001722  MOVB    R0,@#SYSSIZE+10 :STORE IN TABLE
6602
6603
*****
6604 007104 012737 007214 000004 11$:          MOV      #15$,@#ERRVEC :SETUP ERROR VEC FOR RS04 TEST
6605 007112 005037 001352          CLR      @#STMP0
6606 007116 005000          CLR      R0
6607 007120 012701 000010          MOV      #10,R1      :SOB COUNT
6608 007124 113777 001352 173172 18$:          MOVB    @#STMP0,@RSCS2 :SET UNIT NUMBER
6609 007132 012777 000001 173152  MOV      #1,@RSCS1   :TRY NOP OPERATION
6610 007140 032777 010000 173156  BIT      #BIT12,@RSCS2 :NON EXISTANT DRIVE?
6611 007146 001011          BNE      16$        :BRANCH IF YES
6612 007150 017702 173154          MOV      @RSDS,R2   :GET DRIVE STATUS
6613 007154 042702 163577  BIC      #163577,R2  :GET BITS 12, 11, & 7 ONLY
6614 007160 022702 010200  CMP      #10200,R2  :IS DRIVE READY?
6615 007164 001002          BNE      16$        :BRANCH IF NO
6616 007166 052700 000400  BIS      #BIT8,R0   :SET DRIVE AVAILABLE BIT
6617 007172 006000          16$:          ROR      R0
6618 007174 052777 000040 173122  BIS      #BIT5,@RSCS2 :CLEAR ANY ERROR BITS
6619 007202 005237 001352  INC      @#STMP0     :SELECT NEXT UNIT
6620 007206 077132          SOB     R1,18$      :CONTINUE
6621 007210 110037 001724  MOVB    R0,@#SYSSIZE+12 :STORE IN TABLE
6622
:
6623          :NEXT, DELETE XXDP UNIT 0 FROM TABLE
6624 007214 122737 000002 000041 15$:          CMPB    #2,@#41     :RK?
6625 007222 001004          BNE      19$        :BRANCH IF NO
6626 007224 042737 000001 001714  BIC      #BIT0,@#SYSSIZE+2 :MAKE UNIT ZERO NOT AVAILABLE
6627 007232 000420          BR      20$
6628 007234 113700 000041 19$:          MOVB    @#41,R0     :GET LOCATION 41
6629 007240 042700 177770  BIC      #177770,R0  :GET LEAST SIG 3 BITS
6630 007244 000241          CLC
6631 007246 006100          ROL     R0
6632 007250 122700 000002  CMPB    #2,R0
6633 007254 002404          BLT     40$        :BRANCH IF NO
6634 007256 042737 000001 001712  BIC      #BIT0,@#SYSSIZE
6635 007264 000403          BR      20$
6636 007266 042760 000001 001716 40$:          BIC      #BIT0,SYSSIZE+4(R0)
    
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6637 007274 005227 177777      20$: INC      #-1
6638 007300 001057              BNE      LOOP1          ;;BRANCH IF NOT FIRST TIME
6639 007302 104400 065627      TYPE     ,MSG25
6640 007306 013746 001550      MOV      @#OPT.CP,-(SP)
6641 007312 104402              TYP0C
6642 007314 104400 001407      TYPE     ,SCLRF
6643 007320 005737 001602      TST      @#QV          ;ACT11?
6644 007324 001045              BNE      LOOP1          ;BRANCH IF YES
6645 007326 105737 003641      50$: TSTB    @#XXDPC      ;XXDP CHAIN MODE?
6646 007332 001042              BNE      LOOP1          ;;BRANCH IF YES
6647 007334 105737 001250      TSTB    @#SPASS        ;FIRST PASS?
6648 007340 001037              BNE      LOOP1          ;;BRANCH IF NO
6649 007342 032777 000200 171674 BIT      #SW7,@$SWRP     ;INHIBIT SIZE TYPEOUT?
6650 007350 001031              BNE      SWBMSG         ;;BRANCH IF YES
6651 007352 004767 047514      JSR      PC,TYPSIZ      ;GO TYPE SYSTEM SIZE
6652 007356 104400 007364      TYPE     ,69$          ;;TYPE ASCIZ STRING
(1) 007362 000417              BR       68$           ;;GET OVER THE ASCIZ
(1)                               ;;69$: .ASCIZ /TYPE A CHARACTER TO CONTINUE/<CRLF>
(1)                               68$:
6653 007422 005037 177776      CLR      @#PSW
6654 007426 000001              WAIT
6655 007430 000137 006364      JMP      @#SIZE        ;GO CHECK SYSTEM AGAIN
6656 007434 104400 070651      SWBMSG: TYPE ,MSG30    ;TYPE SWITCH 8 REVERSAL MESSAGE
6657 007440 000167 000334      LOOP1: JMP      LOOP
6658 010000 010000              .=10000
6659                               ;PROGRAM RESTARTS HERE AFTER RELOCATION ABOVE 28K IS COMPLETE.
6660                               ;INITIALIZE TRAP VECTORS
6661 010000 012706 000700      LOOP: MOV      #SUPSTK,SP ;SET THE STACK...WILL BE DIFFERENT
6662                               ;THAN KERN STACK WHEN IN OUTER MODE
6663 010004 012700 000004      MOV      #ERRVEC,R0
6664 010010 013701 177776      MOV      @#PSW,R1      ;GET CURRENT PSW
6665 010014 012720 064422      MOV      #ERPRT,(R0)+  ;SET ERROR VEC
6666 010020 052701 000340      BIS      #PR7,R1      ;SET PRIORITY 7 IN CURRENT PSW
6667 010024 042701 000020      BIC      #BIT4,R1     ;CLEAR T BIT
6668 010030 010120      MOV      R1,(R0)+
6669 010032 012720 064350      MOV      #RESERR,(R0)+ ;SET RESERVED INST TRAP VECTOR
6670 010036 010120      MOV      R1,(R0)+
6671 010040 012720 001570      MOV      #SRTN,(R0)+  ;SET T BIT VEC
6672 010044 042701 000340      BIC      #PR7,R1
6673 010050 005020      CLR      (R0)+        ;SET TBIT VEC+2
6674 010052 005720      TST      (R0)+        ;BUMP R0 TO SCOPE VEC+2
6675 010054 005020      CLR      (R0)+        ;SET SCOPE VEC+2
6676 010056 062700 000006      ADD      #6,R0        ;SET R0 TO ERROR TRAP VEC
6677 010062 012720 000340      MOV      #PR7,(R0)+  ;SET ERROR VEC
6678 010066 005720      TST      (R0)+
6679 010070 012720 000340      MOV      #PR7,(R0)+  ;SET TRAP VEC+2
6680 010074 012737 063616 000114 MOV      #,PARSRV,@#CACHVEC ;SET PARITY ERROR VECTOR
6681 010102 052701 000340      BIS      #PR7,R1
6682 010106 010137 000116      MOV      R1,@#CACHVEC+2
6683 010112 012737 064254 000250 MOV      #KTABRT,@#MIVEC  ;SET KT11 ABORT VECTOR
6684 010120 010137 000252      MOV      R1,@#MIVEC+2
6685 010124 042737 000340 177776 BIC      #PR7,@#PSW

```

```

(3)
(3)
(2)
;*****
;*TEST 1      MEMORY VERIFICATION TEST
;*****

```

```
(2) 010132 012767 000001 171236      MOV     #1,$TIMES      ;;DO 1 ITERATION
(2) 010140 000004          TST1:  SCOPE
(2) 010142 112737 000001 001252      MOV     #1,@$STSTNM    ;LOAD TEST NUMBER
(2) 010150 013737 001252 177570      MOV     @$STSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
6687
(1)          .SBTTL  START OF SECTION 0
(1)          ;00000000000000 FIRST ADDRESS TO BE RELOCATED 00000000
RELO:  MOV     PC,RO      ;GET PC
(1) 010156 010700          TST     -(RO)          ;RO CONTAINS THE ADDRESS OF RELO
(1) 010160 005740          MOV     RO,@$FRSTAD    ;SAVE
(1) 010162 010037 001610          MOV     PC,RO          ;GET CURRENT PC
(1) 010166 010700          SUB     #,$RO          ;SUBTRACT RELOCATION FACTOR
(1) 010170 162700 010170          MOV     RO,@$FACTOR    ;SAVE RELOCATION FACTOR
(1) 010174 010037 001604          MOV     PC,@$SLPERR    ;SET LOOP ADDRESS
(1) 010200 010737 001262          ADD     #30,@$SLPERR   ;ADJUST
(1) 010204 062737 000030 001262          MOV     @$SLPERR,@$SLPADR
(1) 010212 013737 001262 001260          TSTB   @NEXEC         ;BR IF TEST CODE TO BE EXECUTED
(1) 010220 105737 001600          BEQ     +6
(1) 010224 001402          JMP     RELO
(1) 010226 000167 000720          ;MEMORY AND DISK (IF SELECTED) VERIFICATION TEST.
6688          JMP     1$
6689 010232 000167 000714          .WORD  -1,-1,-1,-1,0,0,0,0
6692 010236 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010244 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010252 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010256 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010264 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010272 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010276 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010304 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010312 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010316 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010324 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010332 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010336 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010344 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010352 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010356 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010364 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010372 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010376 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010404 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010412 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010416 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010424 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010432 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010436 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010444 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010452 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010456 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010464 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010472 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010476 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010504 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010512 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010516 177777 177777 177777          .WORD  -1,-1,-1,-1,0,0,0,0
(1) 010524 177777 000000 000000          .WORD  -1,-1,-1,-1,0,0,0,0
```

(1)	010532	000000	000000		
(1)	010536	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010544	177777	000000	000000	
(1)	010552	000000	000000		
(1)	010556	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010564	177777	000000	000000	
(1)	010572	000000	000000		
(1)	010576	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010604	177777	000000	000000	
(1)	010612	000000	000000		
(1)	010616	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010624	177777	000000	000000	
(1)	010632	000000	000000		
(1)	010636	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010644	177777	000000	000000	
(1)	010652	000000	000000		
(1)	010656	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010664	177777	000000	000000	
(1)	010672	000000	000000		
(1)	010676	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010704	177777	000000	000000	
(1)	010712	000000	000000		
(1)	010716	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010724	177777	000000	000000	
(1)	010732	000000	000000		
(1)	010736	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010744	177777	000000	000000	
(1)	010752	000000	000000		
(1)	010756	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	010764	177777	000000	000000	
(1)	010772	000000	000000		
(1)	010776	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011004	177777	000000	000000	
(1)	011012	000000	000000		
(1)	011016	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011024	177777	000000	000000	
(1)	011032	000000	000000		
(1)	011036	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011044	177777	000000	000000	
(1)	011052	000000	000000		
(1)	011056	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011064	177777	000000	000000	
(1)	011072	000000	000000		
(1)	011076	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011104	177777	000000	000000	
(1)	011112	000000	000000		
(1)	011116	177777	177777	177777	.WORD -1,-1,-1,-1,0,0,0,0
(1)	011124	177777	000000	000000	
(1)	011132	000000	000000		
6693	011136	177777	177777	177777	.WORD -1,-1,-1,-1,0,0
	011144	177777	000000	000000	

6694	011152				
6695	011152	000004			
(1)	011154	010702			
(1)	011156	062702	000012		
(1)	011162	012707	044042		

1\$: RELEO: SCOPE
 MOV PC,R2
 ADD #12,R2
 MOV #RELOC,PC ;GO RELOCATE PROGRAM CODE

```

(1) 011166 000000      RELOO:  WORD 0
(1)                   ;00000000000000 LAST ADDRESS OF CODE TO BE RELOCATED 0000000000
(1)
6696                   ;*****
(3)                   ;*TEST 2      CHECK BRANCH INSTRUCTIONS
(3)                   ;*****
(2)
(2) 011170 012767 000001 170200  TST2:  MOV      #1,$TIMES      ;,DO 1 ITERATION
(2) 011176 000004                   SCOPE
(2) 011200 112737 000002 001252  MOVB     #2,@$STSTM          ;LOAD TEST NUMBER
(2) 011206 013737 001252 177570  MOV      @$STSTM,@$DISPLAY ;:DISPLAY TEST NUMBER
6697
(1)                   .SBTTL  START OF SECTION 1
(1)                   ;111111111111 FIRST ADDRESS TO BE RELOCATED 1111111111
(1) 011214 010700      REL1:  MOV      PC,RO          ;GET PC
(1) 011216 005740      TST      -(RO)           ;RO CONTAINS THE ADDRESS OF REL1
(1) 011220 010037 001610  MOV      RO,@$FRSTAD      ;SAVE
(1) 011224 010700      MOV      PC,RO          ;GET CURRENT PC
(1) 011226 162700 011226  SUB      #,$RO           ;SUBTRACT RELOCATION FACTOR
(1) 011232 010037 001604  MOV      RO,@$FACTOR      ;SAVE RELOCATION FACTOR
(1) 011236 010737 001262  MOV      PC,@$LPERR        ;SET LOOP ADDRESS
(1) 011242 062737 000030 001262  ADD      #30,@$LPERR      ;ADJUST
(1) 011250 013737 001262 001260  MOV      @$LPERR,@$LPADR
(1) 011256 105737 001600      TSTB     @NEXEC          ;BR IF TEST CODE TO BE EXECUTED
(1) 011262 001402      BEQ      +6
(1) 011264 000167 004146      JMP      REL1
6698
6699                   ;
6700 011270 000257      CCC          ;CC'S=0000
6701 011272 103407      BCS      CCO          ;SAME AS BLO
6702 011274 102406      BVS      CCO
6703 011276 001405      BEQ      CCO
6704 011300 100404      BMI      CCO
6705 011302 002403      BLT      CCO
6706 011304 003402      BLE      CCO
6707 011306 101401      BLOS     CCO
6708 011310 101001      BHI      +4
6709 011312 104000      CCO:     HLT          ;ONE OF THE ABOVE BRANCHES FAILED
6710                   ;CONTINUE
6711 011314 000270      SEN          ;CC'S=1000
6712 011316 100003      BPL      CC1
6713 011320 002002      BGE      CC1
6714 011322 003001      BGT      CC1
6715 011324 002401      BLT      +4
6716 011326 104000      CC1:     HLT          ;ONE OF THE ABOVE BRANCHES FAILED
6717                   ;CONTINUE
6718                   ;
6719 011330 000262      SEV          ;CC'S=1010
6720 011332 102003      BVC      CC2
6721 011334 002402      BLT      CC2
6722 011336 003401      BLE      CC2
6723 011340 002001      BGE      +4
6724 011342 104000      CC2:     HLT          ;ERROR! ONE OF THE ABOVE BRANCHES FAILED
6725                   ;CONTINUE
6726                   ;
6727 011344 000261      SEC          ;CC'S=1011
    
```

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6728 011346 103002          BCC  CC3
6729 011350 101001          BHI  CC3
6730 011352 003001          BGT  .+4
6731 011354 104000          HLT  ;ERROR. ONE OF THE ABOVE BRANCHES FAILED
6732
6733          ;CONTINUE
6734 011356 000264          SEZ          ;CC'S=1111
6735 011360 001003          BNE  CC4
6736 011362 003002          BGT  CC4
6737 011364 101001          BHI  CC4
6738 011366 003401          BLE  .+4
6739 011370 104000          HLT  ;ERROR! ONE OF THE ABOVE BRANCHES FAILED
6740
(3)
(3)
(2)
(2) 011372 000004          TST3: SCOPF
(2) 011374 112737 000003 001252          MOVB #3,@#STSTNM          ;LOAD TEST NUMBER
(2) 011402 013737 001252 177570          MOV @#STSTNM,@#DISPLAY  ;:DISPLAY TEST NUMBER
6741          ;CLR
6742 011410 000277          RO
6743 011412 000244          SCC
6744 011414 005000          CLZ
6745 011416 103404          CLR  RO          ;RO=0,CC'S=0100
6746 011420 102403          BCS  CLRO
6747 011422 001002          BVS  CLRO
6748 011424 100401          BNE  CLRO
6749 011426 003401          BMI  CLRO
6750 011430 104000          BLE  .+4
6751          CLRO: HLT          ;ERROR! INCORRECT CC'S AFTER CLR
6752 011432 000277          SCC
6753 011434 000244          CLZ
6754 011436 005700          TST  RO          ;RO=0,CC'S=0100
6755 011440 103404          BCS  TSTO
6756 011442 102403          BVS  TSTO
6757 011444 001002          BNE  TSTO
6758 011446 100401          BMI  TSTO
6759 011450 101401          BLOS .+4
6760 011452 104000          TSTO: HLT          ;ERROR! INCORRECT CC'S AFTER TST
6761
6762 011454 000257          CCC
6763 011456 000266          +SEZ!SEV
6764 011460 005100          COM  RO          ;RO--1,CC'S-1001
6765 011462 103004          BCC  COMO
6766 011464 102403          BVS  COMO
6767 011466 001402          BEQ  COMO
6768 011470 100001          BPL  COMO
6769 011472 002401          BLT  .+4
6770 011474 104000          COMO: HLT          ;ERROR! INCORRECT CC'S AFTER COM
6771
6772 011476 000261          SEC
6773 011500 005500          ADC  RO          ;RO=000000,CC'S=0101
6774 011502 103003          BCC  ADCO
6775 011504 102402          BVS  ADCO
6776 011506 001001          BNE  ADCO
6777 011510 002001          BGE  .+4
    
```


6778	011512	104000	ADCO:	HLT		;ERROR! INCORRECT CC'S AFTER ADC
6779						
6780	011514	000261		SEC		
6781	011516	006000		ROR	RO	;RO=100000,CC'S=1010
6782	011520	103404		BCS	RORO	
6783	011522	102003		BVC	RORO	
6784	011524	001402		BEQ	RORO	
6785	011526	100001		BPL	RORO	
6786	011530	003001		BGT	.+4	
6787	011532	104000	RORO:	HLT		;ERROR! INCORRECT CC'S AFTER ROR
6788	011534	000277		SCC		
6789	011536	000242		CLV		
6790	011540	005300		DEC	RO	;RO=077777,CC'S=0011
6791	011542	103004		BCC	DECO	
6792	011544	102003		BVC	DECO	
6793	011546	001402		BEQ	DECO	
6794	011550	100401		BMI	DECO	
6795	011552	003401		BLE	.+4	
6796	011554	104000	DECO:	HLT		;ERROR! INCORRECT CC'S AFTER DEC
6797						
6798	011556	000257		CCC		
6799	011560	005200		INC	RO	;RO=100000,CC'S-1010
6800	011562	103404		BCS	INCO	
6801	011564	102003		BVC	INCO	
6802	011566	001402		BEQ	INCO	
6803	011570	100001		BPL	INCO	
6804	011572	003001		BGT	.+4	
6805	011574	104000	INCO:	HLT		;ERROR! INCORRECT CC'S AFTER INC
6806						
6807	011576	000277		SCC		
6808	011600	000242		CLV		
6809	011602	005400		NEG	RO	;RO=100000,CC'S=1011
6810	011604	103003		BCC	NEGO	
6811	011606	102002		BVC	NEGO	
6812	011610	001401		BEQ	NEGO	
6813	011612	002001		BGE	.+4	
6814	011614	104000	NEGO:	HLT		;ERROR! INCORRECT CC'S AFTER NEG
6815						
6816	011616	000261		SEC		
6817	011620	006300		ASL	RO	;RO=000000,CC'S=0111
6818	011622	103004		BCC	ASLO	
6819	011624	102003		BVC	ASLO	
6820	011626	001002		BNE	ASLO	
6821	011630	100401		BMI	ASLO	
6822	011632	101401		BLOS	.+4	
6823	011634	104000	ASLO:	HLT		;ERROR! INCORRECT CC'S AFTER ASL
6824						
6825	011636	006100		ROL	RO	;RO=000001,CC'S=0000
6826	011640	103402		BCS	ROLO	
6827	011642	003401		BLE	ROLO	
6828	011644	002001		BGE	.+4	
6829	011646	104000	ROLO:	HLT		;ERROR! INCORRECT CC'S AFTER ROL
6830						
6831	011650	006200		ASR	RO	;RO=000000,CC'S=0111
6832	011652	103003		BCC	ASRO	
6833	011654	102002		BVC	ASRO	

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6834 011656 001001      BNE      ASRO
6835 011660 002401      BLT      .+4
6836 011662 104000      ASRO:    HLT                      ;ERROR! INCORRECT CC'S AFTER ASR
6837
6838 011664 000277      SCC
6839 011666 005600      SBC      R0                      ;R0=-1,CC'S=1001
6840 011670 103002      BCC      SBC0
6841 011672 102401      BVS      SBC0
6842 011674 003401      BLE      .+4
6843 011676 104000      SBC0:    HLT                      ;ERROR! INCORRECT CC'S AFTER SBC
6844
6845 011700 005400      NEG      R0                      ;R0=000001,CC'S=00001
6846 011702 000300      SWAB     R0                      ;R0=000400 ,CC'S=0100
6847 011704 103403      BCS      SWAB0
6848 011706 102402      BVS      SWAB0
6849 011710 001001      BNE      SWAB0
6850 011712 002001      BGE      .+4
6851 011714 104000      SWAB0:   HLT                      ;ERROR! INCORRECT CC'S AFTER SWAB
6852
(3)
(3)
(2)
(2) 011716 000004      TST4:   SCOPE
(2) 011720 112737 000004 001252      MOV     #4,@*STSTNM              ;LOAD TEST NUMBER
(2) 011726 013737 001252 177570      MOV     @*STSTNM,@*DISPLAY      ;;DISPLAY TEST NUMBER
6853 011734 012737 000005 001376      MOV     #5,@*STIMES            ;SET ITERATION COUNT TO 5
6854 011742 005000      CLR     R0
6855 011744 000277      SCC
6856 011746 006100      ROL     R0                      ;R0=1
6857 011750 010002      MOV     R0,R2
6858 011752 006302      ASL     R2                      ;R2=2
6859 011754 010203      MOV     R2,R3
6860 011756 006303      ASL     R3                      ;R3=4
6861 011760 010304      MOV     R3,R4
6862 011762 006304      ASL     R4                      ;R4=10
6863 011764 010405      MOV     R4,R5
6864 011766 006305      ASL     R5                      ;R5=20
6865 011770 010546      MOV     R5,-(SP)                ;SET BITS SET IN REGISTERS
6866 011772 050416      BIS     R4,(SP)                ;INTO STACK ADDRESS
6867 011774 050316      BIS     R3,(SP)
6868 011776 050216      BIS     R2,(SP)
6869 012000 050016      BIS     R0,(SP)
6870 012002 022726 000037      CMP     #37,(SP)+
6871 012006 001401      BEQ     .+4                      ;WERE SET
6872 012010 104000      HLT                      ;MISSING BIT(S) REPRESENT
6873
6874
6875      ;CHECK THAT ALL BITS CAN BE SET & CLEARED IN ALL REGISTERS
6876 012012 000257      CCC
6877 012014 112700 000377      MOV     #377,R0                ;SET ALL BITS (MOVB EXTENDS SIGN)
6878 012020 006100      1$:    ROL     R0                ;ROTATE A 0 THROUGH ALL BIT
6879 012022 103776      BCS     1$                      ;POSITIONS
6880 012024 005200      INC     R0                      ;FINAL RESULT IS -1
6881 012026 001401      BEQ     .+4
6882 012030 104000      HLT                      ;ERROR.
6883

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6884 012032 012700 000020      MOV    #16.,R0      ;SET SHIF1 COUNT
6885 012036 005002                CLR    R2
6886 012040 000261      2$:   SEC
6887 012042 006002                ROR    R2          ;ROTATE 1 THROUGH ALL BIT POSITS
6888 012044 005300                DEC    R0          ;DECREMENT SHIFT COUNT
6889 012046 001374                BNE   2$
6890 012050 005102                COM   R2          ;R2 SHOULD CONTAIN -1
6891 012052 001401                BEQ   .+4
6892 012054 104000                HLT
6893
6894 012056 012703 100000      MOV    #100000,R3
6895 012062 006203      3$:   ASR    R3          ;EXTEND 1 BIT THROUGH ALL POSITIONS
6896 012064 103376                BCC   3$
6897 012066 005203                INC   R3
6898 012070 001401                BEQ   .+4
6899 012072 104000                HLT          ;ERROR.
6900
6901 012074 112704 177401      MOVB  #177401,R4
6902 012100 060404      4$:   ADD    R4,R4
6903 012102 103376                BCC   4$
6904 012104 005704                TST   R4
6905 012106 001401                BEQ   .+4
6906 012110 104000                HLT
6907
6908 012112 012705 000001      MOV    #1,R5
6909 012116 006305      5$:   ASL    R5
6910 012120 102376                BVC   5$
6911 012122 006305                ASL   R5
6912 012124 103002                BCC   6$
6913 012126 005705                TST   R5
6914 012130 001401                BEQ   .+4
6915 012132 104000      6$:   HLT
6916
6917                ;CHECK REGISTER VOLITILITY
6918 012134 005002                CLR    R2
6919 012136 005102                COM   R2          ;R2=-1
6920 012140 010203                MOV   R2,R3
6921 012142 000257                CCC
6922 012144 006002                ROR   R2          ;R2=LOOP COUNT
6923 012146 006202                ASR   R2
6924 012150 010304      7$:   MOV   R3,R4
6925 012152 005302                DEC   R2          ;DECREMENT LOOP COUNT
6926 012154 001375                BNE   7$
6927 012156 005203                INC   R3          ;CHECK R3
6928 012160 001002                BNE   8$
6929 012162 005204                INC   R4          ;CHECK R4
6930 012164 001401                BEQ   .+4
6931 012166 104000      8$:   HLT
6932
6933                ;CHECK TRANSFER OF REGISTER DATA BETWEEN THE GS AND GD REGISTERS
6934 012170 032737 000020 177776  GSTST: BIT  #20,@#PSW ;CHECK IF 'T' BIT IS SET
6935 012176 001050                BNE   7$          ;SKIP TEST IF 'T' BIT SET
6936 012200 010627                MOV   SP,(PC)+
6937 012202 000000      1$:   .WORD 0 ;SAVE STACK PTR
6938 012204 010727                MOV   PC,(PC)+
6939 012206 000000      2$:   .WORD 0 ;CONTAINS SAVED STACK PTR
;LOAD DATA. THE CURRENT PC IS USED AS
;DATA. IF THIS TEST FAILS 2$ CON-
    
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6940
6941 012210 005267 177772          INC      2$          ;TAINS THE DATA BEING USED.
6942 012214 016700 177766          3$: MOV      2$,R0    ;MAKE ODD TO CHECK BIT 0
6943 012220 010001                MOV      R0,R1     ;LOAD GD REGISTER 0
6944 012222 010102                MOV      R1,R2     ;TRANSFER GS REG 0 TO GD REG 1
6945 012224 010203                MOV      R2,R3     ;AND GS REG 1 TO GD REG 2
6946 012226 010304                MOV      R3,R4     ;ETC...
6947 012230 010405                MOV      R4,R5
6948 012232 152737 000340 177776    BISB    #340,@#PSW  ;SET PRIORITY LEVEL 7
6949 012240 010506                MOV      R5,SP     ;TRANSFER GS REG 5 TO GD STK PIR
6950 012242 010627                MOV      SP,(PC)+  ;TRANSFER GS STK PTR TO MEMORY
6951 012244 000000          4$: .WORD    0      ;CONTAINS GS STACK PTR
6952 012246 016706 177730          MOV      1$,SP     ;RESTORE STK PTR NEEDED FOR HLT/SCOPE
6953 012252 142737 000340 177776    BISB    #340,@#PSW  ;SET PRIORITY LEVEL 0
6954 012260 026700 177760          CMP      4$,R0     ;COMPARE GS/GD STACK WITH GS REG 0
6955 012264 001004                BNE      5$        ;BRANCH IF THEY WERE NOT =
6956 012266 006367 177714          ASL      2$        ;SHIFT TEST DATA UNTIL = 000000
6957 012272 001350                BNE      3$
6958 012274 000411                BR       6$
6959 012276 010046          5$: MOV      R0,-(SP)  ;GET GS REG 0
6960 012300 010146                MOV      R1,-(SP)  ;ETC...
6961 012302 010246                MOV      R2,-(SP)
6962 012304 010346                MOV      R3,-(SP)
6963 012306 010446                MOV      R4,-(SP)
6964 012310 010546                MOV      R5,-(SP)
6965 012312 104000                HLT
6966                                ;ERROR! DATA IN GS STK PTR NOT = GS REG 0
6967 012314 016706 177662          MOV      1$,SP     ;GS REG 0-GS REG 5 ARE ON THE STACK
6968                                ;RESTORE STACK PTR
6969 012320          6$:
6970 012320          7$:
6971 (3)          ;:*****
6972 (3)          ;:*TEST 5      TEST UNIARY WORD INSTRUCTIONS USING ADDRESS MODE 1
6973 (2)          ;:*****
6974 (2) 012320 000004          TST5:  SCOPE
6975 (2) 012322 112737 000005 001252    MOVB    #5,@#STSTM ;LOAD TEST NUMBER
6976 (2) 012330 013737 001252 177570    MOV     @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
6977 6971 012336 012737 000005 001376    MOV     #5,@#STIMES
6978 6972 012344 000401                BR      .+4
6979 6973 012346 000000          .WORD    0          ;RESERVE ADDRESS FOR TESTS
6980 6974 012350 010702                MOV     PC,R2
6981 6975 012352 162702 000004          SUB     #4,R2       ;R2 POINTS TO RESERVED WORD
6982 6976 012356 005012                CLR     (R2)        ;PRESET (R2)
6983 6977
6984 6978 012360 000261                SEC
6985 6979 012362 006012                ROR     (R2)        ;(R2)=100000,CC=1010
6986 6980 012364 101402                BLOS   ROR1
6987 6981 012366 100001                BPL   ROR1
6988 6982 012370 002001                BGE   .+4
6989 6983 012372 104000          ROR1:  HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
6990 6984
6991 6985 012374 000257                CCC
6992 6986 012376 000261                SEC
6993 6987 012400 005312                DEC     (R2)        ;(R2)=077777,CC=0011
6994 6988 012402 103001                BCC   DEC1
6995 6989 012404 003401                BLE   .+4

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6990	012406	104000	DEC1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
6991						
6992	012410	000257		CCC		
6993	012412	000261		SEC		
6994	012414	005512		ADC	(R2)	;(R2)=100000,CC=1010
6995	012416	103403		BCS	ADC1	
6996	012420	102002		BVC	ADC1	
6997	012422	100001		BPL	ADC1	
6998	012424	001001		BNE	+.4	
6999	012426	104000	ADC1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7000						
7001	012430	006112		ROL	(R2)	;(R2)=000000,CC=0111
7002	012432	103003		BCC	ROL1	
7003	012434	102002		BVC	ROL1	
7004	012436	001001		BNE	ROL1	
7005	012440	100001		BPL	+.4	
7006	012442	104000	ROL1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7007						
7008	012444	006112		ROL	(R2)	;(R2)=000001,CC=0000
7009	012446	101402		BLOS	ROL1A	;BRANCH IF C OR Z IS SET
7010	012450	102401		BVS	ROL1A	
7011	012452	100001		BPL	+.4	
7012	012454	104000	ROL1A:	HLT		
7013						
7014	012456	006212		ASR	(R2)	;(R2)=000000,CC=0111
7015	012460	103003		BCC	ASR1	
7016	012462	102002		BVC	ASR1	
7017	012464	001001		BNE	ASR1	
7018	012466	100001		BPL	+.4	
7019	012470	104000	ASR1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7020						
7021	012472	006012		ROR	(R2)	;(R2)=100000,CC=1010
7022	012474	103403		BCS	ROR1A	
7023	012476	102002		BVC	ROR1A	
7024	012500	001401		BEQ	ROR1A	
7025	012502	100401		BMI	+.4	
7026	012504	104000	ROR1A:	HLT		
7027						
7028	012506	000261		SEC		
7029	012510	005212		INC	(R2)	;(R2)=100001,CC=1001
7030	012512	103003		BCC	INC1	
7031	012514	102402		BVS	INC1	
7032	012516	001401		BEQ	INC1	
7033	012520	100401		BMI	+.4	
7034	012522	104000	INC1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7035						
7036	012524	005612		SBC	(R2)	;(R2)=100000,CC=1000
7037	012526	103403		BCS	SBC1	
7038	012530	102402		BVS	SBC1	
7039	012532	001401		BEQ	SBC1	
7040	012534	100401		BMI	+.4	
7041	012536	104000	SBC1:	HLT		;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7042						
7043	012540	000261		SEC		
7044	012542	005612		SBC	(R2)	;(R2)=077777,CC=0010
7045	012544	103403		BCS	SBC1A	

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7046 012546 102002          BVC  SBC1A
7047 012550 001401          BEQ  SBC1A
7048 012552 100001          BPL  .+4
7049 012554 104000          SBC1A: HLT ;ERROR. INCORRECT CC'S AS SHOEN ABOVE
7050
7051 012556 000261          SEC
7052 012560 005512          ADC  (R2) ;(R2)=100000,CC=1010
7053 012562 100401          BMI  .+4
7054 012564 104000          HLT
7055
7056 012566 000261          SEC
7057 012570 006312          ASL  (R2) ;(R2)=000000,CC=0111
7058 012572 103003          BCC  ASL1
7059 012574 102002          BVC  ASL1
7060 012576 001001          BNE  ASL1
7061 012600 100001          BPL  .+4
7062 012602 104000          ASL1: HLT ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7063
7064 012604 005112          COM  (R2) ;(R2)=177777,CC=1001
7065 012606 103002          BCC  COM1
7066 012610 102401          BVS  COM1
7067 012612 100401          BMI  .+4
7068 012614 104000          COM1: HLT ;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7069
7070 012616 000250          CLN
7071 012620 005712          TST  (R2) ;(R2)=177777,CC=1000
7072 012622 103403          BCS  TEST1
7073 012624 102402          BVS  TEST1
7074 012626 100001          BPL  TEST1
7075 012630 001001          BNE  .+4
7076 012632 104000          TEST1: HLT ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7077
7078 012634 000262          SEV
7079 012636 005412          NEG  (R2) ;(R2)=000001,CC=0000
7080 012640 103002          BCC  NEG1
7081 012642 102401          BVS  NEG1
7082 012644 001001          BNE  .+4
7083 012646 104000          NEG1: HLT ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7084
7085 012650 005312          DEC  (R2) ;(R2)=000000,CC=0101
7086 012652 103001          BCC  DEC1A
7087 012654 001401          BEQ  .+4
7088 012656 104000          DEC1A: HLT ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7089
(3) ;*****
(3) ;*TEST 6 CHECK UNIARY BYTE INSTRUCTIONS USING ADDRESS MODE 1
(2) ;*****
(2) 012660 000004          TST6: SCOPE
(2) 012662 112737 000006 001252          MOV  #6,@%STSTNM ;LOAD TEST NUMBER
(2) 012670 013737 001252 177570          MOV  @%STSTNM,@%DISPLAY ;:DISPLAY TEST NUMBER
7090 012676 000401          BR  .+4 ;RESERVE A WORD
7091 012700 000000          .WORD 0 ;ADDRESS RESERVED FOR TESTS
7092 012702 010703          MOV  PC,R3
7093 012704 162703 000004          SUB  #4,R3 ;R3 POINTS TO EVEN BYTE OF WORD
7094 012710 010304          MOV  R3,R4 ;R4 POINTS TO ODD BYTE OF WORD
7095 012712 005204          INC  R4
    
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7096 012714 005013          CLR      (R3)          ;PRESET DATA
7097
7098 012716 000261          1$: SEC
7099 012720 105513          ADCB    (R3)          ;ADD CARRY TO EVEN BYTE
7100 012722 100402          BMI    2$            ;UNTIL EVEN BYTE BECOMES NEGATIVE
7101 012724 105214          INCB    (R4)          ;INCREMENT ODD BYTE
7102 012726 000773          BR      1$
7103 012730 102401          2$: BVS    .+4        ;(R3)-077600=[0774][200],CC=1010
7104 012732 104000          HLT
7105 012734 000242          CLV
7106 012736 105214          INCB    (R4)          ;(R3)=100200=[1000][200],CC=1010
7107 012740 103402          BCS    INCB1
7108 012742 102001          BVC    INCB1
7109 012744 100401          BMI    .+4
7110 012746 104000          INCB1: HLT            ;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7111
7112 012750 106114          ROLB    (R4)          ;(R3)=000200=[0000][200],CC=0111
7113 012752 103002          BCC    ROLB1
7114 012754 102001          BVC    ROLB1
7115 012756 001401          BEQ    .+4
7116 012760 104000          ROLB1: HLT           ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7117
7118 012762 105614          SBCB    (R4)          ;(R3)=177600=[1774][200], CC=1001
7119 012764 103002          BCC    SBCB1
7120 012766 102401          BVS    SBCB1
7121 012770 100401          BMI    .+4
7122 012772 104000          SBCB1: HLT           ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7123
7124 012774 106313          ASLB    (R3)          ;(R3)=177400,CC=0111
7125 012776 103002          BCC    ASLB1
7126 013000 102001          BVC    ASLB1
7127 013002 001401          BEQ    .+4
7128 013004 104000          ASLB1: HLT           ;! JR! INCORRECT CC'S AS SHOWN ABOVE
7129
7130 013006 105413          NEGB    (R3)          ;(R3)=177400,CC=0100
7131 013010 103402          BCS    NEGB1
7132 013012 102401          BVS    NEGB1
7133 013014 001401          BEQ    .+4
7134 013016 104000          NEGB1: HLT           ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7135
7136 013020 000277          SCC
7137 013022 105313          DECB    (R3)          ;(R3)=177777,CC=1001
7138 013024 103002          BCC    DECB1
7139 013026 102401          BVS    DECB1
7140 013030 001001          BNE    .+4
7141 013032 104000          DECB1: HLT           ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7142
7143 013034 000241          CLC
7144 013036 106013          RORB    (R3)          ;(R3)=177577,CC=0011
7145 013040 103002          BCC    RORB1
7146 013042 102001          BVC    RORB1
7147 013044 100001          BPL    .+4
7148 013046 104000          RORB1: HLT           ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7149
7150 013050 000241          CLC
7151 013052 105114          COMB    (R4)          ;(R3)=000177,CC=0101
    
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7152	013054	103002	BCC	COMB1	
7153	013056	102401	BVS	COMB1	
7154	013060	001401	BEQ	+.4	
7155	013062	104000	COMB1:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7156					
7157	013064	106213	1\$:	ASRB (R3)	;SHIFT EVEN BYTE UNTIL V CLEARS
7158	013066	102002		BVC 2\$	
7159	013070	105514		ADCB (R4)	;AND ADD CARRY TO ODD BYTE
7160	013072	000774		BR 1\$	
7161	013074	103401	2\$:	BCS ASRB1	
7162	013076	001401		BEQ .+4	
7163	013100	104000	ASRB1:	HLT	;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7164					
7165	013102	106214		ASRB (R4)	
7166	013104	106214		ASRB (R4)	; (R3)=000400,CC=0011
7167	013106	103002		BCC ASRB1A	
7168	013110	102001		BVC ASRB1A	
7169	013112	001001		BNE .+4	
7170	013114	104000	ASRB1A:	HLT	;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7171					
7172	013116	105314		DECB (R4)	; (R3)=000000,CC=0100
7173	013120	001401		BEQ .+4	
7174	013122	104000		HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7175					
7176	013124	000261		SEC	
7177	013126	106014		RORB (R4)	; (R3)=100000,CC 1010
7178	013130	103402		BCS RORB1A	
7179	013132	102001		BVC RORB1A	
7180	013134	100401		BMI .+4	
7181	013136	104000	RORB1A:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7182					
7183	013140	000242		CLV	
7184	013142	105314		DECB (R4)	; (R3)=077400,CC=0100
7185	013144	102401		BVS .+4	
7186	013146	104000		HLT	
7187					
7188	013150	000261		SEC	
7189	013152	105313		DECB (R3)	; (R3)=077777,CC=1001
7190	013154	103002		BCC DECB1A	
7191	013156	102401		BVS DECB1A	
7192	013160	100401		BMI .+4	
7193	013162	104000	DECB1A:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7194					
7195	013164	000277		SCC	
7196	013166	000313		SWAB (R3)	; (R3)=177577-[1774][177],CC=0000
7197	013170	103402		BCS SWAB1	
7198	013172	102401		BVS SWAB1	
7199	013174	100001		BPL .+4	
7200	013176	104000	SWAB1:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7201					
7202	013200	105714		TSTB (R4)	; (R3)=177577=[1774][177],CC=1000
7203	013202	103402		BCS TSTB1	
7204	013204	102401		BVS TSTB1	
7205	013206	100401		BMI .+4	
7206	013210	104000	TSTB1:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7207					


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7208 013212 105014      CLRB      (R4)          ;(R3)=000177=[0000][177],CC=0100
7209 013214 001401      BEQ      .+4
7210 013216 104000      HLT
7211 013220 106313      ASLB      (R3)          ;(R3)=000376 ,CC=1010
7212 013222 103402      BCS      ASLB1A
7213 013224 102001      BVC      ASLB1A
7214 013226 100401      BMI      .+4
7215 013230 104000      ASLB1A: HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7216
7217
7218 013232 105113      COMB      (R3)          ;(R3)=000001,CC=0001
7219 013234 103002      BCC      COMB1A
7220 013236 102401      BVS      COMB1A
7221 013240 100001      BPL      .+4
7222 013242 104000      COMB1A: HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7223
7224 013244 000313      SWAB      (R3)          ;(R3)=000400, CC=0100
7225 013246 001401      BEQ      .+4
7226 013250 104000      HLT
7227
7228 013252 105213      INCB      (R3)
7229 013254 000261      SEC
7230 013256 105613      SBCB      (R3)          ;(R3)=000400,CC=0100
7231 013260 001401      BEQ      .+4
7232 013262 104000      HLT
7233 013264 022713      CMP      #400,(R3)      ;CHECK REMAINING RESULT
7234 013270 001401      BEQ      .+4
7235 013272 104000      HLT
7236
(3)
(3)
(2)
(2) 013274 000004      TST7:  SCOPE
(2) 013276 112737      MOV      #7,@#STSTNM    ;LOAD TEST NUMBER
(2) 013304 013737      MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
7237 013312 000401      BR      .+4
7238 013314 000000      .WORD   0              ;ADDRESS RESERVED FOR TESTS
7239 013316 010704      MOV      PC,R4
7240 013320 162704      SUB      #4,R4          ;R4 AND R5 POINT TO
7241 013324 010405      MOV      R4,R5         ;RESERVED WORD
7242 013326 005015      CLR      (R5)          ;PRESET DATA=0
7243
7244 013330 000277      SCC
7245 013332 000244      CLZ
7246 013334 005725      TST      (R5)+         ;(R5)=000000,CC=0100
7247 013336 103402      BCS      TEST2
7248 013340 102401      BVS      TEST2
7249 013342 001401      BEQ      .+4
7250 013344 104000      TEST2: HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7251
7252 013346 005145      COM      -(R5)         ;(R5)=177777,CC=1001
7253 013350 103001      BCC      COM4
7254 013352 100401      BMI      .+4
7255 013354 104000      COM4:  HLT          ;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7256
7257 013356 000241      CLC
    
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000400

000004

000007 001252
001252 177570

7258	013360	006024	ROR	(R4)+	;(R4)=077777,CC=0011
7259	013362	103002	BCC	ROR2	
7260	013364	102001	BVC	ROR2	
7261	013366	100001	BPL	+.4	
7262	013370	104000	ROR2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7263					
7264	013372	000257	CCC		
7265	013374	005244	INC	-(R4)	;(R4)=100000,CC=1010
7266	013376	102002	BVC	INC4	
7267	013400	001401	BEQ	INC4	
7268	013402	100401	BMI	+.4	
7269	013404	104000	INC4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7270					
7271	013406	000261	SEC		
7272	013410	000324	SWAB	(R4)+	;(R4)=000200,CC=1000
7273	013412	103401	BCS	SWAB2	
7274	013414	100401	BMI	+.4	
7275	013416	104000	SWAB2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7276					
7277	013420	005425	NEG	(R5)+	;(R5)=177600,CC=1001
7278	013422	103001	BCC	NEG2	
7279	013424	100401	BMI	+.4	
7280	013426	104000	NEG2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7281					
7282	013430	005044	CLR	-(R4)	;(R4)=000000,CC=0100
7283	013432	001401	BEQ	+.4	
7284	013434	104000	HLT		
7285					
7286	013436	000261	SEC		
7287	013440	006045	ROR	-(R5)	;(R5)=100000,CC=1010
7288	013442	000261	SEC		
7289	013444	005525	ADC	(R5)+	;(R5)=100001,CC 1000
7290	013446	102401	BVS	ADC2	
7291	013450	100401	BMI	+.4	
7292	013452	104000	ADC2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7293					
7294	013454	000262	SEV		
7295	013456	006224	ASR	(R4)+	;(R4)=140000,CC=1001
7296	013460	103002	BCC	ASR2	
7297	013462	102401	BVS	ASR2	
7298	013464	100401	BMI	+.4	
7299	013466	104000	ASR2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7300					
7301	013470	000262	SEV		
7302	013472	006144	ROL	-(R4)	;(R4)=100001, CC=1001
7303	013474	103002	BCC	ROL4	
7304	013476	102401	BVS	ROL4	
7305	013500	100401	BMI	+.4	
7306	013502	104000	ROL4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7307					
7308	013504	005645	SBC	-(R5)	;(R5)=100000,CC=1000
7309	013506	103001	BCC	+.4	
7310	013510	104000	HLT		;ERROR! 'C' BIT FAILED TO CLEAR
7311					
7312	013512	005325	DEC	(R5)+	;(R5)=077777,CC=0010
7313	013514	103402	BCS	DEC2	

```

7314 013516 102001      BVC      DEC2
7315 013520 100001      BPL      .+4
7316 013522 104000      DEC2:   HLT          ;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7317
7318 013524 006324      ASL      (R4)+      ;(R4)=177776,CC=1010
7319 013526 102401      BVS      .+4
7320 013530 104000      HLT
7321 013532 006344      ASL      -(R4)      ;(R4)-177774,CC=1001
7322 013534 103003      BCC      ASL4
7323 013536 102402      BVS      ASL4
7324 013540 001401      BEQ      ASL4
7325 013542 100401      BMI      .+4
7326 013544 104000      ASL4:   HLT          ;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7327
7328 013546 022724 177774      CMP      #177774,(R4)+
7329 013552 001401      BEQ      .+4
7330 013554 104000      HLT
7331 013556 020405      CMP      R4,R5
7332 013560 001401      BEQ      .+4
7333 013562 104000      HLT
7334
(3)
(3)
(2)
(2) 013564 000004      TST10:  SCOPE
(2) 013566 112737 000010 001252      MOV      #10,@#STSTM ;LOAD TEST NUMBER
(2) 013574 013737 001252 177570      MOV      @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
7335 013602 000401      BR      .+4 ;RESERVE A WORD
7336 013604 000000      .WORD   0 ;RESERVED WORD
7337 013606 010705      MOV      PC,R5
7338 013610 162705 000004      SUB      #4,R5 ;R5 POINTS TO EVEN BYTE OF RESERVED WORD
7339 013614 010500      MOV      R5,R0
7340 013616 010002      MOV      R0,R2
7341 013620 005202      INC      R2 ;R2 POINTS TO ODD BYTE OF RESERVED WORD
7342 013622 005010      CLR      (R0) ;PRESET
7343
7344 013624 000277      SCC
7345 013626 000241      CLC
7346 013630 105125      COMB      (R5)+      ;(R0)=000377,CC=1001
7347 013632 103002      BCC      COMB2
7348 013634 102401      BVS      COMB2
7349 013636 100401      BMI      .+4
7350 013640 104000      COMB2:  HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7351
7352 013642 105542      ADCB      -(R2)      ;(R0)=000000,CC=0101
7353 013644 001401      BEQ      .+4
7354 013646 104000      HLT          ;ERROR! INCORRECT RESULT AS SHOWN ABOVE
7355 013650 105525      ADCB      (R5)+      ;(R0)=000400,CC=0000
7356 013652 103401      BCS      ADCB2
7357 013654 001001      BNE      .+4
7358 013656 104000      ADCB2:  HLT          ;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7359
7360 013660 000263      +SEC. SEV
7361 013662 106045      RORB      -(R5)      ;(R0)=100000,CC=1001
7362 013664 103003      BCC      RORB4
7363 013666 102402      BVS      RORB4
    
```

7364	013670	001401	BEQ	RORB4	
7365	013672	100401	BMI	+.4	
7366	013674	104000	RORB4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7367					
7368	013676	000277	SCC		
7369	013700	106122	ROLB	(R2)+	;(R0)=100001,CC=0000
7370	013702	103403	BCS	ROLB2	
7371	013704	102402	BVS	ROLB2	
7372	013706	001401	BEQ	ROLB2	
7373	013710	100001	BPL	+.4	
7374	013712	104000	ROLB2:	HLT	;ERROR. INCORRECT CC'S AS SHOWN ABOVE
7375					
7376	013714	000257	CCC		
7377	013716	106225	ASRB	(R5)+	;(R0)=140001, CC=1010
7378	013720	103402	BCS	ASRB2	
7379	013722	102001	BVC	ASRB2	
7380					
7381	013724	100401	BMI	+.4	
7382	013726	104000	ASRB2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7383					
7384	013730	105242	INCB	-(R2)	;(R0)=140002,CC=0000
7385	013732	000277	SCC		
7386	013734	106222	ASRB	(R2)+	;(R0)=140001,CC=0000
7387	013736	103402	BCS	ASRB2A	
7388	013740	102401	BVS	ASRB2A	
7389	013742	100001	BPL	+.4	
7390	013744	104000	ASRB2A:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7391					
7392	013746	000266	+SEZ!SEV		;SET Z,V
7393	013750	106345	ASLB	-(R5)	;(R0)=100001,CC=1001
7394	013752	103003	BCC	ASLB4	
7395	013754	102402	BVS	ASLB4	
7396	013756	001401	BEQ	ASLB4	
7397	013760	100401	BMI	+.4	
7398	013762	104000	ASLB4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7399					
7400	013764	105322	DECB	(R2)+	;(R0)=077401=[0774][001] ,CC=0010
7401	013766	103002	BCC	DECB2	
7402	013770	102001	BVC	DECB2	
7403	013772	100001	BPL	+.4	
7404	013774	104000	DECB2:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7405					
7406	013776	105645	SBCB	-(R5)	;(R0)=077400, CC=0100
7407	014000	103402	BCS	SBCB4	
7408	014002	102401	BVS	SBCB4	
7409	014004	001401	BEQ	+.4	
7410	014006	104000	SBCB4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7411					
7412	014010	105442	NEGB	-(R2)	;(R0)=10400,CC=1001
7413	014012	103002	BCC	NEGB4	
7414	014014	102401	BVS	NEGB4	
7415	014016	100401	BMI	+.4	
7416	014020	104000	NEGB4:	HLT	;ERROR! INCORRECT CC'S AS SHOWN ABOVE
7417					
7418	014022	105725	TSTB	(R5)+	;(R0)=100400,CC=0100
7419	014024	103401	BCS	TSTB2	

```

7420 014026 001401          BEQ      .+4
7421 014030 104000          TSTB2: HLT
7422
7423 014032 105722          TSTB      (R2)+          ;(R0)=100400,CC=1000
7424 014034 001401          BEQ      TSTB2A
7425 014036 100401          BMI      .+4
7426 014040 104000          TSTB2A: HLT
7427
7428 014042 000261          SEC
7429 014044 000342          SWAB     -(R2)          ;(R0)=000201,CC=1000
7430 014046 103401          BCS     SWAB4
7431 014050 100401          BMI      .+4
7432 014052 104000          SWAB4: HLT
7433
7434 014054 000277          SCC
7435 014056 105225          INCB     (R5)+          ;(R0)=000601-[0004][201],CC=0000
7436 014060 103003          BCC     INCB2
7437 014062 102402          BVS     INCB2
7438 014064 001401          BEQ     INCB2
7439 014066 100001          BPL     .+4
7440
7441 014070 104000          INCB2: HLT
7442
7443
7444
7445 014072 022227 000601          CMP     (R2)+,#000601  ;CHECK END RESULT
7446 014076 001401          BEQ     .+4
7447 014100 104000          HLT
7448 014102 020205          CMP     R2,R5          ;CHECK REGISTERS
7449 014104 001401          BEQ     .+4
7450 014106 104000          HLT
7451
(3)
(3)
(2)
(2) 014110 000004          TST11: SCOPE
(2) 014112 112737 000011 001252          MOV     #11,@#STSTNM  ;LOAD TEST NUMBER
(2) 014120 013737 001252 177570          MOV     @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
7452 014126 000402          BR      .+6          ;RESERVE 2 WORDS
7453 014130 000000          .WORD  0          ;:1 FOR THE ADDRESS
7454 014132 000000          .WORD  0          ;AND 1 FOR DATA
7455 014134 010703          MOV     PC,R3
7456 014136 162703 000004          SUB     #4,R3
7457 014142 005013          CLR     (R3)          ;PRESET DATA
7458 014144 010300          MOV     R3,R0          ;R0 POINTS TO DATA WORD
7459 014146 005743          TST     -(R3)
7460 014150 010013          MOV     R0,(R3)
7461 014152 010304          MOV     R3,R4
7462
7463 014154 000257          CCC
7464 014156 005733          TST     @ (R3)+          ;(R0)=000000,CC=0100
7465 014160 001401          BEQ     .+4
7466 014162 104000          HLT
7467
7468 014164 000261          SEC
7469 014166 006053          ROR     @-(R3)          ;(R0)=100000,CC=1010
    
```

7470	014170	103402	BCS	ROR5	
7471	014172	102001	BVC	ROR5	
7472	014174	100401	BMI	.+4	
7473	014176	104000	ROR5:	HLT	
7474					
7475	014200	000257	CCC		
7476	014202	006234	ASR	@(R4)+	;(R0)=140000,CC=1010
7477	014204	102001	BVC	ASR3	
7478	014206	100401	BMI	.+4	
7479	014210	104000	ASR3:	HLT	
7480					
7481	014212	000250	CLN		
7482	014214	006333	ASL	@(R3)+	;(R0)=100000,CC=1001
7483	014216	103002	BCC	ASL3	
7484	014220	102401	BVS	ASL3	
7485	014222	100401	BMI	.+4	
7486	014224	104000	ASL3:	HLT	
7487					
7488	014226	000277	SCC		
7489	014230	005354	DEC	@-(R4)	;(R0)=077777, CC=0010
7490	014232	103003	BCC	DEC5	
7491	014234	102002	BVC	DEC5	
7492	014236	001401	BEQ	DEC5	
7493	014240	100001	BPL	.+4	
7494	014242	104000	DEC5:	HLT	
7495					
7496	014244	005453	NEG	@-(R3)	;(R0)=100001, CC=1001
7497	014246	103002	BCC	NEG5	
7498	014250	102401	BVS	NEG5	
7499	014252	100401	BMI	.+4	
7500	014254	104000	NEG5:	HLT	
7501					
7502	014256	000262	SEV		
7503	014260	005134	COM	@(R4)+	;(R0)=077776, CC=0001
7504	014262	103001	BCC	COM3	
7505	014264	102001	BVC	.+4	
7506	014266	104000	COM3:	HLT	
7507					
7508	014270	005233	INC	@(R3)+	;(R0)=077777, CC=0001
7509	014272	103001	BCC	INC3	
7510	014274	100001	BPL	.+4	
7511	014276	104000	INC3:	HLT	
7512					
7513	014300	005554	ADC	@-(R4)	;(R0)=100000, CC=1010
7514	014302	103402	BCS	ADC5	
7515	014304	102001	BVC	ADC5	
7516	014306	100401	BMI	.+4	
7517	014310	104000	ADC5:	HLT	
7518					
7519	014312	000257	CCC		
7520	014314	006134	ROL	@(R4)+	;(R0)=000000,CC=0111
7521	014316	103002	BCC	ROL3	
7522	014320	102001	BVC	ROL3	
7523	014322	001401	BEQ	.+4	
7524	014324	104000	ROL3:	HLT	
7525					

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7526 014326 005253      INC      @-(R3)          ;(R0)-000001, CC 0001
7527 014330 005654      SBR      @-(R4)          ;(R0)-000000, CC-0100
7528 014332 103401      BCS      SBC5
7529 014334 001401      BEQ      +4
7530 014336 104000      SBC5:  HLT
7531 (3)
7532 (3)
7533 (2)
7534 (2) 014340 000004      TST12: SCOPE
7535 (2) 014342 112737      MOV      #12,@$TSTNM    ;LOAD TEST NUMBER
7536 (2) 014350 013737      MOV      @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
7537 014356 000403      BR      +10             ;RESERVE 3 WORDS
7538 014360 000000      .WORD   0               ;1 FOR EVEN BYTE ADDRESS
7539 014362 000000      .WORD   0               ;1 FOR ODD BYTE ADDRESS
7540 014364 000000      .WORD   0               ;AND 1 FOR DATA
7541 014366 010702      MOV      PC,R2
7542 014370 005742      TST      -(R2)          ;BACK R2 UP TO
7543 014372 005742      TST      -(R2)          ;DATA WORD
7544 014374 010200      MOV      R2,R0          ;R0 POINTS TO THE DATA WORD
7545 014376 005010      CLR      (R0)           ;PRESET DATA
7546 014400 005742      TST      -(R2)          ;BACK R2 UP TO
7547 014402 005742      TST      -(R2)          ;EVEN BYTE ADDRESS WORD
7548 014404 010022      MOV      R0,(R2)+      ;LOAD ADDRESS
7549 014406 005200      INC      R0             ;ODD BYTE ADDRESS
7550 014410 010022      MOV      R0,(R2)+      ;LOAD ODD BYTE ADDRESS
7551 014412 010200      MOV      R2,R0          ;RESET R0
7552 014414 010205      MOV      R2,R5
7553 014416 105152      COMB     @-(R2)          ;(R0)=177400,CC=1001
7554 014418 103001      BCC      COMB5
7555 014420 100401      BMI     +4
7556 014422 100401      COMB5: HLT
7557 014424 104000      TSTB     @-(R2)          ;(R0)=177400, CC=0100
7558 014426 105752      BEQ      +4
7559 014428 104000      HLT
7560 014430 000262      SEV
7561 014432 106255      ASRB     @-(R5)          ;(R0)=177400, CC=1001
7562 014434 103002      BCC      ASRB5
7563 014436 102401      BVS      ASRB5
7564 014438 100401      BMI     +4
7565 014440 104000      ASRB5: HLT
7566 014442 105232      INCB     @-(R2)+        ;(R0)=177401, CC=000
7567 014444 103001      BCC      INCB3
7568 014446 100001      BPL     +4
7569 014448 104000      INCB3: HLT
7570 014450 000241      CLC
7571 014452 106055      RORB     @-(R5)          ;(R0)=177400, CC=0111
7572 014454 103003      BCC      RORB5
7573 014456 102002      BVC      RORB5
7574 014458 001001      BNE      RORB5
7575 014460 100001      BPL     +4
7576 014462 104000      RORB5: HLT
7577 014464 106332      ASLB     @-(R2)+        ;(R0)=177000, CC=1001

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7576 014500 103002      BCC    ASLB3
7577 014502 102401      BVS    ASLB3
7578 014504 100401      BMI    .+4
7579 014506 104000      ASLB3: HLT
7580
7581 014510 105552      ADCB   @-(R2)      ;(R0)=177400, CC=1000
7582 014512 103401      BCS   ADCB5
7583 014514 100401      BMI    .+4
7584 014516 104000      ADCB5: HLT
7585
7586 014520 000277      SCC
7587 014522 106135      ROLB   @ (R5)+      ;(R0)=177401, CC=0000
7588 014524 101402      BLOS  ROLB3        ;BRANCH IF C OR Z IS SET
7589 014526 102401      BVS   ROLB3
7590 014530 100001      BPL   .+4
7591 014532 104000      ROLB3: HLT
7592
7593 014534 000352      SWAB   @-(R2)      ;(R0)=000777, CC=1000
7594 014536 100401      BMI    .+4
7595 014540 104000      HLT
7596
7597 014542 000261      SEC
7598 014544 105635      SBCB   @ (R5)+      ;(R0)=000377, CC=0100
7599 014546 103401      BCS   SBCB3
7600 014550 001401      BEQ   .+4
7601 014552 104000      SBCB3: HLT
7602
7603 014554 105432      NEGB   @ (R2)+      ;(R0)=000001
7604 014556 105352      DECB   @-(R2)      ;(R0)=000000, CC=0101
7605 014560 103001      BCC   DECB5
7606 014562 001401      BEQ   .+4
7607 014564 104000      DECB5: HLT
7608
::*****
::*TEST 13      CHECK UNIARY WORD OPS USING ADDRESS MODE 6 (PC)
::*****
(3)
(3)
(2)
(2) 014566 000004      TST13: SCOPE
(2) 014570 112737 000013 001252      MOVVB #13,@#STSTNM ;LOAD TEST NUMBER
(2) 014576 013737 001252 177570      MOV   @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
7609 014604 005027      CLR   (PC)+        ;PRESET DATA = 0
7610 014606 000000      UWM6: .WORD 0      ;RESERVED FOR DATA
7611 014610 010700      MOV   PC,R0
7612 014612 024040      CMP   -(R0),-(R0) ;R0 POINTS TO DATA WORD
7613 014614 000277      SCC
7614 014616 006167 177764      ROL   UWM6        ;(R0)=000001,CC=0000
7615 014622 103403      BCS   ROL6
7616 014624 102402      BVS   ROL6
7617 014626 001401      BEQ   ROL6
7618 014630 100001      BPL   .+4
7619 014632 104000      ROL6: HLT
7620
7621 014634 005167 177746      COM   UWM6        ;(R0)=177776, CC=1001
7622 014640 103002      BCC   COM6
7623 014642 102401      BVS   COM6
7624 014644 100401      BMI   .+4
7625 014646 104000      COM6: HLT
    
```


7626	014650	006267	177732	ASR	UWM6	; (R0)=177777, CC=1010
7627	014654	103402		BCS	ASR6	
7628	014656	102001		BVC	ASR6	
7629	014660	100401		BMI	.+4	
7630	014662	104000		ASR6:	HLT	
7631						
7632	014664	000277		SCC		
7633	014666	005467	177714	NEG	UWM6	; (R0)-000001, CC=0001
7634	014672	103003		BCC	NEG6	
7635	014674	102402		BVS	NEG6	
7636	014676	001401		BEQ	NEG6	
7637	014700	100001		BPL	.+4	
7638	014702	104000		NEG6:	HLT	
7639						
7640	014704	000277		SCC		
7641	014706	006067	177674	ROR	UWM6	; (R0)-100000, CC=1001
7642	014712	103003		BCC	ROR6	
7643	014714	102402		BVS	ROR6	
7644	014716	001401		BEQ	ROR6	
7645	014720	100401		BMI	.+4	
7646	014722	104000		ROR6:	HLT	
7647						
7648	014724	005667	177656	SBC	UWM6	; (R0)=077777, CC=0010
7649	014730	103402		BCS	SBC6	
7650	014732	102001		BVC	SBC6	
7651	014734	100001		BPL	.+4	
7652	014736	104000		SBC6:	HLT	
7653						
7654	014740	000242		CLV		
7655	014742	005267	177640	INC	UWM6	; (R0)=100000, CC=1011
7656	014746	103403		BCS	INC6	
7657	014750	102002		BVC	INC6	
7658	014752	001401		BEQ	INC6	
7659	014754	100401		BMI	.+4	
7660	014756	104000		INC6:	HLT	
7661						
7662	014760	006267	177622	ASR	UWM6	; (R0)=140000, CC=1010
7663	014764	000261		SEC		
7664	014766	006367	177614	ASL	UWM6	; (R0)=100000, CC=1001
7665	014772	103002		BCC	ASL6	
7666	014774	102401		BVS	ASL6	
7667	014776	100401		BMI	.+4	
7668	015000	104000		ASL6:	HLT	
7669						
7670	015002	005367	177600	DEC	UWM6	; (R0)=077777, CC=0011
7671	015006	103002		BCC	DEC6	
7672	015010	102001		BVC	DEC6	
7673	015012	100001		BPL	.+4	
7674	015014	104000		DEC6:	HLT	
7675						
7676	015016	005567	177564	ADC	UWM6	; (R0)=100000, CC=1010
7677	015022	103402		BCS	ADC6	
7678	015024	102001		BVC	ADC6	
7679	015026	100401		BMI	.+4	
7680	015030	104000		ADC6:	HLT	
7681	015032	000242		CLV		

7682 015034 000367 177546
 7683 015040 100401
 7684 015042 104000
 7685 015044 022710 000200
 7686 015050 001401
 7687 015052 104000
 7688

SWAB UBM6
 BMI .+4
 HLT
 CMP #200,(R0)
 BEQ .+4
 HLT

 :*TEST 14 CHECK UNIARY BYTE OPS (EVEN/ODD) USING ADDRESS MODE 6 (PC)

(3)
 (3)
 (2)

(2) 015054 000004
 (2) 015056 112737 000014 001252
 (2) 015064 013737 001252 177570
 7689 015072 012700 015434
 7690 015076 063700 001604
 7691 015102 005067 000326
 7692 015106 000277
 7693 015110 000244
 7694 015112 105767 000316
 7695 015116 103403
 7696 015120 102402
 7697 015122 001001
 7698 015124 100001
 7699 015126 104000

TST14: SCOPE
 MOV8 #14,@#STSTNM ;LOAD TEST NUMBER
 MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
 MOV #UBM6,R0
 ADD @#FACTOR,R0 ;R0 POINTS TO ADDRESS OF DATA
 CLR UBM6 ;CLEAR DATA
 SCC
 CLZ
 TSTB UBM6
 BCS TSTB6
 BVS TSTB6
 BNE TSTB6
 BPL .+4
 TSTB6: HLT

7700
 7701 015130 000257
 7702 015132 105767 000277
 7703 015136 001401
 7704 015140 104000
 7705

CCC
 TSTB UBM6+1 ;TEST ODD BYTE
 BEQ .+4
 HLT

7706 015142 105667 000266
 7707 015146 103402
 7708 015150 102401
 7709 015152 001401
 7710 015154 104000
 7711

SBCB6: SBCB UBM6 ;(R0)=000000, CC=0100
 BCS SBCB6
 BVS SBCB6
 BEQ .+4
 SBCB6: HLT

7712 015156 000261
 7713 015160 105267 000250
 7714 015164 100403
 7715 015166 105567 000243
 7716 015172 000771
 7717 015174 103001
 7718 015176 102401
 7719 015200 104000
 7720

1\$: SEC
 INCB UBM6 ;LOOP UNTIL (R0)=077600, CC=1011
 BMI 2\$
 ADCB UBM6+1 ;INCB INST INCREMENTS EVEN BYTE
 BR 1\$;ADCB INCREMENTS ODD BYTE
 2\$: BCC INCB6
 BVS .+4
 INCB6: HLT

7721 015202 106367 000226
 7722 015206 103003
 7723 015210 102002
 7724 015212 001001
 7725 015214 100001
 7726 015216 104000
 7727

ASLB6: ASLB UBM6 ;(R0)=077400, CC=0111
 BCC ASLB6
 BVC ASLB6
 BNE ASLB6
 BPL .+4
 ASLB6: HLT

7728 015220 000242
 7729 015222 105567 000207
 7730 015226 103402
 7731 015230 102001

CLV
 ADCB UBM6+1 ;(R0)=100000, CC=1010
 BCS ADCB6
 BVC ADCB6

7732	015232	100401		BMI	.+4	
7733	015234	104000		ADCB6: HLT		
7734						
7735	015236	000261		SEC		
7736	015240	106067	000171	RORB	UBM6+1	;(RO)=140000, CC=1010
7737	015244	103402		BCS	RORB6	
7738	015246	102001		BVC	RORB6	
7739	015250	100401		BMI	.+4	
7740	015252	104000		RORB6: HLT		
7741						
7742	015254	105167	000154	COMB	UBM6	;(RO)=140377 CC=1001
7743	015260	103002		BCC	COMB6	
7744	015262	102401		BVS	COMB6	
7745	015264	100401		BMI	.+4	
7746	015266	104000		COMB6: HLT		
7747						
7748	015270	000262		SEV		
7749	015272	105467	000137	NEGB	UBM6+1	;(RO)=040377, CC=0001
7750	015276	103002		BCC	NEGB6	
7751	015300	102401		BVS	NEGB6	
7752	015302	100001		BPL	.+4	
7753	015304	104000		NEGB6: HLT		
7754						
7755	015306	106167	000123	ROLB	UBM6+1	;(RO)=100777, CC=1010
7756	015312	103402		BCS	ROLB6	
7757	015314	102001		BVC	ROLB6	
7758	015316	100401		BMI	.+4	
7759	015320	104000		ROLB6: HLT		
7760						
7761	015322	106267	000106	ASRB	UBM6	;(RO)=100777, CC=1001
7762	015326	103002		BCC	ASRB6	
7763	015330	102401		BVS	ASRB6	
7764	015332	100401		BMI	.+4	
7765	015334	104000		ASRB6: HLT		
7766						
7767	015336	105267	000072	INCB	UBM6	;(RO)=100400, CC=0101
7768	015342	103002		BCC	INCB6A	
7769	015344	102401		BVS	INCB6A	
7770	015346	001401		BEQ	.+4	
7771	015350	104000		INCB6A: HLT		
7772						
7773	015352	105367	000057	DECB	UBM6+1	;(RO)=100000, CC=1001
7774	015356	103003		BCC	DECB6A	
7775	015360	102402		BVS	DECB6A	
7776	015362	001401		BEQ	DECB6A	
7777	015364	100401		BMI	.+4	
7778	015366	104000		DECB6A: HLT		
7779						
7780	015370	000367	000040	SWAB	UBM6	;(RO)=000200, CC=1000
7781	015374	103401		BCS	SWAB6	
7782	015376	100401		BMI	.+4	
7783	015400	104000		SWAB6: HLT		
7784						
7785	015402	106167	000026	ROLB	UBM6	;(RO)=000000, CC=0111
7786	015406	103002		BCC	ROLB6A	
7787	015410	102001		BVC	ROLB6A	

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7788 015412 001401          BEQ      .+4
7789 015414 104000          ROLB6A: HLT
7790
7791 015416 005767 000012          TST      UBM6          ;(R0)=000000, CC=0100
7792 015422 103402          BCS      TEST6
7793 015424 102401          BVS      TEST6
7794 015426 001401          BEQ      .+4
7795 015430 104000          TEST6: HLT
7796
7797 015432 000401          BR       .+4          ;RESERVE A WORD
7798 015434 000000          UBM6:   .WORD      0          ;WORD RESERVED FOR DATA
7799 015436 000004          RELE1:  SCOPE
(1) 015440 010702          MOV      PC,R2
( ) 015442 062702 000012          ADD      #12,R2
(1) 015446 012707 044042          MOV      #RELOC,PC          ;GO RELOCATE PROGRAM CODE
(1) 015452 000000          REL11:  .WORD      0
(1) ;1111111111111111 LAST ADDRESS OF CODE TO BE RELOCATED 111111111111
7800
(3) ;*****
(3) ;*TEST 15 CHECK UNIARY WORD OPS USING ADDRESS MODE 7
(2) ;*****
(2) 015454 012767 000001 163714          TST15:  MOV      #1,$TIMES          ;;DO 1 ITERATION
(2) 015462 000004          SCOPE
(2) 015464 112737 000015 001252          MOV8    #15,@$STSTM          ;LOAD TEST NUMBER
(2) 015472 013737 001252 177570          MOV     @$STSTM,@$DISPLAY          ;;DISPLAY TEST NUMBER
7801
(1) ;SBTTL START OF SECTION 2
(1) ;2222222222222222 FIRST ADDRESS TO BE RELOCATED 22222222
(1) 015500 010700          REL2:   MOV      PC,R0          ;GET PC
(1) 015502 005740          TST     -(R0)          ;R0 CONTAINS THE ADDRESS OF REL2
(1) 015504 010037 001610          MOV     R0,@$FRSTAD          ;SAVE
(1) 015510 010700          MOV     PC,R0          ;GET CURRENT PC
(1) 015512 162700 015512          SUB     #. ,R0          ;SUBTRACT RELOCATION FACTOR
(1) 015516 010037 001604          MOV     R0,@$FACTOR          ;SAVE RELOCATION FACTOR
(1) 015522 010737 001262          MOV     PC,@$SLPERR          ;SET LOOP ADDRESS
(1) 015526 062737 000030 001262          ADD     #30,@$SLPERR          ;ADJUST
(1) 015534 013737 001262 001260          MOV     @$SLPERR,@$SLPADR
(1) 015542 105737 001600          TSTB   @WEXEC          ;BR IF TEST CODE TO BE EXECUTED
(1) 015546 001402          BEQ     .+6
(1) 015550 000167 004170          JMP     RELE2
7802 015554 000403          BR      UW7          ;RESERVE 3 WORDS FOR ADDRESSES & DATA
7803 015556 000000          .WORD  0          ;CONTAINS ADDRESS OF UW7
7804 015560 000000          UW7:   .WORD  0          ;CONTAINS DATA
7805 015562 000000          .WORD  0          ;CONTAINS ADDRESS OF UW7
7806
7807 015564 010700          UW7:   MOV     PC,R0
7808 015566 005740          TST     -(R0)
7809 015570 005740          TST     -(R0)
7810 015572 005040          CLR     -(R0)          ;CLEAR TEST DATA
7811 015574 010002          MOV     R0,R2
7812 015576 010240          MOV     R2,-(R0)          ;SET UP ADDRESS
7813 015600 005720          TST     (R0)+          ;MOVE R0 TO NEXT ADDRESS
7814 015602 005720          TST     (R0)+
7815 015604 010210          MOV     R2,(R0)          ;SET NEXT ADDRESS
7816 015606 010200          MOV     R2,R0          ;SET R0 POINTING TO DATA
    
```

7817	015610	000277		SCC		
7818	015612	000244		CLZ		
7819	015614	005772	000002	TST	@-2(2)	;(R0)=000000, CC=0100
7820	015620	001401		BEQ	+.4	
7821	015622	104000		HLT		
7822						
7823	015624	000277		SCC		
7824	015626	005672	177776	SBC	@-2(2)	;(R0)=177777, CC=1001
7825	015632	103002		BCC	SBC7	
7826	015634	102401		BVS	SBC7	
7827	015636	100401		BMI	+.4	
7828	015640	104000		SBC7:	HLT	
7829						
7830	015642	000277		SCC		
7831	015644	000241		CLC		
7832	015646	006372	000002	ASL	@-2(2)	;(R0)=177776, CC=1001
7833	015652	103002		BCC	ASL7	
7834	015654	102401		BVS	ASL7	
7835	015656	100401		BMI	+.4	
7836	015660	104000		ASL7:	HLT	
7837						
7838	015662	000257		CCC		
7839	015664	005372	000002	DEC	@-2(2)	;(R0)=177775, CC=1000
7840	015670	103402		BCS	DEC7	
7841	015672	102401		BVS	DEC7	
7842	015674	100401		BMI	+.4	
7843	015676	104000		DEC7:	HLT	
7844						
7845	015700	000262		SEV		
7846	015702	006272	177776	ASR	@-2(2)	;(R0)=177776, CC=1001
7847	015706	103002		BCC	ASR7	
7848	015710	102401		BVS	ASR7	
7849	015712	100401		BMI	+.4	
7850	015714	104000		ASR7:	HLT	
7851						
7852	015716	000241		CLC		
7853	015720	000262		SEV		
7854	015722	006072	177776	ROR	@-2(2)	;(R0)=077777, CC=0000
7855	015726	101402		BLOS	ROR7	;BRANCH IF C OR Z IS SET
7856	015730	102401		BVS	ROR7	
7857	015732	100001		BPL	+.4	
7858	015734	104000		ROR7:	HLT	
7859						
7860	015736	000262		SEV		
7861	015740	005472	000002	NEG	@-2(2)	;(R0)=100001, CC=1001
7862	015744	103002		BCC	NEG7	
7863	015746	102401		BVS	NEG7	
7864	015750	100401		BMI	+.4	
7865	015752	104000		NEG7:	HLT	
7866						
7867	015754	000250		CLN		
7868	015756	000372	177776	SWAB	@-2(2)	;(R0)=000600, CC=1000
7869	015762	103401		BCS	SWAB7	
7870	015764	100401		BMI	+.4	
7871	015766	104000		SWAB7:	HLT	
7872						

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7873 015770 000262          SEV
7874 015772 005172 000002    COM      @2(2)          ;(R0)=177177, CC=100;
7875 015776 103002          BCC      COM7
7876 016000 102401          BVS      COM7
7877 016002 100401          BMI      .+4
7878 016004 104000          COM7:   HLT
7879
7880 016006 000372 000002    SWAB     @2(2)          ;(R0)=077776, CC=1000
7881 016012 100401          BMI      .+4
7882 016014 104000          HLT
7883
7884 016016 000277          SCC
7885 016020 005572 177776    ADC      @-2(2)        ;(R0)=077777, CC=0000
7886 016024 103402          BCS      ADC7
7887 016026 102401          BVS      ADC7
7888 016030 100001          BPL      .+4
7889 016032 104000          ADC7:   HLT
7890
7891 016034 005272 000002    INC      @2(2)          ;(R0)=100000, CC=1010
7892 016040 102001          BVC      INC7
7893 016042 100401          BMI      .+4
7894 016044 104000          INC7:   HLT
7895
7896 016046 000257          CCC
7897 016050 006172 177776    ROL      @-2(2)        ;(R0)=000000, CC=0111
7898 016054 103002          BCC      ROL7
7899 016056 102001          BVC      ROL7
7900 016060 001401          BEQ      .+4
7901 016062 104000          ROL7:   HLT
7902
(3)
(3)
(2)
(2) 016064 000004          TST16:  SCOPE
(2) 016066 112737 000016 001252    MOV      #16,@#STSTNM      ;LOAD TEST NUMBER
(2) 016074 013737 001252 177570    MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
7903 016102 012700 015560    MOV      #UWM7,R0
7904 016106 063700 001604    ADD      @#FACTOR,R0
7905 016112 010002          MOV      R0,R2
7906 016114 010067 177442    MOV      R0,UWM7+2
7907 016120 005720          TST      (R0)+
7908 016122 005210          INC      (R0)          ;WORD FOLLOWING UWM7 CONTAINS ADDRESS
7909 016124 005740          TST      -(R0)        ;OF ODD BYTE, R0 POINTS TO DATA WORD
7910 016126 005010          CLR      (R0)          ;PRESET DATA
7911 016130 010067 177422    MOV      R0,UWM7-2
7912
7913
7914 016134 000263          ;NOTE:  @2(2) REFERENCES THE ODD BYTE, AND @-2(2) REFERENCES THE EVEN BYTE.
7915 016136 105672 000002    +SEC.SEV          ;SET C AND V
7916 016142 103003          SBCB      @2(2)          ;(R0)=177400, CC=1001
7917 016144 102402          BCC      SBCB7
7918 016146 001401          BVS      SBCB7
7919 016150 100401          BEQ      SBCB7
7920 016152 104000          BMI      .+4
7921
7922 016154 000277          SBCB7:   HLT
          SCC              ;SET CONDITION CODES
    
```

7923	016156	105572	177776	ADCB	a-2(2)	; (RO)=177401, CC=0000
7924	016162	103403		BCS	ADCB7	
7925	016164	102402		BVS	ADCB7	
7926	016166	001401		BEQ	ADCB7	
7927	016170	100001		BPL	.+4	
7928	016172	104000		ADCB7:	HLT	
7929						
7930	016174	105172	177776	COMB	a-2(2)	; (RO)=177776, CC=1001
7931	016200	103002		BCC	COMB7	
7932	016202	102401		BVS	COMB7	
7933	016204	100401		BMI	.+4	
7934	016206	104000		COMB7:	HLT	
7935						
7936	016210	000241		CLC		; CLEAR CARRY
7937	016212	106072	000002	RORB	a2(2)	; (RO)=077776, CC=0011
7938	016216	103002		BCC	RORB7	
7939	016220	102001		BVC	RORB7	
7940	016222	100001		BPL	.+4	
7941	016224	104000		RORB7:	HLT	
7942						
7943	016226	105272	000002	INCB	a2(2)	; (RO)=100376, CC=1011
7944	016232	103002		BCC	INCB7	
7945	016234	102001		BVC	INCB7	
7946	016236	100401		BMI	.+4	
7947	016240	104000		INCB7:	HLT	
7948						
7949	016242	105372	177776	DECB	a-2(2)	; (RO)=100375, CC=1001
7950	016246	103002		BCC	DECB7	
7951	016250	102401		BVS	DECB7	
7952	016252	100401		BMI	.+4	
7953	016254	104000		DECB7:	HLT	
7954						
7955	016256	106372	000002	ASLB	a2(2)	; (RO)=000375, CC=0111
7956	016262	103002		BCC	ASLB7	
7957	016264	102001		BVC	ASLB7	
7958	016266	001401		BEQ	.+4	
7959	016270	104000		ASLB7:	HLT	
7960						
7961	016272	000241		CLC		; CLEAR CARRY
7962	016274	106272	177776	ASRB	a-2(2)	; (RO)=000376, CC=1001
7963	016300	103002		BCC	ASRB7	
7964	016302	102401		BVS	ASRB7	
7965	016304	100401		BMI	.+4	
7966	016306	104000		ASRB7:	HLT	
7967						
7968	016310	105472	000002	NEGB	a2(2)	; (RO)=000376, CC=0100
7969	016314	103402		BCS	NEGB7	
7970	016316	102401		BVS	NEGB7	
7971	016320	001401		BEQ	.+4	
7972	016322	104000		NEGB7:	HLT	
7973						
7974	016324	000262		SEV		
7975	016326	106172	177776	ROLB	a-2(2)	; (RO)=00374, CC=1001
7976	016332	103002		BCC	ROLB7	
7977	016334	102401		BVS	ROLB7	
7978	016336	100401		BMI	.+4	

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7979 016340 104000          ROLB7: HLT
7980
7981 016342 105272 177776          INCB    @-2(2)          ;(R0)=000375, CC=1001
7982 016346 105272 177776          INCB    @-2(2)          ;(R0)=000376, CC=1001
7983 016352 105572 177776          ADCB    @-2(2)          ;(R0)=000377, CC=1000
7984 016356 105172 177776          COMB    @-2(2)          ;(R0)=000000, CC=0100
7985 016362 001401          BEQ     .+4
7986 016364 104000          HLT
7987
(3) ::*****
(3) :*TEST 17      CHECK BINARY OPS USING ADDRESS MODE 0
(2) ::*****
(2) 016366 000004          TST17: SCOPE
(2) 016370 112737 000017 001252          MOVB    #17,@#STSTNM          ;LOAD TEST NUMBER
(2) 016376 013737 001252 17757C          MOV     @#STSTNM,@#DISPLAY    ;:DISPLAY TEST NUMBER
7988 016404 000277          SCC     ;SET CONDITION CODES
7989 016406 010700          MOV     PC,R0                ;R0-PC, CC=X001
7990 016410 103002          BCC    MOV0
7991 016412 102401          BVS    MOV0
7992 016414 001001          BNE    .+4
7993 016416 104000          MOV0: HLT
7994
7995 016420 010002          MOV     R0,R2                ;R2=R0
7996 016422 000262          SEV    ;SET V
7997 016424 160002          SUB     R0,R2                ;R2=000000, CC=0100
7998 016426 103402          BCS    SUB0
7999 016430 102401          BVS    SUB0
8000 016432 001401          BEQ    .+4
8001 016434 104000          SUB0: HLT
8002
8003 016436 000244          CLZ
8004 016440 010203          MOV     R2,R3                ;R2=R3=000000, CC=0100
8005 016442 103401          BCS    MOV0A
8006 016444 001401          BEQ    .+4
8007 016446 104000          MOV0A: HLT
8008
8009 016450 000257          CCC
8010 016452 000272          +SEV!SEN                    ;SET V & N
8011 016454 020203          CMP     R2,R3                ;R2=R3=000000, CC=0100
8012 016456 103403          BCS    CMP0
8013 016460 102402          BVS    CMP0
8014 016462 001001          BNE    CMP0
8015 016464 100001          BPL    .+4
8016 016466 104000          CMP0: HLT
8017
8018 016470 010002          MOV     R0,R2                ;R0=R2
8019 016472 010203          MOV     R2,R3                ;R0=R2=R3
8020 016474 060203          ADD     R2,R3                ;R3=2*R0
8021 016476 006302          ASL    R2                    ;R2=2*R0
8022 016500 020203          CMP     R2,R3                ;R2=R3=2*R0
8023 016502 001401          BEQ    .+4
8024 016504 104000          HLT                          ;ERROR! CHECK ADD INSTRUCTION
8025
8026 ;THE FOLLOWING SUBTEST SHIFTS A BIT THROUGH R2 AND R5 AND DOES A
8027 ;BIT TEST (BIT) USING R2 AND R5.
8028 016506 005002          CLR     R2
    
```


