PDP11/70

CACHE DIAGNOSTIC PART 1

MD-11-DEKBC-B

EP-DEKBC-DL-A

FICHE 2 OF 2

NOV 1976

digital

MADE IN USA

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DEKBC-B-D

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MAINTAINER: DIAGNOSTIC ENGINEERING

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1. ABSTRACT

THE PROGRAMS, DEKBC AND DEKBD, ARE INTENDED TO BE USED AS AIDS FOR THE REPAIR AND MAINTENANCE OF THE CACHE MEMORY SYSTEM IN THE PDP 11/70 COMPUTING SYSTEM. THE AIM IS TO DETECT AND REPORT FAILING COMPONENTS OF THE CACHE UNIT. THE FAILURES ARE TYPICALLY IDENTIFIED WITH A FAILING CIRCUIT WHEN THE REPORT IS MADE, BUT THE OVERALL DIAGNOSTIC PHILOSOPHY HAS BEEN TO LOCATE THE FAILING MODULE (HEX BOARD) OF WHICH THERE ARE FOUR (4) IN THE CACHE UNIT. NOTE THAT WHEN IS FAILURE IS REPORTED AND THE ASSOCIATED CIRCUIT IDENTIFIED, THAT CIRCUIT SHOULD NOT BE TAKEN IN BLIND FAITH AS THE DEFECTIVE COMPONENT; THE IDENTIFIED COMPONENT SHOULD RATHER BE TAKEN AS THE PROBABLE CAUSE OF THE FAILURE. THERE

ARE FOUR (4) MODULES (HEX BOARDS) IN THE CACHE UNIT:

CCB CACHE CONTROL BOARD
CDB CACHE DATA PATHS BOARD
ADM CACHE ADDRESS MEMORY BOARD
DTM CACHE DATA MEMORY BOARD THE PROGRAM, DEKBC, IS DESIGNED TO TEST THE FIRST TWO OF THESE BOARDS; THE PROGRAM, DEKBD, IS DESIGNED TO TEST THE LAST TWO BOARDS. NOTE THAT THOUGH THE TESTING HAS BEEN DIVIDED INTO TWO STAND ALONE PROGRAMS EACH ASSOCIATED WITH TWO MODULES IT SHOULD NOT BE ASSUMED THAT A PARTICULAR MODULE IS WORKING AFTER HAVING RUN ONLY ONE OF THE PROGRAMS! BOTH PROGRAMS SHOULD BE RUN! FOR EXAMPLE, JUST RUNNING DEKBC WITHOUT ERROR DOES NOT RULE OUT A FAULTY COMPONENT ON THE CCB (CACHE CONTROL) BOARD. TO PUT IT MORE SIMPLY THE TESTING HAS BEEN DIVIDED INTO TO PROGRAMS ONLY BECAUSE OF THE RESTRICTIONS OF CORE SIZE! AND NOT TO PROVIDE A MEANS OF TESTING TWO OF THE BOARDS WITH ONE PROGRAM AND THE OTHER TWO BOARDS WITH A SECOND PROGRAM. NOTE THAT DEKBD IS DESIGNED TO RUN AFTER DEKBC. IF THIS HIERARCHY IS NOT NEEDED, THAT IS IF DEKBD IS RUN BEFORE DEKBC, THEN THE ERROR REPORTING FROM DEKBD SHOULD NOT BE STRICTLY INTERPRETED.

2. REQUIREMENTS

2.1 EQUIPMENT PDP 11/70 CPU WITH OPERATORS CONSOLE LA30 OR EQUIVALENT TERMINAL.

2.2 STORAGE BOTH PROGRAMS, DEKBC AND DEKBD, EACH REQUIRE 13K TO LOAD, BUT THEY BOTH ALSO ASSUME THAT THERE IS A MINIMUM OF 28K OF MEMORY IN WHICH TO RUN TESTS.

2.3 PRELIMINARY PROGRAMS THIS PROGRAM ASSUME THAT THE CPU IS FUNCTIONAL! THIS COULD IN SOME CIRCUMSTANCES MEAN THAT THE CPU DIAGNOSTICS SHOULD BE RUN BEFORE EITHER OF THESE DIAGNOSTICS. BUT A FAULTY MEMORY SYSTEM MAY PRECLUDE THIS, SO SITUATIONAL JUDGEMENT MUST BE USED. IF THE CPU IS KNOWN TO BE WORKING THEN RUN THESE DIAGNOSTICS, DEKBC AND DEKBD, FIRST. BUT IF THE CPU CAN NOT BE ASSUMED TO BE WORKING THEN TRY TO RUN THE CPU DIAGNOSTICS FIRST. THEN RUN THESE PROGRAMS IN THE ORDER: DEKBC BEFORE DEKBD! IN FACT DEKBD ASSUMES THAT MUCH OF WHAT IS TESTED IN DEKBC IS OPERATIONAL FOR DOING ITS FAULT ANALYSIS.

3. LOADING PROCEDURE

3.1 METHOD (TO BE SUPPLIED)

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS (SEE 5.1)

4.2 STARTING ADDRESS 200

4.3 PROGRAM AND OPERATOR ACTION BOTH PROGRAMS CAN BE STARTED BY:

1 LOAD PROGRAM INTO MEMORY
2 LOAD ADDRESS 200
3 PRESS START
4 THE PROGRAMS WILL LOOP UNTIL THE HALT SWITCH IS PRESSED OR UNTIL THE USER STRIKES (TYPES) CONTROL-C (^C) ON THE TELETYPE OR TERMINAL (SEE 8.6 AND 5.2.7).

4.4 SPECIAL OPERATOR INTERVENTION OPTIONS IF SWITCH 7 OF THE SWITCH REGISTER IS ON THEN DEKBD WILL REQUIRE THE OPERATOR TO POWER THE MACHINE FIRST DOWN AND THEN UP (SEE 5.1 AND 8.7).

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS FOR DEKBC:

SW<15>=1 HALT ON ERROR
SW<14>=1 LOOP ON TEST
SW<13>=1 INHIBIT ERROR TYPOUTS
SW<12> NOT USED IN DEKBC
SW<11>=1 INHIBIT ITERATIONS
SW<10>=1 RING BELL ON ERROR
SW<9> =1 LOOP ON ERROR
SW<8> =1 LOOP ON TEST IN SW<7:0>
SW<7:0> TEST NUMBER FOR LOOPING WHEN SW<8>=1

DEKBD USES THE SAME SWITCH SETTINGS AS DEKBC EXCEPT

SW<7> =1 RUN THE OPERATOR INTERVENTION NEEDED POWER UP TEST

5.2 SUBROUTINE ABSTRACTS BOTH DEKBC AND DEKBD USE THE FOLLOWING SUBROUTINES.

5.2.1 SPURIOUS ERROR HANDLERS THESE ARE TWO ROUTINES WHICH ARE CALLED BY UNEXPECTED TRAPS TO EITHER VECTOR 4, IN THE CASE OF A CPU ERROR, OR VECTOR 114, IN CASE OF A MEMORY PARITY ERROR. THE CPU ERROR HANDLER, CPSPUR, TYPES OUT THE PC AT THE TIME OF THE TRAP AND THE CONTENTS OF THE CPU ERROR REGISTER, CPUERR AND SKIPS TO THE TEST FOLLOWING THE ONE DURING WHICH THE ERROR OCCURRED. THE PARITY ERROR HANDLER, SPUR, TYPES OUT THE PC AT THE TIME OF THE TRAP AND THE CACHE ERROR REGISTERS, MEMERR AND LOADRS AND HIADRS, IT THEN ALSO GIVES CONTROL TO THE TEST FOLLOWING THE ONE DURING WHICH THE ERROR OCCURRED.

5.2.2 SCOPE THIS SUBROUTINE IS CALLED (VIA AN IOT INSTRUCTION) AT THE BEGINNING OF THE EXECUTION OF ALL THE TESTS. IT CONTROLS THE OPERATIONAL FUNCTIONS OF LOOPING ON TEST, ITERATION, AND SETS UP FOR LOOPING ON ERRORS.

5.2.3 ERROR THIS SUBROUTINE IS CALLED (VIA AN EMT INSTRUCTION) TO TYPE OUT AN ERROR REPORT. IT CONTROLS THE OPERATIONAL FUNCTIONS OF HALTING ON ERROR, INHIBITING ERROR PRINT OUT, LOOPING ON ERROR, BELL ON ERROR, ETC.

5.2.4 TRAP CATCHER THIS CONSISTS OF A '.+2' FOLLOWED BY A HALT INSTUCTION REPEATED FROM LOCATION 0 THROUGH 776 FOR THE PURPOSE OF CATCHING ANY SPURIOUS TRAP TO A VECTOR. SUCH A TRAP WILL RESULT IN A HALT AT THE TRAP VECTOR ADDRESS PLUS TWO (2).

5.2.5 TRAP A NUMBER OF SUBROUTINES ARE CALLED BY USING THE TRAP INSTRUCTION:
TYPE TO TYPE OUT AN ASCIZ STRING
TYPEOC TO TYPE OUT THE OCTAL FOR A 16-BIT BINARY NUMBER ETC.

5.2.6 POWER DOWN AND POWER UP THIS SUBROUTINE IS CALLED WHEN AN UNEXPECTED POWER DOWN OCCURS. WHEN POWER IS RETURNED (IF THE HALT SWITCH IS NOT ON) THE PROGRAM WILL RESTART AFTER TYPING A MESSAGE.

5.2.7 MONITOR OR LOADER RESTORE WHEN THIS PROGRAM IS FIRST STARTED IT SAVES THE CONTENTS OF THE HIGHEST 1.5 (DEC) K OF MEMORY IN THE FIRST 28K. THESE LOCATIONS USUALLY CONTAIN THE LOADER OR MONITOR OF THE SYSTEM. TO RESTORE THIS LOADER OR MONITOR THE USER NEED ONLY TYPE CONTROL C (↑C) ON THE TERMINAL AND THAT MONITOR OR LOADER WILL AUTOMATICALLY BE RESTORED. AFTER THIS IS DONE THE PROGRAM WILL HALT. NOTE THAT MANY OF THESE TESTS WIPE OUT THE ORIGINAL CONTENTS OF THAT PART OF MEMORY THEREFORE THE USER SHOULD TYPE CONTROL-C (↑C) TO RESTORE THESE LOCATIONS AND AVOID HAVING TO RELOAD HIS MONITOR OR LOADER.

5.3 OPERATOR ACTION ONLY THE POWER UP INVALIDATOR TEST IN PROGRAM DEKBD REQUIRES OPERATOR INTERVENTION, IN THE FORM OF POWERING THE PROCESSOR FIRST DOWN AND THEN UP. THIS TEST IS RUN ONLY IF SW(12)=1 (SEE 4.4 AND 5.1).

6. ERRORS

6.1 ERROR HALTS ONLY TEST NUMBER 14 IN PROGRAM DEKBC, THE MAINTENANCE REGISTER COUNT PATTERN TEST, HALTS THE PROCESSOR IN THE SITUATION WHERE IT CAN'T CLEAR THE MAINTENANCE REGISTER. HERE PROCEDING WITH

THE PROGRAM'S EXECUTION WOULD PROBABLY BE FATAL. SO A HALT IS EXECUTED! NO OTHER TEST IN EITHER PROGRAM SHOULD HALT UNDER ANY NORMAL ERROR DETECTION.