8029	016510	005202	INC	R2	;R2=1
8030	016512	000402	BR	2\$	
8031	016514	006302	1\$: ASL	R2	
8032	016516	100407	BMI	4\$	
8033	016520	010205	2\$: MOV	R2,R5	
8034	016522	000277	SCC		;SET CC'S
8035	016524	030205	BIT	R2,R5	;R2=R5, CC=X001
8036	016526	103002	BCC	3\$	
8037	016530	102401	BVS	3\$	
8038	016532	001370	BNE	1\$	
8039	016534	104000	3\$: HLT		
8040	016536	010205	4\$: MOV	R2,R5	;R2 AND R5=100000(OCTAL)
8041	016540	000257	CCC		;CLEAR CC'S
8042	016542	030205	BIT	R2,R5	;R2=R5, CC=1000
8043	016544	100401	BMI	+.4	
8044	016546	104000	HLT		
8045					
8046	016550	005002	CLR	R2	
8047	016552	000277	SCC		;SET CC'S
8048	016554	050002	BIS	R0,R2	;R0=PC (NON-ZERIO DATA), CC=X001
8049	016556	103002	BCC	BIS0	
8050	016560	102401	BVS	BIS0	
8051	016562	001001	BNE	+.4	
8052	016564	104000	BIS0: HLT		
8053					
8054	016566	010003	MOV	R0,R3	
8055	016570	000277	SCC		;CC=1111
8056	016572	000244	CLZ		
8057	016574	040003	BIC	R0,R3	;R0=R3, CC=0101
8058	016576	103003	BCC	BIC0	
8059	016600	102402	BVS	BIC0	
8060	016602	001001	BNE	BIC0	
8061	016604	100001	BPL	+.4	
8062	016606	104000	BIC0: HLT		
8063					
8064	016610	010004	MOV	R0,R4	
8065	016612	005104	COM	R4	
8066	016614	040004	BIC	R0,R4	;R0=COMPLEMENT OF R4, R4 REMAINS UNCHANGED
8067	016616	005104	COM	R4	
8068	016620	020004	CMP	R0,R4	;R0=R4
8069	016622	001401	BEQ	+.4	
8070	016624	104000	HLT		
8071					
8072	016626	010004	MOV	R0,R4	
8073	016630	005104	COM	R4	
8074	016632	010403	MOV	R4,R3	;R3=R4
8075	016634	050003	BIS	R0,R3	;R3=COMPLEMENT OF R0, CC=1001
8076	016636	103001	BCC	BIS0A	
8077	016640	100401	BMI	+.4	
8078	016642	104000	BIS0A: HLT		
8079	016644	005203	INC	R3	;R3=0 AFTER INC
8080	016646	001401	BEQ	+.4	
8081	016650	104000	HLT		
8082	016652	010304	MOV	R3,R4	;R3=R4=0
8083	016654	005103	COM	R3	;R3=177777
8084	016656	000261	SEC		;SET C

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8085 016660 006004      ROR      R4          ;R4=100000
8086 016662 060304      ADD      R3,R4      ;R3=177777,R4=077777, CC=0011
8087 016664 103003      BCC     ADD0
8088 016666 102002      BVC     ADD0
8089 016670 001401      BEQ     ADD0
8090 016672 100001      SPL     .+4
8091 016674 104000      ADD0:  HLT
8092 016676 010700      MOV     PC,R0      ;R0=PC
8093 016700 022020      CMP     (R0)+,(R0)+ ;R0=R0+4
8094 016702 020007      CMP     R0,PC      ;PC=PC+4=R0
8095 016704 001401      BEQ     .+4
8096 016706 104000      HLT
8097
8098 016710 010700      MOV     PC,R0      ;R0=PC
8099 016712 062700 000010      ADD     #10,R0     ;R0=PC+10(8)
8100 016716 010002      MOV     R0,R2     ;R2=R0
8101 016720 020700      CMP     PC,R0     ;R0=PC
8102 016722 001002      BNE     CMPOA
8103 016724 020200      CMP     R2,R0     ;R2=R0
8104 016726 001401      BEQ     .+4
8105 016730 104000      CMPOA: HLT
8106
:*****
:*TEST 20      CHECK BINARY OPS USING ADDRESS MODE 1
:*****
(3)
(3)
(2)
(2) 016732 000004      TST20: SCOPE
(2) 016734 112737 000020 001252      MOV     #20,@#STSTM ;LOAD TEST NUMBER
(2) 016742 013737 001252 177570      MOV     @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
8107 016750 000402      BR      .+6        ;RESERVE TWO WORDS
8108 016752 000000      .WORD  0          ;RESERVED FOR SOURCE DATA
8109 016754 000000      .WORD  0          ;RESERVED FOR DESTINATION DATA
8110 016756 010704      MOV     PC,R4
8111 016760 005744      TST    -(R4)
8112 016762 005044      CLR    -(R4)      ;R4 POINTS TO DESTINATION DATA
8113 016764 010403      MOV     R4,R3
8114 016766 005043      CLR    -(R3)      ;R3 POINTS TO SOURCE DATA
8115
8116 016770 005113      COM    (R3)        ;(R3)=177777
8117 016772 005214      INC    (R4)        ;(R4)=000001
8118 016774 000262      SEV
8119 016776 061314      ADD    (R3),(R4)   ;(R3)=177777,(R4)=000000, CC=0101
8120 017000 103002      BCC    ADD1
8121 017002 102401      BVS    ADD1
8122 017004 001401      BEQ    .+4
8123 017006 104000      ADD1:  HLT
8124
8125 017010 000277      SCC
8126 017012 000250      CLN
8127 017014 021314      CMP    (R3),(R4)   ;(R3)=177777,(R4)=000000, CC=1000
8128 017016 103403      BCS    CMP1
8129 017020 102402      BVS    CMP1
8130 017022 001401      BEQ    CMP1
8131 017024 100401      BMI    .+4
8132 017026 104000      CMP1:  HLT
8133
8134 017030 000277      SCC
    
```

8135	017032	000244	CLZ		
8136	017034	031314	BIT	(R3), (R4)	; (R3)=177777, (R4)=000000, CC=0101
8137	017036	103002	BCC	BITT1	
8138	017040	102401	BVS	BITT1	
8139	017042	001401	BEQ	.+4	
8140	017044	104000	BITT1:	HLT	
8141					
8142	017046	000277	SCC		
8143	017050	000245	+CLC!CLZ		
8144	017052	005114	COM	(R4)	; (R4)=177777
8145	017054	161314	SUB	(R3), (R4)	; (R3)=177777, (R4)=000000, CC=0100
8146	017056	103402	BCS	SUB1	
8147	017060	102401	BVS	SUB1	
8148	017062	001401	BEQ	.+4	
8149	017064	104000	SUB1:	HLT	
8150					
8151	017066	105013	CLRB	(R3)	; (R3)=177400
8152	017070	000313	SWAB	(R3)	; (R3)=000377
8153	017072	000270	SEN		
8154	017074	011314	MOV	(R3), (R4)	; (R3)=(R4)=000377
8155	017076	100001	BPL	.+4	
8156	017100	104000	HLT		
8157	017102	000314	SWAB	(R4)	; (R3)=000377, (R4)=177400
8158	017104	000263	+SEC!SEV		; SET C & V
8159	017106	051314	BIS	(R3), (R4)	; (R3)=000377, (R4)=177777, CC=1001
8160	017110	103002	BCC	BIS1	
8161	017112	102401	BVS	BIS1	
8162	017114	100401	BMI	.+4	
8163	017116	104000	BIS1:	HLT	
8164					
8165	017120	041314	BIC	(R3), (R4)	; (R3)=000377, (R4)=177400, CC=1001
8166	017122	103002	BCC	BIC1	
8167	017124	102401	BVS	BIC1	
8168	017126	100401	BMI	.+4	
8169	017130	104000	BIC1:	HLT	
8170					
8171	017132	000262	SEV		; SET V
8172	017134	021314	CMP	(R3), (R4)	; (R3)=000377, (R4)=177400, CC=0001
8173	017136	103003	BCC	CMP1A	
8174	017140	102402	BVS	CMP1A	
8175	017142	001401	BEQ	CMP1A	
8176	017144	100001	BPL	.+4	
8177	017146	104000	CMP1A:	HLT	
8178					
8179	017150	005013	CLR	(R3)	; (R3)=000000
8180	017152	000261	SEC		
8181	017154	006013	ROR	(R3)	; (R3)=100000
8182	017156	011314	MOV	(R3), (R4)	; (R3)=(R4)=100000
8183	017160	005114	COM	(R4)	; (R4)=077777
8184	017162	161314	SUB	(R3), (R4)	; (R3)=100000, (R4)=177777, CC=1011
8185	017164	103002	BCC	SUB1A	
8186	017166	102001	BVC	SUB1A	
8187	017170	100401	BMI	.+4	
8188	017172	104000	SUB1A:	HLT	
8189					
8190	017174	000277	SCC		

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8191 017176 161314          SUB      (R3), (R4)          ;(R3)=100000, (R4)=077777, CC=0000
8192 017200 101402          BLOS    SUB1B              ;BRANCH IF C OR Z IS SET
8193 017202 102401          BVS     SUB1B
8194 017204 100001          BPL     .+4
8195 017206 104000          SUB1B: HLT
8196
8197 017210 011314          MOV     (R3), (R4)          ;(R3)=100000, (R4)=100000, CC=1000
8198 017212 001401          BEQ    MOV1
8199 017214 100401          BMI    .+4
8200 017216 104000          MOV1:  HLT
8201
8202 017220 061314          ADD     (R3), (R4)          ;(R3)=100000, (R4)=000000, CC=0111
8203 017222 103003          BCC    ADD1A
8204 017224 102002          BVC    ADD1A
8205 017226 001001          BNE    ADD1A
8206 017230 100001          BPL     .+4
8207 017232 104000          ADD1A: HLT
8208
8209 017234 005113          COM    (R3)                ;(R3)=077777
8210 017236 011314          MOV     (R3), (R4)          ;(R4)=077777
8211 017240 061314          ADD     (R3), (R4)          ;(R3)=077777, (R4)=177776, CC=1010
8212 017242 103402          BCS    ADD1B
8213 017244 102001          BVC    ADD1B
8214 017246 100401          BMI    .+4
8215 017250 104000          ADD1B: HLT
8216
8217
8218 017252 062714 000002          ADD     #2, (R4)
8219 017256 005714          TST    (R4)                ;CHECK FINAL RESULT
8220 017260 001401          BEQ    .+4
8221 017262 104000          HLT
8222
(3)
(3)
(2)
(2) 017264 000004          TST21: SCOPE
(2) 017266 112737 000021 001252          MOV     #21, @#STSTNM      ;LOAD TEST NUMBER
(2) 017274 013737 001252 177570          MOV     @#STSTNM, @#DISPLAY ;:DISPLAY TEST NUMBER
8223 017302 000402          BR     .+6
8224 017304 000000          .WORD 0
8225 017306 000000          .WORD 0
8226 017310 010705          MOV     PC, R5
8227 017312 005745          TST    -(R5)
8228 017314 005045          CLR    -(R5)                ;(R5)=000000
8229 017316 010502          MOV     R5, R2
8230 017320 005042          CLR    -(R2)                ;(R2)=000000
8231 017322 005202          INC    R2                    ;R2 POINTS TO ODD BYTE
8232 017324 105112          COMB   (R2)                  ;(R2)=177400
8233
8234 017326 000277          SCC
8235 017330 111215          MOV     (R2), (R5)          ;(R2)=177400, (R5)=000377, CC=1001
8236 017332 103005          BCC    MOV1
8237 017334 102404          BVS    MOV1
8238 017336 001403          BEQ    MOV1
8239 017340 100002          BPL    MOV1
8240 017342 105215          INCB   (R5)                ;CHECK RESULT

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8241 017344 001401
8242 017346 104000      MOVB1:  BEQ      .+4
8243
8244 017350 106312      ASLB     (R2)      ;SHIFT (R2) UNTIL
8245 017352 102376      BVC     .-2        ;(R2)=000000
8246 017354 106012      RORB    (R2)      ;(R2)=100000
8247 017356 105315      DECB   (R5)      ;(R5)=00377
8248 017360 106015      RORB    (R5)      ;(R5)=000177
8249 017362 000257      CCC
8250 017364 121512      CMPB   (R5),(R2)  ;(R5)=000177,(R2)=100000, CC=1010
8251 017366 102001      BVC    CMPB1
8252 017370 100401      BMI    .+4
8253 017372 104000      CMPB1:  HLT
8254
8255 017374 005003      CLR    R3
8256 017376 000261      SEC
8257 017400 006003      ROR    R3        ;R3=100000
8258 017402 050315      BIS    R3,(R5)   ;(R5)=100177
8259 017404 000273      +SEC.SEV!SEN    ;SET C,V, & N
8260 017406 131215      BITB   (R2),(R5) ;(R2)=100000,(R5)=100177, CC=0101
8261 017410 103002      BCC    BITB1
8262 017412 102401      BVS    BITB1
8263 017414 001401      BEQ    .+4
8264 017416 104000      BITB1:  HLT
8265
8266 017420 151215      BISB   (R2),(R5) ;(R2)=100000,(R5)=100377, CC=1001
8267 017422 103001      BCC    BISB1
8268 017424 100401      BMI    .+4
8269 017426 104000      BISB1:  HLT
8270
8271 017430 141215      BICB   (R2),(R5) ;(R2)=100000,(R5)=100177, CC=0001
8272 017432 103002      BCC    BICB1
8273 017434 001401      BEQ    BICB1
8274 017436 100001      BPL    .+4
8275 017440 104000      BICB1:  HLT
8276
8277 017442 105112      COMB   (R2)      ;(R2)=077400,(R5)=100177
8278 017444 121215      CMPB   (R2),(R5)
8279 017446 001401      BEQ    .+4
8280 017450 104000      HLT
8281
8282 017452 141512      BICB   (R5),(R2) ;(R5)=100177,(R2)=000000, CC=0100
8283 017454 001002      BNE    BICB1A
8284 017456 105712      TSTB   (R2)
8285 017460 001401      BEQ    .+4
8286 017462 104000      BICB1A: HLT
8287
8288 017464 000402      BR     .+6        ;RESERVE TWO WORDS FOR DATA
8289 017466 000000      .WORD 0          ;SOURCE DATA
8290 017470 000000      .WORD 0          ;DEST DATA
8291 017472 010705      MOV    PC,R5
8292 017474 005745      TST   -(R5)
8293 017476 105045      CLRB  -(R5)      ;R5 POINTS TO DEST ODD BYTE
8294 017500 010504      MOV   R5,R4
8295 017502 105044      CLRB  -(R4)      ;R4 POINTS TO DEST EVEN BYTE
8296 017504 010403      MOV   R4,R3
    
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8297 017506 105043 CLRB -(R3) ;R3 POINTS TO SOURCE ODD BYTE
8298 017510 010302 MOV R3,R2
8299 017512 105042 CLRB -(R2) ;R2 POINTS TO SOURCE EVEN BYTE
8300
8301 ;COMMENTS ARE LEAST SIGNIFICANT 4 BITS OF BYTES POINTED TO BY R2,R3
8302 ;R4, AND R5 RESPECTIVELY AND THE REMAINING BITS ARE 0'S.
8303 017514 000261 SEC ;SET CARRY
8304 ;(R2),(R3),(R4),(R5)
8305 017516 106112 ROLB (R2) ;0001,0000,0000,0000
8306 017520 111214 MOVB (R2),(R4) ;0001,0000,0001,0000
8307 017522 106112 ROLB (R2) ;0010,0000,0001,0000
8308 017524 111213 MOVB (R2),(R3) ;0010,0010,0001,0000
8309 017526 106112 ROLB (R2) ;0100,0010,0001,0000
8310 017530 111315 MOVB (R3),(R5) ;0100,0010,0001,0010
8311 017532 106112 ROLB (R2) ;1000,0010,0001,0010
8312 017534 106113 ROLB (R3) ;1000,0100,0001,0010
8313 017536 151215 BISB (R2),(R5) ;1000,0100,0001,1010
8314 017540 131512 BITB (R5),(R2) ;1000,0100,0001,1010
8315 017542 001426 BEQ BIN1
8316 017544 151314 BISB (R3),(R4) ;1000,0100,0101,1010
8317 017546 131413 BITB (R4),(R3) ;1000,0100,0101,1010
8318 017550 001423 BEQ BIN1
8319 017552 105213 INCB (R3) ;1000,0101,0101,1010
8320 017554 121314 CMPB (R3),(R4) ;1000,0101,0101,1010
8321 017556 001020 BNE BIN1
8322 017560 106113 ROLB (R3) ;1000,1010,0101,1010
8323 017562 121315 CMPB (R3),(R5) ;1000,1010,0101,1010
8324 017564 001015 BNE BIN1
8325 017566 106212 ASRB (R2) ;0100,1010,0101,1010
8326 017570 131214 BITB (R2),(R4) ;0100,1010,0101,1010
8327 017572 001412 BEQ BIN1
8328 017574 106015 RORB (R5) ;0100,1010,0101,0101
8329 017576 121415 CMPB (R4),(R5) ;0100,1010,0101,0101
8330 017600 001007 BNE BIN1
8331 017602 105314 DECB (R4) ;0100,1010,0100,0101
8332 017604 141214 BICB (R2),(R4) ;0100,1010,0000,0101
8333 017606 001004 BNE BIN1
8334 017610 111314 MOVB (R3),(R4) ;0100,1010,1010,0101
8335 017612 106213 ASRB (R3) ;0100,0101,1010,0101
8336 017614 141315 BICB (R3),(R5) ;0100,0101,1010,0101
8337 017616 001401 BEQ .+4
8338 017620 104000 BIN1: HLT

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*****
::*****
::*TEST 22 CHECK BINARY WORD OPS USING ADDRESS MODE 2 & 4
*****
::*****

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```

(2) 017622 000004 TST22: SCOPE
(2) 017624 112737 000022 001252 MOVB #22,@#STSTNM ;LOAD TEST NUMBER
(2) 017632 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
8340 017640 012704 017470 MOV #BICB1A+6,R4
8341 017544 012702 017466 MOV #BICB1A+4,R2
8342 017650 063702 001604 ADD @#FACTOR,R2
8343 017654 063704 001604 ADD @#FACTOR,R4
8344 017660 010405 MOV R4,R5 ;SET DESTINATION REGISTER
8345 017662 012715 000001 MOV #1,(R5)
8346 017666 012712 177777 MOV #-1,(R2)

```

8347	017672	000257		CCC		
8348	017674	000262		SEV		
8349	017676	062225		ADD	(R2)+,(R5)+	;(R2)=177777,(R5)=000000,CC=0101
8350	017700	103002		BCC	ADD2	
8351	017702	102401		BVS	ADD2	
8352	017704	001401		BEQ	.+4	
8353	017706	104000		ADD2:	HLT	
8354						
8355	017710	000262		SEV		:SET V
8356	017712	024527	000001	CMP	-(R5),#1	;(R5)=000000,CC=1001
8357	017716	103002		BCC	CMP2	
8358	017720	102401		BVS	CMP2	
8359	017722	100401		BMI	.+4	
8360	017724	104000		CMP2:	HLT	
8361						
8362	017726	054225		BIS	-(R2),(R5)+	;(R2)=177777,(R5)=177777,CC=1001
8363	017730	103001		BCC	BIS2	
8364	017732	100401		BMI	.+4	
8365	017734	104000		BIS2:	HLT	
8366	017736	000277		SCC		
8367	017740	000244		CLZ		
8368	017742	162245		SUB	(R2)+,-(R5)	;(R2)=177777,(R5)=000000,CC=0100
8369	017744	103402		BCS	SUB2	
8370	017746	102401		BVS	SUB2	
8371	017750	001401		BEQ	.+4	
8372	017752	104000		SUB2:	HLT	
8373						
8374	017754	005442		NEG	-(R2)	;(R2)=000001
8375	017756	005115		COM	(R5)	;(R5)=177777
8376	017760	000277		SCC		
8377	017762	000250		CLN		
8378	017764	042225		BIC	(R2)+,(R5)+	;(R2)=000001,(R5)=177776,CC=1001
8379	017766	103003		BCC	BIC2	
8380						
8381	017770	102402		BVS	BIC2	
8382	017772	001401		BEQ	BIC2	
8383	017774	100401		BMI	.+4	
8384	017776	104000		BIC2:	HLT	
8385						
8386	020000	012742	125252	MOV	#125252,-(R2)	
8387	020004	012245		MOV	(R2)+,-(R5)	
8388	020006	005125		COM	(R5)+	;(R5)=052525
8389	020010	000262		SEV		
8390	020012	034245		BIT	-(R2),-(R5)	;(R2)=125252,(R5)=052525,CC=0101
8391	020014	103002		BCC	BITT2	
8392	020016	102401		BVS	BITT2	
8393	020020	001401		BEQ	.+4	
8394	020022	104000		BITT2:	HLT	
8395						
8396	020024	000262		SEV		
8397	020026	052225		BIS	(R2)+,(R5)+	;(R2)=125252,(R5)=177777,CC=1001
8398	020030	103002		BCC	BIS2A	
8399	020032	102401		BVS	BIS2A	
8400	020034	100401		BMI	.+4	
8401	020036	104000		BIS2A:	HLT	
8402						

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8403 020040 042745 125252      BIC    #125252,-(R5)    ;(R5)=052525
8404 020044 005125              COM    (R5)+           ;(R5)=125252
8405 020046 024245              CMP    -(R2),-(R5)
8406 020050 001401              BEQ    +4
8407 020052 104000              HLT
8408
8409 020054 005012              CLR    (R2)
8410 020056 005122              COM    (R2)+           ;(R2)=177777
8411 020060 162742 000001      SUB    #1,-(R2)        ;(R2)=177776, (C=1000)
8412 020064 103402              BCS    SUB2A
8413 020066 102401              BVS    SUB2A
8414 020070 100401              BMI    +4
8415 020072 104000              HLT
8416 020074 010702              MOV    PC,R2           ;GET CURRENT PC
8417 020076 010205              MOV    R2,R5          ;MOVE TO R5
8418 020100 124245 1$:      CMPB   -(R2),-(R5)     ;COMPARE ALL PREVIOUS MEMORY ADDRESSES
8419 020102 001401              BEQ    +4
8420 020104 104000              HLT
8421 020106 020237 001610      CMP    R2,@FRSTAD     ;CHECK FOR LOW LIMIT
8422 020112 001372              BNE    1$

```

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;*****
;*TEST 23 CHECK BINARY BYTE OPS USING ADDRESS MODE 2 & 4
;*****

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```

(2) 020114 000004      TST23: SCOPE
(2) 020116 112737 000023 001252  MOVB   #23,@$TSTNM    ;LOAD TEST NUMBER
(2) 020124 013737 001252 177570  MOV    @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
8424 020132 000402      BR     +6             ;RESERVE TWO WORDS
8425 020134 000000      .WORD 0              ;SOURCE DATA
8426 020136 000000      .WORD 0              ;DESTINATION DATA
8427 020140 010703      MOV    PC,R3
8428 020142 005743      TST   -(R3)

```

```

;FIRST CHECK AUTO INCREMENT/DECREMENT
8431 020144 010300      MOV    R3,R0          ;R0=ADDRESS OF MOV ABOVE
8432 020146 010002      MOV    R0,R2          ;R2=R0
8433 020150 005302      DEC    R2             ;R2=R0-1
8434 020152 010604      MOV    SP,R4
8435 020154 010605      MOV    SP,R5
8436 020156 005745      TST   -(R5)          ;R5=SP-2
8437
8438 020160 114046      MOVB   -(R0),-(SP)    ;R0=R0-1, SP=SP-2
8439 020162 020506      CMP    R5,SP          ;R5=SP
8440 020164 001021      BNE    BINB
8441 020166 020200      CMP    R2,R0          ;R2=R0
8442 020170 001017      BNE    BINB
8443 020172 122026      CMPB   (R0)+,(SP)+    ;R0=R0+1, SP=SP+2
8444 020174 020406      CMP    R4,SP          ;R4=SP (SP BACK TO ORIGINAL)
8445 020176 001014      BNE    BINB
8446
8447 020200 020003      CMP    R0,R3          ;R0=R3 (R0 BACK TO ORIGINAL)
8448 020202 001012      BNE    BINB
8449 020204 154640      BLSB   -(SP),-(R0)    ;SP=SP-2, R0=R0-1
8450 020206 020506      CMP    R5,SP          ;R5=SP
8451 020210 001007      BNE    BINB
8452 020212 020200      CMP    R2,R0          ;R2=R0

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```

8453 020214 001005      BNE      BINB
8454 020216 142620      BICB    (SP)+,(R0)+      ;SP=SP+2,R0=R0+1 (SP BACK TO ORIGINAL)
8455 020220 020406      CMP     R4,SP           ;R4=SP
8456 020222 001002      BNE      BINB
8457 020224 020003      CMP     R0,R3          ;R0=R3
8458 020226 001401      BEQ     .+4
8459 020230 104000      HLT
BINB:
8460 020232 010003      MOV     R0,R3          ;R0=R3
8461 020234 112743 000200  MOVB    #200,-(R3)      ;R3=ODD BYTE (UPPER BYTE)
8462 020240 112743 000377  MOVB    #377,-(R3)     ;(R3)=100377, R3=EVEN BYTE (LOWER BYTE)
8463 020244 010304      MOV     R3,R4
8464 020246 112744 000177  MOVB    #177,-(R4)     ;R4= ODD BYTE (UPPER BYTE)
8465 020252 112744 000000  MOVB    #0,-(R4)      ;(R4)=077400, R4=EVEN BYTE (LOWER BYTE)
8466 020256 001401      BEQ     .+4
8467 020260 104000      HLT
8468
8469 020262 152324      BISB    (R3)+,(R4)+    ;(R3)=100377,(R4)=077777
8470 020264 100401      BMI     .+4
8471 020266 104000      HLT
8472
8473 020270 122324      CMPB    (R3)+,(R4)+    ;CC=0X10
8474 020272 103407      BCS    CMPB2
8475 020274 102001      BVC    CMPB2
8476 020276 100001      BPL     .+4
8477 020300 104000      HLT
CMPB2:
8478
8479 020302 000261      SEC
8480 020304 134344      BITB    -(R3),-(R4)    ;SET C BIT, CC=0X11
8481 020306 103002      BCC    BITB2
8482 020310 102401      BVS    BITB2
8483 020312 001401      BEQ     .+4
8484 020314 104000      HLT
BITB2:
8485
8486 020316 000244      CLZ
8487 020320 144344      BICB    -(R3),-(R4)    ;(R3)=100377,(R4)=077400
8488 020322 001401      BEQ     .+4
8489 020324 104000      HLT

```

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:*****
:*TEST 24      CHECK BINARY WORD OPS USING ADDRESS MODES 3 & 5
:*****

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```

(2) 020326 000004      TST24: SCOPE
(2) 020330 112737 000024 001252  MOVB    #24,@$TSTNM    ;LOAD TEST NUMBER
(2) 020336 013737 001252 177570  MOV     @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
8491 020344 000404      BR      2$             ;RESERVE SPACE FOR DATA AND ADDRESSES
8492 020346 000000      .WORD   0              ;CONTAINS ADDRESS OF SOURCE DATA
8493 020350 000000      .WORD   0              ;CONTAINS ADDRESS OF DEST DATA
8494 020352 000000      .WORD   0              ;CONTAINS SOURCE DATA
8495 020354 000000      .WORD   0              ;CONTAINS DEST DATA
8496 020356 010701      2$:  MOV     PC,R1
8497 020360 010100      MOV     R1,R0          ;SET SCOPE PTR
8498 020362 024040      CMP     -(R0),-(R0)    ;ADJUST R0
8499 020364 010005      MOV     R0,R5          ;R5 POINTS TO DEST DATA
8500 020366 024545      CMP     -(R5),-(R5)    ;SUB 4 FROM R5
8501 020370 010015      MOV     R0,(R5)        ;R5 POINTS TO ADDRESS OF DEST DATA
8502 020372 010502      MOV     R5,R2

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```

8503 020374 010004      MOV    R0,R4          ;R4 POINTS TO DEST DATA
8504 020376 005740      TST   -(R0)
8505 020400 010003      MOV    R0,R3          ;R3 POINTS TO SOURCE DATA
8506 020402 010042      MOV    R0,-(R2)      ;R2 POINTS TO ADDRESS OF SOURCE DATA
8507 020404 005013      CLR   (R3)           ;PRESET SOURCE DATA
8508 020406 005014      CLR   (R4)           ;PRESET DEST DATA
8509
8510 020410 000277      SCC
8511 020412 000244      CLZ
8512 020414 163235      SUB   @ (R2)+,@ (R5)+ ; (R3)=000000,(R4)=000000, CC=0100
8513 020416 103402      BCS  SUB3
8514 020420 102401      BVS  SUB3
8515 020422 001401      BEQ  .+4
8516 020424 104000      SUB3: HLT
8517
8518 020426 052752 100000      BIS   #100000,@-(R2) ; (R3)=100000
8519 020432 062755 000001      ADD  #1,@-(R5)      ; (R4)=000001
8520 020436 163235      SUB   @ (R2)+,@ (R5)+ ; (R3)=100000,(R4)=100001, CC=1011
8521 020440 103002      BCC  SUB3A
8522 020442 102001      BVC  SUB3A
8523 020444 100401      BMI  .+4
8524 020446 104000      SUB3A: HLT
8525
8526 020450 005414      NEG   (R4)           ; (R4)=077777
8527 020452 035255      BIT   @-(R2),@-(R5) ; (R3)=100000,(R4)=077777
8528 020454 001401      BEQ  .+4
8529 020456 104000      HLT
8530 020460 023235      CMP   @ (R2)+,@ (R5)+
8531 020462 102401      BVS  .+4
8532 020464 104000      HLT
8533 020466 005152      COM   @-(R2)
8534 020470 000257      CCC
8535 020472 063255      ADD   @ (R2)+,@-(R5)
8536 020474 102001      BVC  ADD3
8537 020476 100401      BMI  .+4
8538 020500 104000      ADD3: HLT
8539 020502 000261      SEC
8540 020504 045235      BIC   @-(R2),@ (R5)+ ; (R3)=077777,(R4)=100000
8541 020506 103001      BCC  BIC3
8542 020510 100401      BMI  .+4
8543 020512 104000      BIC3: HLT
8544
8545 020514 005155      COM   @-(R5)         ; (R4)=077777
8546 020516 023235      CMP   @ (R2)+,@ (R5)+ ; (R3)=077777,(R4)=077777
8547 020520 001401      BEQ  .+4
8548 020522 104000      HLT
8549

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*****
*TEST 25 CHECK BINARY BYTE OPS USING ADDRESS MODES 3 & 5
*****

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```

(2) 020524 000004      TST25: SCOPE
(2) 020526 112737 000025 001252      MOV   #25,@#STSTNM ;LOAD TEST NUMBER
(2) 020534 013737 001252 177570      MOV   @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
8550 020542 000406      BR    1$           ;RESERVE SPACE FOR ADDRESS AND DATA
8551 020544 000000      .WORD 0           ;CONTAINS ADDRESS OF SOURCE DATA (EVEN BYTE)
8552 020546 000000      .WORD 0           ;CONTAINS ADDRESS OF SOURCE DATA (ODD BYTE)

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8553 020550 000000 .WORD 0 ;CONTAINS ADDRESS OF DEST DATA (EVEN BYTE)
8554 020552 000000 .WORD 0 ;CONTAINS ADDRESS OF DEST DATA (ODD BYTE)
8555 020554 000000 .WORD 0 ;CONTAINS SOURCE DATA
8556 020556 000000 .WORD 0 ;CONTAINS DEST DATA
8557
8558 020560 010700 1$: MOV PC,R0
8559 020562 024040 CMP -(R0),-(R0) ;R0=ADDRESS OF DEST DATA
8560 020564 010003 MOV R0,R3 ;R3
8561 020566 010305 MOV R3,R5 ;R5 .. ..
8562 020570 005743 TST -(R3) ;SUB 2 FROM R3
8563 020572 010043 MOV RO, -(R3) ;R3 POINTS TO ADDRESS OF DEST DATA
8564 020574 005213 INC (R3) ;ODD BYTE
8565 020576 010043 MOV RO, -(R3) ;EVEN BYTE
8566 020600 010304 MOV R3,R4
8567 020602 005740 TST -(R0) ;R0=ADDRESS OF SOURCE DATA
8568 020604 010044 MOV RO, -(R4) ;R4 POINTS TO ADDRESS OF SOURCE DATA
8569 020606 005214 INC (R4) ;ODD BYTE
8570 020610 010044 MOV RO, -(R4) ;EVEN BYTE
8571
8572 020612 000261 SEC ;SET CARRY
8573 020614 012734 177001 MOV #177001,a(R4)+
8574 020620 112734 000200 MOVB #200,a(R4)+ ;SOURCE DATA=100001
8575 020624 115433 MOVB a-(R4),a(R3)+
8576 020626 115433 MOVB a-(R4),a(R3)+ ;DEST DATA=000600
8577 020630 103401 BCS .+4
8578 020632 104000 HLT ;ERROR! MOV DOES AFFECT C BIT IN PSW
8579 020634 022715 000600 CMP #600,(R5) ;CHECK DEST DATA
8580 020640 001401 BEQ .+4
8581 020642 104000 HLT ;ERROR! INCORRECT RESULT
8582 020644 024343 CMP -(R3),-(R3) ;POINT R4 BACK TO EVEN BYTE
8583 020646 153433 BISB a(R4)+,a(R3)+
8584 020650 153433 BISB a(R4)+,a(R3)+ ;DEST DATA=100601
8585 020652 022715 100601 CMP #100601,(R5) ;CHECK RESULT
8586 020656 001401 BEQ .+4
8587 020660 104000 HLT ;ERROR! INCORRECT DEST DATA AFTER BISB
8588 020662 145453 BICB a-(R4),a-(R3)
8589 020664 145453 BICB a-(R4),a-(R3)
8590 020666 133433 BITB a(R4)+,a(R3)+
8591 020670 001002 BNE BITB3
8592 020672 135433 BITB a-(R4),a(R3)+
8593 020674 001001 BNE .+4
8594 020676 104000 BITB3: HLT
8595
8596 020700 123453 CMPB a(R4)+,a-(R3)
8597 020702 001002 BNE CMPB3
8598 020704 123453 CMPB a(R4)+,a-(R3)
8599 020706 001401 BEQ .+4
8600 020710 104000 CMPB3: HLT
8601
(3) ;*****
(3) ;*TEST 26 CHECK BINARY OPS USING ADDRESS MODE 6
(2) ;*****
(2)
(2) 020712 000004 TST26: SCOPE
(2) 020714 112737 000026 001252 MOVB #26,a$TSTNM ;LOAD TEST NUMBER
(2) 020722 013737 001252 177570 MOV a$TSTNM,a$DISPLAY ;:DISPLAY TEST NUMBER
8602 020730 000402 BR .+6 ;RESERVE TWO LOCATIONS
    
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8603 020732 000000          SDATA: .WORD 0          ;RESERVED FOR SOURCE DATA
8604 020734 000000          DDATA: .WORD 0          ;RESERVED FOR DESTINATION DATA
8605
8606 020736 013702 001604    MOV      @#FACTOR,R2      ;GET RELOCATION FACTOR AND USE AS AN
8607 020742 010205          MOV      R2,R5           ;INDEX VALUE TO POINT TO DATA
8608 020744 005065 020734    CLR      DDATA(5)        ;PRESET DESTINATION DATA
8609 020750 012762 000001 020732 MOV      #1,SDATA(2)      ;THIS ROUTINE PUT A 1 BIT INTO EVERY
8610 020756 056265 020732 020734 1$:  BIS      SDATA(2),DDATA(5) ;OTHER BIT POSITION IN THE DEST-
8611 020764 006362 020732          ASL      SDATA(2)         ;INATION ADDRESS (52525)
8612 020770 006362 020732          ASL      SDATA(2)
8613 020774 103370          BCC      1$
8614 020776 022765 052525 020734 CMP      #52525,DDATA(5) ;CHECK RESULT
8615 021004 001401          BEQ      .+4
8616 021006 104000          HLT
8617 021010 012762 177777 020732 MOV      #-1,SDATA(2)     ;ERROR. INCORRECT RESULT
8618 021016 046562 020734 020732 BIC      DDATA(5),SDATA(2) ;SOURCE DATA=125252
8619 021024 036265 020732 020734 BIT      SDATA(2),DDATA(5)
8620 021032 001401          BEQ      .+4
8621 021034 104000          HLT
8622 021036 006365 020734          ASL      DDATA(5)         ;ERROR! BIT INST FAILED
8623 021042 026265 020732 020734 CMP      SDATA(2),DDATA(5) ;DDATA=125252
8624 021050 001401          BEQ      .+4
8625
8626 021052 104000          HLT
8627 021054 000257          CCC
8628 021056 066265 020732 020734 ADD      SDATA(2),DDATA(5)
8629 021064 103002          BCC      ADD6
8630 021066 102001          BVC      ADD6
8631 021070 100001          BPL      .+4
8632 021072 104000          ADD6:  HLT
8633
8634 021074 006362 020732          ASL      SDATA(2)         ;SDATA=52524
8635 021100 166265 020732 020734 SUB      SDATA(2),DDATA(5)
8636 021106 103401          BCS      SUB6
8637 021110 001401          BEQ      .+4
8638 021112 104000          SUB6:  HLT
8639
8640 021114 112700 000377    MOVB     #377,R0         ;R0=177777 (MOVB XR EXTENDS SIGN)
8641 021120 010062 020732          MOV      R0,SDATA(2)
8642 021124 012765 177777 020734 MOV      #-1,DDATA(5)
8643 021132 166500 020734          SUB      DDATA(5),R0
8644 021136 001401          BEQ      .+4
8645 021140 104000          HLT
8646 021142 066265 020732 020734 1$:  ADD      SDATA(2),DDATA(5)
8647 021150 006362 020732          ASL      SDATA(2)
8648 021154 005162 020732          COM      SDATA(2)
8649 021160 036265 020732 020734 BIT      SDATA(2),DDATA(5)
8650 021166 001401          BEQ      .+4
8651 021170 104000          HLT
8652 021172 005162 020732          COM      SDATA(2)
8653 021176 026265 020732 020734 CMP      SDATA(2),DDATA(5)
8654 021204 001401          BEQ      .+4
8655 021210 104000          HLT
8656 021210 026200 020732          CMP      SDATA(2),R0
8657 021214 001352          BNE      1$
8658
;:*****

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```

(3) ;*TEST 27 CHECK BINARY BYTE OPS USING ADDRESS MODE 6
(3) ;:*****
(2)
(2) 021216 000004 TST27: SCOPE
(2) 021220 112737 000027 001252 MOVB #27,@#STSTNM ;LOAD TEST NUMBER
(2) 021226 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
8659 ;NOTE: SDATEB(2), AND DDATEB(4) REFERENCE EVEN BYTE OF SOURCE & DEST DATA
8660 ;AND SDATEB(3), AND DDATEB(5) REFERENCE ODD BYTE OF SOURCE & DEST DATA
8661
8662 021234 013702 001604 MOV @#FACTOR,R2 ;GET INDEX VALUE
8663 021240 010204 MOV R2,R4 ;R2 FOR SOURCE EVEN BYTE INDEX, R4 FOR
8664 021242 010403 MOV R4,R3 ;DEST ODD BYTE, R3 FOR SOURCE EVEN
8665 021244 005203 INC R3 ;AND R5 FOR DEST ODD BYTE
8666 021246 010305 MOV R3,R5
8667 021250 000261 SEC ;SET CARRY
8668 021252 012762 125252 021374 MOV #125252,SDATEB(2)
8669 021260 112763 177125 021374 MOVB #177125,SDATEB(3) ;SOURCE DATA - 052652
8670 021266 016264 021374 021376 MOV SDATEB(2),DDATEB(4)
8671 021274 052764 125125 021376 BIS #125125,DDATEB(4) ;DEST DATA - 177777
8672 021302 136263 021374 021374 BITB SDATEB(2),SDATEB(3)
8673 021310 001401 BEQ .+4
8674 021312 104000 BITB6: HLT
8675
8676 021314 146264 021374 021376 BICB SDATEB(2),DDATEB(4)
8677 021322 103401 BCS .+4
8678 021324 104000 HLT ;ERROR MOV,BIS,BIT;BIC DO NOT AFFECT 'C'
8679 021326 126364 021374 021376 CMPB SDATEB(3),DDATEB(4)
8680 021334 001401 BEQ .+4
8681 021336 104000 HLT
8682
8683 021340 146365 021374 021376 BICB SDATEB(3),DDATEB(5)
8684 021346 126265 021374 021376 CMPB SDATEB(2),DDATEB(5)
8685 021354 001401 BEQ .+4
8686 021356 104000 HLT
8687
8688 021360 136564 021376 021376 BITB DDATEB(5),DDATEB(4)
8689 021366 001401 BEQ .+4
8690 021370 104000 HLT
8691 021372 000415 BR UB7 ;RESERVE TWO WORDS
8692 021374 000000 SDATEB: .WORD 0 ;RESERVED FOR SOURCE DATA
8693 021376 000000 DDATEB: .WORD 0 ;RESERVED FOR DEST DATA
8694
8698

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```

(3) ;:*****
(4) ;*TEST 30 CHECK BINARY WORD OPS USING ADDRESS MODE 7
(3) ;* R2=ADDRESS OF SOURCE DATA, AND R3= ADDRESS OF DEST DATA
(3) ;:*****
(2)
(2) 021400 000004 TST30: SCOPE
(2) 021402 112737 000030 001252 MOVB #30,@#STSTNM ;LOAD TEST NUMBER
(2) 021410 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
8699 021416 000000 SBIN7: .WORD 0 ;CONTAINS ADDRESS OF SOURCE DATA
8700 021420 000000 DBIN7: .WORD 0 ;CONTAINS ADDRESS OF DEST DATA
8701 021422 000000 .WORD 0 ;CONTAINS SOURCE DATA
8702 021424 000000 .WORD 0 ;CONTAINS DEST DATA
8703
8704 021426 010700 UB7: MOV PC,R0

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```

8705 021430 024040      CMP      -(R0),-(R0)
8706 021432 010002      MOV      R0,R2
8707 021434 024242      CMP      -(R2),-(R2)
8708 021436 010012      MOV      R0,(R2)
8709 021440 010203      MOV      R2,R3
8710 021442 024043      CMP      -(R0),-(R3)
8711 021444 010013      MOV      R0,(R3)
8712
8713 021446 000261      SEC
8714 021450 012777 100000 177740      MOV      #100000,@SBIN7 ;SOURCE DATA = 100000
8715 021456 017777 177734 177734      MOV      @SBIN7,@DBIN7 ;DEST DATA = 100000
8716 021464 103001      BCC      MOV7
8717 021466 100401      BMI      .+4
8718 021470 104000      HLT      MOV7:
8719 021472 006377 177722      ASL      @DBIN7 ;DEST DATA = 000000
8720 021476 102001      BVC      .+4
8721 021500 001401      BEQ      .+4
8722 021502 104000      HLT
8723
8724 021504 027777 177706 177706      CMP      @SBIN7,@DBIN7 ;(R2)=100000,(R3)=000000
8725 021512 103402      BCS      CMP7
8726 021514 102401      BVS      CMP7
8727 021516 100401      BMI      .+4
8728 021520 104000      HLT      CMP7:
8729
8730 021522 167777 177670 177670      SUB      @SBIN7,@DBIN7 ;(R2)=100000,(R3)=100000
8731 021530 103003      BCC      SUB7
8732 021532 102002      BVC      SUB7
8733 021534 001401      BEQ      SUB7
8734 021536 100401      BMI      .+4
8735 021540 104000      HLT      SUB7:
8736
8737 021542 006277 177650      ASR      @SBIN7 ;(R2)=140000
8738 021546 067777 177644 177644      ADD      @SBIN7,@DBIN7 ;(R2)=140000,(R3)=040000
8739 021554 103003      BCC      ADD7
8740 021556 102002      BVC      ADD7
8741 021560 001401      BEQ      ADD7
8742 021562 100001      BPL      .+4
8743 021564 104000      HLT      ADD7:
8744
8745 021566 047777 177624 177624      BIC      @SBIN7,@DBIN7 ;(R2)=140000,(R3)=000000
8746 021574 001401      BEQ      .+4
8747 021576 104000      HLT
8748
8749 021600 057777 177612 177612      BIS      @SBIN7,@DBIN7 ;(R2)=140000,(R3)=140000
8750 021606 100401      BMI      .+4
8751 021610 104000      HLT
8752
8753 021612 027777 177600 177600      CMP      @SBIN7,@DBIN7
8754 021620 001401      BEQ      .+4
8755 021622 104000      HLT
8759
    
```

(3)
(4)
(3)
(2)

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:*****
:*TEST 31      SOME MISCELLANEOUS OPERATIONS INVOLVING THE PC
:*      NOTE: NONE OF THESE OPERATIONS SHOULD AFFECT THE PC
:*****
    
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```

(2) 021624 000004          TST31: SCOPE
(2) 021626 112737 000031 001252      MOVB #31,@#STSTNM      ;LOAD TEST NUMBER
(2) 021634 013737 001252 177570      MOV @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
8760 021642 005000          CLR R0
8761 021644 005067 000072          CLR 1$
8762 021650 010707          MOV PC,PC
8763 021652 120707          CMPB PC,PC
8764 021654 030707          BIT PC,PC
8765 021656 060007          ADD R0,PC
8766 021660 105707          TSTB PC
8767 021662 005507          ADC PC
8768 021664 021007          CMP (R0),PC
8769 021666 131007          BITB (R0),PC
8770 021670 062707 000000          ADD #0,PC
8771 021674 023707 001604          CMP @#FACTOR,PC
8772 021700 133707 001604          BITB @#FACTOR,PC
8773 021704 000240          NOP
8774                                     ;THE NEXT TWO INSTRUCTION CAUSE THE PROGRAM TO JUMP TO THE UNRELOCATED
8775                                     ;CODE AND TO RETURN ON THE FOLLOWING INST (IF THE CODE IS RELOCATED)
8776 021706 163707 001604          SUB @#FACTOR,PC      ;JUMPS TO UNRELOCATED CODE
8777 021712 063707 001604          ADD @#FACTOR,PC      ;RETURNS
8778 021716 000240          NOP
8779 021720 024607          CMP -(SP),PC
8780 021722 132607          BITB (SP)+,PC
8781 021724 026707 000012          CMP 1$,PC
8782 021730 166707 000006          SUB 1$,PC
8783 021734 046707 000002          BIC 1$,PC
8784 021740 000401          BR .+4                ;BRANCH OVER 1$
8785 021742 000000          1$: 0
8786 021744 000004          REL2: SCOPE
(1) 021746 010702          MOV PC,R2
(1) 021750 062702 000012          ADD #12,R2
(1) 021754 012707 044042          MOV #RELOC,PC        ;GO RELOCATE PROGRAM CODE
(1) 021760 000000          REL22: .WORD 0
(1)                                     ;222222222222 LAST ADDRESS OF CODE TO BE RELOCATED 2222222222
(1)                                     ;:*****
(3) *TEST 32 CHECK BINARY BYTE OPS USING ADDRESS 4 F 0
(3) ;:*****
(2)
(2) 021762 012767 000001 157406      MOV #1,$TIMES        ;;DO 1 ITERATION
(2) 021770 000004          TST32: SCOPE
(2) 021772 112737 000032 001252      MOVB #32,@#STSTNM    ;LOAD TEST NUMBER
(2) 022000 013737 001252 177570      MOV @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
8788 (1)
(1) .SBTTL START OF SECTION 3
(1) ;3333333333333333 FIRST ADDRESS TO BE RELOCATED 3333333333
(1) REL3: MOV PC,R0          ;GET PC
(1) 022010 005740          TST -(R0)           ;R0 CONTAINS THE ADDRESS OF REL3
(1) 022012 010037 001610          MOV R0,@#FRSTAD     ;SAVE
(1) 022016 010700          MOV PC,R0           ;GET CURRENT PC
(1) 022020 162700 022020          SUB #,R0            ;SUBTRACT RELOCATION FACTOR
(1) 022024 010037 001604          MOV R0,@#FACTOR     ;SAVE RELOCATION FACTOR
(1) 022030 010737 001262          MOV PC,@#SLPERR     ;SET LOOP ADDRESS
(1) 022034 062737 000030 001262      ADD #30,@#SLPERR    ;ADJUST
(1) 022042 013737 001262 001260      MOV @#SLPERR,@#SLPADR
    
```

```

(1) 022050 105737 001600 TSTB @NEXEC ;BR IF TEST CODE TO BE EXECUTED
(1) 022054 001402 BEQ .+6
(1) 022056 000167 002314 JMP RELE3
8789 022062 012703 125252 MOV #125252,R3
8790 022066 010304 MOV R3,R4 ;R3-R4=125252
8791 022070 140304 BICB R3,R4 ;R3=125252,R4=125000
8792 022072 022704 125000 CMP #125000,R4 ;CHECK RESULT
8793 022076 001401 BEQ .+4
8794 022100 104000 HLT
8795
8796 022102 005004 CLR R4 ;R3=125252,R4=0
8797 022104 150304 BISB R3,R4 ;R3=125252,R4=000252
8798 022106 022704 000252 CMP #252,R4 ;CHECK RESULT
8799 022112 001401 BEQ .+4
8800 022114 104000 HLT
8801
8802 022116 110404 MOVB R4,R4 ;R4=177652
8803 022120 022704 177652 CMP #177652,R4 ;CHECK RESULT
8804 022124 001401 BEQ .+4
8805 022126 104000 HLT
8806
8807 022130 132704 177525 BITB #177525,R4
8808 022134 001401 BEQ .+4
8809 022136 104000 HLT
8810
8811 022140 105104 COMB R4 ;R4=177525
8812 022142 110404 MOVB R4,R4 ;R4=000125
8813 022144 022704 000125 CMP #125,R4 ;CHECK RESULT
8814 022150 001401 BEQ .+4
8815 022152 104000 HLT
8816
8817 022154 150304 BISB R3,R4 ;R3=125252,R4=000377
8818 022156 105204 INCB R4
8819 022160 001401 BEQ .+4
8820 022162 104000 HLT
8821

```

```

;*****
;*TEST 33 CHECK BINARY BYTE OPS USING ADDRESS MODE 7
;*****

```

```

(2) 022164 000004 TST33: SCOPE
(2) 022166 112737 000033 001252 MOVB #33,@$TSTNM ;LOAD TEST NUMBER
(2) 022174 013737 001252 177570 MOV @$TSTNM,@$DISPLAY ;DISPLAY TEST NUMBER
8822 022202 000406 BR BINB7 ;RESERVE SPACE FOR ADDRESSES & DATA
8823 022204 000000 SBINB7: .WORD 0 ;CONTAINS ADDRESS OF SOURCE EVEN BYTE
8824 022206 000000 .WORD 0 ;CONTAINS ADDRESS OF SOURCE ODD BYTE
8825 022210 000000 .WORD 0 ;CONTAINS ADDRESS OF DEST EVEN BYTE
8826 022212 000000 .WORD 0 ;CONTAINS ADDRESS OF DEST ODD BYTE
8827 022214 000000 DBINB7: .WORD 0 ;CONTAINS SOURCE DATA
8828 022216 000000 .WORD 0 ;CONTAINS DEST DATA
8829
8830 022220 010700 BINB7: MOV PC,R0
8831 022222 024040 CMP -(R0),-(R0) ;R0 = ADDRESS OF DEST DATA
8832 022224 010060 177772 MOV R0,-6(R0) ;LOAD ADDRESS OF DEST EVEN BYTE DATA
8833 022230 010060 177774 MOV R0,-4(R0)
8834 022234 005260 177774 INC -4(R0) ;LOAD ADDRESS OF DEST ODD BYTE DATA
8835 022240 005740 TST -(R0) ;R0=ADDRESS OF SOURCE DATA

```



```

8836 022242 010060 177770      MOV    R0,-10(R0)      ;LOAD ADDRESS OF SOURCE EVEN BYTE DATA
8837 022246 010060 177772      MOV    R0,-6(R0)      ;LOAD ADDRESS OF SOURCE ODD BYTE DATA
8838 022252 005260 177772      INC    -6(R0)
8839
8840 022256 005002              CLR    R2              ;SET INDEX REGISTERS
8841 022260 012703 000002      MOV    #2,R3          ;@SBINB7(2);@SBINB7(3) REFERENCE EVEN &
8842 022264 012704 177774      MOV    #-4,R4         ;ODD BYTE SOURCE DATA; @DBINB7(4);@DBINB7(5)
8843 022270 012705 177776      MOV    #-2,R5         ;REFERENCE DEST EVEN& ODD BYTE DATA
8844
8845
8846 022274 005020              CLR    (R0)+          ;PRESET SOURCE DATA
8847 022276 005010              CLR    (R0)           ;PRESET DEST DATA
8848 022300 013746 001604      MOV    @#FACTOR,-(SP) ;GET RELOCATION FACTOR
8849 022304 061602              ADD    (SP),R2        ;AND ADD TO INDEX VALUES
8850 022306 061603              ADD    (SP),R3
8851 022310 061604              ADD    (SP),R4
8852 022312 062605              ADD    (SP)+,R5
8853
8854 022314 112773 177777 022204      MOVB  #-1,@SBINB7(3) ;SRC DATA = 177400
8855 022322 132772 000377 022204      BITB  #377,@SBINB7(2) ;CHECK THAT EVEN BYTE WAS NOT AFFECTED
8856 022330 001401              BEQ   .+4             ;BY MOVB INSTRUCTION
8857 022332 104000              HLT
8858
8859 022334 157374 022204 022214      BISB  @SBINB7(3),@DBINB7(4)
8860 022342 105274 022214          INCB  @DBINB7(4)      ;CHECK THAT BIS SET ALL BITS
8861 022346 001401              BEQ   .+4
8862 022350 104000              HLT
8863
8864 022352 105375 022214          DECB  @DBINB7(5)      ;DEST DATA = 177400
8865 022356 005274 022214          INC   @DBINB7(4)      ;DEST DATA - 177401
8866 022362 127375 022204 022214      CMPB  @SBINB7(3),@DBINB7(5)
8867 022370 001401              BEQ   .+4
8868 022372 104000              HLT
8869
8870 022374 147375 022204 022214      BICB  @SBINB7(3),@DBINB7(5)
8871 022402 001401              BEQ   .+4
8872 022404 104000              HLT
8873
8874 022406 105073 022204          CLRB  @SBINB7(3)      ;SRC DATA = 000000
8875 ;THIS ROUTINE SETS ALL BITS IN THE SOURCE ODD BYTE BY BISING A BIT FROM
8876 ;THE DEST EVEN BYTE INTO THE SOURCE ODD BYTE
8877 022412 157473 022214 022204      BIS7: BISB  @DBINB7(4),@SBINB7(3)
8878 022420 106174 022214          ROLB  @DBINB7(4)
8879 022424 103372              BCC   BIS7
8880 022426 022772 177400 022204      CMP   #177400,@SBINB7(2) ;CHECK RESULT
8881 022434 001401              BEQ   .+4
8882 022436 104000              HLT
8883
8884 022440 000372 022204          SWAB  @SBINB7(2)      ;SRC DATA = 000377
8885 022444 112775 000200 022214      MOVB  #200,@DBINB7(5) ;DEST DATA = 100000
8886
8887 022452 147572 022214 022204      BIC7: BICB  @DBINB7(5),@SBINB7(2)
8888 022460 106075 022214          RORB  @DBINB7(5)
8889 022464 103372              BCC   BIC7
8890 022466 005772 022204          TST  @SBINB7(2)
8891 022472 001401              BEQ   .+4

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8892 022474 104000          HLT
8893
8894 022476 012702 000001  OAERR: MOV #1,R2          ;LOAD R2 WITH ODD #
8895 022502 010703          MOV PC,R3
8896 022504 000401          BR .+4          ;RESERVE SPACE FOR A WORD
8897 022506 000000          .WORD 0        ;WILL CONTAIN AN ODD ADDRESS
8898 022510 005723          TST (R3)+      ;STEP R3 TO POINT TO WORD ABOVE
8899 022512 010313          MOV R3,(R3)
8900 022514 005213          INC (R3)        ;AND MAKE ODD
8901 022516 012737 022644 000004  MOV #1$,@#ERRVEC ;SET ODD ADDRESS & RESERVED INSTRUCTION
8902 022524 063737 001604 000004  ADD @#FACTOR,@#ERRVEC
8903 022532 013737 000004 000010  MOV @#ERRVEC,@#RESVEC ;TO TRAP TO 1$ BELOW
8904
8905 022540 000277          SCC            ;SET ALL CC'S
8906 022542 160212          SUB R2,(R2)
8907 022544 104000          HLT
8908 022546 060222          ADD R2,(R2)+
8909 022550 104000          HLT
8910 022552 006342          ASL -(R2)
8911 022554 104000          HLT
8912 022556 106512          MFPD (R2)
8913 022560 104000          HLT
8914 022562 170412          CLRF (R2)
8915 022564 104000          HLT
8916 022566 042202          BIC (R2)+,R2
8917 022570 104000          HLT
8918 022572 164202          SUB -(R2),R2
8919 022574 104000          HLT
8920 022576 155202          BISB @-(R2),R2
8921 022600 104000          HLT
8922 022602 105532          ADCB @ (R2)+
8923 022604 104000          HLT
8924 022606 163302          SUB @ (R3)+,R2
8925 022610 104000          HLT
8926 022612 005733          TST @ (R3)+
8927 022614 104000          HLT
8928 022616 106533          MFPD @ (R3)+
8929 022620 104000          HLT
8930 022622 170453          CLRD @-(R3)
8931 022624 104000          HLT
8932 022626 137702 177775  BITB @.+1,R2
8933 022632 104000          HLT
8934 022634 105477 177773  NEGB @.-1
8935 022640 104000          HLT
8936 022642 000406          BR 2$
8937
8938 022644 062716 000002 1$: ADD #2,(SP)      ;ADJUST RETURN PC
8939 022650 052766 000017 000002  BIS #17,2(SP)   ;SET CONDITION CODES ON RETURN
8940 022656 000002          RTI
8941
8942 022660 012706 000700 2$: MOV #SUPSTK,SP  ;RESET STACK PTR
8943 022664 012737 064422 000004  MOV #ERPRT,@#ERRVEC ;RESET TIME OUT VECTOR
8944 022672 012737 064350 000010  MOV #RESERR,@#RESVEC
8945
(3) ;*****
(3) ;*TEST 34 CHECK JUMP INSTRUCTIONS
(3) ;*****

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(2)
(2) 022700 000004          TST34: SCOPE
(2) 022702 112737 000034 001252 MOVB #34,@RSTSTNM ;LOAD TEST NUMBER
(2) 022710 013737 001252 177570 MOV @RSTSTNM,@RDISP ;:DISPLAY TEST NUMBER
8946 022716 010700          MOV PC,R0
8947 022720 062700 000012 ADD #12,R0 ;SET ADDRESS FOR JMP INST
8948 022724 000277          SCC ;SET CC'S
8949 022726 000110          JMP (R0)
8950 022730 000402          BR .+6
8951 022732 000250          CLN ;JMP INST JUMPS HERE
8952 022734 000775          BR .-4
8953
8954 022736 103003          BCC JMP1
8955 022740 102002          BVC JMP1
8956 022742 001001          BNE JMP1
8957 022744 100001          BPL .+4
8958 022746 104000          JMP1: HLT ;ERROR! INCORRECT CC'S AFTER JMP
8959
8960 022750 005002          CLR R2 ;SET INDICATOR
8961 022752 010703          MOV PC,R3
8962 022754 000401          BR .+4 ;RESERVE WORD FOR JMP ADDRESS
8963 022756 000000          .WORD 0 ;CONTAINS ADDRESS FOR JMP INST
8964 022760 005723          TST (R3)+
8965 022762 010313          MOV R3,(R3)
8966 022764 010300          MOV R3,R0
8967 022766 062713 000022 ADD #22,(R3) ;(R3) IS JMP ADDRESS
8968 022772 010300          MOV R3,R0
8969 022774 000133          JMP @R3+ ;JUMP TO ADDRESS CONTAINED IN R3
8970 022776 000402          BR .+6
8971 023000 005102          COM R2 ;COMPLEMENT INDICATOR
8972 023002 000775          BR .-4
8973 023004 005202          INC R2 ;CHECK INDICATOR
8974 023006 001003          BNE JMP3
8975 023010 005720          TST (R0)+
8976 023012 020003          CMP R0,R3 ;CHECK AUTO-INC R3
8977 023014 001401          BEQ .+4
8978 023016 104000          JMP3: HLT
8979
8980 023020 005002          CLR R2 ;SET INDICATOR
8981 023022 010704          MOV PC,R4 ;SET UP JMP REGISTER
8982 023024 010400          MOV R4,R0 ;SET UP CHECK REGISTER
8983 023026 000402          BR 1$
8984 023030 005102          COM R2 ;COMPLEMENT INDICATOR
8985 023032 000403          BR 2$
8986 023034 022424          1$: CMP (R4)+,(R4)+
8987 023036 005724          TST (R4)+ ;R4=JMP ADDRESS
8988 023040 000144          JMP -(R4) ;USE R4 AS ADDRESS
8989 023042 005202          2$: INC R2 ;CHECK INDICATOR
8990 023044 001003          BNE JMP4
8991 023046 022020          CMP (R0)+,(R0)+
8992 023050 020004          CMP R0,R4 ;CHECK AUTO-DEC R4
8993 023052 001401          BEQ .+4
8994 023054 104000          JMP4: HLT
8995
8996 023056 010703          MOV PC,R3
8997 023060 000401          BR .+4 ;RESERVE WORD FOR JMP ADDRESS

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8998 023062 000000      1$: .WORD 0 ;CONTAINS JUMP ADDRESS
8999 023064 005723      TST (R3)+
9000 023066 010313      MOV R3,(R3)
9001 023070 062723 000016 ADD #16,(R3)+
9002 023074 010300      MOV R3,R0 ;LOAD CHECK REGISTER
9003 023076 000402      BR 3$
9004 023100 005102      2$: COM R2
9005 023102 000401      BR 4$
9006 023104 000153      3$: JMP @-(R3) ;JUMP TO 2$ VIA 1$ ABOVE
9007 023106 005202      4$: INC R2 ;CHECK INDICATOR
9008 023110 001003      BNE JMP5
9009 023112 005740      TST -(R0)
9010 023114 020003      CMP R0,R3 ;CHECK AUTO-DEC R3
9011 023116 001401      BEQ .+4
9012 023120 104000      JMP5: HLT
9013
9014 023122 000402      BR 2$
9015 023124 005102      1$: COM R2 ;COMPLEMENT INDICATOR
9016 023126 000402      BR 3$
9017 023130 000167 177770 2$: JMP 1$
9018 023134 005202      3$: INC R2
9019 023136 001401      BEQ .+4
9020 023140 104000      JMP6: HLT
9021
9022 023142 012767 023160 000020 MOV #1$,7$ ;SET UP JMP ADDRESS
9023 023150 063767 001604 000012 ADD @#FACTOR,7$ ;ADD RELOCATION FACTOR
9024 023156 000402      BR 2$ ;GO TO JMP @7$ INST
9025 023160 005102      1$: COM R2 ;COMPLEMENT INDICATOR
9026 023162 000403      BR 3$ ;GO TO CHECK ROUTINE
9027 023164 000177 000000 2$: JMP @7$ ;JMP TO 1$ ABOVE VIA 7$
9028 023170 000000      7$: .WORD 0 ;CONTAINS JMP ADDRESS
9029 023172 005202      3$: INC R2 ;CHECK INDICATOR
9030 023174 001401      BEQ .+4
9031 023176 104000      JMP7: HLT
9032
(3) ;*****
(3) ;*TEST 35 CHECK JSR INSTRUCTIONS
(2) ;*****
(2) 023200 000004      TST35: SCOPE
(2) 023202 112737 000035 001252 MOVB #35,@#STSTM ;LOAD TEST NUMBER
(2) 023210 013737 001252 177570 MOV @#STSTM,@#DISPLAY ;;DISPLAY TEST NUMBER
9033 023216 013705 001604 JSR1: MOV @#FACTOR,R5 ;GET RELOCATION FACTOR
9034 023222 012702 023254 MOV #3$,R2 ;FORM DEST ADRS
9035 023226 060502 ADD R5,R2 ;ADD RELOCATION FACTOR
9036 023230 000277 SCC ;PRESET CC'S
9037 023232 000242 CLV
9038 023234 004512 JSR R5,(R2) ;GO TO 3$ VIA R2
9039 023236 005702 1$: TST R2 ;CHECK INDICATOR
9040 023240 001017 BNE 4$ ;R2 SHOULD=0
9041 023242 023705 001604 CMP @#FACTOR,R5 ;CHECK THAT RTS R5 RESTORED R5
9042 023246 001014 BNE 4$
9043 023250 000414 BR JSR3 ;GO TO NEXT TEST
9044 023252 000205 2$: RTS R5 ;RETURN FROM SUBROUTINE
9045 023254 103011 3$: BCC 4$ ;CHECK THAT JSR DID NOT
9046 023256 102410 BVS 4$
9047 023260 001007 BNE 4$ ;AFFECT CC'S

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9048 023262 100006      BPL      4$
9049 023264 005002      CLR      R2          ;CLEAR INDICATOR
9050 023266 012704 023236  MOV      #1$,R4      ;GET UNRELOCATED RETURN ADDRESS
9051 023272 061604      ADD      (SP),R4     ;ADD RELOCATION FACTOR (OLD R5)
9052 023274 020405      CMP      R4,R5       ;CHECK THAT OLD R5 WAS PLACED ON THE
9053 023276 001765      BEQ      2$          ;STACK, & THAT NEW R5 CONTAINS RETURN PC
9054 023300 104000      4$:      HLT          ;ERROR! ABOVE
9055
9056      ;CHECK JSR INSTRUCTION ADDRESS MODE 3
9057 023302 013704 001604  JSR3:    MOV      @#FACTOR,R4 ;GET RELOCATION FACTOR
9058 023306 005000      CLR      R0          ;SET INDICATOR
9059 023310 012705 023330  MOV      #1$,R5
9060 023314 060405      ADD      R4,R5       ;SET UP JSR DEFERRED ADRS
9061 023316 010502      MOV      R5,R2
9062 023320 012715 023346  MOV      #5$, (R5)
9063 023324 060415      ADD      R4, (R5)    ;(R5)=DEST ADRS
9064 023326 000401      BR       2$          ;RESERVE WORD FOR ADDRESS
9065 023330 000000      1$:      .WORD      0      ;CONTAINS DEST ADRS FOR JSR
9066 023332 004435      2$:      JSR      R4,@(R5)+ ;JSR TO 5$ VIA 1$ ABOVE
9067 023334 005200      3$:      INC      R0          ;CHECK INDICATOR
9068 023336 001013      BNE      6$
9069 023340 000413      BR       JSR4
9070 023342 005100      4$:      COM      R0          ;COMPLEMENT INDICATOR
9071 023344 000204      RTS      4           ;RETURN FROM SUBROUTINE
9072 023346 012703 023334  5$:      MOV      #3$,R3      ;GET UNRELOCATED RETURN ADDRESS
9073 023352 061603      ADD      (SP),R3     ;ADD RELOCATION FACTOR (OLD R4)
9074 023354 020403      CMP      R4,R3
9075 023356 001003      BNE      6$
9076 023360 005722      TST     (R2)+
9077 023362 020205      CMP      R2,R5       ;CHECK AUTO-INC R5
9078 023364 001766      BEQ      4$          ;GO TO RTS
9079 023366 104000      6$:      HLT          ;ERROR ABOVE
9080
9081      ;CHECK JSR INST ADDRESS MODE 4
9082 023370 013704 001604  JSR4:    MOV      @#FACTOR,R4
9083 023374 010405      MOV      R4,R5
9084 023376 010703      MOV      PC,R3
9085 023400 000401      BR       2$
9086 023402 000405      1$:      BR       4$
9087 023404 022323      2$:      CMP      (R3)+,(R3)+
9088 023406 000277      SCC
9089 023410 004443      JSR      R4,-(R3)    ;GO TO 2$
9090 023412 104000      3$:      HLT
9091 023414 000414      BR       JSR6       ;GO TO NEXT TEST
9092 023416 103012      4$:      BCC      5$
9093 023420 102011      BVC      5$
9094 023422 001010      BNE      5$
9095 023424 100007      BPL      5$
9096 023426 012702 023412  MOV      #3$,R2      ;GET UNRELOCATED RETURN ADDRESS
9097 023432 061602      ADD      (SP),R2     ;ADD RELOCATION FACTOR (OLD R4)
9098 023434 020204      CMP      R2,R4       ;CHECK THAT CALCULATED RETURN
9099 023436 001002      BNE      5$          ;PC = NEW R4
9100 023440 005724      TST     (R4)+
9101 023442 000204      RTS      R4
9102 023444 104000      5$:      HLT
9103

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9104          :TEST JSR INST ADDRESS MODE 6
9105 023446 000401 JSR6: BR 2$
9106 023450 000405 1$: BR 3$
9107 023452 010700 2$: MOV PC,R0
9108 023454 004767 177770 JSR PC,1$
9109 023460 100407 BMI JSR7
9110 023462 104000 HLT :GO TO NEXT TEST
9111 023464 022020 3$: CMP (R0)+,(R0)+ :ERROR ON CC'S
9112 023466 020016 CMP R0,(SP) :CHECK THAT RETURN ADDRESS IS ON THE
9113 023470 001401 BEQ .+4 :STACK
9114 023472 104000 HLT
9115 023474 000270 SEN :SET N
9116 023476 000207 RTS PC
9117
9118          :TEST JSR INST ADDRESS MODE 7
9119 023500 013746 001604 JSR7: MOV @#FACTOR,-(SP) :GET RELOCATION FACTOR
9120 023504 062716 023524 ADD #1$(,SP) :FORM ADDRESS OF 1$ BELOW
9121 023510 000277 SCC :SET ALL CC'S
9122 023512 004076 000000 JSR R0,@(SP) :JSR TO 1$
9123 023516 003003 BGT 3$
9124 023520 102002 BVC 3$
9125 023522 000402 BR 4$
9126
9127 023524 000200 1$: RTS R0 :RETURN
9128 023526 104000 3$: HLT :ERROR!! INCORRECT CC'S
9133 023530 4$:
(4) :*****
(3) :*TEST 36 CHECK IOT TRAP (AND ROLB/ASLB)
(4) :* THIS TEST CHECKS THAT THE PSW IS CORRECT AFTER THE IOT AND THAT THE
(4) :* 'NEW'PSW (FROM IOTVEC+2) IS CORRECT.
(3) :*****
(2)
(2) 023530 000004 TST36: SCOPE
(2) 023532 112737 000036 001252 MOVB #36,@#STSTNM :LOAD TEST NUMBER
(2) 023540 013737 001252 177570 MOV @#STSTNM,@#DISPLAY :;DISPLAY TEST NUMBER
9134 023546 012705 000022 IOTST: MOV #IOTVEC+2,R5
9135 023552 005000 CLR R0
9136 023554 052740 000200 BIS #PR4,-(R0) :SET PRIORITY LEVEL 4 IN PSW
9137 023560 011015 MOV (R0),(R5) :SET IOTVEC+2 - PSW
9138 023562 011504 MOV (R5),R4 :SAVE IN R4
9139 023564 010746 MOV PC,-(SP)
9140 023566 062716 000036 ADD #1$-,(SP)
9141 023572 012645 MOV (SP)+,-(R5) :LOAD IOT TRAP VECTOR
9142 023574 042710 000357 BIC #PR7+17,(R0)
9143 023600 052710 000244 BIS #PR5+4,(R0) :PSW=X XXX X00 101 1x1 000
9144 023604 012003 MOV (R0)+,R3 :R3 = PSW ABOVE
9145 023606 010340 MOV R3,-(R0) :RESTORE PSW (MOV CHANGED IT)
9146 023610 000004 IOT
9147 023612 012737 054456 000020 10$: MOV #SCOPE,@#IOTVEC :RESTORE IOT VECTOR
9148 023620 104000 HLT :ERROR! IOT FAILED TO TRAP
9149 023622 000457 BR TST37 ;;GO TO NEXT TEST
9150
9151 023624 012002 1$: MOV (R0)+,R2 :GET PSW AFTER IOT TRAP
9152 :NOTE: R0=0
9153 023626 012725 054456 MOV #SCOPE,(R5)+ :RESTORE IOTVEC
9154 023632 012715 000200 MOV #PR4,(R5) :AND IOTVEC+2
    
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9155 023636 010746          MOV      PC,-(SP)          ;FORM PC OF 10$ ABOVE
9156 023640 062716 177752  ADD      #10$-.,(SP)
9157 023644 022626          CMP      (SP)+,(SP)+      ;CHECK RETURN PC ON STACK
9158 023646 001036          BNE     99$
9159 023650 022603          CMP      (SP)+,R3        ;CHECK SAVED PSW
9160 023652 001034          BNE     99$
9161 023654 032703 140000  BIT      #UM,R3          ;BRANCH TO 3$ IF IN USER MODE
9162 023660 100413          BMI     3$
9163 023662 001003          BNE     2$
9164 023664 020204          CMP      R2,R4          ;BRANCH TO 2$ IF IN SUPER MODE
9165 023666 001026          BNE     99$
9166 023670 000413          BR      4$
9167
9168 023672 042704 030000  2$:     BIC      #PUM,R4        ;CLEAR PREV MODE BITS
9169 023676 052704 010000  BIS      #PSM,R4        ;SET PREV SUPER MODE
9170 023702 020204          CMP      R2,R4          ;CHECK PSW AFTER IOT
9171 023704 001017          BNE     99$
9172 023706 000404          BR      4$
9173
9174 023710 052704 030000  3$:     BIS      #PUM,R4        ;SET PREV USER MODE
9175 023714 020204          CMP      R2,R4          ;CHECK PSW AFTER IOT
9176 023716 001012          BNE     99$
9177
9178 023720 005002          4$:     CLR      R2
9179 023722 000261          SEC
9180 023724 106100          ROLB    R0              ;ROTATE R0
9181 023726 102376          BVC     -2              ;UNTIL V SETS (R0=200)
9182
9183 023730 106300          ASLB    R0              ;SHIFT SHOULD SET CARRY
9184 023732 103004          BCC     99$
9185 023734 102003          BVC     99$
9186 023736 001002          BNE     99$
9187 023740 005700          TST     R0
9188 023742 001401          BEQ     -4
9189 023744 104000          99$:    HLT
9190
9191
9192 023746 042704 000340  BIC      #PR7,R4
9193 023752 010437 177776  MOV      R4,@PSW        ;RESTORE PSW
9194 023756 012706 000700  MOV      #SUPSTK,SP     ;RESTORE STACK PTR
9195
;*****
; *TEST 37      CHECK EMT TRAP SEQUENCE
;*****
(3)
(3)
(2)
(2) 023762 000004          TST37: SCOPE
(2) 023764 112737 000037 001252  MOVB     #37,@$TSTNM     ;LOAD TEST NUMBER
(2) 023772 013737 001252 177570  MOV      @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
9196          .EQUIV IOT,HLT      ;REDEFINE HLT CALL
9197 024000 012737 054710 000020  MOV      #ERROR,@$IOTVEC ;SETUP VECTOR
9198 024006 012737 000340 000022  MOV      #PR7,@$IOTVEC+2
9199 024014 005000          CLR     R0
9200 024016 010746          MOV     PC,-(SP)
9201 024020 062716 000030  ADD      #EMT1-.,(SP)
9202 024024 012637 000030  MOV      (SP)+,@$EMTVEC
9203 024030 000262          SEV
9204 024032 013737 177776 000032  MOV      @$PSW,@$EMTVEC+2 ;SET V
;RETAIN CURRENT PSW ON TRAP

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9205 024040 000265      +SEZ!SEC
9206 024042 104000      EMT          ;TRAP TO EMT1
9207 024044 001433      BEQ          EMT1C    ;GO TO EMT1C
9208 024046 000004      HLT          ;ERROR! INCORRECT CC'S WERE SET ON RETURN
9209 024050 102027      EMT1: BVC     EMT1B    ;'V' SHOULD'VE SET ON EMT TRAP
9210 024052 105100      COMB        RO        ;RO=000377,CC'S=1001
9211 024054 105500      ADCB        RO        ;RO=000000,CC'S=0101
9212 024056 106000      RORB        RO        ;RO=000200,CC'S=1010
9213 024060 102023      BVC         EMT1B
9214 024062 100022      BPL         EMT1B
9215 024064 000257      CCC
9216 024066 105400      NEGB        RO        ;RO=000200,CC'S=1010
9217 024070 102017      BVC         EMT1B
9218
9219 024072 100016      BPL         EMT1B
9220 024074 000242      CLV          ;CLEAR 'V'
9221 024076 000261      SEC          ;AND SET 'C'
9222 024100 105300      DECB        RO        ;RO=000177,CC'S=0011
9223 024102 102012      BVC         EMT1B
9224 024104 100411      BMI         EMT1B
9225 024106 000242      CLV          ;CLEAR 'V'
9226 024110 105200      INCB        RO        ;RO=000200,CC'S=1011
9227 024112 103006      BCC         EMT1B
9228 024114 102005      BVC         EMT1B
9229 024116 100004      BPL         EMT1B
9230 024120 000242      CLV          ;CLEAR 'V'
9231 024122 106200      ASRB        RO        ;SHIFT RO UNTIL 'V' CLEARS
9232 024124 102776      BVS         -2
9233 024126 000401      BR          +4
9234 024130 000004      EMT1B: HLT
9235 024132 000002      RTI          ;ERROR!
9236 024134 105500      EMT1C: ADCB        RO        ;EXIT WITH RO=000377
9237 024136 103003      BCC         EMT1D    ;RO=000000
9238 024140 001002      BNE         EMT1D
9239 024142 005700      TST         RO
9240 024144 001401      BEQ         +4
9241 024146 000004      EMT1D: HLT
9242 024150 012737 054710 000030      MOV         #ERROR,@EMTVEC    ;RESTORE EMT TO ERROR
9243 024156 012737 000340 000032      MOV         #PR7,@EMTVEC+2    ;SET PRIORITY 7 ON ERROR
9244 024164 012737 054456 000020      MOV         #SCOPE,@IOTVEC    ;RESTORE IOT VECTOR
9245 024172 005037 000022      CLR         @IOTVEC+2
9246 .EQUIV ERROR,HLT          ;REDEFINE HLT CALL
9247
::*****
::*TEST 40      CHECK TRAP INSTRUCTION TRAP SEQUENCE
::*****
(3)
(3)
(2)
(2) 024176 000004      TST40: SCOPE
(2) 024200 112737 000040 001252      MOVB        #40,@#STSTNM      ;LOAD TEST NUMBER
(2) 024206 013737 001252 177570      MOV         @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
9248 024214 052737 000340 177776      BIS         #PR7,@#PSW        ;LOCK OUT LINE CLOCK
9249 024222 052737 000340 000016      BIS         #PR7,@#BITVEC+2
9250 024230 010746      MOV         PC,-(SP)
9251 024232 062716 000056      ADD         #TRAP1-,(SP)
9252 024236 012637 000034      MOV         (SP)+,@#TRAPVEC
9253 024242 000270      SEN
9254 024244 013737 177776 000036      MOV         @#PSW,@#TRAPVEC+2 ;SET N
;RETAIN CURRENT PSW ON TRAP
    
```



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9255 024252 000261          SEC                ;SET CARRY
9256 024254 010700          MOV          PC,R0
9257 024256 000264          SEZ                ;SET Z BIT
9258 024260 104400          TRAP           ;TRAP TO TRAP1
9259 024262 103404          BCS          .+12
9260 024264 012737 062270 000034 MOV          #STRAP,@TRAPVFC ;RESTORE TRAP VECTOR
9261 024272 104000          HLT
9262 024274 001404          BEQ          .+12
9263 024276 012737 062270 000034 MOV          #STRAP,@TRAPVEC ;RESTORE TRAP VECTOR
9264 024304 104000          HLT
9265 024306 000420          BR          TRAP1C
9266 024310 100404          BMI          .+12 ;N BIT GOT SET ON TRAP
9267 024312 012737 062270 000034 MOV          #STRAP,@TRAPVEC ;RESTORE TRAP VECTOR
9268 024320 104000          HLT
9269 024322 062700 000004          ADD          #4,R0
9270 024326 020016          CMP          R0,(SP) ;CHECK LOW BYTE OF RETURN PC ON
9271 024330 001404          BEQ          .+12 ;STACK
9272 024332 012737 062270 000034 MOV          #STRAP,@TRAPVEC ;RESTORE TRAP VECTOR
9273 024340 104000          HLT
9274 024342 124646          CMPS         -(SP),-(SP)
9275 024344 032626          BIT          (SP)+,(SP)+
9276 024346 000002          RTI                ;RETURN TO INST FOLLOWING TRAP (1$)
9277
9278 024350 012702 000036          TRAP1C: MOV          #TRAPVEC+2,R2 ;RESTORE VECTORS
9279 024354 012712 000340          MOV          #PR7,(R2)
9280 024360 012742 062270          MOV          #STRAP,-(R2)
9281 024364 042737 000340 000016          BIC          #PR7,@TBITVEC+2
9282 024372 105037 177776          CLRB         @PSW ;GO BACK TO PRIORITY 0
9283
9284 024376 000004          RELE3:  SCOPE
(1) 024400 010702          MOV          PC,R2
(1) 024402 062702 000012          ADD          #12,R2
(1) 024406 012707 044042          MOV          #RELOC,PC ;GO RELOCATE PROGRAM CODE
(1) 024412 000000          RELE3:  .WORD          0
(1) ;33333333333333 LAST ADDRESS OF CODE TO BE RELOCATED 3333333333
(1)
9285 ;:*****
(3) ;*TEST 41 CHECK STACK OVERFLOW
(3) ;:*****
(2)
(2) 024414 012767 000001 154754          TST41:  MOV          #1,$TIMES ;:DO 1 ITERATION
(2) 024422 000004          SCOPE
(2) 024424 112737 000041 001252          MOV          #41,@$TSTNM ;:LOAD TEST NUMBER
(2) 024432 013737 001252 177570          MOV          @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
9286
(1) .SBTTL START OF SECTION 4
(1) ;44444444444444 FIRST ADDRESS TO BE RELOCATED 4444444444
(1) 024440 010700          REL4:  MOV          PC,R0 ;:GET PC
(1) 024442 005740          TST          -(R0) ;:R0 CONTAINS THE ADDRESS OF REL4
(1) 024444 010037 001610          MOV          R0,@$FRSTAD ;:SAVE
(1) 024450 010700          MOV          PC,R0 ;:GET CURRENT PC
(1) 024452 162700 024452          SUB          #.,R0 ;:SUBTRACT RELOCATION FACTOR
(1) 024456 010037 001604          MOV          R0,@$FACTOR ;:SAVE RELOCATION FACTOR
(1) 024462 010737 001262          MOV          PC,@$PLPERR ;:SET LOOP ADDRESS
(1) 024466 062737 000030 001262          ADD          #30,@$PLPERR ;:ADJUST
(1) 024474 013737 001262 001262          MOV          @$PLPERR,@$PLPADR
    
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(1) 024502 105737 001600      TSTB  @MEXEC      ;BR IF TEST CODE TO BE EXECUTED
(1) 024506 001402      BEQ    .+6
(1) 024510 000167 001512      JMP    RELE4
9287
9288 024514 013767 177776 000334 OVFLW: MOV    @MPSW,7$      ;SAVE STATUS IN 7$ BELOW
9289 024522 005037 177776      CLR    @MPSW      ;SET KERNEL MODE
9290 024526 004737 063314      JSR    PC,@MCLRTBIT ;GO CLEAR 'I' BIT IF SET
9291 024532 052737 000340 177776  BIS    #PR7,@MPSW  ;SET PRIORITY LEVEL 7 TO BLOCK CLOCK
9292 024540 010746      MOV    PC,-(SP)   ;PUSH CURRENT PC ONTO STACK
9293 024542 062716 000152      ADD    #2$-.,(SP) ;FORM ADDRESS OF 2$ BELOW
9294 024546 011637 000004      MOV    (SP),@MERRVEC ;SET ERROR VECTOR
9295 024552 012737 000340 000006  MOV    #340,@MERRVEC+2 ;SET PRIORITY LEVEL 7 ON TRAP
9296 024560 013727 000014      MOV    @MBPTVEC,(PC)+ ;SAVE BPT VECTOR ADRS
9297 024564 000000      .WORD 0
9298 024566 062716 000100      ADD    #41$-2$,(SP) ;FORM ADDRESS OF 41$ BELOW
9299 024572 012637 000014      MOV    (SP)+,@MBPTVEC ;SET BPT TRAP VECTOR TO 41$
9300 024576 012737 000340 000016  MOV    #340,@MBPTVEC+2
9301
9302 024604 012703 000376      MOV    #376,R3
9303 024610 010313      MOV    R3,(R3)    ;LOAD 376 INTO ADDRESS 376
9304 024612 010306      MOV    R3,SP      ;SET STACK PTR AT BOUNDARY
9305 024614 032767 140000 000234  BIT    #UM,7$     ;CHECK IF ENTERED TEST IN KERNEL
9306 024622 001015      BNE    1$        ;MODE. BRANCH IF NOT IN KERNEL
9307
9308      ;THE BELOW INSTRUCTIONS SHOULD NOT CAUSE AN OVERFLOW TRAP
9309 024624 005716      TST    (SP)      ;BECAUSE TST IS A NON MODIFYING INST
9310 024626 021666 177776      CMP    (SP),-2(SP) ;SO IS COMPARE
9311 024632 012656      MOV    (SP)+,@-(SP) ;BECAUSE OF ADDRESS MODE 5
9312 024634 057636 000000      BIS    @-(SP),@-(SP)+ ;BECAUSE OF ADDRESS MODE 3
9313 024640 054676 000000      BIS    -(SP),@-(SP) ;BECAUSE OF ADDRESS MODE 7
9314 024644 005006      CLR    SP
9315 024646 013766 020000 020000  MOV    @#20000,20000(SP)
9316 024654 000425      BR     3$        ;BRANCH OVER NON KERNEL MODE TESTS
9317
9318      ;NOTE: NO OVEFLOW TRAP WILL OCCUR IF NOT IN KERNEL MODE!!!
9319 024656 156737 000175 177777 1$: BIS    7$+1,@MPSW+1 ;RESTORE MODE BITS IN PSW
9320 024664 012706 000376      MOV    #376,SP   ;SET STACK PTR
9321 024670 016646 177776      MOV    -2(SP),-(SP) ;SHOULD NOT TRAP
9322 024674 051616      BIS    (SP),(SP)
9323 024676 061666 177776      ADD    (SP),-2(SP)
9324 024702 105037 177777      CLR    @MPSW+1  ;SET KERNEL MODE
9325 024706 012706 000700      MOV    #SUPSTK,SP ;RESTORE THE STACK
9326 024712 000451      BR     6$        ;EXIT TEST
9327
9328      ;ERROR SERVICE ROUTINE
9329 024714 012600 2$: MOV    (SP)+,R0   ;SAVE PC OF INSTRUCTION THAT TRAPPED
9330 024716 012602      MOV    (SP)+,R2   ;SAVE PSW
9331 024720 012706 000700      MOV    #SUPSTK,SP ;SET STACK PTR
9332 024724 104000      HLT
9333      ;ERROR! AN INSTRUCTION THAT WAS NOT
9334      ;SUPPOSED TO TRAP TRAPPED
9335 024726 000443      BR     6$        ;R0 CONTAINS PC, R2 CONTAINS PSW
9336      ;EXIT TEST
9337      ;THE BELOW INSTRUCTIONS WILL CAUSE A STACK OVERFLOW
9338 024730 062737 000066 000004 3$: ADD    #4$-2$,@MERRVEL ;SET ERROR VECTOR TO 4$
9339 024736 010306      MOV    R3,SP     ;SET STACK PTR AT 376
    
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9340 024740 112702 000001      MOVB  #1,R2
9341 024744 005000      CLR  R0
9342 024746 005016      CLR  (SP)          ;SETS BIT 0 IN R0
9343 024750 006302      ASL  R2            ;SHIFT INDICATOR BIT
9344 024752 105226      INCB (SP)+        ;SETS BIT 1 IN R0
9345 024754 006302      ASL  R2
9346 024756 060746      ADD  PC,-(SP)     ;SETS BIT 2 IN R0
9347 024760 006302      ASL  R2
9348 024762 000003      BPT                    ;SETS BIT 3 IN R0
9349 024764 006302      ASL  R2
9350 024766 004767 000014      JSR  PC,40$      ;SETS BIT 4 IN R0
9351 024772 006302      ASL  R2
9352 024774 050666 177776      BIS  SP,-2(SP)   ;SETS BIT 5 IN R0
9353 025000 000410      BR   5$
9354
9355      ;PROGRAM WILL TRAP HERE ON OVERFLOW TRAP
9356 025002 050200 4$:  BIS  R2,R0      ;SET APPROPRIATE BIT IN R0
9357 025004 000002      RTI                    ;RETURN FROM TRAP
9358
9359 025006 052700 001000 40$:  BIS  #1000,R0    ;SET IND THAT JSR WAS EXECUTED
9360 025012 000207      RTS  PC
9361
9362 025014 052700 000400 41$:  BIS  #400,R0     ;SET IND THAT BPT WAS EXECUTED
9363 025020 000002      RTI
9364
9365      ;CHECK THAT ABOVE INSTRUCTIONS DID TRAP
9366 025022 012706 000700 5$:  MOV  #SUPSTK,SP  ;SET STACK PTR
9367 025026 022700 001477      CMP  #1477,R0    ;EACH INSTRUCTION SET A BIT IN R0
9368 025032 001401      BEQ  .+4         ;R0= 1477
9369 025034 104000      HLT
9370
9371      ;EXIT ROUTINE
9372 025036 012706 001200 6$:  MOV  #KERSTK,SP  ;SET KERNEL STACK PTR
9373 025042 016737 177516 000014  MOV  @#BPTVEC    ;RESTORE BPT VECTOR
9374 025050 005037 000016      CLR  @#BPTVEC+2
9375 025054 012746      MOV  (PC)+,-(SP) ;PUSH OLD PSW ONTO STACK
9376 025056 000000 7$:  .WORD 0          ;CONTAINS SAVED PSW
9377 025060 010746      MOV  PC,-(SP)   ;PUSH CURRENT PC ONTO STACK
9378 025062 062716 000006      ADD  #6,(SP)    ;ADD OFFSET
9379 025066 000002      RTI
9380
9381 025070 012706 000700      MOV  #SUPSTK,SP  ;SET STACK PTR
9382 025074 012737 064422 000004  MOV  #ERPRT,@#ERRVEC ;RESET TIME OUT VECTOR
9383 025102 013737 177776 000006  MOV  @#PSW,@#ERRVEC+2
9384 025110 052737 000340 000006  BIS  #PR7,@#ERRVEC+2
9385 025116 042737 000020 000006  BIC  #BIT4,@#ERRVEC+2
9386 025124 005037 177766      CLR  @#CPUERR
9387
9388 (3)
9389 (3)
9390 (2)
9391 (2) 025130 000004      TST42: SCOPE
9392 (2) 025132 112737 000042 00125?  MOVB  #42,@#STSTM ;LOAD TEST NUMBER
9393 (2) 025140 013737 001252 177570  MOV  @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
9394 9388 025146 005737 001552      RESTRP: TST  @#KB11E ;IS THIS A KB11-E OR KB11-EM?
9395 9389 025152 001403      BEQ  10$         ;BR IF NOT
    
```

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9390 025154 012767 000010 000122      MOV      #10,5$      ;KB11-E AND KB11-EM USES OPCODE 7, START WITH OPCODE 10
9391 025162 012702 025304      MOV      #5$,R2      ;GET ADDRESS OF RESERVED INSTRUCTION TABLE
9392 025166 105737 001555      TSTB    @WCISP      ;IS CISP OPTION PRESENT?
9393 025172 001402      BEQ     8$          ;BR IF NOT
9394 025174 012702 025342      MOV      #6$,R2      ;ADDRESS OF RESERVED INSTRUCTION TABLE WITH CIS
9395 025200 063702 001604      ADD     @WFACTOR,R2
9396 025204 132737 000040 001551      BITB    #40,@WOPT.CP+1 ;CHECK IF 11/45 FLOATING POINT IS AVAIL.
9397 025212 001404      BEQ     9$          ;BRANCH IF NOT AVAILABLE
9398 025214 005067 000212      CLR     51$        ;SET CIS TABLE TERMINATOR AT GROUP 7
9399 025220 005067 000110      CLR     50$        ;SET TABLE TERMINATOR AT GROUP 7
9400 025224 012737 025262 000010 9$:      MOV      #4$,@WRESVEC ;SET RESERVED INSTRUCTION TRAP
9401 025232 063737 001604 000010      ADD     @WFACTOR,@WRESVEC
9402 025240 012203      MOV     (R2)+,R3    ;GET FIRST RESERVED INSTRUCTION
9403 025242 001476      BEQ     7$          ;0 TERMINATES THE TABLE
9404 025244 012204      MOV     (R2)+,R4    ;GET LAST RESERVED INSTRUCTION IN GROUP
9405 025246 010317      MOV     R3,(PC)    ;EXECUTE RESERVED INSTRUCTION
9406 025250 000000      .WORD   0          ;CONTAINS RESERVED INSTRUCTION
9407 025252 000240      NOP     ;ERROR! INSTRUCTION IN R3
9408 025254 000240      NOP     ;(2$) ABOVE FAILED TO CAUSE A
9409 025256 104000      HLT     ;RESERVED INSTRUCTION TRAP
9410 025260 000405      BR      41$
9411 025262 012716 025274 4$:      MOV     #41$,(SP)  ;ADJUST RETURN PC
9412 025266 063716 001604      ADD     @WFACTOR,(SP) ;TO RETURN TO 41$
9413 025272 000002      RTI    ;RETURN TO 41$
9414 025274 020304 41$:      CMP     R3,R4      ;HAS GROUP OF RESERVED INSTRUCTIONS
9415 025276 001760      BEQ     1$          ;BEEN EXECUTED
9416 025300 005203      INC     R3          ;INCREMENT THIS RESERVED INSTRUCTION
9417 025302 000761      BR      2$          ;TO NEXT ONE AND EXECUTE
9418      ;TABLE OF 1170 RESERVED INSTRUCTIONS (0 TERMINATES THE TABLE)
9419 025304 000007 5$:      7          ;GROUP 1 (GETS A 10 IF KB11-E OR KB11-EM)
9420 025306 000077      77         ;
9421 025310 000210      210        ;GROUP 2
9422 025312 000227      227        ;
9423 025314 007000      7000       ;GROUP 3
9424 025316 007777      7777       ;
9425 025320 075040      75040      ;GROUP 4
9426 025322 076777      76777      ;
9427 025324 106400      106400     ;GROUP 5
9428 025326 106477      106477     ;
9429 025330 106700      106700     ;GROUP 6
9430 025332 107777      107777     ;
9431 025334 170000 50$:      170000    ;GROUP 7      FLOATING POINT
9432 025336 177777      177777    ;INSTRUCTIONS
9433 025340 000000      0          ;0 TERMINATES THE TABLE
9434
9435
9436      ;TABLE OF KB11-E/EM WITH CIS RESERVED INSTRUCTIONS (0 TERMINATES THE TABLE)
9437 025342 000010 6$:      10        ;GROUP 1
9438 025344 000077      77         ;
9439 025346 000210      210        ;GROUP 2
9440 025350 000227      227        ;
9441 025352 007000      7000       ;GROUP 3
9442 025354 007777      7777       ;
9443 025356 075040      75040     ;GROUP 4A
9444 025360 076017      76017     ;
9445 025362 076033      76033     ;GROUP 4B
    
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9446 025364 076037          76037          :  "
9447 025366 076046          76046          : GROUP 4.
9448
9449 025370 076047          76047          :  "
9450 025372 076100          76100          : GROUP 4D
9451 025374 076127          76127          :  "
9452 025376 076133          76133          : GROUP 4E
9453 025400 076137          76137          :  "
9454 025402 076146          76146          : GROUP 4F
9455 025404 076147          76147          :  "
9456 025406 076160          76160          : GROUP 4G
9457 025410 076167          76167          :  "
9458 025412 076200          76200          : GROUP 4H
9459 025414 076600          76600          :  "
9460 025416 076602          76602          : GROUP 4I
9461 025420 076777          76777          :  "
9462 025422 106400          106400         : GROUP 5
9463 025424 106477          106477         :  "
9464 025426 106700          106700         : GROUP 6
9465 025430 107777          107777         :  "
9466 025432 170000          170000         : GROUP 7          FLOATING POINT
9467 025434 177777          177777         :  "          INSTRUCTIONS
9468 025436 000000          0              : 0 TERMINATES THE TABLE
9469
9470 025440 012737 064350 000010 7$:  MOV      #RESERR,@#RESVEC      ;RESTORE RESERVED TRAP
9471
(3)  ;:*****
(3)  ;*TEST 43      CHECK THAT ALL BITS IN THE PSW CAN BE SET AND CLEARED
(2)  ;:*****
(2)  025446 000004          TST43:  SCOPE
(2)  025450 112737 000043 001252      MOV      #43,@#TSTNM          ;LOAD TEST NUMBER
(2)  025456 013737 001252 177570      MOV      @#TSTNM,@#DISPLAY    ;:DISPLAY TEST NUMBER
9472 025464 105737 001601      PSWCHK:  TST      @#MMON        ;IF MEM MGMT IS ON SKIP THIS TEST
9473 025470 001070          BNE      4$
9474 025472 013767 177776 000140      MOV      @#PSW,3$            ;SAVE STATUS
9475 025500 005037 177776          CLR      @#PSW              ;CLEAR MODE BITS IN PSW
9476 025504 004737 063314          JSR      PC,@#CLRTRBIT      ;GO 'CLEAR 'T' BIT IF SET
9477 025510 013746 000016          MOV      @#TBITVEC+2,-(SP)
9478 025514 012704 177776          MOV      #PSW,R4            ;LOAD ADDRESS OF PSW INTO R4
9479 025520 000250          CLN
9480 025522 005714          TST      (R4)              ;CHECK THAT PSW WAS CLEARED
9481 025524 001401          BEQ      .+4
9482 025526 104000          HLT
          ;ERROR! PSW FAILED TO CLEAR
9483 025530 012700 170357          MOV      #170357,R0
9484 025534 005737 001552          TST      @#KB11E            ;IS THIS A KB11-E OR KB11-EM PROCESSOR?
9485 025540 001402          BEQ      10$
          ;BR IF NOT
9486 025542 052700 000400          BIS      #400,R0            ;ALSO TEST PS08 IF KB11-E
9487 025546 012702 000001      10$:  MOV      #1,R2              ;R2 = TEST BIT
9488 025552 030200      1$:  BIT      R2,R0              ;CHECK IF BIT CAN BE SET/CLEARED
9489 025554 001423          BEQ      2$
9490 025556 005037 000016          CLR      @#TBITVEC+2
9491 025562 030227 000020          BIT      R2,#20            ;CHECK IF TEST WILL SET 'T' BIT
9492 025566 001403          BEQ      20$
9493 025570 012737 000002 000016      MOV      #RTI,@#TBITVEC+2;SET RTI INTO RETURN
9494 025576 005014      20$:  CLR      (R4)              ;CLEAR PSW
9495 025600 050214          BIS      R2,(R4)           ;SET R2 INTO PSW
    
```

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9496 025602 011403      MOV      (R4),R3      ;GET BIT
9497 025604 020203      CMP      R2,R3      ;CHECK THAT BIT WAS SET IN PSW
9498 025606 001401      BEQ      .+4
9499 025610 104000      HLT      ;ERROR! BIT IN R2 FAILED TO SET IN PSW
9500 025612 000244      CLZ      ;CLEAR Z BIT
9501 025614 040214      BIC      R2,(R4)     ;CLEAR BIT IN PSW
9502 025616 011403      MOV      (R4),R3     ;GET PSW RESULT
9503 025620 001401      BEQ      2$         ;BRANCH IF BIC ABOVE CLEARED BIT IN PSW
9504 025622 104000      HLT      ;ERROR! BIT IN R2 FAILED TO CLEAR IN PSW
9505 025624 006302      2$: ASL      R2      ;SHIFT TEST BIT
9506 025626 103351      BCC      1$         ;BRANCH IF ALL BITS NOT TESTED
9507 025630 005014      CLR      (R4)      ;CLEAR STATUS
9508 025632 012637 000016      MOV      (SP)+,@#TBITVEC+2 ;RESTORE T BIT RETURN
9509 025636 012746      MOV      (PC)+,-(SP) ;PUSH ORIGINAL STATUS ON STACK
9510 025640 000000      3$: .WORD 0 ;CONTAINS ORIGINAL PSW
9511 025642 010746      MOV      PC,-(SP)   ;SET RETURN PC
9512 025644 062716 000006      ADD      #6,(SP)
9513 025650 000002      RTI      ;RETURN
9514 025652 013704 177776      4$: MOV      @#PSW,R4 ;SAVE PSW IN R4
9515 025656 112737 000340 177776      MOVB    #340,@#PSW ;SET PRIORITY LEVEL 7
9516 025664 004737 063314      JSR      PC,@#CLRBTBIT ;GO CLEAR 'T' BIT IF SET
9517
(3)
(3)
(2)
(2) 025670 000004      TST44: SCOPE
(2) 025672 112737 000044 001252      MOVB    #44,@#STSTNM ;LOAD TEST NUMBER
(2) 025700 013737 001252 177570      MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
9518 025706 010603      CHKSP: MOV      SP,R3 ;SAVE STACK PTR
9519 025710 000257      CCC
9520 025712 112706 000377      MOVB    #377,SP ;SET STACK PTR = -1
9521 025716 006006      1$: ROR      SP ;ROTATE 0 BIT THROUGH ALL BIT
9522 025720 103776      BCS      1$ ;BIT POSITIONS
9523 025722 005206      INC      SP ;SHOULD INCREMENT SP TO 0
9524 025724 001403      BEQ      2$
9525 025726 010602      MOV      SP,R2 ;SAVE ERROR STACK PTR
9526 025730 010306      MOV      R3,SP ;SET STACK PTR FOR TRAP
9527 025732 104000      HLT      ;ERROR!
9528
9529 025734 010306      2$: MOV      R3,SP ;RESTORE ORIGINAL STACK PTR
9530
9531 ;CHECK BYTE OPERATIONS USING THE STACK
9532 025736 010600      SPCHK: MOV      SP,R0 ;SAVE STACK PTR
9533 025740 010003      MOV      R0,R3
9534
9535 025742 005043      CLR      -(R3)
9536 025744 112746 177777      MOVB    #-1,-(SP) ;:(SP) = 377
9537 025750 022713 000377      CMP      #377,(R3) ;CHECK THAT ONLY EVEN BYTE WAS AFFECTED
9538 025754 001002      BNE      1$
9539 025756 020306      CMP      R3,SP ;CHECK AUTO-DEC
9540 025760 001401      BEQ      .+4
9541 025762 104000      1$: HLT
9542
9543 025764 105226      INCB    (SP)+
9544 025766 005723      TST      (R3)+ ;CHECK RESULT
9545 025770 001002      BNE      2$
    
```

```

9546 025772 020006      CMP      R0,SP      ;CHECK AUTO-INC
9547 025774 001401      BEQ      .+4
9548 025776 104000      HLT
2$:
9549
9550 026000 005143      COM      -(R3)      ;(R3)=177777
9551 026002 144613      BICB    -(SP),R3
9552 026004 022713 177400      CMP      #177400,R3 ;CHECK RESULT
9553 026010 001002      BNE     3$
9554 026012 020603      CMP     SP,R3
9555 026014 001401      BEQ     .+4
9556 026016 104000      HLT
3$:
9557
9558 026020 132627 000377      BITB    (SP)+,#377
9559 026024 001002      BNE     4$
9560 026026 020600      CMP     SP,R0
9561 026030 001401      BEQ     .+4
9562 026032 104000      HLT
4$:
9563
9564 026034 012746 000001      MOV     #1,-(SP)
9565 026040 062706 000002      ADD     #2,SP
9566 026044 012702 177401      MOV     #177401,R2
9567 026050 120246      CMPB   R2,-(SP)
9568 026052 001004      BNE     5$
9569 026054 122602      CMPB   (SP)+,R2
9570 026056 001002      BNE     5$
9571 026060 020006      CMP     R0,SP
9572 026062 001401      BEQ     .+4
9573 026064 104000      HLT
5$:
9574 026066 105037 177776      CLR    @PSW
9575 026072 010446      MOV     R4,-(SP)      ;RESTORE ORIGINAL PSW TO STACK
9576 026074 010746      MOV     PC,-(SP)
9577 026076 062716 000006      ADD     #6,(SP)
9578 026102 000002      RTI
9579
:*****
:*TEST 45      CHECK THAT 'C' BIT SETS/CLEARs PROPERLY
:*****
(3)
(3)
(2)
(2) 026104 000004      TST45: SCOPE
(2) 026106 112737 000045 001252      MOVB   #45,@#STSTNM ;LOAD TEST NUMBER
(2) 026114 013737 001252 177570      MOV    @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
9580 026122 012727 177776      CBIT:  MOV    #177776,(PC)+ ;LOAD CONSTANT
9581 026126 000000      1$:    .WORD  0
9582 026130 010700      MOV    PC,R0      ;GET CURRENT PC
9583 026132 162700 000004      SUB    #4,R0      ;POINT R0 TO 1$ ABOVE
9584 026136 005520      2$:    ADC    (R0)+     ;ADD 'C' BIT TO 1$ ABOVE
9585 026140 006340      ASL    -(R0)      ;SHIFT 1$
9586 026142 102375      BVC    2$         ;UNTIL 'V' BIT SETS
9587 026144 022767 077776 177754      CMP    #077776,1$ ;CHECK RESULT
9588 026152 001401      BEQ    .+4
9589 026154 104000      HLT      ;ERROR! INCORRECT RESULT IN 1$ ABOVE
9590
9591
9592      ;CHECK THAT CONDITION CODES ARE SET PROPERLY WHEN A NUMBER (CURRENT PC)
9593      ;AND THAT NUMBER +1 ARE COMPARED, AND VICE VERSA.
9594 026156 010700      CMPNUM: MOV    PC,R0 ;GET CURRENT PC
9595 026160 010002      MOV    R0,R2     ;SAVE IN R2

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9596 026162 005202      INC      R2          ;MAKE R2 = R0+1
9597 026164 000277      SCC
9598 026166 000251      +CLC!CLN          ;CLEAR C & N BITS
9599 026170 020002      CMP      R0,R2     ;COMPARE # WITH #+1
9600 026172 103003      BCC     1$         ;CARRY BIT SHOULD SET
9601 026174 102402      BVS     1$         ;V BIT SHOULD CLEAR
9602 026176 001401      BEQ     1$         ;Z BIT SHOULD CLEAR
9603 026200 100401      BMI     .+4        ;N BIT SHOULD SET
9604 026202 104000      1$:      HLT          ;ERROR! COMPARE # WITH #+1 FAILED TO
9605                                     ;SET CONDITION CODES IN PSW CORRECTLY
9606
9607 026204 000277      SCC          ;SET CONDITION CODES IN PSW
9608 026206 120200      CMPB    R2,R0     ;COMPARE #+1 WITH #
9609 026210 103403      BCS     2$         ;C BIT SHOULD CLEAR
9610 026212 102402      BVS     2$         ;V BIT SHOULD CLEAR
9611 026214 001401      BEQ     2$         ;Z BIT SHOULD CLEAR
9612 026216 100001      BPL     .+4        ;N BIT SHOULD CLEAR
9613 026220 104000      2$:      HLT          ;ERROR! COMPARE #+1 WITH # FAILED TO SET
9614                                     ;CONDITION CODES IN PSW CORRECTLY
9615 026222 105037 177776      CLRB    @#PSW     ;ENSURE PRIORITY 0
9616 026226 000004      RELE4:  SCOPE
(1) 026230 010702      MOV     PC,R2
(1) 026232 062702 000012      ADD     #12,R2
(1) 026236 012707 044042      MOV     #RELOC,PC ;GO RELOCATE PROGRAM CODE
(1) 026242 000000      REL44:  .WORD     0
(1)                                     ;4444444444444444 LAST ADDRESS OF CODE TO BE RELOCATED 444444444444
9617                                     ;:*****
(3)                                     ;*TEST 46      CHECK EXTENDED INSTRUCTION SET
(3)                                     ;:*****
(2)
(2) 026244 012767 000001 153124      TST46:  MOV     #1,$TIMES ;:DO 1 ITERATION
(2) 026252 000004      MOV     SCOPE
(2) 026254 112737 000046 001252      MOV     #46,@#STSTM ;LOAD TEST NUMBER
(2) 026262 013737 001252 177570      MOV     @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
9618
(1) .SBTTL START OF SECTION 5
(1) ;5555555555555555 FIRST ADDRESS TO BE RELOCATED 555555555
(1) 026270 010700      RELS:  MOV     PC,R0 ;GET PC
(1) 026272 005740      TST     -(R0) ;R0 CONTAINS THE ADDRESS OF RELS
(1) 026274 010037 001610      MOV     R0,@#FRSTAD ;SAVE
(1) 026300 010700      MOV     PC,R0 ;GET CURRENT PC
(1) 026302 162700 026302      SUB     #,@#R0 ;SUBTRACT RELOCATION FACTOR
(1) 026306 010037 001604      MOV     R0,@#FACTOR ;SAVE RELOCATION FACTOR
(1) 026312 010737 001262      MOV     PC,@#LPERR ;SET LOOP ADDRESS
(1) 026316 062737 000030 001262      ADD     #30,@#LPERR ;ADJUST
(1) 026324 013737 001262 001260      MOV     @#LPERR,@#LPADR
(1) 026332 105737 001600      TSTB   @#NEXEC ;BR IF TEST CODE TO BE EXECUTED
(1) 026336 001402      BEQ     .+6
(1) 026340 000167 001510      JMP     RELES
9619 026344 005000      EXTINST:CLR    R0
9620 026346 000277      SCC          ;PRESET CC'S
9621 026350 006700      SXT     R0 ;EXTEND SIGN (1) INTO R0
9622 026352 103005      BCC     SXTO ;CHECK RESULT CC'S
9623 026354 102404      BVS     SXTO
9624 026356 001403      BEQ     SXTO
    
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9625 026360 100002      BPL      SXT0
9626 026362 005200      INC      R0          ;CHECK RESULT
9627 026364 001401      BEQ      .+4
9628 026366 104000      SXT0:    HLT
9629
9630 026370 010700      MOV      PC,R0
9631 026372 010002      MOV      R0,R2
9632 026374 012703      MOV      #-1,R3    177777
9633 026400 005102      COM      R2
9634 026402 000243      +CLV:CLC          ;CLEAR C AND V BITS
9635 026404 074003      XOR      R0,R3    ;R3 SHOULD CONTAIN COMPLEMENT OF R0
9636 026406 103404      BCS      XOR0    ;CHECK THAT C WAS NOT AFFECTED
9637 026410 102403      BVS      XOR0    ;AND THAT V WAS CLEARED
9638 026412 001402      BEQ      XOR0
9639 026414 020203      CMP      R2,R3    ;CHECK RESULT
9640 026416 001401      BEQ      .+4
9641 026420 104000      XOR0:    HLT          ;ERROR! XOR FAILED
9642
9643 026422 010700      MOV      PC,R0
9644 026424 022020      CMP      (R0)+,(R0)+ ;SET ADDRESS REGISTER
9645 026426 000401      BR       1$        ;RESERVE WORD FOR TEST DATA
9646 026430 000000      .WORD   0          ;CONTAINS TEST DATA
9647 026432 005700      1$:     TST      R0    ;EXTEND SIGN OF ADDRESS INTO
9648 026434 006710      SXT      (R0)      ;ADDRESS (R0)=-1 IF MSB R0=1
9649 026436 005002      CLR      R2        ;OTHERWISE, (R0)=0
9650 026440 005700      TST      R0        ;CHECK SIGN OF ADDRESS
9651 026442 100001      BPL      .+4
9652 026444 005102      COM      R2        ;COMPLEMENT CHECK REG IF NEG
9653 026446 021002      CMP      (R0),R2   ;CHECK RESULT OF SXT
9654 026450 001401      BEQ      .+4
9655 026452 104000      SXT1:    HLT          ;ERROR! SXT FAILED TO EXTEND SIGN PROPERLY
9656
9657 026454 012710      MOV      #100000,(R0) ;PRESET DATA
9658 026460 011002      MOV      (R0),R2
9659 026462 000277      SCC          ;PRESET CC'S
9660 026464 074210      XOR      R2,(R0)    ;XOR 100000 WITH 100000 RESULT = 0
9661 026466 103007      BCC      XOR1      ;CHECK CC'S AFTER XOR
9662 026470 102406      BVS      XOR1
9663 026472 001005      BNE      XOR1
9664 026474 100404      BMI      XOR1
9665 026476 005710      TST      (R0)      ;CHECK RESULT (0)
9666 026500 001002      BNE      XOR1
9667 026502 005402      NEG      R2        ;CHECK THAT REG WAS NOT AFFECTED
9668 026504 102401      BVS      .+4
9669 026506 104000      XOR1:    HLT
9670
9671 026510 010702      MOV      PC,R2
9672 026512 022222      CMP      (R2)+,(R2)+ ;PRESERVE WORD FOR DATA
9673 026514 000401      BR       SXT4      ;RESERVED FOR DATA
9674 026516 000000      .WORD   0          ;PRESET DATA
9675 026520 012722      SXT4:    MOV      #125252,(R2)+ ;EXTEND SIGN
9676 026524 006742      SXT      -(R2)
9677 026526 074722      XOR      PC,(R2)+
9678 026530 010700      MOV      PC,R0    ;GET PC
9679 026532 005740      TST      -(R0)    ;SUBTRACT 2 FROM PC
9680 026534 005100      COM      R0        ;R0=RESULT OF XOR PC-1 ABOVE

```

9681	026536	074042		XOR	R0,-(R2)		:CHECK RESULT OF SXT AND XOR ABOVE
9682	026540	001401		BEQ	+.4		
9683	026542	104000		XOR24:	HLT		:ERROR! SXT & XOR ABOVE INCORRECT
9684							
9685	026544	012704	000001	MOV	#1,R4		:SET R4
9686	026550	006767	000060	SXT	XOR6A		:PRESET DATA-0
9687	026554	074467	000054	2\$:	R4,XOR6A		
9688	026560	100423		BMI	XOR6		
9689	026562	006304		ASL	R4		:SHIFT R4
9690	026564	102373		BVC	2\$:UNTIL V SETS (R4=100000)
9691	026566	100020		BPL	XOR6		:BRANCH IF 'N' IS CLEAR
9692	026570	074467	000040	XOR	R4,XOR6A		:XOR6A=177777
9693	026574	100015		BPL	XOR6		
9694	026576	074767	000032	XOR	PC,XOR6A		:XOR PC WITH XOR6A (177777)
9695	026602	010767	000030	MOV	PC,XOR6B		:FORM PC AS USED IN XOR ABOVE
9696	026606	162767	000004 000022	SUB	#4,XOR6B		
9697	026614	005167	000016	COM	XOR6B		
9698	026620	026767	000012 000006	CMP	XOR6B,XOR6A		:XOR6A SHOULD = COMPLEMENT OF PC
9699	026626	001401		BEQ	+.4		
9700	026630	104000		XOR6:	HLT		:ERROR! XOR TESTS ABOVE FAILED
9701							
9702	026632	000402		BR	+.6		
9703							
9704	026634	000000		XOR6A:	.WORD 0		:CONTAINS DATA USED BY TEST ABOVE
9705	026636	000000		XOR6B:	.WORD 0		
9706							
9707							
9708	026640	012700	077777	MOV	#077777,R0		:SET SOURCE OPERAND FOR ADD
9709	026644	006767	177764	SXT	XOR6A		:CLEAR XOR6A
9710	026650	001004		BNE	SXT6		:CHECK CC'S AFTER EXTENDING ZERO'S
9711	026652	100403		BMI	SXT6		
9712	026654	103402		BCS	SXT6		
9713	026656	102401		BVS	SXT6		
9714	026660	000401		BR	+.4		
9715	026662	104000		SXT6:	HLT		:ERROR! SXT FAILED
9716							
9717	026664	012702	000001	MOV	#1,R2		:SET DEST OPERAND FOR ADD
9718	026670	013703	001604	MOV	#FACTOR,R3		:LOAD INDEX REGISTER
9719	026674	060002		ADD	R0,R2		:RESULT OF ADD=100000
9720	026676	006763	026634	SXT	XOR6A(3)		:EXTEND SIGN OF ADD ABOVE
9721	026702	001403		BEQ	SXT6A		
9722	026704	005267	177724	INC	XOR6A		:CHECK RESULT OF SXT
9723	026710	001401		BEQ	+.4		
9724	026712	104000		SXT6A:	HLT		:ERROR! SXT ABOVE FAILED TO EXTEND SIGN
9725							
9726	026714	010703		MOV	PC,R3		
9727	026716	000402		BR	+.6		:PRESERVE 2 WORDS FOR DATA
9728	026720	000000		SXRA:	.WORD 0		:RESERVED WORD FOR DATA
9729	026722	000000		SXRB:	.WORD 0		:RESERVED WORD FOR DATA
9730	026724	005723		TST	(R3)+		
9731	026726	010304		MOV	R3,R4		:R3 = ADDRESS OF SXRA
9732	026730	000250		CLN			:CLEAR N BIT
9733	026732	006724		SXT	(R4)+		:EXTEND ZEROS INTO SXRA
9734	026734	001401		BEQ	+.4		
9735	026736	104000		SXT2:	HLT		:ERROR. SXT FAILED
9736							

```

9737 026740 010467 177754      MOV      R4,SXRA      ;SXRA = ADDRESS OF SXRB
9738 026744 000257              CCC                  ;CLEAR CONDITION CODES
9739 026746 006733              SXT      @2(R3)+     ;EXTEND ZEROS INTO SXRB
9740 026750 001401              BEQ      .+4
9741 026752 104000              SXT3:   HLT          ;ERROR!
9742
9743 026754 000270              SEN                  ;SET N BIT
9744 026756 006753              SXT      @-(R3)      ;EXTEND ONES INTO SXRB
9745 026760 100401              BMI      .+4
9746 026762 104000              SXT5:   HLT          ;ERROR!
9747
9748 026764 012704 025252      MOV      #025252,R4  ;R4 = 025252
9749 026770 074433              XOR      R4,@2(R3)+  ;SXRB = 152525 (COMPLEMENT OF R4)
9750 026772 005002              CLR      R2
9751 026774 074253              XOR      R2,@-(R3)   ;SXRB REMAINS UNCHANGED
9752 026776 001405              BEQ      XOR35       ;CHECK CONDITION CODES
9753 027000 100004              BPL      XOR35
9754 027002 005104              COM      R4          ;R4 = 152525
9755 027004 020467 177712      CMP      R4,SXRB     ;CHECK XOR
9756 027010 001401              BEQ      .+4
9757 027012 104000              XOR35:  HLT          ;ERROR! XOR FAILED
9758
9759 027014 005743              TST      -(R3)       ;R3 = ADDRESS OF SXRA-2
9760 027016 000250              CLN
9761 027020 006773 000002      SXT      @2(R3)      ;SXRB = 0
9762 027024 001401              BEQ      .+4
9763 027026 104000              SXT7:   HLT          ;ERROR! SXT FAILED
9764
9765 027030 074473 000002      XOR      R4,@2(R3)   ;SXRB = R4
9766 027034 020473 000002      CMP      R4,@2(R3)   ;CHECK XOR
9767 027040 001401              BEQ      .+4
9768 027042 104000              XOR7:   HLT          ;ERROR! XOR FAILED
9773
(3)
(4)
(4)
(3)
(2)
(2) 027044 000004              TST47:  SCOPE
(2) 027046 112737 000047 001252  MOV      #47,@#STSTNM ;LOAD TEST NUMBER
(2) 027054 013737 001252 177570  MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
9774
9775 027062 005005              CLR      R5          ;CLEAR ERROR INDICATOR
9776 027064 000407              BR       SOB0        ;BRANCH TO SOB TEST
9777
9778 027066 005004              SOB10:  CLR      R4          ;R4 = 0
9779 027070 005705              TST      R5          ;CHECK ERROR INDICATOR
9780 027072 001401              BEQ      .+4         ;SOB BRANCHED CORRECTLY
9781 027074 104000              HLT
9782
9783 027076 005005              SOB9:   CLR      R5          ;CLEAR INDICATOR (R5)
9784 027100 006004              ROR      R4          ;ROTATE RIGHT R4
9785 027102 000467              BR       SOB8
9786
9787 027104 012700 000010      SOB0:   MOV      #10,R0 ;R0=10
9788 027110 000277              SCC
    
```

```

;*****
;*TEST 47      SOB TEST
;*      NOTE:   DO NOT INSERT ANY CODE IN FOLLOWING SOB TESTS
;              SINCE IT TESTS THE MAXIMUM BRANCH WIDTH OF THE INSTRUCTION.
;*****
    
```

```

9789 027112 001012 SOB1: BNE SOB2 ;CHECK CONDITION CODES AFTER SOB
9790 027114 100011 BPL SOB2 ;SOB SHOULD NOT EFFECT THE
9791 027116 102010 BVC SOB2 ;CONDITION CODES.
9792 027120 103007 BCC SOB2
9793 027122 077005 SOB RO,SOB1
9794 027124 001005 BNE SOB2 ;CHECK CONDITION CODES AFTER
9795 027126 100004 BPL SOB2 ;SOB FALLS THROUGH,
9796 027130 102003 BVC SOB2 ;SOB SHOULD NOT EFFECT
9797 027132 103002 BCC SOB2 ;CONDITION CODES.
9798 027134 005700 TST RO ;CHECK IF RO=0
9799 027136 001401 BEQ .+4
9800 027140 104000 SOB2: HLT ;ERROR!
9801
9802 027142 012702 000100 MOV #100,R2 ;R2=100
9803 027146 012700 000101 MOV #101,RO ;SET CHECK REGISTER, RO=101
9804 027152 001414 SOB3: BEQ SOB4 ;CHECK CONDITION CODES AFTER
9805 027154 100413 BMI SOB4 ;SOB BRANCH,
9806 027156 102412 BVS SOB4 ;SOB SHOULD NOT EFFECT
9807 027160 103411 BCS SOB4 ;CONDITION CODES.
9808 027162 005300 DEC RO ;DECREMENT CHECK REGISTER
9809 027164 020002 CMP RO,R2 ;CHECK THAT SOB DECREMENTS
9810 027166 001006 BNE SOB4
9811 027170 000257 CCC ;SET CONDITION CODES BEFORE SOB
9812 027172 077211 SOB R2,SOB3 ;BRANCH TO SOB3 UNTIL R2=0
9813 027174 001403 BEQ SOB4 ;CHECK CONDITION CODES AFTER
9814 027176 100402 BMI SOB4 ;SOB FALLS THROUGH
9815 027200 005702 TST R2 ;CHECK IF R2=0
9816 027202 001401 BEQ .+4
9817 027204 104000 SOB4: HLT ;ERROR!
9818
9819 027206 012700 000001 SOB5: MOV #1,RO ;RO=1
9820 027212 000401 BR .+4
9821 027214 104000 HLT ;ERROR!
9822 027216 077002 SOB RO,.-2 ;SOB SHOULD NOT BRANCH
9823
9824 027220 005700 TST RO ;CHECK IF RO=0 AFTER SOB
9825 027222 001401 BEQ .+4
9826 027224 104000 HLT ;ERROR!
9827
9828 027226 012704 100000 SOB5A: MOV #100000,R4 ;R4=100000
9829 027232 000403 BR 1$
9830 027234 005204 3$: INC R4 ;R4=100000
9831 027236 100403 BMI 2$ ;N BIT SHOULD BE SET
9832 027240 104000 HLT ;ERROR! SOB DID NOT
;INCREMENT PROPERLY
9833
9834
9835 027242 077404 1$: SOB R4,3$ ;SOB SHOULD BRANCH
9836 027244 104000 HLT ;ERROR! SOB DID NOT BRANCH
9837
9838 027246 012703 000100 2$: MOV #100,R3 ;R3=100
9839 027252 077301 SOB6: SOB R3,SOB6 ;USE SOB TO BRANCH TO ITSELF
9840 027254 005703 TST R3 ;CHECK IF R3=0
9841 027256 001703 BEQ SOB10
9842 027260 104000 SOB7: HLT ;ERROR!
9843
9844 027262 005705 SOB8: TST R5 ;CHECK INDICATOR (R5)
    
```

```
9845 ;IF SOB BRANCHES INCORRECTLY
9846 ;WHEN CHECKING MAX. BRANCH,
9847 ;R5 WILL NOT BE CLEARED AT
9848 ;THIS POINT INDICATING AN ERROR.
9849
9850 027264 001401 BEQ .+4 ;BRANCH IF SOB BRANCHES CORRECTLY
9851 027266 104000 HLT ;ERROR!
9852
9853 027270 005205 INC R5 ;SET INDICATOR (R5)
9854 027272 077477 SOB R4,SOB9 ;TEST MAX. BRANCH OF SOB
9855 027274 005704 TST R4 ;CHECK IF R4=0
9856 027276 001401 BEQ .+4
9857 027300 104000 HLT ;ERROR.
9858
;*****
(3) ;*TEST 50 CHECK THE MARK INSTRUCTION
(3) ;*****
(2)
(2) 027302 000004 TST50: SCOPE
(2) 027304 112737 000050 001252 MOVB #50,@#STSTNM ;LOAD TEST NUMBER
(2) 027312 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
9859 027320 010602 MRKTST: MOV SP,R2
9860 027322 010705 MOV PC,R5 ;THE STACK LOOKS LIKE THIS AFTER
9861 027324 010500 MOV R5,R0 ;THE JSR INSTRUCTION
9862 027326 010546 MOV R5,-(SP) ; -2(SP)= R0 THIS IS A
9863 027330 010746 MOV PC,-(SP) ; -4(SP)= PC STRING
9864 027332 010746 MOV PC,-(SP) ; -6(SP)= PC+2 OF
9865 027334 010746 MOV PC,-(SP) ; -10(SP)= PC+4 FIVE
9866 027336 010746 MOV PC,-(SP) ; -12(SP)= PC+6 DUMMY
9867 027340 010746 MOV PC,-(SP) ; -14(SP)= PC+10 ARGUMENTS
9868 027342 012746 006405 MOV #MARK+5,-(SP) ; -16(SP)= MARK 5
9869 027346 010605 000002 MOV SP,R5 ; -20(SP)= PC PUSHED BY JSR
9870 027350 004767 JSR PC,MARK1
9871 027354 000403 BR .+10
9872 027356 000205 MARK1: RTS R5
9873 027360 104000 HLT ;ERROR! SHOULD BE DOING MARK 5 INST.
9874 027362 000407 BR MARKEK
9875 027364 020602 CMP SP,R2
9876 027366 001402 BEQ .+6
9877 027370 104000 HLT ;ERROR! SP NOT RETURNED TO PROPER
9878 027372 000403 BR MARKEK ;VALUE BY MARK INSTRUCTION
9879 027374 020005 CMP R0,R5
9880 027376 001401 BEQ .+4
9881 027400 104000 HLT ;ERROR! DID NOT RESTORE R5 FROM STACK
9882 027402 010206 MARKEK: MOV R2,SP ;RESTORE SP
9906
(3) ;*****
(4) ;*TEST 51 RTT/RTI TEST
(4) ;* RTT/RTI TEST INSURES THAT CP DOES THE INSTRUCTION FOLLOWING
(4) ;* AN RTT IF THE 'T' BIT IS SET IN THE PSW,BUT DOES HONOR
(4) ;* THE TRAP IMMEDIATELY IF IT EXECUTES AN RTI
(4) ;* INSTRUCTION SEQUENCE-RTT
(4) ;* 2$: RTT ;NO 'T' TRAP AFTER RTT
(4) ;* INC R0 ;R0=000001
(4) ;* ;'T' TRAP TO 5$ AFTER INC
(4) ;* 5$: COM R0 ;R0=177776
(4) ;* MOV SAVPSW,2(SP) ;CLEAR 'T' BIT IN RETURN PSW
(4) ;* RTI ;RETURN TO INSTRUCTION FOLLOWING INC
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(4)          : *          CMP          #RTT,2$          :CHECK
(4)          : *          ETC
(4)          : *          INSTRUCTION SEQUENCE-RTI
(4)          : *          2$:          RTI          : 'T' TRAP AFTER RTI
(4)          : *          5$:          COM          R0          :RO=177777
(4)          : *          MOV          SAVPSW,2(SP)      :CLEAR 'T' BIT IN RETURN PSW
(4)          : *          RTI
(4)          : *          INC          R0          :RETURN TO INC INSTRUCTION
(4)          : *          CMP          #RTT,2$          :RO=000000
(4)          : *          ETC          :CHECK
(3)          : *          *****
(2)          : *
(2) 027404 000004          TST51:  SCOPE
(2) 027406 112737 000051 001252      MOV      #51,@#STSTNM          :LOAD TEST NUMBER
(2) 027414 013737 001252 177570      MOV      @#STSTNM,@#DISPLAY    :;DISPLAY TEST NUMBER
9907 027422 013767 177776 000214      MOV      @#PSW,SAVPSW         :SAVE PSW
9908 027430 032767 000020 000206      BIT      #20,SAVPSW          :CHECK IF 'T' BIT SET
9909 027436 001402          BEQ      1$                   :CONTINUE IF NOT
9910 027440 000167 000402          JMP      RTT2EX              :BRANCH TO EXIT
9911 027444 010746          1$:  MOV      PC,-(SP)          :GET CURRENT PC
9912 027446 062716 000116          ADD      #5$-.,(SP)         :FORM RELOCATED PC
9913 027452 012637 000014          MOV      (SP)+,@#TBITVEC    :LOAD INTO TRAP VECTOR
9914 027456 016746 000162          MOV      SAVPSW,-(SP)       :GET CURRENT PSW
9915 027462 011637 000016          MOV      (SP),@#TBITVEC+2
9916 027466 052737 000340 177776      BIS      #PR7,@#PSW         :SET PRIORITY LEVEL 7
9917 027474 005000          CLR      R0
9918 027476 052716 000360          BIS      #PR7+20,(SP)       :SET 'T' BIT IN PSW ON STACK
9919 027502 010746          MOV      PC,-(SP)          :PUT THE PC ON THE STACK
9920 027504 062716 000006          ADD      #6,(SP)           :ADJUST PC FOR NEXT INSTRUCTION
9921 027510 000006          2$:  RTT
9922 027512 005200          INC      R0
9923          :DONE TO SEE IF INSTR. FOLLOWING
9924 027514 042737 000340 177776      BIC      #PR7,@#PSW         :RTT IS EXECUTED IF T-BIT SET
9925 027522 022767 000006 177760      CMP      #RTT,2$           :SET PRIORITY LEVEL 0
9926 027530 001005          BNE      3$
9927 027532 022700 177776          CMP      #177776,R0        :CHECK IF INC WAS EXECUTED
9928 027536 001406          BEQ      4$                 :CHECK IF COM-RO EXECUTED
9929 027540 104000          HLT
9930 027542 000415          BR      6$
9931 027544 005700          3$:  TST      R0
9932          :ERROR!RO NOT COMPLIMENTED
9933          :EXIT TEST
9933 027546 001413          BEQ      6$
9934 027550 104000          HLT
9935 027552 000411          BR      6$
9936 027554 012767 000002 177726      4$:  MOV      #RTI,2$
9937 027562 000730          BR      1$
9938 027564 005100          5$:  COM      R0
9939 027566 016766 000052 000002      MOV      SAVPSW,2(SP)      :RTT CHECK
9940 027574 000002          RTI
9941 027576 012767 000006 177704      6$:  MOV      #RTT,2$
9942 027604 012737 001570 000014      MOV      #SRTN,@#TBITVEC    ;RESTORE 'T' TRAP VECTOR
9943 027612 005037 000016          CLR      @#TBITVEC+2
9944 027616 042737 000360 000016      BIC      #PR7+BIT4,@#TBITVEC+2
9945 027624          RTT1EX:
(4)          : *          *****
    
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(3)          ;*TEST 52          SECOND RTT TEST
(3)          ;:*****
(2)
(2) 027624 000004          TST52: SCOPE
(2) 027626 112737 000052 001252      MOVB #52,@#STSTNM          ;LOAD TEST NUMBER
(2) 027634 013737 001252 177570      MOV  @#STSTNM,@#DISPLAY  ;;DISPLAY TEST NUMBER
9946 027642 000401          BR      RTT2A
9947 027644 000000          SAVPSW: .WORD 0
9948 027646 016700 177772      RTT2A: MOV  SAVPSW,R0          ;GET SAVED PSW
9949 027652 105000          CLRB   R0                ;CLEAR PRIORITY LEVEL,T, AND COND CODES
9950 027654 012702 144000      MOV   #UM+REG,R2
9951 027660 074002          XOR   R0,R2
9952 027662 001435          BEQ   2$                ;USER MODE REG. SET #1 ON
9953 027664 012702 044000      MOV   #SM+REG,R2
9954 027670 074002          XOR   R0,R2
9955 027672 001447          BEQ   3$                ;SUPER MODE REG. SET #1 ON
9956 027674 032700 140000      BIT   #UM,R0
9957 027700 001062          BNE   RTT2EX
9958
9959          ;TEST THAT RTT CLEARS BITS 11,12,13 & PRIORITY LEVEL BITS IN KERNEL MODE
9960 027702 012702 77777      MOV   #-1,R2            ;KERNEL MODE REG. SET 0 ON
9961 027706 012737 034240 177776  MOV   #PUM+REG+PR5,@#PSW ;SELECT REG. SET #1
9962 027714 005002          CLR   R12              ;SHOULD CLEAR REG #12
9963 027716 012746 000100      MOV   #PR2,-(SP)
9964 027722 010746          MOV   PC,-(SP)
9965 027724 062716 000006      ADD   #1$-.,(SP)        ;FORM NEW PC
9966 027730 000006          RTT
9967 027732 013700 177776  1$:  MOV   @#PSW,R0          ;NOW USING REG SET 0
9968 027736 005702          TST   R2                ;SHOULD TEST R2 NOT R12
9969 027740 001001          BNE   4$
9970 027742 104000          HLT
9971 027744 022700 000100  4$:  CMP   #PR2,R0            ;TESTS THE PSW AFTER THE RTT
9972 027750 001436          BEQ   RTT2EX
9973 027752 104000          HLT
9974 027754 000434          BR    RTT2EX            ;ERROR! INCORRECT PSW AFTER THE RTT
9975
9976          ;TEST TO INSURE THAT RTI DOES NOT CLEAR BITS 11-15 IN USER MODE
9977 027756 052737 030340 177776  2$:  BIS   #PUM+PR7,@#PSW ;PSW<15-5>=144X
9978 027764 005046          CLR   -(SP)
9979 027766 010746          MOV   PC,-(SP)
9980 027770 062716 000006      ADD   #5$-.,(SP)
9981 027774 000002          RTI
9982 027776 022737 174340 177776  5$:  CMP   #UM+PUM+REG+PR7,@#PSW ;ATTEMPS TO INSERT A PSW OF 0
9983 030004 001420          BEQ   RTT2EX            ;SHOULD CHECK AGAINST REG #0
9984 030006 104000          HLT
9985 030010 000416          BR    RTT2EX            ;ERROR! RTI CLEARED BITS IN PSW
9986
9987          ;TEST THAT BITS 11-15 AND PRIORITY BITS ARE NOT ALTERED IN SUPER MODE
9988 030012 052737 030200 177776  3$:  BIS   #PUM+PR4,@#PSW ;PSW<15-5>=044X
9989 030020 012746 000340      MOV   #PR7,-(SP)
9990 030024 010746          MOV   PC,-(SP)
9991 030026 062716 000006      ADD   #6$-.,(SP)
9992 030032 000006          RTT
9993          ;ATTEMPS TO CLEAR 11-15 AND ALTER PR
9994 030034 022737 074200 177776  6$:  CMP   #SM+PUM+REG+PR4,@#PSW
9995 030042 001401          BEQ   RTT2EX
    
```



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9996 030044 104000 HLT ;ERROR! RTT ALTERED PR IN
9997 ;SUPER MODE OR BITS 11-15.
9998 030046 016737 177572 177776 RTT2EX: MOV SAVPSW,@#PSW
9999 030054 000004 RELE5: SCOPE
(1) 030056 010702 MOV PC,R2
(1) 030060 062702 0G0012 ADD #12,R2
(1) 030064 012707 044042 MOV #RELOC,PC ;GO RELOCATE PROGRAM CODE
(1) 030070 000000 REL55: .WORD 0
(1) ;555555555555 LAST ADDRESS OF CODE TO BE RELOCATED 5555555555
10000 ;:*****
(3) ;*TEST 53 CHECK ASH, ASHC, MUL, AND DIV INSTRUCTIONS
(3) ;:*****
(2)
(2) 030072 012767 000001 151276 TST53: MOV #1,$TIMES ;;DO 1 ITERATION
(2) 030100 000004 SCOPE
(2) 030102 112737 000053 001252 MOV#B #53,@#STSTNM ;LOAD TEST NUMBER
(2) 030110 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
10001
(1) .SBTTL START OF SECTION 6
(1) ;6666666666666666 FIRST ADDRESS TO BE RELOCATED 6666666666
REL6: MOV PC,R0 ;GET PC
(1) 030116 010700 TST -(R0) ;R0 CONTAINS THE ADDRESS OF REL6
(1) 030120 005740 MOV R0,@#FRSTAD ;SAVE
(1) 030122 010037 001610 MOV PC,R0 ;GET CURRENT PC
(1) 030126 010700 SUB #.,R0 ;SUBTRACT RELOCATION FACTOR
(1) 030130 162700 030130 MOV R0,@#FACTOR ;SAVE RELOCATION FACTOR
(1) 030134 010037 001604 MOV PC,@#SLPERR ;SET LOOP ADDRESS
(1) 030140 010737 001262 ADD #30,@#SLPERR ;ADJUST
(1) 030144 062737 000030 001262 MOV @#SLPERR,@#SLPADR
(1) 030152 013737 001262 001260 TSTB @#NEXEC ;BR IF TEST CODE TO BE EXECUTED
(1) 030160 105737 001600 BEQ .+6
(1) 030164 001402 JMP RELE6
(1) 030166 000167 002120 ASHLO: MOV #1,R0 ;R0 WILL BE THE SHIFT COUNT
10002 030172 012700 000001 MOV #17.,R3 ;MAX SHIFT COUNT
10003 030176 012703 000021 1$: CLR 2$ ;PRESET SAVED CC'S LOCATION=0
10004 030202 005067 000014 MOV R0,R2 ;GET SHIFT COUNT FOR PASS
10005 030206 010002 MOV PC,R5 ;R5 & R4 WILL BE DATA SHIFTED BY
10006 030210 010705 MOV R5,R4 ;ASH & ASL INSTRUCTIONS
10007 030212 010504 ASH R2,R5 ;SHIFT R5
10008 030214 072502 MOV#B @#PSW,(PC)+ ;SAVE CC'S
10009 030216 113727 177776 2$: .WORD 0 ;CONTAINS ASH CC'S IN EVEN BYTE
10010 030222 000000 3$: ASL R4 ;ASL CC'S IN ODD BYTE
10011 ;SHIFT R4
10012 030224 006304 MOV#B @#PSW,-(SP) ;SAVE PSW ON STACK
10013 030226 113746 177776 BITB #2,(SP) ;CHECK IF ASL SET V BIT
10014 030232 132716 000002 BEQ 30$
10015 030236 001403 BISB #2,2$+1 ;IF ASL SET V THEN SET V IN 2$+1
10016 030240 152767 000002 177755 30$: MOV#B (SP)+,@#PSW ;RESTORE ORIGINAL PSW
10017 030246 112637 177776 SOB R2,3$ ;SHIFT R4 R2 TIMES
10018 030252 077214 BISB @#PSW,2$+1 ;SAVE CC'S AFTER ASL
10019 030254 153767 177776 177741 CMP R5,R4 ;CHECK ASH & ASL RESULTS
10020 030262 020504 BNE 4$
10021 030264 001004 CMP#B 2$,2$+1 ;CHECK ASH & ASL CC'S
10022 030266 126767 177730 177727 BEQ .+4
10023 030274 001401 4$: HLT ;ERROR! INCORRECT RESULT OR CC'S
10024 030276 104000
    
```


10025	030300	005200				INC	R0	:INCREMENT PASS SHIFT COUNT
10026	030302	070003				CMP	R0,R3	
10027	030304	013336				BNE	1\$	
10028								
10029	030306	012700	177777			ASHRO: MOV	#-1,R0	:R0 = RIGHT SHIFT COUNT FOR PASS
10030	030312	012703	177757			MOV	#-1,R3	:MAX SHIFT COUNT
10031	030316	010002			1\$:	MOV	R0,R2	:GET SHIFT COUNT FOR PASS
10032	030320	010705				MOV	PC,R5	:R5 & R4 = DATA TO BE SHIFTED
10033	030322	010504				MOV	R5,R4	:BY ASH & ASR INSTRUCTIONS
10034	030324	072502				ASH	R2,R5	:SHIFT R5 R2 TIMES
10035	030326	113727	177776			MOVSB	2\$PSW,(PC)+	:SAVE CC'S IN EVEN BYTE
10036	030332	000000			2\$:	.WORD	0	:CONTAINS ASH CC'S IN EVEN BYTE
10037								:ASR CC'S IN ODD BYTE
10038	030334	005402				NEG	R2	
10039	030336	006204			3\$:	ASR	R4	:SHIFT R4
10040	030340	077202				SOB	R2,3\$:SHIFT R4 R2 TIMES
10041	030342	113767	177776	177763		MOVSB	2\$PSW,2\$+1	:SAVE CC'S AFTER ASR
10042	030350	142767	000002	177755		BICB	#2,2\$+1	:ASH RIGHT WILL NOT SET V ASR MAY SET V
10043	030356	020504				CMP	R5,R4	:CHECK ASH & ASR RESULTS
10044	030360	001004				BNE	4\$	
10045	030362	126767	177744	177743		CMPB	2\$,2\$+1	:CHECK ASH & ASR CC'S
10046	030370	001401				BEQ	.+4	
10047	030372	104000			4\$:	HLT		
10048	030374	005300				DEC	R0	:DECREMENT PASS SHIFT COUNT
10049	030376	020003				CMP	R0,R3	
10050	030400	001346				BNE	1\$	
10051								
10052	030402	012746	000037			ASHCLO: MOV	#31,-(SP)	:PUT MAX SHIFT COUNT ON STACK
10053	030406	012746	000001			MOV	#1,-(SP)	:PUT LEFT SHIFT COUNT ON STACK
10054	030412	011600			1\$:	MOV	(SP),R0	:GET PASS SHIFT COUNT
10055	030414	010705				MOV	PC,R5	:CURRENT PC IS DATA TO BE SHIFTED
10056	030416	010503				MOV	R5,R3	:ASHC SHIFTS R4,R5;ASL,ROL SHIFTS R2,R3
10057	030420	005004				CLR	R4	
10058	030422	005002				CLR	R2	
10059	030424	073400				ASHC	R0,R4	:SHIFT R4 LEFT AS SPECIFIED BY R0
10060	030426	006303			2\$:	ASL	R3	:SHIFT R2,R3 LEFT
10061	030430	006102				ROL	R2	:AS SPECIFIED BY R0
10062	030432	077003				SOB	R0,2\$	
10063	030434	020402				CMP	R4,R2	:CHECK RESULTS
10064	030436	001002				BNE	3\$	
10065	030440	020503				CMP	R5,R3	
10066	030442	001401				BEQ	.+4	
10067	030444	104000			3\$:	HLT		
10068	030446	005216				INC	(SP)	:INCREMENT NEXT PASS SHIFT COUNT
10069	030450	021666	000002			CMP	(SP),2(SP)	:REACHED MAX COUNT (31.)
10070	030454	001356				BNE	1\$	
10071	030456	022626				CMP	(SP)+,(SP)+	:RESTORE STACK PTR
10072								
10073	030460	012746	177740			ASHCRO: MOV	#-32,-(SP)	:PUT MAX RIGHT SHIFT COUNT ON STACK
10074	030464	012746	177777			MOV	#-1,-(SP)	:PUT PASS SHIFT COUNT ON STACK
10075	030470	011600			1\$:	MOV	(SP),R0	:GET PASS SHIFT COUNT
10076	030472	010702				MOV	PC,R2	:R2,R3 & R4,R5 ARE THE DATA REGISTERS
10077	030474	010204				MOV	R2,R4	:TO BE SHIFTED BY TEST
10078	030476	005003				CLR	R3	
10079	030500	005005				CLR	R5	
10080	030502	000262				SEV		:SET V BIT IN PSW

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10081 030504 073200 ASHC R0,R2 ;SHIFT R2,R3 RIGHT R0 TIMES
10082 030506 102410 BVS 2$ ;SHIFT RIGHT CLEARS V
10083 030510 005400 NEG R0 ;NEGATE SHIFT COUNT FOR SOB
10084 030512 006204 2$: ASR R4 ;SHIFT R4,R5 RIGHT R0 TIMES
10085 030514 006005 ROR R5
10086 030516 077003 SOB R0,2$
10087 030520 020204 CMP R2,R4 ;CHECK RESULT
10088 030522 001002 BNE 3$
10089 030524 020305 CMP R3,R5
10090 030526 001401 BEQ .+4
10091 030530 104000 3$: HLT
10092 030532 005316 DEC (SP) ;SET SHIFT COUNT FOR NEXT PASS
10093 030534 021666 000002 CMP (SP),2(SP) ;CHECK IF MAX SHIFT COUNT
10094 030540 001353 BNE 1$
10095 030542 022626 CMP (SP)+,(SP)+ ;RESTORE STACK PTR
10101 *****
(3) *TEST 54 CHECK MUL
(4) * THE BELOW TEST OF THE MUL INSTRUCTION MULTIPLIES THE CURRENT PC
(4) * BY 1,2,4,8 ETC AND SHIFTS THE SAME PC VALUE USING AN ASHC LEFT BY
(4) * 0,1,2,3,ETC AND COMPARES THE RESULTS. CONDITION CODE RESULTS ARE NOT CHECKED.
(3) *****
(2)
(2) 030544 000004 TST54: SCOPE
(2) 030546 112737 000054 001252 MOVB #54,#$STSTNM ;LOAD TEST NUMBER
(2) 030554 013737 001252 177570 MOV #$STSTNM,#$DISPLAY ;:DISPLAY TEST NUMBER
10102 030562 012700 000001 MULO: MOV #1,R0 ;R0 CONTAINS MULTIPLIER FOR MUL
10103 030566 012706 000700 MOV #SUPSTK,SP ;SETUP THE STACK
10104 030572 005016 CLR (SP) ;(SP) CONTAINS SHIFT VALUE FOR ASHC
10105 030574 010702 1$: MOV PC,R2 ;R3,R2 & R5,R4 ARE DATA REGISTERS
10106 030576 010227 MOV R2,(PC)+ ;SAVE MULTIPICAND
10107 030600 000000 .WORD 0 ;CONTAINS ORIGINAL MULTIPICAND
10108 030602 005003 CLR R3
10109 030604 005004 CLR R4
10110 030606 010205 MOV R2,R5 ;FOR MUL AND ASHC
10111 030610 100001 BPL .+4 ;IF MULTIPICAND IS NEG THEN SET R4 --1
10112 030612 005104 COM R4 ;FOR ASHC
10113 030614 000277 SCC ;PRESET CC'S
10114 030616 070200 MUL R0,R2 ;MULTIPLY R2 BY R0 LEAVE PRODUCT
10115 ;IN R2,R3 MSH IN R2,LSH IN R3
10116 030620 102406 BVS 2$
10117 030622 001405 BEQ 2$ ;PRODUCT WILL NEVER BE = 0
10118 030624 073416 ASHC (SP),R4 ;'MULTIPLY' R4,R5 BY (SP) LEAVE PRODUCT
10119 ;IN R4,R5 MSH IN R4,LSH IN R5
10120 030626 020204 CMP R2,R4 ;CHECK MSH RESULT
10121 030630 001002 BNE 2$
10122 030632 020305 CMP R3,R5 ;CHECK LSH RESULT
10123 030634 001401 BEQ .+4
10124 030636 104000 2$: HLT
10125 030640 005216 INC (SP) ;INCREMENT ASHC SHIFT COUNT
10126 030642 006300 ASL R0 ;SHIFT MUL MULTIPLIER
10127 030644 102353 BVC 1$
10128 ;CHECK MUL INST WITH MULTIPLIER (R0) = 100000
10129 030646 010702 MOV PC,R2 ;R2 = MULTIPICAND
10130 030650 005202 INC R2
10131 030652 010227 MOV R2,(PC)+ ;SAVE MULTIPICAND
10132 030654 000000 .WORD 0 ;CONTAINS ORIGINAL MULTIPICAND
    
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10133 030656 005103          COM      R3
10134 030660 010204          MOV      R2,R4          ;R4 WILL BE MSH 'PRODUCT'
10135 030662 006204          ASR      R4              ;FORM 'PRODUCT'
10136 030664 005104          COM      R4              ;COMPLEMENT MSH 'PRODUCT'
10137 030666 070200          MUL      R0,R2          ;MULTIPLY R2 BY 10000 LEAVING
10138                                ;R2 = MSH, R3 = LSH PRODUCT
10139 030670 020204          CMP      R2,R4          ;COMPARE MSH PRODUCTS
10140 030672 001002          BNE      3$
10141 030674 020003          CMP      R0,R3          ;CHECK LSH PRODUCT
10142 030676 001401          BEQ      .+4
10143 030700 104000          3$:      HLT
10150                                ;*****
(3)                                ;+TEST 55      CHECK THE DIV INSTRUCTION
(4)                                ;*      THE BELOW TEST OF THE DIV INSTRUCTION DIVIDES THE CURRENT PC BY
(4)                                ;*      1,2,4,8,ETC LEAVING THE QUOTIENT/REMAINDER IN R2/R3. NEXT THE QUOTIENT
(4)                                ;*      IS MULTIPLIED BY 1,2,4,8,ETC AND THE REMAINDER ADDED. THE RESULT IS
(4)                                ;*      THEN COMPARED WITH THE ORIGINAL CURRENT PC.
(3)                                ;*****
(2)
(2) 030702 000004          TST55:   SCOPE
(2) 030704 112737 000055 001252      MOV      #55,@#STSTNM      ;LOAD TEST NUMBER
(2) 030712 013737 001252 177570      MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10151 030720 012700 000001      DIV0:   MOV      #1,R0          ;R0=DIVISOR
10152 030724 010716          MOV      PC,(SP)         ;SAVE DATA ON STACK
10153 030726 011603          1$:     MOV      (SP),R3        ;GET DATA
10154 030730 005002          CLR      R2              ;CLEAR MSH DIVIDEND
10155 030732 000277          SCC
10156 030734 071200          DIV      R0,R2          ;DIVIDE R2 BY R0 LEAVING QUOTIENT IN R2
10157                                ;AND REMAINDER IN R3
10158 030736 103417          BCS      2$
10159 030740 100416          BMI      2$
10160 030742 102007          BVC      20$            ;BRANCH IF DIVIDE WORKED
10161 030744 022700 000001      CMP      #1,R0          ;V BIT SHOULD ONLY SET IF DIVIDING BY 1
10162 030750 001012          BNE      2$              ;AND THE LSH OF DIVIDEND
10163 030752 032716 100000      BIT      #100000,(SP)   ;IS NEGATIVE
10164 030756 001407          BEQ      2$
10165 030760 000407          BR       3$
10166 030762 010204          20$:   MOV      R2,R4          ;GET QUOTIENT
10167 030764 070400          MUL      R0,R4          ;MULTIPLY QUOTIENT BY DIVISOR
10168 030766 060305          ADD      R3,R5          ;ADD REMAINDER TO LSH PRODUCT
10169 030770 103402          BCS      2$              ;SHOULD BE NO CARRY
10170 030772 021605          CMP      (SP),R5        ;CHECK RESULT
10171 030774 001401          BEQ      .+4
10172 030776 104000          2$:     HLT              ;ERROR! DIVIDE FAILED
10173                                ;QUOTIENT IS IN R2,REMAINDER IN R3
10174                                ;ORIGINAL PC IS ON STACK AND FINAL
10175                                ;PRODUCT IN R4,R5 [MSH][LSH]
10176 031000 006300          3$:     ASL      R0              ;GET NEXT DIVISOR
10177 031002 102351          BVC      1$
10178
10179                                ;CHECK ASH,ASHC,MUL, AND DIV INSTRUCTIONS USING ADDRESS MODE 1
10180 031004 005016          ASHL1:  CLR      (SP)        ;(SP) = SHIFT COUNT
10181 031006 005000          CLR      R0              ;R0 = SHIFT COUNT FOR CHECK ASH
10182 031010 012702 000020      MOV      #16.,R2        ;R2 = MAX LEFT SHIFT COUNT
10183 031014 005067 000012      1$:     CLR      2$              ;CLEAR CC'S HOLDING ADDRESS
10184 031020 010703          MOV      PC,R3          ;R3,R4 = DATA TO BE SHIF'ED
    
```

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10185 031022 010304      MOV      R3,R4
10186 031024 072316      ASH      (SP),R3      ;SHIFT R3 LEFT (SP) TIMES
10187 031026 013727 177776      MOV      @#PSW,(PC)+ ;SAVE CC'S
10188 031032 000000      .WORD   0            ;CONTAINS ASH (SP),R3 CC'S IN EVEN BYTE
10189                                ;AND ASH R0,R4 CC'S IN ODD BYTE
10190 031034 072400      ASH      R0,R4      ;SHIFT R4 LEFT R0 TIMES
10191 031036 113767 177776 177767      MOVB    @#PSW,2$+1   ;SAVE CC'S IN ODD BYTE OF 2$
10192 031044 020304      CMP      R3,R4      ;COMPARE RESULTS
10193 031046 001004      BNE     3$          ;BRANCH IF THEY DO NOT COMPARE
10194 031050 126767 177756 177755      CMPSB  2$,2$+1     ;CHECK CC'S AFTER ASH INSTRUCTIONS
10195 031056 001401      BEQ     .+4
10196 031060 104000      HLT
10197                                ;ERROR! EITHER RESULTS OF SHIFT OR
10198 031062 005200      INC     R0          ;RESULT CC'S ARE INCORRECT
10199 031064 005216      INC     (SP)        ;INCREMENT SHIFT COUNT FOR ASH R0,R4
10200 031066 020200      CMP     R2,R0      ;INCREMENT SHIFT COUNT FOR ASH (SP),R3
10201 031070 001351      BNE     1$          ;CHECK FOR MAX SHIFT COUNT
10202
10203 031072 005016      ASHR1:  CLR     (SP)   ;(SP) = SHIFT COUNT FOR ASH (SP),R4
10204 031074 005000      CLR     R0          ;R0 = SHIFT COUNT FOR ASH R0,R5
10205 031076 005402      NEG     R2          ;R2 = MAX RIGHT SHIFT COUNT (SET BY
10206                                ;ABOVE TEST TO 16. NOW = -16.
10207 031100 005067 000012      1$:    CLR     2$      ;CLEAR CC'S HOLDING ADDRESS
10208 031104 010704      MOV     PC,R4      ;R4,R5 = DATA TO BE SHIFTED RIGHT
10209 031106 010405      MOV     R4,R5
10210 031110 072416      ASH     (SP),R4    ;SHIFT R4 RIGHT (SP) TIMES
10211 031112 013727 177776      MOV     @#PSW,(PC)+ ;SAVE CC'S
10212 031116 000000      .WORD   0            ;CONTAINS ASH (SP),R4 CC'S IN EVEN BYTE
10213                                ;AND ASH R0,R5 CC'S IN ODD BYTE
10214 031120 072500      ASH     R0,R5      ;SHIFT R5 RIGHT R0 TIMES
10215 031122 113767 177776 177767      MOVB    @#PSW,2$+1   ;SAVE CC'S IN ODD BYTE 2$
10216 031130 020405      CMP     R4,R5      ;CHECK RESULTS
10217 031132 001004      BNE     3$
10218 031134 126767 177756 177755      CMPSB  2$,2$+1     ;CHECK RESULT CC'S
10219
10220 031142 001401      BEQ     .+4
10221 031144 104000      HLT
10222                                ;ERROR! EITHER RESULTS OR RESULT CC'S
10223                                ;DID NOT COMPARE
10224 031146 005300      DEC     R0          ;DECREMENT SHIFT COUNT
10225 031150 005316      DEC     (SP)        ;DECREMENT SHIFT COUNT FOR ASH (SP),R4
10226 031152 020002      CMP     R0,R2      ;CHECK FOR MAX RIGHT SHIFT
10227 031154 001351      BNE     1$
10232
(3)  ;*****
(4)  ;*TEST 56      DIVIDE AGAIN
(4)  ;*      THE BELOW TEST CHECKS THE DIVIDE INSTRUCTION BY DIVIDING
(4)  ;*      THE CURRENT PC BY ITSELF+1. THE QUOTIENT (IN R2) ALWAYS = 0,
(4)  ;*      AND THE REMAINDER (IN R3) ALWAYS = THE CURRENT PC.
(3)  ;*****
(2)
(2) 031156 000004      TST56: SCOPE
(2) 031160 112737 000056 001252      MOVB    #56,@#STSTNM ;LOAD TEST NUMBER
(2) 031166 013737 001252 177570      MOV     @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10233 031174 010703      DIV1:  MOV     PC,R3    ;CURRENT PC IS LSH DIVIDEND
10234 031176 006702      SXT    R2          ;EXTEND SIGN TO R2 (MSH DIVIDEND)
10235 031200 010304      MOV     R3,R4      ;SAVE ORIGINAL DIVIDEND
10236 031202 010316      MOV     R3,(SP)    ;PUT ON STACK
    
```

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10237 031204 005216          INC      (SP)          ;ADD 1 (WILL BE DIVISOR)
10238 031206 100002          BPL      1$           ;BRANCH IF POSITIVE
10239 031210 162716 000002    SUB      #2,(SP)      ;MAKE DIVISOR 1 LESS THAN DIVIDEND
10240 031214 071216          1$: DIV      (SP),R2   ;DIVIDE R2 BY (SP)
10241 031216 103410          BCS      2$           ;CHECK CONDITION CODES
10242 031220 102407          BVS      2$
10243 031222 001006          BNE      2$
10244 031224 100405          BMI      2$
10245 031226 005702          TST      R2           ;CHECK QUOTIENT (R2 - 0)
10246 031230 001361          BNE      DIV1
10247 031232 010416          MOV      R4,(SP)     ;GET ORIGINAL DIVISOR
10248 031234 020316          CMP      R3,(SP)     ;CHECK REMAINDER
10249 031236 001401          BEQ      .+4
10250 031240 104000          2$: HLT              ;REPORT ERROR
10251
;*****
; *TEST 57      CHECK SPL INSTRUCTION
;*****
(3)
(3)
(2)
(2) 031242 000004          TST57: SCOPE
(2) 031244 112737 000057 001252  MOV      #57,@#STSTNM ;LOAD TEST NUMBER
(2) 031252 013737 001252 177570  MOV      @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10252 031260 012702          SPLTST: MOV      (PC)+,R2 ;R2 CONTAINS OP CODE FOR SPL 7
10253 031262 000237          SPL      7
10254 031264 005004          CLR      R4
10255 031266 042744 000340    BIC      #PR7,-(R4)   ;CLEAR PRIORITY LEVEL BITS IN PSW
10256 031272 011403          MOV      (R4),R3     ;GET CURRENT PSW
10257 031274 042703 177757    BIC      #177757,R3  ;R3 CONTAINS CORRECT PSW AFTER SPL
10258
10259 031300 012767 000230 000010  MOV      #SPL+0,2$   ;INITIALIZE SPL INSTRUCTIONS
10260 031306 012767 000237 000050  MOV      #SPL+7,5$
10261 031314 000257          1$: CCC              ;CLEAR CONDITION CODES
10262 031316 000230          2$: SPL      0       ;SET PRIORITY LEVEL (NOTE: SPL NOP IF USER/SUPER MODE)
10263 031320 121403          CMPB     (R4),R3     ;CHECK RESULT OF SPL ABOVE
10264 031322 001401          BEQ      .+4
10265 031324 104000          HLT              ;ERROR! SPL ABOVE FAILED
10266 031326 032714 140000    BIT      #UM,(R4)   ;IF NOT IN KERNEL MODE THEN SPL
10267 031332 001002          BNE      3$         ;ACTS AS A NOP
10268 031334 062703 000040    ADD      #40,R3     ;SET NEXT CORRECT PSW RESULT
10269 031340 005267 177752    3$: INC      2$      ;SET NEXT SPL INSTRUCTION
10270 031344 026702 177746    CMP      2$,R2     ;CHECK IF DONE
10271 031350 002761          BLT      1$         ;LOOP UNTIL DONE CHANGING SPL EACH PASS
10272 031352 012702          MOV      (PC)+,R2   ;R2 CONTAINS SPL INSTRUCTION BELOW
10273 031354 000230          SPL      0
10274 031356 052703 000017    BIS      #17,R3     ;SET CONDITION CODE RESULT INTO R3
10275 031362 000277          4$: SCC              ;SET CONDITION CODES
10276 031364 000237          5$: SPL      7       ;SET PRIORITY LEVEL
10277 031366 121403          CMPB     (R4),R3     ;CHECK RESULT OF SPL ABOVE
10278 031370 001401          BEQ      .+4
10279 031372 104000          HLT              ;ERROR! SPL ABOVE FAILED
10280 031374 032714 140000    BIT      #UM,(R4)   ;CHECK IF IN KERNEL MODE
10281 031400 001002          BNE      6$
10282 031402 162703 000040    SUB      #40,R3     ;SET NEXT CORRECT PSW RESULT
10283 031406 005367 177752    6$: DEC      5$      ;SET NEXT SPL
10284 031412 026702 177746    CMP      5$,R2     ;CHECK IF DONE ALL SPL'S
10285 031416 002361          BGE      4$
10292
;*****