6.2 ERROR RECOVERY IF NONE OF THE ERROR PERTAINENT OPERATIONAL SWITCHES ARE BEING USED THE PROGRAM WILL EITHER RESUME THE TEST THAT MADE THE ERROR CALL OR START EXECUTION OF THE TEST FOLLOWING THE TEST DURING WHICH THE ERROR CALL WAS MADE DEPENDING ON WHETHER OR NOT THE ERROR WHICH WAS DETECTED (OR EVEN THE ERROR CALL ITSELF) WAS FATAL TO THE TEST WHICH MADE THE ERROR CALL. IF THE HALT DESCRIBED IN 6.1 ABOVE IS EVER EXECUTED TO USER CAN RESUME, IF HE IS BRAVE, BY HITTING THE CONSOLE CONTINUE SWITCH. IF ANY OF THE PERTAINENT CONSOLE SWITCH SETTING ARE SET SEE SECTION 5.1 FOR A DESCRIPTION OF THE ACTION TAKEN WHEN AN ERROR CALL IS MADE.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS NONE

7.2 OPERATING RESTRICTIONS THE MONITOR OR LOADER (OR WHAT EVER IS IN THE FIRST 28K OF MEMORY FROM LOCATIONS 152000 THROUGH LOCATION 157776 ARE SAVED SO THAT THE USER CAN RESTORE HIS LOADER OR MONITOR BY TYPING CONTROL-C (↑C) , (SEE 4.3 AND 5.2.7). IF THE PROGRAM WAS CHAINED IN BY A MONITOR WHICH WANTS CONTROL AUTOMATICALLY PASSED BACK TO IT WHEN TESTING IS DONE THAT MONITOR IS RESTORED AND CONTROL IS GIVEN TO IT BY THE END OF PASS ROUTINE .$EOP.

8. MISCELLANEOUS

8.1 EXECUTION TIME FIRST PASS UNDER 10 SECONDS FOR BOTH PROGRAMS. SUBSEQUENT PASSES UNDER 2 MINUTES FOR BOTH PROGRAMS. (MORE EXACT EXECUTION TIMES WILL BE LATER SUPPLIED).

8.2 STACK POINTER IN BOTH PROGRAMS THE STACK POINTER (R6) WILL BE INITIALIZED TO LOCATIO 1100.

8.3 PASS COUNT BOTH PROGRAMS WILL TYPE OUT THE PASS COUNT AT THE END OF EACH PASS.

8.4 ITERATIONS EACH TEST HAS BEEN ASSIGNED AN ITERATION COUNT WHICH WILL DESIGNATE HOW MANY TIMES THAT TEST IS TO BE EXECUTED ON EACH PASS. NOTE THAT ON THE FIRST PASS THE ITERATION COUNT IS OVERIDED BY A ONE (1) MAKING ITERATIONS MEANINGLESS ON THAT FIRST PASS.

8.5 OSCILLOSCOPE SYNC POINTS WHERE EVER POSSIBLE EACH TEST HAS BEEN GIVEN AN OSCILLOSCOPE SYNC POINT (A NOP INSTRUCTION). THE ADDRESS OF THE CONDITION CODE ROM STATE (44) IS PUT IN THE PROCESSOR MICROBREAK REGISTER (177770). THIS WILL RESULT IN PIN AE1 (SLOT 10) ON THE BACK PLANE TO GO HIGH WHENEVER THE CPU ROM FLOW GOES THROUGH THE MICRO CODE ADDRESS 144. THEREFORE BY USING THE OUTPUT OF THIS BACKPLANE PIN AS A SCOPE SYNC AND BY PUTTING NOP INSTRUCTION IN CRUCIAL PARTS OF A TEST THE USER WILL HAVE A VERY CONVENIENT SYNC FOR MANY SIGNALS HE MAY WISH TO OBSERVER. THE LIMITATIONS OF THIS PROCEDURE ARE THAT THE USER MUST BE ABLE TO JUDGE (DETERMINE) HOW SOON AFTER THE NOP IN THE PARTICULAR TEST HE IS RUNNING (LOOPING ON) THE SIGNAL HE WISHES TO OBSERVE SHOULD OCCUR. IN MANY CASES THIS WILL BE EASY (E.G. THE ERROR REGISTER TESTS.) BUT IN SOME TESTS THE NOP IS SO FAR FROM THE EXPECTED OCCURRENCE OF THE DESIRED SIGNAL THAT THE PROBLEM BECOMES NONTRIVIAL AND THE EXPERIENCED USER WOULD DO WELL TO FIND OTHER SYNC SIGNALS ORIGINATING IN THE CACHE DEVICE ITSELF TO OBSERVE THE LOGIC.

8.6 RESTORING THE MONITOR OR LOADER FOR THE USERS CONVENIENCE BOTH PROGRAMS SAVE EITHER THE MONITOR OR LOADER (OR WHATEVER IS IN THE HIGHEST 1.5K OF MEMORY'S FIRST 28K) AND RESTORE IT WHEN THE USER TYPES CONTROL-C (↑C) ON THE TELETYPE OR TERMINAL. THE PROGRAM WHEN IT GETS THE CONTROL-C RESTORES THE MONITOR AND THEN HALTS; AT THIS POINT THE USERS CAN EITHER RESTART THE MONITOR OR REUSE THE LOADER ETC.

8.7 POWER UP LOGIC TEST THERE IS A CERTAIN PART OF THE CACHE DEVICE WHICH REQUIRES A POWER DOWN POWER UP SEQUENCE TO TEST. THIS TEST HAS BEEN INCLUDED HERE AS AN OPTION ONLY BECAUSE IT REQUIRES OPERATOR INTERVENTION. TO RUN THIS TEST SET SW<12>=1 (SEE 5.1).

8.8 MEMORY MANAGEMENT RESTRICTION OPTION MANY OF THE TESTS REQUIRE THE USE OF EXTENSIVE MEMORY MANAGEMENT MAPPING FACILITY. THESE TESTS MUST ASSUME THE MEMORY MANAGEMENT (AND SOME THE MAPPING BOX) IS OPERATIONAL. NORMALLY THESE TEST WILL BE EXECUTED. BUT THE FEATURE HAS BEEN PROVIDED WHEREBY THE USER CAN DELETE THE EXECUTION OF ANY TESTS WHICH REQUIRE THE USE OF MEMORY MANAGEMENT AND/OR THE MAPPING. THIS HAS BEEN IMPLIMENTED USING SW<7>. WHEN THIS SWITCH IS 0 NORMAL OPERATION IS UNDERTAKEN, BUT WHEN SW<7>=1 THEN ANY TEST WHICH MUST TURN ON THE MEMORY MANAGEMENT UNIT (THE MAPPING BOX) WILL NOT BE RUN AND CONTROL WILL BE PASSED TO THE NEXT TEST!

8.9 CRITICAL DEPENDENCE OF SOME TESTS ON THE

CACHE REGISTERS AS THE PROGRAMS RUN FLAGS ARE SET WHICH DESIGNATE THE FUNCTIONALITY OF A CACHE REGISTER. IF A TEST DETERMINES THAT A PARTICULAR REGISTER IS NOT FUNCTIONAL IT SETS A FLAG WHICH DESIGNATES TO THE REST OF THE PROGRAM THAT THAT REGISTER DOES NOT WORK PROPERLY. SOME TESTS WHICH RELY ON THE REGISTERS TO BE FUNCTIONAL WILL TEST THESE FLAGS AND IF THEY FIND THEM TO INDICATE THAT A REGISTER THEY NEED IS BAD THEY WILL SKIP TO THE NEXT TEST!

9. PROGRAM DESCRIPTION

9.1 DEBSC

PROGRAM BY ANTHONY S. VEZZA

THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC PACKAGE (MAINDEC-11-DZQAC-A3).

TEST 1 CACHE REGISTERS RESPONSE TEST

REFERENCE EACH CACHE REGISTER MAKING SURE SUCH REFERENCES DO NOT TIME OUT.

TEST 2 CACHE REGISTERS DATA PATH, READ ZEROES TEST

THIS TEST CHECKS THE ABILITY OF THE CACHE REGISTER DATA PATHS TO PASS 0'S BY FIRST WRITING THEN READING 0'S AT THE CONTROL AND MAINTENANCE REGISTERS.

TEST 3 CACHE REGISTERS DATA PATH, READ ONES TEST

THIS TEST PERFORMS A READ OF BOTH THE HIGH ORDER AND LOW ORDER ERROR

ADDRESS REGISTER. THIS IS DONE TO MAKE SURE THAT THE REGISTERS' DATA PATHS CAN PASS ONES. NOTE THAT THE LOW ORDER ADDRESS REGISTER SHOULD CONTAIN A 177740 AND THE HIGH ORDER REGISTER SHOULD CONTAIN 000003; THIS LEAVES THE DATA PATH LINE'S BITS 2,3 AND 4 UNTESTED FOR THEIR AVAILITY TO PASS ONES. THIS WILL BE CHECKED IN THE COUNT PATTERN TST4.

TEST 4 CACHE CONTROL REGISTER COUNT PATTERN TEST

THIS TEST RUNS A COUNT PATTERN THROUGH THE CACHE CONTROL REGISTER FOR THE PURPOSE OF CHECKING OUT THE DATA RELIABILITY OF BOTH THE REGISTER BITS AND THE DATA PATHS LINES.

TEST 5 CACHE HIT/MISS AND CONTROL REGISTER SIMPLE MISSES TEST

THIS IS A TEST OF THE HIT/MISS REGISTER AND THE CONTRL REGISTER'S ABILITY TO FORCE MISSES. ZEROES ARE FLOATED THROUGH THE HIT/MISS REGISTER.

TEST 6 CACHE HIT/MISS AND CONTROL REGISTER SIMPLE HIT TEST

THIS IS A TEST OF THE HIT/MISS REGISTER AND THE THE FORCE MISS BITS OF THE CONTROL REGISTER. WHAT IS DONE IS TO SEE IF ANY HITS AT ALL ARE POSSIBLE WITH THE CONTROL REGISTER CLEARED. THEN THE SAME IS DONE WITH EACH GROUP DISABLE ONE AT A TIME. BY DISABLED IS MEANT THAT THE FORCE MISS BIT IS SET IN THE CONTROL REGISTER FOR THE DISABLED GROUP AND THE FORCE SELECT BIT IS SET FOR THE OTHER GROUP.

TEST 7 CACHE CONTROL REGISTER, FORCE SELECT-FORCE MISS, GROUP 0 TEST

THIS IS A TEST OF THE CONTROL REGISTER FUNCTIONS OF FORCE MISS AND

FORCE SELECTION. AN ADDRESS IS MADE A HIT IN GROUP ONE; THEN ANOTHER ADDRESS, WHOSE HIT WOULD BE MUTUALLY EXCLUSIVE WITH THE FIRST ADDRESS IN ONLY ONE GROUP, IS MADE A HIT WHILE FORCING SELECTION OF GROUP ZERO; THEN SEE IF THE FIRST ADDRESS IS STILL A HIT IN GROUP ONE; FINALLY TURN ON THE FORCE MISS GROUP ZERO BIT AND SEE IF THE SECOND ADDRESS' HIT IN GROUP ZERO CAN BE FORCED TO A MISS.