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(3)      ;*TEST 60      CHECK PIRQ LOGIC
(4)      ;*
(4)      ;* THIS TEST CHECKS THAT WHEN A REQUEST IS MADE AT A LEVEL = TO THE
(4)      ;* CURRENT PROCESSER PRIORITY LEVEL THAT NO INTERRUPT TAKES PLACE, AND
(4)      ;* THAT WHEN A REQUEST IS MADE AT A LEVEL 1 GREATER THAN THE CURRENT PRO-
(3)      ;* CESSER LEVEL THAT AN INTERRUPT OCCURS
(2)      ;*.....
(2)      (2) 031420 000004          TST60: SCOPE
(2)      (2) 031422 112737 000060 001252      MOVB    #60,@#STSTNM          ;LOAD TEST NUMBER
(2)      (2) 031430 013737 001252 177570      MOV     @#STSTNM,@#DISPLAY    ;:DISPLAY TEST NUMBER
10293    031436 012700 031602      PIRQ0: MOV     #4$,R0          ;R0 POINTS TO A TABLE OF CORRECT PIRQ
10294                                          ;:CONTENTS AFTER AN INTERRUPT
10295    031442 012702 000400      MOV     #400,R2              ;:R2 CONTAINS INTERRUPT REQUEST LEVEL
10296    031446 005003              CLR     R3                   ;:R3 CONTAINS PROCESSER PRIORITY LEVEL
10297    031450 012704 177772      MOV     #PIRQ,R4            ;:R4 CONTAINS ADDRESS OF PIRQ REGISTER
10298    031454 005014              CLR     (R4)                 ;:INITIALZE REQUEST LEVEL TO 0
10299    031456 013737 177776 000242      MOV     @#PSW,@#PIRQVEC+2    ;:RETAIN MODE & REG SET ON TRAP
10300    031464 112737 000340 000242      MOVB   #PR7,@#PIRQVEC+2      ;:ASSUME LEVEL 7 ON INTERRUPT
10301    031472 112737 000340 000016      MOVB   #PR7,@#TBITVEC+2      ;:PRIORITY LEVEL 7 ON TRAP
10302    031500 012737 031540 000240      1$:   MOV     #2$,@#PIRQVEC    ;:SET PIRQ ERROR INTERRUPT VECTOR
10303    031506 063737 001604 000240      ADD    @#FACTOR,@#PIRQVEC    ;:ADD RELOCATION FACTOR
10304    031514 110337 177776      MOVB   R3,@#PSW              ;:SET CP PRIORITY LEVEL
10305    031520 050214              BIS    R2,(R4)               ;:MAKE REQUEST AT LEVEL = TO CP LEVEL
10306    031522 100436              BMI    5$                    ;:BRANCH WHEN DONE
10307    031524 062737 000002 000240      ADD    #3$-2$,@#PIRQVEC      ;:SET PIRQ INTERRUPT VECTOR TO 3$
10308    031532 006302              ASL    R2                    ;
10309    031534 050214              BIS    R2,(R4)               ;:MAKE REQUEST AT LEVEL 1 HIGHER
10310    031536 000240              NOP
10311    031540 104000              2$:   HLT
10312                                          ;:ERROR! EITHER AN INTERRUPT OCCURED
10313                                          ;:WHEN RQST LEVEL - CP LEVEL (PIRQVEC) 2$
10314    031542 022014              3$:   CMP     (R0)+,(R4)        ;:OR INTERRUPT FAILED (PIRQVEC)=3$
10315    031544 001406              BEQ    6$                    ;:CHECK CONTENTS OF PIRQ REGISTER
10316    031546 013737 177772 001352      MOV     @#PIRQ,@#STMP0        ;:SAVE PIRQ
10317    031554 005037 177772      CLR     @#PIRQ
10318    031560 104000              HLT
10319    031562 062703 000040      6$:   ADD    #40,R3              ;:ERROR! INCORRECT PIRQ CONTENTS
10320    031566 040214              BIC    R2,(R4)               ;:SET NEXT CP PRIORITY LEVEL
10321    031570 012716 031500      MOV     #1$, (SP)            ;:LOWER LEVEL BY 1
10322    031574 063716 001604      ADD    @#FACTOR,(SP)         ;:ADJUST RETURN ADDRESS
10323    031600 000006      30$:  RTT                      ;:TO RETURN TO 1$
10324
10325      ;TABLE OF CORRECT PIRQ REGISTER CONTENTS ON INTERRUPT
10326    031602 001042      4$:   1042                      ;:PIR1+PIA1
10327    031604 003104          3104                      ;:PIR2+PIR1+PIA2
10328    031606 007146          7146                      ;:PIR3+PIR2+PIR1+PIA3
10329    031610 017210          17210                     ;:PIR4+PIR3+PIR2+PIR1+PIA4
10330    031612 037252          37252                     ;:PIR5+PIR4+PIR3+PIR2+PIR1+PIA5
10331    031614 077314          77314                     ;:PIR6+PIR5+PIR4+PIR3+PIR2+PIR1+PIA6
10332    031616 177356          177356                    ;:PIR7+PIR6+PIR5+PIR4+PIR3+PIR2+PIR1+PIA7
10333
10334    031620 005014      5$:   CLR     (R4)              ;:CLEAR PIRQ REGISTER
10335    031622 012737 000242 000240      MOV     #PIRQVEC+2,@#PIRQVEC ;:RESET PIRQVEC TO HALT AT PIRQVEC+2
10336    031630 005037 000242      CLR     @#PIRQVEC+2
10337    031634 105037 177776      CLRB   @#PSW
10338    031640 042737 000340 000016      BIC    #PR7,@#TBITVEC+2
    
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10342
(3)
(4)
(3)
(2)
(2) 031646 000004
(2) 031650 112737 000061 001252
(2) 031656 013737 001252 177570
10343 031664 012702 177770
10344 031670 011246
10345 031672 012700 177776
10346 031676 010003
10347 031700 005737 001552
10348 031704 001002
10349 031706 042703 177400
10350 031712 010012
10351 031714 021203
10352 031716 001004
10353 031720 000261
10354 031722 006100
10355 031724 103764
10356 031726 000402
10357 031730 104000
10358 031732 000772
10359 031734 012612
10360
(3)
(3)
(2)
(2) 031736 000004
(2) 031740 112737 000062 001252
(2) 031746 013737 001252 177570
10361 031754 032737 140000 177776
10362 031762 001553
10363 031764 010746
10364 031766 062716 000134
10365 031772 012637 000250
10366 031776 005046
10367 032000 010603
10368 032002 010346
10369 032004 105737 001601
10370 032010 001417
10371 032012 013737 177640 177654
10372 032020 012737 006006 177614
10373 032026 013737 172240 172254
10374 032034 012737 006006 172214
10375 032042 062706 140000
10376 032046 000240
10377 032050 010746
10378 032052 062716 000024
10379 032056 012637 000020
10380
10381 032062 000004
10382 032064 005266 000002
10383 032070 001417
10384 032072 104000

*****
*TEST 61 CHECK MICRO-BREAK REGISTER
* THIS TEST SHIFTS A '0' BIT THRU ALL BIT POSITIONS.
*****
TST61: SCOPE
MOV# #61,@#STSTNM ;LOAD TEST NUMBER
MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
MBRK: MOV #UBREAK,R2 ;SET ADDRESS OF MICRO BREAK REGISTER
MOV (R2)-,(SP) ;SAVE ORIG CONTENTS
MOV #177776,R0 ;SET DATA PATTERN
1$: MOV R0,R3 ;GOING TO COMPARE DATA WITH R3
TST @#KB11E ;IS THIS A KB11-E OR KB11-EM PROCESSOR?
BNE 5$ ;BR IF IT IS
BIC #177400,R3 ;ONLY 8 BITS IN U-BREAK OF KB11-B/C
5$: MOV R0,(R2) ;LOAD REGISTER WITH PATTERN
CMP (R2),R3 ;AND CHECK
BNE 3$ ;BRANCH IF INCORRECT
2$: SEC ;SET 'C'
ROL R0 ;SHIFT DATA
BCS 1$
BR 4$
3$: HLT ;ERROR DATA IN R0 NOT IN UBREAK REG
BR ;CONTINUE TEST
4$: MOV (SP)+,(R2) ;RESTORE ORIG UBREAK CONTENTS
*****
*TEST 62 CHECK MFPI/MTPI INSTRUCTIONS
*****
TST62: SCOPE
MOV# #62,@#STSTNM ;LOAD TEST NUMBER
MOV @#STSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER
MPI: BIT #UM,@#PSW ;KERNEL MODE?
BEQ ENDCP ;YES EXIT TEST
MOV PC,-(SP)
ADD #5$-.,(SP)
MOV (SP)+,@#MIVEC ;SET MEM MGMT ABORT VECTOR
CLR -(SP) ;CLEAR CHECK WORD
MOV SP,R3
MOV R3,-(SP) ;PUT ADDRESS OF CHECK WORD ON THE STACK
TSTB @#MMON ;CHECK IF MEM MGMT IS ENABLED
BEQ 1$ ;BRANCH IF OFF
MOV @#UIPAR0,@#UIPAR6 ;SET UP USER PAGE ADDR. REG.
MOV #6006,@#UIPDR6 ;SET USER PAGE DESC REG R/W UP 6 PAGES
MOV @#SIPAR0,@#SIPAR6
MOV #6006,@#SIPDR6 ;SET SUPER PAGE DESC. REG.
10$: ADD #140000,SP ;SET CURRENT MODE'S STACK POINTER
NOP
1$: MOV PC,-(SP)
ADD #3$-.,(SP)
MOV (SP)+,@#IOTVEC ;SET IOT TRAP VECTOR
IOT ;TRAP TO 3$ BELOW
INC 2(SP) ;INCREMENT CHECK WORD
BEQ 6$
4$: HLT ;ERROR. MFPI,MTPI FAILURE--FOR BETTER
    
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10385 032074 000415          BR      6$          ;ISOLATION SUGGEST RUNNING MFPI DIAG. DCKTD/E
10386 032076 000240          3$:  NOP          ;PSW=KERNEL MODE,PREV USER OR SUPER MODE
10387 032100 006506          MFPI   SP          ;GET PREV. MODES STACK POINTER
10388 032102 006536          MFPI   @ (SP)+     ;GET DATA (AN ADDRESS) ON PREV MODE'S STACK
10389 032104 006576 000000  MFPI   @ (SP)     ;GET DATA (=0) FROM PREV MODES ADDRESS
10390 032110 000240          NOP          ;SPACE AND PUSH ONTO KERNEL STACK
10391 032112 001367          BNE    4$          ;ERROR IF BRANCH TAKEN. SHOULD HAVE A ZERO ON THE STACK
10392 032114 005116          COM    (SP)       ;COMPLEMENT OPERAND
10393 032116 006636          MTPI   @ (SP)+     ;POP OPERAND OFF KERNEL STACK AND MOVE
10394                                     ;IT TO PREV MODE'S SPACE
10395 032120 000002          RTI                                     ;RETURN TO INST FOLLOWING IOT ABOVE
10396 032122 104000          5$:  HLT                                     ;ERROR! MEMORY MANG. ABORT
10397 032124 105037 177776  CLR    @#PSW       ;SET PRIORITY LEVEL BACK TO 0
10398 032130 012737 064254 000250 6$:  MOV    #KTABRT,@#MMVEL ;RESTORE VECTOR
10399 032136 012737 054456 00002C  MOV    #SSCOPE,@#IOTVEC
10400 032144 012706 000700  MOV    #SUPSTK,SP ;RESTORE STACK POINTER
10401                                     ;*****
(3)                                     ;*TEST 63 CHECK ILLEGAL HALT
(3)                                     ;*****
(2)
(2) 032150 000004          TST63: SCOPE
(2) 032152 112737 000063 001252  MOV    #63,@#STSTNM ;LOAD TEST NUMBER
(2) 032160 013737 001252 177570  MOV    @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10402 032166 010746          HALT1: MOV    PC,-(SP) ;GET CURRENT PC
10403 032170 062716 000022  ADD    #2$-.,(SP)
10404 032174 011637 000004  MOV    (SP),@#ERRVEC ;SET ERROR TRAP VECTOR TO 2$ BELOW
10405 032200 012637 000010  MOV    (SP)+,@#RESVEC ;LOAD RESERVED INST TRAP VECTOR (11/40)
10406 032204 000000          HALT ;SHOULD TRAP TO 4 IN USER/SUPER MODE
10407 032206 104000          1$:  HLT                                     ;ERROR! HALT ABOVE FAILED IN USER/SUPER MODE
10408 032210 000404          BR      3$
10409 032212 010716          2$:  MOV    PC,(SP) ;REPLACE RETURN PC WITH
10410 032214 062716 000006  ADD    #3$-.,(SP) ;ADDRESS OF 3$ BELOW
10411 032220 000002          RTI                                     ;RETURN (TO 3$)
10412
10413 032222 012737 064422 000004 3$:  MOV    #ERPRT,@#ERRVEC ;RESTORE ERROR TRAP VECTOR
10414 032230 012737 064350 000010  MOV    #RESERR,@#RESVEC
10415 032236 105037 177776  CLR    @#PSW
10416 032242 005037 177766  CLR    @#CPUERR
10417                                     ;*****
(3)                                     ;*TEST 64 CHECK RESET IN SUPER/USER MODE
(3)                                     ;*****
(2)
(2) 032246 000004          TST64: SCOPE
(2) 032250 112737 000064 001252  MOV    #64,@#STSTNM ;LOAD TEST NUMBER
(2) 032256 013737 001252 177570  MOV    @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10418 032264 000277          RESET1: SCC
10419 032266 013700 177776  MOV    @#PSW,R0 ;GET CURRENT PSW
10420 032272 000277          SCC
10421 032274 000005          RESET
10422 032276 023700 177776  CMP    @#PSW,R0 ;CHECK THAT PSW UNCHANGED BY RESET ABOVE
10423 032302 001401          BEQ    .+4
10424 032304 104000          HLT                                     ;ERROR! RESET CLEARED MODE BITS IN PSW
10425 032306 010037 177776  MOV    R0,@#PSW ;RESTORE PSW (FOR ERROR)
10426 032312          ENDCP:
(1) 032312 000004          RELE6: SCOPE
(1) 032314 010702          MOV    PC,R2

```


(1) 032316 062702 000012
(1) 032322 012707 044042
(1) 032326 000000
(1)
(1)
10427
(3)
(3)
(2)
(2) 032330 012767 000001 147040
(2) 032336 000004
(2) 032340 112737 000065 001252
(2) 032346 013737 001252 177570
10428
(1)
(1)
(1) 032354 010700
(1) 032356 005740
(1) 032360 010037 001610
(1) 032364 010700
(1) 032366 162700 032366
(1) 032372 010037 001604
(1) 032376 010737 001262
(1) 032402 062737 000030 001262
(1) 032410 013737 001262 001260
(1) 032416 105737 001600
(1) 032422 001402
(1) 032424 000167 001302
10429
10430 032430 012702 177774
10431 032434 005022
10432 032436 032712 000020
10433 032442 001116
10434 032444 052712 000340
10435
10436 032450 012700 000400
10437 032454 010042
10438 032456 022200
10439 032460 001401
10440 032462 104000
10441
10442
10443 032464 006300
10444 032466 103372
10445 032470 005042
10446
10447
10448
10449
10450
10451
10452
10453 032472 010746
10454 032474 062716 000060
10455 032500 012637 000004
10456 032504 013737 177776 000006

```
ADD #12,R2  
MOV #RELOC,PC ;GO RELOCATE PROGRAM CODE  
REL66: .WORD 0  
;666666666666 LAST ADDRESS OF CODE TO BE RELOCATED 666666666666  
:*****  
:TEST 65 TEST STACK LIMIT REGISTER  
:*****  
TST65: MOV #1,STIMES ;;DO 1 ITERATION  
SCOPE  
MOV #65,@STSTNM ;LOAD TEST NUMBER  
MOV @STSTNM,@DISPLAY ;;DISPLAY TEST NUMBER  
:SBTTL START OF SECTION 7  
:777777777777 FIRST ADDRESS TO BE RELOCATED 777777777  
REL7: MOV PC,R0 ;GET PC  
TST -(R0) ;R0 CONTAINS THE ADDRESS OF REL7  
MOV R0,@FRSTAD ;SAVE  
MOV PC,R0 ;GET CURRENT PC  
SUB #,@R0 ;SUBTRACT RELOCATION FACTOR  
MOV R0,@FACTOR ;SAVE RELOCATION FACTOR  
MOV PC,@SLPERR ;SET LOOP ADDRESS  
ADD #30,@SLPERR ;ADJUST  
MOV @SLPERR,@SLPADR  
TSTB @NEXEC ;BR IF TEST CODE TO BE EXECUTED  
BEQ .+6  
JMP RELE7  
:THIS TEST SHIFTS A '1' BIT THROUGH ALL BIT POSITIONS  
MOV #STKLMT,R2 ;GET ADDRESS OF STACK LIM REG  
CLR (R2)+ ;CLEAR STACK LIMIT REG  
BIT #20,(R2) ;EXIT TEST IF '1' BIT IS SET  
BNE 101$  
BIS #340,(R2) ;SET PRIORITY LEVEL 7 TO PREVENT  
;ANY INTERRUPTS FROM OCCURRING  
1$: MOV #400,R0 ;SET CHECK DATA  
MOV R0,-(R2) ;MOVE TO STACK LIMIT REG  
CMP (R2)+,R0 ;AND CHECK RESULT  
BEQ 2$  
HLT ;ERROR! STACK LIMIT DID NOT  
;LOAD CORRECTLY. CORRECT RESULT  
2$: ASL R0 ;IS IN F)  
BCC 1$ ;SHIFT '1' BIT LEFT  
CLR -(R2) ;LOOP UNTIL 1 BIT SHIFTS OUT  
;CLEAR STACK LIMIT REG  
:THIS TEST CHECKS THAT A PROPER 'RED' ZONE VIOLATION OCCURS. NOTE THAT  
:NO 'RED ZONE' VIOLATION WILL OCCUR IF IN USER/SUPER MODES.  
:A RED ZONE VIOLATION PUSHES THE CURRENT PSW,PC ON A STACK AT 2 AND 0  
:AND TAKES THE NEXT INSTRUCTION FROM THE PC IN LOCATION4. THE INST-  
:RUCTION CAUSING THE RED ZONE VIOLATION IS 'ABORTED'.  
MOV PC,-(SP) ;GET CURRENT PC  
ADD #4$,-(SP) ;FORM ADDRESS OF 4$ BELOW  
MOV (SP)+,@ERRVEC ;SET ERROR TRAP VECTOR TO 4$ BELOW  
MOV @PSW,@ERRVEC+2 ;RETAIN CURRENT STATUS ON 'RAP'
```

```

10457 032512 010712          MOV    PC,(R2)          ;SET STACK LIMIT TO CURRENT PC
10458                                ;+400
10459 032514 011206          MOV    (R2),SP          ;AND STACK PTR = STACK LIMIT REG
10460 032516 010603          MOV    SP,R3           ;SAVE STACK PTR
10461 032520 016304 000336    MOV    336(R3),R4       ;SAVE MEMORY LOC CONTENTS
10462                                ;AT 'RED ZONE' BOUNDARY
10463 032524 032737 140000 177776 BIT    #UM,@#PSW        ;BRANCH IF IN KERNEL MODE
10464 032532 001403          BEQ    20$             ;
10465 032534 010466 000336    MOV    R4,336(SP)       ;SHOULD NOT CAUSE TRAP
10466 032540 000432          BR     100$           ;
10467                                ;
10468 032542 005066 000336    20$:  CLR    336(SP)       ;SHOULD CAUSE 'RED ZONE' TRAP
10469 032546 012706 000700    3$:  MOV    #SUPSTK,SP   ;RESTORE THE STACK
10470 032552 104000          HLT                               ;ERROR! FAILED TO TRAP
10471                                ;
10472 032554 032737 140000 000002 4$:  BIT    #UM,@#2         ;CHECK IF TRAPPED WHEN IN USER
10473                                ;/SUPER MODES (2 CONTAINS OLD PSW)
10474 032562 001013          BNE    99$            ;GO TO ERROR CALL
10475 032564 010600          MOV    SP,R0           ;STACK PTR SHOULD = 0
10476 032566 001011          BNE    99$            ;GO TO ERROR CALL IF NOT 0
10477 032570 026304 000336    CMP    336(R3),R4       ;CHECK THAT INST WAS ABORTED
10478 032574 001006          BNE    99$            ;GO REPORT ERRPR
10479 032576 005012          5$:  CLR    (R2)          ;CLEAR STACK LIMIT REG
10480 032600 010705          MOV    PC,R5           ;GET CURRENT PC
10481 032602 062705 177744    ADD    #3$-,R5         ;FORM ADDRESS OF 3$ ABOVE
10482 032606 020516          CMP    R5,(SP)         ;CHECK THAT RETURN PC IS ON
10483                                ;THE STACK (AT 0)
10484 032610 001406          BEQ    100$           ;EXIT TEST
10485                                ;
10486                                ;ERROR
10487 032612 005012          99$:  CLR    (R2)          ;CLEAR STACK LIMIT REG
10488 032614 010463 000336    MOV    R4,336(R3)       ;RESTORE MEM LOCATION
10489 032620 012706 000700    MOV    #SUPSTK,SP      ;SET STACK PTR
10490 032624 104000          HLT                               ;ERROR!
10491 032626 010463 000336    100$: MOV    R4,336(R3)    ;RESTORE MEM LOCATION
10492 032632 005022          CLR    (R2)+           ;CLEAR STACK LIM REG
10493 032634 012706 000700    MOV    #SUPSTK,SP      ;SET STACK PTR
10494 032640 042712 000340    BIC    #340,(R2)       ;SET PRIORITY LEVEL BACK TO 0
10495 032644 012737 064422 000004    MOV    #ERRPT,@#ERRVEC ;RESTORE ERROR TRAP VECTOR
10496 032652 013737 177776 000006    MOV    @#PSW,@#ERRVEC+2
10497 032660 112737 000340 000006    MOVB   #PR7,@#ERRVEC+2
10498 032666 042737 000020 000006    BIC    #BIT4,@#ERRVEC+2
10499 032674 005037 177766          CLR    @#CPUERR        ;CLEAR ERROR REG
10504 032700          101$:
(4) ;*****
(3) ;*TEST 66 MEMORY MANAGEMENT REGISTER TESTS
(4) ;* PDR TEST - THIS TEST WRITES 64. RANDOM #'S INTO EACH PDR REGISTER
(4) ;* NOTE: IF MEM MGMT IS ENABLED ONLY PDR/PAR PAIRS 4-6 ARE TESTED.
(3) ;*****
(2)
(2) 032700 000004 TST66: SCOPE
(2) 032702 112737 000066 001252 MOV    #66,@#STSTNM ;LOAD TEST NUMBER
(2) 032710 013737 001252 177570 MOV    @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
10505
10506 032716 012702 033150 KTPDR: MOV    #PDR7BL,R2 ;SET TABLE ADDRESS OF PDR'S
10507 032722 012705 100360 MOV    #100360,R5 ;SET BIT MASK
    
```

```

10508 032726 012200      1$:  MOV      (R2)+,R0      ;GET PDR ADDRESS
10509 032730 001435      BEQ      100$           ;EXIT ON '0' TERMINATOR
10510 032732 012716 000010  2$:  MOV      #8,(SP)      ;SET LOOP COUNT (FOR 8 REGS)
10511 032736 105737 001601  TSTB    @MMON          ;BRANCH IF MEM MGMT DISABLED
10512 032742 001404      BEQ      3$            ;
10513 032744 062700 000010  ADD     #10,R0         ;SET R0 TO PDR4
10514 032750 012716 000003  MOV     #3,(SP)        ;AND LIMIT TO TEST 3 PDRS
10515 032754 012703 000040  3$:  MOV     #32,,R3       ;SET DATA COUNT
10516 032760 005004      CLR     R4             ;INITIALIZE DATA TO BE WRITTEN
10517 032762 040504      4$:  BIC     R5,R4         ;CLEAR NON-SETTABLE BITS
10518 032764 010410      MOV     R4,(R0)        ;WRITE INTO PDR
10519 032766 021004      CMP     (R0),R4        ;AND CHECK DATA READ BACK
10520 032770 001013      BNE    99$            ;GO TO ERROR CALL
10521 032772 005104      COM     R4             ;COMPLEMENT DATA
10522 032774 040504      BIC     R5,R4         ;CLEAR NON-SETTABLE BITS
10523 032776 010410      MOV     R4,(R0)        ;WRITE COMPLEMENT DATA INTO PDR
10524 033000 021004      CMP     (R0),R4        ;AND CHECK
10525 033002 001006      BNE    99$            ;GO TO ERROR CALL
10526 033004 060104      ADD     R1,R4          ;STEP DATA
10527 033006 077313      SOB    R3,4$          ;
10528 033010 005020      5$:  CLR     (R0)+          ;STEP TO NEXT REGISTER
10529 033012 005316      DEC    (SP)           ;DECREMENT REGISTER COUNT
10530 033014 001357      BNE    3$            ;
10531 033016 000743      BR     1$            ;GET NEXT SET OF 8 REGISTERS
10532
10533 033020 104000      99$:  HLT
10534
10535
10536 033022 000772      BR     5$
10540 033024
(4)
(3)
(4)
(3)
(2)
(2) 033024 000004      TST67: SCOPE
(2) 033026 112737 000067 001252  MOVB    #67,@$TSTNM    ;LOAD TEST NUMBER
(2) 033034 013737 001252 177570  MOV     @$TSTNM,@$DISPLAY ;:DISPLAY TEST NUMBER
10541 033042 012702 033166  KTPAR: MOV     #PARTBL,R2 ;GET TABLE ADDRESS OF PAR'S
10542 033046 005005      CLR     R5
10543 033050 012200      1$:  MOV     (R2)+,R0      ;GET PAR ADDRESS
10544 033052 001435      BEQ     100$          ;EXIT ON '0' TERMINATOR
10545 033054 012716 000010  2$:  MOV     #8,(SP)      ;SET LOOP COUNT (FOR 8 REGS.)
10546 033060 105737 001601  TSTB    @MMON          ;BRANCH IF MEM MGMT DISABLED
10547 033064 001404      BEQ     3$            ;
10548 033066 062700 000010  ADD     #10,R0         ;SET R0 TO PAR4
10549 033072 012716 000003  MOV     #3,(SP)        ;AND LIMIT TEST TO 3 PARS
10550 033076 012703 000040  3$:  MOV     #32,,R3       ;SET DATA COUNT
10551 033102 005004      CLR     R4             ;INITIALIZE DATA
10552 033104 040504      4$:  BIC     R5,R4         ;CLEAR NON-SETTABLE BITS
10553 033106 010410      MOV     R4,(R0)        ;WRITE INTO PAR
10554 033110 021004      CMP     (R0),R4        ;AND CHECK
10555 033112 001013      BNE    99$            ;TAKE ERROR EXIT
10556 033114 005104      COM     R4             ;COMPLEMENT DATA
10557 033116 040504      BIC     R5,R4         ;CLEAR NON-SETTABLE BITS
10558 033120 010410      MOV     R4,(R0)        ;WRITE COMPLEMENT DATA

```

```

10559 033122 021004      CMP      (R0),R4      ;AND CHECK
10560 033124 001006      BNE     99$          ;TAKE ERROR EXIT
10561 033126 060104      ADD     R1,R4       ;STEP DATA
10562 033130 077313      SOB     R3,4$       ;LOOP UNTIL FINISHED
10563
10564 033132 005020      5$:    CLR      (R0)+
10565 033134 005316      DEC     (SP)        ;DECREMENT REGISTER COUNT
10566 033136 001357      BNE     3$          ;BRANCH IF 8 REGS NOT DONE
10567 033140 000743      BR      1$
10568
10569 033142 104000      99$:   HLT
10570                                     ;ERROR! INCORRECT DATA READ BACK
10571                                     ;FROM PAR. ADDRESS OF PAR IS IN
10572                                     ;R0, DATA IS IN R4
10572 033144 000772      BR      5$         ;DO NEXT REGISTER
10573 033146
10574 (2) 033146 000416      100$:  BR      TST70   ;GO TO NEXT TEST
10574 ;TABLES FOR PDR & PAR TESTS ABOVE
10575 033150 172300      PDRTBL: .WORD   KIPDRO
10576 033152 177600      .WORD   UIPDRO
10577 033154 172200      .WORD   SIPDRO      ;CHANGED TO '0' IF 11/40
10578 033156 172320      .WORD   KDPDRO
10579 033160 177620      .WORD   UDPDRO
10580 033162 172220      .WORD   SDPDRO
10581 033164 000000      .WORD   0           ;TERMINATOR
10582
10583 033166 172340      PARTBL: .WORD   KIPARO
10584 033170 177640      .WORD   UIPARO
10585 033172 172240      .WORD   SIPARO      ;CHANGED TO '0' IF 11/40
10586 033174 172360      .WORD   KDPARO
10587 033176 177660      .WORD   UDPARO
10588 033200 172260      .WORD   SDPARO
10589 033202 000000      .WORD   0           ;TERMINATOR
10590
10596 (3)
10596 (4)
10596 (4)
10596 (4)
10596 (3)
10596 (2)
10596 (2) 033204 000004
10596 (2) 033206 112737 000070 001252 TST70: SCOPE
10596 (2) 033214 013737 001252 177570      MOV     #70,@#STSTM ;LOAD TEST NUMBER
10597 033222 105737 001601      MOV     @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
10598 033226 001515      KTABT: TSTB @#MMON ;BRANCH IF MEM MGMT DISABLED
10599 033230 005037 172350      BEQ     KTEX
10600 033234 005037 172310      CLR     @#KIPAR4    ;SET UP MEM MGMT REGISTERS
10601 033240 005037 177650      CLR     @#KIPDR4    ;TO ABORT IF A MEMORY
10602 033244 005037 177610      CLR     @#UIPAR4    ;REFERENCE IS MADE TO
10603 033250 005037 172250      CLR     @#UIPDR4    ;ADDRESSES (VIRTUAL) BETWEEN
10604 033254 005037 172210      CLR     @#SIPAR4
10605 033260 013746 000250      CLR     @#SIPDR4
10605 1$:   MOV     @#MMVEC,-(SP) ;SAVE MEM MGMT VECTOR
10606 033264 013746 000252      MOV     @#MMVEC+2,-(SP) ;AND PRIORITY
10607 033270 010746      MOV     PC,-(SP)    ;SET MEM MGMT
10608 033272 062716 000040      ADD     #4$-,(SP)  ;VECTOR TO 4$ BELOW
10609 033276 012637 000250      MOV     (SP)+,@#MMVEC
    
```

```

10610 033302 015737 177776 000252      MOV      @#PSW,@#MMVEC+2
10611 033310 005000                      CLR      RO                ;CLEAR ABORT INDICATOR
10612 033312 010702                      PC R2                ;SET R2 AND R3 NOTE:
10613 033314 012703 100000              MOV      #100000,R3    ;THE REF VIA R3 CAUSES THE
10614 033320 014223                      2$: MOV      -(R2),(R3)+ ;ABORT
10615 033322 005700                      3$: TST      RO                ;BRANCH IF THE ABORT OCCURRED
10616 033324 001001                      BNE     .+4
10617 033326 104000                      HLT     .              ;REPORT ERROR
10618 033330 000445                      BR      100$
10619                                     ;ABORT HERE
10620 033332 013700 177776              4$: MOV      @#PSW,RO    ;SRO SHOULD CONTAIN
10621 033336 000300                      SWAB   RO                ;CAUSE FOR ABORT AND
10622 033340 006200                      ASR    RO                ;ALSO WHICH SEGMENT
10623 033342 042700 177637              BIC    #177637,RO       ;WAS IN USE WHEN ABORT
10624 033346 062700 100011              ADD    #100011,RO       ;OCCURRED.
10625 033352 029037 177572              CMP    RO,@#SRO
10626 033356 001025                      BNE     99$
10627 033360 012700 033320              MOV    #2$,RO           ;GET ADDRESS OF INST
10628 033364 020037 177576              CMP    RO,@#SR2        ;THAT ABORTED
10629 033370 001020                      BNE     99$
10630 033372 012700 000362              MOV    #362,RO
10631 033376 120037 177574              CMPB   RO,@#SR1        ;SR1 CONTAINS REGISTER
10632 033402 001013                      BNE     99$            ;MODIFICATIONS MADE
10633 033404 012700 000023              MOV    #23,RO
10634 033410 120037 177575              CMPB   RO,@#SR1+1
10635 033414 001006                      BNE     99$
10636 033416 012700 033320              MOV    #2$,RO
10637 033422 005720                      5$: TST    (RO)+        ;RO=ADDRESS OF INST FOLLOWING ABORT
10638 033424 020016                      CMP    RO,(SP)        ;(3$)
10639 033426 001001                      BNE     99$
10640 033430 000002                      RTI     .              ;RETURN
10641                                     ;ENTER HERE ON ERROR
10642 033432 104000                      99$: HLT     .              ;REPORT ERROR
10643 033434 010716                      MOV    PC,(SP)
10644 033436 062716 177664              ADD    #3$-.,(SP)
10645 033442 000002                      RTI     .              ;RETURN
10646 033444 012637 000252              100$: MOV   (SP)+,@#MMVEC+2 ;RESTORE ABORT VECTOR
10647 033450 012637 000250              MOV   (SP)+,@#MMVEC    ;& PRIORITY.
10648 033454 012737 000001 177572      MOV    #1,@#SRO        ;CLEAR ERROR CONDITIONS
10652 033462
(4)
(3)
(4)
(3)
(2)
(2) 033462 000004
(2) 033464 112737 000071 001252
(2) 033472 013737 001252 177570
10653 033500 032737 000040 172516      BIT    #BITS,@#MR3    ;IS MAP ON?
10654 033506 001070                      BNE    MAPTWO         ;BRANCH IF YES
10655 033510 012700 170200              MAPTST: MOV   #MAPLO,RO ;SET ADRS OF FIRST MAP REGISTER
10656 033514 023737 000042 000046      CMP    @#42,@#46     ;ACT11 ???
10657 033522 001002                      3$: BNE     .
10658 033524 062700 000020              ADD    #20,RO        ;USE ONLY MP4 AND UP...
10659 033530
10660 033530 012706 000700              3$: MOV    #SUPSTK,SP ;SETUP THE SP
    
```

```

KTEX:
;*****
;*TEST 71 MAPPING REGISTER TESTS
;* THIS TEST LOADS RANDOM #'S INTO EACH MAPPING REGISTER
;*****
    
```

```

TST71: SCOPE
MOV# #71,@#TSTNM ;LOAD TEST NUMBER
MOV @#TSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
BIT #BITS,@#MR3 ;IS MAP ON?
BNE MAPTWO ;BRANCH IF YES
MAPTST: MOV #MAPLO,RO ;SET ADRS OF FIRST MAP REGISTER
CMP @#42,@#46 ;ACT11 ???
3$: BNE .
ADD #20,RO ;USE ONLY MP4 AND UP...
3$: MOV #SUPSTK,SP ;SETUP THE SP
    
```

```

10661 033534 012716 000001      MOV      #1,(SP)      ;SET BIT MASK FOR MAPLO <15-01>
10662 033540 012702 177700      MOV      #177700,R2   ;AND ALSO FOR MAPHO <21-16>
10663 033544 023737 000042 000046  CMP      @#42,@#46    ;ACT11 ???
10664 033552 001003      BNE      1$
10665 033554 012703 000034      MOV      #28.,R3 ;
10666 033560 000402      BR       4$
10667 033562 012703 000040      1$: MOV      #32.,R3      ;SET DATA COUNT
10668 033566 005005      4$: CLR      R5          ;SET INITIAL DATA
10669 033570 010504      2$: MOV      R5,R4      ;GET DATA
10670 033572 041604      BIC      (SP),R4      ;CLEAR UNUSED BITS
10671 033574 010410      MOV      R4,(R0)      ;LOAD DATA INTO MAPLO <15-01>
10672 033576 021004      CMP      (R0),R4      ;CHECK DATA
10673 033600 001032      BNE      99$          ;BRANCH IF INCORRECT
10674 033602 005105      COM      R5          ;COMPLEMENT TEST DATA
10675 033604 010504      MOV      R5,R4      ;GET TEST DATA
10676 033606 041604      BIC      (SP),R4      ;CLEAR UNUSED BITS
10677 033610 010410      MOV      R4,(R0)      ;LOAD COMPLEMENT DATA
10678 033612 021004      CMP      (R0),R4      ;AND CHECK
10679 033614 001024      BNE      99$
10680 033616 005720      TST      (R0)+        ;STEP TO NEXT REGISTER
10681 033620 010504      MOV      R5,R4      ;GET COMPLEMENT TEST DATA
10682 033622 040204      BIC      R2,R4      ;CLEAR UNUSED BITS
10683 033624 010410      MOV      R4,(R0)      ;LOAD TEST DATA INTO MAPHO <21-16>
10684 033626 021004      CMP      (R0),R4      ;AND CHECK
10685 033630 001016      BNE      99$
10686 033632 005105      COM      R5          ;COMPLEMENT TEST DATA
10687 033634 010504      MOV      R5,R4      ;GET TEST DATA
10688 033636 040204      BIC      R2,R4      ;CLEAR UNUSED BITS
10689 033640 010410      MOV      R4,(R0)      ;LOAD TEST DATA
10690 033642 021004      CMP      (R0),R4      ;AND CHECK
10691 033644 001010      BNE      99$
10692 033646 060705      ADD      PC,R5        ;FORM NEXT TEST DATA
10693 033650 005740      TST      -(R0)        ;RESET PTR TO REGISTER <15-01>
10694 033652 077332      SOB      R3,2$        ;AND TEST UNTIL ALL #'S USED
10695 033654 022020      CMP      (R0)+,(R0)+ ;STEP TO NEXT REGISTER PAIR
10696 033656 022700 170400  CMP      #MAPLO+128.,R0 ;BRANCH IF NOT LAST PAIR
10697 033662 001337      BNE      1$
10698 033664 000401      BR       MAPTWO
10699
10700 033666 104000      99$: HLT
10701
10702
10703 033670 005737 001602      MAPTWO: TST      @#QV
10704 033674 001416      BEQ      RELE7
10705 033676 012737 040000 170210  MOV      #40000,@MAPL2 ;
10706 033704 005037 170212      CLR      @MAPH2
10707 033710 012737 020000 170204  MOV      #20000,@MAPL1 ;SET MAP 1 AND 2 INCASE ACT11
10708 033716 005037 170206      CLR      @MAPH1
10709 033722 005037 170200      CLR      @MAPLO
10710 033726 005037 170202      CLR      @MAPHO
10711 033732 000004      RELE7: SCOPE
(1) 033734 010702      MOV      PC,R2
(1) 033736 062702 000012  ADD      #12,R2
(1) 033742 012707 044042  MOV      #RELOC,PC ;GO RELOCATE PROGRAM CODE
(1) 033746 000000      REL7: .WORD 0
(1) ;777777777777 LAST ADDRESS OF CODE TO BE RELOCATED 7777777777

```

```

(1) 10721 .....
(3) *TEST 72      FLOATING POINT TEST 1
(4) *
(4) * THIS TEST TAKES TWO RANDOM NUMBERS (A AND B) AND
(4) * COMPARES THE RESULTS OF TWO EQUAL CALCULATIONS.
(4) * EACH SECTION EVALUATES A DIFFERENT EQUATION AS DESCRIBED BELOW:
(4) * SECT1  (A+B)**2=A**2+2*A*B+B**2
(4) * SECT2  (A+B)*(A-B)=A**2-B**2
(4) * SECT3  A/B*B=A
(3) .....
(2) (2) 033750 012767 000001 145420 TST72: MOV #1,$TIMES ;;DO 1 ITERATION
(2) (2) 033756 000004 SCOPE
(2) (2) 033760 112737 000072 001252 MOVB #72,@$TSTNM ;LOAD TEST NUMBER
(2) (2) 033766 013737 001252 177570 MOV @$TSTNM,@$DISPLAY ;;DISPLAY TEST NUMBER
10722 033774 012737 000001 001376 MOV #1,@$TIMES ;SET ITERATIONS TO 1
10723
(1) .SBTTL START OF SECTION 8
(1) (1) 034002 010700 ;8888888888888888 FIRST ADDRESS TO BE RELOCATED 8888888888
(1) (1) 034004 005740 REL8: MOV PC,R0 ;GET PC
(1) (1) 034006 010037 001610 TST -(R0) ;R0 CONTAINS THE ADDRESS OF REL8
(1) (1) 034012 010700 MOV R0,@$FRSTAD ;SAVE
(1) (1) 034014 162700 034014 MOV PC,R0 ;GET CURRENT PC
(1) (1) 034020 010037 001604 SUB #,$R0 ;SUBTRACT RELOCATION FACTOR
(1) (1) 034024 010737 001262 MOV R0,@$FACTOR ;SAVE RELOCATION FACTOR
(1) (1) 034030 062737 000030 001262 PC,@$SLPERR ;SET LOOP ADDRESS
(1) (1) 034036 013737 001262 001260 MOV @$SLPERR,@$SLPADR ;ADJUST
(1) (1) 034044 105737 001600 TSTB @NEXEC ;BR IF TEST CODE TO BE EXECUTED
(1) (1) 034050 001402 BEQ .+6
(1) (1) 034052 000167 002422 JMP RELE8
10724 034056 032737 020000 001550 BIT #FPOPT,@$OPT.CP ;FLOATING POINT AVAILABLE?
10725 034064 001002 BNF 100$ ;BRANCH IF YES
10726 034066 000167 002424 JMP REL8+2
10727 034072 004737 060666 100$: JSR PC,@$FLTSGL ;GET RANDOM OPERANDS
10728 034076 170127 000000 LDFPS #0 ;INIT FPS
10729 034102 172537 001352 LDF @$STMP0,AC1 ;LOAD A OPERAND
10730 034106 172437 001356 LDF @$STMP2,AC0 ;LOAD B OPERAND
10731 034112 013737 001326 001464 MOV @$SREG0,@$SAC1 ;SETUP EXTENDED
10732 034120 013737 001330 001462 MOV @$SREG1,@$SAC0 ;EXPONENTS
10733 034126 004767 002210 JSR PC,FLTADD ;PERFORM THE ADD
10734 034132 174100 STF AC1,AC0 ;SETUP AC0 TO
10735 034134 013737 001464 001462 MOV @$SAC1,@$SAC0 ;PERFORM THE SQUARE
10736 034142 004767 002124 JSR PC,FLTMPY ;DO THE MULTIPLY
10737 034146 174137 001362 STF AC1,@$STMP4 ;SAVE RESULT
10738 034152 013737 001464 001332 MOV @$SAC1,@$SREG2 ;AND SOFTWARE EXP
10739
10740 ;NOW DO THE RIGHT HAND SIDE OF THE EQUATION
10741 ;DO THE A*A FIRST
10742 034160 013737 001326 001462 MOV @$SREG0,@$SAC0 ;GET EXT EXPONENT
10743 034166 172437 001352 LDF @$STMP0,AC0 ;LOAD OPERAND A
10744 034172 013737 001462 001464 MOV @$SAC0,@$SAC1 ;SET OPERAND B EXT EXPONENT
10745 034200 172500 LDF AC0,AC1 ;LOAD B OPERAND
10746 034202 004767 002064 JSR PC,FLTMPY ;EXECUTE THE MULTIPLY
10747 034206 174102 STF AC1,AC2 ;SAVE RESULT
    
```



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10748 034210 013737 001464 001466      MOV      @%SAC1,@%SAC2
10749
10750                                     :NOW DO THE B*B
10751 034216 172437 001356      LDF      @%STMP2,AC0      :LOAD B OPERAND
10752 034222 172500      LDF      AC0,AC1
10753 034224 013737 001330 001462      MOV      @%SREG1,@%SAC0   :AND EXT EXPONENT
10754 034232 013737 001462 001464      MOV      @%SAC0,@%SAC1
10755 034240 004767 002026      JSR      PC,FLTMPY        :DO THE MULTIPLY
10756 034244 174103      STF      AC1,AC3          :SAVE THE RESULT
10757 034246 013737 001464 001470      MOV      @%SAC1,@%SAC3
10758
10759                                     :NOW DO THE 2*B*A
10760 034254 012701 001356      MOV      @%STMP2,R1
10761 034260 172411      LDF      (R1),AC0        :LOAD THE B OPERAND
10762 034262 172541      LDF      -(R1),AC1       :LOAD THE A OPERAND
10763 034264 013737 001330 001462      MOV      @%SREG1,@%SAC0   :AND THE EXT EXPONENTS
10764 034272 013737 001326 001464      MOV      @%SREG0,@%SAC1
10765 034300 004767 001766      JSR      PC,FLTMPY        :DO THE MULTIPLY
10766 034304 172427 040000      LDF      #*040000,AC0    :SETUP TO MULTIPLY BY TWO
10767 034310 012737 000002 001462      MOV      #2,@%SAC0
10768 034316 004767 001750      JSR      PC,FLTMPY        :DO THE MULTIPLY
10769
10770                                     :NOW SUM THE RESULTS
10771 034322 013737 001470 001462      MOV      @%SAC3,@%SAC0
10772 034330 172403      LDF      AC3,AC0        :GET RESULT OF B*B
10773 034332 004767 002004      JSR      PC,FLTADD        :ADD THE RESULT
10774 034336 172402      LDF      AC2,AC0        :GET RESULT OF A*A
10775 034340 013737 001466 001462      MOV      @%SAC2,@%SAC0
10776 034346 004767 001770      JSR      PC,FLTADD        :ADD THIS RESULT
10777 034352 174137 001366      STF      AC1,@%STMP6     :SAVE FINAL RESULT
10778 034356 013737 001464 001334      MOV      @%SAC1,@%SREG3
10779
10780                                     :NOW CHECK BOTH SIDES OF THE EQUATION
10781                                     :CALCULATE THE NUMBER OF CORRECT BITS
10782                                     :PUT LARGEST EXPONENT OF A**2 OR B**2 IN SAC2
10783 034364 023737 001466 001470      CMP      @%SAC2,@%SAC3
10784 034372 002003      BGE      1$
10785 034374 013737 001470 001466      MOV      @%SAC3,@%SAC2   :BRANCH IF SAC2 ALREADY HAS LARGEST
10786 034402 163737 001464 001466      1$: SUB      @%SAC1,@%SAC2   :SAC3 WAS LARGER
10787 034410 162737 000023 001466      SUB      #19,@%SAC2      :NOW CALCULATE NUMBER
10788 034416 005437 001466      NEG      @%SAC2          :OF CORRECT BITS WITHIN 2
10789 034422 172437 001362      LDF      @%STMP4,AC0     :MAKE RESULT POSITIVE
10790 034426 013737 001332 001462      MOV      @%STMP4,AC0     :LOAD RESULT OF LEFT HAND SIDE
10791 034434 004767 001676      JSR      PC,FLTSUB       :AND EXTENDED EXPONENT
10792 034440 163737 001334 001464      SUB      @%SREG3,@%SAC1  :SUBTRACT TO SEE HOW CLOSE THEY ARE
10793                                     :GET DIFFERENCE IN EXT EXPONENTS
10794 034446 100002      BPL      3$
10795 034450 005437 001464      NEG      @%SAC1          :ACTUAL EXP'S ARE EQUAL TO 200
10796 034454 023737 001466 001464      CMP      @%SAC2,@%SAC1  :ENSURE RESULT IS POSITIVE
10797 034462 003401      BLE      SECT2          :ANSWERS WITHIN ALLOWABLE NUMBER?
10798 034464 104014      4$: ERRCR  14          :BRANCH IF YES
10799                                     :RESULTS ARE WRONG
10800 034466 170127 000000      SECT2: LDFPS  #0
10801                                     :DO A+B
10802 034472 172537 001352      LDF      @%STMP0,AC1     :LOAD A OPERAND
10803 034476 172437 001356      LDF      @%STMP2,AC0     :LOAD B OPERAND
    
```


10804	034502	013737	001326	001464	MOV	2RSREG0,2RSAC1	
10805	034510	013737	001330	001462	MOV	2RSREG1,2RSAC0	
10806	034516	004767	001620		JSR	PC,FLTADD	:ADD THEM
10807	034522	174102			STF	AC1,AC2	:SAVE IN AC2
10808	034524	013737	001464	001466	MOV	2RSAC1,2RSAC2	:AND EXT EXPONENT
10809					:NOW DO THE A-B		
10810	034532	172537	001352		LDF	2RSSTMP0,AC1	:LOAD OPERAND A
10811	034536	013737	001326	001464	MOV	2RSREG0,2RSAC1	:AND EXT EXPONENT
10812	034544	172437	001356		LDF	2RSSTMP2,AC0	:LOAD OPERAND B
10813	034550	013737	001330	001462	MOV	2RSREG1,2RSAC0	
10814	034556	004767	001554		JSR	PC,FLTSUB	:SUBTRACT THEM
10815					:NOW DO (A+B)*(A-B)		
10816	034562	172402			LDF	AC2,AC0	:GET RESULT OF (A+B)
10817	034564	013737	001466	001462	MOV	2RSAC2,2RSAC0	
10818	034572	004767	001474		JSR	PC,FLTMPY	:FORM THE PRODUCT
10819	034576	174137	001362		STF	AC1,2RSSTMP4	:SAVE RESULT
10820	034602	013737	001464	001332	MOV	2RSAC1,2RSREG2	:AND EXT EXPONENT
10821					:NOW DO THE B*B		
10822	034610	172437	001356		LDF	2RSSTMP2,AC0	:LOAD OPERAND B
10823	034614	013737	001330	001462	MOV	2RSREG1,2RSAC0	
10824	034622	172500			LDF	AC0,AC1	:B OPERAND IS IN AC0
10825	034624	013737	001462	001464	MOV	2RSAC0,2RSAC1	:AND EXT EXPONENT
10826	034632	004767	001434		JSR	PC,FLTMPY	:
10827	034636	174102			STF	AC1,AC2	:SAVE RESULT IN AC2
10828	034640	013737	001464	001466	MOV	2RSAC1,2RSAC2	
10829					:NOW DO THE A*A		
10830	034646	172437	001352		LDF	2RSSTMP0,AC0	:LOAD OPERAND A
10831	034652	013737	001326	001462	MOV	2RSREG0,2RSAC0	
10832	034660	172500			LDF	AC0,AC1	
10833	034662	013737	001462	001464	MOV	2RSAC0,2RSAC1	
10834	034670	004767	001376		JSR	PC,FLTMPY	:EXECUTE THE MULTIPLY
10835	034674	013737	001464	001470	MOV	2RSAC1,2RSAC3	:SAVE EXT EXPO OF A*A
10836					:NOW DO A**2-B**2		
10837	034702	172402			LDF	AC2,AC0	:GET B*B
10838	034704	013737	001466	001462	MOV	2RSAC2,2RSAC0	:A*A IN AC1
10839	034712	004767	001420		JSR	PC,FLTSUB	
10840	034716	174137	001366		STF	AC1,2RSSTMP6	:SAVE IN MEMORY
10841	034722	013737	001464	001334	MOV	2RSAC1,2RSREG3	
10842					:NOW COMPUTE THE RESULTS		
10843					:CALCULATE THE NUMBER OF CORRECT BITS		
10844	034730	023737	001466	001470	CMP	2RSAC2,2RSAC3	:DETERMINE WHICH EXP IS LARGER
10845	034736	002003			BGE	2\$:BRANCH IF AC2 LARGER
10846	034740	013737	001470	001466	MOV	2RSAC3,2RSAC2	:PUT LARGEST IN AC2
10847	034746	163737	001464	001466	2\$: SUB	2RSAC1,2RSAC2	
10848	034754	162737	000025	001466	SUB	#21.,2RSAC2	
10849	034762	005437	001466		NEG	2RSAC2	
10850	034766	172437	001362		LDF	2RSSTMP4,AC0	:GET LEFT HAND SIDE
10851	034772	013737	001332	001462	MOV	2RSREG2,2RSAC0	
10852	035000	004767	001332		JSR	PC,FLTSUB	:SUBTRACT TO SEE HOW CLOSE THEY ARE
10853	035004	163737	001334	001464	SUB	2RSREG3,2RSAC1	:SUB EXT EXPONENTS
10854					:ACTUAL EXPONENTS ARE EQUAL		
10855	035012	100002			BPL	1\$:MAKE SURE RESULT IS POSITIVE
10856	035014	005437	001464		NEG	2RSAC1	
10857	035020	023737	001466	001464	1\$: CMP	2RSAC2,2RSAC1	:RESULTS WITHIN RANGE ALLOWED?
10858	035026	003401			BLE	SECT3	:BRANCH IF YES
10859	035030	104014			ERROR	14	:RESULTS WRONG

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10860
1086 035032 172537 001352
10862 035036 172437 001356
10863 035042 013737 001326 001464
10864 035050 013737 001330 001462
10865 035056 004767 001232
10866 035062 004767 001204
10867 035066 174137 001362
10868 035072 013737 001464 001332
10869 035100 172437 001352
10870 035104 174037 001366
10871 035110 013737 001326 001462
10872 035116 013737 001326 001334
10873 035124 004767 001206
10874 035130 163737 001326 001464
10875 035136 100002
10876 035140 005437 001464
10877 035144 022737 000026 001464
10878 035152 003001
10879 035154 000401
10880 035156 104014
10881
10882
10883
    ..*****
    SECT3: LDF @RSTMP0,AC1 ;LOAD OPERAND A
           LDF @RSTMP2,ACO ;AND OPERAND B
           MOV @RREG0,@RAC1
           MOV @RREG1,@RACO
           JSR PC,FLTDIV ;GO DIVIDE THEM
           JSR PC,FLTMPY ;MULTIPLY RESULT BY B
           STF AC1,@RSTMP4 ;SAVE RESULT
           MOV @RAC1,@RREG2
           LDF @RSTMP0,ACO ;LOAD OPERAND A
           STF ACO,@RSTMP6 ;SAVE INCASE TYPE OUT
           MOV @RREG0,@RACO
           MOV @RREG0,@RREG3
           JSR PC,FLTSUB ;SUBTRACT RIGHT AND LEFT HAND SIDES
           SUB @RREG0,@RAC1 ;SEE IF RESULT OK
           BPL 1$ ;ENSURE DIFFERENCE IS POSITIVE
           NEG @RAC1
           CMP #22.,@RAC1 ;RESULTS WITHIN 2 BITS?
           BGT 2$ ;BRANCH IF NO
           BR TST73 ;GO TO NEXT TEST
           ERROR 14 ;RESULTS WRONG
    1$:
    2$:
    ..*****

```

```

(3)
(4)
(4)
(4)
(4)
(4)
(4)
(4)
(3)
(2)
(2)
(2)
(2)
10884 035160 000004
10885 035162 112737 000073 001252
10886 035170 013737 001252 177570
10887 035176 012737 000001 001376
10888 035204 004737 060660
10889 035210 170127 000200
10890 035214 172537 001352
10891 035220 172437 001362
10892 035224 013737 001326 001464
10893 035232 013737 001330 001462
10894 035240 004767 001076
10895 035244 174100
10896 035246 013737 001464 001462
10897 035254 004767 001012
10898 035260 174137 001502
10899 035264 013737 001464 001332
10900
10901
10902
    ..*****
    *TEST 73 FLOATING POINT TEST 2
    *
    * THIS TEST TAKES TWO RANDOM NUMBERS (A AND B) AND
    * COMPARES THE RESULTS OF TWO EQUAL CALCULATIONS.
    * EACH SECTION EVALUATES A DIFFERENT EQUATION AS DESCRIBED BELOW:
    * SECT1 (A+B)**2=A**2+2*A*B+B**2
    * SECT2 (A+B)*(A-B)=A**2-B**2
    * SECT3 A/B*B=A
    ..*****

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TST73: SCOPE
        MOV #73,@RSTSTNM ;LOAD TEST NUMBER
        MOV @RSTSTNM,@RDISP ;DISPLAY TEST NUMBER
        MOV #1,@RSTTIMES
100$: JSR PC,@RFLTDBL ;GET RANDOM OPERANDS
       LDFPS #200 ;INIT FPS
       LDF @RSTMP0,AC1 ;LOAD A OPERAND
       LDF @RSTMP4,ACO ;LOAD B OPERAND
       MOV @RREG0,@RAC1 ;SETUP EXTENDED
       MOV @RREG1,@RACO ;EXPONENTS
       JSR PC,FLTADD ;PERFORM THE ADD
       STF AC1,ACO ;SETUP ACO TO
       MOV @RAC1,@RACO ;PERFORM THE SQUARE
       JSR PC,FLTMPY ;DO THE MULTIPLY
       STF AC1,@RSTMP0 ;SAVE RESULT
       MOV @RAC1,@RREG2 ;AND SOFTWARE EXP
:
: NOW DO THE RIGHT HAND SIDE OF THE EQUATION
: DO THE A*A FIRST
10900 035272 013737 001326 001462
10901 035300 172437 001352
10902 035304 013737 001462 001464
        MOV @RREG0,@RACO ;GET EXT EXPONENT
        LDF @RSTMP0,ACO ;LOAD OPERAND A
        MOV @RACO,@RAC1 ;SET OPERAND B FXT EXPONENT

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10903 035312 172500          LDF      ACO,AC1          :LOAD B OPERAND
10904 035314 004767 000752  JSR      PC,FLTMPY       :EXECUTE THE MULTIPLY
10905 035320 174102          STF      AC1,AC2         :SAVE RESULT
10906 035322 013737 001464 001466  MOV      @#SAC1,@#SAC2
10907
10908          :NOW DO THE B*B
10909 035330 172437 001362  LDF      @#STMP4,ACO     :LOAD B OPERAND
10910 035334 172500          LDF      ACO,AC1
10911 035336 013737 001330 001462  MOV      @#SREG1,@#SACO  :AND EXT EXPONENT
10912 035344 013737 001462 001464  MOV      @#SACO,@#SAC1
10913 035352 004767 000714          JSR      PC,FLTMPY       :DO THE MULTIPLY
10914 035356 174103          STF      AC1,AC3         :SAVE THE RESULT
10915 035360 013737 001464 001470  MOV      @#SAC1,@#SAC3
10916
10917          :NOW DO THE 2*B*A
10918 035366 012701 001362  MOV      #STMP4,R1
10919 035372 172411          LDF      (R1),ACO       :LOAD THE B OPERAND
10920 035374 172541          LDF      -(R1),AC1      :LOAD THE A OPERAND
10921 035376 013737 001330 001462  MOV      @#SREG1,@#SACO  :AND THE EXT EXPONENTS
10922 035404 013737 001326 001464  MOV      @#SREG0,@#SAC1
10923 035412 004767 000654          JSR      PC,FLTMPY       :DO THE MULTIPLY
10924 035416 172427 040000          LDF      #*040000,ACO   :SETUP TO MULTIPLY BY TWO
10925 035422 012737 000002 001462  MOV      #2,@#SAC0
10926 035430 004767 000636          JSR      PC,FLTMPY       :DO THE MULTIPLY
10927
10928          :NOW SUM THE RESULTS
10929 035434 013737 001470 001462  MOV      @#SAC3,@#SACO
10930 035442 172403          LDF      AC3,ACO       :GET RESULT OF B*B
10931 035444 004767 000672          JSR      PC,FLTADD      :ADD THE RESULT
10932 035450 172402          LDF      AC2,ACO       :GET RESULT OF A*A
10933 035452 013737 001466 001462  MOV      @#SAC2,@#SACO
10934 035460 004767 000656          JSR      PC,FLTADD      :ADD THIS RESULT
10935 035464 174137 001512          STF      AC1,@#FLTMP1   :SAVE FINAL RESULT
10936 035470 013737 001464 001334  MOV      @#SAC1,@#SREG3
10937
10938          :NOW CHECK BOTH SIDES OF THE EQUATION
10939          :CALCULATE THE NUMBER OF CORRECT BITS
10940          :PUT LARGEST EXPONENT OF A**2 OR B**2 IN SAC2
10941 035476 023737 001466 001470  CMP      @#SAC2,@#SAC3
10942 035504 002003          BGE     1$              :BRANCH IF SAC2 ALREADY HAS LARGEST
10943 035506 013737 001470 001466  MOV      @#SAC3,@#SAC2  :SAC3 WAS LARGER
10944 035514 163737 001464 001466  1$: SUB   @#SAC1,@#SAC2   :NOW CALCULATE NUMBER
10945 035522 162737 000064 001466  SUB     #52,@#SAC2      :OF CORRECT BITS WITHIN 2
10946 035530 005437 001466          NEG     @#SAC2          :MAKE RESULT POSITIVE
10947 035534 172437 001502          LDF     @#FLTMP0,ACO    :LOAD RESULT OF LEFT HAND SIDE
10948 035540 013737 001332 001462  MOV     @#SREG2,@#SACO  :AND EXTENDED EXPONENT
10949 035546 004767 000564          JSR     PC,FLTSUB      :SUBTRACT TO SEE HOW CLOSE THEY ARE
10950 035552 163737 001334 001464  SUB     @#SREG3,@#SAC1  :GET DIFFERENCE IN EXT EXPONENTS
10951          :ACTUAL EXP'S ARE EQUAL TO 200
10952 035560 100002          BPL     3$              :ENSURE RESULT IS POSITIVE
10953 035562 005437 001464          NEG     @#SAC1
10954 035566 023737 001466 001464  3$: CMP   @#SAC2,@#SAC1  :ANSWERS WITHIN ALLOWABLE NUMBER?
10955 035574 003401          BLE     SECT2D          :BRANCH IF YES
10956 035576 104016          4$: ERROR 16           :RESULTS ARE WRONG
10957
10958 035600 170127 000200  SECT2D: LDFPS #200
    
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10959          :DO A+B
10960 035604 172537 001352      LDF @RSTMP0,AC1      :LOAD A OPERAND
10961 035610 172437 001362      LDF @RSTMP4,AC0      :LOAD B OPERAND
10962 035614 013737 001326 001464  MOV @RREG0,@RAC1
10963 035622 013737 001330 001462  MOV @RREG1,@RAC0
10964 035630 004767 000506      JSR PC,FLTADD        :ADD THEM
10965 035634 174102              STF AC1,AC2          :SAVE IN AC2
10966 035636 013737 001464 001466  MOV @RAC1,@RAC2      :AND EXT EXPONENT
10967          :NOW DO THE A-B
10968 035644 172537 001352      LDF @RSTMP0,AC1      :LOAD OPERAND A
10969 035650 013737 001326 001464  MOV @RREG0,@RAC1      :AND EXT EXPONENT
10970 035656 172437 001362      LDF @RSTMP4,AC0      :LOAD OPERAND B
10971 035662 013737 001330 001462  MOV @RREG1,@RAC0
10972 035670 004767 000442      JSR PC,FLTSUB        :SUBTRACT THEM
10973          :NOW DO (A+B)*(A-B)
10974 035674 172402              LDF AC2,AC0          :GET RESULT OF (A+B)
10975 035676 013737 001466 001462  MOV @RAC2,@RAC0
10976 035704 004767 000362      JSR PC,FLTMPY        :FORM THE PRODUCT
10977 035710 174137 001502      STF AC1,@RFLTMP0     :SAVE RESULT
10978 035714 013737 001464 001332  MOV @RAC1,@RREG2     :AND EXT EXPONENT
10979          :NOW DO THE B*B
10980 035722 172437 001362      LDF @RSTMP4,AC0      :LOAD OPERAND B
10981 035726 013737 001330 001462  MOV @RREG1,@RAC0
10982 035734 172500              LDF AC0,AC1          :B OPERAND IS IN AC0
10983 035736 013737 001462 001464  MOV @RAC0,@RAC1      :AND EXT EXPONENT
10984 035744 004767 000322      JSR PC,FLTMPY
10985 035750 174102              STF AC1,AC2          :SAVE RESULT IN AC2
10986 035752 013737 001464 001466  MOV @RAC1,@RAC2
10987          :NOW DO THE A*A
10988 035760 172437 001352      LDF @RSTMP0,AC0      :LOAD OPERAND A
10989 035764 013737 001326 001462  MOV @RREG0,@RAC0
10990 035772 172500              LDF AC0,AC1
10991 035774 013737 001462 001464  MOV @RAC0,@RAC1
10992 036002 004767 000264      JSR PC,FLTMPY        :EXECUTE THE MULTIPLY
10993 036006 013737 001464 001470  MOV @RAC1,@RAC3      :SAVE EXT EXPO OF A*A
10994          :NOW DO A**2-B**2
10995 036014 172402              LDF AC2,AC0          :GET B*B
10996 036016 013737 001466 001462  MOV @RAC2,@RAC0      :A*A IN AC1
10997 036024 004767 000306      JSR PC,FLTSUB
10998 036030 174137 001512      STF AC1,@RFLTMP1     :SAVE IN MEMORY
10999 036034 013737 001464 001334  MOV @RAC1,@RREG3
11000          :NOW COMPUTE THE RESULTS
11001          :CALCULATE THE NUMBER OF CORRECT BITS
11002 036042 023737 001466 001470  CMP @RAC2,@RAC3      :DETERMINE WHICH EXP IS LARGER
11003 036050 002003              BGE 2$              :BRANCH IF AC2 LARGER
11004 036052 013737 001470 001466  MOV @RAC3,@RAC2      :PUT LARGEST IN AC2
11005 036060 163737 001464 001466  2$: SUB @RAC1,@RAC2
11006 036066 162737 000065 001466  SUB #53,@RAC2
11007 036074 005437 001466      NEG @RAC2
11008 036100 172437 001502      LDF @RFLTMP0,AC0     :GET LEFT HAND SIDE
11009 036104 013737 001332 001462  MOV @RREG2,@RAC0
11010 036112 004767 000220      JSR PC,FLTSUB        :SUBTRACT TO SEE HOW CLOSE THEY ARE
11011 036116 163737 001334 001464  SUB @RREG3,@RAC1     :SUB EXT EXPONENTS
11012          :ACTUAL EXPONENTS ARE EQUAL
11013 036124 100002              BPL 1$              :MAKE SURE RESULT IS POSITIVE
11014 036126 005437 001464      NEG @RAC1
    
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11015 036132 023737 001466 001464 1$: CMP @SAC2,@SAC1 :RESULTS WITHIN RANGE ALLOWED
11016 036140 003401 BLE SECT3D :BRANCH IF YES
11017 036142 104016 ERROR 16 :RESULTS WRONG
11018
11019
11020 036144 172537 001352 SECT3D: LDF @STMP0,AC1 :LOAD OPERAND A
11021 036150 172437 001362 LDF @STMP4,ACO :AND OPERAND B
11022 036154 013737 001326 001464 MOV @SREG0,@SAC1
11023 036162 013737 001330 001462 MOV @SREG1,@SACO
11024 036170 004767 000120 JSR PC,FLTDIV :GO DIVIDE THEM
11025 036174 004767 000072 JSR PC,FLTMPY :MULTIPLY RESULT BY B
11026 036200 174137 001502 STF AC1,@FLTMP0 :SAVE RESULT
11027 036204 013737 001464 001332 MOV @SAC1,@SREG2
11028 036212 172437 001352 LDF @STMP0,ACO :LOAD OPERAND A
11029 036216 174037 001512 STF ACO,@FLTMP1 :SAVE INCASE TYPE OUT
11030 036222 013737 001326 001462 MOV @SREG0,@SACO
11031 036230 013737 001326 001334 MOV @SREG0,@SREG3
11032 036236 004767 000074 JSR PC,FLTSUB :SUBTRACT RIGHT AND LEFT HAND SIDES
11033 036242 163737 001326 001464 SUB @SREG0,@SAC1 :SEE IF RESULT OK
11034 036250 100002 BPL 1$ :ENSURE DIFFERENCE IS POSITIVE
11035 036252 005437 001464 NEG @SAC1
11036 036256 022737 000066 001464 1$: CMP #54,@SAC1 :RESULTS WITHIN 2 BITS?
11037 036264 003505 BLE RELE8 :BRANCH IF YES
11038 036266 104016 ERROR 16 :RESULTS WRONG
11039 036270 000503 BR RELE8
11040
11041
11042 :*****
11043 :SBTTL FLOATING POINT MULTIPLY ROUTINE
11044 :* THIS ROUTINE MULTIPLIES THE CONTENTS OF ACO AND AC1
11045 :* AND LEAVES THE RESULT IN AC1. IT ALSO TAKES CARE OF
11046 :* THE SOFTWARE EXPONENTS THAT ARE KEPT IN SAC0 AND SAC1.
11047 :*****
11047 036272 063737 001462 001464 FLTMPY: ADD @SACO,@SAC1 :ADD SOFTWARE EXPONENTS
11048 036300 171100 MULF ACO,AC1 :DO THE MULTIPLY
11049 036302 012746 100400 MOV #100400,-(SP) :PUT CONTROL WORD ON STACK
11050 036306 004737 061020 JSR PC,@EXPEXT :CALCULATE EXT EXPONENT
11051 036312 000207 1$: RTS PC :RETURN
11052
11053 :*****
11054 :SBTTL FLOATING POINT DIVIDE ROUTINE
11055 :* THIS ROUTINE DIVIDES THE CONTENTS OF AC1 BY ACO
11056 :* AND LEAVES THE RESULT IN AC1.
11057 :*****
11058 036314 163737 001462 001464 FLTDIV: SUB @SACO,@SAC1 :ADJUST SOFTWARE EXPONENTS
11059 036322 174500 DIVF ACO,AC1 :EXECUTE THE DIVIDE
11060 036324 012746 100400 MOV #100400,-(SP) :PUT CONTROL WORD ON STACK
11061 036330 004737 061020 JSR PC,@EXPEXT :CALCULATE EXT EXPONENT
11062 036334 000207 1$: RTS PC :RETURN
11063
11064 :*****
11065 :SBTTL FLOATING POINT ADD ROUTINE
11066 :* THIS ROUTINE ADDS THE CONTENTS OF ACO TO AC1.
11067 :* THIS CAN ONLY BE DONE IF THE SOFTWARE EXPONENTS
11068 :* ARE CLOSE ENOUGH TOGETHER SUCH THAT AN ADJUSTMENT
11069 :* OF THE REAL EXPONENT LEAVES A NON-ZERO NUMBER.
11070 :*****

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11071 036336 010667 000134      FLTSUB: MOV      SP,SUBFLG      ;SET SUBTRACT FLAG
11072 036342 023737 001462 001464 FLTADD: CMP      @#SAC0,@#SAC1    ;CHECK SOFTWARE EXPONENTS
11073 036350 003016              BGT      1$
11074 036352 001434              BEQ      2$
11075              ;ACCUMULATOR 1 IS LARGER THAN ACCUMULATOR 0
11076 036354 013702 001464      MOV      @#SAC1,R2            ;GET OPERAND B SOFTWARE EXP
11077 036360 163702 001462      SUB      @#SAC0,R2            ;GET DIFFERENCE IN SOFTWARE EXP'S
11078 036364 020227 000071      CMP      R2,#57.             ;EXP WITHIN DBL PREC RANGE?
11079 036370 002003              BGE      7$                  ;BRANCH IF ADD NOT REQUIRED
11080              ;RESULT IS OPERAND B
11081 036372 005402              NEG      R2
11082 036374 176402              LDEXP   R2,AC0              ;RELOAD THE EXPONENT
11083 036376 000422              BR      2$
11084 036400 176427 177703      7$: LDEXP   #-75,AC0         ;FAKE EXPONENT SO HARDWARE
11085 036404 000417              BR      2$                  ;WILL DETECT OUT OF RANGE
11086              ;
11087              ;ACCUMULATOR 0 IS LARGER THAN ACCUMULATOR 1
11088 036406 013702 001462      1$: MOV      @#SAC0,R2            ;GET SOFTWARE EXP OF OPERAND A
11089 036412 163702 001464      SUB      @#SAC1,R2            ;GET DIFFERENCE IN EXP'S
11090 036416 013737 001462 001464 MOV      @#SAC0,@#SAC1        ;MAKE SOFTWARE EXP'S EQUAL
11091 036424 020227 000071      CMP      R2,#57.             ;EXP WITHIN DBL PREC RANGE?
11092 036430 002003              BGE      4$                  ;BRANCH IF NO
11093 036432 005402              NEG      R2
11094 036434 176502              LDEXP   R2,AC1              ;RELOAD THE EXPONENT
11095 036436 000402              BR      2$
11096              ;
11097              ;ACCUMULATOR 0 IS MUCH LARGER THAN ACCUMULATOR 1 SO RESULT IS 0
11098 036440 176527 177703      4$: LDEXP   #-75,AC1         ;FAKE EXPONENT SO HARDWARE
11099              ;WILL DETECT OUT OF RANGE
11100 036444 005767 000026      2$: TST      SUBFLG            ;ADD OR SUBTRACT?
11101 036450 001402              BEQ      5$                  ;BRANCH IF ADD
11102 036452 173100              SUBF    AC0,AC1
11103 036454 000401              BR      6$
11104 036456 172100      5$: ADDF    AC0,AL1            ;EXECUTE THE ADD
11105 036460 012746 100400      6$: MOV      #100400,-(SP)      ;PUT CONTROL WORD ON STACK
11106 036464 004737 061020      JSR     PC,@#EXPEXT          ;CALCULATE EXT EXPONENT
11107 036470 005067 000002      3$: CLR      SUBFLG            ;INIT SUBTRACT FLAG
11108 036474 000207              RTS      PC                  ;RETURN
11109 036476 000000      SUBFLG: .WORD
11110 036500 000004      RELE8: SCOPE
      (1) 036502 010702      MOV      PC,R2
      (1) 036504 062702 000012      ADD      #12,R2
      (1) 036510 012707 044042      MOV      #RELOC,PC          ;GO RELOCATE PROGRAM CODE
      (1) 036514 000000      REL88: .WORD 0
      (1) ;88888888888888 LAST ADDRESS OF CODE TO BE RELOCATED 8888888888
11111
11112
11113 036516 005737 001552      TST     @#KB11E              ;IS THIS A KB11-E OR KB11-EM?
11114 036522 001002              BNE     DOMFPT              ;BR IF IT IS
11115 036524 000167 004060      JMP     ENDCIS              ;SKIP THIS TEST IF NOT. MFPT AND CIS NOT THERE
11116 036530
11126
      DOMFPT:
      ;*****
      ;*TEST 74 CHECK MFPT INSTRUCTION (KB11-E/EM ONLY)
      ;* THE MFPT INSTRUCTION IS NOT AVAILABLE ON THE KB11-B/C/CM BUT
      ;* IF THIS IS A KB11-E/EM THIS TEST IS RUN. MFPT RETURNS
    
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(4)          ;*      DATA TO RO IN THE FOLLOWING FORMAT:
(4)          ;*      BIT 0 - 1 INDICATES 11/44 CPU
(4)          ;*      BIT 1 - 1 INDICATES KB11-E/EM CPU (SHOULD ALWAYS COME UP IN THIS TEST)
(4)          ;*      BIT 8 - 1 INDICATES CISP PRESENT
(4)          ;*      BIT 9 - 1 INDICATES FP PRESENT
(3)          ;:*****
(2)          (2) 036530 012767 000001 142640          MOV      #1,$TIMES          ;;DO 1 ITERATION
(2)          (2) 036536 000004          TST74: SCOPE
(2)          (2) 036540 112737 000074 001252          MOV      #74,@$STSTNM          ;LOAD TEST NUMBER
(2)          (2) 036546 013737 001252 177570          MOV      @$STSTNM,@$DISPLAY          ;;DISPLAY TEST NUMBER
11'27
(1)          .SBTTL START OF SECTION 9
(1)          ;9999999999999999 FIRST ADDRESS TO BE RELOCATED 9999999999
REL9:        (1) 036554 010700          MOV      PC,RO          ;GET PC
(1)          (1) 036556 005740          TST      -(RO)          ;RO CONTAINS THE ADDRESS OF REL9
(1)          (1) 036560 010037 001610          MOV      RO,@$FRSTAD          ;SAVE
(1)          (1) 036564 010700          MOV      PC,RO          ;GET CURRENT PC
(1)          (1) 036566 162700 036566          SUB      #,$RO          ;SUBTRACT RELOCATION FACTOR
(1)          (1) 036572 010037 001604          MOV      RO,@$FACTOR          ;SAVE RELOCATION FACTOR
(1)          (1) 036576 010737 001262          MOV      PC,@$SLPERR          ;SET LOOP ADDRESS
(1)          (1) 036602 062737 000030 001262          ADD      #30,@$SLPERR          ;ADJUST
(1)          (1) 036610 013737 001262 001260          MOV      @$SLPERR,@$SLPADR
(1)          (1) 036616 105737 001600          TSTB    @MEXEC          ;BR IF TEST CODE TO BE EXECUTED
(1)          (1) 036622 001402          BEQ     .+6
(1)          (1) 036624 000167 003742          JMP     REL9
11128       (1) 036630 012703 000002          MOV      #2,R3          ;R3 IS DATA PATTERN. BIT 1 WILL ALWAYS BE SET
11129       (1) 036634 105737 001555          TSTB    @MCISP          ;CISP FOUND?
11130       (1) 036640 001402          BEQ     1$          ;BR IF NOT
11131       (1) 036642 052703 000400          BIS      #400,R3          ;BIT 8 SHOULD BE SET FOR CISP
11132       (1) 036646 032737 020000 001550 1$: BIT      #20000,@$OPT.CP          ;FP FOUND?
11133       (1) 036654 001402          BEQ     2$          ;BR IF NOT
11134       (1) 036656 052703 001000          BIS      #1000,R3          ;BIT 9 WILL BE SET FOR FP
11135       (1) 036662 000007 2$: MFPT          ;EXECUTE INSTRUCTION
11136       (1) 036664 020003          CMP      RO,R3          ;MATCH?
11137       (1) 036666 001405          BEQ     DONE7          ;DONE IF SO
11138       (1) 036670 010337 001352          MOV      R3,@$STMP0          ;SET UP EXPECTED (GOOD) DATA
11139       (1) 036674 010037 001354          MOV      RO,@$STMP1          ;SET UP RECIEVED (BAD) DATA
11140       (1) 036700 104017          ERROR   17          ;ERROR PRINTOUT
11141       (1) 036702 105737 001555          DONE7: TSTB    @MCISP          ;IS CISP PRESENT?
11142       (1) 036706 001002          BNE     DOCIS          ;BR IF IT IS
11143       (1) 036710 000167 003656          JMP     REL9          ;SKIP CIS TEST BUT RELOCATE SECTION FOR MFPT
11144       (1) 036714          DOCIS:
11145       (3)          ;:*****
(3)          ;*TEST 75          COMMERCIAL INSTRUCTION SET TEST
(3)          ;:*****
(2)          (2) 036714 000004          TST75: SCOPE
(2)          (2) 036716 112737 000075 001252          MOV      #75,@$STSTNM          ;LOAD TEST NUMBER
(2)          (2) 036724 013737 001252 177570          MOV      @$STSTNM,@$DISPLAY          ;;DISPLAY TEST NUMBER
11146       (2) 036732 013767 001620 002272          MOV      @$SLONUM,SAVRN1          ;SAVE SEED LOW
11147       (2) 036740 013767 001622 002266          MOV      @$SHINUM,SAVRN2          ;SAVE SEED HIGH
11148       (2) 036746 062737 000036 001262          ADD      #30,@$SLPERR          ;ADJUST LOOP ON ERROR POINTER
11149       (2)          ;START OF TEST TO MODIFY ABSOLUTE ADDRESSES WHEN RELOCATING
11150       (2) 036754 016737 002252 001620          MOV      SAVRN1,@$SLONUM          ;RESTORE SEED LO
11151       (2) 036762 016737 002246 001622          MOV      SAVRN2,@$SHINUM          ;RESTORE SEED HI
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11152	036770	012700	041332		MOV	#OFFTAB,RO	:GET OFFSET TO OFFSET TABLE
11153	036774	063700	001604		ADD	@FACTOR,RO	:ADD FACTOR TO GET ADDRESS OF TABLE
11154	037000	012001		1\$:	MOV	(RO)+,R1	:GET OFFSET OF STRING
11155	037002	001407			BEQ	3\$:DONE IF OFFSET = 0
11156	037004	010102			MOV	R1,R2	:SAVE R1
11157	037006	063702	001604		ADD	@FACTOR,R2	:ADD FACTOR TO OFFSET
11158	037012	011112			MOV	(R1),(R2)	:MOVE ORIGINAL DATA TO ADDRESS
11159	037014	063712	001604		ADD	@FACTOR,(R2)	:ADD FACTOR FOR ADDRESS
11160	037020	000767			BR	1\$:GO MODIFY NEXT ADDRESS
11161							:SET PASS COUNT AND GET RANDOM DATA
11162	037022	016700	002302	3\$:	MOV	BUFFAD,RO	:SET SRC ADDRESS FOR DATA
11163	037026	016701	002276		MOV	BUFFAD,R1	:SET DST ADDRESS FOR DATA
11164	037032	062701	000310		ADD	#200,R1	:ADJUST
11165	037036	004737	060562	4\$:	JSR	PC,@\$RAND	:GET RANDOM NUMBER
11166	037042	013710	001620		MOV	@\$LOWUM,(RO)	:STORE NUMBER IN SOURCE ONE
11167	037046	042710	100200		BIC	#100200,(RO)	:MAKE NUMBER BETWEEN 0 AND 177
11168	037052	012021			MOV	(RO)+,(R1)+	:STORE NUMBER IN DST FOR TEST CMPC
11169	037054	020067	002164		CMPC	RO,DST.1A	:DONE FILLING SOURCE ONE YET
11170	037060	062766			BLT	4\$:NO GET NEXT RANDOM NUMBER
11171							:YES GO TO FIRST TEST
11172							:TEST CMPC INSTRUCTION COMPARE SRC 1 TO SRC 1
11173	037062	004767	001560	COMP:	JSR	PC,SETUP	:SET UP DESCRIPTORS
11174	037066	076144			CMPCI		:COMPARE STRINGS
11175	037070	041236		SRC1:	.WORD	SRC.1D	:SOURCE ONE DESCRIPTOR
11176	037072	041242		DST1:	.WORD	DST.1D	:DST DESCRIPTOR
11177	037074	000040			.WORD	'	:FILL WITH SPACES
11178	037076	001403			BEQ	MOVE	:NO ERROR GO TO NEXT TEST
11179	037100	004767	001602		JSR	PC,CISER	:GET ERROR DATA
11180	037104	104020			ERROR	20	:REPORT ERROR
11181					:MOVE	CHAR STRING	
11182	037106	004767	001534	MOVE:	JSR	PC,SETUP	:SET STRING DESCRIPTORS
11183	037112	076067			L3D7		:LOAD DESC INTO REG
11184	037114	041236		SRC2:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11185	037116	041242		DST2:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11186	037120	041320		CHAR1:	.WORD	CHAR	
11187	037122	076030			MOVC		:MOVE STRING
11188	037124	076144			CMPCI		:COMPARE SRC AND DST
11189	037126	041236		SRC3:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11190	037130	041242		DST3:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11191	037132	000040			.WORD	'	:FILL WITH SPACES
11192	037134	001403			BEQ	SCAN	:IF EQUAL NEXT TEST
11193	037136	004767	001544		JSR	PC,CISER	:GET ERROR DATA
11194	037142	104020			ERROR	20	:REPORT ERROR
11195					:SCAN,MOVC		
11196	037144	004767	001476	SCAN:	JSR	PC,SETUP	:SET UP DESCRIPTORS
11197	037150	112767	000001	002124	MOVB	#1,SET.1D	:SET CHAR MASK FOR SPAN AND SCAN
11198	037156	076142		NXSCAN:	SCANCI		:SCAN
11199	037160	041236		SRC4:	.WORD	SRC.1D	:SOURCE DESC
11200	037162	041302		SET1:	.WORD	SET.1D	:PTR TO CHAR SET DESC
11201	037164	001003			BNE	FNDSCN	:CHAR FOUND MOVE STRING
11202	037166	106367	002110		ASLB	SET.1D	:NOT FOUND SHIFT MASK
11203	037172	000771			BR	NXSCAN	:LOOK AGAIN
11204	037174	010067	002036	FNDSCN:	MOV	RO,SRC.1D	:MOV NEW ADDRESS TO DESC
11205	037200	010167	002034		MOV	R1,SRC.1A	:MOV NEW LENGTH TO DESC
11206	037204	076130			MOVC		:MOV TEXT STARTING WITH CHAR FOUND
11207	037206	041236		SRC5:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES

11208	037210	041242			DST4:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11209	037212	000040				.WORD	'	:FILL WITH SPACES
11210	037214	076144				CMPCI		:COMPARE SRC AND DST
11211	037216	041236			SRC6:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11212	037220	041242			DST5:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11213	037222	000040				.WORD	'	:FILL WITH SPACES
11214	037224	001403				BEQ	SPAN	:STRINGS EQUAL NEXT TEST
11215	037226	004767	001454			JSR	PC,CISER	:NOT EQUAL GET ERROR DATA
11216	037232	104020				ERROR	20	:REPORT ERROR
11217						:SPAN	AND MOVC	
11218	037234	004767	001406		SPAN:	JSR	PC,SETUP	:SETUP DESC
11219	037240	012767	000001	002034		MOV	#1,SET.1D	:SET MASK
11220								
11221	037246	076067			NXSPAN:	L3D7		:LOAD DESC
11222	037250	041236			SRC7:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11223	037252	041242			DST6:	.WORD	DST.1D	:DUMMY DESC TO GET SET.1D TO R4
11224	037254	041302			SET2:	.WORD	SET.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11225	037256	076043				SPANC		:FIND CHAR
11226	037260	001003				BNE	FNDSPN	:FOUND MOVE STRING
11227	037262	106367	002014			ASLB	SET.1D	:NOT SHIFT MASK
11228	037266	000767				BR	NXSPAN	:AND LOOK AGAIN
11229	037270	010067	001742		FNDSPN:	MOV	R0,SRC.1D	:GET ADDRESS
11230	037274	010167	001740			MOV	R1,SRC.1A	:SET LENGTH
11231	037300	076067				L3D7		:LOAD DESC
11232	037302	041236			SRC8:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11233	037304	041242			DST7:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11234	037306	041320			CHAR2:	.WORD	CHAR	
11235	037310	076030				MOVC		:MOVE STING BEGINNING WITH CHAR
11236	037312	076067				L3D7		:LOAD DESC
11237	037314	041236			SRC9:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11238	037316	041242			DST8:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11239	037320	041320			CHAR3:	.WORD	CHAR	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11240	037322	076044				CMPC		:COMPARE SRC AND DST
11241	037324	001403				BEQ	MATCH	:STRINGS EQUAL NEXT TEST
11242	037326	004767	001354			JSR	PC,CISER	:NOT EQUAL GET ERROR DATA
11243	037332	104020				ERROR	20	:REPORT ERROR
11244						:MATCH	AND MOVE REVERSE	
11245	037334	004767	001306		MATCH:	JSR	PC,SETUP	:SET UP DESC
11246	037340	076027				L2D7		:LOAD DESC INTO REGISTERS
11247	037342	041236			SRC10:	.WORD	SRC.1D	:SOURCE POINTER
11248	037344	041246			OBJ1:	.WORD	OBJ.1D	:OBJECT POINTER
11249	037346	076045				MATC		:MATCH STRINGS
11250	037350	010167	001664			MOV	R1,SRC.1A	:GET NEW SRC ADDRESS
11251	037354	012767	000031	001654		MOV	#*D25,SRC.1D	:GET NEW SRC LENGTH
11252	037362	076067				L3D7		:LOAD DESCRIPTORS
11253	037364	041236			SRC11:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11254	037366	041246			DST9:	.WORD	OBJ.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11255	037370	041320			CHAR4:	.WORD	CHAR	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11256	037372	076044				CMPC		:COMPARE RESULTS
11257	037374	001403				BEQ	MOVER	:FOUND NEXT TEST
11258	037376	004767	001304			JSR	PC,CISER	:ERROR DATA
11259	037402	104020				ERROR	20	:REPORT ERROR
11260						:MOVE	REVERSE	
11261	037404	004767	001236		MOVER:	JSR	PC,SETUP	:SET UP DESC
11262	037410	076131				MOVRCI		:MOVE REVERSE
11263	037412	041236			SRC12:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES

11264	037414	041242		DST10:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11265	037416	000040			.WORD	'		:FILL WITH SPACES
11266	037420	076067			L3D7			:LOAD DESCRIPTORS
11267	037422	041242		DST11:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11268	037424	041242		DST12:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11269	037426	000040			.WORD	'		:FILL WITH SPACES
11270	037430	076031			MOVRC			:MOVE REVERSE AGAIN
11271	037432	076067			L3D7			:LOAD DESC FORCOMPARE
11272	037434	041236		SRC13:	.WORD	SRC.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11273	037436	041242		DST13:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11274	037440	000040			.WORD	'		:FILL WITH SPACES
11275	037442	076044			CMPC			:COMPARE STRINGS
1 276	037444	001403			BEQ	MOVT		:EQUAL NEXT TEST
11277	037446	004767	001234		JSR	PC,CISER		:GET ERROR DATA
11278	037452	104020			ERROR	20		:REPORT ERROR
11279					:MOVE	TRANSLATE		
11280	037454	004767	001166	MOVT:	JSR	PC,SETUP		:SET UP DESC
11281	037460	076132			MOVTCI			:MOVE TRANSLATE
11282	037462	041236		SRC14:	.WORD	SRC.1D		:SRC DESC PTR
11283	037464	041242		DST14:	.WORD	DST.1D		:DEST DESC PTR
11284	037466	000040			.WORD	'		:FILL WITH SPACES
11285	037470	040776		TRANS1:	.WORD	TRANS		:TRANSLATE TABLE ADDRESS
11286	037472	076132			MOVTCI			:MOVE TRANS AGAIN
11287	037474	041242		DST15:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11288	037476	041242		DST16:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11289	037500	000040			.WORD	'		:FILL WITH SPACES
11290	037502	040776		TRANS2:	.WORD	TRANS		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11291	037504	076144			CMPCI			:COMPARE SRC AND DST
11292	037506	041236		SRC15:	.WORD	SRC.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11293	037510	041242		DST17:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11294	037512	000040			.WORD	'		:FILL WITH SPACES
11295	037514	001403			BEQ	LOCATE		:STRINGS EQUAL NEXT TST
11296	037516	004767	001164	ERR4:	JSR	PC,CISER		:GET ERROR DATA
11297	037522	104020			ERROR	20		:REPORT ERROR
11298					:LOCATE	AND MOVE CHARACTER		
11299	037524	004767	001116	LOCATE:	JSR	PC,SETUP		:SETUP DESCRIPTORS
11300	037530	076140			NXLOC			:LOCATE CHARACTER
11301	037532	041236		SRC16:	.WORD	SRC.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11302	037534	000040		LOCCHR:	.WORD	'		:FILL WITH SPACES
11303	037536	001003			BNE	FNDLOC		:FOUND MOVE STRING
11304	037540	105267	177770		INCB	LOCCHR		:NOT FOUND INC CHAR FOR SEARCH
11305	037544	000771			BR	NXLOC		:LOOK AGAIN FOR NEW CHAR
11306	037546	010067	001464	FNDLOC:	MOV	R0,SRC.1D		:ADDRESS OF CHAR FOUND TO SCR.1
11307	037552	010167	001462		MOV	R1,SRC.1A		:LENGTH OF STRING
11308	037556	016703	001462		MOV	DST.1A,R3		:MOVE DST ADDRESS TO R2
11309	037562	016702	001454		MOV	DST.1D,R2		:MOVE STRING LENGTH TO R3
11310	037566	012704	000040		MOV	#',R4		:FILL CHAR
11311	037572	076030			MOVRC			:MOVE STRING BEGINING WITH CHAR FOUND
11312	037574	076144			CMPCI			:COMPARE SOURCE AND DEST
11313	037576	041236		SRC17:	.WORD	SRC.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11314	037600	041242		DST18:	.WORD	DST.1D		:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11315	037602	000040			.WORD	'		:FILL WITH SPACES
11316	037604	001403			BEQ	SKIP		:STRINGS EQUAL NEXT TEST
11317	037606	004767	001074		JSR	PC,CISER		:NOT EQUAL ERROR
11318	037612	104020			ERROR	20		:REPORT ERROR
11319					:SKIP	AND MOVE CHAR STRING		

11320	037614	004767	001026	SKIP:	JSR	PC,SETUP	:SETUP DESCRIPTORS
11321	037620	076141		NXSKIP:	SKPCI		:SKIP CHAR
11322	037622	041236		SRC18:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11323	037624	000040		SKPCHR:	.WORD		
11324	037626	001003		BNE	FNDSKP		:CHAR FOUND GO MOVE STRING
11325	037630	005267	177770	INC	SKPCHR		:NOT FOUND INC CHAR
11326	037634	000771		BR	NXSKIP		:LOOK AGAIN
11327	037636	010067	001374	FNDSKP:	MOV	R0,SRC.1D	:GET NEW SRC ADDRESS
11328	037642	010167	001372		MOV	R1,SRC.1A	:NEW SOURCE LENGTH
11329	037646	076130			MOVCI		:MOVE STRING
11330	037650	041236		SRC19:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11331	037652	041242		DST19:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11332	037654	000040			.WORD		:FILL WITH SPACES
11333	037656	076067			L3D7		:LOAD DESCRIPTORS FOR COMPARE
11334	037660	041236		SRC20:	.WORD	SRC.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11335	037662	041242		DST20:	.WORD	DST.1D	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11336	037664	041320		CHAR5:	.WORD	CHAR	
11337	037666	076044			CMPC		:COMPARE STRINGS
11338	037670	001403			BEQ	DECDAT	:EQUAL NEXT TEST
11339	037672	004767	001010		JSR	PC,CISER	:NOT EQUAL GET ERROR DATA
11340	037676	104020			ERROR	20	:REPORT ERROR
11341							:DECIMAL ARITHMETIC TESTS
11342							:SETUP DECIMAL DATA
11343	037700	016700	001424	DECDAT:	MOV	BUFFAD,R0	:GET BUFFAD TO R0 FOR INDEX
11344	037704	016705	001420		MOV	BUFFAD,R5	
11345	037710	062705	000070		ADD	#56.,R5	
11346	037714	005002		1\$:	CLR	R2	:CLR R2 TO ACCUMULATE NIBBLES
11347	037716	012703	041176		MOV	#MSKTAB,R3	:GET OFFSET OF MSKTAB
11348	037722	063703	001604		ADD	#FACTOR,R3	:ADJUST ADDRESS
11349	037726	011001			MOV	(R0),R1	:LOAD R1
11350	037730	005004			CLR	R4	:CLR FOR COUNTER
11351	037732	042301		2\$:	BIC	(R3)+,R1	:CLEAR OFF UNDESIRE NIBBLES
11352	037734	022301			CMPC	(R3)+,R1	:IS NIBBLE LESS THAN 9
11353	037736	002001			BGE	3\$:YES DONT SUBTRACT
11354	037740	161301			SUB	(R3),R1	:GREATER THAN 9 SUB 6
11355	037742	005723		3\$:	TST	(R3)+	:INC R3 TWICE IF NO SUB
11356	037744	050102			BIS	R1,R2	:STORE NIBBLE IN R2
11357	037746	005204			INC	R4	:INC NIBBLE COUNT
11358	037750	022704	000004		CMPC	#4,R4	:4 NIBBLES DONE YET
11359	037754	002366			BGE	2\$:NO DO AGAIN
11360	037756	010220			MOV	R2,(R0)+	:STORE VALID DATA IN SOURCE
11361	037760	020500			CMPC	R5,R0	
11362	037762	103354			BHIS	1\$:NO DO AGAIN
11363	037764	012701	041252		MOV	#A.DSC,R1	:SET DATA TYPE
11364	037770	063701	001604		ADD	#FACTOR,R1	:ADD FACTOR FOR ADDRESS
11365	037774	012702	041276		MOV	#D.DSC,R2	:GET OFFSET OF D.DSC
11366	040000	063702	001604		ADD	#FACTOR,R2	:ADJUST TO GET ADDRESS
11367	040004	042711	070000	4\$:	BIC	#070000,(R1)	:CLEAR TYPE BITS
11368	040010	052711	010000		BIS	#10000,(R1)	:MAKE UNSIGNED ZONED DATA
11369	040014	062701	000004		ADD	#4,R1	:GET NEXT DATA TYPE SPECIFIER
11370	040020	020102			CMPC	R1,R2	:TEST FOR DONE
11371	040022	103770			BLO	4\$:NOT DONE DO AGAIN
11372							:TEST COMPARE NUMERIC
11373	040024	076152			CMPC		:COMPARE EQUAL STRINGS
11374	040026	041252		A1:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11375	040030	041252		A2:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES

11376	0. 7032	001403		BEO	NUMRIC	:EQUAL NEXT TEST
11377	040034	004767	000720	JSR	PC,CISER3	:GET ERROR DATA
11378	040040	104020		ERROR	20	:REPORT ERROR
11379					:CALCULATE [(10A+10B)-10C]	
11380						
11381	040042	076156		NUMRIC:	ASHNI	:SHIFT A
11382	040044	041252		A3:	.WORD A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11383	040046	041276		D1:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11384	040050	000001			.WORD 1	:SHIFT COUNT
11385	040052	076156			ASHNI	:SHIFT B
11386	040054	041256		B1:	.WORD B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11387	040056	041266		E1:	.WORD E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11388	040060	000001			.WORD 1	:SHIFT COUNT
11389	040062	076150			ADDNI	:10A+10B
11390	040064	041276		D2:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11391	040066	041266		E2:	.WORD E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11392	040070	041277		F1:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11393	040072	076156			ASHNI	:SHIFT C
11394	040074	041262		C1:	.WORD C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11395	040076	041276		D3:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11396	040100	000001			.WORD 1	:SHIFT COUNT
11397	040102	076151			SUBNI	:10A+10B-10C
11398	040104	041276		F2:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11399	040106	041272		D4:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11400	040110	041266		E3:	.WORD E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11401					:CALCULATE 10*[(A-C)+B]	
11402	040112	076067			L3D7	:LOAD DESCRIPTORS
11403	040114	041252		A4:	.WORD A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11404	040116	041262		C2:	.WORD C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11405	040120	041272		F3:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11406	040122	076051			SUBN	:SUB A-C
11407	040124	076067			L3D7	:LOAD DESC
11408	040126	041256		B2:	.WORD B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11409	040130	041272		F4:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11410	040132	041276		D5:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11411	040134	076050			ADDN	:ADD A-C+B
11412	040136	076067			L3D7	:LOAD DESC
11413	040140	041276		D6:	.WORD D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11414	040142	041272		F5:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11415	040144	041316		ONE1:	.WORD ONE	
11416	040146	076056			ASHN	:MULT BY 10
11417					:COMPARE RESULTS	
11418	040150	076027			L2D7	:LOAD DESC
11419	040152	041266		E4:	.WORD E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11420	040154	041272		F6:	.WORD F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11421	040156	076052			CMPN	:COMPARE STRINGS
11422	040160	001403		BEO	CONNUM	:NEXT TEST IF EQUAL
11423	040162	004767	000554	JSR	PC,CISER2	:GET ERROR DATA
11424	040166	104020		ERROR	20	:REPORT ERROR
11425					:CONVERT DATA TYPES	
11426					:LONG -> NUMERIC -> LONG	
11427					:NUMERIC -> PACKED -> NUMERIC	
11428	040170	076157		CONNUM:	CVTLNI	:CONVERT LONG TO NUMERIC
11429	040172	041266		E5:	.WORD E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11430	040174	041306		LONG1:	.WORD LONG.1	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11431	040176	076153			CVTLNI	:CONVERT NUMERIC TO LONG

11432	040200	041266			E18:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11433	040202	041312			LONG4:	.WORD	LONG.2	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11434	040204	026767	001076	001100		CMP	LONG.1, LONG.2	:CHECK FIRST HALF #LONG WORD
11435	040212	001004				BNE	1\$:NOT EQUAL ERROR
11436	040214	026767	001070	001072		CMP	LONG.1+2, LONG.2+2	:EQUAL CHECK SECOND HALF
11437	040222	001403				BEQ	NUMPAC	:EQUAL NEXT TEST
11438	040224	004767	000474		1\$:	JSR	PC, CISER1	:GET ERROR DATA
11439	040230	104020				ERROR	20	:REPORT ERROR
11440							:CONVERT NUM TO PACK TO NUM	
11441	040232	076155			NUMPAC:	CVTNPI		:CONVERT NUM TO PACKED
11442	040234	041252			A5:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11443	040236	041266			E6:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11444	040240	076154				CVTNPI		:CONVERT BACK TO NUM
11445	040242	041266			E7:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11446	040244	041272			F7:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11447	040246	076156				ASHNI		:TRANSFER A RO E 32 BYTES
11448	040250	041252			A6:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11449	040252	041266			E8:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11450	040254	000000				.WORD	0	:SHIFT COUNT
11451	040256	076152				CMPNI		:COMPARE RESULTS
11452								
11453	040260	041266			E9:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11454	040262	041272			F8:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11455	040264	001403				BEQ	PACDAT	:EQUAL NEXT TEST
11456	040266	004767	000450			JSR	PC, CISER2	:GO GET ERROR DATA
11457	040272	104020				ERROR	20	:REPORT ERROR
11458							:PACKED DECIMAL ARITHMETIC	
11459	040274	012701	041252		PACDAT:	MOV	#A.DSC, R1	:SET DATA TYPE
11460	040300	063701	001604			ADD	#AFACTOR, R1	:ADJUST FOR ADDRESS
11461	040304	012702	041276			MOV	#D.DSC, R2	:GET OFFSET TO D.DSC
11462	040310	063702	001604			ADD	#AFACTOR, R2	:ADJUST FOR ADDRESS
11463								
11464	040314	042711	070000		1\$:	BIC	#070000, (R1)	:MAKE UNSIGNED PACKED DATA
11465	040320	052711	060000			BIS	#060000, (R1)	:SET TYPE BITS
11466	040324	062701	000004			ADD	#4, R1	:NEXT DATA TYPE SPEC
11467	040330	020102				CMP	R1, R2	:DONE YET
11468	040332	101770				BLOS	1\$:NO DO AGAIN
11469	040334	146777	000666	000712		BICB	HIMASK, @A	:CLR HI NIBBLE TO MAKE VALID PACKED STRING
11470	040342	146777	000660	000710		BICB	HIMASK, @B	:CLR HI NIB OF B
11471	040350	146777	000652	000706		BICB	HIMASK, @C	:CLR HI NIB OF C
11472	040356	016700	000746			MOV	BUFFAD, RO	:GET ADDRESS OF BUFF
11473	040362	146760	000642	000016		BICB	LOMASK, 14. (RO)	:CLEAR SIGN NIBBLE
11474	040370	156760	000633	000016		BISB	SIGN, 14. (RO)	:SET SIGN NIBBLE OF A
11475	040376	146760	000626	000043		BICB	LOMASK, 35. (RO)	:CLEAR SIGN NIBBLE
11476	040404	156760	000617	000043		BISB	SIGN, 35. (RO)	:SET SIGN
11477	040412	146760	000612	000057		BICB	LOMASK, 47. (RO)	:CLEAR SIGN NIBBLE
11478	040420	156760	000603	000057		BISB	SIGN, 47. (RO)	:SET SIGN
11479							:TEST COMPARE PACKED	
11480	040426	076172			(MPPAK:	CMPPI		:COMPARE EQUAL STRINGS
11481	040430	041252			A7:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11482	040432	041252			A8:	.WORD	A.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11483	040434	001401				BEQ	PACKED	:EQUAL GO TEST
11484	040436	104020				ERROR	20	:REPORT ERROR
11485							:CALCULATE 10*[(B+C)]-10*[(B**2)]-(C**2)/(B-C)	
11486	040440	076174			PACKED:	MULPI		:MULT A*A
11487	040442	041256			B3:	.WORD	B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES

11488	040444	041256	B4:	.WORD	B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11489	040446	041276	E10:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11490	040450	076174		MULPI		:MULT B*B
11491	040452	041262	C3:	.WORD	C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11492	040454	041262	C4:	.WORD	C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
493	040456	041266	F9:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
494	040460	076171		SUBPI		:SUB E-F
11495	040462	041262	F10:	.WORD	C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11496	040464	041256	E11:	.WORD	B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11497	040466	041272	E12:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11498	040470	001005		BNE	NOZERO	:BRANCH IF RESULT NOT ZERO
11499	040472	076176		ASHPI		
11500	040474	041262	C7:	.WORD	C.DSC	
11501	040476	041256	B7:	.WORD	B.DSC	
11502	040500	000001		.WORD	1	
11503	040502	000756		BR	PACKED	:DO ANOTHER CALCULATION TO GET RID OF ZERO
11504	040504	076171	NOZERO:	SUBPI		:SUB A-B
11505	040506	041266	C5:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11506	040510	041276	B5:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11507	040512	041266	F11:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11508	040514	076067		L3D7		
11509	040516	041276	D8:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11510	040520	041266	E14:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11511	040522	041316	ONE3:	.WORD	ONE	:SHIFT COUNT
11512	040524	076175		DIVPI		:DIVIDE E/F
11513	040526	041272	F12:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11514	040530	041266	E13:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11515	040532	041276	D7:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11516	040534	076076		ASHP		:SHIFT 10*SCRATCH
11517						:CALCULATE 10*(A+B) REGISTER MODE
11518	040536	076067		L3D7		:LOAD DESCRIPTORS
11519	040540	041256	B6:	.WORD	B.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11520	040542	041262	C6:	.WORD	C.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11521	040544	041276	D9:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11522	040546	076070		ADDP		:ADD A+B
11523	040550	076067		L3D7		:LOAD DESCRIPTORS
11524	040552	041276	D10:	.WORD	D.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11525	040554	041272	F13:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11526	040556	041316	ONE2:	.WORD	ONE	
11527	040560	076076		ASHP		:SHIFT 10*SCRATCH
11528						:COMPARE RESULTS
11529	040562	076172		CMPI		:E=F ????
11530	040564	041266	E15:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11531	040566	041272	F14:	.WORD	F.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11532	040570	001403		BEQ	CONPAK	
11533	040572	004767		JSR	PC,CISER	:GET ERROR DATA
11534	040576	104020		ERROR	20	:REPORT ERROR
11535						:CONVERT DATA TYPES
11536						:LONG -> PACKED -> LONG
11537						:LONG -> NUMERIC -> NUMERIC
11538	040600	076177	CONPAK:	CVTLP1		:CONVERT LONG TO PACKED
11539	040602	041266	E16:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11540	040604	041306	LONG2:	.WORD	LONG.1	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11541	040606	076173		CVTLP1		:CONVERT PACKED TO LONG
11542	040610	041266	E17:	.WORD	E.DSC	:THIS LOCATION MODIFIED WHEN TEST RELOCATES
11543	040612	041312	LONG3:	.WORD	LONG.2	:THIS LOCATION MODIFIED WHEN TEST RELOCATES

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11544 040614 026767 000466 000470      CMP      LONG.1, LONG.2      ;COMPARE RESULTS
11545 040622 001004                BNE      1$                  ;
11546 040624 026767 000460 000462      CMP      LONG.1+2, LONG.2+2 ;COMPARE RESULTS OF SECOND WORD
11547 040632 001403                BEQ      DONE                ;
11548 040634 004767 000064      1$:    JSR      PC, CISER1     ;GET PC, ERROR DATA
11549 040640 104020                ERROR   20                   ;REPORT ERROR
11550 040642 000167 001724      DONE:  JMP      RELE9         ;GO ON TO NEXT TEST
11551
11552      ;SUBROUTINE-SETUP
11553      ;SETS UP CHAR STRING DESCRIPTORS
11554      ;USAGE: JSR      PC, SETUP
11555      ;NO ARGUMENTS
11556 040646 012767 000310 000362      SETUP: MOV      #200., SRC.1D     ;SET SOURCE LENGTH
11557 040654 016767 000450 000356      MOV      BUFFAD, SRC.1A     ;SET SOURCE ADDRESS
11558 040662 012767 000310 000352      MOV      #200., DST.1D     ;DEST LENGTH
11559 040670 016767 000434 000346      MOV      BUFFAD, DST.1A    ;DEST ADDRESS
11560 040676 062767 000310 000340      ADD      #200., DST.1A     ;ADJUST FOR DST
11561 040704 000207                RTS      PC                  ;RETURN
11562      ;SUBROUTINES-CISER, CISER1, CISER2 AND CISER3
11563      ;GETS SHOULD AND WAS DATA AND ADDRESSES
11564      ;USAGE: JSR      PC, CISER(X)
11565      ;NO ARGUMENTS
11566 040706 016737 000326 001352      CISER:  MOV      SRC.1A, @RSTMP0 ;SHOULD BE ADDRESS
11567 040714 016737 000324 001354      MOV      DST.1A, @RSTMP1    ;WAS ADDRESS
11568 040722 000207                RTS      PC                  ;RETURN
11569 040724 016737 000356 001352      CISER1: MOV      LONG.1P, @RSTMP0 ;SHOULD BE ADDRESS
11570 040732 016737 000354 001354      MOV      LONG.2P, @RSTMP1  ;WAS ADDRESS
11571 040740 000207                RTS      PC                  ;RETURN
11572 040742 016737 000322 001352      CISER2: MOV      E, @RSTMP0   ;SHOULD BE ADDRESS
11573 040750 016737 000320 001354      MOV      F, @RSTMP1       ;WAS ADDRESS
11574 040756 000207                RTS      PC                  ;RETURN
11575 040760 016737 000270 001352      CISER3: MOV      A, @RSTMP0   ;SHOULD BE ADDRESS
11576 040766 016737 000262 001354      MOV      A, @RSTMP1       ;WAS ADDRESS
11577 040774 000207                RTS      PC                  ;RETURN
11578
11579      ;TRANSLATE TABLE
11580      ;USED BY MOVE TRANSLATE
11581      ;USED BY SPAN AND SCAN INSTRUCTIONS
11582      ;128 CHAR ASCII
11583
11584 040776      177      176      175      TRANS: .BYTE 177,176,175,174,173,172,171,170
11585 041001      174      173
11585 041004      171      170
11585 041006      167      166      165      .BYTE 167,166,165,164,163,162,161,160
11585 041011      164      163      162
11585 041014      161      160
11586 041016      157      156      155      .BYTE 157,156,155,154,153,152,151,150
11586 041021      154      153      152
11586 041024      151      150
11587 041026      147      146      145      .BYTE 147,146,145,144,143,142,141,140
11587 041031      144      143      142
11587 041034      141      140
11588 041036      137      136      135      .BYTE 137,136,135,134,133,132,131,130
11588 041041      134      133      132
11588 041044      131      130
11589 041046      127      126      125      .BYTE 127,126,125,124,123,122,121,120

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	041051	124	123	122		
	041054	121	120			
11590	041056	117	116	115	.BYTE	117,116,115,114,113,112,111,110
	041061	114	113	112		
	041064	111	110			
11591	041066	107	106	105	.BYTE	107,106,105,104,103,102,101,100
	041071	104	103	102		
	041074	101	100			
11592	041076	077	076	075	.BYTE	077,076,075,074,073,072,071,070
	041101	074	073	072		
	041104	071	070			
11593	041106	067	066	065	.BYTE	067,066,065,064,063,062,061,060
	041111	064	063	062		
	041114	061	060			
11594	041116	057	056	055	.BYTE	057,056,055,054,053,052,051,050
	041121	054	053	052		
	041124	051	050			
11595	041126	047	046	045	.BYTE	047,046,045,044,043,042,041,040
	041131	044	043	042		
	041134	041	040			
11596	041136	037	036	035	.BYTE	037,036,035,034,033,032,031,030
	041141	034	033	032		
	041144	031	030			
11597	041146	027	026	025	.BYTE	027,026,025,024,023,022,021,020
	041151	024	023	022		
	041154	021	020			
11598	041156	017	016	015	.BYTE	017,016,015,014,013,012,011,010
	041161	014	013	012		
	041164	011	010			
11599	041166	007	006	005	.BYTE	007,006,005,004,003,002,001,000
	041171	004	003	002		
	041174	001	000			

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:MASK TABLES
:FOR MAKING VALID DECIMAL DATA

MSKTAB:	.WORD	177760
	.WORD	11
	.WORD	6
	.WORD	177417
NINTAB:	.WORD	220
	.WORD	140
	.WORD	170377
	.WORD	4400
SIXTAB:	.WORD	3000
	.WORD	7777
	.WORD	70000
	.WORD	100000
HIMASK:	.BYTE	360
SIGN:	.BYTE	014
LOMASK:	.BYTE	017
	.EVEN	
SAVRNL:	.WORD	0
SAVRNH:	.WORD	0

:CHARACTER STRING DESCRIPTOR TABLE

11624						
11625	041236	000310			SRC.1D:	.WORD 200.
11626	041240	041752			SRC.1A:	.WORD BUFF
11627	041242	000310			DST.1D:	.WORD 200.
11628	041244	042262			DST.1A:	.WORD BUFF+200.
11629	041246	000031			OBJ.1D:	.WORD 25.
11630	041250	042034			OBJ.1A:	.WORD BUFF+50.
11631	041252	000034			A.DSC:	.WORD 28.
11632	041254	041752			A:	.WORD BUFF
11633	041256	000016			B.DSC:	.WORD 14.
11634	041260	042006			B:	.WORD BUFF+28.
11635	041262	000012			C.DSC:	.WORD 10.
11636	041264	042024			C:	.WORD BUFF+42.
11637	041266	000037			E.DSC:	.WORD 31.
11638	041270	042042			E:	.WORD BUFF+56.
11639	041272	000037			F.DSC:	.WORD 31.
11640	041274	042102			F:	.WORD BUFF+88.
11641	041276	000037			D.DSC:	.WORD 31.
11642	041300	042142			D:	.WORD BUFF+120.
11643	041302	000001			SET.1D:	.WORD 1
11644	041304	040776			TRANS4:	.WORD TRANS
11645	041306	001020	000000		LONG.1:	.WORD 528.,0
11646	041312	000002			LONG.2:	.BLKW 2
11647	041316	000001			ONE:	.WORD 1
11648	041320	000040			CHAR:	.WORD *
11649	041322	040776			TRANS3:	.WORD TRANS
11650	041324	041306			LONG1P:	.WORD LONG.1
11651	041326	041312			LONG2P:	.WORD LONG.2
11652	041330	041752			BUFFAD:	.WORD BUFF
11653						
11654					:OFFTAB	CONTAINS ALL ABSOLUTE ADDRESSES TO BE MODIFIED WHEN RELOCATING
11655						
11656	041332	037070	037114	037126	OFFTAB:	.WORD SRC1,SRC2,SRC3,SRC4,SRC5,SRC6,SRC7,SRC8,SRC9,SRC10
	041340	037160	037206	037216		
	041346	037250	037302	037314		
	041354	037342				
11657	041356	037364	037412	037434	.WORD	SRC11,SRC12,SRC13,SRC14,SRC15,SRC16,SRC17,SRC18,SRC19,SRC20
	041364	037462	037506	037532		
	041372	037576	037622	037650		
	041400	037660				
11658	041402	037072	037116	037130	.WORD	DST1,DST2,DST3,DST4,DST5,DST6,DST7,DST8,DST9,DST10
	041410	037210	037220	037252		
	041416	037304	037316	037366		
	041424	037414				
11659	041426	037422	037424	037436	.WORD	DST11,DST12,DST13,DST14,DST15,DST16,DST17,DST18,DST19,DST20
	041434	037464	037474	037476		
	041442	037510	037600	037652		
	041450	037662				
11660	041452	037470	037502	041322	.WORD	TRANS1,TRANS2,TRANS3,OBJ1,SET1,SET2
	041460	037344	037162	037254		
11661	041466	037120	037306	037320	.WORD	CHAR1,CHAR2,CHAR3,CHAR4,CHAR5
	041474	037370	037664			
11662	041500	040026	040030	040044	.WORD	A1,A2,A3,A4,A5,A6,A7,A8
	041506	040114	040234	040250		
	041514	040430	040432			
11663	041520	040054	040126	040442	.WORD	B1,B2,B3,B4,B5,B6,B7

041526	040444	040510	040540		
11664	041534	040074	040116	040452	.WORD C1,C2,C3,C4,C5,C6,C7
	041544	040454	040506	040542	
11665	041552	040074	040064	040076	.WORD D1,D2,D3,D4,D5,D6,D7,D8,D9,D10
	041562	040106	040132	040140	
	041570	040532	040516	040544	
11666	041576	040552	040066	040110	.WORD E1,E2,E3,E4,E5,E6,E7,E8,E9,E10
	041600	040056	040172	040236	
	041606	040152	040172	040236	
	041614	040242	040252	040260	
11667	041622	040446	040466	040530	.WORD E11,E12,E13,E14,E15,E16,E17,E18
	041624	040464	040564	040602	
	041632	040520	040610	040200	
11668	041640	040070	040104	040120	.WORD F1,F2,F3,F4,F5,F6,F7,F8,F9,F10
	041644	040130	040142	040154	
	041652	040244	040262	040456	
	041660	040462	040526	040554	.WORD F11,F12,F13,F14
11669	041670	040512	041244	041250	.WORD SRC.1A,DST.1A,OBJ.1A
11670	041700	041240	041260	041264	.WORD A,B,C,D,E,F,BUFFAD,TRANS4
11671	041706	041254	041270	041274	
	041714	041300	041304	040174	.WORD LONG.1P, LONG.2P, LONG1, LONG2, LONG3, LONG4
11672	041722	041330	041312	040202	
	041726	041306	040556	040522	.WORD ONE1, ONE2, ONE3
11673	041742	040144	040556	040522	.WORD 0 ;TABLE TERMINATER
11674	041750	000000			

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11675
11676
11677 ;BUFFER SPACE
11678 ;200 WORDS LONG
11679 ;USED FOR SOURCE AND DESTINATIONS
11680
11681 041752 000310 BUFF: .BLKW 200.
11682
11683 042572 000004 RELE9: SCOPE
(1) 042574 010702 MOV PC,R2
(1) 042576 062702 000012 ADD #12,R2
(1) 042602 012707 044042 MOV #RELOC,PC ;GO RELOCATE PROGRAM CODE
(1) 042606 000000 REL99: .WORD 0
;9999999999999999 LAST ADDRESS OF CODE TO BE RELOCATED 999999999999
11684 042610 ENDCIS:
11685 (3) ;*****
(3) ;*TEST 76 TELETYPE AND CLOCK TESTS
(2) ;*****
(2)
(2) 042610 000240 TST76: NOP
(2) 042612 112737 000076 001252 MOVB #76,@#STSTNM ;LOAD TEST NUMBER
(2) 042620 013737 001252 177570 MOV @#STSTNM,@#DISPLAY ;:DISPLAY TEST NUMBER
11686 042626 005037 001604 TTYCHK: CLR @#FACTOR
11687 042632 012704 000100 MOV #100,R4 ;SET R4 - CONSTANT 100
11688 042636 032737 000400 001550 BIT #TTOPT,@#OPT.CP ;BRANCH IF TTY

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11689 042644 001002      BNE 1$ :ON SYSTEM
11690 042646 000167 000220  JMP ARBFIN :JUMP IF NOT
11691 042652 132777 000200 136434 1$: BITB #200,@STPS :CHECK IF TTY IS READY
11692 042660 001774      BEQ 1$
11693 042662 012737 001623 001340  MOV #NULLS-1,@$REG5 :SET ADDRESS OF ASCII STRING TO TYPE
11694 042670 106277 136420  ASRB @STPS :SET IE BIT. SEE TPISR FOR INT SERVICE.
11695 042674 000001      WAIT :WAIT FOR INTERRUPT
11696
11697
11698 042676      DUMMY:
11699 :ROUTINE TO CHECK PRIORITY ARBITRATION LOGIC
11700 :THE BELOW TEST WILL INHIBIT INTERRUPTS ON LEVEL 6 AND ABOVE (LOCKING
11701 :OUT THE LINE CLOCK) AND THEN SET UP THE TTY TO INTERRUPT. NEXT THE
11702 :PRIORITY LEVEL WILL BE SET TO 0 ALLOWING INTERRUPTS IN WHICH CASE
11703 :THE LINE CLOCK (AT LEVEL 6) SHOULD INTERRUPT BEFORE THE TTY (AT LEVEL 4).
11704 042676 132737 000020 177776 1$: BITB #20,@PSW
11705 042704 001104      BNE ARBEX :EXIT TEST IF 'T' BIT SET
11706 042706 030477 136402  2$: BIT R4,@STPS :WAIT FOR TTY TO BE NOT
11707 042712 001375      BNE 2$ :BUSY
11708 042714 112737 000300 177776  MOVB #300,@PSW :SET PRIORITY LEVEL 6
11709 042722 150477 136366  3$: BISB R4,@STPS :SET IE BIT
11710 042726 100375      BPL :AND WAIT FOR READY
11711 042730 032737 001000 001550  BIT #LKOPT,@OPT.CP :LINE CLOCK AVAILABLE?
11712 042736 001455      BEQ ARBFIN :BRANCH IF NO
11713 042740 012737 043044 000064  MOV #7$,@TPVEC :SET TTY VECTOR
11714 042746 012737 000340 000066  MOV #PR7,@TPVEC+2
11715 042754 012737 043056 000100  MOV #8$,@LKVEC :SET CLOCK VECTORS
11716 042762 012737 000340 000102  MOV #PR7,@LKVEC+2
11717 042770 005027      CLR (PC)+ :CLEAR CHECK WORD
11718 042772 000000  4$: .WORD 0
11719
11720
11721 :REV E....BECAUSE OF ATIMING DELAY IN THE LINE CLOCK PORTION OF A DL11-W
11722 :IT IS OCCASIONALLY POSSIBLE FOR 'READY' TO SET WITHOUT GENERATING AN IN-
11723 :TERRUPT REQUEST ON THE FIRST LINE CLOCK TICK FOLLOWING PROGRAM SETTING
11724 :OF 'I.E.' REV E WAITS FOR A SECOND CLOCK TICK PRIOR TO EXECUTING TEST.
11725 :PRIORITY MANIPULATION WAS ALSO MODIFIED TO LOCK OUT 'LATE' INTERRUPTS.
11726
11727
11728 042774 012700 000002      MOV #2,R0 :SET SOB COUNT
11729 043000 010437 177546  5$: MOV R4,@#LKS :SET I.E. AND CLEAR READY
11730 043004 105737 177546  6$: TSTB @#LKS :SEE IF LINE CLOCK READY
11731 043010 100375      BPL 6$ :LOOP IF NOT
11732 043012 077006      SOB R0,5$ :DO IT ONE MORE TIME
11733 043014 000240      NOP :AT THIS TIME BOTH THE CLOCK
11734 :ARE READY TO INTERRUPT
11735 043016 105037 177776  CLRB @PSW :SET PRIORITY LEVEL 0
11736 :A CLOCK INTERRUPT WILL OCCUR (8$) AND LOC 4$ WILL BE INCREMENTED
11737 :AFTER THE CLOCK SERVICE A TTY INTERRUPT WILL OCCUR. THE TTY INT SERV
11738 :ICE WILL SHIFT LEFT 4$.
11739
11740 043022 012737 000340 177776  MOV #PR7,@PSW :DON'T ALLOW 'LATE' INTERRUPTS
11741 043030 022767 000002 177734  CMP #2,4$ :CHECK THAT THE CLOCK
11742 043036 001415      BEQ ARBFIN :& TTY INTERRUPTED IN
11743 043040 104000      HLT :THE PROPER SEQUENCE
11744 043042 000413      BR ARBFIN
    
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11745
11746 043044 005077 136244      7$: CLR @STPS ;CLEAR IE BIT
11747 043050 006367 177716      ASL 4$ ;SHIFT INDICATOR
11748 043054 000002              RTI ;RETURN
11749
11750 043056 005267 177710      8$: INC 4$
11751 043062 012737 054362 000100 MOV #LKSRV,@#LKVEC ;SET CLOCK VECTORS
11752 043070 000002              RTI
11753
11754
11755 043072 012737 063566 000064 ARBFIN: MOV #TPISR,@#TPVEC ;RESTORE TTY VECTOR
11756 043100 012737 000200 000066 MOV #200,@#TPVEC+2
11757 043106 105037 177776      CLRB ;RESTORE PROCESSOR PRIORITY
11758 043112 005077 136176      CLR @STPS ;CLEAR IE BIT
11762 043116
(4)
(3)
(4)
(3)
(2)
(2) 043116 000240
(2) 043120 112737 000077 001252 TST77: NOP ;LOAD TEST NUMBER
(2) 043126 013737 001252 177570 MOV @#STSTM,@#DISPLAY ;:DISPLAY TEST NUMBER
11763 043134 032737 001000 001550 BIT #LKOPT,@#OPT.CP ;BRANCH IF NOT AVAIL
11764 043142 001411 BEQ UBESET
11765 043144 012737 054362 000100 MOV #LKSRV,@#LKVEC
11766 043152 012737 000340 000102 MOV #PR7,@#LKVEC+2
11767 043160 052737 000100 177546 BIS #100,@#LKS ;SET IE BIT
11768
11769
11770
11771 043166 105737 001550
11772 043172 100015
11773 043174 032777 010000 136042
11774 043202 001011
11775 043204 032737 000040 172516
11776 043212 001045
11777 043214 004737 062340
11778 043220 012772 064545 000000
11779
11780
11781
11782 043226 032737 002000 001550
11783 043234 001434
11784 043236 032777 000010 136000
11785 043244 001030
11786 043246 122737 000060 001630
11787 043254 001024
11788 043256 105737 001601
11789 043262 001021
11790 043264 052777 000047 137076
11791 043272 012777 000007 137070
11792 043300 005077 137054
11793 043304 012777 054050 137066
11794 043312 012777 000340 137062
11795 043320 112777 000161 137030

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11798
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11800
11801
11802 043326 112737 000100 001252
11803 043334 112737 000100 177570
11804
11805
11806 043342 032777 000100 135674
11807 043350 001402
11808 043352 000167 002626
11809
11810
11811
11812
11813
11814
11815 043356 013727 177776
11816 043362 000000
11817 043364 012737 000200 177776
11818 043372 004767 017716
11819
11820
11821 043376 012700 077406
11822 043402 010037 172300
11823 043406 010037 172302
11824 043412 010037 172304
11825 043416 010037 172306
11826 043422 010037 172310
11827 043426 010037 172312
11828 043432 010037 172314
11829 043436 010037 172316
11830
11831 043442 005037 172340
11832 043446 012737 000200 172342
11833 043454 012737 000400 172344
11834 043462 012737 000600 172346
11835 043470 013737 001616 172350
11836 043476 013737 172350 172352
11837 043504 062737 000600 172352
11838 043512 012737 177600 172356
11839
11840 043520 010037 177600
11841 043524 010037 177602
11842 043530 010037 177604
11843 043534 010037 177606
11844 043540 010037 177616
11845 043544 016737 136046 177640
11846 043552 013737 177640 177642
11847 043560 062737 000200 177642
11848 043566 013737 177640 177644
11849 043574 062737 000400 177644
11850 043602 013737 177640 177646
11851 043610 062737 000600 177646

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:*****
:SBTTL STMM ROUTINE
:ROUTINE TO SET UP MEMORY MANAGEMENT TO RELOCATE PROGRAM CODE ABOVE 16K
:CHECK IF PROGRAM IS TO BE RELOCATED.
:SW6=1=NO RELOCATION
:*****
STMM:  MOVB  #100,@#STSTMM  ;LOAD TEST NUMBER
      MOVB  #100,@#DISPLAY ;IN SWICH REG TOO
      BIT   #SW6,@$SWRP   ;ANY TIME TEST 100 IS IN ERROR REPORT
      BEQ   3$           ;THEN ERROR OCCURRED DURING RELOCATION
      JMP   ENDM        ;RELOCATION DISABLED?
                          ;BRANCH IF NO
:THE PROGRAM IS GOING TO RELOCATE.
:RELOCATION WILL BE PERFORMED IN KERNEL MODE WITH PSW SET AT PRIORITY
:LEVEL 4 (TO PREVENT TTY INTERRUPT-WHICH CHANGES DATA IN PROGRAM)
:THE 'T' BIT IS CLEARED (IF SET). AFTER THE DATA HAS BEEN WRITTEN IT IS
:VERIFIED BEFORE EXECUTION.
3$:   MOV   @#PSW,(PC)+   ;SAVE CURRENT PSW
OLDPSW: .WORD 0
      MOV   #PR4,@#PSW
      JSR   PC,CLRTBIT   ;CO CLEAR 'T' BIT IF SET
:NOW SETUP MEMORY MANAGEMENT REGISTERS.
      MOV   #77406,R0    ;SET CONSTANT-R/W UP 4K WORDS
      MOV   R0,@#KIPDR0 ;SET KIPDR0 THROUGH 7 R/W UP 4K WORDS
      MOV   R0,@#KIPDR1
      MOV   R0,@#KIPDR2
      MOV   R0,@#KIPDR3
      MOV   R0,@#KIPDR4
      MOV   R0,@#KIPDR5
      MOV   R0,@#KIPDR6
      MOV   R0,@#KIPDR7
      CLR   @#KIPAR0    ;SET UP KIPDR0 THROUGH 3 FOR NO RELOCATION
      MOV   #200,@#KIPAR1
      MOV   #400,@#KIPAR2
      MOV   #600,@#KIPAR3
      MOV   @#NEXPAR,@#KIPAR4 ;PAR4 MAPS TO BEGINNING OF RELOCATION SPOT
      MOV   @#KIPAR4,@#KIPAR5
      ADD   #600,@#KIPAR5 ;PAR5 MAPS TO TOP 4K PAGE (NEXPAR START ADDRESS + 12K)
      MOV   #177600,@#KIPAR7 ;AND OF COUSE THE I/O PAGE
:NOW SETUP USER MEM MGMT REGISTERS
1$:   MOV   R0,@#UIPDR0 ;SET UP USER MEM MGMT REGS
      MOV   R0,@#UIPDR1
      MOV   R0,@#UIPDR2
      MOV   R0,@#UIPDR3
      MOV   R0,@#UIPDR7
      MOV   NEXPAR,@#UIPAR0
      MOV   @#UIPAR0,@#UIPAR1
      ADD   #200,@#UIPAR1
      MOV   @#UIPAR0,@#UIPAR2
      ADD   #400,@#UIPAR2
      MOV   @#UIPAR0,@#UIPAR3
      ADD   #600,@#UIPAR3

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11852 043616 013737 172356 177656      MOV      @#KIPAR7,@#UIPAR7
11853
11854 043624 010037 172200      MOV      R0,@#SIPDR0      ;SET UP SUPERVISOR MEM MGMT REGS
11855 043630 010037 172202      MOV      R0,@#SIPDR1
11856 043634 010037 172204      MOV      R0,@#SIPDR2
11857 043640 010037 172206      MOV      R0,@#SIPDR3
11858 043644 010037 172216      MOV      R0,@#SIPDR7
11859 043650 016737 135742 172240      MOV      NEXPAR,@#SIPAR0
11860 043656 013737 172240 172242      MOV      @#SIPAR0,@#SIPAR1
11861 043664 062737 000200 172242      ADD      #200,@#SIPAR1
11862 043672 013737 172240 172244      MOV      @#SIPAR0,@#SIPAR2
11863 043700 062737 000400 172244      ADD      #400,@#SIPAR2
11864 043706 013737 172240 172246      MOV      @#SIPAR0,@#SIPAR3
11865 043714 062737 000600 172246      ADD      #600,@#SIPAR3
11866 043722 013737 172356 172256      MOV      @#KIPAR7,@#SIPAR7
11867 043730 012737 000001 177572      MOV      #1,@#SR0      ;ENABLE MEM MGMT
11868 043736 012737 000060 172516      MOV      #60,@#SR3      ;SETUP SR3
11869 043744 110637 001601      MOV      SP,@#MON      ;SET MEM MGMT ON IND = ON
11870 043750 005037 000006      RETRY: CLR      @#ERRVEC+2
11871 043754 012737 046202 000004      MOV      #ENDMEM,@#ERRVEC ;SET TIME OUT TRAP VECTOR
11872 043762 013701 000116      MOV      @#CACHVEC+2,R1 ;SAVE CACHVEC PSW
11873 043766 005037 000116      CLR      @#CACHVEC+2
11874 043772 012737 046202 000114      MOV      #ENDMEM,@#CACHVEC ;SET UP CACHE VECTOR FOR HOLE
11875 044000 012702 100000      MOV      #100000,R2      ;SETUP GENERAL REGISTERS
11876 044004 012700 000000      MOV      #0,R0      ;DATA WILL BE RELOCATED FROM
11877                                     ;ADDRESS IN R0 TO ADDRESS IN R2 AFTER MAPPING
11878 044010 012703 127776      MOV      #127776,R3      ;SELECT PARS + 2K (14K TOTAL REQUIRED)
11879 044014 010013      MOV      R0,(R3)      ;TRAP TO ENDMEM IF INSUFFICIENT MEMORY
11880 044016 012737 064422 000004      MOV      #ERPRT,@#ERRVEC ;RESTORE ERROR TRAP VECTOR
11881 044024 010137 000116      MOV      R1,@#CACHVEC+2
11882 044030 012737 063616 000114      MOV      #,PARSRV,@#CACHVEC ;RESTORE CACHE VECTOR
11883 044036 000137 044236      JMP      @#IOMON
11884
11885      ;*****
11886      .SBTTL RELOCATION ROUTINE
11887      ;* THIS ROUTINE IS USED TO RELOCATE THE 9 SUBTESTS UP TO 28K.
11888      ;* IF RELOCATION BY AN I/O DEVICE IS SELECTED, CONTROL IS PASSED
11889      ;* TO THE I/O MONITOR.
11890      ;* ENTER WITH:
11891      ;* FRSTAD=PHYSICAL ADDRESS OF FIRST CODE
11892      ;* FACTOR=NUMBER OF BYTES ABOVE BASE CODE
11893      ;* R2 =LAST PHYSICAL ADDRESS OF THE SECTION
11894      ;* EXIT TO I/O MONITOR WITH:
11895      ;* OLDBASE=FIRST PHYSICAL ADDRESS TO BE RELOCATED
11896      ;* NMBASL =FIRST PHYSICAL ADDRESS TO RELOCATE TO
11897      ;* IOWC =TWO'S COMPLIMENT WORD COUNT
11898      ;*****
11898 044042 032777 000100 135174 RELOC: BIT      #SW6,@#SWRP      ;IS RELOCATION DISABLED?
11899 044050 001067      BNE      EXITRE      ;BRANCH IF YES
11900 044052 105737 001601      TSTB    @#MON      ;IS MEMORY MGMT ON?
11901 044056 001064      BNE      EXITRE      ;BRANCH IF YES
11902 044060 013700 001610      MOV      @#FRSTAD,R0      ;GET FIRST ADDRESS TO BE RELOCATED
11903 044064 010005      MOV      R0,R5
11904                                     ;LAST ADDRESS IS IN R2
11905 044066 010203      MOV      R2,R3      ;SAVE LAST ADDRESS
11906 044070 010204      MOV      R2,R4
11907 044072 160004      SUB      R0,R4      ;R4 NOW HAS BYTE COUNT
    
```

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11908 044074 010437 001606      MOV      R4,@#SFACOR      ;SAVE BYTE COUNT
11909 044100 005737 001604      TST      @#FACOR          ;FIRST RELOC IS TO ENDTAG+2
11910 044104 001004                BNE      1$              ;BRANCH IF NOT EXECUTING BASE CODE
11911 044106 010237 044234      MOV      R2,@#RETPC      ;SAVE RETURN PC TO NEXT SECTION
11912 044112 013702 001612      MOV      @#FRSTMEM,R2   ;GET FIRST ADDRESS TO RELOCATE TO
11913 044116 060204                ADD      R2,R4           ;R4 NOW CONTAINS LAST MEM ADDRESS
11914 044120 020437 001614      CMP      R4,@#LSTMEM     ;ENOUGH MEMORY?
11915 044124 101042                BHI      NOMEM           ;BRANCH IF NO
11916 044126 160204                SUB      R2,R4           ;R4 NOW HAS BYTE COUNT
11917 044130 005037 001604      CLR      @#FACOR        ;
11918 044134 032777 000400 135102  BIT      #SW8,@#SSWRP    ;INHIBIT RELOC BY I/O DEVICE?
11919 044142 001414                BEQ      RELNIO          ;BRANCH IF YES
11920 044144 010037 001636      MOV      R0,@#OLDBASE   ;SAVE START ADDRESS
11921 044150 010237 001640      MOV      R2,@#NWBSL     ;SAVE NEW BASE ADDRESS
11922 044154 005037 001642      CLR      @#NWBASH       ;
11923 044160 006204                ASR      R4              ;MAKE IT A WORD COUNT
11924 044162 005404                NEG      R4              ;GET TWO'S COMPLIMENT
11925 044164 010437 001644      MOV      R4,@#IOWC      ;SAVE R4 AS WORDCOUNT
11926 044170 000167 000122      JMP      ENTER2         ;GO TO I/O MONITOR
11927                                ;RELOCATE BY CPU-MEMORY MANAGEMENT OFF
11928 044174 012022      RELNIO: MOV      (R0)+,(R2)+ ;RELOCATE CODE
11929 044176 020003      CMP      R0,R3         ;DONE YET?
11930 044200 001375                BNE      RELNIO         ;BRANCH IF NO
11931 044202 004737 062660      JSR      PC,@#CHKDAT    ;GO CHECK DATA
11932 044206 102010                BVC      EXITRE        ;
11933 044210 010037 001352      MOV      R0,@#STMP0     ;SAVE R0 FOR TYPEOUT
11934 044214 010237 001572      MOV      R2,@#VADR      ;SAVE R2
11935 044220 004737 062556      JSR      PC,@#CNVADR    ;CONVERT R2 TO A PHYSICAL ADR
11936 044224 104006                ERROR    6              ;
11937 044226 000401                BR      NOMEM           ;
11938 044230 010207      EXITRE: MOV      R2,PC    ;GO EXECUTE RELOCATED CODE
11939 044232 011707      NOMEM:  MOV      (PC),PC ;GO TO NEXT SECTION
11940 044234 000000      RETPC:  .WORD    0      ;CONTAINS PC OF NEXT SECTION
11941                                ;*****
11942                                ;SBTTL I/O RELOCATION MONITOR
11943                                ;* THIS ROUTINE IS USED TO SCHEDULE I/O DEVICES FOR SUBTEST
11944                                ;* RELOCATION AND PROGRAM RELOCATION. THE I/O DEVICE UNIT
11945                                ;* NUMBER IS DETERMINED, THE BUS ADDRESS CALCULATED, THE WORD
11946                                ;* COUNT CALCULATED AND PASSED TO THE DEVICE HANDLER.
11947                                ;*****
11948 044236 012737 044244 001262  IOMON: MOV      #1$,@#SLPERR ;SETUP ERROR LOOP
11949 044244 012737 000000 001636 1$:  MOV      #0,@#OLDBASE
11950 044252 013705 001616      MOV      @#NEXPAR,R5   ;SETUP R4 AND R5
11951 044256 005004                CLR      R4              ;TO FORM 22 BIT ADDRESS
11952 044260 073427 000006                ASHC    #6,R4           ;FORM 22 BIT ADDRESS
11953 044264 010537 001640      MOV      R5,@#NWBSL    ;SAVE LOWER 16 BITS
11954 044270 010437 001642      MOV      R4,@#NWBASH   ;SAVE UPPER 6 BITS
11955 044274 032777 000400 134742  BIT      #SW8,@#SSWRP    ;RELOCATE VIA I/O?
11956 044302 001002                BNE      2$              ;BRANCH IF YES
11957 044304 000167 001444                JMP      RELOCP         ;GO RELOCATE VIA CP
11958 044310 012737 174000 001644 2$:  MOV      #174000,@#IOWC ;SET WORD COUNT TO 2K
11959 044316 005037 001356      ENTER2: CLR     @#STMP2
11960 044322 012737 177776 001654      MOV      #-2,@#RNTBINX ;SETUP RUN TABLE INDEX
11961 044330 005037 001352                CLR     @#STMP0
11962 044334 005002                CLR     R2              ;CLEAR LEGAL DEV FLAG
11963 044336 032777 000040 134700 41$: BIT      #SW5,@#SSWRP    ;INHIBIT ROUND ROBIN?

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11964	044344	001416			BEQ	50\$:BRANCH IF NO
11965	044346	005737	001352		TST	@\$TMP0		:FLAG SET?
11966	044352	001027			BNE	43\$:BRANCH IF YES
11967	044354	117737	134664	001650	MOVB	@\$SRP,@\$DEVINDX		:GET DEVICE FROM SWITCHES
11968	044362	042737	177770	001650	BIC	#177770,@\$DEVINDX		:MASK LOWER 3 BITS
11969	044370	006337	001650		ASL	@\$DEVINDX		:ADJUST FOR WORD INDEX
11970	044374	005237	001352		INC	@\$TMP0		:SET FLAG
11971	044400	000414			BR	43\$:CONTINUE
11972	044402	012705	000010	50\$:	MOV	#10,R5		:SET SOB COUNT
11973	044406	022737	000016	001650	40\$:	CMP	#16,@\$DEVINDX	:LAST DEVICE YET?
11974	044414	001003			BNE	42\$:BRANCH IF NO
11975	044416	012737	177776	001650	48\$:	MOV	#-2,@\$DEVINDX	:INIT DEVICE INDEX
11976	044424	062737	000002	001650	42\$:	ADD	#2,@\$DEVINDX	:INCREMENT INDEX
11977	044432	013703	001650		43\$:	MOV	@\$DEVINDX,R3	:GET INDEX
11978	044436	012737	000401	001354		MOV	#401,@\$TMP1	:INIT UNIT MASK
11979	044444	012704	000010		MOV	#10,R4		:SET SOB COUNT
11980	044450	133763	001354	001712	44\$:	BITB	@\$TMP1,SYSSIZE(R3)	:IS THIS UNIT EXISTENT?
11981	044456	001405			BEQ	52\$:BRANCH IF NO
11982	044460	005202			INC	R2		:SET LEGAL DEVICE FLAG
11983	044462	133763	001355	001713		BITB	@\$TMP1+1,SYSSIZE+1(R3)	:HAS IT BEEN USED?
11984	044470	001516			BEQ	11\$:BRANCH IF NO
11985	044472	006337	001354		52\$:	ASL	@\$TMP1	:SELECT NEXT UNIT
11986	044476	077414			SOB	R4,44\$:CONTINUE
11987	044500	005737	001352		TST	@\$TMP0		:INHIBIT ROUND ROBIN?
11988	044504	001013			BNE	45\$:BRANCH IF YES
11989	044506	077541			SOB	R5,40\$:CONTINUE
11990	044510	005702			TST	R2		:ANY DEVICES AT ALL?
11991	044512	001442			BEQ	46\$:BRANCH IF NO
11992	044514	012704	000010		MOV	#10,R4		:SET SOB COUNT
11993	044520	012701	001713		MOV	#SYSSIZE+1,R1		:GET ADR OF SIZE TABLE
11994	044524	105021			47\$:	CLRB	(R1)+	:CLEAR ALL USED BITS
11995	044526	005201			INC	R1		:IN ALL DEVICES
11996	044530	077403			SOB	R4,47\$:CONTINUE
11997	044532	000701			BR	41\$		
11998	044534	005702			45\$:	TST	R2	:WAS IT A LEGAL DEVICE?
11999	044536	001403			BEQ	49\$:BRANCH IF NO
12000	044540	105063	001713		CLRB	SYSSIZE+1(R3)		:CLEAR ALL USED BITS THIS DEV
12001	044544	000732			BR	43\$		
12002	044546	010367	000016		49\$:	MOV	R3,60\$:
12003	044552	062767	064572	000010		ADD	#MSGINX,60\$:GEN MESSAGE ADR
12004	044560	017767	000004	000002		MOV	@60\$,60\$	
12005	044566	104400			TYPE			
12006	044570	000000			60\$:	.WORD		
12007	044572	104400	044600			TYPE	,65\$::TYPE ASCIZ STRING
(1)	044576	000407				BR	64\$::GET OVER THE ASCIZ
(1)					::65\$:	.ASCIZ	/UNAVAILABLE/<CRLF>	
(1)	044616				64\$:			
12008	044616	000637			BR	ENTER2		
12009	044620	105737	001602		46\$:	TSTB	@#QV	:ACT11?
12010	044624	001016			BNE	51\$:BRANCH IF YES
12011	044626	005227	177777		INC	#-1		
12012	044632	001013			BNE	51\$		
12013	044634	104400	044642		TYPE	,67\$::TYPE ASCIZ STRING
(1)	044640	000410				BR	66\$::GET OVER THE ASCIZ
(1)					::67\$:	.ASCIZ	?NO I/O DEVICES?<CRLF>	
(1)	044662				66\$:			

12014	044662	105737	001601	51\$:	TSTB	@MMON	:MGMT ON?	
12015	044666	001012			BNE	61\$:BRANCH IF YES	
12016	044670	013700	001636		MOV	@MOLDBASE,R0	:RESTORE R0	
12017	044674	013702	001640		MOV	@MNBASL,R2	:RESTORE R2	
12018	044700	013703	001606		MOV	@M\$FACTOR,R3	:GET RELOCATION FACTOR	
12019	044704	060003			ADD	R0,R3	:FORM LAST ADDRESS	
12020	044706	010005			MOV	R0,R5	:SETUP R5	
12021	044710	000167	177260		JMP	RELNIO	:GO RELOCATE WITH CP	
12022	044714	012702	100000	61\$:	MOV	#100000,R2	:SETUP REGISTERS	
12023	044720	005000			CLR	R0	:WITH FROM AND TO ADDRESS	
12024	044722	000137	045754		JMP	@PRELOCP	:RELOCATE VIA CP	
12025	044726	105763	002006	11\$:	TSTB	RP3HSTAT(R3)	:IS HANDLER BUSY?	
12026	044732	100405			BMI	8\$:BRANCH IF NO	
12027	044734	005737	001352		TST	@M\$TMP0	:ROUND ROBIN?	
12028	044740	001372			BNE	11\$:BRANCH IF NO	
12029	044742	000167	177370		JMP	41\$		
12030	044746	005763	002006	8\$:	TST	RP3HSTAT(R3)	:DID HANDLER FAIL?	
12031	044752	100005			BPL	62\$:BRANCH IF NO	
12032	044754	005737	001352		TST	@M\$TMP0	:ROUND ROBIN	
12033	044760	001402			BEQ	62\$:BRANCH IF YES	
12034	044762	000137	045734		JMP	@#15\$		
12035	044766	153763	001355	001713	62\$:	BISB	@M\$TMP1+1,SYSSIZE+1(R3)	:SET UNIT USED BIT
12036	044774	005002			CLR	R2		
12037	044776	006037	001354	30\$:	ROR	@M\$TMP1	:ENCODE THE BIT POSITION	
12038	045002	005202			INC	R2	:INTO A UNIT NUMBER	
12039	045004	103374			BCC	30\$		
12040	045006	005302			DEC	R2		
12041	045010	010237	001652		MOV	R2,@MUNITNO	:SAVE UNIT NUMBER	
12042	045014	013763	001644	002026	10\$:	MOV	@MLOWC,RP3HWC(R3)	:GIVE WORD COUNT TO HANDLER
12043	045022	010304			MOV	R3,R4	:	
12044	045024	072427	000003		ASH	#3,R4	:ENCODE DEVICE FOR RUNTABLE	
12045	045030	053704	001652		BIS	@MUNITNO,R4	:ENCODE UNIT NUMBER	
12046	045034	006304			ASL	R4		
12047	045036	062737	000002	001654	ADD	#2,@M\$RNTBINX	:INCREMENT RUN TABLE INDEX	
12048	045044	013702	001654		MOV	@M\$RNTBINX,R2	:GET RUN TABLE INDEX	
12049	045050	110462	001733		MOVB	R4,RUNTABL+1(R2)	:ENTER DEV & UNIT IN TABLE	
12050	045054	013763	001652	002122	MOV	@MUNITNO,RP3UNIT(R3)	:GIVE HANDLER UNIT NUMBER	
12051	045062	012737	000240	000012	MOV	#PR5,@M\$RESVEC+2	:SETUP RESERVED VECTOR PSW	
12052	045070	016337	002136	000010	MOV	RP3HANA(R3),@M\$RESVEC	:SETUP RESERVED VECTOR	
12053	045076	006303			ASL	R3	:ADJUST INDEX	
12054	045100	013763	001636	002042	MOV	@MOLDBASE,RP3OLD(R3)	:GIVE HANDLER OLD BASE ADDRESS	
12055	045106	013763	001640	002072	MOV	@MNBASL,RP3NWL(R3)	:GIVE HANDLER	
12056	045114	013763	001642	002074	MOV	@MNBASH,RP3NWH(R3)	:NEW BASE ADDRESS	
12057	045122	005063	002044		CLR	RP3OLD+2(R3)	:ENSURE OLD BASE HIGH IS CLR	
12058	045126	000010			CALL	HANDLER		
12059	045130	105737	001601		TSTB	@MMON	:IS MEMORY MANAGEMENT ON?	
12060	045134	001416			BEQ	13\$:BRANCH IF NO	
12061	045136	022737	000014	001654	CMP	#14,@M\$RNTBINX	:TRANSFERED 14K YET?	
12062	045144	001412			BEQ	13\$:BRANCH IF YES	
12063	045146	062737	010000	001636	ADD	#10000,@MOLDBASE	:ADD 2K	
12064	045154	062737	010000	001640	ADD	#10000,@MNBASL	:TO BASE	
12065	045162	005537	001642		ADC	@MNBASH	:ADDRESSES	
12066	045166	000137	044336		JMP	@#41\$		
12067	045172	113705	001701	13\$:	MOVB	@M\$LTICKS+1,R5	:GET SECOND COUNT	
12068	045176	062705	000002		ADD	#2,R5	:INCREMENT BY TWO	
12069	045202	162705	000074		SUB	#60.,R5	:ENSURE RESULT IS 59 OR LESS	

Address	OpCode	Operand 1	Operand 2	Operand 3	Comment
12070	045206	100002			
12071	045210	062705	000074		
12072	045214	012700	000010		
12073	045220	005002			
12074	045222	005003			
12075	045224	005004			
12076	045226	066203	002006		
12077	045232	005504			
12078	045234	062702	000002		
12079	045240	077006			
12080	045242	006103			
12081	045244	005504			
12082	045246	022703	004000		
12083	045252	001406			
12084	045254	123705	001701		
12085	045260	001355			
12086	045262	104015			
12087	045264	000177	133772		
12088	045270	005704			
12089	045272	001402			
12090	045274	000167	000434		
12091	045300	105737	001601		
12092	045304	001012			
12093	045306	013705	001636		
12094	045312	010500			
12095	045314	063700	001606		
12096					
12097	045320	013702	001640		
12098	045324	063702	001606		
12099					
12100	045330	000411			
12101	045332	012700	070000		
12102	045336	012702	110000		
12103	045342	013737	172352	172350	
12104	045350	012705	002414		
12105	045354	004737	062660		
12106	045360	102413			
12107	045362	105737	001254		
12108	045366	001002			
12109	045370	000167	000466		
12110	045374	032777	001000	133642	
12111	045402	001473			
12112	045404	000167	000250		
12113	045410	005001			
12114	045412	010037	001352		
12115	045416	010237	001572		
12116	045422	010003			
12117	045424	005004			
12118	045426	105737	001601		
12119	045432	001406			
12120	045434	162703	010000		
12121	045440	100403			
12122	045442	062704	000002		
12123	045446	000772			
12124					
12125	045450	116404	001733		

;R4 NOW CONTAINS INDEX OF ERROR FOR RUN TIME TABLE
 16\$: MOV B RUNTBL+1(R4),R4

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:COUNT WAS LESS THAN 58-RESTORE
:SET SOB COUNT

:ADD ALL THE HANDLER
:STATUS WORDS. WHEN ALL
:TRANSFERS ARE FINISHED
:RESULT WILL BE 2000
:(WITHOUT ROTATE)

:ALL DONE?
:BRANCH IF YES
:TWO SECONDS ELAPSED YET?
:BRANCH IF NO
:DEVICE HUNG
:RESTART RELOCATION
:ANY DEVICE ERRORS?
:BRANCH IF NO
:ERROR
:MEM MGMT ON?
:BRANCH IF YES
:SETUP R5 FOR DATA CHECK

:GET LAST ADDRESS
:OF GOOD DATA

:GET LAST ADDRESS
:OF DATA TO BE CHECKED
:CONTINUE
:GET LAST ADR + 2 OF GOOD DATA
:GET LAST ADR + 2 OF DATA TO BE CHECKED
:SET UP PAR4 FOR TOP 4K BANK
:DON'T CHECK BELOW $ERRTB
:GO CHECK DATA
:BRANCH IF ERROR
:ANY ERRORS?
:BRANCH IF YES
:RETURN
:LOOP ON ERROR?
:BRANCH IF NO
:GO DO FUNCTION AGAIN

:SAVE ERROR ADDRESS

:IS MEM MGMT ON?
:BRANCH IF NO
:SUBTRACT 2K FROM ERROR ADDRESS
:BRANCH IF BLOCK IS FOUND
:COUNT ONE MORE BLOCK
:CONTINUE

:GET DEVICE THAT FAILED
    
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12126	045454	042704	177400			BIC	#177400,R4		:ENSURE HIGH BYTE CLEAR
12127	045460	006204				ASR	R4		:THROW AWAY LSB
12128	045462	005005				CLR	R5		:ENSURE R5 CLEAR
12129	045464	073427	177775			ASHC	#-3,R4		:GET UNIT NUMBER IN R5
12130	045470	010500				MOV	R5,R0		
12131	045472	072027	177763			ASH	#-15,R0		
12132	045476	042700	177770			BIC	#177770,R0		
12133	045502	010037	001360			MOV	R0,@RSTMP3		
12134	045506	010403				MOV	R4,R3		:AND DEVICE INDEX IN R4 & R3
12135	045510	010337	001356			MOV	R3,@RSTMP2		
12136	045514	012737	000001	001354		MOV	#1,@RSTMP1		:ENCODE 3 BIT UNIT NO INTO
12137	045522	162705	020000	19\$:		SUB	#20000,R5		:ONE BIT IN THE LOW BYTE OF STMP1
12138	045526	103403				BCS	18\$:BRANCH IF DONE
12139	045530	006137	001354			ROL	@RSTMP1		:SELECT NEXT UNIT
12140	045534	000772				BR	19\$:CONTINUE
12141	045536	012737	045660	001262	18\$:	MOV	#20\$,@RSLPERR		:SETUP LOOP RETURN
12142	045544	005701				TST	R1		:DEVICE ERROR?
12143	045546	001010				BNE	100\$:BRANCH IF YES
12144	045550	104010				ERROR	10		:DATA CHECK ERROR
12145	045552	105737	001601			TSTB	@MMON		:MGMT ON?
12146	045556	001002				BNE	70\$:BRANCH IF YES
12147	045560	000137	044316	71\$:		JMP	@ENTER2		
12148	045564	000137	044236	70\$:		JMP	@IOMON		
12149	045570	104007		100\$:		ERROR	7		
12150	045572	042763	100000	002006		BIC	#BIT15,RP3HSTAT(R3)		:CLEAR THE ERROR
12151	045600	105037	001254			CLRB	@RERFLG		
12152	045604	022703	000002			CMP	#2,R3		:RK05 ERROR?
12153	045610	002405				BLT	90\$:BRANCH IF RH70
12154	045612	003016				BGT	92\$:BRANCH IF RP03
12155	045614	112777	000001	134414		MOVB	#1,@RKCS		:RK CONTROLLER CLEAR
12156	045622	000412				BR	92\$		
12157	045624	022703	000012	90\$:		CMP	#12,R3		:RS04?
12158	045630	001004				BNE	91\$:BRANCH IF NO
12159	045632	052777	000040	134464		BIS	#BIT5,@RSCS2		:CLEAR RS CONTROLLER
12160	045640	000403				BR	92\$		
12161	045642	052777	000040	134414	91\$:	BIS	#BIT5,@RP4CS2		:CLEAR RP04 CONTROLLER
12162	045650	105737	001601	92\$:		TSTB	@MMON		:MGMT ON?
12163	045654	001343				BNE	70\$:BRANCH IF YES
12164	045656	000740				BR	71\$		
12165	045660	052763	000400	002006	20\$:	BIS	#BIT8,RP3HSTAT(R3)		:SET REPEAT FLAG IN HANDLER
12166	045666	016337	002136	000010		MOV	RP3HANA(R3),@PRESVEC		:SETUP RESEVED INSTRUCTION VECTOR
12167	045674	000010				CALLHANDLER			
12168	045676	105763	002006	21\$:		TSTB	RP3HSTAT(R3)		:HANDLER FINISHED?
12169	045702	100375				BPL	21\$:BRANCH IF NO
12170	045704	005763	002006			TST	RP3HSTAT(R3)		:ANY ERROR?
12171	045710	100712				BMI	18\$:BRANCH IF YES
12172	045712	005701				TST	R1		:DEVICE ERROR?
12173	045714	001002				BNE	80\$:BRANCH IF YES
12174	045716	000167	177352			JMP	32\$+4		:GO CHECK DATA
12175	045722	032777	001000	133314	80\$:	BIT	#BIT9,@SSWRP		:STILL LOOPING?
12176	045730	001353				BNE	20\$:BRANCH IF YES
12177	045732	000717				BR	100\$+2		:CONTINUE TEST
12178									:THE FOLLOWING CODE HANDLES DEVICE ERROR ON RELOCATION
12179	045734	005004		15\$:		CLR	R4		:SET INDEX
12180	045736	010601				MOV	SP,R1		
12181	045740	005764	001750	24\$:		TST	RUNTRAK(R4)		:SEARCH FOR DEVICE ERROR

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12182 045744 100641          BMI      16$          ;BRANCH IF ERROR
12183 045746 062704 000002    ADD      #2,R4       ;INCREMENT INDEX
12184 045752 000772          BR       24$          ;CONTINUE SEARCH
12185          ;RELOCATE R U-MEMORY MANAGEMENT ON
12186 045754 012703 010000    RELOCP: MOVL #4096.,R3 ;4K COUNTER
12187 045760 012022          1$:      MOVL (R0)+,(R2)+ ;RELOCATE CODE
12188 045762 077302          SOB      R3,1$       ;BR IF NOT DONE 4K WORDS
12189 045764 023737 172350 172352    CMP     @#KIPAR4,@#KIPAR5 ;DONE 16K YET?
12190 045772 001414          BEQ     2$          ;BR IF DONE
12191 045774 062737 000200 172350    ADD     #200,@#KIPAR4 ;MAP TO NEXT 4K SPACE
12192 046002 012702 100000          MOV     #100000,R2   ;MAP WITH R2 (PAR4)
12193 046006 023737 172350 172352    CMP     @#KIPAR4,@#KIPAR5 ;DOING LAST 4K BANK?
12194 046014 001357          BNE     RELOCP      ;BR IF NOT
12195 046016 012703 004000          MOV     #2048.,R3   ;2K COUNTER
12196 046022 000756          BR      1$          ;RELOCATE LAST 2K ONLY (14K TOTAL)
12197 046024 012705 002006 2$:      MOV     #RP3HSTAT,R5 ;DON'T CHECK BELOW RP3HSTAT
12198 046030 004737 062660          JSR     PC,@#CHKDAT ;CHECK DATA
12199 046034 102012          BVC     EXIT
12200 046036 010037 001352          MOV     R0,@#STMP0
12201 046042 010237 001572          MOV     R2,@#VADR
12202 046046 104006          ERROR   6
12203 046050 013737 001616 172350    MOV     @#NEXPAR,@#KIPAR4 ;RESTORE PAR4
12204 046056 000167 175666          JMP     RETRY
12205 046062 105737 001601          EXIT:   TSTB @#MMON ;MEM MGMT ON?
12206 046066 001002          BNE     .+6         ;BRANCH IF YES
12207 046070 000137 044230          JMP     @#EXITRE
12208 046074 062737 000077 001616    ADD     #77,@#NEXPAR ;SET VALUE FOR NEXT RELOCATION
12209 046102 013737 172350 172340    MOV     @#KIPAR4,@#KIPAR0
12210 046110 063737 172350 172342    ADD     @#KIPAR4,@#KIPAR1
12211 046116 063737 172350 172344    ADD     @#KIPAR4,@#KIPAR2
12212 046124 063737 172350 172346    ADD     @#KIPAR4,@#KIPAR3
12213          ;*****
12214          ;PROGRAM IS NOW EXECUTING IN KERNEL MODE RELOCATED TO ADDRESS AS SPEC-
12215          ;IFIED IN KIPAR0. FOR EX. IF KIPAR0=1600 THEN PROGRAM EXECUTING AT
12216          ;ADDRESS 160000+(PC)
12217 046132 013700 172340          MOV     @#KIPAR0,R0 ;GET PAR0
12218 046136 072027 177771          ASH     #-7,R0      ;GET BITS <14:7> IN LOW BYTE
12219 046142 110037 001253          MOVSB  R0,@#STSTNM+1 ;PUT IN DSPLAY REG HIGH BYTE
12220 046146 012706 001200          MOV     #KERSTK,SP ;SET KERNEL STACK PTR
12221          ;
12222 046152 005037 177776          CLR     @#PSW
12223 046156 016746 175200          MOV     OLDPSW,-(SP) ;RESTORE OLD PSW
12224 046162 012746 010000          MOV     #LOOP,-(SP)
12225 046166 105737 001600          TSTB   @#NEXEC ;BRANCH IF TEST CODE TO
12226 046172 001402          BEQ     1$          ;BE EXECUTED
12227 046174 012716 043326          MOV     #STMM,(SP)
12228 046200 000002 1$:      RTI          ;RESTART PROGRAM AT LOOP
12229          ;
12230          ;WHEN RELOCATION ABOVE 28K IS COMPLETE PROGRAM TRAPS TO ENDMEM.
12231 046202 022626          ENDMEM: CMP (SP)+,(SP)+ ;POP STACK TWICE
12232 046204 005037 177572          ENDM:   CLR @#SRO ;DISABLE MEM MGMT
12233 046210 042737 000020 172516    BIC     #BIT4,@#MMR3 ;CLEAR 22 BIT MODE
12234          ;
12235          ;*****
12236          ;AT THIS TIME A 'SUB-PASS' HAS BEEN COMPLETED.
12237          ;PROGRAM NOW EXECUTING IN KERNEL MODE AT PC AS SHOWN (NO RELOCATION)
    
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12238 046216 012737 000700 001616      MOV      #700,@NEXPAR      ;RESET NEXT VALUE FOR PAR REGISTERS
12239 046224 005737 003644                TST      @PROT
12240 046230 001403                BEQ      2$
12241 046232 012737 001600 001616      MOV      #1600,@NEXPAR
12242 046240 105037 001601      2$:    CLR      @MPMON          ;SET MEM MGMT ON IND - OFF
12243
12244      .SBTTL  END OF SUB-PASS ROUTINE
12245      ;*
12246      ;* THIS ROUTINE SETS UP THE PSW AND MAINTENANCE REGISTERS
12247      ;* FOR THE NEXT SUB-PASS. IT THEN STARTS THE PRINTER
12248      ;* (IF NOT ON ACT11) FOR TYPING THE END OF SUB-PASS MESSAGE.
12249      ;*
12249      END:
12250 046244 012737 064422 000004      END1:  MOV      #ERPR, @ERRVEC
12251 046252 012737 063616 000114      MOV      #.PARSRV, @CACHVEC          ;RESTORE CACHE PARITY VECTOR
12252 046260 010137 000116      MOV      R1, @CACHVEC+2          ;AND PSW
12253 046264 005037 177776      CLR      @PSW                    ;CLEAR MODE BITS IN PSW
12254 046270 004767 015020      JSR      PC, CLRTBIT              ;GO CLEAR 'T' BIT IF SET
12255 046274 012706 001200      MOV      #KERSTK, SP              ;SET KERNEL STACK PTR
12256 046300 032777 000100 133006      BIT      #100, @STPS              ;CHECK IF OUTPUT DEVICE IS BUSY
12257 046306 001374      BNE      -6                        ;IS AVAILABLE
12258 046310 105237 001630      1$:    INCB      @SUBPASS
12259 046314 113702 001630      MOV      @SUBPASS, R2
12260 046320 162702 000060      SUB      #60, R2
12261 046324 022702 000006      CMP      #6, R2                    ;END OF TEST?
12262 046330 001013      BNE      2$                        ;BRANCH IF NOT AT END
12263 046332 012737 000060 001630      MOV      #60, @SUBPASS              ;INIT SUBPASS COUNT TO ASCII 0
12264 046340 005037 177750      CLR      @MAINT                    ;CLEAR MAINTENANCE REG
12265 046344 005037 001710      CLR      @$MAINT                    ;CLEAR SOFTWARE VALUE
12266 046350 005046      CLR      -(SP)
12267 046352 012746 046460      MOV      #SEOP, -(SP)
12268 046356 000002      RTI
12269 046360 006302      2$:    ASL      R2
12270 046362 012737 001570 000014      MOV      #SRTRN, @TBITVEC          ;SET 'T' TRAP VECTOR
12271 046370 012737 001627 001340      MOV      #SUBPASS-1, @$REG5
12272 046376 106277 132712      ASRB      @STPS
12273 046402 016246 064516      MOV      PSWTAB(2), -(SP)          ;PUSH NEXT PASS PSW ON STACK
12274 046406 012746 010000      MOV      #LOOP, -(SP)              ;RESART PROGRAM AT LOOP
12275 046412 016237 064532 001710      MOV      MRGTAB(R2), @$MAINT
12276 046420 016237 064532 177750      MOV      MRGTAB(R2), @MAINT
12277 046426 105737 001602      3$:    TST      @QV                    ;QV PASS?
12278 046432 001011      BNE      RTI1                      ;BRANCH IF YES
12279 046434 122777 000200 132652      CMPB     #200, @STPS              ;IS PRINTER READY?
12280 046442 001371      BNE      3$                        ;BRANCH IF NO
12281 046444 012737 065445 001340      MOV      #MSG20-1, @$REG5
12282 046452 106277 132636      ASRB      @STPS                    ;TYPE END SUBPASS MESSAGE
12283 046456 000002      RTI1:  RTI                          ;RESTART PROGRAM AT LOOP WITH NEW PSW
12284
12285
12286      ;*
12286      ;* INCREMENT THE PASS NUMBER ($PASS)
12286      ;* TYPE 'END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYYY'
12286      ;* WHERE XXXXX AND YYYYYY ARE DECIMAL NUMBERS
12286      ;* IF THERES A MONITOR GO TO IT

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(1) ;*IF THERE ISN'T JUMP TO LOOP
(1)
(1) 046460 $EOP:
(2) 046460 004737 056632 JSR PC,@TYPTIME
(1) 046464 005067 132562 CLR $STNM ;;ZERO THE TEST NUMBER
(1) 046470 005067 132702 CLR $TIMES ;;ZERO THE NUMBER OF ITERATIONS
(1) 046474 005267 132550 INC $PASS ;;INCREMENT THE PASS NUMBER
(1) 046500 042767 100000 132542 BIC #100000,$PASS ;;DON'T ALLOW A NEG. NUMBER
(1) 046506 005327 DEC (PC)+ ;;LOOP?
(1) 046510 000001 $EOPCT: .WORD 1
(1) 046512 003063 BGT $DOAGN ;;YES
(1) 046514 012737 MOV (PC)+,@(PC)+ ;;RESTORE COUNTER
(1) 046516 000001 $ENDCT: .WORD 1
(1) 046520 046510 $EOPCT
(2) 046522 104400 046530 TYPE .65$ ;;TYPE ASCIZ STRING
(2) 046526 000407 BR 64$ ;;GET OVER THE ASCIZ
(2) ;;65$: .ASCIZ <12><15>/END PASS #/
(2) 046546 64$:
(2) 046546 016746 132476 MOV $PASS,-(SP) ;;SAVE $PASS FOR TYPEOUT
(2) ;;TYPE PASS NUMBER
(2) 046552 104410 TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
(2) 046554 104400 046562 TYPE .67$ ;;TYPE ASCIZ STRING
(2) 046560 000421 BR 66$ ;;GET OVER THE ASCIZ
(2) ;;67$: .ASCIZ / TOTAL ERRORS SINCE LAST REPORT /
(2) 046624 66$:
(2) 046624 016746 132434 MOV $ERTTL,-(SP) ;;SAVE $ERTTL FOR TYPEOUT
(2) ;;TOTAL NUMBER OF ERRORS
(2) 046630 104410 TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
(1) 046632 104400 001407 TYPE .$CRLF ;;TYPE CARRIAGE RETURN, LINE FEED
(1) 046636 005067 132422 CLR $ERTTL ;;CLEAR ERROR TOTAL
(1) 046642 013700 000042 $GET42: MOV @#42,R0 ;;GET MONITOR ADDRESS
(1) 046646 001405 BEQ $DOAGN ;;BRANCH IF NO MONITOR
(1) 046650 000005 RESET ;;CLEAR THE WORLD
(1) 046652 004710 $ENDAD: JSR PC,(R0) ;;GO TO MONITOR
(1) 046654 000240 NOP ;;SAVE ROOM
(1) 046656 000240 NOP ;;FOR
(1) 046660 000240 NOP ;;ACT11
(1) 046662 $DOAGN:
(1) 046662 000137 010000 JMP @#LOOP ;;RETURN
(1) 046666 377 377 000 $ENULL: .BYTE -1,-1,0 ;;NULL CHARACTER STRING
(1) 046672 .EVEN
12287 ;;*****
12288 .SBTTL RP11/RP03 HANDLER
12289 ;;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF HANDLER
12290 ;;*****
12291 046672 104420 RP3DRV: SAVREG
12292 046674 105037 002006 CLRB @#RP3HSTA ;;CLEAR DONE FLAG
12293 046700 032737 000400 002006 BIT #BIT8,@#RP3HSTA ;;REPEAT FLAG SET?
12294 046706 001403 BEQ 8$ ;;BRANCH IF NO
12295 046710 104422 RESREG
12296 046712 000137 050544 JMP @#RP3RPT
12297 046716 013737 001654 001664 8$: MOV @#RNTBINX,@#RP311 ;;SAVE RUN TABLE INDEX
12298 046724 032777 000020 132312 BIT #SW4,@$SWRP ;;INHIBIT RND DSK ADR?
12299 046732 001403 BEQ 1$ ;;BRANCH IF NO
12300 046734 005000 CLR R0
12301 046736 005001 CLR R1
    
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12302	046740	000410			BR	4\$		
12303	046742	004737	060562		1\$: JSR	PC,@R3RND	:GO GET RANDOM NUMBER	
12304	046746	013700	001622		MOV	@R3HINUM,R0	:GET HI NUMBER	
12305	046752	013701	001620		MOV	@R3LONUM,R1	:GET LO NUMBER	
12306	046756	073027	177771		ASHC	#-7,R0	:ADJUST TO FORM CYL ADR	
12307	046762	042700	177000		4\$: BIC	#177000,R0	:GET RID OF UNUSED BITS	
12308	046766	022700	000624		CMP	#624,R0	:LEGAL CYL?	
12309	046772	100003			BPL	5\$:BRANCH IF YES	
12310	046774	062700	000624		ADD	#624,R0	:MAKE IT LEGAL	
12311	047000	000770			BR	4\$		
12312	047002	013702	001664		5\$: MOV	@R3R311,R2	:GET RUN TABLE INDEX	
12313	047006	016203	001732		MOV	RUNTABL(R2),R3	:GET DEVICE ID	
12314	047012	042703	000777		BIC	#777,R3	:ID ONLY	
12315	047016	050300			BIS	R3,R0	:COMBINE WITH CYL ADR	
12316	047020	010062	001732		MOV	R0,RUNTABL(R2)	:PUT BACK IN TABLE	
12317	047024	072127	177775		ASH	#-3,R1	:GEN TRK-SECT ADR	
12318	047030	010103			MOV	R1,R3	:SAVE	
12319	047032	042701	160377		6\$: BIC	#160377,R1	:GET RID OF ALL BUT TRK	
12320	047036	022701	011400		CMP	#11400,R1	:LEGAL TRAK?	
12321	047042	100003			BPL	2\$:BRANCH IF YES	
12322	047044	062701	011400		ADD	#11400,R1	:MAKE IT LEGAL	
12323	047050	000770			BR	6\$		
12324	047052	042703	177760		2\$: BIC	#177760,R3	:GET SECTOR ADR	
12325	047056	022703	000011		CMP	#11,R3	:IS IT LEGAL?	
12326	047062	100003			BPL	3\$:BRANCH IF YES	
12327	047064	062703	000011		ADD	#11,R3	:MAKE IT LEGAL	
12328	047070	000770			BR	2\$		
12329	047072	050301			3\$: BIS	R3,R1	:COMBINE TRK-SECT	
12330	047074	010162	001750		MOV	R1,RUNTRAK(R2)	:PUT IN TABLE	
12331	047100	010037	002154		MOV	R0,@R3HDC	:SAVE DESIRED CYL	
12332	047104	010137	002222		MOV	R1,@R3DA	:SAVE DSK ADR	
12333	047110	112737	177775	002202	MOV#B	#-3,@R3TRY	:INIT TRY COUNT	
12334	047116	032737	000040	172516	BIT	#BIT5,@R3R3	:MAP ON?	
12335	047124	001405			BEQ	7\$:BRANCH IF NO	
12336	047126	005046			CLR	-(SP)	:PUT DEVICE ID ON STACK	
12337	047130	013746	002042		MOV	@R3R3OLD,-(SP)	:PUT ADR OF BUS ADR ON STK	
12338	047134	004737	063022		JSR	PC,@R3GETMAP	:GET MAP REGISTER	
12339	047140	012737	000103	001662	7\$: MOV	#103,@R3R310	:GET FUNCTION	
12340	047146	013700	002044		MOV	@R3R3OLD+2,R0	:GET BAE BITS	
12341	047152	072027	000004		ASH	#4,R0	:SHIFT TO BITS 4 & 5	
12342	047156	050037	001662		BIS	R0,@R3R310	:COMBINE WITH FUNCTION	
12343	047162	010037	002044		MOV	R0,@R3R3OLD+2		
12344	047166	013700	002122		MOV	@R3R3UNIT,R0		
12345	047172	072027	000010		ASH	#10,R0	:SHIFT UNIT NO TO RIGHT BITS	
12346	047176	050037	001662		BIS	R0,@R3R310	:COMBINE WITH FUNC & BAE	
12347	047202	010037	002122		MOV	R0,@R3R3UNIT		
12348	047206	104422			RESREG			
12349	047210	005777	132774		RP3WTRY: TST	@R3R3DS	:IS DRIVE READY?	
12350	047214	100375			BPL	RP3WTRY	:BRANCH IF NO	
12351	047216	053777	002122	132770	BIS	@R3R3UNIT,@R3R3CS	:SET UNIT BITS	
12352	047224	004737	047256		JSR	PC,@R3LDRP3	:LOAD RP3 REGISTERS	
12353	047230	012777	050574	132770	MOV	@R3R3SRV,@R3R3VEC	:SET VECTOR	
12354	047236	005077	132766		CLR	@R3R3PSW		
12355	047242	005037	002170		CLR	@R3R3FUN	:SET FUNCTION TO WRITE	
12356	047246	013777	001662	132740	MOV	@R3R310,@R3R3CS	:LOAD FUNCT AND GO	
12357	047254	000002			RTI		:RETURN	

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12358 047256 013777 002152 132736 LDRP3: MOV @WRP3HDA,@RP3DA ;LOAD DSK ADR
12359 047264 013777 002154 132732 MOV @WRP3HDC,@RP3DC ;LOAD CYL ADR
12360 047272 013777 002026 132716 MOV @WRP3HWC,@RP3WC ;LOAD WORD COUNT
12361 047300 013777 002042 132712 MOV @WRP3OLD,@RP3BA ;LOAD BUS ADR
12362 047306 000207 RTS PC ;RETURN
12363
12364
12365
12366
12367
12368 047310 104420
12369 047312 105037 002010
12370 047316 032737 000400 002010
12371 047324 001403
12372 047326 104422
12373 047330 000137 051362
12374 047334 013737 001654 001670 5$: MOV @WRNTBINX,@RK11 ;SAVE RUN TABLE INDEX
12375 047342 105037 002010 CLR B @WRKHSTAT ;CLEAR DONE FLAG IN HANDLER STAT
12376 047346 032777 000020 131670 BIT #SW4,@SSWRP ;RANDOM DSK ADDRESS?
12377 047354 001403 BEQ 6$ ;BRANCH IF YES
12378 047356 005000 CLR R0 ;CLEAR REGISTERS
12379 047360 005001 CLR R1
12380
12381 047362 000404 BR 7$ ;FOR ADDRESS CHECKING
12382 047364 004737 060562 6$: JSR PC,@$SRAND ;GET RANDOM NUMBER
12383 047370 013700 001622 MOV @W$HNUM,R0 ;GET HIGH NUMBER
12384 047374 072027 177775 7$: ASH #-3,R0 ;ADJUST TO FORM
12385 ;CYLINDER ADDRESS
12386 047400 010001 MOV R0,R1 ;SAVE IN R1
12387 047402 042701 160037 4$: BIC #160037,R1 ;GET RID OF SURF-SECT BITS
12388 047406 022701 014300 CMP #14300,R1 ;IS IT A LEGAL CYLINDER?
12389 047412 100003 BPL 3$ ;BRANCH IF YES
12390 047414 062701 014340 ADD #14340,R1 ;ADD MAXIMUM CYLINDER
12391 047420 000770 BR 4$ ;TRY AGAIN
12392 047422 072127 177773 3$: ASH #-5,R1 ;ADJUST CYLINDER ADDRESS
12393 047426 013702 001670 MOV @WRK11,R2 ;GET RUN TABLE INDEX
12394 047432 016203 001732 MOV RUNTBL(R2),R3 ;GET RUN TABLE ENTRY
12395 047436 042703 000777 BIC #777,R3 ;SAVE ID AND UNIT NO.
12396 047442 050103 BIS R1,R3 ;INSERT CYLINDER ADDR
12397 047444 010362 001732 MOV R3,RUNTBL(R2) ;ENTER CYLINDER ADR IN RUN TABLE
12398 047450 072027 177770 ASH #-10,R0 ;GENER SECTOR-SURF ADDRESS
12399 047454 042700 177740 BIC #177740,R0 ;GET RID OF EXTRA BITS
12400 047460 010003 MOV R0,R3 ;SAVE
12401 047462 042700 000020 BIC #BIT4,R0 ;GET RID OF SURFACE BIT
12402 047466 022700 000012 CMP #12,R0 ;IS SECTOR ADDRESS LEGAL?
12403 047472 100004 BPL 1$ ;BRANCH IF YES
12404 047474 062700 000012 ADD #12,R0 ;MAKE IT LEGAL
12405 047500 042700 000020 BIC #BIT4,R0 ;GET RID OF CARRY FROM ADD
12406 047504 042703 000017 1$: BIC #17,R3 ;GET SURFACE ADDRESS
12407 047510 050300 BIS R3,R0 ;GENER COMP SECT-SURF ADDRESS
12408 047512 010062 001750 MOV R0,RUNTRAK(R2) ;SAVE IN RUN TRAK TABLE
12409 047516 072127 000005 ASH #5,R1 ;ADJUST CYLINDER ADDRESS
12410 047522 050100 BIS R1,R0 ;CONCATINATE TRK & SECT ADDR
12411 047524 013701 002124 MOV @WRKUNIT,R1 ;GET UNIT NUMBER
12412 047530 072127 000015 ASH #15,R1 ;ADJUST
12413 047534 050100 BIS R1,R0 ;CONCATINATE UNIT,TRK,SURF,SECT
    
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12414 047536 010037 002156          MOV      R0,@#RKHDA      ;SAVE
12415 047542 112737 177775 002203  MOVB     #-3,@#RKTRY    ;SET RETRY COUNT
12416 047550 032737 000040 172516  BIT      #BIT5,@#MRR3   ;MAP ON?
12417 047556 001406          BEQ      2$             ;BRANCH IF NO
12418 047560 012746 000001          MOV      #1,-(SP)       ;PUT DEVICE ID ON STACK
12419 047564 012746 002046          MOV      #RKOLD,-(SP)  ;PUT ADDRESS OF ADR ON STACK
12420 047570 004737 063022          JSR      PC,@#GETMAP   ;GET MAP REG
12421 047574 012767 000103 132064 2$:  MOV      #103,RK10      ;SET FUNCTION
12422 047602 013700 002050          MOV      @#RKOLD+2,R0  ;GET BA EXTENDED
12423 047606 072027 000004          ASH      #4,R0         ;ADJUST
12424 047612 050037 001666          BIS      R0,@#RK10     ;PUT IN WITH FUNCTION
12425 047616 010037 002050          MOV      R0,@#RKOLD+2 ;SAVE IN MEMORY
12426 047622 104422          RESREG
12427 047624 013777 002156 132412  RKWTRY: MOV     @#RKHDA,@#RKDA ;LOAD DISK ADDRESS
12428 047632 032777 000100 132372  BIT      #BIT6,@#RKDS  ;UNIT READY?
12429 047640 001774          BEQ      -6            ;BRANCH IF NO
12430 047642 013777 002030 132370  MOV      @#RKHWC,@#RKWC ;LOAD WORD COUNT
12431 047650 013777 002046 132364  MOV      @#RKOLD,@#RKBA ;LOAD BUS ADDRESS
12432 047656 012777 051412 132362  MOV      ##RKSrv,@#RKVEC ;LOAD INTERRUPT VECTOR
12433 047664 005077 132360          CLR      @#RKPSW
12434 047670 005037 002172          CLR      @#RKFUN
12435 047674 013777 001666 132334  MOV      @#RK10,@#RKCS ;SET FUNCTION TO WRITE
12436 047702 000006          RTT                    ;LOAD FUNCTION AND GO
12437
12438
12439
12440
12441
12442 047704 104420          ;:*****
12443 047706 105037 002016          ;SBTTL RH70/RP04 HANDLER
12444 047712 032737 000400 002016  ;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF HANDLER
12445 047720 001403          ;:*****
12446 047722 104422          RP4DRV: SAVREG
12447 047724 000137 052240          CLRB     @#RP4HSTA     ;CLEAR DONE FLAG
12448 047730 013737 001654 001672 6$:  BIT      #BIT8,@#RP4HST ;REPEAT FLAG SET?
12449 047736 105037 002016          BEQ      6$           ;BRANCH IF NO
12450 047742 032777 000020 131274  RESREG
12451 047750 001403          JMP      @#RP4RPT
12452 047752 005000          MOV      @#RNTBINX,@#RP411 ;SAVE RUN TABLE INDEX
12453 047754 005001          CLRB     @#RP4HSTA     ;CLEAR DONE FLAG
12454 047756 000410          BIT      #SW4,@#SWRP   ;RANDOM DSK ADDRESS?
12455 047760 004737 060562          BEQ      1$           ;BRANCH IF YES
12456 047764 013700 001622          CLR      R0
12457 047770 013701 001620          CLR      R1
12458 047774 073027 177771          BR       4$
12459 050000 042700 177000          JSR      PC,@#SRAND    ;GET RANDOM NUMBER
12460 050004 022700 000631          MOV      @#HINUM,R0    ;GET HI NUMBER
12461 050010 100003          MOV      @#LONUM,R1    ;GET LO NUMBER
12462 050012 062700 000631          ASHC     #-7,R0        ;ADJUST TO FORM CYL. ADR.
12463 050016 000770          BIC      #177000,R0    ;GET RID OF UNUSED BITS
12464          CMP      #631,R0      ;LEGAL CYLINDER
12465          BPL      5$           ;BRANCH IF YES
12466          ADD      #631,R0     ;MAKE IT LEGAL
12467          BR       4$
12468          MOV      @#RP411,R2 ;GET RUN TABLE INDEX
12469          MOV      RUNTBL(R2),R3 ;GET DEVICE ID
12470          BIC      #777,R3  ;SAVE ID ONLY
    
```