TEST 10 CACHE CONTROL REGISTER, FORCE SELECT-FORCE MISS, GROUP 1 TEST

THIS IS A TEST OF THE CONTROL REGISTER FUNCTIONS OF FORCE MISS AND FORCE SELECTION. AN ADDRESS IS MADE A HIT IN GROUP ZERO; THEN ANOTHER ADDRESS, WHOSE HIT WOULD BE MUTUALLY EXCLUSIVE WITH THE FIRST ADDRESS IN ONLY ONE GROUP, IS MADE A HIT WHILE FORCING SELECTION OF GROUP ONE; THEN SEE IF THE FIRST ADDRESS IS STILL A HIT IN GROUP ZERO; FINALLY TURN ON THE FORCE MISS GROUP ONE BIT AND SEE IF THE SECOND ADDRESS' HIT IN GROUP ONE CAN BE FORCED TO A MISS.

TEST 11 CACHE HIT/MISS REGISTER PATTERNS TEST

THIS IS A TEST OF THE HIT/MISS REGISTER WHICH FLOATS DIFFERENT PATTERNS OF HITS AND MISSES THROUGH THAT REGISTER. THIS IS DONE FIRST WITH BOTH GROUPS ENABLE; THEN WITH GROUP ZERO DISABLED THAT IS FORCING SELECTION OF GROUP ONE AND FORCING MISSES TO GROUP ZERO; FINALLY WITH GROUP ONE DISABLED.

TEST 12 CACHE CONTROL AND HIT/MISS REGISTERS EVALUATION ROUTINE

THIS IS NOT A TEST. THIS ROUTINE IS USED TO LOOK AT THE RESULTS OF TSTS THROUGH TST10, WHICH TESTED THE HIT/MISS REGISTER AND THE CONTROL REGISTER. THOSE TESTS HAVE

SIGNALLED A BAD REGISTER USING THE FLAGS, CONFL2 AND HIMFL2, REPRESENTING THE CONTROL AND HIT/MISS REGISTERS RESPECTIVELY. IF ONE OF THESE REGISTERS WAS FOUND TO BE BAD THE FLAG SHOULD BE A -1. WHILE A ZERO FLAG INDICATES THAT THOSE TESTS FOUND THAT REGISTER FUNCTIONAL. THIS ROUTINE LOOKS AT THE FLAGS, CONFL2 AND HIMFL2, WHICH ARE CONSIDERED TO BE LOCAL AND TRANSFERS THE INDICATORS THEY CONTAIN TO THE GLOBAL FLAGS, CONFLG AND HIMFLG. THESE GLOBAL FLAGS ARE USED TO DESIGNATE TO THE REST OF THE PROGRAM THE FUNCTIONALITY OR DISFUNCTIONALITY OF THOSE REGISTERS.

TEST 13 CACHE CONTROL LOGIC, 'RANDOM' FLIP FLOP TEST

THIS IS A TEST OF THE 'RANDOM' CONTROL SIGNAL. A TEST IS MADE TO INSURE THAT THE 'RANDOM' FLIP-FLOP IS NOT STUCK AND IS TOGGLED ONCE FOR EVERY 'BUST' CYCLE INITIATED BY THE PROCESSOR. 'BUST' IS BUS START, A SIGNAL PRODUCED BY THE PROCESSOR WHENEVER IT THINKS IT IS ABOUT TO DO A MEMORY CYCLE. THE RANDOM FLIP FLOP IS USED IN THE CACHE TO DETERMINE WHICH GROUP TO WRITE IN THE EVENT OF A READ MISS CYCLE. IF THIS FLIP FLOP IS SET THEN GROUP ZERO IS WRITTEN; IF CLEAR THEN GROUP ONE IS WRITTEN.

TEST 14 CACHE MAINTENANCE REGISTER CCOUNT PATTERN TEST

THIS TEST RUNS A COUNT PATTERN THROUGH THE MAINTENANCE REGISTER'S BITS 15 TO 4. THIS IS DONE TO INSURE THAT THESE BITS ARE SETABLE AND THAT THE DATA PATH TO THE REGISTERS IS VIABLE. MISSES ARE FORCED TO BOTH GROUPS SO THAT NO CACHE DATA OR ADDRESS MEMORY ERRORS SHOULD OCCUR. ALSO ANY CYCLES DONE TO MAIN MEMORY ARE INSURED, BY PROPER SELECTION OF INSTRUCTIONS, TO RETURN DATA WITH THE PARITY BITS ON SO AS TO NOT CAUSE MAIN MEMORY

PARITY ERRORS BY SETTING THE MAIN MEMORY MAINTENANCE FUNCTION WHICH WOULD EFFECTIVELY FORCE THE PARITY BITS READ FROM MAIN MEMORY TO A ONE. SINCE THESE PARITY ARE ALREADY ONES, NO ERRORS SHOULD OCCUR.

TEST 15 CACHE MAINTENANCE AND ERROR REGISTERS TEST 1

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY ADDRESS AND CONTROL LINES, AND ALSO A TEST OF THE ERROR REGISTER'S ABILITY TO APPROPRIATELY SET TO 104402. THE REFERENCE CAUSING THIS ERROR WILL BE MADE FROM THE CPU DIRECTLY TO THE CACHE.

TEST 16 CACHE MAINTENANCE AND ERROR REGISTERS TEST 2

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S LOW BYTE, WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 17 CACHE MAINTENANCE AND ERROR REGISTERS TEST 3

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S HIGH BYTE, WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 20 CACHE MAINTENANCE AND ERROR REGISTERS TEST 4

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S LOW BYTE, WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 21 CACHE MAINTENANCE AND ERROR REGISTERS TEST 5

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S HIGH BYTE, WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 22 CACHE MAINTENANCE AND ERROR REGISTERS TEST 6

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S LOW BYTE, WHEN THAT WORD IS THE UNWANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 23 CACHE MAINTENANCE AND ERROR REGISTERS TEST 7

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S LOW BYTE, WHEN THAT WORD IS THE UNWANTED WORD IN THE PAIR GOTTEN FROM MEMORY.

TEST 24 CACHE MAINTENANCE AND ERROR REGISTERS TEST 10

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ZERO, FOR THE LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 25 CACHE MAINTENANCE AND ERROR REGISTERS TEST 11

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ZERO, FOR THE HIGH BYTE OF THE

ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 28 CACHE MAINTENANCE AND ERROR REGISTERS TEST 12

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ONE, FOR THE LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 29 CACHE MAINTENANCE AND ERROR REGISTERS TEST 13

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ONE, FOR THE HIGH BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 30 CACHE MAINTENANCE AND ERROR REGISTERS TEST 14

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ZERO, FOR THE LOW BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 31 CACHE MAINTENANCE AND ERROR REGISTERS TEST 15

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ZERO, FOR THE HIGH BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 32 CACHE MAINTENANCE AND ERROR REGISTERS TEST 16

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE LOW BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 33 CACHE MAINTENANCE AND ERROR REGISTERS TEST 17

THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE HIGH BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S ABILITY TO SET CORRECTLY FOR THIS ERROR. THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU TO THE CACHE.

TEST 34 CACHE MAINTENANCE AND ERROR REGISTERS TEST 20

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO MAKE THAT REFERENCE CAUSE A MAIN MEMORY ADDRESS AND CONTROL LINES PARITY ERROR ON THE MAIN MEMORY BUS.

TEST 35 CACHE MAINTENANCE AND ERROR

REGISTERS TEST 21

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A MAIN MEMORY DATA PARITY ERROR ON THAT REFERENCE WHICH IS TO AN EVEN WORD IN THE PAIR, WHICH IS ALSO THE WANTED WORD.

TEST 36 CACHE MAINTENANCE AND ERROR REGISTERS TEST 22

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A MAIN MEMORY DATA PARITY ERROR ON THAT REFERENCE WHICH IS TO AN ODD WORD IN THE PAIR, WHICH IS ALSO THE WANTED WORD.

TEST 37 CACHE MAINTENANCE AND ERROR REGISTERS TEST 23

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE LOW BYTE OF THAT ADDRESS .

TEST 40 CACHE MAINTENANCE AND ERROR REGISTERS TEST 24

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND

THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE LOW BYTE OF THAT ADDRESS .

TEST 41 CACHE MAINTENANCE AND ERROR REGISTERS TEST 25

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE LOW BYTE OF THAT DATA .

TEST 42 CACHE MAINTENANCE AND ERROR REGISTERS TEST 26

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE. THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE LOW BYTE OF THAT DATA .

TEST 43 CACHE ERROR REGISTER UNIBUS TIME OUT TEST

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO COMPREHEND A CPU TO UNIBUS THROUGH THE MAP TO THE CACHE REFERENCE WHICH TIMES OUT IN MAIN MEMORY. MANY SUCH NON-EXISTENT MEMORY LOCATIONS ARE CONVIENTLY GUARENTEED TO EXIST! ALL THE ADDRESSES FROM 17000000 THROUGH 17777776 ARE ADDRESSES WHICH CAN NOT EXIST. HERE ONLY ONE OF THESE ADDRESSES, 17777776, WILL BE USED TO CAUSE A TIME OUT ON THE UNIBUS AN

THE CONSEQUENT ABORT TO VECTOR
ERROR.

TEST 44 CACHE CONTROL REGISTER DISABLE TRAPS
TEST 1

THIS IS A TEST OF THE CONTROL REGISTER'S ABILITY TO DISABLE A TRAP OCCURRING AS THE RESULT OF A MAIN MEMORY DATA PARITY ERROR IN THE UNWANTED WORD OF THE REFERENCED PAIR. THE MAINTENANCE REGISTER IS USED TO FORCE AN ERROR ON THE LOW BYTE OF THE ODD WORD WHEN REFERENCING THE EVEN WORD OF THAT PAIR.

TEST 45 CACHE CONTROL REGISTER DISABLE TRAPS
TEST 2

THIS IS A TEST OF THE CONTROL REGISTER'S DISABLE TRAPS FUNCTION. IT IS ATTEMPTED TO DISABLE A TRAP RESULTING FROM A CACHE ADDRESS MEMORY PARITY ERROR. THE MAINTENANCE REGISTER WILL BE USED TO FORCE THE ERROR ON THE LOW BYTE OF THE ADDRESS, IN THE ADDRESS MEMORY OF GROUP 0.

TEST 46 CACHE CONTROL REGISTER DISABLE TRAPS
TEST 3

THIS IS A TEST OF THE CONTROL REGISTER'S DISABLE TRAPS FUNCTION. IT IS ATTEMPTED TO DISABLE A TRAP RESULTING FROM A CACHE MEMORY PARITY ERROR. THE MAINTENANCE REGISTER WILL BE USED TO FORCE THE ERROR ON THE LOW BYTE OF THE , IN THE MEMORY OF GROUP 0.

TEST 47 CACHE ERROR REGISTER LOCK UP TEST 1

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST

TWO ERROR ARE FORCED ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU TO THE CACHE DIRECTLY. THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU TO THE CACHE DIRECTLY.

TEST 30 CACHE ERROR REGISTER LOCK UP TEST 2

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU TO THE CACHE DIRECTLY. THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.

TEST 31 CACHE ERROR REGISTER LOCK UP TEST 3

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO

THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU TO THE UNIBUS THROUCH THE MAPPING BOX TO THE CACHE. THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU TO THE CACHE DIRECTLY.

TEST 52 CACHE ERROR REGISTER LOCK UP TEST 4

THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE. THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.

TEST 53 MAIN MEMORY DATA PARITY CHECKERS LOW BYTE TEST

THIS IS A TEST OF THE TWO MAIN MEMORY DATA PARITY CHECKERS FOR THE LOW BYTE, ONE FOR EACH OF THE EVEN AND ODD WORD. THE MAINTENANCE REGISTER IS USED TO FORCE A PARITY ERROR AT EVERY DATA PATTERN, WHICH HAS A ZERO PARITY BIT, THAT CAN BE WRITTEN INTO AN 8-BIT BYTE. NOTE THAT MAIN MEMORY HAS ODD PARITY WHICH MEANS THAT A BYTE WILL HAVE A ZERO PARITY BIT IF THERE ARE AN ODD NUMBER OF BITS SET (1) IN THAT BYTE. THE PARITY BIT WOULD BE ONE (SET) FOR A BYTE WHICH HAD NO BITS SET (1) OR A BYTE WHICH HAD AN EVEN NUMBER OF BITS SET (1). THE MAINTENANCE FUNCTION FOR THE MAIN MEMORY DATA PARITY CHECKERS WORKS IN SUCH A WAY AS TO EFFECTIVELY FORCE THE BYTES PARITY BIT TO ONE (SET), SO THAT IF THE PARITY BIT FOR THAT BYTE HAD BEEN ZERO AN ERROR OCCURS! IF THE BYTE'S PARITY BIT WAS ALREADY ONE THEN NO ERROR OCCURS!

TEST 54 MAIN MEMORY DATA PARITY CHECKERS HIGH BYTE TEST

THIS IS A TEST OF THE TWO MAIN

MEMORY DATA PARITY CHECKERS FOR THE HIGH BYTE, ONE FOR EACH OF THE EVEN AND ODD WORD. THE MAINTENANCE REGISTER IS USED TO FORCE A PARITY ERROR AT EVERY DATA PATTERN, WHICH HAS A ZERO PARITY BIT, THAT CAN BE WRITTEN INTO AN 8-BIT BYTE. NOTE THAT MAIN MEMORY HAS ODD PARITY WHICH MEANS THAT A BYTE WILL HAVE A ZERO PARITY BIT IF THERE ARE AN ODD NUMBER OF BITS SET (1) IN THAT BYTE. THE PARITY BIT WOULD BE ONE (SET) FOR A BYTE WHICH HAD NO BITS SET (1) OR A BYTE WHICH HAD AN EVEN NUMBER OF BITS SET (1). THE MAINTENANCE FUNCTION FOR THE MAIN MEMORY DATA

PARITY CHECKERS WORKS IN SUCH A WAY AS TO EFFECTIVELY FORCE THE BYTES PARITY BIT TO ONE (SET), SO THAT IF THE PARITY BIT FOR THAT BYTE HAD BEEN ZERO AN ERROR OCCURS! IF THE BYTE'S PARITY BIT WAS ALREADY ONE THEN NO ERROR OCCURS!

```
                        .LIST   ME
                        .NLIST  MD,MC,BIN
```

```
                        .ENABL  ABS,AMA
                        .MCALL  .HEADER,.SWRHI,.1170,.SETUP,.$CATCH,.$ACT11,.$CMTAG
                        .MCALL  .$EOP,.$SCOPE,.$ERROR,.$SAVE,.$TYPE,.$TYPOCT
                        .MCALL  .$TYPDEC,.$TRAP,.$POWER,.$DB20
.TITLE  MAINDEC-11-DEKBC-B      PDP 11/70 CACHE DIAGNOSTIC PART 1
;*COPYRIGHT (C) SEPT 11, 1975
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY ANTHONY S. VEZZA
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
```

```
                                ;*PACKAGE (MAINDEC-11-DZQAC-C2), SEPT 14, 1976.
                                ;*
000001                          $TN=1
160000                          $SWR=160000     ;;HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYPOUT
167400                          $SWR=167400
000200                          $SWRMK=200

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<6:0>
                                ;*         7            SKIP EXECUTION OF ALL TESTS THAT USE MEMORY MANAGEMENT

                                .SBTTL  BASIC DEFINITIONS

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100            ;;FIRST ADDRESS OF THE STACK
001100                          KERSTK= STACK           ;;KERNEL STACK
000700                          SUPSTK= STACK-200       ;;SUPERVISOR STACK
000600                          USESTK= STACK-300       ;;USER STACK
                                .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                                .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
177546                          LKS=    177546          ;;LINE CLOCK (KW11-L) STATUS REGISTER

                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE LINE FEED
000015                          CR=     15              ;;CODE CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED

                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
000004                          R4=     %4              ;;GENERAL REGISTER
000005                          R5=     %5              ;;GENERAL REGISTER
000006                          R6=     %6              ;;GENERAL REGISTER
000007                          R7=     %7              ;;GENERAL REGISTER
                                .EQUIV  R0,R10          ;;GENERAL REGISTER
                                .EQUIV  R1,R11          ;;GENERAL REGISTER
                                .EQUIV  R2,R12          ;;GENERAL REGISTER
                                .EQUIV  R3,R13          ;;GENERAL REGISTER
```

```
                                .EQUIV  R4,R14          ;;GENERAL REGISTER
                                .EQUIV  R5,R15          ;;GENERAL REGISTER
000006                          SP=     %6              ;;STACK POINTER
                                .EQUIV  SP,KSP          ;;KERNEL STACK POINTER
                                .EQUIV  SP,SSP          ;;SUPERVISOR STACK POINTER
                                .EQUIV  SP,USP          ;;USER STACK POINTER
000007                          PC=     %7              ;;PROGRAM COUNTER

                                ;*PRIORITY LEVEL DEFINITIONS
000000                          PR0=    0               ;;PRIORITY LEVEL 0
000040                          PR1=    40              ;;PRIORITY LEVEL 1
000100                          PR2=    100             ;;PRIORITY LEVEL 2
000140                          PR3=    140             ;;PRIORITY LEVEL 3
000200                          PR4=    200             ;;PRIORITY LEVEL 4
000240                          PR5=    240             ;;PRIORITY LEVEL 5
000300                          PR6=    300             ;;PRIORITY LEVEL 6
000340                          PR7=    340             ;;PRIORITY LEVEL 7

                                ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                          SW15=   100000
040000                          SW14=   40000
020000                          SW13=   20000
010000                          SW12=   10000
004000                          SW11=   4000
002000                          SW10=   2000
001000                          SW09=   1000
000400                          SW08=   400
000200                          SW07=   200
000100                          SW06=   100
000040                          SW05=   40
000020                          SW04=   20
000010                          SW03=   10
000004                          SW02=   4
000002                          SW01=   2
000001                          SW00=   1
                                .EQUIV  SW09,SW9
                                .EQUIV  SW08,SW8
                                .EQUIV  SW07,SW7
                                .EQUIV  SW06,SW6
                                .EQUIV  SW05,SW5
                                .EQUIV  SW04,SW4
                                .EQUIV  SW03,SW3
                                .EQUIV  SW02,SW2
                                .EQUIV  SW01,SW1
                                .EQUIV  SW00,SW0

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                          BIT15=  100000
040000                          BIT14=  40000
020000                          BIT13=  20000
010000                          BIT12=  10000
004000                          BIT11=  4000
002000                          BIT10=  2000
001000                          BIT09=  1000
000400                          BIT08=  400
000200                          BIT07=  200
```

```
                        BIT06=  100
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000100                  LKVEC=  100             ;;LINE CLOCK (KW11-L) VECTER
000114                  CACHVEC=114             ;;CACHE ERROR INTERRUPT VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
000250                  MMVEC=  250             ;;MEMORY MANAGEMENT VECTOR
                        .SBTTL  CACHE   REGISTER DEFINITIONS


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

                        .SBTTL  CPU REGISTER DEFINITIONS


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

```
                        .SBTTL  MEMORY MANAGEMENT DEFINITIONS


                        ;*MEMORY MANAGEMENT STATUS REGISTER ADDRESSES

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

                        ;*USER "I" PAGE DESCRIPTOR REGISTERS

177600                  UIPDR0= 177600
177602                  UIPDR1= 177602
177604                  UIPDR2= 177604
177606                  UIPDR3= 177606
177610                  UIPDR4= 177610
177612                  UIPDR5= 177612
177614                  UIPDR6= 177614
177616                  UIPDR7= 177616

                        ;*USER "D" PAGE DESCRIPTOR REGISTORS

177620                  UDPDR0= 177620
177622                  UDPDR1= 177622
177624                  UDPDR2= 177624
177626                  UDPDR3= 177626
177630                  UDPDR4= 177630
177632                  UDPDR5= 177632
177634                  UDPDR6= 177634
177636                  UDPDR7= 177636

                        ;*USER "I" PAGE ADDRESS REGISTERS

177640                  UIPAR0= 177640
177642                  UIPAR1= 177642
177644                  UIPAR2= 177644
177646                  UIPAR3= 177646
177650                  UIPAR4= 177650
177652                  UIPAR5= 177652
177654                  UIPAR6= 177654
177656                  UIPAR7= 177656

                        ;*USER "D" PAGE ADDRESS REGISTERS

177660                  UDPAR0= 177660
177662                  UDPAR1= 177662
177664                  UDPAR2= 177664
177666                  UDPAR3= 177666
177670                  UDPAR4= 177670
177672                  UDPAR5= 177672
```

```
                        ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS

172200                  SIPDR0= 172200
172202                  SIPDR1= 172202
172204                  SIPDR2= 172204
172206                  SIPDR3= 172206
172210                  SIPDR4= 172210
172212                  SIPDR5= 172212
172214                  SIPDR6= 172214
172216                  SIPDR7= 172216

                        ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS

172220                  SDPDR0= 172220
172222                  SDPDR1= 172222
172224                  SDPDR2= 172224
172226                  SDPDR3= 172226
172230                  SDPDR4= 172230
172232                  SDPDR5= 172232
172234                  SDPDR6= 172234
172236                  SDPDR7= 172236

                        ;*SUPERVISOR "I" PAGE ADDRESS REGISTERS

172240                  SIPAR0= 172240
172242                  SIPAR1= 172242
172244                  SIPAR2= 172244
172246                  SIPAR3= 172246
172250                  SIPAR4= 172250
172252                  SIPAR5= 172252
172254                  SIPAR6= 172254
172256                  SIPAR7= 172256

                        ;*SUPERVISOR "D" PAGE ADDRESS REGISTERS

172260                  SDPAR0= 172260
172262                  SDPAR1= 172262
172264                  SDPAR2= 172264
172266                  SDPAR3= 172266
172270                  SDPAR4= 172270
172272                  SDPAR5= 172272
172274                  SDPAR6= 172274
172276                  SDPAR7= 172276

                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS

172300                  KIPDR0= 172300
172302                  KIPDR1= 172302
172304                  KIPDR2= 172304
172306                  KIPDR3= 172306
172310                  KIPDR4= 172310
172312                  KIPDR5= 172312
172314                  KIPDR6= 172314
```