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12470 050034 050003          BIS      R0,R3          :COMBINE WITH CYL ADR
12471 050036 010362 001732    MOV      R3,RUNTABL(R2) :PUT IN RUN TABLE
12472 050042 072127 177775    ASH     #-3,R1          :GEN TRAK-SECT ADR
12473 050046 042701 160340    BIC     #160340,R1      :GET RID OF UNUSED BITS
12474 050052 010103          MOV      R1,R3          :SAVE
12475 050054 042701 000037    BIC     #37,R1          :GET RID OF SECT BITS
12476 050060 022701 011000    CMP     #11000,R1       :LEGAL TRAK?
12477 050064 100004          BPL     2$              :BRANCH IF YES
12478 050066 062701 011000    ADD     #11000,R1       :MAKE IT LEGAL
12479 050072 042701 020000    BIC     #BIT13,R1       :GET RID OF ADD CARRY
12480 050076 042703 177740    2$:    BIC     #177740,R3      :GET SECTOR ADR
12481 050102 022703 000025    CMP     #25,R3         :LEGAL SECTOR
12482 050106 100004          BPL     3$              :BRANCH IF YES
12483 050110 062703 000025    ADD     #25,R3         :MAKE IT LEGAL
12484 050114 042703 000040    BIC     #BIT5,R3        :GET RID OF ADD CARRY
12485 050120 050301          3$:    BIS     R3,R1          :COMBINE TRAK-SECTOR
12486 050122 010162 001750    MOV     R1,RUNTRAK(R2) :PUT TRAK-SECT IN TABLE
12487 050126 010037 002164    MOV     R0,@MRP4HDC     :SAVE CYLINDER ADR
12488 050132 010137 002162    MOV     R1,@MRP4HDA     :SAVE TRAK-SECTOR ADR
12489 050136 112737 177775 002205    MOV     #3,@MRP4TRY     :SET TRY COUNT
12490 050144 104422          RESREG
12491 050146 004767 000026    RP4WTRY:JSR    PC,LDRP4   :LOAD RP4 REGISTERS
12492 050152 012777 052264 132126    MOV     @MRP4SRV,@MRP4VEC ;LOAD INTERRUPT VECTOR
12493 050160 005077 132124    CLR     @MRP4PSW        :
12494 050164 005037 002176    CLR     @MRP4FUN        :SET FUNCTION TO WRITE
12495 050170 112777 000161 132054    MOV     #161,@MRP4CS1   :LOAD FUNCTION AND GO
12496 050176 000002          RTI                    :RETURN
12497
12498 050200 013777 002132 132056    LDRP4:  MOV     @MRP4UNIT,@MRP4CS2 :LOAD UNIT NUMBER
12499 050206 012777 010000 132070    MOV     #BIT12,@MRP4OF  :SET FORMAT TO 16 BIT
12500 050214 013777 002164 132052    MOV     @MRP4HDC,@MRP4DC :LOAD CYLINDER ADR
12501 050222 013777 002162 132032    MOV     @MRP4HDA,@MRP4DA :LOAD TRAK-SECTOR
12502 050230 013777 002036 132016    MOV     @MRP4HWC,@MRP4WC :LOAD WORD COUNT
12503 050236 013777 002064 132014    MOV     @MRP4OLD+2,@MRP4BAE :LOAD EXTENDED ADR BITS
12504 050244 013777 002062 132004    MOV     @MRP4OLD,@MRP4BA :LOAD BUS ADR
12505 050252 000207          RTS                    :RETURN
12506
12507 ;:*****
12508 ;SBTTL RH70/RS04 HANDLER
12509 ;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF HANDLER
12510 ;:*****
12511 050254 104420          RSDRV:  SAVREG
12512 050256 105037 002020    CLR     @MRSHSTAT       :CLEAR DONE FLAG
12513 050262 032737 000400 002020    BIT     #BIT8,@MRSHSTAT :REPEAT FLAG SET?
12514 050270 001403          BEQ     3$              :BRANCH IF NO
12515 050272 104422          RESREG
12516 050274 000137 052750    JMP     @MRSRPT
12517 050300 013737 001654 001674 3$:    MOV     @MRNTBINX,@MR$11 :SAVE RUN TABLE INDEX
12518 050306 032777 000020 130730    BIT     #SW4,@SSWRP     :RANDOM DSK ADR?
12519 050314 001403          BEQ     1$              :BRANCH IF YES
12520 050316 005000          CLR     R0
12521 050320 005001          CLR     R1
12522 050322 000407          BR      4$
12523 050324 004737 060562 1$:    JSR     PC,@MR$RAND     :GET RANDOM NUMBER
12524 050330 013700 001622    MOV     @MR$HNUM,R0
12525 050334 072027 177774    ASH     #-4,R0
    
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12526 050340 010001          MOV      R0,R1          ;SAVE RANDOM NUMBER
12527 050342 042700 170077 4$: BIC      #170077,R0    ;GET TRACK ADR
12528 050346 022700 007600    CMP      #7600,R0      ;IS IT LEGAL?
12529 050352 100003          BPL      5$            ;BRANCH IF YES
12530 050354 062700 007600    ADD      #7600,R0      ;MAKE IT LEGAL
12531 050360 000770          BR       4$
12532 050362 013702 001674 5$: MOV      @#RS11,R2    ;GET RUN TABLE INDEX
12533 050366 072027 177772    ASH     #-6,R0         ;ADJUST TRACK ADR
12534 050372 110062 001732    MOVB    R0,RUNTABL(R2) ;SAVE TRAK ADR IN RUN TBL
12535 050376 042701 177700 6$: BIC      #177700,R1    ;GET SECTOR ADR
12536 050402 022701 000077    CMP      #77,R1       ;IS IT LEGAL?
12537 050406 100003          BPL      2$            ;BRANCH IF YES
12538 050410 062701 000077    ADD      #77,R1       ;MAKE IT LEGAL
12539 050414 000770          BR       6$
12540 050416 010162 001750 2$: MOV      R1,RUNTRAK(R2) ;SAVE IN RUN TRAK TABLE
12541 050422 072027 000006    ASH     #6,R0         ;ADJUST TRACK ADDR
12542 050426 050100          BIS     R1,R0         ;COMBINE SECTOR TRAK
12543 050430 010037 002166    MOV      R0,@#RSHDA   ;SAVE AS DSK ADR
12544 050434 112737 177775 002206 MOVB    #-3,@#RSTRY   ;SET TRY COUNT
12545 050442 104422          RESREG
12546 050444 004737 050504 RSWTRY: JSR     PC,@#LDRS ;GO LOAD REGISTERS
12547 050450 012777 052774 131656 MOV      #R3SRV,@#RSEV ;SET INTERRUPT VECTOR
12548 050456 005077 131654    CLR     @#RSPSW
12549 050462 005037 002200    CLR     @#RSEFUN      ;SET FUNCTION TO WRITE
12550 050466 105777 131636 1$: TSTB    @#RSDS      ;IS DRIVE READY?
12551 050472 001775          BEQ     1$            ;BRANCH IF NO
12552 050474 112777 000161 131610 MOVB    #161,@#RSCS1  ;LOAD FUNCTION AND GO
12553 050502 000002          RTI
12554
12555 050504 013777 002134 131612 LDERS: MOV      @#RSUNIT,@#RSCS2 ;LOAD UNIT NUMBER
12556 050512 013777 002166 131602 MOV      @#RSHDA,@#RSDA ;LOAD DSK ADR
12557 050520 013777 002040 131566 MOV      @#RSHWC,@#RSHC ;LOAD WORD COUNT
12558 050526 013777 002070 131564 MOV      @#RSOLD+2,@#RSBAE ;LOAD EXTENDED ADDRESS
12559 050534 013777 002066 131554 MOV      @#RSOLD,@#RSBA ;LOAD BUS ADDRESS
12560 050542 000207          RTS     PC            ;RETURN
12561
12562 ;:*****
12563 ;SBTTL RP11/RP03 SERVICE ROUTINE
12564 ;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
12565 ;:*****
12566 050544 000005          RP3RPT: RESET
12567 050546 005337 002170          DEC     @#RP3FUN      ;RESTORE FUNCTION
12568 050552 022737 000001 002170 CMP      #1,@#RP3FUN   ;WHAT IS IT?
12569 050560 001472          BEQ     RP31         ;BRANCH IF WC
12570 050562 002402          BLT     1$           ;BRANCH IF WRITE
12571 050564 000137 047210          JMP     @#RP3WTRY    ;BRANCH TO READ
12572 050570 000167 000414 1$: JMP     RP33
12573 050574 005237 002170          RP3SRV: INC     @#RP3FUN ;INCREMENT FUNCTION
12574 050600 022737 000002 002170 CMP      #2,@#RP3FUN   ;WHAT IS IT?
12575 050606 001501          BEQ     RP3WCK      ;BRANCH TO WRITE CHECK
12576 050610 100002          BPL     .+6
12577 050612 000137 051250          JMP     @#RP3READ
12578
12579 ;FUNCTION JUST EXECUTED WAS A WRITE
12580 050616 032737 000400 002006 BIT      #BIT8,@#RP3HSTAT ;REPEAT FLAG SET?
12581 050624 001036          BNE     RP3LOOP     ;BRANCH IF YES
    
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12582	050626	005777	131362			TST	@RP3CS		:ANY ERRORS?
12583	050632	100045				BPL	RP31		:BRANCH IF NO
12584	050634	105737	002202			TSTB	@RP3TRY		:TRIED 3 TIMES?
12585	050640	001415				BEQ	RP3ERR		:BRANCH IF YES
12586	050642	112777	000001	131344		MOV	#BIT0,@RP3CS		:CLEAR THE DRIVE
12587	050650	105777	131340			TSTB	@RP3CS		:CONTROLLER READY?
12588	050654	100375				BPL	.-4		:BRANCH IF NO
12589	050656	105237	002202			INCB	@RP3TRY		:INCREMENT TRY COUNT
12590	050662	013746	177776			MOV	@PSW,-(SP)		:MAINTAIN SAME PSW
12591	050666	012746	047210			MOV	@RP3WTRY,-(SP)		:SET RETRY ADDRESS
12592	050672	000002				RTI			:RETURN
12593	050674	012737	100200	002006	RP3ERR:	MOV	#100200,@RP3HSTA		:SET ERROR BIT IN HAND. STA
12594	050702	010046				MOV	RO,-(SP)		:SAVE RO
12595	050704	013700	001664			MOV	@RP311,RO		:GET RUNTABLE INDEX
12596	050710	052760	100000	001750		BIS	#BIT15,RUNTRAK(RO)		:SET ERROR BIT
12597	050716	012600				MOV	(SP)+,RO		:RESTORE RO
12598	050720	000002				RTI			:RETURN
12599									
12600	050722	012737	100200	002006	RP3LOOP:	MOV	#100200,@RP3HSTAT		:SET DONE AND ERROR
12601	050730	005777	131260			TST	@RP3CS		:ANY ERRORS?
12602	050734	100403				BMI	1\$:BRANCH IF YES
12603	050736	042737	100000	002006		BIC	#BIT15,@RP3HSTAT		:CLEAR ERROR BIT
12604	050744	000002			1\$:	RTI			:RETURN
12605									:WRITE WAS OK- NOW DO A WRITE CHECK
12606	050746	112737	177775	002202	RP31:	MOV	#-3,@RP3TRY		:INIT TRY COUNT
12607	050754	012737	000107	001662		MOV	#107,@RP310		:SET FUNCTION
12608	050762	053737	002044	001662		BIS	@RP3OLD+2,@RP310		:SET BAE BITS
12609	050770	053737	002122	001662		BIS	@RP3UNIT,@RP310		:SET UNIT BITS
12610	050776	004737	047256		RP32:	JSR	PC,@LDRP3		:LOAD RP3 REGISTERS
12611	051002	013777	001662	131204		MOV	@RP310,@RP3CS		:LOAD FUNCTION AND GO
12612	051010	000002				RTI			:RETURN
12613									
12614									:FUNCTION JUST EXECUTED WAS A WRITE CHECK
12615	050112	032737	000400	002006	RP3WCK:	BIT	#BIT8,@RP3HSTAT		:REPEAT FLAG SET?
12616	051020	001340				BNE	RP3LOOP		:BRANCH IF YES
12617	051022	005777	131166			TST	@RP3CS		:ANY ERRORS?
12618	051026	100031				BPL	1\$:BRANCH IF NO
12619	051030	005737	001664			TST	@RP311		:FIRST 2K?
12620	051034	001422				BEQ	4\$:BRANCH IF YES
12621	051036	105737	002202		5\$:	TSTB	@RP3TRY		:TRIED 3 TIMES?
12622	051042	001714				BEQ	RP3ERR		:BRANCH IF YES
12623	051044	005337	002170			DEC	@RP3FUN		:RESTORE FUNCTION
12624	051050	112777	000001	131136		MOV	#BIT0,@RP3CS		:CLEAR THE DRIVE
12625	051056	105777	131132			TSTB	@RP3CS		:CONTROLLER READY?
12626	051062	100375				BPL	.-4		:BRANCH IF NO
12627	051064	105237	002202			INCB	@RP3TRY		:INCREMENT TRY COUNT
12628	051070	013746	177776			MOV	@PSW,-(SP)		
12629	051074	012746	050776			MOV	@RP32,-(SP)		
12630	051100	000002				RTI			:GO TRY AGAIN
12631	051102	032777	000010	131102	4\$:	BIT	#BIT3,@RP3ER		:WRITE CHECK ERROR?
12632	051110	001752				BEQ	5\$:BRANCH IF NO
12633									
12634									:WRITE CHECK OK- NOW DO A READ
12635	051112	112737	177775	002202	1\$:	MOV	#-3,@RP3TRY		:RESTORE TRY COUNT
12636	051120	032737	000040	172516		BIT	#BIT5,@MMR3		:MAP ON?
12637	051126	001407				BEQ	2\$:BRANCH IF NO

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12638 051130 005046          CLR      -(SP)          ;PUT DEVICE ID ON STACK
12639 051132 004737 063274 JSR      PC,@GIVEMAP    ;RETURN MAP REGISTER
12640 051136 012746 002072 MOV      @RP3NWL,-(SP)  ;PUT ADR OF BUS ADR ON STK
12641 051142 004737 063022 JSR      PC,@GETMAP     ;GET MAP REGISTERS
12642 051146 010046          MOV      RO,-(SP)      ;SAVE RO
12643 051150 013700 002074 MOV      @RP3NWH,RO    ;GET BAE BITS
12644 051154 072027 000004 ASH      #4,RO         ;ADJUST
12645 051160 010037 002074 MOV      RO,@RP3NWH    ;SAVE
12646 051164 012600          MOV      (SP)+,RO     ;RESTORE RO
12647 051166 012737 000105 001662 MOV      #105,@RP310   ;SET FUNCTION
12648 051174 053737 002074 001662 MOV      @RP3NWH,@RP310 ;SET BAE BITS
12649 051202 053757 002122 001662 BIS      @RP3UNIT,@RP310 ;SET UNIT NUMBER
12650 051210 013777 002152 131004 RP33: MOV  @RP3HDA,@RP3DA  ;LOAD DSK ADR
12651 051216 013777 002154 131000 MOV      @RP3HDC,@RP3DC ;LOAD CYL
12652 051224 013777 002026 130764 MOV      @RP3HWC,@RP3WC ;LOAD WORD COUNT
12653 051232 013777 002072 130760 MOV      @RP3NWL,@RP3BA ;LOAD BUS ADR
12654 051240 013777 001662 130746 MOV      @RP310,@RP3CS  ;LOAD FUNCTION AND GO
12655 051246 000002          RTI                    ;RETURN
12656
12657          ;FUNCTION JUST EXECUTED WAS A READ
12658 051250 032737 000400 002006 RP3READ:BIT @BIT8,@RP3HSTAT ;REPEAT FLAG SET?
12659 051256 001221          BNE      RP3LOOP      ;BRANCH IF YES
12660 051260 005777 130730          TST      @RP3CS      ;ANY ERRORS?
12661 051264 100022          BPL      1$          ;BRANCH IF NO
12662 051266 105737 002202          TSTB   @RP3TRY      ;TRIED 3 TIMES?
12663 051272 001600          BEQ      RP3ERR     ;BRANCH IF YES
12664 051274 005337 002170          DEC      @RP3FUN    ;RESTORE FUNCTION
12665 051300 112777 000001 130706 MOVB    @BIT0,@RP3CS ;CLEAR THE DRIVE
12666 051306 105777 130702          TSTB   @RP3CS      ;CONTROLLER READY?
12667 051312 100375          BPL      -4         ;BRANCH OF NO
12668 051314 105237 002202          INCB   @RP3TRY     ;INCREMENT TRY COUNT
12669 051320 013746 177776          MOV      @RPSW,-(SP)
12670 051324 012746 051210          MOV      @RP33,-(SP)
12671 051330 000002          RTI                    ;GO TRY AGAIN
12672 051332 032737 000040 172516 1$: BIT  @BIT5,@MMR3     ;MAP ON?
12673 051340 001404          BEQ      2$          ;BRANCH IF NO
12674 051342 005046          CLR      -(SP)      ;PUT DEVICE ID IN STK
12675 051344 004737 063274 JSR      PC,@GIVEMAP    ;RETURN MAP REGISTERS
12676 051350 005726          TST      (SP)+      ;RESTORE STACK
12677 051352 112737 000200 002006 2$: MOVB  @#200,@RP3HSTA ;SET DONE FLAG
12678 051360 000002          RTI                    ;RETURN
12679
12680          ;*****
12681          .SBTTL RK11/RK05 SERVICE ROUTINE
12682          ;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
12683          ;*****
12683 051362 000005          RKRPT: RESET
12684 051364 005337 002172          DEC      @#RKFUN    ;RESTORE FUNCTION
12685 051370 022737 000001 002172 CMP      #1,@#RKFUN  ;WHAT IS IT?
12686 051376 001475          BEQ      RK1        ;BRANCH IF WC
12687 051400 002402          BLT      1$        ;BRANCH IF WRITE
12688 051402 000137 047624          JMP      @#RKWTRY   ;IT WAS A WRITE
12689 051406 000137 052044          1$: JMP  @#RK3
12690 051412 062737 000001 002172 RKSrv: ADD  #1,@#RKFUN ;FIND OUT WHAT FUNCTION
12691          ;WAS EXECUTED
12692 051420 022737 000002 002172 CMP      #2,@#RKFUN  ;WAS IT A WRITE CHECK?
12693 051426 001507          BEQ      RKWRCK    ;BRANCH IF YES
    
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12694 051430 100002          BF      +6          ;BRANCH IF IT WAS A WRITE
12695 051432 000137 052076  JMP      @WRKREAD
12696
12697          ;FUNCTION JUST EXECUTED WAS A WRITE. ANY ERRORS?
12698 051436 032737 000400 002010 BIT      @BIT8,@WRKHSTAT ;REPEAT FLAG SET?
12699 051444 001040          BNE     RKLOOP          ;BRANCH IF YES
12700 051446 005777 130564          TST     @RKCS          ;ANY ERRORS?
12701 051452 100047          BPL     RK1            ;BRANCH IF NO
12702 051454 105737 002203          TSTB   @WRKTRY        ;TRYED 3 TIMES?
12703 051460 001417          BEQ     RKERR         ;BRANCH IF YES
12704 051462 012777 000001 130546 MOV     #1,@RKCS      ;CLEAR THE ERROR
12705 051470 004737 052222          JSR    PC,@TIMER     ;WAIT A LITTLE
12706 051474 105777 130536          TSTB   @RKCS          ;WAIT FOR CONT CLR TO FINISH
12707 051500 100375          BPL     -4            ;
12708 051502 105237 002203          INCB   @WRKTRY        ;INCREMENT TRY COUNT
12709 051506 013746 177776          MOV     @PSW,-(SP)
12710 051512 012746 047624          MOV     @RKWTRY,-(SP)
12711 051516 000002          RTI
12712 051520 012737 100200 002010 RKERR: MOV     #100200,@WRKHSTAT ;SET ERROR & DONE FLAG
12713 051526 010046          MOV     RO,-(SP)      ;SAVE RO
12714 051530 013700 001670          MOV     @RK11,RO     ;GET SAVED RUN TABLE INDEX
12715 051534 052760 100000 001750 BIS     @BIT15,RUNTRAK(RO) ;SET ERROR BIT IN RUN TABLE
12716 051542 012600          MOV     (SP)+,RO     ;RESTORE RO
12717 051544 000002          RTI                  ;RETURN
12718
12719 051546 012737 100200 002010 RKLOOP:MOV    #100200,@WRKHSTAT ;SET DONE AND ERROR BITS
12720 051554 005737 130456          TST     @RKCS        ;ANY ERRORS?
12721 051560 100403          BMI     1$           ;BRANCH IF YES
12722 051562 042737 100000 002010 BIC     @BIT15,@WRKHSTAT ;CLEAR ERROR BIT
12723 051570 000002          RTI                  ;RETURN
12724
12725          ;WRITE WAS OK, NOW DO A WRITE CHECK
12726 051572 112737 177775 002203 RK1:  MOV     #-3,@WRKTRY ;RESTORE TRY COUNT
12727 051600 012767 000507 130060          MOV     #507,RK10   ;SET FUNCTION TO WRITE
12728 051606 053767 002050 130052          BIS     @RKOLD+2,RK10 ;SET BA EXT BITS
12729 051614 013777 002156 130422 RK2:  MOV     @WRKHDA,@RKDA ;LOAD DISK ADDRESS
12730 051622 013777 002030 130410          MOV     @WRKHWC,@RKWC ;LOAD WORD COUNT
12731 051630 013777 002046 130404          MOV     @WRKOLD,@RKBA ;LOAD BUS ADDRESS
12732 051636 016777 130024 130372          MOV     RK10,@RKCS  ;START FUNCTION
12733 051644 000002          RTI                  ;RETURN
12734
12735          ;FUNCTION JUST EXECUTED WAS A WRITE CHECK. ANY ERRORS?
12736 051646 032737 000400 002010 RKWRCK:BIT    @BIT8,@WRKHSTAT ;REPEAT FLAG SET?
12737 051654 001334          BNE     RKLOOP          ;BRANCH IF YES
12738 051656 005777 130354          TST     @RKCS          ;ANY ERRORS?
12739 051662 100033          BPL     1$           ;BRANCH IF NO
12740 051664 005737 001670          TST     @RK11         ;FIRST 2K?
12741 051670 001424          BEQ     4$           ;BRANCH IF YES
12742 051672 105737 002203          TSTB   @WRKTRY        ;TRYED 3 TIMES?
12743 051676 001710          BEQ     RKERR         ;BRANCH IF YES
12744 051700 005337 002176          DEC     @WRP4FUN      ;SET FUNCTION BACK TO WC
12745 051704 012777 000001 130324 MOV     #1,@RKCS      ;CLEAR THE ERROR
12746 051712 004737 052222          JSR    PC,@TIMER     ;WAIT A LITTLE
12747 051716 105777 130314          TSTB   @RKCS          ;WAIT FOR CLR TO FINISH
12748 051722 100375          BPL     -4            ;
12749 051724 105237 002203          INCB   @WRKTRY        ;INCREMENT TRY COUNT
12749 051730 013746 177776          MOV     @PSW,-(SP)

```



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12806
12807
12808
12809
12810 052240 000005
12811 052242 005337 002176
12812 052246 022737 000001 002176
12813 052254 001501
12814 052256 002560
12815 052260 000137 050146
12816 052264 005237 002176
12817 052270 022737 000002 002176
12818 052276 001504
12819 052300 100566
12820
12821
12822 052302 032737 000400 002016
12823 052310 001050
12824 052312 032777 040000 127750
12825 052320 001457
12826 052322 105737 002205
12827 052326 001426
12828 052330 052777 000040 127726
12829 052336 004737 050200
12830 052342 105237 002205
12831 052346 013746 177776
12832 052352 012746 050146
12833 052356 032737 000400 002016
12834 052364 001006
12835 052366 012777 000007 127656
12836 052374 105777 127670
12837 052400 100375
12838 052402 000002
12839 052404 012737 100200 002016
12840 052412 010046
12841 052414 013700 001672
12842 052420 052760 100000 001750
12843 052426 012600
12844 052430 000002
12845
12846 052432 012737 100200 002016
12847 052440 032777 040000 127622
12848 052446 001003
12849 052450 042737 100000 002016
12850 052456 000002
12851
12852 052460 112737 177775 002205
12853 052466 105777 127576
12854 052472 001775
12855 052474 004737 050200
12856 052500 112777 000151 127544
12857 052506 000002
12858
12859
12860 052510 032737 000400 002016
12861 052516 001345

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:*****
:SBTTL RH70/RP04 SERVICE ROUTINE
:* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
:*****
RP4RPT: RESET
DEC @RP4FUN ;RESTORE FUNCTION
CMP #1,@RP4FUN ;WHAT IS IT?
BEQ RP41 ;BRANCH IF WC
BLT RP43 ;BRANCH IF READ
JMP @RP4WTRY ;GO TO WRITE
RP4SRV: INC @RP4FUN ;FIND OUT WHAT FUNCTION
CMP #2,@RP4FUN ;WAS JUST EXECUTED
BEQ RP4WCK
BMI RP4READ

:WRITE FUNCTION WAS JUST EXECUTED.
BIT #BIT8,@RP4HSTAT ;REPEAT FLAG SET?
BNE RP4LOOP ;BRANCH IF YES
BIT #BIT14,@RP4DS ;ANY ERRORS
BEQ RP41 ;BRANCH IF NO
TSTB @RP4TRY ;TRIED 3 TIMES?
BEQ RP4ERR ;BRANCH IF YES
BIS #BIT5,@RP4CS2 ;CLEAR ALL ERRORS
JSR PC,@LDRP4 ;RELOAD THE UNIT NO
INCB @RP4TRY ;INCREMENT TRY COUNT
MOV @PSW,-(SP) ;SETUP THE STACK TO
MOV #RP4WTRY,-(SP) ;TRY WRITE AGAIN
BIT #BIT8,@RP4HSTAT ;REPEAT FLAG SET?
BNE 2$ ;BRANCH IF YES
MOV #7,@RP4CS1 ;RECALIBRATE
1$: TSTB @RP4DS ;DRIVE READY?
BPL 1$ ;BRANCH IF NO
2$: RTI
RP4ERR: MOV #100200,@RP4HSTA ;SET ERROR & DONE BIT
MOV RO,-(SP) ;SAVE RO
MOV @RP411,RO ;GET RUN TABLE INDEX
BIS #BIT15,RUNTRAK(RO) ;SET ERROR BIT
MOV (SP)+,RO ;RESTORE RO
RTI ;RETURN

RP4LOOP:MOV #100200,@RP4HSTAT ;SET DONE AND ERROR BITS
BIT #BIT14,@RP4DS ;ANY ERRORS?
BNE 1$ ;BRANCH IF YES
BIC #BIT15,@RP4HSTAT ;CLEAR ERROR BIT
1$: RTI ;RETURN

:WRITE OK...NOW DO A WRITE CHECK.
RP41: MOVB #-3,@RP4TRY ;INITIALIZE TRY COUNT
RP42: TSTB @RP4DS ;IS DRIVE READY?
BEQ RP42 ;BRANCH IF NO
JSR PC,@LDRP4
MOVB #151,@RP4CS1 ;LOAD FUNCTION AND GO
RTI

:FUNCTION JUST EXECUTED WAS A WRITE CHECK
RP4WCK: BIT #BIT8,@RP4HSTAT ;REPEAT FLAG SET?
BNE RP4LOOP ;BRANCH IF YES

```



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12862 052520 032777 040000 127542          BIT      #BIT14,@RP4DS          :ANY ERRORS?
12863 052526 001421          BEQ      1$                    :BRANCH IF NO
12864 052530 105737 002205          3$:   TSTB   @RP4TRY           :TRIED 3 TIMES?
12865 052534 001723          BEQ      RP4ERR                :BRANCH IF YES
12866 052536 005337 002176          DEC      @RP4FUN                ;SET TO WRITE CHECK
12867 052542 052777 000040 127514          BIS      #BIT5,@RP4CS2        :CLEAR ALL ERRORS
12868 052550 004737 050200          JSR      PC,@LDRP4            :RELOAD THE UNIT NO
12869 052554 105237 002205          INCB    @RP4TRY                :INCREMENT TRY COUNT
12870 052560 013746 177776          MOV      @PSW,-(SP)
12871 052564 012746 052466          MOV      #RP42,-(SP)
12872 052570 000002          RTI
12873 052572 032777 040000 127464 1$:   BIT      #BIT14,@RP4CS2        :TRY AGAIN
12874 052600 001404          BEQ      2$                    :WRITE CHECK ERROR?
12875 052602 005737 001672          TST     @RP411                :BRANCH IF NO
12876 052606 001401          BEQ      2$                    :FIRST 2K?
12877 052610 000747          BR      3$
12878
12879          :WRITE CHECK WAS OK...NOW DO A READ.
12880 052612 112737 177775 002205 2$:   MOVB    #-3,@RP4TRY           :INITIALIZE TRY COUNT
12881 052620 105777 127444          RP43:  TSTB   @RP4DS            :IS DRIVE READY?
12882 052624 001775          BEQ      RP43                  :BRANCH IF NO
12883 052626 004737 050200          JSR      PC,@LDRP4            :LOAD REGISTERS
12884 052632 013777 002114 127420          MOV      @RP4NWH,@RP4BAE       :LOAD EXTENDED ADR BITS
12885 052640 013777 002112 127410          MOV      @RP4NWL,@RP4BA       :LOAD BUS ADR
12886 052646 112777 000171 127376          MOVB    #171,@RP4CS1         :LOAD FUNCTION AND GO
12887 052654 000002          RTI                            :RETURN
12888
12889          :FUNCTION JUST EXECUTED WAS A READ.
12890 052656 032737 000400 002016 RP4READ:BIT #BIT8,@RP4HSTAT      :REPEAT FLAG SET?
12891 052664 001262          BNE     RP4LOOP                :BRANCH IF YES
12892 052666 032777 040000 127374          BIT     #BIT14,@RP4DS         :ANY ERRORS?
12893 052674 001421          BEQ     1$                      :BRANCH IF NO
12894 052676 105737 002205          TSTB   @RP4TRY                :TRIED 3 TIMES?
12895 052702 001640          BEQ     RP4ERR                  :BRANCH IF YES
12896 052704 005337 002176          DEC     @RP4FUN                :SET FUNCTION TO A READ
12897 052710 052777 000040 127346          BIS     #BIT5,@RP4CS2        :CLEAR ALL ERRORS
12898 052716 004737 050200          JSR     PC,@LDRP4            :RELOAD THE UNIT NO
12899 052722 105237 002205          INCB   @RP4TRY                :INCREMENT TRY COUNT
12900 052726 013746 177776          MOV     @PSW,-(SP)
12901 052732 012746 052620          MOV     #RP43,-(SP)
12902 052736 000002          RTI
12903 052740 112737 000200 002016 1$:   MOVB    #200,@RP4HSTA        :TRY AGAIN
12904 052746 000002          RTI                            :SET DONE FLAG
12905          :RETURN
12906          ;*****
12907          :SBTTL RH70/RS04 SERVICE ROUTINE
12908          :* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
12909          ;*****
12909 052750 000005          RSRPT: RESET
12910 052752 005337 002200          DEC     @RSFUN                 :RESTORE FUNCTION
12911 052756 022737 000001 002200          CMP     #1,@RSFUN             :WHAT IS IT?
12912 052764 001467          BEQ     RS41                   :BRANCH IF WC
12913 052766 002546          BLT     RS43                   :BRANCH IF WRITE
12914 052770 000137 050444          JMP     @RSWTRY
12915 052774 005237 002200          RSSRV: INC   @RSFUN           :FIND OUT WHAT FUNCTION
12916 053000 022737 000002 002200          CMP     #2,@RSFUN             :WAS JUST EXECUTED
12917 053006 001472          BEQ     RSWCK
    
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12918 053010 100554          BMI    RSREAD
12919
12920          ;WRITE FUNCTION WAS JUST EXECUTED
12921 053012 032737 000400 002020  BIT    #BIT8,@RSHSTAT ;REPEAT FLAG SET?
12922 053020 001036          BNE    RSLOOP          ;BRANCH IF YES
12923 053022 032777 040000 127300  BIT    #BIT14,@RSDS    ;ANY ERRORS?
12924 053030 001445          BEQ    RS41            ;BRANCH IF NO
12925 053032 105737 002206          TSTB  @RSTRY          ;TRIED 3 TIMES?
12926 053036 001414          BEQ    RSERR          ;BRANCH IF YES
12927 053040 052777 000040 127256  BIS    #BITS,@RSCS2    ;CLEAR ALL ERRORS
12928 053046 004737 050504          JSR   PC,@LDRS        ;LOAD UNIT #
12929 053052 105237 002206          INCB  @RSTRY          ;INCREMENT TRY COUNT
12930 053056 013746 177776          MOV   @RPSW,-(SP)     ;SETUP THE STACK TO
12931 053062 012746 050444          MOV   @RSTRY,-(SP)   ;TRY THE WRITE AGAIN
12932 053066 000002          RTI
12933 053070 012737 100200 002020  RSERR: MOV   #100200,@RSHSTAT ;SET ERROR AND DONE BIT
12934 053076 010046          MOV   RO,-(SP)       ;SAVE RO
12935 053100 013700 001674          MOV   @R11,RO        ;GET RUN TBL INDEX
12936 053104 052760 100000 001750  BIS    #BIT15,RUNTRAK(RO) ;SET ERROR BIT
12937 053112 012600          MOV   (SP)+,RO       ;RESTORE RO
12938 053114 000002          RTI
12939
12940 053116 012737 100200 002020  RSLOOP: MOV  #100200,@RSHSTAT ;SET DONE AND ERROR BITS
12941 053124 032777 040000 127176  BIT    #BIT14,@RSDS    ;ANY ERRORS?
12942 053132 001003          BNE    1$            ;BRANCH IF YES
12943 053134 042737 100000 002020  BIC    #BIT15,@RSHSTAT ;CLEAR ERROR BIT
12944 053142 000002          1$:   RTI            ;RETURN
12945          ;WRITE OK...NOW DO A WRITE CHECK
12946 053144 112737 177775 002206  RS41:  MOVB  #-3,@RSTRY ;INIT TRY COUNT
12947 053152 105777 127152          RS42:  TSTB  @RSDS     ;IS DRIVE READY?
12948 053156 001775          BEQ    RS42          ;BRANCH IF NO
12949 053160 004737 050504          JSR   PC,@LDRS        ;LOAD RS REGISTERS
12950 053164 112777 000151 127120  MOVB  #151,@RSCS1     ;LOAD FUNCTION AND GO
12951 053172 000002          RTI            ;RETURN
12952
12953          ;FUNCTION JUST EXECUTED WAS A WRITE CHECK
12954 053174 032737 000400 002020  RSWCK: BIT    #BIT8,@RSHSTAT ;REPEAT FLAG SET?
12955 053202 001345          BNE    RSLOOP          ;BRANCH IF YES
12956 053204 032777 040000 127116  BIT    #BIT14,@RSDS    ;ANY ERRORS?
12957 053212 001421          BEQ    1$            ;BRANCH IF NO
12958 053214 105737 002206          3$:   TSTB  @RSTRY          ;TRIED 3 TIMES?
12959 053220 001723          BEQ    RSERR          ;BRANCH IF YES
12960 053222 005337 002200          DEC   @RSTRY          ;SET FUNCTION BACK TO WC
12961 053226 052777 000040 127070  BIS    #BITS,@RSCS2    ;CLEAR THE ERROR
12962 053234 004737 050504          JSR   PC,@LDRS        ;INCREMENT THE TRY COUNT
12963 053240 105237 002206          INCB  @RSTRY
12964 053244 013746 177776          MOV   @RPSW,-(SP)
12965 053250 012746 053152          MOV   @RS42,-(SP)
12966 053254 000002          RTI            ;TRY AGAIN
12967
12968 053256 032777 040000 127040  1$:   BIT    #BIT14,@RSCS2 ;WRITE CHECK ERROR?
12969 053264 001404          BEQ    2$            ;BRANCH IF NO
12970 053266 005737 001674          TST   @R11          ;FIRST 2K?
12971 053272 001401          BEQ    2$            ;BRANCH IF YES
12972 053274 000747          BR    3$
12973
    
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12974      :WRITE CHECK WAS OK...NOW DO A READ.
12975 053276 112737 177775 002206 2$: MOVB #3,@RSTRY      :INIT TRY COUNT
12976 053304 105777 127020 RS43: TSTB @RSDS        :IS DRIVE READY?
12977 053310 001775          BEQ RS43          :BRANCH IF NO
12978 053312 004737 050504     JSR PC,@WLDRS      :LOAD RS REGISTERS
12979 053316 013777 002120 126774     MOV @RSDNEWH,@RSBAE :LOAD BAE
12980 053324 013777 002116 126764     MOV @RSDNEWL,@RSBA  :LOAD BUS ADR
12981 053332 112777 000171 126752     MOVB #171,@RSCS1   :LOAD FUNCTION AND GO
12982 053340 000002          RTI          :RETURN
12983
12984      :FUNCTION JUST EXECUTED WAS A READ.
12985 053342 032737 000400 002020 RSREAD: BIT #BIT8,@RSHSTAT :REPEAT FLAG SET?
12986 053350 001262          BNE RSLOOP       :BRANCH IF YES
12987 053352 032777 040000 126750     BIT #BIT14,@RSDS   :ANY ERRORS?
12988 053360 001421          BEQ 1$          :BRANCH IF NO
12989 053362 105737 002206     TSTB @RSTRY       :TRIED 3 TIMES?
12990 053366 001640          BEQ RSERR        :BRANCH IF YES
12991 053370 005337 002200     DEC @RSDFUN       :RESTORE FUN TO READ
12992 053374 052777 000040 126722     BIS #BIT5,@RSCS2   :CLEAR ALL ERRORS
12993 053402 004737 050504     JSR PC,@WLDRS      :LOAD UNIT #
12994 053406 105237 002206     INCB @RSTRY       :INCREMENT TRY COUNT
12995 053412 013746 177776     MOV @RPSW,-(SP)
12996 053416 012746 053304     MOV #RS43,-(SP)
12997 053422 000002          RTI          :TRY AGAIN
12998 053424 112737 000200 002020 1$: MOVB #200,@RSHSTAT :SET DONE FLAG
12999 053432 000002          RTI          :RETURN
13000
13001      :*****
13002      :SBITL UNIBUS EXERCISER SERVICE ROUTINE
13003      :* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
13004      :*****
13004 053434 104420          UBESRV: SAVREG
13005 053436 004737 064104     JSR PC,@WLDKT      :GO TO LOW CORE
13006 053442 012704 002346     MOV #UBETBL+6,R4   :GET ADDRESS OF UBECR1
13007 053446 005774 000000     TST @R4            :WAS THERE AN ERROR?
13008 053452 100437          BMI UBE2          :BRANCH IF YES
13009 053454 012746 000003     MOV #3,-(SP)       :PUT DEVICE ID IN STACK
13010 053460 004737 063274     JSR PC,@GIVEMAP    :GIVE UP MAP REG
13011 053464 012767 002414 126300     MOV #SERRTB,UBESAV :INITIALIZE UBE
13012 053472 005067 126276     CLR UBESAV+2
13013 053476 012767 002414 126272     MOV #SERRTB,UBEADR
13014 053504 005067 126270     CLR UBEADR+2
13015 053510 012746 001776     MOV #UBEADR,-(SP)
13016 053514 004737 063022     JSR PC,@GETMAP
13017 053520 013754 002000     MOV @UBEADR+2,@-(R4) :LOAD UBECR2
13018 053524 013754 001776     MOV @UBEADR,@-(R4)  :LOAD UBEB A
13019 053530 012754 172400     MOV #172400,@-(R4)  :LOAD UBECC
13020 053534 004737 064202     JSR PC,@PRESKT     :GO BACK TO ORIGINAL CORE
13021 053540 104422          RESREG
13022 053542 012777 064545 126576     MOV #64545,@UBETBL+6 :RESTART UBE
13023 053550 000002          RTI          :RETURN
13024
13025      :UBE ERROR-IS IT LAST MEMORY?
13026 053552 005037 001372     UBE2: CLR @RSTMP10
13027 053556 162704 000004     SUB #4,R4          :ADJUST R4
13028 053562 017403 000002     MOV @2(R4),R3      :GET BECR2
13029 053566 042703 070037     BIC #70037,R3      :CLEAR ALL BUT FRROR FLAGS
    
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13030 053572 022703 000400      CMP      #400,R3      ;WAS ERROR A TIMEOUT?
13031 053576 001052      BNE      UBEERR      ;BRANCH IF NO
13032 053600 017437 000000 002002      MOV      @R4,@WERRBA ;SAVE BUS ADR OF ERROR
13033 053606 017437 000002 002004      MOV      @2(R4),@WERRBA+2
13034 053614 042737 177774 002004      BIC      #177774,@WERRBA+2
13035 053622 004737 062450      JSR      PC,@PHYMAP  ;GET PHYSICAL ADDRESS THAT TIMED OUT
13036 053626 162737 000004 001574      SUB      #4,@WPA1500 ;ADJUST PHYSICAL ADR THAT FAILED
13037 053634 005637 001576      SBC      @WPA2116    ;UBE STOPS AT ADR+4
13038 053640 023737 001576 001656      CMP      @WPA2116,@WXMHHI ;AT MAX MEM HIGH?
13039 053646 101006      BHI      1$         ;BRANCH IF HIGHER
13040 053650 103423      BLO      MHOLE      ;BRANCH IF LOWER
13041 053652 023737 001574 001660      CMP      @WPA1500,@WXMML0 ;AT MAX MEM LO?
13042 053660 101001      BHI      1$         ;BRANCH IF HIGHER
13043 053662 103416      BLO      MHOLE      ;BRANCH IF LOWER
13044 053664 012746 000003      1$: MOV      #3,-(SP)   ;PUT DEVICE ID ON STACK
13045 053670 004737 063274      JSR      PC,@GIVEMAP
13046 053674 005726      TST      (SP)+
13047 053676 004737 062340      JSR      PC,@UBEINIT
13048 053702 004737 064202      JSR      PC,@WRESKT
13049 053706 104422      RESREG
13050 053710 012777 064545 126430      MOV      #64545,@UBETBL+6
13051 053716 000002      RTI
13052
13053 053720 010637 001372      MHOLE: MOV      SP,@$TMP10
13054 053724 013737 001262 001374 UBEERR: MOV      @$SLPERR,@$TMP11 ;SAVE LOOP ERROR ADR
13055 053732 012737 053774 001262      MOV      #UBE3,@$SLPERR ;SET LOOP ADR
13056 053740 012703 000022      MOV      #22,R3
13057 053744 005737 001372      TST      @$TMP10
13058 053750 001002      BNE      1$
13059 053752 104007      ERROR   7
13060 053754 000407      BR      UBE3
13061 053756 013737 001574 001276 1$: MOV      @WPA1500,@$GDDAT
13062 053764 013737 001576 001300      MOV      @WPA2116,@$SDDAT
13063 053772 104012      ERROR   12
13064
13065      ;RESTART UBE IN SAME MEMORY
13066 053774 013737 001374 001262 UBE3: MOV      @$TMP11,@$SLPERR ;RESTORE ERROR LOOP ADR
13067 054002 010446      MOV      R4,-(SP)   ;SAVE R4
13068 054004 012704 002340      MOV      #UBETBL,R4 ;GET ADDRESS OF UBE TABLE
13069 054010 012734 172400      MOV      #172400,@(R4)+ ;SET UBECC
13070 054014 013734 001776      MOV      @WUBEADR,@(R4)+ ;SET UBEBA <15:00>
13071 054020 005074 000004      CLR      @4(R4)     ;CLEAR ALL ERRORS
13072 054024 013734 002000      MOV      @WUBEADR+2,@(R4)+ ;SET EXT ADR BITS
13073 054030 012774 064545 000000      MOV      #64545,@(R4) ;START UBE
13074 054036 012604      MOV      (SP)+,R4  ;RESTORE R4
13075 054040 004737 064202      JSR      PC,@WRESKT
13076 054044 104422      RESREG
13077 054046 000002      RTI      ;RETURN
13078
13079
13080      ;*****
13081      .SBTTL MASS BUS TESTER SERVICE ROUTINE
13082      ;* SEE DOCUMENTATION FOR FUNCTIONAL DESCRIPTION OF ROUTINE
13083      ;*****
13083 054050 104420      MBTSRV: SAVREG
13084 054052 004737 064104      JSR      PC,@WLDKT ;GO TO LOW CORE
13085 054056 005037 001372      CLR      @$TMP10

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13086 054062 012704 002356      MOV      #MBTTBL,R4      ;GET ADDRESS OF ADDRESS OF CS1 REG
13087 054066 032734 040000      BIT      #BIT14,@(R4)+  ;ANY ERRORS?
13088 054072 001007                BNE     1$              ;BRANCH IF YES
13089 054074 004737 064202      2$:    JSR      PC,@#RESKT ;GO BACK TO ORIGINAL CORE
13090 054100 104422                RESREG
13091 054102 112777 000161 126246      MOVB    #161,@MBTTBL
13092 054110 000002                RTI                    ;RESTART MBT AND RETURN
13093 054112 062704 000010      1$:    ADD      #10,R4        ;ADJUST R4
13094 054116 032774 004000 000000      BIT      #BIT11,@(R4)   ;NON-EXISTANT MEMORY ERROR?
13095 054124 001436                BEQ     MBTERR         ;BRANCH IF NO
13096 054126 162704 000006      SUB     #6,R4          ;ADJUST R4
13097 054132 013437 001574      MOV     @ (R4)+,@#PA1500 ;GET BUS ADR
13098 054136 013437 001576      MOV     @ (R4)+,@#PA2116 ;GET BUS ADR EXT
13099 054142 162737 000004 001574      SUB     #4,@#PA1500    ;ADJUST BUS ADR
13100 054150 005637 001576      SBC    @#PA2116
13101 054154 023737 001574 001660      CMP     @#PA1500,@#MXMML0 ;IS IT LAST MEMORY?
13102 054162 001015                BNE     MEMHOLE        ;BRANCH IF NO
13103 054164 023737 001576 001656      CMP     @#PA2116,@#MXMMHI ;CHECK EXT ADR BITS
13104 054172 001011                BNE     MEMHOLE
13105 054174 005724                TST     (R4)+          ;INCREMENT R4
13106 054176 052774 000047 000000      BIS     #47,@(R4)      ;CLEAR THE ERROR
13107 054204 012734 000007      MOV     #7,@(R4)+     ;SELECT UNIT 7
13108 054210 005074 177766      CLR     @-12(R4)      ;CLEAR WORD COUNT
13109 054214 000727                BR      2$            ;CONTINUE
13110
13111 054216 010637 001372      MEMHOLE:MOV SP,@#STMP10
13112 054222 013737 001262 001374 MBTERR:MOV @#SLPERR,@#STMP11 ;SAVE LOOP ADDRESS
13113 054230 012737 054272 001262      MOV     #1$,@#SLPERR   ;SET NEW LOOP ADR
13114 054236 012703 000020      MOV     #20,R3        ;PUT DEVICE ID IN R3
13115 054242 005737 001372      TST     @#STMP10
13116 054246 001002                BNE     2$
13117 054250 104007                ERROR   7
13118 054252 000407                BR      1$
13119 054254 013737 001574 001276 2$:    MOV     @#PA1500,@#SGDDAT
13120 054262 013737 001576 001300      MOV     @#PA2116,@#SBDDAT
13121 054270 104013                ERROR   13
13122 054272 013737 001374 001262 1$:    MOV     @#STMP11,@#SLPERR ;RESTORE LOOP ADR
13123 054300 012704 002366      MOV     #MBTTBL+10,R4 ;GET ADR OF MBTTBL+10
13124 054304 015400      MOV     @-(R4),R0     ;GET BUS ADR EXTENDED
13125 054306 015401      MOV     @-(R4),R1     ;GET BUS ADR
13126 054310 015402      MOV     @-(R4),R2     ;GET WORD COUNT
13127 054312 006302                ASL     R2            ;ADJUST WORD COUNT
13128 054314 160201                SUB     R2,R1        ;FORM START ADR OF THIS XFER
13129 054316 005600                SBC     R0
13130 054320 052774 000047 000010      BIS     #47,@10(R4)    ;CLEAR THE WORLD
13131 054326 012774 000007 000010      MOV     #7,@10(R4)    ;SELECT UNIT 7
13132 054334 005724                TST     (R4)+        ;ADJUST R4
13133 054336 010134                MOV     R1,@(R4)+    ;RESTORE BUS ADR
13134 054340 010074 000000      MOV     R0,@(R4)
13135 054344 004737 064202      JSR     PC,@#RESKT    ;GO BACK TO ORIGINAL CORE
13136 054350 104422                RESREG
13137 054352 112777 000161 125776      MOVB    #161,@MBTTBL  ;START MBT AGAIN
13138 054360 000002                RTI                    ;RETURN
13139
13140
13141
:*****
:SBTTL LINE CLOCK SERVICE ROUTINE
:* THIS ROUTINE FIRST REMAPS PROGRAM EXECUTION TO LOW
    
```

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13142      ;* MEMORY. IT THEN INCREMENTS AND KEEPS TRACK OF THE  
13143      ;* SECOND AND MINUTE COUNTS KEPT IN LOCATIONS 'LTICKS'  
13144      ;* AND 'MTICKS' RESPECTIVELY.  
13145      ;*****  
13146 054362 104420      LKSRV: SAVREG  
13147 054364 004737 064104      JSR    PC,@#LDKT      ;GO TO LOW CORE  
13148 054370 105237 001700      INCB   @#LTICKS      ;INCREMENT TICK COUNT  
13149 054374 122737 000074 001700      CMPB   #60.,@#LTICKS ;ONE SECOND YET?  
13150 054402 001016      BNE    1$           ;BRANCH IF NO  
13151 054404 105237 001701      INCB   @#LTICKS+1    ;INCREMENT SECOND COUNT  
13152 054410 005267 124610      INC    $DEVCT        ;KEEP APT GOING.....  
13153 054414 105037 001700      CLRB   @#LTICKS      ;CLEAR SECOND COUNT  
13154 054420 122737 000074 001701      CMPB   #60.,@#LTICKS+1 ;ONE MINUTE YET?  
13155 054426 001004      BNE    1$           ;BRANCH IF NO  
13156 054430 105037 001701      CLRB   @#LTICKS+1    ;INCREMENT MINUTE COUNT  
13157 054434 005237 001676      INC    @#MTICKS      ;RESTORE THE KT  
13158 054440 004737 064202      JSR    PC,@#RESKT  
13159 054444 104422      RESREG  
13160 054446 012737 000100 177546      MOV    #BIT6,@#LKS   ;CLEAR READY BIT IN CLOCK  
13161 054454 000002      RTI                ;RETURN  
13162  
13163
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(1)      ;*****  
(1)      .SBTTL SCOPE HANDLER ROUTINE  
(1)  
(1)      ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT  
(1)      ;*AND LOAD THE TEST NUMBER($STNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)  
(1)      ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:  
(1)      ;*SW14=1      LOOP ON TEST  
(1)      ;*SW11=1      INHIBIT ITERATIONS  
(1)      ;*SW09=1      LOOP ON ERROR  
(1)      ;*CALL  
(1)      ;*      SCOPE      ;;SCOPE=IOT  
(1)      $SCOPE:  
(1) 054456      BIT    #SW14,@$SWRP      ;;LOOP ON PRESENT TEST?  
(1) 054456 032777 040000 124560      BNE    $OVER          ;;YES IF SW14=1  
(1) 054464 001077      ;*****START OF CODE FOR THE XOR TESTER*****  
(1) 054466 000416      $XTSTR: BR    6$      ;;IF RUNNING ON THE 'XOR' TESTER CHANGE  
(1)      ;*THIS INSTRUCTION TO A 'NOP' (NOP=240)  
(1) 054470 013746 000004      MOV    @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR  
(1) 054474 012737 054514 000004      MOV    #5$,@#ERRVEC  ;;SET FOR TIMEOUT  
(1) 054502 005737 177060      TST    @#177060      ;;TIME OUT ON XOR?  
(1) 054506 012637 000004      MOV    (SP)+,@#ERRVEC ;RESTORE THE ERROR VECTOR  
(1) 054512 000453      BR    $$VLAD         ;;GO TO THE NEXT TEST  
(1) 054514 022626      5$: CMP    (SP)+,(SP)+   ;;CLEAR THE STACK AFTER A TIME OUT  
(1) 054516 012637 000004      MOV    (SP)+,@#ERRVEC ;RESTORE THE ERROR VECTOR  
(1) 054522 000413      BR    7$           ;;LOOP ON THE PRESENT TEST  
(1) 054524      6$;*****END OF CODE FOR THE XOR TESTER*****  
(1) 054524 105767 124524      2$: TSTB $ERFLG      ;;HAS AN ERROR OCCURRED?  
(1) 054530 001421      BEQ    3$           ;;BR IF NO  
(1) 054532 126767 124531 124514      CMPB   $ERMAX,$ERFLG ;MAX. ERRORS FOR THIS TEST OCCURRED?  
(1) 054540 101015      BHI    3$           ;;BR IF NO  
(1) 054542 032777 001000 124474      BIT    #BIT09,$$SWRP ;LOOP ON ERROR?  
(1) 054550 001404      BEQ    4$           ;;BR IF NO  
(1) 054552 016767 124504 124500      7$: MOV    $LPERR,$LPADR ;SET LOOP ADDRESS TO LAST SCOPE
```

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(1) 054560 000441          BR      $OVER
(1) 054562 105067 124466 4$: CLRB   $ERFLG      ;;ZERO THE ERROR FLAG
(1) 054566 005067 124604   CLR     $TIMES      ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
(1) 054572 000415          BR      1$          ;;ESCAPE TO THE NEXT TEST
(1) 054574 032777 004000 124442 3$: BIT    #BIT11,@$$SWRP ;;INHIBIT ITERATIONS?
(1) 054602 001011          BNE    1$          ;;BR IF YES
(1) 054604 105767 124440   TSTB   $PASS      ;;IF FIRST PASS OF PROGRAM
(1) 054610 001406          BEQ    1$          ;;      INHIBIT ITERATIONS
(1) 054612 005267 124440   INC     $ICNT      ;;INCREMENT ITERATION COUNT
(1) 054616 026767 124554 124432  CMP    $TIMES,$ICNT ;;CHECK THE NUMBER OF ITERATIONS MADE
(1) 054624 002017          BGE    $OVER      ;;BR IF MORE ITERATION REQUIRED
(1) 054626 012767 000001 124422 1$: MOV    #1,$ICNT   ;;REINITIALIZE THE ITERATION COUNTER
(1) 054634 016767 000046 124534  MOV    $MXCNT,$TIMES ;;SET NUMBER OF ITERATIONS TO DO
(1) 054642 011667 124412  $$VLAD: MOV   (SP),$LPADR ;;SAVE SCOPE LOOP ADDRESS
(1) 054646 011667 124410   MOV    (SP),$LPERR ;;SAVE ERROR LOOP ADDRESS
(1) 054652 005067 124522   CLR     $ESCAPE   ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
(1) 054656 112767 000001 124403  MOVB   #1,$ERMAX  ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
(1) 054664 105767 124364  $OVER: TSTB   $ERFLG ;;ANY ERRORS?
(1) 054670 001403          BEQ    1$          ;;BRANCH IF NO
(1) 054672 116737 124356 001253  MOVB   $ERFLG,@#$STSTM+1
(1) 054700 016716 124354 1$: MOV    $LPADR,(SP) ;;FUDGE RETURN ADDRESS
(1) 054704 000002          RTI                    ;;FIXES PS
(1) 054706 000010  $MXCNT: 10          ;;MAX. NUMBER OF ITERATIONS

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13164

.SBTTL ERROR HANDLER ROUTINE

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; *THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
; *SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
; *AND GO TO $ERRTYP ON ERROR
; *THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
; *SW15=1      HALT ON ERROR
; *           HALT CAN OCCUR BEFORE AND AFTER THE ERROR TYPEOUT
; *           INHIBIT ERROR TYPEOUTS
; *SW13=1      BELL ON ERROR
; *SW10=1      LOOP ON ERROR
; *SW09=1
; *CALL
; *           ERROR N      ;;ERROR=EMT AND N-ERROR ITEM NUMBER

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(1) 054710          $ERROR:
(2) 054710 116737 124340 001253  MOVB   $ERFLG,@#$STSTM+1
(1) 054716 105267 124332 7$: INCB   $ERFLG      ;;SET THE ERROR FLAG
(1) 054722 001775          BEQ    7$          ;;DON'T LET THE FLAG GO TO ZERO
(1) 054724 016737 124322 177570  MOV    $STNM,@#DISPLAY ;;DISPLAY TEST NUMBFR AND ERROR FLAG
(1) 054732 005767 124276   TST    $ENV        ;;APT MODE ?
(1) 054736 001414          BEQ    10$         ;;LOAD APT MAILBOX
(1) 054740 011667 124252   MOV    (SP),$FATAL
(1) 054744 162767 000002 124244  SUB    #2,$FATAL
(1) 054752 016767 124274 124240  MOV    $STNM,$TESTN
(1) 054760 012767 000001 124226  MOV    #1,$MSGTY    ;;FATAL ERROR
(1) 054766 000000          HALT
(1) 054770          10$:
(1) 054770 005777 124250   TST    @$$SWRP     ;;HALT ON ERROR = 1?
(1) 054774 100001          BPL    8$          ;;BRANCH IF NO
(1) 054776 000000          HALT                ;;YES--HALT
(1) 055000 032777 002000 124236 8$: BIT    #BIT10,@$$SWRP ;;BELL ON ERROR?

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(1) 055006 001402 BEQ 1$ ;;NO - SKIP
(1) 055010 104400 001402 TYPE ,SBELL ;;RING BELL
(1) 055014 005267 124244 1$: INC $ERTL ;;COUNT THE NUMBER OF ERRORS
(1) 055020 011667 124244 MOV (SP), $ERRPC ;;GET ADDRESS OF ERROR INSTRUCTION
(1) 055024 162767 000002 124236 SUB #2, $ERRPC
(1) 055032 117767 124232 124226 MOVB @ $ERRPC, $ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE
(1) 055040 032777 020000 124176 BIT #BIT13, @ $$SWRP ;;SKIP TYPEOUT IF SET
(1) 055046 001004 BNE 2$ ;;SKIP TYPEOUTS
(1) 055050 004767 000056 JSR PC, $ERRTYP ;;GO TO USER ERROR ROUTINE
(1) 055054 104400 001407 TYPE , $CRLF
(1) 055060 005777 124160 2$: TST @ $$SWRP ;;HALT ON ERROR
(1) 055064 100001 BPL 9$ ;;SKIP IF CONTINUE
(1) 055066 000000 HALT ;;HALT ON ERROR.
(1) 055070 022767 046652 122744 9$: CMP # $ENDAD, 42 ;;ACT-11?
(1) 055076 001001 BNE 3$ ;;BRANCH IF NO
(1) 055100 000000 HALT ;;YES
(1) 055102 032777 001000 124134 3$: BIT #BIT09, @ $$SWRP ;;LOOP ON ERROR SWITCH SET?
(1) 055110 001402 BEQ 4$ ;;BR IF NO
(1) 055112 016716 124144 MOV $LPERR, (SP) ;;FUDGE RETURN FOR LOOPING
(1) 055116 005767 124256 4$: TST $ESCAPE ;;CHECK FOR AN ESCAPE ADDRESS
(1) 055122 001402 BEQ 5$ ;;BR IF NONE
(1) 055124 016716 124250 MOV $ESCAPE, (SP) ;;FUDGE RETURN ADDRESS FOR ESCAPE
(1) 055130 5$: RTI ;;RETURN
(1) 155130 000002
    
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*****
.SBTTL ERROR MESSAGE TYPEOUT ROUTINE

;*THIS ROUTINE FIRST TYPES A STANDARD MESSAGE CONSISTING OF THE
;*VIRTUAL PC, THE PHYSICAL PC, THE PSW AT THE TIME OF THE ERROR CALL,
;*AND THE SUB-PASS COUNT. THE SUB-PASS COUNT CONSISTS OF THE SUB PASS COUNT IN THE
;*HIGH BYTE AND THE PASS COUNT IN THE LOW BYTE.
;*
;*IT THEN USES THE 'ITEM CONTROL BYTE' ($ITEMB) TO DETERMINE WHICH
;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE 'ERROR TABLE'
;*THE ERROR MESSAGE POINTER AND TYPES THE ERROR MESSAGE. THE DATA
;*HEADER POINTER IS THEN OBTAINED AND A DATA HEADER IS TYPED.
;*THE DATA POINTER AND DATA FORMAT ARE THEN OBTAINED. THERE ARE
;*FOUR TYPES OF DATA FORMAT, AS FOLLOWS:
;*
;*      0      TYPE THE CONTENTS OF THE DATA TABLE WORD IN
;*              6 DIGIT OCTAL FORMAT
;*      1      CONVERT THE CONTENTS OF THE DATA TABLE WORD TO
;*              22 BITS AND TYPE AN 8 DIGIT OCTAL NUMBER
;*      2      TYPE THE CONTENTS OF THE DATA TABLE WORD AND
;*              THE WORD+2 IN 8 DIGIT OCTAL FORMAT
;*      3      USE THE CONTENTS OF THE DATA TABLE WORD AS A
;*              DEVICE ID AND TYPE THE DEVICES NAME
;*      4      CONVERT THE TWO WORDS POINTED TO BY THE DATA
;*              TABLE TO FLOATING POINT FORMAT AND TYPE.
;*      5      CONVERT THE FOUR WORDS POINTED TO BY THE DATA
;*              TABLE TO FLOATING DOUBLE FORMAT AND TYPE
*****
    
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13194 055132 104420 $ERRTYP: SAVREG
13195 055134 104400 001407 TYPE , $CRLF ;;'CARRIAGE RETURN' & 'LINE FEED'
13196 055140 004737 056632 JSR PC, @ #TYPTIME ;;GO TYPE THE TIME
    
```



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13197 055144 104400 064642      TYPE      ,MSG3
13198 055150 104400 001407      TYPE      ,$CRLF
13199 055154 016746 124110      MOV       $ERRPC,-(SP)      ;;SAVE $ERRPC FOR TYPEOUT
(1)                                     ;;TYPE THE VIRTUAL PC
(1)                                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
13200 055160 104402      TYPOC
13201 055162 104400 056404      TYPE      ,8$
13201 055166 013700 001572      MOV       @#VADR,RO      ;SAVE VADR
13202 055172 013737 001270      MOV       @#$ERRPC,@#VADR ;SAVE THE VIR PC FOR CONVERSION
13203 055200 122737 000014      CMPB     #14,@#$ITEMB
13204 055206 003403      BLE      51$
13205 055210 105737 001266      TSTB     @#$ITEMB      ;ERROR ZERO?
13206 055214 001005      BNE      42$      ;BRANCH IF NO
13207 055216 004737 062556      JSR      PC,@#CNVADR    ;CONVERT TO 22 BITS
13208 055222 010037 001572      MOV       RO,@#VADR
13209 055226 000407      BR       41$
13210 055230 013737 001572      MOV       @#VADR,@#PA1500
13211 055236 005037 001576      CLR      @#PA2116
13212 055242 010037 001572      MOV       RO,@#VADR
13213 055246 012746 001574      MOV       #PA1500,-(SP) ;PUT ADDRESS OFPC ON STACK
13214 055252 004737 057670      JSR      PC,@#$DB20    ;CONVERT TO ASCII
13215 055256 062716 000003      ADD      #3,(SP)      ;GET RID OF 3 MS DIGITS
13216 055262 012667 000002      MOV       (SP)+,30$    ;SAVE POINTER TO ASCII
13217 055266 104400      TYPE      ;TYPE IT
13218 055270 000000      30$:     ,WORD
13219 055272 104400 056404      TYPE      ,8$
13220 055276 016646 000030      MOV       30(SP),-(SP) ;GET PSW AT TIME OF ERROR
13221 055302 104402      TYPOC      ;TYPE IT
13222
13223 055304 104400 056404      TYPE      ,8$
13224 055310 016746 124374      MOV       $MAINT,-(SP)  ;;SAVE $MAINT FOR TYPEOUT
(1)                                     ;;TYPE THE MAINTENANCE REG
(1)                                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
13225 055314 104402      TYPOC
13225 055316 104400 056404      TYPE      ,8$
13226 055322 116746 123724      MOVB     $STNM,-(SP)
13227 055326 105066 000001      CLRB     1(SP)
13228 055332 104402      TYPOC      ;TYPE THE TEST NUMBER
13229 055334 104400 056404      TYPE      ,8$
13230 055340 013746 001630      MOV       @#SUBPASS,-(SP)
13231 055344 162716 000060      SUB      #60,(SP)
13232 055350 104402      TYPOC
13233 055352 104400 056404      TYPE      ,8$
13234 055356 016746 123666      MOV       $PASS,-(SP)  ;;SAVE $PASS FOR TYPEOUT
(1)                                     ;;TYPE THE PASS COUNT
(1)                                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
13235 055362 104402      TYPOC
13235 055364 104400 001407      TYPE      ,$CRLF
13236 055370 005000      CLR      RO
13237 055372 153700 001266      BISB     @#$ITEMB,RO    ;PICK UP THE INDEX
13238 055376 001431      BEQ      6$      ;EXIT IF ZERO
13239 055400 022700 000007      CMP      #7,RO      ;IS THIS ERROR 7?
13240 055404 001551      BEQ      15$    ;BRANCH IF YES
13241 055406 005300      DEC      RO      ;;ADJUST THE INDEX SO THAT IT WILL
13242 055410 006300      ASL      RO      ;;      WORK FOR THE ERROR TABLE
13243 055412 006300      ASL      RO
13244 055414 006300      ASL      RO
13245 055416 062700 002414      ADD      #$ERRTB,RO    ;;FORM TABLE POINTER
13246 055422 012067 000004      MOV      (RO)+,2$    ;;PICKUP 'ERROR MESSAGE' POINTER

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13247 055426 001404      BEQ      3$      ;;SKIP TYPEOUT IF NO POINTER
13248 055430 104400      TYPE     ;;TYPE THE 'ERROR MESSAGE'
13249 055432 000000      2$: .WORD 0      ;;'ERROR MESSAGE' POINTER GOES HERE
13250 055434 104400 001407  TYPE     , $CRLF  ;;'CARRIAGE RETURN' & 'LINE FEED'
13251 055440 012067 000004  3$: MOV     (R0)+,4$  ;;PICKUP 'DATA HEADER' POINTER
13252 055444 001404      BEQ      5$      ;;SKIP TYPEOUT IF 0
13253 055446 104400      TYPE     ;;TYPE THE 'DATA HEADER'
13254 055450 000000      4$: .WORD 0      ;;'DATA HEADER' POINTER GOES HERE
13255 055452 104400 001407  TYPE     , $CRLF  ;;'CARRIAGE RETURN' & 'LINE FEED'
13256 055456 012001  5$: MOV     (R0)+,R1  ;;PICKUP 'DATA TABLE' POINTER
13257 055460 001004      BNE     7$      ;;GO TYPE THE DATA
13258 055462 104422      6$: RESREG
13259 055464 104400 001407  TYPE     , $CRLF  ;;'CARRIAGE RETURN' & 'LINE FEED'
13260 055470 000207      RTS     PC      ;;RETURN
13261 055472 011002      7$: MOV     (R0),R2  ;;GET 'DATA FORMAT' POINTER
13262 055474 122712 000001  10$: CMPB   #1,(R2)  ;;DATA FORMAT 1?
13263 055500 001424      BEQ     9$      ;;BRANCH IF YES
13264 055502 122712 000002  CMPB   #2,(R2)  ;;DATA FORMAT 2?
13265 055506 001441      BEQ    11$     ;;BRANCH IF YES
13266 055510 122712 000003  CMPB   #3,(R2)  ;;DATA FORMAT 3?
13267 055514 001445      BEQ    24$     ;;BRANCH IF YES
13268 055516 122712 000004  CMPB   #4,(R2)  ;;DATA FORMAT 4?
13269 055522 001456      BEQ    40$     ;;BRANCH IF YES
13270 055524 122712 000005  CMPB   #5,(R2)  ;;DATA FORMAT 5?
13271 055530 001465      BEQ    60$     ;;BRANCH IF YES
13272      ;;*****
13273      ;:DATA FORMAT 0
13274 055532 005202      INC     R2      ;:INCREMENT FORMAT POINTER
13275 055534 013146      MOV     @ (R1)+,-(SP) ;:PUSH DATA TO BE TYPED
13276 055536 104402      TYP0C
13277 055540 005711      13$: TST     (R1)    ;:ANY MORE DATA?
13278 055542 001747      BEQ     6$      ;:BRANCH IF NO
13279 055544 104400 056404  TYPE     ,8$     ;:TYPE TWO SPACES
13280 055550 000751      BR      10$
13281      ;;*****
13282      ;:DATA FORMAT 1
13283 055552 005202      9$: INC     R2      ;:INCREMENT FORMAT POINTER
13284 055554 004737 062556  JSR     PC,@#CNVADR  ;:GET 22 BIT ADR
13285 055560 012746 001574  14$: MOV     #PA1500,-(SP) ;:PUSH ADR OF 22 BIT ADR
13286 055564 004737 057670  JSR     PC,@#$DB20  ;:CONVERT TO ASCII
13287 055570 062716 000003  ADD     #3,(SP)    ;:DELETE LEADING ZEROS
13288 055574 012667 000002  MOV     (SP)+,12$  ;:GET ADR OF ASCII STRING
13289 055600 104400      TYPE
13290 055602 000000      12$: .WORD
13291 055604 062701 000002  ADD     #2,R1     ;:INCREMENT R1
13292 055610 000753      BR      13$
13293      ;;*****
13294      ;:DATA FORMAT 2
13295 055612 005202      11$: INC     R2      ;:INCREMENT FORMAT POINTER
13296 055614 011100      MOV     (R1),R0
13297 055616 012037 001574  MOV     (R0)+,@#PA1500
13298 055622 011037 001576  MOV     (R0),@#PA2116
13299 055626 000754      BR      14$
13300      ;;*****
13301      ;:DATA FORMAT 3
13302 055630 005202      24$: INC     R2      ;:INCREMENT FORMAT POINTER

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13303 055632 013167 000016      MOV      @ (R1)+,25$      ;GET DEVICE ID
13304 055636 062767 064572 000010  ADD      #MSGINX,25$     ;FORM ADR OF ASCIZ ADR
13305 055644 017767 000004 000002  MOV      @25$,25$       ;GET ADR OF ASCIZ
13306 055652 104400                TYPE
13307 055654 000000                25$: .WORD
13308 055656 000730                BR      13$              ;CONTINUE
13309
13310 ;*****
13311 055660 005202                ;DATA FORMAT 4
13312 055662 012167 000002                40$: INC      R2
13313 055666 104424                MOV      (R1)+,44$      ;GET ADDRESS OF DATA
13314 055670 000000                FL20     ;CONVERT TO FLOATING FORMAT
13315 055672 012667 000002                44$: MOV      (SP)+,45$   ;GET ADDRESS OF ASCIZ STRING
13316 055676 104400                TYPE     ;TYPE THE DATA
13317 055700 000000                45$: .WORD
13318 055702 000716                BR      13$
13319 ;*****
13320 ;DATA FORMAT 5
13321 055704 005202                60$: INC      R2
13322 055706 012167 000002                MOV      (R1)+,61$     ;INCREMENT FORMAT POINTER
13323 055712 104426                FLD20   ;GET ADDRESS OF DATA
13324 055714 000000                61$: .WORD     ;CONVERT TO FLOATING ASCIZ
13325 055716 012667 000002                MOV      (SP)+,62$     ;GET ADDRESS OF ASCIZ STRING
13326 055722 104400                TYPE     ;TYPE THE DATA
13327 055724 000000                62$: .WORD
13328 055726 000704                BR      13$
13329 ;*****
13330 ;ERROR 7 DECODE
13331 055730 010300                15$: MOV      R3,R0      ;SAVE R3
13332 055732 062700 064572  ADD      #MSGINX,R0     ;GEN ADRS OF ASCIZ
13333 055736 011067 000002  MOV      (R0),16$
13334 055742 104400                TYPE
13335 055744 000000                16$: .WORD
13336 055746 104400 055754                TYPE     ;TYPE ASCIZ STRING
13337 (1) 055752 000404                BR      65$             ;GET OVER THE ASCIZ
13338 (1)
13339 (1) 055764                ;:65$: .ASCIZ /FAILED/<CRLF>
13340 055764 010300                64$: MOV      R3,R0      ;SAVE DEVICE ID
13341 055766 022700 000010  CMP      #10,R0         ;MASS BUS DEVICE?
13342 055772 003403                BLE      17$            ;BRANCH IF YES
13343 055774 104400 064761                TYPE     ,MSG12
13344 056000 000411                BR      18$
13345 ;*****
13346 ;MASS BUS ERR
13347 056002 022703 000020                17$: CMP      #20,R3     ;MBT ERROR?
13348 056006 001426                BEQ      26$            ;BRANCH IF MBT ERROR
13349 056010 002435                BLT      27$            ;BRANCH IF UBE ERROR
13350 056012 104400 065074                TYPE     ,MSG13
13351 056016 022700 000012                CMP      #12,R0         ;WAS IT RS?
13352 056022 001140                BNE      29$            ;BRANCH IF NO
13353 ;*****
13354 ;UNIBUS ERROR OR RSO4 ERROR
13355 056024 062700 064546                18$: ADD      #REGINX,R0   ;FORM ADR OF REG TABLE
13356 056030 011000                MOV      (R0),R0        ;GET ADR OF REG TABLE
13357 056032 022703 000002                CMP      #2,R3          ;RP3 OR RK?
13358 056036 001404                BEQ      20$            ;BRANCH IF RK

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13356 056040 100406          BMI      21$          ;BRANCH IF NOT RPO3
13357 056042 012704 000007    MOV      #7,R4        ;SET RPO3 SOB COUNT
13358 056046 000423          SR       22$
13359 056050 012704 000006    20$:    MOV      #6,R4        ;SET RK05 SOB COUNT
13360 056054 000420          BR       22$
13361 056056 012704 000011    21$:    MOV      #11,R4       ;SET RS04 SOB COUNT
13362 056062 000415          BR       22$
13363
13364
13365 056064 104400 065263    26$:    TYPE     ,MSG16
13366 056070 012704 000011    MOV      #11,R4        ;SET MBT SOB COUNT
13367 056074 062700 064546    28$:    ADD      #REGINX,R0
13368 056100 011000          MOV      (R0),R0       ;GET ADR OF MBT TABLE
13369 056102 000405          BR       22$           ;GO TYPE REGISTERS
13370
13371 056104 104400 065372    ;UNIBUS EXERCISER ERROR
13372 056110 012704 000004    27$:    TYPE     ,MSG17
13373 056114 000767          MOV      #4,R4        ;SET UBE SOB COUNT
13374 056116 013046          BR       28$           ;GO TYPE UBE REGISTERS
13375 056120 104402          22$:    MOV      @ (R0)+, -(SP) ;GET DATA IN REG
13376 056122 104400 056404    TYPOC
13377 056126 077405          TYPE     .8$          ;TYPE TWO SPACES
13378          SOB      R4,22$    ;CONTINUE
13379
13380
13381 056130 022703 000022    ;THIS CODE TYPES A PHYSICAL BUS ADDRESS IF THE ERROR WAS AN RPO3, RK05, OR UBE
13382 056134 001454          CMP      #22,R3        ;UBE ERROR?
13383 056136 022703 000002    BEQ      73$           ;BRANCH IF YES
13384 056142 002445          CMP      #2,R3        ;RK05?
13385 056144 001005          BLT     32$           ;BRANCH IF NOT RK OR RPO3
13386          BNE     70$           ;BRANCH IF RPO3
13387 056146 104400 065566    ;RK05 ERROR
13388 056152 012700 002236    TYPE     ,MSG22
13389 056156 000404          MOV      #RKCS,R0     ;GET ADR OF ADR OF RKCS REG
13390          BR       71$
13391 056160 012700 002214    ;RPO3 ERROR
13392 056164 104400 065576    70$:    MOV      #RP3CS,R0   ;GET ADR OF ADR OF RP3CS REG
13393          TYPE     ,MSG23
13394 056170 013001          ;GET, CALCULATE, & TYPE PHYSICAL BUS ADDRESS
13395 056172 005720          71$:    MOV      @ (R0)+,R1   ;GET BUS ADR EXTENDED BITS
13396 056174 013037 002002    TST     (R0)+         ;ADJUST R0
13397 056200 072127 177774    MOV      @ (R0)+, @ERRBA ;GET BUS ADDRESS THAT FAILED
13398 056204 042701 177774    ASH     # -4,R1       ;GET BITS 4&5 INTO BITS 0&1
13399 056210 010137 002004    BIC     #177774,R1    ;GET RID OF UNUSED BITS
13400 056214 162737 000002 002002 74$:    MOV      R1, @ERRBA+2 ;SAVE EXTENDED BITS
13401 056222 005637 002004    SUB     #2, @ERRBA    ;DECREMENT BUS ADR
13402 056226 004737 062450    SBC     @ERRBA+2
13403 056232 012746 001574    JSR     PC, @PHYMAP   ;GO CONVERT TO 22 BIT PHYSICAL
13404 056236 004737 057670    MOV     #PA1500, -(SP)
13405 056242 062716 000003    JSR     PC, @SDB20   ;CONVERT TO ASCIZ STRING
13406 056246 012667 000002    ADD     #3, (SP)     ;GET RID OF LEADING ZEROS
13407 056252 104400          MOV     (SP)+, 72$
13408 056254 000000          TYPE     .WORD
13409 056256 104400 001407    32$:    TYPE     ,SCLF
13410 056262 000167 177174    JMP     6$           ;EXIT
13411
;GET UBE VIRTUAL ADDRESS

```

13412	056266	012700	002342
13413	056272	013037	002002
13414	056276	013037	002004
13415	056302	042737	177774 002004
13416	056310	162737	000002 002002
13417	056316	005637	002004
13418	056322	000734	
13419			
13420			
13421	056324	062700	064546
13422	056330	011000	
13423	056332	012704	000011
13424	056336	013046	
13425	056340	104402	
13426	056342	104400	056404
13427	056346	077405	
13428	056350	104400	001407
13429	056354	104400	001407
13430	056360	012704	000004
13431	056364	104400	065204
13432	056370	013046	
13433	056372	104402	
13434	056374	104400	056404
13435	056400	077405	
13436	056402	000725	
13437	056404	020040	000
13438		056410	
13439			

```

73$:  MOV    #UBETBL+2,R0    ;GET ADR OF UBE TABLE +2
      MOV    @ (R0)+,@#ERRBA ;GET BUS ADR THAT FAILED
      MOV    @ (R0)+,@#ERRBA+2;GET BAE BITS
      BIC    #177774,@#ERRBA+2;MASK OFF ADR BITS
      SUB    #2,@#ERRBA
      SBC    @#ERRBA+2
      BR     74$             ;GO CONVERT & TYPE PHYSICAL ADR
;*****
:RPO4 ERROR
29$:  ADD    #REGINX,R0
      MOV    (R0),R0        ;FORM ADR OF RPO4 TABLE
      MOV    #11,R4         ;SET SOB COUNT
31$:  MOV    @ (R0)+,-(SP)   ;GET DATA TO BE TYPED
      TYPOC ;TYPE DATA
      TYPE   ,8$
      SOB   R4,31$         ;CONTINUE
      TYPE   , $CRLF
      TYPE   , $CRLF
      MOV    #4,R4         ;SET SOB COUNT
50$:  MOV    @ (R0)+,-(SP)   ;GET DTA TO BE TYPED
      TYPOC ;TYPE IT
      TYPE   ,8$
      SOB   R4,50$        ;CONTINUE
      BR     32$
8$:   .ASCIZ / /           ;;TWO(2) SPACES
      .EVEN
;*****

```

.SBTTL TYPE ROUTINE

```

;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
;*NOTE1:   $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
;*NOTE2:   $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
;*NOTE3:   $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
;*
;*CALL:
;*1) USING A TRAP INSTRUCTION
;*    TYPE    ,MESADR      ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
;*OR
;*    TYPE
;*    MESADR
;*
;*2) USING A JSR INSTRUCTION
;*    MOV    PS,-(SP)      ;;PUSH PROCESSOR STATUS WORD ON THE STACK
;*    JSR    PC,$TYPE      ;;CALL TYPE ROUTINE
;*    MESADDR              ;;FIRST ADDRESS OF MESSAGE
;
;$TYPE: TSTB  $TPFLG      ;;IS THERE A TERMINAL?
      BPL   1$           ;;BR IF YES
      HALT ;HALT HERE IF NO TERMINAL
      BR   3$           ;;LEAVE
1$:  MOV    R0,-(SP)      ;;SAVE R0
      MOV    @2(SP),R0    ;;GET ADDRESS OF ASCIZ STRING
2$:  MOVB   (R0)+,-(SP)  ;;PUSH CHARACTER TO BE TYPED ONTO STACK

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(1)			
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(1)	056410	105767	122707
(1)	056414	100002	
(1)	056416	000000	
(1)	056420	000407	
(1)	056422	010046	
(1)	056424	017600	000002
(1)	056430	112046	

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(1) 056432 001005      BNE      4$          ;;BR IF IT ISN'T THE TERMINATOR
(1) 056434 005726      TST      (SP)+      ;;IF TERMINATOR POP IT OFF THE STACK
(1) 056436 012600      MOV      (SP)+,R0   ;;RESTORE R0
(1) 056440 062716 000002 3$:      ADD      #2,(SP)   ;;ADJUST RETURN PC
(1) 056444 000002      RTI                     ;;RETURN
(1) 056446 122716 000011 4$:      CMPB    #HT,(SP)   ;;BRANCH IF <HT>
(1) 056452 001426      BEQ      8$          ;;BRANCH IF NOT
(1) 056454 122716 000200      CMPB    #CRLF,(CP) ;;BRANCH IF NOT
(1) 056460 001004      BNE      5$          ;;BRANCH IF NOT
(1) 056462 005726      TST      (SP)+      ;;POP <CR><LF> EQUIV
(1) 056464 104400 001407      TYPE    $CRLF
(1) 056470 000757      BR       2$          ;;GET NEXT CHARACTER
(1) 056472 004767 000056 5$:      JSR     PC,$TYPEC   ;;GO TYPE THIS CHARACTER
(1) 056476 126726 122620 6$:      CMPB    $FILLC,(SP)+ ;;IS IT TIME FOR FILLER CHARS.?
(1) 056502 001352      BNE      2$          ;;IF NO GO GET NEXT CHAR.
(1) 056504 016746 122610      MOV     $NULL,-(SP) ;;GET # OF FILLER CHARS. NEEDED
(1)                                ;;AND THE NULL CHAR.
(1) 056510 105366 000001 7$:      DECB    1(SP)      ;;DOES A NULL NEED TO BE TYPED?
(1) 056514 002770      BLT     6$          ;;BR IF NO--GO POP THE NULL OFF OF STACK
(1) 056516 004767 000032      JSR     PC,$TYPEC   ;;GO TYPE A NULL
(1) 056522 105367 000100      DECB    $CHARCNT   ;;DON'T COUNT THE NULL AS A CHARACTER
(1) 056526 000770      BR      7$          ;;LOOP
(1)
(1)                                ;;HORIZONTAL TAB PROCESSOR
(1)
(1) 056530 112716 000040 8$:      MOVB    #' ,(SP)   ;;REPLACE TAB WITH SPACE
(1) 056534 004767 000014 9$:      JSR     PC,$TYPEC   ;;TYPE A SPACE
(1) 056540 132767 000007 000060      BITB    #7,$CHARCNT ;;BRANCH IF NOT AT
(1) 056546 001372      BNE     9$          ;;TAB STOP
(1) 056550 005726      TST     (SP)+      ;;POP SPACE OFF STACK
(1) 056552 000726      BR      2$          ;;GET NEXT CHARACTER
(1) 056554 005737 001546 $TYPEC: TST     @NOTYPE ;;INHIBIT TYPING?
(1) 056560 100423      BMI     $TYPEX     ;;BRANCH IF YES
(1) 056562 105777 122526      TSTB    @STPS     ;;WAIT UNTIL PRINTER IS READY
(1) 056566 100372      BPL     $TYPEC
(1) 056570 116677 000002 122520      MOVB    2(SP),@STPB ;;LOAD CHAR TO BE TYPED INTO DATA REG.
(1) 056576 122766 000015 000002      CMPB    #CR,2(SP)  ;;BRANCH IF
(1) 056604 001003      BNE     1$          ;;NOT <CR>
(1) 056606 105067 000014      CLRB    $CHARCNT  ;;
(1) 056612 000406      BR      $TYPEX     ;;EXIT
(1) 056614 122766 000012 000002 1$:      CMPB    #LF,2(SP)  ;;BRANCH IF
(1) 056622 001402      BEQ     $TYPEX     ;;<LF>
(1) 056624 105227      INCB    (PC)+     ;;INC SPACE
(1) 056626 000000      $CHARCNT: .WORD  0 ;;COUNT
(1) 056630 000207      $TYPEX: RTS      PC
(1)
13440      ;;*****
13441      ;;SBTTL ROUTINE TO TYPE THE ELAPSED RUN TIME OF THE PROGRAM
13442      ;; THIS ROUTINE CONVERTS THE CONTENTS OF LOCATIONS 'LTICKS'
13443      ;; AND 'MTICKS' TO SECONDS AND MINUTES/HOURS RESPECTIVELY
13444      ;; AND TYPES THEM IN THE FOLLOWING FORMAT:
13445      ;;          HH:MM:SS
13446      ;;*****
13447      TYPTIME: SAVREG
13448      JSR     PC,@#LDKT ;;GO BACK TO LOW CORE
13449      MOVB    @#LTICKS+1,R1 ;;GET SECOND COUNT

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13450 056644 005000 CLR R0
13451 056646 071027 000012 DIV #10.,R0
13452 056652 062701 000060 ADD #60,R1
13453 056656 110137 057070 MOVB R1,@#TIMEBUF+10
13454 056662 010001 MOV R0,R1
13455 056664 005000 CLR R0
13456 056666 071027 000006 DIV #6,R0
13457 056672 062701 000060 ADD #60,R1
13458 056676 110137 057067 MOVB R1,@#TIMEBUF+7
13459 056702 013701 001676 MOV @#MTICKS,R1 ;GET MINUTE COUNT
13460 056706 005000 CLR R0
13461 056710 071027 000012 DIV #10.,R0 ;GET HOURS AND MINUTES
13462 056714 062701 000060 ADD #60,R1 ;MAKE REMAINDER ASCII
13463 056720 110167 000141 MOVB R1,TIMEBUF+5 ;PUT IN BUFFER
13464 056724 010001 MOV R0,R1
13465
13466 056726 005000 CLR R0
13467 056730 071027 000006 DIV #6.,R0
13468 056734 062701 000060 ADD #60,R1
13469 056740 110167 000120 MOVB R1,TIMEBUF+4
13470 056744 005700 TST R0
13471 056746 001434 BEQ 2$
13472 056750 010001 MOV R0,R1
13473
13474 056752 005000 CLR R0
13475
13476 056754 071027 000012 DIV #10.,R0
13477 056760 062701 000060 ADD #60,R1
13478 056764 110167 000072 MOVB R1,TIMEBUF+2
13479 056770 005700 TST R0
13480 056772 001422 BEQ 2$
13481 056774 010001 MOV R0,R1
13482 056776 005000 CLR R0
13483 057000 071027 000010 DIV #10,R0
13484 057004 062701 000060 ADD #60,R1
13485 057010 110167 000045 MOVB R1,TIMEBUF+1
13486 057014 005700 TST R0
13487 057016 001410 BEQ 2$
13488 057020 010001 MOV R0,R1
13489 057022 005000 CLR R0
13490 057024 071027 000012 DIV #10.,R0
13491 057030 062701 000060 ADD #60,R1
13492 057034 110167 000020 MOVB R1,TIMEBUF
13493 057040 104400 057060 2$: TYPE ,TIMEBUF
13494 057044 104400 001407 TYPE ,$CRLF
13495 057050 004737 064202 JSR PC,@#RESKT ;GO BACK TO ORIGINAL MEMORY
13496 057054 104422 RESREG
13497 057056 000207 RTS PC
13498 057060 001 001 001 TIMEBUF:.BYTE 1,1,1,72,1,1,72,60,60,0
057063 072 001 001
057066 072 060 060
057071 000

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13499 .EVEN
13500 ;*****
13501 ;SBTTL ROUTINE TO TYPE THE AVAILABLE DEVICES AND UNIT NUMBERS
13502 ;* THIS ROUTINE SEARCHES THE SYSTEM SIZE TABLE FOR NON-

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13503      ;*      ZERO ENTRIES.WHEN IT FINDS ONE, IT TYPES THE NAME OF THE
13504      ;*      DEVICE AND THE UNIT NUMBERS THAT WERE FOUND TO BE
13505      ;*      AVAILABLE FOR THAT DEVICE.
13506      ;*****
13507 057072 104400 067330  TYPsiz: TYPE      ,SWITCH
13508 057076 104400 070651  TYPE      ,MSG30      ;NOTE SWITCH REG BIT 8 REVERSAL
13509 057102 104400 070516  TYPE      ,MSG4
13510 057106 012700 000010  MOV      #10,R0      ;SET SOB COUNT
13511 057112 005001  CLR      R1
13512 057114 105761 001712  1$: TSTB     SYSSize(R1) ;DEVICE AVAILABLE?
13513 057120 001004  BNE     2$           ;BRANCH IF YES
13514 057122 062701 000002  7$: ADD     #2,R1      ;INCREMENT INDEX
13515 057126 077006  SOB     R0,1$       ;CONTINUE
13516 057130 000207  RTS     PC          ;RETURN
13517 057132 010102  2$: MOV     R1,R2      ;GET INDEX
13518 057134 062702 064572  ADD     #MSGINX,R2   ;GET ADR OF MESSAGE ADR
13519 057140 011267 000002  MOV     (R2),3$     ;GET ADDRESS OF MESSAGE
13520 057144 104400  TYPE
13521 057146 000000  3$: .WORD
13522 057150 112767 000060 000034  MOVB    #60,4$      ;INIT UNIT NO. BUFFER (ASCII)
13523 057156 116102 001712  MOVB    SYSSize(R1),R2 ;GET WORD WITH AVAILABLE UNITS
13524 057162 012703 000010  MOV     #10,R3      ;SET SOB COUNT
13525 057166 006002  6$: ROR     R2        ;GET UNITS
13526 057170 103002  BCC     5$          ;BRANCH IF NOT A UNIT
13527 057172 104400 057212  TYPE     ,4$
13528 057176 005267 000010  5$: INC     4$
13529 057202 077307  SOB     R3,6$       ;CONTINUE
13530 057204 104400 001407  TYPE     ,$CRLF
13531 057210 000744  BR      7$
13532 057212 000 054 040 4$: .BYTE 0,54,40,0 ;NUMBER,COMMA,SPACE,TERMINATOR
057215 000

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13533      ;*****
(1)      .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
(1)
(1)      ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
(1)      ;*OCTAL (ASCII) NUMBER AND TYPE IT.
(1)      ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
(1)      ;*CALL:
(1)      ;*      MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
(1)      ;*      TYPOS      ;;CALL FOR TYPEOUT
(1)      ;*      .BYTE  N      ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
(1)      ;*      .BYTE  M      ;;M=1 OR 0
(1)      ;*      ;;1=TYPE LEADING ZEROS
(1)      ;*      ;;0=SUPPRESS LEADING ZEROS
(1)      ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
(1)      ;*$TYPOS OR $TYPOC
(1)      ;*CALL:
(1)      ;*      MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
(1)      ;*      TYPON      ;;CALL FOR TYPEOUT
(1)      ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
(1)      ;*CALL:
(1)      ;*      MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
(1)      ;*      TYPOC      ;;CALL FOR TYPEOUT

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(1)
(1) 057216 017646 000000 $TYPOS: MOV @ (SP), -(SP) ;; PICKUP THE MODE
(1) 057222 116667 000001 000211 MOVB 1 (SP), $OFILL ;; LOAD ZERO FILL SWITCH
(1) 057230 112667 000207 MOVB (SP)+, $SOMODE+1 ;; NUMBER OF DIGITS TO TYPE
(1) 057234 062716 000002 ADD #2, (SP) ;; ADJUST RETURN ADDRESS
(1) 057240 000406 $TYPON BR $TYPON
(1) 057242 112767 000001 000171 $TYPOC: MOVB #1, $OFILL ;; SET THE ZERO FILL SWITCH
(1) 057250 112767 000006 000165 MOVB #6, $SOMODE+1 ;; SET FOR SIX(6) DIGITS
(1) 057256 112767 000005 000154 $TYPON: MOVB #5, $OCNT ;; SET THE ITERATION COUNT
(1) 057264 010346 MOV R3, -(SP) ;; SAVE R3
(1) 057266 010446 MOV R4, -(SP) ;; SAVE R4
(1) 057270 010546 MOV R5, -(SP) ;; SAVE R5
(1) 057272 116704 000145 MOVB $SOMODE+1, R4 ;; GET THE NUMBER OF DIGITS TO TYPE
(1) 057276 005404 NEG R4
(1) 057300 062704 000006 ADD #6, R4 ;; SUBTRACT IT FOR MAX. ALLOWED
(1) 057304 110467 000132 MOVB R4, $SOMODE ;; SAVE IT FOR USE
(1) 057310 116704 000125 MOVB $OFILL, R4 ;; GET THE ZERO FILL SWITCH
(1) 057314 016605 000012 MOV 12 (SP), R5 ;; PICKUP THE INPUT NUMBER
(1) 057320 005003 CLR R3 ;; CLEAR THE OUTPUT WORD
(1) 057322 006105 1$: ROL R5 ;; ROTATE MSB INTO 'C'
(1) 057324 000404 BR 3$ ;; GO DO MSB
(1) 057326 006105 2$: ROL R5 ;; FORM THIS DIGIT
(1) 057330 006105 ROL R5
(1) 057332 006105 ROL R5
(1) 057334 010503 MOV R5, R3
(1) 057336 006103 3$: ROL R3 ;; GET LSB OF THIS DIGIT
(1) 057340 105367 000076 DECB $SOMODE ;; TYPE THIS DIGIT?
(1) 057344 100016 BPL 7$ ;; BR IF NO
(1) 057346 042703 177770 BIC #177770, R3 ;; GET RID OF JUNK
(1) 057352 001002 BNE 4$ ;; TEST FOR 0
(1) 057354 005704 TST R4 ;; SUPPRESS THIS 0?
(1) 057356 001403 BEQ 5$ ;; BR IF YES
(1) 057360 005204 4$: INC R4 ;; DON'T SUPPRESS ANYMORE 0'S
(1) 057362 052703 000060 BIS #'0, R3 ;; MAKE THIS DIGIT ASCII
(1) 057366 052703 000040 5$: BIS #'1, R3 ;; MAKE ASCII IF NOT ALREADY
(1) 057372 110367 000040 MOVB R3, 8$ ;; SAVE FOR TYPING
(1) 057376 104400 057436 TYPE 8$ ;; GO TYPE THIS DIGIT
(1) 057402 105367 000032 7$: DECB $OCNT ;; COUNT BY 1
(1) 057406 003347 BGT 2$ ;; BR IF MORE TO DO
(1) 057410 002402 BLT 6$ ;; BR IF DONE
(1) 057412 005204 INC R4 ;; INSURE LAST DIGIT ISN'T A BLANK
(1) 057414 000744 BR 2$ ;; GO DO THE LAST DIGIT
(1) 057416 012605 6$: MOV (SP)+, R5 ;; RESTORE R5
(1) 057420 012604 MOV (SP)+, R4 ;; RESTORE R4
(1) 057422 012603 MOV (SP)+, R3 ;; RESTORE R3
(1) 057424 016666 000002 000004 MOV 2 (SP), 4 (SP) ;; SET THE STACK FOR RETURNING
(1) 057432 012616 MOV (SP)+, (SP)
(1) 057434 000002 RTI ;; RETURN
(1) 057436 000 8$: .BYTE 0 ;; STORAGE FOR ASCII DIGIT
(1) 057437 000 .BYTE 0 ;; TERMINATOR FOR TYPE ROUTINE
(1) 057440 000 $OCNT: .BYTE 0 ;; OCTAL DIGIT COUNTER
(1) 057441 000 $OFILL: .BYTE 0 ;; ZERO FILL SWITCH
(1) 057442 000000 $SOMODE: .WORD 0 ;; NUMBER OF DIGITS TO TYPE
13534 ;; *****
(1)
(1) .SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

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(1)
(1)      ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
(1)      ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
(1)      ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
(1)      ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
(1)      ;*REPLACED WITH SPACES.
(1)      ;*CALL:
(1)      ;*      MOV      NUM,-(SP)      ;;PUT THE BINARY NUMBER ON THE STACK
(1)      ;*      TYPDS      ;;GO TO THE ROUTINE
(1)
(1)      $TYPDS:
(3) 057444      MOV      R0,-(SP)      ;;PUSH R0 ON STACK
(3) 057446      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
(3) 057450      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
(3) 057452      MOV      R3,-(SP)      ;;PUSH R3 ON STACK
(3) 057454      MOV      R5,-(SP)      ;;PUSH R5 ON STACK
(1) 057456      MOV      #20200,-(SP)  ;;SET BLANK SWITCH AND SIGN
(1) 057462      MOV      20(SP),R5    ;;GET THE INPUT NUMBER
(1) 057466      BPL      1$          ;;BR IF INPUT IS POS.
(1) 057470      NEG      R5          ;;MAKE THE BINARY NUMBER POS.
(1) 057472      MOV      #'-,1(SP)    ;;MAKE THE ASCII NUMBER NEG.
(1) 057500      CLR      R0          ;;ZERO THE CONSTANTS INDEX
(1) 057502      MOV      #$DBLK,R3    ;;SETUP THE OUTPUT POINTER
(1) 057506      MOV      #'',(R3)+    ;;SET THE FIRST CHARACTER TO A BLANK
(1) 057512      CLR      R2          ;;CLEAR THE BCD NUMBER
(1) 057514      MOV      $DTBL(R0),R1  ;;GET THE CONSTANT
(1) 057520      SUB      R1,R5        ;;FORM THIS BCD DIGIT
(1) 057522      BLT      4$          ;;BR IF DONE
(1) 057524      INC      R2          ;;INCREASE THE BCD DIGIT BY 1
(1) 057526      BR      3$
(1) 057530      4$:      ADD      R1,R5    ;;ADD BACK THE CONSTANT
(1) 057532      TST      R2          ;;CHECK IF BCD DIGIT=0
(1) 057534      BNE      5$          ;;FALL THROUGH IF 0
(1) 057536      TSTB   (SP)          ;;STILL DOING LEADING 0'S?
(1) 057540      BMI      7$          ;;BR IF YES
(1) 057542      5$:      ASLB   (SP)    ;;MSD?
(1) 057544      BCC      6$          ;;BR IF NO
(1) 057546      MOV      1(SP),-1(R3)  ;;YES--SET THE SIGN
(1) 057554      BIS      #'0,R2      ;;MAKE THE BCD DIGIT ASCII
(1) 057560      BIS      #' ,R2      ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
(1) 057564      MOV      R2,(R3)+    ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
(1) 057566      TST      (R0)+        ;;JUST INCREMENTING
(1) 057570      CMP      R0,#10      ;;CHECK THE TABLE INDEX
(1) 057574      BLT      2$          ;;GO DO THE NEXT DIGIT
(1) 057576      BGT      8$          ;;GO TO EXIT
(1) 057600      MOV      R5,R2        ;;GET THE LSD
(1) 057602      BR      6$          ;;GO CHANGE TO ASCII
(1) 057604      8$:      TSTB   (SP)+  ;;WAS THE LSD THE FIRST NON-ZERO?
(1) 057606      BPL      9$          ;;BR IF NO
(1) 057610      MOV      -1(SP),-2(R3)  ;;YES--SET THE SIGN FOR TYPING
(1) 057616      9$:      CLRB   (R3)    ;;SET THE TERMINATOR
(3) 057620      MOV      (SP)+,R5    ;;POP STACK INTO R5
(3) 057622      MOV      (SP)+,R3    ;;POP STACK INTO R3
(3) 057624      MOV      (SP)+,R2    ;;POP STACK INTO R2
(3) 057626      MOV      (SP)+,R1    ;;POP STACK INTO R1
(3) 057630      MOV      (SP)+,R0    ;;POP STACK INTO R0
    
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(1) 057632 104400 057660          TYPE      $DBLK      ;;NOW TYPE THE NUMBER
(1) 057636 016666 000002 C00004  MOV      2(SP),4(SP)  ;;ADJUST THE STACK
(1) 057644 012616          MOV      (SP)+,(SP)
(1) 057646 000002          RTI              ;;RETURN TO USER
(1) 057650 023420          SDBTL: 10000.
(1) 057652 001750          1000.
(1) 057654 000144          100.
(1) 057656 000012          10.
(1) 057660 000004          SDBLK: .BLKW 4
13535 ;;*****
(1) .SBTTL DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
(1)
(1) ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
(1) ;*UNSIGNED OCTAL ASCII NUMBER.
(1) ;*CALL
(1) ;*   MOV      #PNTR,-(SP)      ;;POINTER TO LOW WORD OF BINARY NUMBER
(1) ;*   JSR      PC,@#$DB20      ;;CALL THE ROUTINE
(1) ;*   RETURN                    ;;THE ADDRESS OF THE FIRST ASCII CHAR. IS ON THE STACK
(1)
(1) 057670 104420          SDB20: SAVREG      ;;SAVE ALL REGISTERS
(1) 057672 016601 000002      MOV      2(SP),R1    ;;PICKUP THE POINTER TO LOW WORD
(1) 057676 012705 060025      MOV      #SOCTVL+13.,R5 ;;POINTER TO DATA TABLE
(1) 057702 012704 000014      MOV      #12.,R4     ;;DO ELEVEN CHARACTERS
(1) 057706 012703 177770      MOV      #^C7,R3     ;;MASK
(1) 057712 012100          MOV      (R1)+,R0    ;;LOWER WORD
(1) 057714 012101          MOV      (R1)+,R1    ;;HIGH WORD
(1) 057716 005002          CLR      R2          ;;TERMINATOR
(1) 057720 110245          1$: MOVB      R2,-(R5)  ;;PUT CHARACTER IN DATA TABLE
(1) 057722 010002          MOV      R0,R2       ;;GET THIS DIGIT
(1) 057724 005304          DEC      R4          ;;COUNT THIS CHARACTER
(1) 057726 003016          BGT      3$          ;;BR IF NOT THE LAST DIGIT
(1) 057730 001414          BEQ      2$          ;;BR IF IT IS THE LAST DIGIT
(1) 057732 005205          INC      R5          ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
(1) 057734 010566 000002      MOV      R5,2(SP)    ;;ASCII CHAR. & PUT IT ON THE STACK
(1) 057740 122765 000061 000005  CMPB     #61,3(R5)   ;;LAST NUMBER LEGAL?
(1) 057746 002003          BGE      4$          ;;BRANCH IF YES
(1) 057750 112765 000060 000003  MOVB     #60,3(R5)   ;;MAKE IT ZERO
(1) 057756 104422          4$: RESREG      ;;RESTORE ALL REGISTERS
(1) 057760 000207          RTS      PC          ;;RETURN TO USER
(1) 057762 006203          2$: ASR      R3          ;;POSITION THE MASK FOR THE LAST DIGIT
(1) 057764 006001          3$: ROR      R1          ;;POSITION THE BINARY NUMBER FOR
(1) 057766 006000          ROR      R0          ;; THE NEXT OCTAL DIGIT
(1) 057770 006001          ROR      R1
(1) 057772 006000          ROR      R0
(1) 057774 006001          ROR      R1
(1) 057776 006000          ROR      R0
(1) 060000 040302          BIC      R3,R2       ;;MASK OUT ALL JUNK
(1) 060002 062702 000060      ADD      #'0,R2      ;;MAKE THIS CHAR. ASCII
(1) 060006 000744          BR       1$          ;;GO PUT IT IN THE DATA TABLE
(1) 060010 000016          SOCTVL: .BLKB 14.   ;;RESERVE DATA TABLE
13536 ;;*****
(1) .SBTTL SAVE AND RESTORE R0-R5 ROUTINES
(1)
(1)

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(1)          ;*SAVE R0-R5
(1)          ;*CALL:
(1)          ;*   SAVREG
(1)          ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
(1)          ;*
(1)          ;*TOP---(+16)
(1)          ;* +2---(+18)
(1)          ;* +4---R5
(1)          ;* +6---R4
(1)          ;* +8---R3
(1)          ;*+10---R2
(1)          ;*+12---R1
(1)          ;*+14---R0

(1) 060026   $SAVREG:
(3) 060026   MOV     R0,-(SP)      ;;PUSH R0 ON STACK
(3) 060030   MOV     R1,-(SP)      ;;PUSH R1 ON STACK
(3) 060032   MOV     R2,-(SP)      ;;PUSH R2 ON STACK
(3) 060034   MOV     R3,-(SP)      ;;PUSH R3 ON STACK
(3) 060036   MOV     R4,-(SP)      ;;PUSH R4 ON STACK
(3) 060040   MOV     R5,-(SP)      ;;PUSH R5 ON STACK
(1) 060042   MOV     22(SP),-(SP)  ;;SAVE PS OF MAIN FLOW
(1) 060046   MOV     22(SP),-(SP)  ;;SAVE PC OF MAIN FLOW
(1) 060052   MOV     22(SP),-(SP)  ;;SAVE PS OF CALL
(1) 060056   MOV     22(SP),-(SP)  ;;SAVE PC OF CALL
(1) 060062   RTI

(1)          ;*RESTORE R0-R5
(1)          ;*CALL:
(1)          ;*   RESREG
(1) 060064   $RESREG:
(1) 060064   MOV     (SP)+,22(SP)  ;;RESTORE PC OF CALL
(1) 060070   MOV     (SP)+,22(SP)  ;;RESTORE PS OF CALL
(1) 060074   MOV     (SP)+,22(SP)  ;;RESTORE PC OF MAIN FLOW
(1) 060100   MOV     (SP)+,22(SP)  ;;RESTORE PS OF MAIN FLOW
(3) 060104   MOV     (SP)+,R5      ;;POP STACK INTO R5
(3) 060106   MOV     (SP)+,R4      ;;POP STACK INTO R4
(3) 060110   MOV     (SP)+,R3      ;;POP STACK INTO R3
(3) 060112   MOV     (SP)+,R2      ;;POP STACK INTO R2
(3) 060114   MOV     (SP)+,R1      ;;POP STACK INTO R1
(3) 060116   MOV     (SP)+,R0      ;;POP STACK INTO R0
(1) 060120   RTI

13537       ;*****
13538       ;SBTTL CONVERT FLOATING BINARY TO OCTAL ASCIZ
13539       ;*
13540       ;*THIS ROUTINE CONVERTS A 32 BIT FLOATING NUMBER TO AN OCTAL
13541       ;*ASCIZ STRING IN THE FOLLOWING FORMAT:
13542       ;*
13543       ;*           W XXX YYY ZZZZZZ
13544       ;*
13545       ;*   WHERE  W - SIGN BIT
13546       ;*           X = 8-BIT EXPONENT (RIGHT JUSTIFIED)
13547       ;*           Y = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
13548       ;*           Z = FRACTION BITS <50:35>
13549       ;*
13550       ;*IT IS ENTERED BY A TRAP CALL WITH THE ADDRESS OF THE FLOATING
    
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13551 ;*NUMBER IN THE WORD FOLLOWING THE CALL.
13552 ;*IT RETURNS WITH THE ADDRESS OF THE ASCIZ STRING ON THE STACK.
13553 ;*****
13554 $FL20: SAVREG
13555 060122 104420 000000 MOV @ (SP),R0 ;GET ADDRESS OF DATA
13556 060130 062716 000002 ADD #2,(SP) ;ADJUST RETURN PC
13557 060134 016001 000002 MOV 2(R0),R1 ;PUT SECOND DATA WORD IN R1
13558 060140 011000 MOV (R0),R0 ;PUT FIRST DATA WORD IN R0
13559 060142 012704 001437 MOV #$FLBUFF+23,R4 ;GET ADDRESS OF BUFFER END IN R4
13560 060146 112744 000000 MOVB #0,-(R4) ;PUT TERMINATOR IN BUFFER
13561 060152 012705 000005 MOV #5,R5 ;SET SOB COUNT FOR FRACTION DIGITS
13562 060156 010103 1$: MOV R1,R3 ;GET LSB'S OF FRACTION
13563 060160 042703 177770 BIC #^C7,R3 ;SAVE LS 3 BITS
13564 060164 062703 000060 ADD #60,R3 ;MAKE THEM ASCII
13565 060170 110344 MOVB R3,-(R4) ;STORE IN BUFFER
13566 060172 073027 177775 ASHC #-3,R0 ;SHIFT NUMBER TO NEXT 3 BITS
13567 060176 077511 SOB R5,1$ ;CONTINUE FOR 7 DIGITS
13568 060200 010103 MOV R1,R3 ;GET NEXT DIGITS
13569 060202 042703 177776 BIC #^C1,R3 ;ONLY WANT 1 BIT
13570 060206 062703 000060 ADD #60,R3 ;MAKE THEM ASCII
13571 060212 110344 MOVB R3,-(R4) ;STORE IN BUFFER
13572 060214 112744 000040 MOVB #40,-(R4) ;PUT SPACE IN BUFFER
13573 060220 073027 177777 ASHC #-1,R0
13574 060224 012705 000002 MOV #2,R5 ;SET SOB COUNT
13575 060230 010103 3$: MOV R1,R3 ;GET LOW WORD
13576 060232 042703 177770 BIC #^C7,R3 ;MASK 3 BITS
13577 060236 062703 000060 ADD #60,R3 ;MAKE THEM ASCII
13578 060242 110344 MOVB R3,-(R4) ;PUT IN BUFFER
13579 060244 073027 177775 ASHC #-3,R0 ;GET NEXT 3 BITS
13580 060250 077511 SOB R5,3$ ;CONVERT THEM
13581 060252 010103 MOV R1,R3 ;
13582 060254 042703 177776 BIC #^C1,R3 ;ONLY WANT 1 BIT
13583 060260 062703 000060 ADD #60,R3 ;MAKE IT ASCII
13584 060264 110344 MOVB R3,-(R4) ;PUT IN BUFFER
13585 060266 112744 000040 MOVB #40,-(R4) ;PUT SPACE IN BUFFER
13586 060272 112744 000040 MOVB #40,-(R4)
13587 060276 072127 177777 ASH #-1,R1 ;GET FIRST 3 BITS OF EXPONENT
13588 060302 012705 000002 MOV #2,R5 ;SET SOB COUNT FOR 2 DIGITS
13589 060306 010103 2$: MOV R1,R3 ;GET LSB'S OF EXPONENT
13590 060310 042703 177770 BIC #^C7,R3 ;SAVE 3 BITS
13591 060314 062703 000060 ADD #60,R3 ;MAKE THEM ASCII
13592 060320 110344 MOVB R3,-(R4) ;STORE IN BUFFER
13593 060322 072127 177775 ASH #-3,R1 ;GET NEXT 3 BITS
13594 060326 077511 SOB R5,2$ ;CONTINUE
13595 060330 010103 MOV R1,R3 ;GET LAST 2 BITS OF EXPONENT
13596 060332 042703 177774 BIC #^C3,R3 ;MAKE SURE ONLY 2 BITS
13597 060336 062703 000060 ADD #60,R3 ;MAKE THEM ASCII
13598 060342 110344 MOVB R3,-(R4) ;STORE IN BUFFER
13599 060344 112744 000040 MOVB #40,-(R4) ;PUT SPACE IN BUFFER
13600 060350 112744 000040 MOVB #40,-(R4)
13601 060354 042700 177776 BIC #^C1,R0 ;GET SIGN BIT (IT WAS EXTENDED)
13602 060360 062700 000060 ADD #60,R0 ;MAKE IT ASCII
13603 060364 110044 MOVB R0,-(R4) ;PUT IT IN THE BUFFER
13604 060366 104422 RESREG
13605 060370 011646 MOV (SP),-(SP) ;SAVE RETURN PC
13606 060372 016666 000004 000002 MOV 4(SP),2(SP) ;AND RETURN PSW
    
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13663      ;:*****
(1)      .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
(1)      ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
(1)      ;*WITH A RANGE OF 0 TO 2(+33)-1.
(1)      ;*CALL:
(1)      ;*      JSR      PC,$RAND      ;;CALL THE ROUTINE
(1)      ;*      RETURN      ;;RETURN HERE THE RANDOM
(1)      ;*      ;;NUMBER WILL BE IN
(1)      ;*      ;;$HINUM,$LONUM
(1)      $RAND:
(3) 060562 010046      MOV      R0,-(SP)      ;;PUSH R0 ON STACK
(3) 060564 010146      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
(3) 060566 010246      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
(1) 060570 016700 121024      MOV      $LONUM,R0      ;;SET R0 WITH LOW
(1) 060574 016701 121022      MOV      $HINUM,R1      ;;SET R1 WITH HIGH
(1) 060600 012702 177771      MOV      #-7,R2      ;;SET SHIFT COUNT
(1) 060604 006300      1$:      ASL      R0      ;;SHIFT R0 LEFT AND
(1) 060606 006101      ROL      R1      ;;ROTATE CARRY INTO R1 AND
(1) 060610 005202      INC      R2      ;;CHECK FOR DONE
(1) 060612 001374      BNE      1$      ;;CONTINUE SHIFT LOOP
(1) 060614 066700 121000      ADD      $LONUM,R0      ;;ADD NUMBER TO MAKE X 129
(1) 060620 005501      ADC      R1      ;;PROPOGATE CARRY
(1) 060622 066701 120774      ADD      $HINUM,R1      ;;ADD NUMBER TO MAKE X 129
(1) 060626 062700 001057      ADD      #1057,R0      ;;ADD LOW CONSTANT
(1)
(1) 060632 005501      ADC      R1      ;;PROPOGATE CARRY
(1) 060634 062701 047401      ADD      #47401,R1      ;;ADD HIGH CONSTANT
(1) 060640 010067 120754      MOV      R0,$LONUM      ;;SAVE R0
(1) 060644 010167 120752      MOV      R1,$HINUM      ;;SAVE R1
(3) 060650 012602      MOV      (SP)+,R2      ;;POP STACK INTO R2
(3) 060652 012601      MOV      (SP)+,R1      ;;POP STACK INTO R1
(3) 060654 012600      MOV      (SP)+,R0      ;;POP STACK INTO R0
(1) 060656 000207      RTS      PC      ;;RETURN
    
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13664      ;:*****
13665      .SBTTL  FLOATING POINT NUMBER GENERATOR
13666      ;*
13667      ;* THIS ROUTINE GENERATES TWO RANDOM FLOATING POINT NUMBERS
13668      ;* IN EITHER SINGLE OR DOUBLE PRECISION. FOR SINGLE PRECISION
13669      ;* THE NUMBERS ARE STORED IN $TMP0 AND $TMP2. DOUBLE PRECISION
13670      ;* NUMBERS ARE STORED IN $TMP0 AND $TMP4.
13671      ;* IN EITHER SINGLE OR DOUBLE THE EXTENDED EXPONENT IS STORED
13672      ;* IN $REG0 AND $REG1.
13673      ;:*****
13673 060660 012767 000002 000130      FLTDBL: MOV      #2,SOBDBL      ;;SET LOOP FOR 2, FOUR WORD NUMBERS
13674 060666 016700 000124      FLTSG:  MOV      SOBDBL,R0      ;;SET WORD LENGTH LOOP
13675 060672 012702 001352      MOV      #$TMP0,R2      ;;GET ADDRESS TO STORE WORDS IN
13676 060676 012701 000002      2$:      MOV      #2,R1      ;;SET NUMBER OF WORDS TO 2
13677 060702 004767 177654      1$:      JSR      PC,$RAND      ;;GET RANDOM NUMBER
13678 060706 022701 000002      CMP      #2,R1      ;;FIRST TIME?
13679 060712 001404      BEQ      3$      ;;BRANCH IF YES
13680 060714 022767 000002 000074      CMP      #2,SOBDBL      ;;DOUBLE PRECISION?
13681 060722 001407      BEQ      4$      ;;BRANCH IF YES
13682 060724 016703 120672      3$:      MOV      $HINUM,R3      ;;GET EXPONENT PART
13683 060730 042703 000177      BIC      #177,R3      ;;CHECK FOR MINUS ZERO
    
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13684 060734 022703 100000      CMP      #BIT15,R3
13685 060740 001760      BEQ      1$                ;BRANCH IF MINUS ZERO
13686 060742 016722 120654      4$: MOV      $HINUM,(R2)+    ;SAVE HINUM
13687 060746 016722 120646      MOV      $LONUM,(R2)+    ;SAVE LONUM
13688 060752 077125      SOB      R1,1$           ;CONTINUE
13689 060754 077030      SOB      R0,2$           ;CONTINUE FOR DOUBLE PREC
13690 060756 012746 001352      MOV      #$TMP0,-(SP)    ;PUT ADDRESS OF NUMBER ON STACK
13691 060762 012746 001002      MOV      #1002,-(SP)    ;PUT CONTROL WORD ON STACK
13692 060766 022767 000002 000022      CMP      #2,SOBDBL      ;DOUBLE PREC?
13693 060774 001002      BNE      5$             ;BRANCH IF NO
13694 060776 012716 001004      MOV      #1004,(SP)     ;CHANGE CONTROL WORD
13695 061002 004767 000012 000012      5$: JSR      PC,EXPEXT   ;CALCULATE EXT EXPONENTS
13696 061006 012767 000001 000002      MOV      #1,SOBDBL     ;INIT SOBDBL FOR SINGLE PREC
13697 061014 000207      RTS      PC             ;RETURN
13698 061016 000001      SOBDBL: .WORD 1

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13699 *****
13700 .SBTTL  FLOATING POINT EXPONENT EXTENSION
13701  ;*      THIS ROUTINE CONVERTS THE ACTUAL EXPONENT OF A FLOATING POINT
13702  ;*      NUMBER INTO AN ACTUAL EXPONENT OF 200 AND AN EXTENDED
13703  ;*      EXPONENT EQUAL TO THE DIFFERENCE BETWEEN THE ORIGINAL
13704  ;*      ACTUAL EXPONENT AND 200.
13705  ;*
13706  ;*      THE ROUTINE IS ENTERED WITH A CONTROL WORD ON THE STACK.
13707  ;*      BIT 15 OF THE CONTROL WORD INDICATES WHETHER THE NUMBER
13708  ;*      IS IN MEMORY (<15>=0) OR IN AN ACCUMULATOR (<15>=1).
13709  ;*      IF THE NUMBER IS IN AN ACCUMULATOR, BITS <9:8> INDICATE
13710  ;*      THE ACCUMULATOR NUMBER. IF THE NUMBER(S) IS IN MEMORY,
13711  ;*      BITS <9:8> INDICATE THE NUMBER OF NUMBERS TO CONVERT AND
13712  ;*      BITS <2:0> INDICATE THE WORD LENGTH OF THE NUMBER(S).
13713  ;*      IN THE CASE OF A MEMORY CONVERSION, THE ADDRESS OF THE
13714  ;*      FIRST WORD TO CONVERT IS ALSO ON THE STACK (PRECEDING
13715  ;*      THE CONTROL WORD).
13716  *****

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13717 061020 012605      EXPEXT: MOV      (SP)+,R5    ;SAVE RETURN PC
13718 061022 012600      MOV      (SP)+,R0      ;GET CONTROL WORD
13719 061024 100437      BMI      1$            ;BRANCH IF ACC CONVERSION
13720 061026 012601      MOV      (SP)+,R1      ;GET START ADDRESS
13721 061030 162700 000400      SUB      #400,R0
13722 061034 012702 001352      MOV      #$TMP0,R2     ;GET OFFSET FROM $TMP0
13723 061040 160102      SUB      R1,R2
13724 061042 005402      NEG      R2
13725 061044 006202      ASR      R2
13726 061046 062702 001326      ADD      #$REG0,R2     ;GEN ADDRESS OF EXT WORD
13727 061052 011103      3$: MOV      (R1),R3     ;GET DATA
13728 061054 042703 100177      BIC      #100177,R3    ;GET EXPONENT
13729 061060 072327 177771      ASH      #-7,R3        ;RIGHT JUSTIFY EXPONENT
13730 061064 162703 000200      SUB      #200,R3       ;CONVERT TO 2'S COMPLIMENT
13731 061070 010312      MOV      R3,(R2)       ;ADD TO EXTENDED EXPONENT
13732 061072 042711 077600      BIC      #77600,(R1)   ;MAKE ACTUAL
13733 061076 052711 040000      BIS      #BIT14,(R1)   ;EXPONENT 200
13734 061102 162700 000400      SUB      #400,R0       ;ANY MORE WORDS?
13735 061106 100435      BMI      2$            ;BRANCH IF NO
13736 061110 110003      MOVB    R0,R3          ;GET WORD LENGTH
13737 061112 006303      ASL      R3
13738 061114 060301      ADD      R3,R1         ;SELECT NEXT NUMBER ADDRESS
13739 061116 062702 000002      ADD      #2,R2         ;SELECT NEXT EXTENDED ADDRESS

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13740 061122 000753          BR      3$          ;CONTINUE
13741          ;ACCUMULATOR CONVERSION
13742 061124 072027 177776 1$:      ASH      #-2,R0          ;GET ACCUMULATOR NUMBER
13743 061130 042700 177477          BIC      #177477,R0
13744 061134 010002          MOV      R0,R2          ;GENERATE
13745 061136 072227 177773          ASH      #-5,R2          ;ADDRESS OF
13746 061142 062702 001462          ADD      #SAC0,R2          ;EXTENDED EXPONENT
13747 061146 042767 000300 000004          BIC      #300,5$          ;GENERATE INSTRUCTION
13748 061154 050067 000000          BIS      R0,5$          ;TO GET EXPONENT
13749 061160 175003          5$:      STEXP    AC0,R3          ;GET EXPONENT
13750 061162 060312          ADD      R3,(R2)          ;ADD TO EXTENDED EXPONENT
13751 061164 005003          CLR      R3
13752 061166 042767 000300 000004          BIC      #300,4$          ;GENERATE INSTRUCTION
13753 061174 050067 000000          BIS      R0,4$          ;TO LOAD EXPONENT BACK TO ACC
13754 061200 176403          4$:      LDEXP    R3,AC0          ;LOAD EXPONENT OF 200
13755 061202 010546          2$:      MOV      R5,-(SP)          ;RESTORE RETURN PC
13756 061204 000207          RTS      PC          ;RETURN
13757          ;:*****
(1)          .SBTTL  POWER DOWN AND UP ROUTINES
(1)          ;POWER DOWN ROUTINE
(1) 061206 012737 061334 000024 $PWRDN: MOV      #SILLUP,@#PWRVEC ;:SET FOR FAST UP
(1) 061214 012737 000340 000026          MOV      #340,@#PWRVEC+2 ;:PRIO:7
(3) 061222 010046          MOV      R0,-(SP)          ;:PUSH R0 ON STACK
(3) 061224 010146          MOV      R1,-(SP)          ;:PUSH R1 ON STACK
(3) 061226 010246          MOV      R2,-(SP)          ;:PUSH R2 ON STACK
(3) 061230 010346          MOV      R3,-(SP)          ;:PUSH R3 ON STACK
(3) 061232 010446          MOV      R4,-(SP)          ;:PUSH R4 ON STACK
(3) 061234 010546          MOV      R5,-(SP)          ;:PUSH R5 ON STACK
(1) 061236 010667 000076          MOV      SP,$SAVR6          ;:SAVE SP
(1) 061242 012737 061254 000024          MOV      #SPWRUP,@#PWRVEC ;:SET UP VECTOR
(1) 061250 000000          HALT
(1) 061252 000776          BR      -2          ;:HANG UP
(1)          ;POWER UP ROUTINE
(1) 061254 016706 000060          $PWRUP: MOV      $SAVR6,SP          ;:GET SP
(1) 061260 005067 000054          CLR      $SAVR6          ;:WAIT LOOP FOR THE TTY
(1) 061264 005267 000050          1$:      INC      $SAVR6          ;:WAIT FOR THE INC
(1) 061270 001375          BNE      1$          ;:OF WORD
(3) 061272 012605          MOV      (SP)+,R5          ;:POP STACK INTO R5
(3) 061274 012604          MOV      (SP)+,R4          ;:POP STACK INTO R4
(3) 061276 012603          MOV      (SP)+,R3          ;:POP STACK INTO R3
(3) 061300 012602          MOV      (SP)+,R2          ;:POP STACK INTO R2
(3) 061302 012601          MOV      (SP)+,R1          ;:POP STACK INTO R1
(3) 061304 012600          MOV      (SP)+,R0          ;:POP STACK INTO R0
(1) 061306 012737 061206 000024          MOV      #SPWRDN,@#PWRVEC ;:SET UP THE POWER DOWN VECTOR
(1) 061314 012737 000340 000026          MOV      #340,@#PWRVEC+2 ;:PRIO:7
(1) 061322 104400          TYPE          ;:REPORT THE POWER FAILURE
(1) 061324 061342          $PWRMG: .WORD    $POWER          ;:POWER FAIL MESSAGE POINTER
(1) 061326 012716          MOV      (PC)+,(SP)          ;:RESTART AT START
(1) 061330 003612          $PWRAD: .WORD    START          ;:RESTART ADDRESS
(1) 061332 000002          RTI
(1) 061334 000000          $ILLUP: HALT          ;:THE POWER UP SEQUENCE WAS STARTED
(1) 061336 000776          BR      -2          ;: BEFORE THE POWER DOWN WAS COMPLETE
(1) 061340 000000          $SAVR6: 0          ;:PUT THE SP HERE

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(1) 061342 005015 047520 042527 $POWER: .ASCIZ <15><12>'POWER'  
(1) 061350 000122  
(1)  
13758  
(1)  
(1) .SBTTL TTY INPUT ROUTINE  
(1)  
(1) ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY  
(1) ;*CALL:  
(1) ;* RDCHR ;:INPUT A SINGLE CHARACTER FROM THE TTY  
(1) ;* RETURN HERE ;:CHARACTER IS ON THE STACK  
(1) ;* ;:WITH PARITY BIT STRIPPED OFF  
(1) ;  
(1) 061352 011646 $RDCHR: MOV (SP),-(SP) ;:PUSH DOWN THE PC  
(1) 061354 016666 000004 000002 MOV 4(SP),2(SP) ;:SAVE THE PS  
(1) 061362 105777 117722 1$: TSTB @$TKS ;:WAIT FOR  
(1) 061366 100375 BPL 1$ ;:A CHARACTER  
(1) 061370 117766 117716 000004 MOVB @$TKB,4(SP) ;:READ THE TTY  
(1) 061376 042766 177600 000004 BIC #^C<177>,4(SP) ;:GET RID OF JUNK IF ANY  
(1) 061404 000002 RTI ;:GO BACK TO USER  
(2)  
(1) ;:*****  
(1) ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY  
(1) ;*CALL:  
(1) ;* RDLIN ;:INPUT A STRING FROM THE TTY  
(1) ;* RETURN HERE ;:ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK  
(1) ;* ;:TERMINATOR WILL BE A BYTE OF ALL 0'S  
(1) 061406 010346 $RDLIN: MOV R3, -(SP) ;:SAVE R3  
(1) 061410 012703 061514 1$: MOV #$TTYIN, R3 ;:GET ADDRESS  
(1) 061414 022703 061524 2$: CMP #$TTYIN+8., R3 ;:BUFFER FULL?  
(1) 061420 101405 BLOS 4$ ;:BR IF YES  
(1) 061422 104412 RDCHR ;:GO READ ONE CHARACTER FROM THE TTY  
(1) 061424 112613 MOVB (SP)+, (R3) ;:GET CHARACTER  
(1) 061426 122713 000177 10$: CMPB #177, (R3) ;:IS IT A RUBOUT  
(1) 061432 001003 BNE 3$ ;:SKIP IF NOT  
(1) 061434 104400 001406 4$: TYPE $QUES ;:TYPE A '?'  
(1) 061440 000763 BR 1$ ;:CLEAR THE BUFFER AND LOOP  
(1) 061442 111367 000044 3$: MOVB (R3), 9$ ;:ECHO THE CHARACTER  
(1) 061446 104400 061512 TYPE 9$  
(1) 061452 122723 000015 CMPB #15, (R3)+ ;:CHECK FOR RETURN  
(1) 061456 001356 BNE 2$ ;:LOOP IF NOT RETURN  
(1) 061460 105063 177777 CLR B -1(R3) ;:CLEAR RETURN (THE 15)  
(1) 061464 104400 001410 TYPE , $LF ;:TYPE A LINE FEED  
(1) 061470 012603 MOV (SP)+, R3 ;:RESTORE R3  
(1) 061472 011646 MOV (SP), -(SP) ;:ADJUST THE STACK AND PUT ADDRESS OF THE  
(1) 061474 016666 000004 000002 MOV 4(SP), 2(SP) ;: FIRST ASCII CHARACTER ON IT  
(1) 061502 012766 061514 000004 MOV #$TTYIN, 4(SP)  
(1) 061510 000002 RTI ;:RETURN  
(1) 061512 000 9$: .BYTE 0 ;:STORAGE FOR ASCII CHAR. TO TYPE  
(1) 061513 000 .BYTE 0 ;:TERMINATOR  
(1) 061514 000010 $TTYIN: .BLKB 8. ;:RESERVE 8 BYTES FOR TTY INPUT  
13759  
(1) ;:*****  
(1) .SBTTL READ A DECIMAL NUMBER FROM THE TTY  
(1)
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(1) ;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
(1) ;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
(1) ;*ARE READ A '?' FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
(1) ;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
(1) ;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
(1) ;*POSITIVE 32767 TO NEGATIVE 32768.
(1) ;*CALL:
(1) ;*      RDDEC          ;;READ A DECIMAL NUMBER
(1) ;*      RETURN HERE   ;;NUMBER IS ON TOP OF THE STACK
(1) ;
(1) (1) 061524 011646          $RDDEC: MOV      (SP),-(SP)      ;;PROVIDE SPACE FOR
(1) (1) 061526 016666 000004 000002 MOV      4(SP),2(SP)    ;;THE INPUT NUMBER
(3) (1) 061534 010046          MOV      RO,-(SP)      ;;PUSH RO ON STACK
(3) (1) 061536 010146          MOV      R1,-(SP)      ;;PUSH R1 ON STACK
(3) (1) 061540 010246          MOV      R2,-(SP)      ;;PUSH R2 ON STACK
(1) (1) 061542 104414          1$:  RDLIN          ;;READ AN ASCII LINE
(1) (1) 061544 012600          MOV      (SP)+,RO      ;;ADDRESS OF 1ST CHAR.
(1) (1) 061546 010067 000120  MOV      RO,6$          ;;SAVE INCASE OF BAD INPUT
(1) (1) 061552 005046          CLR      -(SP)        ;;CLEAR DATA WORD
(1) (1) 061554 005002          CLR      R2          ;;SIGN SET POSITIVE
(1) (1) 061556 122710 000055  CMPB     #'-,(RO)      ;;SEE IF A MINUS SIGN WAS TYPED
(1) (1) 061562 001001          BNE     2$          ;;BR IF NO MINUS SIGN
(1) (1) 061564 112002          MOVB    (RO)+,R2     ;;SAVE FOR LATER USE
(1) (1) 061566 112001          2$:  MOVB    (RO)+,R1     ;;PICKUP THIS CHARACTER
(1) (1) 061570 001424          BEQ     3$          ;;GET OUT IF ZERO
(1) (1) 061572 122701 000060  CMPB     #'0,R1      ;;MAKE SURE THIS CHARACTER
(1) (1) 061576 003032          BGT     5$          ;;IS A DIGIT BETWEEN 0 & 9
(1) (1) 061600 122701 000071  CMPB     #'9,R1
(1) (1) 061604 002427          BLT     5$
(1) (1) 061606 032716 170000  BIT      #'^C7777,(SP) ;;DON'T LET NUMBER GET TO BIG
(1) (1) 061612 001024          BNE     5$          ;;BR IF NUMBER WOULD OVERFLOW
(1) (1) 061614 006316          ASL     (SP)         ;;*2
(1) (1) 061616 011646          MOV     (SP),-(SP)   ;;SAVE FOR LATER
(1) (1) 061620 006316          ASL     (SP)         ;;*4
(1) (1) 061622 006316          ASL     (SP)         ;;*8
(1) (1) 061624 062616          ADD     (SP)+,(SP)   ;;*10
(1) (1) 061626 102416          BVS     5$          ;;OVERFLOW ISN'T ALLOWED
(1) (1) 061630 162701 000060  SUB     #'0,R1      ;;STRIP AWAY THE ASCII JUNK
(1) (1) 061634 060116          ADD     R1,(SP)     ;;ADD IN THIS DIGIT
(1) (1) 061636 102412          BVS     5$          ;;OVERFLOW ISN'T ALLOWED
(1) (1) 061640 000752          BR      2$          ;;LOOP
(1) (1) 061642 005702          3$:  TST     R2          ;;CHECK IF NUMBER IS NEG
(1) (1) 061644 001401          BEQ     4$          ;;BR IF NO
(1) (1) 061646 005416          NEG     (SP)         ;;YES--NEGATE THE NUMBER
(1) (1) 061650 012666 000012  4$:  MOV     (SP)+,12(SP) ;;SAVE THE RESULT
(3) (1) 061654 012602          MOV     (SP)+,R2     ;;POP STACK INTO R2
(3) (1) 061656 012601          MOV     (SP)+,R1     ;;POP STACK INTO R1
(3) (1) 061660 012600          MOV     (SP)+,RO     ;;POP STACK INTO RO
(1) (1) 061662 000002          RTI          ;;RETURN
(1) (1) 061664 005726          5$:  TST     (SP)+      ;;CLEAN PARTIAL NUMBER FROM STACK
(1) (1) 061666 105010          CLRB    (RO)        ;;SET A TERMINATOR
(1) (1) 061670 104400          TYPE          ;;TYPE THE INPUT UP TO BAD CHAR.
(1) (1) 061672 000000          6$:  .WORD   0          ;;POINTER GOES HERE
(1) (1) 061674 104400 001406  TYPE     ,$QUES     ;; '?' 'CR' & 'LF'

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(1) 061700 000720          BR      1$          ;;TRY AGAIN
13760                      ;;*****
(1)                        .SBTTL ROUTINE TO SIZE MEMORY
(1)
(1)                        ;*CALL:
(1)                        ;*      JSR      PC,$SIZE
(1)                        ;*      RETURN
(1)                        ;*$LSTAD WILL CONTAIN:
(1)                        ;*      WITH KT11 OPTION      -- LAST VIRTUAL ADDRESS OF THE LAST BANK
(1)                        ;*      WITHOUT KT11 OPTION     -- LAST ABSOLUTE ADDRESS OF AVAILABLE MEMORY
(1)                        ;*$LSTBK WILL CONTAIN THE LAST BANK AS A SAF
(1)                        ;*$KT11 IS THE MEMORY MANAGEMENT KEY
(1)                        ;*$BIT07 = 0 DON'T USE MEMORY MANAGEMENT
(1)                        ;*      MUST BE SETUP BEFORE THE CALL
(1)                        ;*$BIT15 = 0 DON'T HAVE MEMORY MANAGEMENT OPTION
(1)                        ;*      DETERMINED BY ROUTINE
(1)                        ;*      --NOTE--
(1)                        ;*THIS ROUTINE SUPPORTS PDP 11/74.
(1)                        ;*IF ACTUAL MEMORY IS LESS THAN THAT INDICATED BY SIZE REGISTER
(1)                        ;*AND A REFERENCE IS MADE TO A MEMORY ADDRESS THAT IS GREATER THAN
(1)                        ;*ACTUAL MEMORY BUT LESS THAN SIZE REGISTER (INDICATED), THEN A
(1)                        ;*MEMORY REFERENCE TIMEOUT TO VECTOR 114 WILL OCCUR.
(1)
(1) 061702 010046          $$SIZE: MOV     R0,-(SP)      ;;SAVE R0 ON THE STACK
(1) 061704 010146          MOV     R1,-(SP)      ;;SAVE R1 ON THE STACK
(1) 061706 010246          MOV     R2,-(SP)      ;;SAVE R2 ON THE STACK
(1) 061710 010346          MOV     R3,-(SP)      ;;SAVE R3 ON THE STACK
(1) 061712 013746 000004   MOV     @#ERRVEC,-(SP) ;;SAVE PRESENT ERROR VECTOR PS & PC
(1) 061716 013746 000006   MOV     @#ERRVEC+2,-(SP)
(1) 061722 013746 000114   MOV     @#114,-(SP)   ;;SAVE PRESENT PARITY VECTOR PS & PC
(1) 061726 013746 000116   MOV     @#116,-(SP)
(1) 061732 010600          MOV     SP,R0         ;;SAVE THE STACK POINTER
(1) 061734 013737 177776 000006   MOV     @#PS,@#ERRVEC+2 ;;SET ERRVEC PS TO PRESENT PS
(1) 061742 012701 003776          MOV     #3776,R1     ;;SETUP ADDRESS
(1) 061746 105727          TSTB   (PC)+         ;;USE MEMORY MANAGEMENT?
(1) 061750 000200          $KT11: .WORD 200     ;;SET TO USE MEMORY MANAGEMENT
(1) 061752 100065          BPL    $CORE        ;;BR IF NO
(1) 061754 012737 062120 000004   MOV     # $KTNEX,@#ERRVEC ;;SET FOR TIMEOUT
(1) 061762 005737 177572          TST    @#SRO        ;;KT11 ARE YOU THERE?
(1) 061766 052767 100000 177754   BIS    #100000,$KT11 ;;YES--SET KT11 KEY
(1) 061774 005046          CLR    -(SP)        ;;INITIALIZE FOR 'PAR' LOADING
(1) 061776 012702 172340          MOV     #KIPAR0,R2   ;;ADDRESS OF FIRST 'PAR'
(1) 062002 012703 000010          MOV     #^DB,R3     ;;LOAD EIGHT 'PAR.'S' AND EIGHT 'PDR.'S'
(1) 062006 012762 077406 177740 1$: MOV     #77406,-40(R2) ;;PDR = 4K, UP, READ/WRITE
(1) 062014 011622          MOV     (SP),(R2)+   ;;LOAD 'PAR'
(1) 062016 062716 000200          ADD    #200,(SP)    ;;UPDATE FOR NEXT 'PAR'
(1) 062022 077307          SOB    R3,1$       ;;LOOP UNTIL ALL EIGHT ARE LOADED
(1) 062024 012742 177600          MOV     #177600,-(R2) ;;SETUP KIPAR7 FOR I/O
(1) 062030 005042          CLR    -(R2)        ;;SETUP KIPAR6 FOR TESTING
(1) 062032 012737 062050 000004   MOV     #2$,@#ERRVEC ;;CATCH TIMEOUT IF NO SR3
(1) 062040 012737 000020 172516   MOV     #20,@#SR3   ;;ENABLE 22-BIT ADDRESSING
(1) 062046 000401          BR     3$           ;;THIS PDP-11 HAS A SR3 REG.
(1) 062050 022626          2$:  CMP    (SP)+,(SP)+ ;;CLEAN OFF THE STACK--NO SR3.
(1) 062052 005237 177572          3$:  INC    @#SRO     ;;TURN ON MEMORY MANAGEMENT
(1) 062056 012737 062110 000004   MOV     # $KTOUT,@#ERRVEC ;;SET FOR TIME OUT

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(1) 062064 C12737 062232 000114      MOV    #SMTMOUT,@#114    ;;SET FOR MEMORY REF TIMEOUT TO 114
(1) 062072 005737 143776      4$:   TST    @#143776        ;;TRAP ON NON-EX-MEM
(1) 062076 062712 000040      ADD    #40,(R2)         ;;MAKE A 1K STEP
(1) 062102 023712 172356      CMP    @#KIPAR7,(R2)    ;;LAST ONE?
(1) 062106 101371                BHI    4$               ;;NO--TRY IT
(1) 062110 011202                SKTOUT: MOV (R2),R2        ;;GET LAST BANK+1
(1) 062112 005037 177572      CLR    @#SR0           ;;TURN OFF MEMORY MANAGEMENT
(1) 062116 000421                BR     $$SIZEX
(1) 062120 042767 100000 177622 SKTNEX: BIC #100000,$KT11  ;;KT11 NON-EXISTENT
(1) 062126 012737 062156 000004 SCORE: MOV #SCOREOUT,@#ERRVEC ;;SET FOR TIMEOUT
(1) 062134 005002                CLR    R2              ;;SET UP BANK
(1) 062136 062701 004000      1$:   ADD    #4000,R1       ;;INCREMENT BY 1K
(1) 062142 062702 000040      ADD    #40,R2          ;;1K STEP
(1) 062146 005711                TST    (R1)            ;;TRAP ON TIME OUT
(1) 062150 022701 177776      CMP    #177776,R1     ;;LAST ONE
(1) 062154 001370                BNE    1$              ;;NO--TRY AGAIN
(1) 062156 162701 004000      $SCROUT: SUB #4000,R1   ;;DROP BACK
(1) 062162 162702 000040      $SIZEX: SUB #40,R2     ;;RESTORE THE STACK
(1) 062166 010006                MOV    R0,SP           ;;RESTORE PARITY VECTOR
(1) 062170 012637 000116      MOV    (SP)+,@#116    ;;RESTORE ERROR VECTOR
(1) 062174 012637 000114      MOV    (SP)+,@#114
(1) 062200 012637 000006      MOV    (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
(1) 062204 012637 000004      MOV    (SP)+,@#ERRVEC
(1) 062210 010167 000050      MOV    R1,$LSTAD      ;;LAST ADDRESS
(1) 062214 010267 000046      MOV    R2,$LSTBK     ;;LAST BANK
(1) 062220 012603                MOV    (SP)+,R3       ;;RESTORE R3
(1) 062222 012602                MOV    (SP)+,R2       ;;RESTORE R2
(1) 062224 012601                MOV    (SP)+,R1       ;;RESTORE R1
(1) 062226 012600                MOV    (SP)+,R0       ;;RESTORE R0
(1) 062230 000207                RTS    PC
(1) 062232 032737 000001 177744 SMTMOUT: BIT #BIT0,@#MEMERR ;;MAKE SURE TRAP TO 114 IS
(1) 062240 001005                BNE    1$              ;;DUE TO MEMORY REF TIMEOUT
(1)                                ;;IF NOT, IS IT AN ABORT?
(1) 062242 032737 100000 177744      BIT    #BIT15,@#MEMERR ;;CPU ABORT?
(1) 062250 001001                BNE    1$              ;;IF YES, EXIT
(1) 062252 000002                RTI                    ;;IF NOT, CONTINUE
(1) 062254 012737 177777 177744 1$:   MOV    #-1,@#MEMERR    ;;CLEAR THE MEM ERROR REG
(1) 062262 000712                BR     $SKTOUT
(1) 062264 000000                $LSTAD: .WORD 0        ;;CONTAINS THE LAST ADDRESS
(1) 062266 000000                $LSTBK: .WORD 0        ;;CONTAINS THE LAST BANK
13761 ;:*****
(1)
(1) .SBTTL TRAP DECODER
(1)
(1) ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE 'TRAP' INSTRUCTION
(1) ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
(1) ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
(1) ;*GO TO THAT ROUTINE.
(1)
(1) STRAP: MOV    R0,-(SP)    ;;SAVE R0
(1) 062270 010046                MOV    2(SP),R0       ;;GET TRAP ADDRESS
(1) 062272 016600 000002      MOV    -(R0)          ;;BACKUP BY 2
(1) 062276 005740                TST    (R0),R0        ;;GET RIGHT BYTE OF TRAP
(1) 062300 111000                MOVB   (R0),R0
(1) 062302 016000 062310      MOV    $TRPAD(R0),R0  ;;INDEX TO TABLE
(1) 062306 000200                RTS    R0              ;;GO TO ROUTINE
(1)

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(3)
(3) .SBTTL TRAP TABLE
(3) ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
(3) ;*BY THE 'TRAP' INSTRUCTION.
(3) : ROUTINE
(3) :-----
(3) \$TRPAD:
(3) \$TYPE ;;CALL=TYPE TRAP+0(104400) TTY TYPEOUT ROUTINE
(3) \$TYPOC ;;CALL=TYPOC TRAP+2(104402) TYPE OCTAL NUMBER (WITH LEADING ZEROS)
(3) \$TYPOS ;;CALL=TYPOS TRAP+4(104404) TYPE OCTAL NUMBER (NO LEADING ZEROS)
(3) \$TYPON ;;CALL=TYPON TRAP+6(104406) TYPE OCTAL NUMBER (AS PER LAST CALL)
(3) \$TYPDS ;;CALL=TYPDS TRAP+10(104410) TYPE DECIMAL NUMBER (WITH SIGN)
(3) \$RDCHR ;;CALL=RDCHR TRAP+12(104412) TTY TYPEIN CHARACTER ROUTINE
(3) \$RDLIN ;;CALL=RDLIN TRAP+14(104414) TTY TYPEIN STRING ROUTINE
(3) \$RDDEC ;;CALL=RDDEC TRAP+16(104416) READ A DECIMAL NUMBER FROM TTY
(3) \$\$SAVREG ;;CALL=SAVREG TRAP+20(104420) SAVE R0-R5 ROUTINE
(3) \$RESREG ;;CALL=RESREG TRAP+22(104422) RESTORE R0-R5 ROUTINE
(3) \$FL20 ;;CALL=FL20 TRAP+24(104424)
13762 062334 060122 \$FLD20 ;;CALL=FLD20 TRAP+26(104426)
13763 062336 060410
13764
13765
13766 .SBTTL UNIBUS EXERCISER INITIALIZATION ROUTINE
13767 ;*THIS ROUTINE INITIALIZES THE BASE ADDRESS FOR THE
13768 ;*UNIBUS EXERCISER AND LOADS UP THE EXERCISER REGISTERS.
13769 062340 012767 002414 117424 UBEINIT:MOV #SEERRTB,UBESAV ;BASE ADDRESS OF UBE TRANSFER
13770 062346 005067 117422 CLR UBESAV+2
13771 062352 012767 002414 117416 MOV #SEERRTB,UBEADR ;BASE ADDRESS OF UBE TRANSFER
13772 062360 005067 117414 CLR UBEADR+2
13773
13774
13775 ;SET UP THE UBE AND START IT
13776 062364 012702 002340 MOV #UBETBL,R2 ;GET ADDRESS OF UBE TABLE
13777 062370 005072 000010 CLR @10(R2) ;CLEAR ALL ERRORS
13778 062374 012772 053434 000012 MOV #UBESRV,@12(R2) ;SET UP UBE VECTOR
13779 062402 012772 000340 000014 MOV #PR7,@14(R2) ;SET UP UBE VECTOR PSW
13780 062410 012732 172400 MOV #172400,@(R2)+ ;SET CC FOR 1.3K WORD TRANSFER
13781 ;UBE IS DOING BYTE TRANSFERS
13782 062414 012746 000003 MOV #3,-(SP) ;PUT DEVICE ID IN STACK
13783 062420 012746 001776 MOV #UBEADR,-(SP) ;PUT ADDRESS OF PHYSICAL BA ON STACK
13784 062424 004737 063022 JSR PC,@GETMAP ;GO GET MAP REGISTER
13785 062430 013732 001776 MOV @UBEADR,@(R2)+ ;LOAD UBE BUS ADDRESS
13786 062434 013732 002000 MOV @UBEADR+2,@(R2)+ ;LOAD ADR BITS 16 & 17
13787 062440 052737 000040 172516 BIS #40,@#SR3 ;ENABLE MAP
13788 062446 000207 RTS PC ;RETURN
13789
13790 .SBTTL CONVERT UNIBUS VIRTUAL ADDRESS TO PHYSICAL ADDRESS
13791 ;* THIS ROUTINE CONVERTS THE CONTENTS OF LOCATIONS
13792 ;* 'ERRBA' AND 'ERRBA+2' FROM A VIRTUAL 18-BIT ADDRESS
13793 ;* TO A PHYSICAL 22-BIT ADDRESS AS MAPPED BY THE APPROPRIATE
13794 ;* MAP REGISTER. THE 22-BIT ADDRESS IS STORED IN LOCATIONS
13795 ;* 'PA2116' AND 'PA1500'.
13796
13797 062450 104420 PHYMAP: SAVREG
13798 062452 013703 002002 MOV @#ERRBA,R3 ;GET BUS ADDRESS <15:00>

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13799 062456 013702 002004      MOV    @ERRBA+2,R2      ;GET BUS ADDRESS <17:16>
13800 062462 042702 177774      BIC    #177774,R2      ;
13801 062466 032737 000040 172516 BIT    #BIT5,@MMR3      ;MAP ON?
13802 062474 001005                BNE    1$              ;BRANCH IF YES
13803 062476 010337 001574      MOV    R3,@#PA1500     ;PHY ADR=BUS ADR
13804 062502 010237 001576      MOV    R2,@#PA2116
13805 062506 000421                BR     MAPEND
13806 062510 010305                1$:  MOV    R3,R5        ;SAVE ADR BITS <15:00>
13807 062512 073227 000005      ASHC   #5,R2           ;GET MAP REG SELECT BITS
13808 062516 042702 000003      BIC    #3,R2           ;
13809 062522 062702 170200      ADD    #MAPLO,R2      ;FORM ADDRESS OF MAP REG
13810 062526 012237 001574      MOV    (R2)+,@#PA1500 ;GET CONTENTS OF MAP REG LO
13811 062532 011237 001576      MOV    (R2),@#PA2116  ;GET CONTENTS OF MAP REG HI
13812 062536 042705 160000      BIC    #160000,R5     ;FORM PHYSICAL ADDRESS
13813 062542 060537 001574      ADD    R5,@#PA1500    ;THAT TIMED OUT
13814 062546 005537 001576      ADC    @#PA2116       ;
13815 062552 104422                MAPEND: RESRFG
13816 062554 000207                RTS     PC
13817
13818 ::*****
13819 .SBTTL CONVERT A VIRTUAL ADDRESS TO A PHYSICAL ADDRESS
13820 :* THIS ROUTINE CONVERTS A 16-BIT VIRTUAL ADDRESS TO A
13821 :* 22-BIT PHYSICAL ADDRESS. THE VIRTUAL ADDRESS IS
13822 :* ASSUMED TO BE IN LOCATION 'VADR' AND THE PHYSICAL
13823 :* ADDRESS IS PLACED IN LOCATIONS 'PA2116' AND 'PA1500'.
13824 :*
13825 :* IF MEMORY MANAGEMENT IS OFF THE PHYSICAL ADDRESS IS
13826 :* GENERATED BY SUBTRACTING THE CONTENTS OF LOCATION
13827 :* 'FACTOR' FROM THE VIRTUAL ADDRESS. THIS LOCATION
13828 :* CONTAINS THE BYTE OFFSET BETWEEN THE RELOCATED CODE
13829 :* AND THE NON-RELOCATED CODE.
13830 :*
13831 :* IF MEMORY MANAGEMENT IS ON, THE CONTENTS OF THE
13832 :* APPROPRIATE PAR REGISTER IS ADDED(AFTER ADJUSTMENT)
13833 :* TO THE LEAST SIGNIFICANT 13 BITS OF THE VIRTUAL ADDRESS.
13834 :* *****
13835 062556 104420                CNVADR: SAVREG
13836 062560 013703 001572      MOV    @#VADR,R3      ;GET VIRTUAL ADDRESS TO CONVERT
13837 062564 105737 001601      TSTB  @#MMON          ;IS MEMORY MGMT ON?
13838 062570 001426                BEQ    1$              ;BRANCH IF NO
13839 062572 005002                CLR    R2
13840 062574 073227 000003      ASHC   #3,R2          ;GET PAR SELECT BITS
13841 062600 072327 177775      ASH    #-3,R3         ;RETURN VIR ADDR TO ORIGINAL
13842 062604 042703 160000      BIC    #160000,R3     ;MAKE SURE SIGN DIDN'T EXTEND
13843 062610 006102                ROL    R2              ;MAKE R2 EVEN FOR WORD ADDRESSING
13844 062612 062702 172340      ADD    #KIPAR0,R2    ;GET ADDRESS OF PAR
13845 062616 011205                MOV    (R2),R5        ;GET PAR DATA
13846 062620 005004                CLR    R4              ;SETUP R4
13847 062622 073427 000006      ASHC   #6,R4          ;SHIFT PAR DATA
13848 062626 060305                ADD    R3,R5          ;FORM PHYSICAL ADDRESS
13849 062630 005504                ADC    R4
13850 062632 010437 001576      2$:  MOV    R4,@#PA2116  ;SAVE PHYSICAL
13851 062636 010537 001574      MOV    R5,@#PA1500   ;ADDRESS
13852 062642 104422                RESREG
13853 062644 000207                RTS     PC             ;RETURN
13854 062646 163703 001604      1$:  SUB    @#FACTOR,R3  ;FORM PHYSICAL ADDRESS
    
```

```

13855 062652 005004          CLR      R4
13856 062654 010305          MOV      R3,R5
13857 062656 000765          BR       2$                ;RETURN
13858
13859
13860 :*****
13861 :SBTTL ROUTINE TO CHECK RELOCATED DATA
13862 :*ROUTINE TO CHECK DATA RELOCATED
13863 :*CALL: R0=   HIGHEST ADDRESS +2 OF SOURCE DATA
13864 :*       R2=   HIGHEST ADDRESS +2 OF DEST DATA
13865 :*       R5=   LOWEST ADDRESS OF THE SOURCE DATA
13866 :*
13867 :*       THIS ROUTINE USES A COMPARE INSTRUCTION TO CHECK
13868 :*       THE DATA THAT WAS RELOCATED. IF A PARITY ERROR OCCURS
13869 :*       DURING THIS CHECK A SPECIAL ERROR MESSAGE IS TYPED
13870 :*       INSTEAD OF THE UNEXPECTED TRAP MESSAGE.
13871 :*****
13871 062660 012703 004000      CHKDAT: MOV      #2048.,R3                ;COUNTER
13872 062664 012737 062756 000114  MOV      #2$,@#CACHVEC          ;SETUP PARITY VECTOR
13873 062672 024042          7$:   CMP      -(R0),-(R2)        ;CHECK DATA
13874 062674 001026          BNE     99$
13875 062676 005112          COM     (R2)                    ;COMPLEMENT DEST DATA
13876 062700 005112          COM     (R2)                    ;TWICE
13877 062702 021210          CMP     (R2),(R0)              ;CHECK DATA
13878 062704 001022          BNE     99$
13879 062706 020005          1$:   CMP     R0,R5              ;BRANCH IF ALL DATA CHECKED
13880 062710 001414          BEQ     3$
13881 062712 105737 001601      TSTB   @#MMON                   ;MEMORY MANAGMENT ON?
13882 062716 001765          BEQ     7$                      ;BR BACK IF NOT
13883 062720 077314          SOB     R3,7$                  ;REPEAT 4096 TIMES
13884 062722 012703 010000      MOV     #4096.,R3              ;SET UP COUNTER AGAIN
13885 062726 162737 000200 172350  SUB     #200,@#KIPAR4          ;MAP TO NEXT LOWER 4K OF SPACE
13886 062734 012702 120000      MOV     #120000,R2            ;START AT TOP OF 4K SPACE + 2
13887 062740 000754          BR      7$                      ;CHECK MORE
13888 062742 012737 063616 000114  3$:   MOV     #.PARSRV,@#CACHVEC  ;RESTORE CACHVEC
13889 062750 000207          RTS     PC                      ;RETURN
13890 062752 000262          99$:  SEV
13891 062754 000207          RTS     PC
13892 062756 013737 177744 001356  2$:   MOV     @#MEMERR,@#STMP2       ;SAVE ERROR REG
13893 062764 013737 177740 001360      MOV     @#LOADRS,@#STMP3       ;SAVE ERROR ADR
13894 062772 013737 177742 001362      MOV     @#HIADRS,@#STMP4
13895 063000 010237 001572          MOV     R2,@#VADR
13896 063004 010037 001352          MOV     R0,@#STMP0
13897 063010 104005          ERROR  5
13898 063012 012737 177777 177744      MOV     #-1,@#MEMERR           ;CLEAR ERROR REG
13899 063020 000754          BR      99$                    ;RETURN
13900
13901 :*****
13902 :SBTTL ROUTINE TO GET A MAP REGISTER
13903 :*THIS ROUTINE TAKES AN 18 BIT RANDOM NUMBER, FINDS TWO
13904 :*CONSECUTIVE MAP REGISTERS THAT ARE NOT IN USE, LOADS THE
13905 :*REGISTERS WITH THE PHYSICAL ADDRESS MINUS THE RANDOM NUMBER
13906 :*AND THE NUMBER + 4K, AND RETURNS A NEW BUS ADDRESS, BASED
13907 :*ON THE RANDOM NUMBER.
13908 :*
13909 :*       MAP REGISTERS 0 THRU 3 ARE NOT USED IF THE PROGRAM IS
13910 :*       RUNNING ON ACT11. THIS ALLOWS 'MOTHER' TO ACCESS THE
    
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13911          : *      END OF PASS HOOKS.
13912          : *
13913          : *      THE MAP TABLE (MAPTBL) CONTAINS 4 BYTES, ONE FOR EACH
13914          : *      UNIBUS DEVICE. IF THE UBE IS PRESENT IT USES THE
13915          : *      4TH BYTE. WHEN A REGISTER IS ASSIGNED TO A DEVICE,
13916          : *      THE LOWER 4 ADDRESS BITS OF THAT REGISTER ARE PLACED
13917          : *      IN THE TABLE. WHEN A DEVICE REQUESTS A REGISTER PAIR
13918          : *      THIS TABLE IS THEN SEARCHED TO SEE IF THE REGISTER
13919          : *      PAIR IS IN USE.
13920          : *      ENTER WITH:
13921          : *      4(SP)=DEVICE ID
13922          : *      2(SP)=ADDRESS OF THE PHYSICAL ADDRESS
13923          : *      *****
13924 063022 016600 000004 GETMAP: MOV 4(SP),R0 ;GET DVICE ID
13925 063026 016601 000002 MOV 2(SP),R1 ;GET ADR OF PHY ADR
13926 063032 013746 177776 MOV @#PSW,-(SP) ;SAVE CURRENT PRIORITY
13927 063036 005116 COM (SP) ;MAKE IT READY FOR RESTORE
13928 063040 042716 177437 BIC #^CPR7,(SP) ;
13929 063044 000237 SPL 7 ;IF THIS IS RK CALL, LOCK OUT UBE
13930 063046 104420 SAVREG
13931 063050 012137 001276 MOV (R1)+,@#SGDDAT ;SAVE PHYSICAL
13932 063054 012137 001300 MOV (R1)+,@#SDDAT ;ADDRESS
13933 063060 004737 060562 2$: JSR PC,@#SRAND ;GET RANDOM NUMBER
13934 063064 013702 001622 MOV @#SHINUM,R2 ;GET HIGH RANDOM NUMBER
13935 063070 013703 001620 MOV @#SLONUM,R3 ;GET LOW RANDOM NUMBER
13936 063074 073227 177764 ASHC #-14,R2 ;CONVERT TO 20 BIT NUMBER
13937 063100 042702 177760 BIC #177760,R2 ;GET RID OF 11 BITS OF SIGN EXT
13938 063104 022702 000016 CMP #16,R2 ;LEGAL MAP REG SELECT?
13939 063110 100001 BPL 3$ ;BRANCH IF YES
13940 063112 000762 BR 2$ ;TRY AGAIN
13941 063114 005737 001602 3$: TST @#QV ;ACT11 (QV OR AUTO)?
13942 063120 001406 BEQ 4$ ;BRANCH IF NO
13943 063122 122702 000000 CMPB #0,R2 ;MAP SELECT 0?
13944 063126 001754 BEQ 2$ ;BRANCH IF YES. (ACT MUST
13945          : *      USE MAP 0 - 3)
13946 063130 122702 000001 CMPB #1,R2
13947 063134 001751 BEQ 2$
13948 063136 010204 4$: MOV R2,R4 ;SAVE MAP SELECT BITS
13949 063140 042703 100000 BIC #BIT15,R3 ;CLEAR SELECT BIT 0
13950 063144 073227 177776 ASHC #-2,R2 ;FORM 18 BIT ADDRESS
13951 063150 042703 000001 BIC #BIT0,R3 ;MAKE SURE ITS EVEN
13952 063154 010241 MOV R2,-(R1) ;RETURN NEW BUS ADDRESS
13953 063156 010341 MOV R3,-(R1) ;TO THE APPROPRIATE HANDLER
13954 063160 012705 000004 MOV #4,R5 ;SET SOB COUNT
13955 063164 120465 001765 1$: CMPB R4,MAPTBL-1(R5) ;IS THIS MAP IN USE?
13956 063170 001435 BEQ 5$ ;BRANCH IF YES
13957 063172 077504 SOB R5,1$ ;CONTINUE
13958 063174 110460 001766 MOVB R4,MAPTBL(R0) ;PUT MAP SELECT BITS IN TABLE
13959 063200 072427 000003 ASH #3,R4 ;FORM INDEX TO GET MAP REG ADDR
13960 063204 062704 170200 ADD #MAPLO,R4 ;GENERATE MAP ADDRESS
13961 063210 042703 160000 BIC #160000,R3 ;GET LS 13 BITS OF RAND NO.
13962 063214 013701 001276 MOV @#SGDDAT,R1 ;GET PHYSICAL
13963 063220 013702 001300 MOV @#SDDAT,R2 ;ADDRESS
13964 063224 160301 SUB R3,R1 ;GENERATE MAP
13965 063226 005602 SBC R2 ;REGISTER DATA
13966 063230 010124 MOV R1,(R4)+ ;LOAD THE
    
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13967 063232 010224          MOV     R2,(R4)+      ;FIRST MAP REGISTER
13968 063234 062701 020000  ADD     #20000,R1    ;ADD 4K
13969 063240 005502          ADC     R2           ;TO MAP DATA
13970 063242 010124          MOV     R1,(R4)+    ;LOAD THE
13971 063244 010224          MOV     R2,(R4)+    ;SECOND MAP REGISTER
13972 063246 104422          RESREG
13973 063250 042637 177776  BIC     (SP)+,@#PSW ;RETURN PRIORITY TO ORIGINAL VALUE
13974 063254 011666 000004  MOV     (SP),4(SP)  ;SETUP RETURN PC
13975 063260 022626          CMP     (SP)+,(SP)+ ;CLEAN UP THE STACK
13976 063262 000207          RTS     PC          ;RETURN
13977          ;REGISTER PAIR IS IN USE, TRY ANOTHER RANDOM NUMBER
13978 063264 062701 000004  5$:    ADD     #4,R1    ;RESTORE R1
13979 063270 000137 063060  JMP     @#2$        ;GET ANOTHER RANDOM NUMBER
13980          ;:*****
13981          ;.SBTTL GIVE MAP SUBROUTINE
13982          ;* THIS ROUTINE TAKES THE MAP ADDRESS OUT OF THE MAP TABLE
13983          ;* FOR THE REQUESTING DEVICE AND REPLACES IT WITH 377.
13984          ;:*****
13985 063274 010046          GIVEMAP:MOV  R0,-(SP) ;SAVE R0
13986 063276 016600 000004  MOV     4(SP),R0    ;GET DEVICE ID
13987 063302 112760 000377 001766  MOVB   #377,MAPBL(R0) ;TAKE IT OUT OF THE TABLE
13988 063310 012600          MOV     (SP)+,R0   ;RESTORE R0
13989 063312 000207          RTS     PC          ;RETURN
13990
13991          ;:*****
13992          ;.SBTTL ROUTINE TO CLEAR 'T' BIT
13993          ;:*****
13994 063314 013746 177776  CLRTBIT:MOV @#PSW,-(SP) ;PUSH PSW ONTO STACK
13995 063320 011627          MOV     (SP),(PC)+ ;SAVE IN RETPSW BELOW
13996 063322 000000          RETPSW: .WORD 0
13997 063324 042716 000020  BIC     #20,(SP)    ;CLEAR T BIT IN PSW ON STACK
13998          ;:*****
13999          ;.SBTTL ROUTINE TO RESTORE THE T BIT
14000          ;:*****
14001 063330 012746 063336  RESPSW:MOV  #1$,-(SP) ;SET RETURN PC FOR RTI
14002 063334 000002          RTI
14003 063336 000207          1$:     RTS     PC ;RETURN
14004
14005 063340 042737 177400 177776  RESTPS: BIC     #177400,@#PSW ;SET KERNEL MODE
14006 063346 016746 177750          MOV     RETPSW,-(SP) ;PUSH ORIG PSW ONTO STACK
14007 063352 000766          BR      RESPSW
14008
14009          ;:*****
14010          ;.SBTTL KEYBOARD INT SERV ROUTINE
14011          ;*THIS ROUTINE HANDLES INTERRUPTS FROM THE KEYBOARD
14012          ;*
14013          ;*TYPING A CONTROL 'C' WILL CAUSE THE PROCESSOR TO HALT
14014          ;*
14015          ;*TYPING A CARRAGE RETURN WILL CAUSE A CARRIAGE RETURN-LINE FEED
14016          ;*TO BE TYPED.
14017          ;*
14018          ;*TYPING A CONTROL 'O' WILL INHIBIT ANY FURTHER TYPEOUT. THE SECOND CONTROL 'O'
14019          ;*WILL ENABLE TYPEOUT AGAIN AND ECHO A CR-LF.
14020          ;*
14021          ;*ANY OTHER CHARACTER WILL JUST BE ECHOED.
14022          ;:*****
    
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14023
14024          000003          CNTRLC=3
14025          000017          CNTRLO=17
14026
14027 063354 017746 115732 TKISR: MOV @STKB, -(SP) ;GET CHARACTER
14028 063360 042716 177600 BIC #177600, (SP) ;STRIP UNUSED BITS
14029 063364 022716 000003 CMP #CNTRLC, (SP) ;BRANCH IF NOT CONTROL C (^C)
14030 063370 001010 BNE 1$
14031 063372 012737 001406 001340 MOV #SCRLF-1, @R5 ;ECHO CR LF
14032 063400 106277 115710 ASRB @STPS
14033 063404 005726 TST (SP)+ ;POP CHARACTER OFF THE STACK
14034 063406 000000 HALT
14035 063410 000002 RTI ;RETURN
14036
14037 063412 122716 000015 1$: CMPB #15, (SP) ;BRANCH IF NOT <CR>
14038 063416 001007 BNE 2$
14039 063420 012737 001406 001340 MOV #SCRLF-1, @R5 ;ECHO CR LF
14040 063426 106277 115662 ASRB @STPS
14041 063432 005726 TST (SP)+ ;POP CHARACTER OFF STACK
14042 063434 000002 RTI ;RETURN
14043
14044 063436 122716 000017 2$: CMPB #CNTRLO, (SP) ;BRANCH IF NOT CONTROL O (^O)
14045 063442 001012 BNE 3$
14046 063444 005726 TST (SP)+
14047 063446 005167 116074 COM NOTYPE
14048 063452 100405 BMI 7$
14049 063454 012737 001406 001340 MOV #SCRLF-1, @R5 ;ECHO CR LF
14050 063462 106277 115626 ASRB @STPS
14051 063466 000002 RTI
14052
14053 063470 104420 3$: SAVREG
14054 063472 011605 MOV (SP), R5 ;RETRIEVE CHARACTER
14055 063474 004737 064104 JSR PC, @LDKT ;GO TO LOW CORE
14056 063500 013700 001522 MOV @TKBFRP, R0 ;GET BUFFER PTR
14057 063504 110520 4$: MOV R5, (R0)+ ;LOAD CHAR INTO BFR
14058 063506 105010 CLR B (R0) ;CLEAR NEXT LOC
14059 063510 022700 001544 5$: CMP #TKBFR+20, R0 ;BRANCH IF NOT END OF BFR
14060 063514 001007 BNE 6$
14061 063516 012700 001524 MOV #TKBFR, R0 ;RESET BUFFER PTR
14062 063522 010037 001522 6$: MOV R0, @TKBFRP ;RESTORE BFR PTR
14063 063526 004737 064202 JSR PC, @RESKT ;GO BACK TO ORIGINAL MEMORY
14064 063532 104422 RESREG
14065 063534 005737 001546 ECHO: TST @NOTYPE ;TYPEOUT DISABLED?
14066 063540 100004 BPL 1$ ;BRANCH IF NO
14067 063542 005726 TST (SP)+ ;FIX UP STACK
14068 063544 105077 115544 CLR B @STPS ;CLEAR IE BIT
14069 063550 000002 RTI ;RETURN
14070 063552 105777 115536 1$: TSTB @STPS ;PRINTER READY?
14071 063556 100375 BPL -4 ;BRANCH IF NO
14072 063560 112677 115532 MOV B (SP)+, @STPB ;MOVE CHAR TO PRINTER
14073 063564 000002 RTI ;RETURN
14074
14075
14076
14077
14078
;*****
;SBTTL TELETYPE INTERRUPT SERVICE ROUTINE
;*THIS ROUTINE TYPES A MESSAGE POINTED TO BY THE ADR STORED
    
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14079
14080
14081 063566 005237 001340
14082 063572 117746 115542
14083 063576 001356
14084 063600 005726
14085 063602 005077 115506
14086 063606 012737 001624 001340
14087 063614 000002
14088
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14104
14105 063616 012737 064076 000114
14106 063624 016637 000002 001352
14107 063632 011637 001572
14108 063636 162737 000002 001572
14109 063644 013702 177744
14110 063650 013703 177740
14111 063654 010337 001360
14112 063660 013737 177742 001362
14113 063666 042703 176000
14114 063672 013704 172354
14115 063676 105737 001601
14116 063702 001407
14117 063704 005037 172354
14118 063710 012737 077406 172314
14119 063716 052703 140000
14120 063722 105713 1$:
14121
14122 063724 005102 2$:
14123 063726 010237 177744
14124 063732 013737 177744 001356
14125 063740 013737 001262 001336
14126 063746 012737 063756 001262
14127 063754 104004
14128 063756 013737 001336 001262 2$:
14129 063764 010437 172354
14130 063770 013704 177744
14131 063774 012737 177744 177744
14132 064002 012737 063616 000114
14133 064010 042704 177763
14134 064014 001426

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; *IN LOCATION $REG5. THIS ROUTINE IS INTERRUPT DRIVEN.
;*****
TP:SR: INC @#$REG5 ;STEP MESSAGE ADDRESS PTR
MOV @#$REG5,-(SP) ;GET CHAR TO BE TYPED
BNE ECHO ;GO TYPE CHAR IF NOT '0'
TST (SP)+ ;POP STACK
CLR @#STPS ;CLEAR IE BIT
MOV #NULLS,@#$REG5
RTI ;RETURN

;*****
;SBTTL PARITY ERROR SERVICE
; * THIS ROUTINE FIELDS UNEXPECTED TRAPS TO 114. IT IS ASSUMED
; * THAT THE ERROR WAS IN CACHE AND WAS CAUSED BY THE 'OTHER
; * WORD' RATHER THAN THE 'WANTED WORD' WHICH MEANS THAT THE
; * BAD DATA IS STILL IN THE CACHE. SO, TO CLEAR THE BAD DATA
; * THE ERROR ADDRESS IS REFERENCED CAUSING THE CACHE TO GO
; * TO MAIN MEMORY TO GET THE DATA. THIS PREVENTS AN
; * ARBITRARY REFERENCE TO THE BAD WORD FROM TRAPPING.
; *
; * AFTER THE ERROR IS REPORTED, BITS 2 AND 3 OF THE MEMORY
; * ERROR REGISTER ARE TESTED TO SEE IF THE BAD DATA IS IN
; * MAIN MEMORY. IF IT IS, THE PROGRAM RESTARTS SINCE THE
; * GOOD DATA IS NOW LOST FOREVER. OTHERWISE THE PROGRAM
; * RETURNS TO THE ADDRESS POINTED TO BY '$LPERR'.
;*****
.PARSRV:MOV #RT1,@#CACHVEC ;PUT NEW ADDRESS IN PARITY VECTOR
MOV 2(SP),@#STMP0 ;SAVER ERROR PSW
MOV (SP),@#VADR ;SAVE PC
SUB #2,@#VADR ;ADJUST ERROR PC
MOV @#MEMERR,R2 ;GET ERROR REGISTER
MOV @#LOADRS,R3 ;GET LO ADDRESS ERROR REG
MOV R3,@#STMP3 ;PUT LOW ADR IN MEMORY
MOV @#HIADRS,@#STMP4 ;GET HI ADDRESS ERROR REG
BIC #176000,R3 ;MASK OFF LOWER TEN BITS
MOV @#KIPAR6,R4 ;SAVE PAR6
TSTB @#MION ;IS MEMORY MGMT ON?
BEQ 1$ ;BRANCH IF NO
CLR @#KIPAR6 ;CLEAR PAR6
MOV #77406,@#KIPDR6 ;ENSURE PDR 6 RESIDENT
RIS #140000,R3 ;SETUP R3 TO REFERENCE THRU PAR6
1$: TSTB (R3) ;REFERENCE ADDRESS THAT TRAPPED
;SHOULD CAUSE ABORT
2$: COM R2 ;GET ORIGINAL MEMORY
MOV R2,@#MEMERR ;ERROR REG DATA
PERET: MOV @#MEMERR,@#STMP2 ;SAVE ERROR REG FOR TYPEOUT
MOV @#$LPERR,@#$REG4 ;SAVE LOOP ADDRESS
MOV @#2$,@#$LPERR ;SET RETURN ADDRESS IF LOOPING
ERROR 4
2$: MOV @#$REG4,@#$LPERR ;RESTORE LOOP ADDRESS
MOV R4,@#KIPAR6 ;RESTORE PAR6
MOV @#MEMERR,R4 ;GET MEM ERR REG
MOV #-1,@#MEMERR ;CLEAR ERR REG
MOV #.PARSRV,@#CACHVEC ;RESTORE PARITY VECTOR
BIC #177763,R4 ;CLEAR ALL BUT BITS 2 & 3
BEQ 1$ ;BRANCH IF NOT MAIN MEMORY ERROR

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14135 064016 104400 064024          TYPE      .65$          ;;TYPE ASCIZ STRING
      (1) 064022 000420          BR          64$          ;;GET OVER THE ASCIZ
      (1) 064064          ;;:65$: .ASCIZ /FATAL PARITY ERROR-RESTARTING/<CRLF>
      (1) 064064          64$:
14136 064064 000005          RESET          ;CLEAR THE WORLD
14137 064066 000137 003612          JMP          @#START
14138 064072 012716 064100          1$: MOV          #X,(SP)          ;PUT ADDRESS ON STACK TO GET ORIGINAL
14139          ;PSW BACK
14140 064076 000002          RT1: RTI          ;GET OLD PSW
14141 064100 000177 115156          X: JMP          @$LPERR          ;JUMP TO START OF TEST THAT HAD THE PE
14142          ;*****
14143          ;SBTTL CONTEXT SWITCH DOWN SUBROUTINE
14144          ;* SUBROUTINE TO SAVE & LOAD KIPAR'S 0,1,2 AND 3 (IF MEM MGMT ENABLED)
14145          ;* THIS ROUTINE IS CALLED BY THE KEYBOARD INTERRUPT, LINE CLOCK
14146          ;* INTERRUPT, USE SERVICE ROUTINE, MBT SERVICE ROUTINE, AND TYPE TIME ROUTINE.
14147          ;*****
14148 064104 105737 001601          LDKT: TSTB @#MMON          ;BRANCH IF MEM MGMT DISABLED
14149 064110 001433          BEQ          1$
14150 064112 012604          MOV          (SP)+,R4          ;SAVE RETURN PC
14151 064114 013737 177776 001566          MOV          @#PSW,@#SAVPSW          ;SAVE THE CURRENT PSW
14152 064122 042737 140000 177776          BIC          #140000,@#PSW          ;GO TO KERNEL MODE
14153 064130 012700 172340          MOV          #KIPARO,R0          ;GET ADDRESS OF PARO
14154 064134 012001          MOV          (R0)+,R1          ;GET PAR0
14155 064136 012002          MOV          (R0)+,R2          ;GET PAR1
14156 064140 012003          MOV          (R0)+,R3          ;GET PAR2
14157 064142 012005          MOV          (R0)+,R5          ;GET PAR3
14158 064144 012740 000600          MOV          #600,-(R0)          ;BACK TO LOW CORE
14159 064150 012740 000400          MOV          #400,-(R0)          ;RELOC BACK TO LOW CORE
14160 064154 012740 000200          MOV          #200,-(R0)
14161 064160 005040          CLR          -(R0)
14162 064162 012700 001556          MOV          #SAVPAR,R0          ;GET ADDRESS OF SAVE BUFFER
14163 064166 010120          MOV          R1,(R0)+          ;PUT PAR DATA IN MEMORY
14164 064170 010220          MOV          R2,(R0)+
14165 064172 010320          MOV          R3,(R0)+
14166 064174 010510          MOV          R5,(R0)
14167 064176 010446          MOV          R4,-(SP)          ;PUT RETURN PC ON STACK
14168 064200 000207          1$: RTS          PC
14169
14170          ;*****
14171          ;SBTTL CONTEXT SWITCH UP SUBROUTINE
14172          ;SUBROUTINE TO RESTORE KIPARO, 1,2 AND 3 (IF MGMT ENABLED)
14173          ;*****
14174 064202 105737 001601          RESKT: TSTB @#MMON          ;BRANCH IF MEM MGMT DISABLED
14175 064206 001421          BEQ          1$
14176 064210 012604          MOV          (SP)+,R4          ;GET RETURN PC
14177 064212 012700 001556          MOV          #SAVPAR,R0          ;GET ADDRESS OF SAVE BUFF
14178 064216 012001          MOV          (R0)+,R1          ;GET OLD PAR DATA
14179 064220 012002          MOV          (R0)+,R2
14180 064222 012003          MOV          (R0)+,R3
14181 064224 012005          MOV          (R0)+,R5
14182 064226 012700 172340          MOV          #KIPARO,R0          ;GET ADDRESS OF PARO
14183 064232 010120          MOV          R1,(R0)+          ;RELOCATE BACK
14184 064234 010220          MOV          R2,(R0)+
14185 064236 010320          MOV          R3,(R0)+
14186 064240 010510          MOV          R5,(R0)
14187 064242 013737 001566 177776          MOV          @#SAVPSW,@#PSW
    
```