```
                        172316          KIPDR7= 172316
                                        ;*KERNEL "D" PAGE DESCRIPTOR REGISTERS
                        172320          KDPDR0= 172320
                        172322          KDPDR1= 172322
                        172324          KDPDR2= 172324
                        172326          KDPDR3= 172326
                        172330          KDPDR4= 172330
                        172332          KDPDR5= 172332
                        172334          KDPDR6= 172334
                        172336          KDPDR7= 172336
                                        ;*KERNEL "I" PAGE ADDRESS REGISTERS
                        172340          KIPAR0= 172340
                        172342          KIPAR1= 172342
                        172344          KIPAR2= 172344
                        172346          KIPAR3= 172346
                        172350          KIPAR4= 172350
                        172352          KIPAR5= 172352
                        172354          KIPAR6= 172354
                        172356          KIPAR7= 172356
                                        ;*KERNEL "D" PAGE ADDRESS REGISTERS
                        172360          KDPAR0= 172360
                        172362          KDPAR1= 172362
                        172364          KDPAR2= 172364
                        172366          KDPAR3= 172366
                        172370          KDPAR4= 172370
                        172372          KDPAR5= 172372
                        172374          KDPAR6= 172374
                        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'


                        170200          MAPL00 = 170200
                        170202          MAPH00 = 170202
                        170204          MAPL01 = 170204
                        170206          MAPH01 = 170206
                        170210          MAPL02 = 170210
                        170212          MAPH02 = 170212
                        170214          MAPL03 = 170214
                        170216          MAPH03 = 170216
                        170220          MAPL04 = 170220
                        170222          MAPH04 = 170222
                        170224          MAPL05 = 170224
                        170226          MAPH05 = 170226
```

```
393             170220          MAPL06 = 170230
394             170232          MAPH06 = 170232
395             170234          MAPL07 = 170234
396             170236          MAPH07 = 170236
397             170240          MAPL10 = 170240
398             170242          MAPH10 = 170242
399             170244          MAPL11 = 170244
400             170246          MAPH11 = 170246
401             170250          MAPL12 = 170250
402             170252          MAPH12 = 170252
403             170254          MAPL13 = 170254
404             170256          MAPH13 = 170256
405             170260          MAPL14 = 170260
406             170262          MAPH14 = 170262
407             170264          MAPL15 = 170264
408             170266          MAPH15 = 170266
409             170270          MAPL16 = 170270
410             170272          MAPH16 = 170272
411             170274          MAPL17 = 170274
412             170276          MAPH17 = 170276
413             170300          MAPL20 = 170300
414             170302          MAPH20 = 170302
415             170304          MAPL21 = 170304
416             170306          MAPH21 = 170306
417             170310          MAPL22 = 170310
418             170312          MAPH22 = 170312
419             170314          MAPL23 = 170314
420             170316          MAPH23 = 170316
421             170320          MAPL24 = 170320
422             170320          MAPH24 = 170320
423             170324          MAPL25 = 170324
424             170326          MAPH25 = 170326
425             170330          MAPL26 = 170330
426             170332          MAPH26 = 170332
427             170334          MAPL27 = 170334
428             170336          MAPH27 = 170336
429             170340          MAPL30 = 170340
430             170342          MAPH30 = 170342
431             170344          MAPL31 = 170344
432             170346          MAPH31 = 170346
433             170350          MAPL32 = 170350
434             170352          MAPH32 = 170352
435             170354          MAPL33 = 170354
436             170356          MAPH33 = 170356
437             170360          MAPL34 = 170360
438             170362          MAPH34 = 170362
439             170364          MAPL35 = 170364
440             170366          MAPH35 = 170366
441             170370          MAPL36 = 170370
442             170372          MAPH36 = 170372
443             170374          MAPL37 = 170374
444             170376          MAPH37 = 170376
445                             .EQUIV  MAPL00,MAPL0
446                             .EQUIV  MAPH00,MAPH0
447                             .EQUIV  MAPL01,MAPL1
448                             .EQUIV  MAPH01,MAPH1
```

```
                                        .EQUIV  MAPLO2,MAPL2
                                        .EQUIV  MAPHO2,MAPH2
                                        .EQUIV  MAPLO3,MAPL3
                                        .EQUIV  MAPHO3,MAPH3
                                        .EQUIV  MAPLO4,MAPL4
                                        .EQUIV  MAPHO4,MAPH4
                                        .EQUIV  MAPLO5,MAPL5
                                        .EQUIV  MAPHO5,MAPH5
                                        .EQUIV  MAPLO6,MAPL6
                                        .EQUIV  MAPHO6,MAPH6
                                        .EQUIV  MAPLO7,MAPL7
                                        .EQUIV  MAPHO7,MAPH7

                  000011                TAB=11
                  000044                SIMO=44
                  000030                SOM1=30
                  000054                SIMOM1=54
                  000034                SOMOM1=34
                  000014                MIMO=14
                  000014                MOM1=MIMO
                  140000                TESTR1=140000
                  142000                TESTR2=142000
                  144000                TESTR3=144000
                                        .SBTTL  TRAP CATCHER

                  000000                        .=0
                                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                  000174                        .=174
000174  000000                        DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                        SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                        .SBTTL  STARTING ADDRESS(ES)
000200  000137  003016                        JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM

                                        .SBTTL  ACT11 HOOKS

                                        ;;**************************************************************
                                        ;HOOKS REQUIRED BY ACT11
                  000204                        $SVPC=.                 ;SAVE PC
                  000046                        .=46
000046  026424                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                  000052                        .=52
000052  000000                        .WORD   0               ;;2)SET LOC.52 TO ZERO
                  000204                        .=$SVPC                 ;; RESTORE PC
```

```
                                .SBTTL  COMMON TAGS

                                ;;**************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

                                        .=1100
001100                          $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102  000                     $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000                     $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                  $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                     $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115  001                     $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134  000                     $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135  000                     $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                          .WORD   0
001140  177570                  SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570                  DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560                  $TKS:   177560                  ;;TTY KBD STATUS
001146  177562                  $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000                     $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002                     $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012                     $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000                     $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000                  $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                                ;;WHICH  ($REG0) WAS OBTAINED
001162  000000                  $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000                  $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000                  $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000                  $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000                  $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000                  $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001176  000000                  $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001200  000000                  $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001202  000000                  $REG10: .WORD   0               ;;CONTAINS (($REGAD)+20)
001204  000000                  $REG11: .WORD   0               ;;CONTAINS (($REGAD)+22)
001206  000000                  $REG12: .WORD   0               ;;CONTAINS (($REGAD)+24)
001210  000000                  $REG13: .WORD   0               ;;CONTAINS (($REGAD)+26)
001212  000000                  $REG14: .WORD   0               ;;CONTAINS (($REGAD)+30)
001214  000000                  $REG15: .WORD   0               ;;CONTAINS (($REGAD)+32)
001216  000000                  $REG16: .WORD   0               ;;CONTAINS (($REGAD)+34)
001220  000000                  $REG17: .WORD   0               ;;CONTAINS (($REGAD)+36)
001222  000000                  $REG20: .WORD   0               ;;CONTAINS (($REGAD)+40)
```

```
557  001234  000000                $REG21: .WORD   0               ;;CONTAINS ((SREGAD)+2
558  001236  000000                $REG22: .WORD   0               ;;CONTAINS ((SREGAD)+4
559  001240  000000                $REG23: .WORD   0               ;;CONTAINS ((SREGAD)+6
560  001242  000000                $TMP0:  .WORD   0               ;;USER DEFINED
561  001244  000000                $TMP1:  .WORD   0               ;;USER DEFINED
562  001246  000000                $TMP2:  .WORD   0               ;;USER DEFINED
563  001250  000000                $TMP3:  .WORD   0               ;;USER DEFINED
564  001252  000000                $TMP4:  .WORD   0               ;;USER DEFINED
565  001254  000000                $TMP5:  .WORD   0               ;;USER DEFINED
566  001256  000000                $TMP6:  .WORD   0               ;;USER DEFINED
567  001260  000000                $TMP7:  .WORD   0               ;;USER DEFINED
568  001262  000000                $TMP10: .WORD   0               ;;USER DEFINED
569  001264  000000                $TMP11: .WORD   0               ;;USER DEFINED
570  001266  000000                $TMP12: .WORD   0               ;;USER DEFINED
571  001270  000000                $TMP13: .WORD   0               ;;USER DEFINED
572  001272  000000                $TMP14: .WORD   0               ;;USER DEFINED
573  001274  000000                $TMP15: .WORD   0               ;;USER DEFINED
574  001276  000000                $TMP16: .WORD   0               ;;USER DEFINED
575  001300  000000                $TMP17: .WORD   0               ;;USER DEFINED
576  001302  000000                $TMP20: .WORD   0               ;;USER DEFINED
577  001304  000000                $TMP21: .WORD   0               ;;USER DEFINED
578  001306  000000                $TMP22: .WORD   0               ;;USER DEFINED
579  001310  000000                $TMP23: .WORD   0               ;;USER DEFINED
580  001312  000000                $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
581  001314  000000                $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
582  001316  177607  000377        $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
583  001322     077                $QUES:  .ASCII  /?/             ;;QUESTION MARK
584  001323     015                $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
585  001324  000012                $LF:    .ASCIZ  <12>            ;;LINE FEED
586                                ;;**************************************************************
```

```
                                        .SBTTL  ERROR POINTER TABLE

                                        ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                        ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                        ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                        ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                        ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                        ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                        ;*      DH              ;;POINTS TO THE DATA HEADER
                                        ;*      DT              ;;POINTS TO THE DATA
                                        ;*      DF              ;;POINTS TO THE DATA FORMAT


001316                                  $ERRTB:



                                        ;ERROR TABLE FOR ERROR TYPE OUT:
                                        ;ITEM 1
001316  035105  046456  050602                  .WORD   EM1,DH1,DT1,DF1
001324  053405
                                        ;ITEM 0
001326  000000  000000  000000                  .WORD   0,0,0,0
001334  000000
                                        ;ITEM 0
001336  000000  000000  000000                  .WORD   0,0,0,0
001344  000000
                                        ;ITEM 0
001346  000000  000000  000000                  .WORD   0,0,0,0
001354  000000
                                        ;ITEM 0
001356  000000  000000  000000                  .WORD   0,0,0,0
001364  000000
                                        ;ITEM 0
001366  000000  000000  000000                  .WORD   0,0,0,0
001374  000000
                                        ;ITEM 0
001376  000000  000000  000000                  .WORD   0,0,0,0
001404  000000
                                        ;ITEM 0
001406  000000  000000  000000                  .WORD   0,0,0,0
001414  000000
                                        ;ITEM 0
001416  000000  000000  000000                  .WORD   0,0,0,0
001424  000000
                                        ;ITEM 0
001426  000000  000000  000000                  .WORD   0,0,0,0
001434  000000
                                        ;ITEM 0
001436  000000  000000  000000                  .WORD   0,0,0,0
001444  000000
                                        ;ITEM 14
001446  035172  046531  050614                  .WORD   EM14,DH14,DT14,DF14
001454  050411
                                        ;ITEM 15
```

```
643  001456  035231  046624  052632          .WORD   EM15,CH15,DT15,DF15
644  001464  050416
645                                  ;ITEM 0
646  001466  000000  000000  000000          .WORD   0,0,0,0
647  001474  000000
648                                  ;ITEM 0
649  001476  000000  000000  000000          .WORD   0,0,0,0
650  001504  000000
651                                  ;ITEM 0
652  001506  000000  000000  000000          .WORD   0,0,0,0
653  001514  000000
654                                  ;ITEM 0
655  001516  000000  000000  000000          .WORD   0,0,0,0
656  001524  000000
657                                  ;ITEM 0
658  001526  000000  000000  000000          .WORD   0,0,0,0
659  001534  000000
660                                  ;ITEM 0
661  001536  000000  000000  000000          .WORD   0,0,0,0
662  001544  000000
663                                  ;ITEM 0
664  001546  000000  000000  000000          .WORD   0,0,0,0
665  001554  000000
666                                  ;ITEM 0
667  001556  000000  000000  000000          .WORD   0,0,0,0
668  001564  000000
669                                  ;ITEM 0
670  001566  000000  000000  000000          .WORD   0,0,0,0
671  001574  000000
672                                  ;ITEM 0
673  001576  000000  000000  000000          .WORD   0,0,0,0
674  001604  000000
675                                  ;ITEM 0
676  001606  000000  000000  000000          .WORD   0,0,0,0
677  001614  000000
678
679                                  ;ITEM 0
680  001616  000000  000000  000000          .WORD   0,0,0,0
681  001624  000000
682                                  ;ITEM 0
683  001626  000000  000000  000000          .WORD   0,0,0,0
684  001634  000000
685                                  ;ITEM 0
686  001636  000000  000000  000000          .WORD   0,0,0,0
687  001644  000000
688                                  ;ITEM 0
689  001646  000000  000000  000000          .WORD   0,0,0,0
690  001654  000000
691                                  ;ITEM 0
692  001656  000000  000000  000000          .WORD   0,0,0,0
693  001664  000000
694                                  ;ITEM 0
695  001666  000000  000000  000000          .WORD   0,0,0,0
696  001674  000000
697                                  ;ITEM 0
698  001676  000000  000000  000000          .WORD   0,0,0,0
```

```
599  001704  000000
600
601  001706  000000  000000  000000          ;ITEM 0
602  001714  000000                          .WORD   0,0,0,0
603                                          ;ITEM 0
604  001716  000000  000000  000000          .WORD   0,0,0,0
605  001724  000000
606                                          ;ITEM 0
607  001726  000000  000000  000000          .WORD   0,0,0,0
608  001734  000000
609                                          ;ITEM 0
610  001736  000000  000000  000000          .WORD   0,0,0,0
611  001744  000000
612                                          ;ITEM 0
613  001746  000000  000000  000000          .WORD   0,0,0,0
614  001754  000000
615                                          ;ITEM 0
616  001756  000000  000000  000000          .WORD   0,0,0,0
617  001764  000000
618                                          ;ITEM 0
619  001766  000000  000000  000000          .WORD   0,0,0,0
620  001774  000000
621                                          ;ITEM 0
622  001776  000000  000000  000000          .WORD   0,0,0,0
623  002004  000000
624                                          ;ITEM 0
625  002006  000000  000000  000000          .WORD   0,0,0,0
626  002014  000000
627                                          ;ITEM 0
628  002016  000000  000000  000000          .WORD   0,0,0,0
629  002024  000000
630                                          ;ITEM 0
631  002026  000000  000000  000000          .WORD   0,0,0,0
632  002034  000000
633                                          ;ITEM 0
634  002036  000000  000000  000000          .WORD   0,0,0,0
635  002044  000000
636                                          ;ITEM 0
637  002046  000000  000000  000000          .WORD   0,0,0,0
638  002054  000000
639
640                                          ;ITEM 55
641  002056  035301  046650  050636          .WORD   EM55,DH55,DT55,DF55
642  002064  050420
643                                          ;ITEM 56
644  002066  035445  046650  050636          .WORD   EM56,DH56,DT56,DF56
645  002074  050420
646                                          ;ITEM 57
647  002076  035612  046650  050636          .WORD   EM57,DH57,DT57,DF57
648  002104  050420
649                                          ;ITEM 60
650  002106  035734  046650  050636          .WORD   EM60,DH60,DT60,DF60
651  002114  050420
652                                          ;ITEM 61
653  002116  036060  046650  050636          .WORD   EM61,DH61,DT61,DF61
654  002124  050420
```

```
                                                ;ITEM 62
002126  036210  046650  050636                        .WORD   EM62,DH62,DT62,DF62
002134  050420
                                                ;ITEM 63
002136  036336  046725  050650                        .WORD   EM63,DH63,DT63,DF63
002144  050424
                                                ;ITEM 64
002146  036555  047027  050662                        .WORD   EM64,DH64,DT64,DF64
002154  050424
                                                ;ITEM 65
002156  036752  047102  050672                        .WORD   EM65,DH65,DT65,DF65
002164  050424
                                                ;ITEM 66
002166  037335  047204  050704                        .WORD   EM66,DH66,DT66,DF66
002174  050424
                                                ;ITEM 67
002176  037417  047257  050662                        .WORD   EM67,DH67,DT67,DF67
002204  050424
                                                ;ITEM 70
002206  037634  047257  050662                        .WORD   EM70,DH70,DT70,DF70
002214  050424
                                                ;ITEM 71
002216  040112  047257  050662                        .WORD   EM71,DH71,DT71,DF71
002224  050424
                                                ;ITEM 72
002226  040370  047257  050662                        .WORD   EM72,DH72,DT72,DF72
002234  050424
                                                ;ITEM 73
002236  040612  047257  050662                        .WORD   EM73,DH73,DT73,DF73
002244  050424
                                                ;ITEM 74
002246  041076  047257  050662                        .WORD   EM74,DH74,DT74,DF74
002254  050424

                                                ;ITEM 75
002256  041362  047354  050720                        .WORD   EM75,DH75,DT75,DF75
002264  050431
                                                ;ITEM 76
002266  041362  047354  050734                        .WORD   EM76,DH76,DT76,DF76
002274  050431
                                                ;ITEM 77
002276  041521  047451  050750                        .WORD   EM77,DH77,DT77,DF77
002304  050436
                                                ;ITEM 0
002306  000000  000000  000000                        .WORD   0,0,0,0
002314  000000
                                                ;ITEM 0
002316  000000  000000  000000                        .WORD   0,0,0,0
002324  000000
                                                ;ITEM 0
002326  000000  000000  000000                        .WORD   0,0,0,0
002334  000000
                                                ;ITEM 0
002336  000000  000000  000000                        .WORD   0,0,0,0
002344  000000
                                                ;ITEM 0
```

```
   811  002346  000000  000000  000000          .WORD   0,0,0,0
   812  002354  000000
   813                                  ;ITEM 0
   814  002356  000000  000000  000000          .WORD   0,0,0,0
   815  002364  000000
   816                                  ;ITEM 0
   817  002366  000000  000000  000000          .WORD   0,0,0,0
   818  002374  000000
   819                                  ;ITEM 0
   820  002376  000000  000000  000000          .WORD   0,0,0,0
   821  002404  000000
   822                                  ;ITEM 0
   823  002406  000000  000000  000000          .WORD   0,0,0,0
   824  002414  000000
   825                                  ;ITEM 0
   826  002416  000000  000000  000000          .WORD   0,0,0,0
   827  002424  000000
   828                                  ;ITEM 0
   829  002426  000000  000000  000000          .WORD   0,0,0,0
   830  002434  000000
   831
   832                                  ;ITEM 0
   833  002436  000000  000000  000000          .WORD   0,0,0,0
   834  002444  000000
   835                                  ;ITEM 0
   836  002446  000000  000000  000000          .WORD   0,0,0,0
   837  002454  000000
   838                                  ;ITEM 0
   839  002456  000000  000000  000000          .WORD   0,0,0,0
   840  002464  000000
   841                                  ;ITEM 0
   842  002466  000000  000000  000000          .WORD   0,0,0,0
   843  002474  000000
   844                                  ;ITEM 117
   845  002476  041657  047354  050734          .WORD   EM117,DH117,DT117,DF117
   846  002504  050431
   847                                  ;ITEM 120
   848  002506  042006  047475  050776          .WORD   EM120,DH120,DT120,DF120
   849  002514  050450
   850                                  ;ITEM 121
   851  002516  042221  047551  051066          .WORD   EM121,DH121,DT121,DF121
   852  002524  050503
   853                                  ;ITEM 122
   854  002526  042422  047613  051100          .WORD   EM122,DH122,DT122,DF122
   855  002534  050507
   856                                  ;ITEM 123
   857  002536  042552  047675  051100          .WORD   EM123,DH123,DT123,DF123
   858  002544  050507
   859                                  ;ITEM 124
   860  002546  042753  046531  051112          .WORD   EM124,DH124,DT124,DF124
   861  002554  050513
   862                                  ;ITEM 0
   863  002556  000000  000000  000000          .WORD   0,0,0,0
   864  002564  000000
   865                                  ;ITEM 0
   866  002566  000000  000000  000000          .WORD   0,0,0,0
```

```
  867  002574  000000
  868                                  ;ITEM 127
  869  002576  043161  050045  051132          .WORD   EM127,DH127,DT127,DF127
  870  002604  050537
  871                                  ;ITEM 130
  872  002606  043343  050107  051164          .WORD   EM130,DH130,DT130,DF130
  873  002614  050523
  874
  875                                  ;ITEM 131
  876  002616  043415  050165  051176          .WORD   EM131,DH131,DT131,DF131
  877  002624  050542
  878                                  ;ITEM 132
  879  002626  045530  047735  051132          .WORD   EM132,DH132,DT132,DF132
  880  002634  050523
  881                                  ;ITEM 133
  882  002636  045667  047772  051142          .WORD   EM133,DH133,DT133,DF133
  883  002644  050527
  884                                  ;ITEM 134
  885  002646  046041  050244  051224          .WORD   EM134,DH134,DT134,DF134
  886  002654  050554
  887                                  ;ITEM 135
  888  002656  046207  047451  051244          .WORD   EM135,DH135,DT135,DF135
  889  002664  050563
  890                                  ;ITEM 0
  891  002666  000000  000000  000000          .WORD   0,0,0,0
  892  002674  000000
  893                                  ;ITEM 0
  894  002676  000000  000000  000000          .WORD   0,0,0,0
  895  002704  000000
  896                                  ;ITEM 140
  897  002706  043642  045446  045516          .WORD   EM140,DH140,DT140,DF140
  898  002714  045511
  899                                  ;ITEM 141
  900  002716  044203  045446  045516          .WORD   EM141,DH141,DT141,DF141
  901  002724  045511
  902                                  ;ITEM 142
  903  002726  044543  045446  045516          .WORD   EM142,DH142,DT142,DF142
  904  002734  045511
  905                                  ;ITEM 143
  906  002736  045105  045446  045516          .WORD   EM143,DH143,DT143,DF143
  907  002744  045511
  908                                  ;ITEM 0
  909  002746  000000  000000  000000          .WORD   0,0,0,0
  910  002754  000000
  911                                  ;ITEM 0
  912  002756  000000  000000  000000          .WORD   0,0,0,0
  913  002764  000000
  914                                  ;ITEM 0
  915  002766  000000  000000  000000          .WORD   0,0,0,0
  916  002774  000000
  917                                  ;ITEM 0
  918  002776  000000  000000  000000          .WORD   0,0,0,0
  919  003004  000000
  920                                  ;ITEM 150
  921  003006  046372  050321  051272          .WORD   EM150,DH150,DT150,DF150
  922  003014  050575
```

```
                                                
                                                
                                                