CONTEXT SWITCH UP SUBROUTINE

```

14188 064250 010446          MOV    R4,-(SP)
14189 064252 000207          1$:   RTS    PC
14190                               :*****
14191                               :SBTTL  KT ABORT SUBROUTINE
14192                               :*****
14193 064254 016637 000002 001352  KTABRT: MOV    2(SP),@#STMP0      ;SAVE ERROR PSW
14194 064262 011637 001572          MOV    (SP),@#VADR          ;SAVE ERROR PC
14195 064266 162737 000002 001572          SUB    #2,@#VADR
14196 064274 013737 177572 001356          MOV    @#MMR0,@#STMP2      ;SAVE MMR0
14197 064302 013737 177576 001360          MOV    @#MMR2,@#STMP3      ;SAVE MMR2
14198 064310 013737 001262 001336          MOV    @#SLPERR,@#SREG4    ;SAVE LOOP ADDRESS
14199 064316 012737 064326 001262          MOV    #1,@#SLPERR        ;SET RETURN ADR IF LOOPING
14200 064324 104003          ERROR  3
14201 064326 013737 001336 001262  1$:   MOV    @#SREG4,@#SLPERR    ;RESTORE LOOP ADR
14202 064334 042737 170000 177572          BIC    #170000,@#MMR0     ;CLEAR ERRORS
14203 064342 013716 001262          MOV    @#SLPERR,(SP)      ;GET LOOP ADDRESS
14204 064346 000002          RTI                          ;RETURN
14205
14206                               :*****
14207                               :SBTTL  RESERVED INSTRUCTION ROUTINE
14208                               :*****
14209 064350 016637 000002 001352  RESERR: MOV    2(SP),@#STMP0      ;SAVE PSW
14210 064356 011637 001572          MOV    (SP),@#VADR          ;SAVE ERROR PC
14211 064362 162737 000002 001572          SUB    #2,@#VADR
14212 064370 013737 001262 001336          MOV    @#SLPERR,@#SREG4    ;SAVE LOOP ADR
14213 064376 012737 064406 001262          MOV    #1,@#SLPERR        ;SET RETURN ADR IF LOOPING
14214 064404 104002          ERROR  2
14215 064406 013737 001336 001262  1$:   MOV    @#SREG4,@#SLPERR    ;RESTORE LOOP ADR
14216 064414 013716 001262          MOV    @#SLPERR,(SP)      ;GET LOOP ADDRESS
14217 064420 000002          RTI                          ;RETURN
14218
14219                               :*****
14220                               :SBTTL  TRAP TO 4 SERVICE ROUTINE
14221                               :*****
14222 064422 016637 000002 001352  ERPRT: MOV    2(SP),@#STMP0      ;SAVE ERROR PSW
14223
14224 064430 011637 001572          MOV    (SP),@#VADR          ;SAVE ERROR PC
14225 064434 162737 000002 001572          SUB    #2,@#VADR
14226 064442 012706 000700          MOV    #SUPSTK,SP          ;RESTORE SP
14227 064446 013737 177766 001356          MOV    @#CPUERR,@#STMP2    ;GET FROR REG
14228 064454 013737 001262 001336          MOV    @#SLPERR,@#SREG4    ;SAVE LOOP ADR
14229 064462 012737 064472 001262          MOV    #1,@#SLPERR        ;SET RETURN ADR IF LOOPING
14230 064470 104001          ERROR  1
14231 064472 013737 001336 001262  1$:   MOV    @#SREG4,@#SLPERR    ;SET LOOP ADR
14232 064500 005037 177766          CLR    @#CPUERR
14233 064504 013746 001352          MOV    @#STMP0,-(SP)      ;SETUP STACK TO RETURN
14234 064510 013746 001262          MOV    @#SLPERR,-(SP)
14235 064514 000002          RTI                          ;RETURN
14236
    
```

```

14238 ;THE BELOW TABLE REPRESENTS THE 'NEW' PSW SET BY THE PROGRAM ON
14239 ;SUCCESSIVE SUB-PASSES.
14240 ;NOTE THE BELOW TABLE MAY BE MODIFIED TO CAUSE THE PROGRAM TO RUN
14241 ;UNDER USER DEFINED PARAMETERS BY PATCHING IN THE DESIRED PASS PARAMETER
14242 ;FOR EXAMPLE TO CAUSE THE PROGRAM TO RUN WITHOUT SETTING THE 'T' BIT
14243 ;IN ALL PASSES PATCH OUT THE 'T' BIT IN THE TABLE.
14244 064516 000000 PSWTAB: 000000 ;
14245 064520 000020 000020 ;T-BIT TRAPPING
14246 064522 140000 140000 ;USER MODE
14247 064524 144020 144020 ;USER MODE, REG SET #1, T-BIT TRAPPING
14248 064526 040000 040000 ;SUPERVISOR MODE
14249 064530 044020 044020 ;SUPERVISOR MODE, REG SET #1, T-BIT TRAPPING
14250
14251 ;THE BELOW TABLE IS USED TO SET MEMORY MARGINS
14252 064532 000000 MRGTAB: .WORD 0 ;NO MARGINS
14253 064534 000004 .WORD 4 ;EARLY STROBE
14254 064536 000006 .WORD 6 ;LATE STROBE
14255 064540 000010 .WORD 10 ;LOW DRIVE CURRENT
14256 064542 000000 .WORD 0 ;NO MARGINS
14257 064544 000012 .WORD 12 ;HIGH DRIVE CURRENT
14258 ;MESSAGES
14259 .EVEN
14260 064546 002210 REGINX: RP3DS
14261 064550 002232 RKDS
14262 064552 000000 .WORD
14263 064554 000000 .WORD
14264 064556 002252 RP4CS1
14265 064560 002312 RSCS1
14266 064562 000000 .WORD
14267 064564 000000 .WORD
14268 064566 002356 MBTTBL
14269 064570 002340 UBETBL
14270 064572 064731 MSGINX: .WORD MSG5
14271 064574 064737 .WORD MSG6
14272 064576 065546 .WORD MSG21
14273 064600 065546 .WORD MSG21
14274 064602 064745 .WORD MSG10
14275 064604 064753 .WORD MSG11
14276 064606 065546 .WORD MSG21
14277 064610 065546 .WORD MSG21
14278 064612 065242 .WORD MSG15
14279 064614 065605 .WORD MSG24
14280 064616 046200 053517 046040 MSG1: .ASCIZ '<CRLF>'LOW LIM?'
    064624 046511 000077
14281 064630 044510 044107 046040 MSG2: .ASCIZ 'HIGH LIM?'
    064636 046511 000077
14282 064642 051105 047522 050122 MSG3: .ASCIZ '/ERRORPC PHYSC PC PSW MAINT TEST NO SUB-PASS CNT/'
    064650 020103 044120 051531
    064656 020103 041520 020040
    064664 020040 051520 020127
    064672 020040 040515 047111
    064700 020124 020040 042524
    064706 052123 047040 020117
    064714 052523 026502 040520
    064722 051523 041440 052116
    064730 000
    
```

```

14283                                     ;MSG4 HAS BEEN MOVED TO END OF PROGRAM
14284
14285 064731      122 030120 004463 MSG5:  .ASCIZ  ?RPO3  ?
      064736      000
14286 064737      122 030113 004465 MSG6:  .ASCIZ  ?RK05  ?
      064744      000
14287 064745      122 030120 004464 MSG10: .ASCIZ  ?RPO4  ?
      064752      000
14288 064753      122 030123 004464 MSG11: .ASCIZ  ?RS04  ?
      064760      000
14289 064761      104 053122 052123 MSG12: .ASCIZ  /DRVSTA ERRREG CSREG WRDCNT BUSADR DSKADR CYLADR(RP03) PHYS BUSA
      064766 020101 042440 051122
      064774 042522 020107 041440
      065002 051123 043505 020040
      065010 053440 042122 047103
      065016 020124 041040 051525
      065024 042101 020122 042040
      065032 045523 042101 020122
      065040 041440 046131 042101
      065046 024122 050122 031460
      065054 020051 050040 054510
      065062 020123 052502 040523
      065070 051104 000200
14290 065074 041440 030523 020040 MSG13: .ASCIZ  / CS1 WRDCNT BUSADR BADREX DSKADR CS2 CS3 DRVSTA ERRREG/
      065102 020040 051127 041504
      065110 052116 020040 052502
      065116 040523 051104 020040
      065124 040502 051104 054105
      065132 020040 051504 040513
      065140 051104 020040 041440
      065146 031123 020040 020040
      065154 041440 031523 020040
      065162 020040 051104 051526
      065170 040524 020040 051105
      065176 051122 043505 000200
14291 065204 042504 041523 046131 MSG14: .ASCIZ  /DESCYL ER2 ER3 RPCC/<CRLF>
      065212 020040 042440 031122
      065220 020040 020040 042440
      065226 031522 020040 020040
      065234 050122 041503 000200
14292 065242 040515 051523 041040 MSG15: .ASCIZ  /MASS BUS TESTER /
      065250 051525 052040 051505
      065256 042524 020122 000
14293 065263 040 051503 020061 MSG16: .ASCIZ  / CS1 WRDCNT BUSADR BADREX MR2 CS2 ST ER CS3/<
      065270 020040 053440 042122
      065276 047103 020124 041040
      065304 051525 042101 020122
      065312 041040 042101 042522
      065320 020130 020040 046440
      065326 031122 020040 020040
      065334 041440 031123 020040
      065342 020040 020040 052123
      065350 020040 020040 042440
      065356 020122 020040 020040
      065364 041440 031523 000200
14294 065372 020040 041503 020040 MSG17: .ASCIZ  / CC BUSADR CR2 CR1 PHYS BUSADR/<CRLF>
    
```


	65400	020040	052502	040523	
	65406	051104	020040	020040	
	065414	051103	020062	020040	
	065422	020040	051103	020061	
	065430	050040	054510	020123	
	065436	052502	040523	051104	
	065444	000200			
14295	065446	044124	020105	052521	MSG20: .ASCIZ /THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 0123456789/<15><12>
	065454	041511	020113	051102	
	065462	053517	020116	047506	
	065470	020130	052512	050115	
	065476	042105	047440	042526	
	065504	020122	044124	020105	
	065512	040514	054532	042040	
	065520	043517	020123	040502	
	065526	045503	030040	031061	
	065534	032063	033065	034067	
	065542	006471	000012		
14296	065546	046111	042514	040507	MSG21: .ASCIZ /ILLEGAL DEVICE/<CRLF>
	065554	020114	042504	044526	
	065562	042503	000200		
14297	065566	020040	020040	020040	MSG22: .ASCII / /
	065574	020040			
14298	065576	020040	020040	020040	MSG23: .ASCIZ / /
	065604	000			
14299	065605	125	044516	052502	MSG24: .ASCIZ /UNIBUS EXERCISER /
	065612	020123	054105	051105	
	065620	044503	042523	020122	
	065626	000			
14300	065627	117	052120	041456	MSG25: .ASCIZ /OPT.CP=/
	065634	036520	000		
14301					
14302					
14303					
14304					;MSG30 THROUGH MSG38 ARE AT END OF LISTING
	065637	125	042516	050130	EM1: .ASCIZ /UNEXPECTED TRAP TO 4/
	065644	041505	042524	020104	
	065652	051124	050101	052040	
	065660	020117	000064		
14305	065664	041520	043117	050124	DH1: .ASCIZ /PCOFTP PHYSPC PSW CPUERR/
	065672	020040	044120	051531	
	065700	041520	020040	020040	
	065706	051520	020127	020040	
	065714	050103	042525	051122	
	065722	000			
14306	065723	000	001	000	DF1: .BYTE 0,1,0,0,0
	065726	000	000		
14307					.EVEN
14308	065730	001572	001572	001352	DT1: .WORD VADR,VADR,\$TMP0,\$TMP2,0
	065736	001356	000000		
14309	065742	047125	054105	042520	EM2: .ASCIZ /UNEXPECTED TRAP TO 10/
	065750	052103	042105	052040	
	065756	040522	020120	047524	
	065764	030440	000060		
14310	065770	041520	043117	050124	DH2: .ASCIZ /PCOFTP PHYSPC PSW/
	065776	020040	044120	051531	
	066004	041520	020040	020040	

14311	066012	051520	000127						
14312	066016	001572	001572	001352	DT2:	.EVEN	VADR,VADR,\$TMP0,0		
	066024	000000				.WORD			
14313	066026	047125	054105	042520	EM3:	.ASCIZ	/UNEXPECTED TRAP TO 250(MGMT)/		
	066034	052103	042105	052040					
	066042	040522	020120	047524					
	066050	031040	030065	046450					
	066056	046507	024524	000					
14314	066063	120	047503	052106	DH3:	.ASCIZ	/PCOFTP PHYSPC PSW MMR0 MMR2/		
	066070	020120	050040	054510					
	066076	050123	020103	020040					
	066104	050040	053523	020040					
	066112	020040	046515	030122					
	066120	020040	020040	046515					
	066126	031122	000						
14315		066132				.EVEN			
14316	066132	001572	001572	001352	DT3:	.WORD	VADR,VADR,\$TMP0,\$TMP2,\$TMP3,0		
	066140	001356	001360	000000					
14317	066146	047125	054105	042520	EM4:	.ASCIZ	/UNEXPECTED TRAP TO 114/		
	066154	052103	042105	052040					
	066162	040522	020120	047524					
	066170	030440	032061	000					
14318	066175	120	047503	052106	DH4:	.ASCIZ	/PCOFTP PHYSC PC PSW ERRREG ERR ADR REG/		
	066202	020120	050040	054510					
	066210	041523	050040	020103					
	066216	020040	050040	053523					
	066224	020040	042440	051122					
	066232	042522	020107	042440					
	066240	051122	040440	051104					
	066246	051040	043505	000					
14319	066253	000	001	000	DF4:	.BYTE	0,1,0,0,2		
	066256	000	002						
14320	066260	040520	044522	054524	EM5:	.ASCIZ	/PARITY ERROR DURING DATA CHECK/		
	066266	042440	051122	051117					
	066274	042040	051125	047111					
	066302	020107	040504	040524					
	066310	041440	042510	045503					
	066316	000							
14321	066317	123	041522	042101	DH5:	.ASCIZ	/SRCADR DSTADR EADRREG MEM ERR REG/		
	066324	020122	042040	052123					
	066332	042101	020122	042440					
	066340	042101	051122	043505					
	066346	020040	042515	020115					
	066354	051105	020122	042522					
	066362	000107							
14322	066364	000	001	002	DF5:	.BYTE	0,1,2,0		
	066367	000							
14323						.EVEN			
14324	066370	001352	001572	001360	DT5:	.WORD	\$TMP0,VADR,\$TMP3,\$TMP2,0		
	066376	001356	000000						
14325	066402	051105	047522	020122	EM6:	.ASCIZ	/ERROR DURING DATA CHECK-RELOC WAS BY CP/		
	066410	052104	044522	043516					
	066416	042040	052101	020101					
	066424	044103	041505	026513					
	066432	042522	047514	020103					

	066440	040527	020123	054502		
	066446	041440	000120			
4326	066452	051123	040503	051104	DH6:	.ASCIZ /SRCADR DSTADR/
	066460	020040	051504	040524		
	066466	051104	000			
14327		066472				.EVEN
14328	056472	001352	001572	000000	DT6:	.WORD \$TMPO,VADR,0
14329	066500	051105	047522	020122	EM10:	.ASCIZ ?ERROR DURING DATA CHECK-RELOC WAS BY I/O?
	066506	052504	044522	043516		
	066514	042040	052101	020101		
	066522	044103	041505	026513		
	066530	042522	047514	020103		
	066536	040527	020123	054502		
	066544	044440	047457	000		
14330	066551	123	041522	042101	DH10:	.ASCIZ /SRCADR DSTADR DEVICE THAT DID XFER/
	066556	020122	020040	051504		
	066564	040524	051104	020040		
	066572	042040	053105	041511		
	066600	020105	044124	052101		
	066606	042040	042111	054040		
	066614	042506	000122			
14331	066620	000	001	003	DF10:	.BYTE 0,1,3,0
	066623	000				
14332						.EVEN
14333	066624	001352	001572	001356	DT10:	.WORD \$TMPO,VADR,\$TMP2,\$TMP3,0
	066632	001360	000000			
14334	066636	044502	024124	024523	EM11:	.ASCIZ /BIT(S) STUCK IN MICRO-BREAK REGISTER/
	066644	051440	052524	045503		
	066652	044440	020116	044515		
	066660	051103	026517	051102		
	066666	040505	020113	042522		
	066674	044507	052123	051105		
	066702	000				
14335	066703	107	047517	042104	DH11:	.ASCIZ /GOODDAT BAD DATA/
	066710	052101	041040	042101		
	066716	042040	052101	000101		
14336	066724	000	000		DF11:	.BYTE 0,0
14337						.EVEN
14338	066726	001352	001354	000000	DT11:	.WORD \$TMPO,\$TMP1,0
14339	066734	041125	020105	047516	EM12:	.ASCIZ /UBE NON-EXISTANT MEMORY ERROR/
	066742	026516	054105	051511		
	066750	040524	052116	046440		
	066756	046505	051117	020131		
	066764	051105	047522	000122		
14340	066772	044120	051531	041040	DH12:	.ASCIZ /PHYS BUSADR/
	067000	051525	042101	000122		
14341	067006	002			DF12:	.BYTE 2
14342		067010				.EVEN
14343	067010	001276	000000		DT12:	.WORD \$GDDAT,0
14344	067014	041115	020124	047516	EM13:	.ASCIZ /MBT NON-EXISTANT MEMORY ERROR/
	067022	026516	054105	051511		
	067030	040524	052116	046440		
	067036	046505	051117	020131		
	067044	051105	047522	000122		
14345	067052	044120	051531	040440	DH13:	.ASCIZ /PHYS ADDRESS/
	067060	042104	042522	051523		

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14346 067066 000
      067067 106 047514 052101 EM14: .ASCIZ /FLOATING POINT ERROR/
      067074 047111 020107 047520
      067102 047111 020124 051105
      067110 047522 000122
14347 067114 042011 040524 030524 DH14: .ASCIZ / DAT1 DATA2/
      067122 004411 004411 040504
      067130 040524 000062
14348
14349 067134 001362 001332 001366 DT14: .EVEN
      067142 001334 000000 .WORD $TMP4,$REG2,$TMP6,$REG3,0
14350 067146 004 000 004 DF14: .BYTE 4,0,4,0
      067151 000
14351 067152 042504 044526 042503 EM15: .ASCIZ /DEVICE HUNG/
      067160 044040 047125 000107
14352 067166 004411 040504 040524 DH16: .ASCIZ / DATA1 DATA2/
      067174 004461 004411 020011
      067202 020040 042040 052101
      067210 031101 000
14353 067213 005 000 005 DF16: .BYTE 5,0,5,0
      067216 000
14354
14355 067220 067220
      067220 001502 001332 001512 DT16: .EVEN
      067226 001334 000000 .WORD FLTMP0,$REG2,FLTMP1,$REG3,0
14356 067232 030122 043040 044501 EM17: .ASCIZ /RO FAILED TO LOAD CORRECTLY ON MFPT/
      067240 042514 020104 047524
      067246 046040 040517 020104
      067254 047503 051122 041505
      067262 046124 020131 047117
      067270 046440 050106 000124
14357 067276 044503 020123 047111 EM20: .ASCIZ /CIS INSTRUCTION FAILURE/
      067304 052123 052522 052103
      067312 047511 020116 040506
      067320 046111 051125 000105
14358
14359
14360
14361 067330 050117 051105 052101 ENDTAG: .WORD 0
      067336 047511 040516 020114
      067344 053523 052111 044103
      067352 051440 052105 044524
      067360 043516 100123
      067364 053523 052111 044103 .ASCII /SWITCH USE/<CRLF>
      067372 004411 052411 042523
      067400 200
14363 067401 040 030440 004465 .ASCII / 15 HALT ON ERROR/<CRLF>
      067406 044011 046101 020124
      067414 047117 042440 051122
      067422 051117 200
14364 067425 040 030440 004464 .ASCII / 14 LOOP ON TEST/<CRLF>
      067432 046011 047517 020120
      067440 047117 052040 051505
      067446 100124
14365 067450 020040 031461 004411 .ASCII / 13 INHIBIT ERROR TYPEOUTS/<CRLF>
      067456 047111 044510 044502
      067464 020124 051105 047522
    
```

	067472	020122	054524	042520		
	067500	052517	051524	200		
14366	067505	040	030440	004462	.ASCII / 12	INHIBIT UBE/<CRLF>
	067512	044411	044116	041111		
	067520	052111	052440	042502		
	067526	200				
14367	067527	040	030440	004461	.ASCII / 11	INHIBIT ITERATIONS/<CRLF>
	067534	044411	044116	041111		
	067542	052111	044440	052124		
	067550	051105	052101	047511		
	067556	051516	200			
14368	067561	040	030440	004460	.ASCII / 10	BELL ON ERROR/<CRLF>
	067566	041011	046105	020114		
	067574	047117	042440	051122		
	067602	051117	200			
14369	067605	040	020040	004471	.ASCII / 9	LOOP ON ERROR/<CRLF>
	067612	046011	047517	020120		
	067620	047117	042440	051122		
	067626	051117	200			
14370	067631	040	020040	004470	.ASCII ? 8	ALLOW RELOCATION VIA I/O DEVICE (NOTE CHANGE)?<CRLF>
	067636	040411	046114	053517		
	067644	051040	046105	041517		
	067652	052101	047511	020116		
	067660	044526	020101	027511		
	067666	020117	042504	044526		
	067674	042503	024040	047516		
	067702	042524	041440	040510		
	067710	043516	024505	200		
14371	067715	040	020040	004467	.ASCII / 7	INHIBIT TYPEOUT OF THIS TEXT AND SYS SIZE/<CRLF>
	067722	044411	044116	041111		
	067730	052111	052040	050131		
	067736	047505	052125	047440		
	067744	020106	044124	051511		
	067752	052040	054105	020124		
	067760	047101	020104	054523		
	067766	020123	044523	042532		
	067774	200				
14372	067775	040	020040	004466	.ASCII / 6	INHIBIT RELOCATION/<CRLF>
	070002	044411	044116	041111		
	070010	052111	051040	046105		
	070016	041517	052101	047511		
	070024	100116				
14373	070026	020040	032440	004411	.ASCII / 5	INHIBIT ROUND ROBIN RELOCATION/<CRLF>
	070034	047111	044510	044502		
	070042	020124	047522	047125		
	070050	020104	047522	044502		
	070056	020116	042522	047514		
	070064	040503	044524	047117		
	070072	200				
14374	070073	040	020040	004464	.ASCII / 4	INHIBIT RANDOM DISK ADDRESS/<CRLF>
	070100	044411	044116	041111		
	070106	052111	051040	047101		
	070114	047504	020115	044504		
	070122	045523	040440	042104		
	070130	042522	051523	200		
14375	070135	040	020040	004463	.ASCII / 3	INHIBIT MBT/<CRLF>

	070142	044411	044116	041111		
	070150	052111	046440	052102		
	070156	200				
14376	070157	040	020040	004462	.ASCII / 2	THESE THREE SWITCHES/<CRLF>
	070164	052011	042510	042523		
	070172	052040	051110	042505		
	070200	051440	044527	041524		
	070206	042510	100123			
14377	070212	020040	030440	004411	.ASCII / 1	ARE ENCODED TO SELECT RELOCATION/<CRLF>
	070220	051101	020105	047105		
	070226	047503	042504	020104		
	070234	047524	051440	046105		
	070242	041505	020124	042522		
	070250	047514	040503	044524		
	070256	047117	200			
14378	070261	040	020040	004460	.ASCII / 0	ON THE FOLLOWING DEVICES:/<CRLF>
	070266	047411	020116	044124		
	070274	020105	047506	046114		
	070302	053517	047111	020107		
	070310	042504	044526	042503		
	070316	035123	200			
14379	070321	011	027060	027056	.ASCII ?	0...RP11/RP03?<CRLF>
	070326	050122	030461	051057		
	070334	030120	100063			
14380						
14381	070340	030411	027056	051056	.ASCII ?	1...RK11/RK05?<CRLF>
	070346	030513	027461	045522		
	070354	032460	200			
14382	070357	011	027062	027056	.ASCII ?	2...NOT USED?<CRLF>
	070364	047516	020124	051525		
	070372	042105	200			
14383	070375	011	027063	027056	.ASCII ?	3...NOT USED?<CRLF>
	070402	047516	020124	051525		
	070410	042105	200			
14384	070413	011	027064	027056	.ASCII ?	4...RH70/RP04?<CRLF>
	070420	044122	030067	051057		
	070426	030120	100064			
14385	070432	032411	027056	051056	.ASCII ?	5...RH70/RS04 OR RS03?<CRLF>
	070440	033510	027460	051522		
	070446	032060	047440	020122		
	070454	051522	031460	200		
14386	070461	011	027066	027056	.ASCII ?	6...NOT USED?<CRLF>
	070466	047516	020124	051525		
	070474	042105	200			
14387	070477	011	027067	027056	.ASCII ?	7...NOT USED?<CRLF>
	070504	047516	020124	051525		
	070512	042105	000200			
14388	070516	052200	042510	043040	MSG4: .ASCII <CRLF>/	THE FOLLOWING DEVICES AND DRIVES WILL BE USED FOR RELOCATION IF B
	070524	046117	047514	044527		
	070532	043516	042040	053105		
	070540	041511	051505	040440		
	070546	042116	042040	044522		
	070554	042526	020123	044527		
	070562	046114	041040	020105		
	070570	051525	042105	043040		
	070576	051117	051040	046105		

	070604	041517	052101	047511	
	070612	020116	043111	041040	
	070620	052111	034040	051440	
	070626	052105	100072		
14389	070632	042504	044526	042503	.ASCIZ /DEVICE DRIVES/<CRLF>
	070640	042011	044522	042526	
	070646	100123	000		
14390	070651	015	025012	047052	MSG30: .ASCII <15><12>/**NOTE** SWITCH REG BIT 8 HAS BEEN REVERSED IN REV D/<CRLF>
	070656	052117	025105	020052	
	070664	053523	052111	044103	
	070672	051040	043505	041040	
	070700	052111	034040	044040	
	070706	051501	041040	042505	
	070714	020116	042522	042526	
	070722	051522	042105	044440	
	070730	020116	042522	020126	
	070736	100104			
14391	070740	047516	042524	052040	.ASCII 'NOTE THAT SWR BIT 8 SET NOW ALLOWS I/O RELOCATION'<CRLF><CRLF>
	070746	040510	020124	053523	
	070754	020122	044502	020124	
	070762	020070	042523	020124	
	070770	047516	020127	046101	
	070776	047514	051527	044440	
	071004	047457	051040	046105	
	071012	041517	052101	047511	
	071020	100116	200		
14392	071023	124	044510	020123	.ASCII 'THIS PROGRAM SUPPORTS I/O RELOCATION ONLY WITH THE FOLLOWING DEVICES:''
	071030	051120	043517	040522	
	071036	020115	052523	050120	
	071044	051117	051524	044440	
	071052	047457	051040	046105	
	071060	041517	052101	047511	
	071066	020116	047117	054514	
	071074	053440	052111	020110	
	071102	044124	020105	047506	
	071110	046114	053517	047111	
	071116	020107	042504	044526	
	071124	042503	035123		
14393	071130	051200	030120	026063	.ASCIZ <CRLF>'RP03,RK05,RP04/5/6,RS03/4''
	071136	045522	032460	051054	
	071144	030120	027464	027465	
	071152	026066	051522	031460	
	071160	032057	000		
14394	071163	113	030502	026461	MSG31: .ASCIZ 'KB11-EM'<15><12>
	071170	046505	005015	000	
14395	071175	061	027461	032067	MSG32: .ASCIZ '11/74 (KB11CM)'<15><12>
	071202	020040	020040	020040	
	071210	020040	020040	045450	
	071216	030502	041461	024515	
	071224	005015	000		
14396	071227	015	041412	052520	MSG34: .ASCIZ <15><12>'CPU UNDER TEST FOUND TO BE A ''
	071234	052440	042116	051105	
	071242	052040	051505	020124	
	071250	047506	047125	020104	
	071256	047524	041040	020105	
	071264	020101	000		

CEQKC-E PDP 11/70 CPU EXERCISER MACY11 30A(1052) 12-MAR-80 11:30 PAGE 47-207
CEQKCE.P11 12-MAR-80 11:27 TRAP TO 4 SERVICE ROUTINE

SEQ 0232

14397	071267	113	030502	026461	MSG35: .ASCIIZ 'KB11-B/C'<15><12>
	071274	027502	006503	000012	
14398	071302	041113	030461	042455	MSG36: .ASCIIZ 'KB11-E'<15><12>
	071310	005015	000		
14399	071313	103	051511	020120	MSG37: .ASCIIZ /CISP OPTION NOT FOUND/<15><12>
	071320	050117	044524	047117	
	071326	047040	052117	043040	
	071334	052517	042116	005015	
	071342	000			
14400	071343	103	051511	020120	MSG38: .ASCIIZ /CISP OPTION FOUND/<15><12>
	071350	050117	044524	047117	
	071356	043040	052517	042116	
	071364	005015	000		
14401		000001			.END

A	041254	11469#	11575	11576	11632#	11671
AA	001603	5946#	6180#	6191#		
ADCB2	013656	7356	7358#			
ADCB5	014516	7582	7584#			
ADCB6	015234	7730	7731	7733#		
ADCB7	016172	7924	7925	7926	7928#	
ADC0	011512	6774	6775	6776	6778#	
ADC1	012426	6995	6996	6997	6999#	
ADC2	013452	7290	7292#			
ADC5	014310	7514	7515	7517#		
ADC6	015030	7677	7678	7680#		
ADC7	016032	7886	7887	7889#		
ADDN =	076050	5462#	11411			
ADDNI =	076150	5494#	11389			
ADDP =	076070	5477#	11522			
ADDP1 =	076170	5502#				
ADDO	016674	8087	8088	8089	8091#	
ADD1	017006	8120	8121	8123#		
ADD1A	017232	8203	8204	8205	8207#	
ADD1B	017250	8212	8213	8215#		
ADD2	017706	8350	8351	8353#		
ADD3	020500	8536	8538#			
ADD6	021072	8629	8630	8632#		
ADD7	021564	8739	8740	8741	8743#	
ARBEX	043116	11705	11762#			
ARBF IN	043072	11690	11712	11742	11744	11755#
ASHCLO	030402	10052#				
ASHCRO	030460	10073#				
ASHLO	030172	10002#				
ASHL1	031004	10180#				
ASHN =	076056	5468#	11416			
ASHNI =	076156	5500#	11381	11385	11393	11447
ASHP =	076076	5483#	11516	11527		
ASHP1 =	076176	5508#	11499			
ASHRO	030306	10029#				
ASHR1	031072	10203#				
ASLB1	013004	7125	7126	7128#		
ASLB1A	013230	7212	7213	7215#		
ASLB3	014506	7576	7577	7579#		
ASLB4	013762	7394	7395	7396	7398#	
ASLB6	015216	7722	7723	7724	7726#	
ASLB7	016270	7956	7957	7959#		
ASL0	011634	6818	6819	6820	6821	6823#
ASL1	012602	7058	7059	7060	7062#	
ASL3	014224	7483	7484	7486#		
ASL4	013544	7322	7323	7324	7326#	
ASL6	015000	7665	7666	7668#		
ASL7	015660	7833	7834	7836#		
ASRB1	013100	7161	7163#			
ASRB1A	013114	7167	7168	7170#		
ASRB2	013726	7378	7379	7382#		
ASRB2A	013744	7387	7388	7390#		
ASRB5	014446	7557	7558	7560#		
ASRB6	015334	7762	7763	7765#		
ASRB7	016306	7963	7964	7966#		
ASRO	011662	6832	6833	6834	6836#	

MAPL12=	170250	5373#				
MAPL13=	170254	5373#				
MAPL14=	170260	5373#				
MAPL15=	170264	5373#				
MAPL16=	170270	5373#				
MAPL17=	170274	5373#				
MAPL2 =	170210	5373#	10705*			
MAPL20=	170300	5373#				
MAPL21=	170304	5373#				
MAPL22=	170310	5373#				
MAPL23=	170314	5373#				
MAPL24=	170320	5373#				
MAPL25=	170324	5373#				
MAPL26=	170330	5373#				
MAPL27=	170334	5373#				
MAPL3 =	170214	5373#				
MAPL30=	170340	5373#				
MAPL31=	170344	5373#				
MAPL32=	170350	5373#				
MAPL33=	170354	5373#				
MAPL34=	170360	5373#				
MAPL35=	170364	5373#				
MAPL36=	170370	5373#				
MAPL37=	170374	5373#				
MAPL4 =	170220	5373#				
MAPL5 =	170224	5373#				
MAPL6 =	170230	5373#				
MAPL7 =	170234	5373#				
MAPTBL	001766	5946#	6257*	6258*	13955	13958* 13987*
MAPTST	033510	10655#				
MAPTWO	033670	10654	10698	10703#		
MARKEX	027402	9874	9878	9882#		
MARK1	027356	9870	9872#			
MATC =	076045	5461#	11249			
MATCH	037334	11241	11245#			
MATCI =	076145	5493#				
MBRK	031664	10343#				
MBTAS =	160116	5407#				
MBTBA =	160104	5402#	5946			
MBTBAE=	160174	5411#	5946			
MBTCS1=	160100	5400#	5946			
MBTCS2=	160110	5404#	5946			
MBTCS3=	160176	5412#	5946			
MBTDB =	160120	5408#				
MBTDT =	160126	5410#	5946			
MBTER =	160114	5406#	5946			
MBTERR	054222	13095	13112#			
MBTMR1=	160124	5409#				
MBTMR2=	160106	5403#	5946			
MBTN2	002406	5946#	6341			
MBTN3	002410	5946#	6345			
MBTN4	002412	5946#	6349			
MBTOPT=	002000	5421#	6339	6365	11782	
MBTPSW=	000776	5414#	5946			
MBTSET	043226	11772	11774	11782#		
MBTSRV	054050	11793	13083#			

TST16	016064	7902#	
TST17	016366	7987#	
TST2	011176	6696#	
TST20	016732	8106#	
TST21	017264	8222#	
TST22	017622	8339#	
TST23	020114	8423#	
TST24	020326	8490#	
TST25	020524	8549#	
TST26	020712	8601#	
TST27	021216	8658#	
TST3	011372	6740#	
TST30	021400	8698#	
TST31	021624	8759#	
TST32	021770	8787#	
TST33	022164	8821#	
TST34	022700	8945#	
TST35	023200	9032#	
TST36	023530	9133#	
TST37	023762	9149	9195#
TST4	011716	6852#	
TST40	024176	9247#	
TST41	024422	9285#	
TST42	025130	9387#	
TST43	025446	9471#	
TST44	025670	9517#	
TST45	026104	9579#	
TST46	026252	9617#	
TST47	027044	9773#	
TST5	012320	6970#	
TST50	027302	9858#	
TST51	027404	9906#	
TST52	027624	9945#	
TST53	030100	10000#	
TST54	030544	10101#	
TST55	030702	10150#	
TST56	031156	10232#	
TST57	031242	10251#	
TST6	012660	7089#	
TST60	031420	10292#	
TST61	031646	10342#	
TST62	031736	10360#	
TST63	032150	10401#	
TST64	032246	10417#	
TST65	032336	10427#	
TST66	032700	10504#	
TST67	033024	10540#	
TST7	013274	7236#	
TST70	033204	10573	10596#
TST71	033462	10652#	
TST72	033756	10721#	
TST73	035160	10880	10883#
TST74	036536	11126#	
TST75	036714	11145#	
TST76	042610	11685#	
TST77	043116	11762#	

SKTNE X	062120	13760#												
SKTOUT	062110	13760#												
SKT11	061750	6212*	13760#*											
SLF	001410	5946#	13164	13439	13758	13759								
SLONUM	001620	5946#	6168*	11146	11150*	11166	12305	12457	13663*	13687	13935			
SLPADR	001260	5946#	6271*	6687*	6697*	7801*	8788*	9286*	9618*	10001*	10428*	10723*	11127*	13163*
SLPERR	001262	5946#	6104*	6271*	6687*	6697*	7801*	8788*	9286*	9618*	10001*	10428*	10723*	11127*
		11148*	11948*	12087	12141*	13054	13055*	13066*	13112	13113*	13122*	13163*	13164	14125
		14126*	14128*	14141	14198	14199*	14201*	14203	14212	14213*	14215*	14216	14228	14229*
		14231*	14234											
SLSTAD	062264	13760#*												
SLSTBK	062266	6214*	6216	6228	6235	13760#*								
SMAIL	001214	5924	5931#											
SMINT	001710	5946#	12265*	12275*	13224									
SMIADR	001202	5924#												
SMBLTH	001212	5928#												
SMGAD	001230	5938#												
SMGLG	001232	5939#												
SMSTY	001214	5932#	13164*											
SMTMOU	062232	13760#												
SMXCNT	054706	13163#												
SMULL	001320	5946#	13439											
SMWTST	000001	6686#	6696#	6740#	6852#	6970#	7089#	7236#	7334#	7451#	7531#	7608#	7688#	7800#
		7902#	7987#	8106#	8222#	8339#	8423#	8490#	8549#	8601#	8658#	8698#	8759#	8787#
		8821#	8945#	9032#	9133#	9195#	9247#	9285#	9387#	9471#	9517#	9579#	9617#	9773#
		9858#	9906#	9945#	10000#	10101#	10150#	10232#	10251#	10292#	10342#	10360#	10401#	10417#
		10427#	10504#	10540#	10596#	10652#	10721#	10883#	11126#	11145#	11685#	11762#		
SOCNT	057440	13533#*												
SOCTVL	060010	13535#												
SOMODE	057442	13533#*												
SOVER	054664	13163#												
SPAS	001222	5935#												
SPASS	001250	5946#	6245*	6647	12286*	13163	13234							
SPASTM	001206	5926#												
SPOWER	061342	13757#												
SPWRAD	061330	13757#												
SPWRDN	061206	6271	13757#											
SPWRMG	061324	13757#												
SPWRUP	061254	13757#												
SQUES	001406	5946#	13164	13758	13759									
SRAND	060562	11165	12303	12382	12455	12523	13663#	13677	13933					
SRDCHR	061352	13758#	13761											
SRDDEC	061524	13759#	13761											
SRDLIN	061406	13758#	13761											
SROCT=	***** U	13761												
SRSZ =	000010	13758#												
SREGAD	001324	5946#												
SREGO	001326	5946#	10731	10742	10764	10804	10811	10831	10864	10872	10873	10875	10889	10900
		10922	10962	10969	10989	11022	11030	11031	11033	13726				
SREG1	001330	5946#	10732	10753	10763	10805	10813	10823	10865	10890	10911	10921	10963	10971
		10981	11023											
SREG10	001346	5946#												
SREG11	001350	5946#												
SREG2	001332	5946#	10738*	10790	10820*	10851	10869*	10896*	10948	10978*	11009	11027*	14340	14355
SREG3	001334	5946#	10778*	10792	10841*	10853	10873*	10936*	10950	10999*	11011	11031*	14349	14355
SREG4	001336	5946#	14125*	14128	14198*	14201	14212*	14215	14228*	14231				

\$REG5	001340	5946#	11693*	12271*	12281*	14031*	14039*	14049*	14081*	14082	14086*								
\$REG6	001342	5946#																	
\$REG7	001344	5946#																	
\$RESRE	060064	13536#	13761																
\$RTRN	001570	5946#	6671	9942	12270														
\$SAVPA	001556	5946#	14162	14177															
\$SAVPS	001566	5946#	14151*	14187															
\$SAVRE	060026	13536#	13761																
\$SAVR6	061340	13757#*																	
\$SCDPF	054456	6271	9147	9153	9244	10399	13163#												
\$SETUP-	000037	6251#	6271	6484	12286	13164													
\$SIZE	061702	6213	13760#																
\$SIZEFX	062162	13760#																	
\$STUP =	177777	6251#																	
\$SVLAD	054642	13163#																	
\$SVPC =	000224	5524#																	
\$SWR =	167377	4391#	5348	5360	5946	6271	6686	6696	6740	6852	6970	7089	7236	7334					
		7451	7531	7608	7688	7800	7902	7987	8106	8222	8339	8423	8490	8549					
		8601	8658	8698	8759	8787	8821	8945	9032	9133	9195	9247	9285	9387					
		9471	9517	9579	9617	9773	9858	9906	9945	10000	10101	10150	10232	10251					
		10292	10342	10360	10401	10417	10427	10504	10540	10596	10652	10721	10883	11126					
		11145	11685	11762	12286	13163	13164												
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\$SWRP	001244	5945#	6183*	6649	11773	11784	11806	11898	11918	11955	11963	11967	12110	12175					
		12298	12376	12450	12518	13163	13164												
\$TESTN	001220	5934#	13164*																
\$TIMES	001376	5946#	6271*	6686*	6696*	6853*	6971*	7800*	8787*	9285*	9617*	10000*	10427*	10721*					
		10722*	10884*	11126*	12286*	13163*													
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\$TMP0	001352	5946#	6102*	6523*	6526	6537*	6557*	6560	6564*	6577*	6580	6588	6597*	6605*					
		6608	6619*	10316*	10729	10743	10802	10810	10830	10862	10870	10887	10901	10960					
		10968	10988	11020	11028	11138*	11566*	11569*	11572*	11575*	11933*	11961*	11965	11970*					
		11987	12027	12032	12114*	12200*	13675	13690	13722	13896*	14106*	14193*	14209*	14222*					
		14233	14308	14312	14316	14324	14328	14333	14338										
\$TMP1	001354	5946#	6103*	11139*	11567*	11570*	11573*	11576*	11978*	11980	11983	11985*	12035	12037*					
		12136*	12139*	14338															
\$TMP10	001372	5946#	13026*	13053*	13057	13085*	13111*	13115											
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\$TMP2	001356	5946#	10730	10751	10760	10803	10812	10822	10863	11959*	12135*	13892*	14124*	14196*					
		14227*	14308	14316	14324	14333													
\$TMP3	001360	5946#	12133*	13893*	14111*	14197*	14316	14324	14333										
\$TMP4	001362	5946#	10737*	10789	10819*	10850	10868*	10888	10909	10918	10961	10970	10980	11021					
		13894*	14112*	14349															
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\$TMP6	001366	5946#	10777*	10840*	10871*	14349													
\$TMP7	001370	5946#																	
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		8759#	8787#	8821#	8945#	9032#	9133#	9149	9195#	9247#	9285#	9387#	9471#	9517#					
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		11145#	11685#	11762#															
\$TPB	001316	5946#	13439*	14072*															
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\$TPS	001314	5946#	6298	11691	11694*	11706	11709*	11746*	11758*	12256	12272*	12279	12282*	13439					

STRAP	062270	14032*	14040*	14050*	14068*	14070	14085*	9267	9272	9280	13761#				
STRP =	000030	6075	6156	6219	6271	9260	9263								
STRPAD	062310	13761#	13762#	13763#											
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		7800*	7902*	7987*	8106*	8222*	8339*	8423*	8490*	8549*	8601*	8658*	8698*	8759*	
		8787*	8821*	8945*	9032*	9133*	9195*	9247*	9285*	9387*	9471*	9517*	9579*	9617*	
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		12219*	12286*	13163*	13164*	13226									
STTYIN	061514	13758#													
STYPBN=	***** U	13761													
STYPDS	057444	13534#	13761												
STYPE	056410	13439#	13761												
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STYPEX	056630	13439#													
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		6730	6738	6749	6759	6769	6777	6786	6795	6804	6813	6822	6828	6835	
		6842	6850	6871	6881	6891	6898	6905	6914	6930	6972	6982	6989	6998	
		7005	7011	7018	7025	7033	7040	7048	7053	7061	7067	7075	7082	7087	
		7090	7103	7109	7115	7121	7127	7133	7140	7147	7154	7162	7169	7173	
		7180	7185	7192	7199	7205	7209	7214	7221	7225	7231	7234	7237	7249	
		7254	7261	7268	7274	7279	7283	7291	7298	7305	7309	7315	7319	7325	
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		7415	7420	7425	7431	7439	7446	7449	7452	7465	7472	7478	7485	7493	
		7499	7505	7510	7516	7523	7529	7532	7550	7553	7559	7564	7572	7578	
		7583	7590	7594	7600	7606	7618	7624	7629	7637	7645	7651	7659	7667	
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		7758	7764	7770	7777	7782	7788	7794	7797	7801	7820	7827	7835	7842	
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		7946	7952	7958	7965	7971	7978	7985	7992	8000	8006	8015	8023	8043	
		8051	8061	8069	8077	8080	8090	8095	8104	8107	8122	8131	8139	8148	
		8155	8162	8168	8176	8187	8194	8199	8206	8214	8220	8223	8241	8245	
		8252	8263	8268	8274	8279	8285	8288	8337	8352	8359	8364	8371	8383	
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		8720	8721	8727	8734	8742	8746	8750	8754	8784	8788	8793	8799	8804	
		8808	8814	8819	8856	8861	8867	8871	8881	8891	8896	8932	8934*	8950	
		8952	8957	8962	8970	8972	8977	8993	8997	9011	9019	9030	9113	9140	
		9156	9181	9188	9201	9232	9233	9240	9251	9259	9262	9266	9271	9286	
		9293	9368	9481	9498	9540	9547	9555	9561	9572	9588	9603	9612	9618	

	9627	9640	9651	9654	9668	9682	9699	9702	9714	9723	9727	9734	9740
	9745	9756	9762	9767	9780	9799	9816	9820	9822	9825	9850	9856	9871
	9876	9880	9912	9965	9980	9991	10001	10023	10046	10066	10090	10111	10123
	10142	10171	10195	10220	10249	10264	10278	10364	10378	10403	10410	10423	10428
	10454	10481	10608	10616	10644	10723	11127	11619#	11646#	11681#	12007#	12206	12257
	12286#	12429	12576	12588	12626	12667	12694	12707	12747	12788	13163	13164	13438#
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.\$DB2D	4069#		
.\$DB2O	4194#	5245#	13535
.\$DIV	3971#		
.\$EOP	1913#	4387#	12286
.\$ERRO	2329#	4388#	13164
.\$ERRT	2510#		
.\$MULT	3907#		
.\$POWE	3615#	4387#	13757
.\$RAND	3675#	5300#	13663
.\$RDDE	3311#	4388#	13759
.\$RDOC	3219#		
.\$READ	2983#	4388#	13758
.\$SAVE	3387#	4388#	13536
.\$SB2D	4154#		
.\$SB2O	4257#		
.\$SCOP	2131#	4847#	13163
.\$SIZE	3729#	4388#	13760
.\$SUPR	4296#		
.\$STRAP	3488#	4387#	13761
.\$TYPB	2886#		
.\$TYPD	2808#	4387#	13534
.\$TYPE	2598#	5537#	13439
.\$TYPO	2711#	4388#	13533
.\$1170	494#	4408#	5373

. ABS. 071367 000

ERRORS DETECTED: 0

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RUN-TIME: 77 113 13 SECONDS
RUN-TIME RATIO: 1070/205=5.2
CORE USED: 33K (65 PAGES)