003016  005037  001102          START:  CLR     $TSTNM
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
003022  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
003026  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
003030  022706  001140                  CMP     #SWR,R6 ;;DONE?
003034  001374                          BNE     .-6             ;;LOOP BACK IF NO
003036  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
003042  012737  026460  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
003050  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
003056  012737  026736  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
003064  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
003072  012737  030104  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
003100  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
003106  012737  030202  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
003114  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
003122  013737  026354  026346          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
003130  005037  001302                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
003134  005037  001304                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
003140  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
003146  012737  003146  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
003154  012737  003154  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
003162  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
003166  012737  003222  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
003174  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
003202  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
003210  022777  177777  175722          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
003216  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCLRRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
003220  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
003222  012716  003230          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
003226  000002                          RTI
003230  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
003236  012737  000174  001142          MOV     #DISPREG,DISPLAY
003244  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
                                
                                .SBTTL  TYPE PROGRAM NAME
                                ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
003250  005227  177777                  INC     #-1             ;;FIRST TIME?
003254  001043                          BNE     67$             ;;BRANCH IF NO
003256  022737  026424  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
003264  001437                          BEQ     67$             ;;BRANCH IF YES
003266  104401  003274                  TYPE    ,68$            ;;TYPE ASCIZ STRING
003272  000434                          BR      67$             ;;GET OVER THE ASCIZ
                                ;;68$:  .ASCIZ  <CRLF>'MAINDEC-11-DEKBC-B  PDP 11/70 CACHE DIAGNOSTIC PART 1'<CRLF>
003364                          67$:
                                ;THIS ROUTINE SAVES THE TOP 1500 (DEC) WORDS OF THE FIRST 28K OF
                                ;MEMORY. THESE LOCATIONS SHOULD CONTAIN EITHER THE MONITOR OR THE
                                ;LOADER WHICH LOADED THE PROGRAM. NOTE THAT TO RESTORE THIS PART
                                ;OF CORE, THAT IS TO RESTORE THE LOADER OR MONITOR, ALL THE USER
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```
                                        ;MUST DO IS TYPE ^C (CONTROL-C, WHILE THIS PROGRAM IS RUNING.
                                        ;THIS WILL AUTOMPTICALLY RESTORE THE TOP PART OF MEMORY TO ITS STATE
                                        ;BEFORE THIS PROGRAM WAS STARTED! AFTER THE MONITOR (OR LOADER) HAS BEEN
                                        ;RESTORED THIS PROGRAM WILL HALT.
003364  005237  031333          LOOP:   INC     MONF            ;INCREMENT THE FLAG WHICH INDICATES
003370  001013                          BNE     TOP             ;WHETHER OR NOT THE TOP OF MEMORY
                                                                ;IN THE FIRST 28K HAS BEEN SAVED.
003372  013737  000060  031252          MOV     @#TKVEC,MONTTY  ;SAVE THE INITIAL CONTENTS OF THE TTY KEYBOARD
                                                                ;VECTOR.
003400  012700  002734                  MOV     #^D1500,R0      ;IF NOT THEN SAVE IT.
003404  012701  051310                  MOV     #BOTTOM+4,R1    ;SAVE IT AT THE BOTTOM OF THIS PROGRAM.
003410  012702  160000                  MOV     #160000,R2      ;GET THE ADDRESS OF THE END OF THE MONITOR.
003414  014221                  1$:     MOV     -(R2),(R1)+     ;SAVE 1500 (DEC) LOCATIONS (WORDS)
003416  077002                          SOB     R0,1$
003420  012737  000044  177770  TOP:    MOV     #44,@#177770    ;SET TO SYNC SCOPE (OSCILLOSCOPE)
                                                                ;ON A NOP INSTRUCTION.
003426  012737  031130  000060          MOV     #RESMON,@#TKVEC ;SET UP THE KEYBORD INTERRUPT VECTOR.
003434  012737  000340  000062          MOV     #340,@#TKVEC+2
003442  005077  175500                  CLR     @#TKB           ;MAKE SURE THE BUFFER IS CLEAR
003446  152777  000100  175470          BISB    #BIT6,@#TKS     ;TURN ON INTERRUPT ENABLE FOR THE KEYBOARD.

003454  012737  030474  000004          MOV     #CPSPUR,@#ERRVEC        ;SET UP FOR UNEXPECTED ERRORS.
003462  012737  030522  000114          MOV     #SPUR,@#CACHVEC


                                        ;;*****************************************************************
                                        ;*TEST 1        CACHE REGISTERS RESPONSE TEST
                                        ;*
                                        ;*REFERENCE EACH CACHE REGISTER MAKING SURE SUCH
                                        ;*REFERENCES DO NOT TIME OUT.
                                        ;*
                                        ;;*****************************************************************
003470  000004                  TST1:   SCOPE
003472  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000001                  JA=$TN-1
                                                                ;SET THE SKAD REGISTER
003500  012737  004044  030646          MOV     #TST2,SKAD      ;IN CASE THE TEST ABORTS.

003506  113737  001102  001232          MOVB    $TSTNM,$TMPO
003514  012737  030522  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO PARITY ERRORS.
003522  012701  031056                  MOV     #LOAFLG,R1      ;CLEAR THE REGISTER FLAGS
003526  012700  000014                  MOV     #14,R0
003532  005021                  64$:    CLR     (R1)+
003534  077002                          SOB     R0,64$
003536  013737  000004  003614          MOV     @#ERRVEC,JATMP  ;SAVE THE OLD CONTENTS OF VECTOR ERRVEC.
003544  012737  003616  000004          MOV     #JAERR,@#ERRVEC ;SET UP THE TIME OUT
                                                                ;VECTOR
003552  012700  177740                  MOV     #LOADRS,R0
003556  012737  003564  001110          MOV     #JA1,$LPERR

003564  000240                  JA1:    NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
003566  005710                          TST     (R0)            ;REFERENCE EACH CACHE REGISTER
                                                                ;MAKING SURE EACH DOESN'T TIME OUT.

003570  062700  000002          JA2:    ADD     #2,R0
```

```
1035  003574  020027  177752          CMP     R0,#HITMIS
1036  003600  101771                  BLOS    JA1
1037
1038  003602  013737  003614  000004  JA3:    MOV     JATMP,@#ERRVEC  ;RESET THE CPU TRAP VECTOR.
1039  003610  000137  004040          JMP     JADONE
1040
1041  003614  000000                  JATMP:  .WORD   0               ;SAVE THE OLD CONTENTS OF
1042                                                                  ;VECTOR ERRVEC HERE.
1043
1044  003616  032737  000020  177766  JAERR:  BIT     #20,@#CPUERR
1045  003624  001005                  BNE     JAERR1                  ;MAKE SURE THE ERROR
1046  003626  013737  003614  000004  JAERRC: MOV     JATMP,@#ERRVEC  ;IF NOT RESET VECTOR ERRVEC AND GO TO
1047  003634  000177  174144          JMP     @ERRVEC                 ;THE ROUTINE WHICH HANDLES CPU ERRORS.
1048  003640  021627  003570          JAERR1: CMP     (SP),#JA2       ;OTHERWISE REPORT THE FACT THAT A CACHE
1049  003644  001370                  BNE     JAERR0                  ;REGISTER REFERENCE TIMED OUT!
1050  003646  012637  001234                  MOV     (SP)+,$TMP1
1051  003652  005726                  TST     (SP)+
1052  003654  010037  001240                  MOV     R0,$TMP3
1053  003660  012737  000077  001242          MOV     #77,$TMP4
1054  003666  020027  177740                  CMP     R0,#LOADRS
1055  003672  001005                  BNE     JAERR2
1056  003674  012737  177777  031056          MOV     #-1,LOAFLG
1057  003702  104055          1$:     ERROR   55
1058  003704  000451                  BR      JAERR9
1059
1060  003706  020027  177742          JAERR2: CMP     R0,#HIADRS
1061  003712  001005                  BNE     JAERR3
1062  003714  012737  177777  031060          MOV     #-1,HIAFLG
1063  003722  104056          1$:     ERROR   56
1064  003724  000441                  BR      JAERR9
1065
1066  003726  020027  177744          JAERR3: CMP     R0,#MEMERR
1067  003732  001005                  BNE     JAERR4
1068  003734  012737  177777  031062          MOV     #-1,MMRFLG
1069  003742  104057          1$:     ERROR   57
1070  003744  000431                  BR      JAERR9
1071
1072  003746  020027  177746          JAERR4: CMP     R0,#CONTRL
1073  003752  001005                  BNE     JAERR5
1074  003754  012737  177777  031064          MOV     #-1,CONFLG
1075  003762  104060          1$:     ERROR   60
1076  003764  000421                  BR      JAERR9
1077
1078  003766  020027  177750          JAERR5: CMP     R0,#MAINT
1079  003772  001005                  BNE     JAERR6
1080  003774  012737  177777  031066          MOV     #-1,MANFLG
1081  004002  104061          1$:     ERROR   61
1082  004004  000411                  BR      JAERR9
1083
1084  004006  020027  177752          JAERR6: CMP     R0,#HITMIS
1085  004012  001005                  BNE     JAERR7
1086  004014  012737  177777  031070          MOV     #-1,HIMFLG
1087  004022  104062          1$:     ERROR   62
1088  004024  000401                  BR      JAERR9
1089
1090  004026  000000          JAERR7: HALT                    ;???
```

```
1091
1092  004030  005037  177766          JAERR9: CLR     @#CPUERR
1093  004034  000137  003570                  JMP     JA2
1094
1095  004040  005037  177766          JADONE: CLR     @#CPUERR        ;DONE!
1096
1097                                  ;;*****************************************************************
1098                                  ;*TEST 2        CACHE REGISTERS DATA PATH, READ ZEROES TEST
1099                                  ;*
1100                                  ;*THIS TEST CHECKS THE ABILITY OF THE CACHE REGISTER
1101                                  ;*DATA PATHS TO PASS 0'S BY FIRST WRITING THEN READING
1102                                  ;*0'S AT THE CONTROL AND MAINTENANCE REGISTERS.
1103                                  ;*
1104                                  ;;*****************************************************************
1105  004044  000004                  TST2:   SCOPE
1106          000002                  JB=$TN-1
1107                                                                  ;SET THE SKAD REGISTER
1108  004046  012737  004200  030646          MOV     #TST3,SKAD      ;IN CASE THE TEST ABORTS.
1109
1110  004054  113737  001102  001232          MOVB    $TSTNM,$TMPO
1111  004062  012737  030522  000114          MOV     #SPUR,@#CACHVEC
1112
1113  004070  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1114  004072  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
1115  004074  012737  004102  001110          MOV     #JB1,$LPERR
1116  004102  005037  177746          JB1:    CLR     @#CONTRL        ;WRITE ZEROES
1117  004106  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
1118  004110  013700  177746                  MOV     @#CONTRL,R0     ;READ.ZEROES
1119  004114  005700                          TST     R0
1120  004116  001430                          BEQ     JBDONE
1121  004120  005037  177750          JB2:    CLR     @#MAINT
1122  004124  013701  177750                  MOV     @#MAINT,R1
1123  004130  005701                          TST     R1
1124  004132  001414                          BEQ     JBERR2
1125
1126  004134                          JBERR1:                         ;BOTH READ ZEROES FAILED.
1127  004134  010037  001236                  MOV     R0,$TMP2
1128  004140  010137  001240                  MOV     R1,$TMP3
1129  004144  104063                  1$:     ERROR   63
1130  004146  012737  177777  031064          MOV     #-1,CONFLG      ;SIGNAL BAD REGISTERS
1131  004154  012737  177777  031066          MOV     #-1,MANFLG
1132  004162  000406                          BR      JBDONE
1133
1134  004164                          JBERR2:                         ;ONLY THE READ OF THE
1135  004164  010037  001236                  MOV     R0,$TMP2        ;CONTROL REGISTER FAILED.
1136  004170  104064                  1$:     ERROR   64
1137  004172  012737  177777  031064          MOV     #-1,CONFLG
1138
1139  004200                          JBDONE:                         ;DONE!!!
1140
1141                                  ;;*****************************************************************
1142                                  ;*TEST 3        CACHE REGISTERS DATA PATH, READ ONES TEST
1143                                  ;*
1144                                  ;*THIS TEST PERFORMS A READ OF BOTH THE HIGH ORDER AND
1145                                  ;*LOW ORDER ERROR ADDRESS REGISTER. THIS IS DONE TO MAKE
1146                                  ;*SURE THAT THE REGISTERS' DATA PATHS CAN PASS ONES. NOTE THAT
```

```
                                        ;*THE LOW ORDER ADDRESS REGISTER SHOULD CONTAIN A
                                        ;*177740 AND THE HIGH ORDER REGISTER SHOULD CONTAIN
                                        ;*000003. THIS LEAVES THE DATA PATH LINE'S BITS 2,3 AND 4
                                        ;*UNTESTED FOR THEIR AVAILITY TO PASS ONES. THIS WILL
                                        ;*BE CHECKED IN THE COUNT PATTERN TST4.
                                        ;*
                                        ;;*****************************************************************
004200  000004                    TST3:   SCOPE
004202  012737  000040  001302            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000003                  JC=$TN-1
                                                                    ;SET THE SKAD REGISTER
004210  012737  004342  030646            MOV     #TST4,SKAD      ;IN CASE THE TEST ABORTS.

004216  113737  001102  001232            MOVB    $TSTNM,$TMPO

004224  104414                          SKPBAD                     ;IF THE ERROR ADDRESS REG IS BAD SKIP THIS TEST.
004226  104415                          SKPBER                     ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
004230  012737  177777  177744          MOV     #-1,@#MEMERR    ;MAKE SURE THE ERROR REGISTERS ARE UNLOCKED
004236  012737  004244  001110          MOV     #JC1,$LPERR

004244  000240                  JC1:    NOP                        ;FOR SCOPING WITH AN OSCILLOSCOPE!
004246  013700  177740                  MOV     @#LOADRS,R0
004252  013701  177742                  MOV     @#HIADRS,R1     ;READ THE REGISTERS.
004256  022700  177740                  CMP     #177740,R0
004262  001003                          BNE     JCERR1
004264  022701  000003          JC2:    CMP     #3,R1
004270  001424                          BEQ     JCDONE

004272  012737  004310  001234  JCERR1: MOV     #1$,$TMP1       ;BAD DATA WAS READ FROM THEM!!
004300  010037  001236                  MOV     R0,$TMP2
004304  010137  001240                  MOV     R1,$TMP3
004310  104065                  1$:     ERROR   65
004312  022700  000003                  CMP     #3,R0
004316  001403                          BEQ     2$
004320  012737  177777  031056          MOV     #-1,LOAFLG
004326  022700  177740          2$:     CMP     #177740,R0
004332  001403                          BEQ     JCDONE
004334  012737  177777  031060          MOV     #-1,HIAFLG

004342                          JCDONE:                            ;DONE!


                                        ;;*****************************************************************
                                        ;*TEST 4         CACHE CONTROL REGISTER COUNT PATTERN TEST
                                        ;*
                                        ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE CACHE CONTROL
                                        ;*REGISTER FOR THE PURPOSE OF CHECKING OUT THE
                                        ;*DATA RELIABILITY OF BOTH THE REGISTER BITS AND THE
                                        ;*DATA PATHS LINES.
                                        ;*
                                        ;;*****************************************************************
004342  000004                    TST4:   SCOPE
004344  012737  000004  001302            MOV     #4,$TIMES       ;;DO 4 ITERATIONS

        000004                  JD=$TN-1
```

```
1203                                                                    ;SET THE SKAD REGISTER
1204  004352  012737  004460  030646          MOV     #TST5,SKAD        ;IN CASE THE TEST ABORTS.
1205
1206  004360  113737  001102  001232          MOVB    $TSTNM,$TMP0
1207
1208
1209  004366  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1210
1211  004370  012700  177746                  MOV     #CONTRL,R0
1212  004374  005002                          CLR     R2
1213  004376  012737  004404  001110          MOV     #JD1,$LPERR
1214  004404  000240                  JD1:    NOP                       ;FOR SCOPING WITH AN OSCILLOSCOPE!
1215  004406  010210                          MOV     R2,(R0)           ;WRITE THE REGISTER.
1216  004410  011001                          MOV     (R0),R1           ;READ BACK THE REGISTER AND MAKE SURE
1217  004412  010203                          MOV     R2,R3             ;THE DATA IS CORRECT.
1218  004414  042703  177700                  BIC     #177700,R3
1219  004420  020301                          CMP     R3,R1
1220  004422  001003                          BNE     JDERR1
1221  004424  077211                  JD2:    SOB     R2,JD1
1222  004426  005010                          CLR     (R0)
1223  004430  000413                          BR      JDDONE
1224  004432                          JDERR1:                           ;REPORT THE ERROR!
1225  004432  010237  001236                  MOV     R2,$TMP2
1226  004436  010137  001240                  MOV     R1,$TMP3
1227  004442  010337  001242                  MOV     R3,$TMP4
1228  004446  104066                  1$:     ERROR   66
1229  004450  012737  177777  031064          MOV     #-1,CONFLG
1230  004456  000762                          BR      JD2
1231  004460                          JDDONE:
1232
1233
1234                                    ;;**********************************************************************
1235                                    ;*TEST 5        CACHE HIT/MISS AND CONTROL REGISTER SIMPLE MISSES TEST
1236                                    ;*
1237                                    ;*THIS IS A TEST OF THE HIT/MISS REGISTER AND THE
1238                                    ;*CONTRL REGISTER'S ABILITY TO FORCE MISSES. ZEROES ARE
1239                                    ;*FLOATED THROUGH THE HIT/MISS REGISTER.
1240                                    ;*
1241                                    ;;**********************************************************************
1242  004460  000004                  TST5:   SCOPE
1243  004462  012737  000040  001302          MOV     #40,$TIMES        ;;DO 40 ITERATIONS
1244          000005                  KB=$TN-1
1245                                                                    ;SET THE SKAD REGISTER
1246  004470  012737  005012  030646          MOV     #TST6,SKAD        ;IN CASE THE TEST ABORTS.
1247
1248  004476  113737  001102  001232          MOVB    $TSTNM,$TMP0
1249
1250
1251  004504  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1252  004506  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
1253  004510  005037  004702                  CLR     KBFLG
1254  004514  012737  000014  177746  KB1:    MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
1255  004522  012737  004514  001110          MOV     #KB1,$LPERR
1256
1257  004530  012700  004540                  MOV     #KB2,R0
1258  004534  012701  000020                  MOV     #20,R1
```

```
1259  004540  005720                  .B2:    TST     (R0)+
1260  004542  077102                          SOB     R1,.B2
1261  004544  000240                          NOP                     ;GET SIX FORCED MISSES.
1262  004546  000240                          NOP
1263  004550  000240                          NOP
1264  004552  000240                          NOP
1265  004554  013702  177752                  MOV     @#HITMIS,R2     ;SHOULD HAVE REGISTERED
1266  004560  001051                          BNE     KBERR1          ;SIX MISSES.
1267
1268  004562  012737  004562  001110  KB3:    MOV     #KB3,$LPERR
1269  004570  012737  000054  177746          MOV     #SIMOMI,@#CONTRL        ;SELECT GROUP ONE, MISS GROUP
1270  004576  012700  004606                  MOV     #KB4,R0         ;ZERO AND GROUP ONE.
1271  004602  012701  000020                  MOV     #20,R1
1272  004606  005720                  KB4:    TST     (R0)+
1273  004610  077102                          SOB     R1,KB4
1274  004612  000240                          NOP
1275  004614  000240                          NOP
1276  004616  000240                          NOP
1277  004620  000240                          NOP
1278  004622  013702  177752                  MOV     @#HITMIS,R2     ;SHOULD HAVE SIX MISSES.
1279  004626  001035                          BNE     KBERR2
1280
1281  004630  012737  004630  001110  KB5:    MOV     #KB5,$LPERR
1282  004636  012737  000034  177746          MOV     #SOMOMI,@#CONTRL        ;SELECT GROUP 0, MISS GROUP 0
1283  004644  012700  004654                  MOV     #KB6,R0         ;AND GROUP 1.
1284  004650  012701  000020                  MOV     #20,R1
1285  004654  005720                  KB6:    TST     (R0)+
1286  004656  077102                          SOB     R1,KB5
1287  004660  000240                          NOP
1288  004662  000240                          NOP
1289  004664  000240                          NOP
1290  004666  000240                          NOP
1291  004670  013702  177752                  MOV     @#HITMIS,R2     ;SHOULD HAVE SIX MISSES.
1292  004674  001021                          BNE     KBERR3
1293  004676  000137  004754                  JMP     KBDONE
1294
1295
1296  004702  000000          KBFLG:  .WORD   0               ;ERROR FLAG.
1297
1298  004704                  KBERR1:                         ;GOT HITS WHILE FORCING
1299  004704  010237  001236          MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS.
1300  004710  104072          1$:     ERROR   72
1301  004712  052737  000001  004702  BIS     #BIT0,KBFLG
1302  004720  000720                  BR      KB3
1303  004722                  KBERR2:                         ;GO HITS WHILE FORCING
1304  004722  010237  001236          MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS
1305  004726  104073          1$:     ERROR   73              ;AND SELECTING GROUP 1
1306  004730  052737  000002  004702  BIS     #BIT1,KBFLG
1307  004736  000734                  BR      KB5
1308  004740                  KBERR3:                         ;GO HITS WHILE FORCING
1309  004740  010237  001236          MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS
1310  004744  104074          1$:     ERROR   74              ;AND SELECTING GROUP 0.
1311  004746  052737  000004  004702  BIS     #BIT2,KBFLG
1312
1313  004754  005037  177746  KBDONE: CLR     @#CONTRL
1314  004760  022737  000007  004702          CMP     #7,KBFLG        ;IF THE TEST DETECTED
```

```
1315  004766  001003                        BNE     .BD2                ;HITS FOR ALL OF THE
1316  004770  012737  177777  031104        MOV     #-1,HIMFL2          ;THREE CONDITION USED IN
1317                                                                      ;THE CONTROL REGISTER
1318                                                                      ;SIGNAL A BAD HIT/MISS
1319                                                                      ;REGISTER.
1320  004776  005737  004702        KBD2:   TST     KBFLG               ;IF LESS THEN THREE (BUT
1321  005002  001403                        BEQ     KBD3                ;MORE THAN ZERO) CONTRL
1322  005004  012737  177777  031100        MOV     #-1,CONFL2          ;PATTERNS FAILED SIGNAL
1323                                                                      ;A BAD CONTROL REGISTER.
1324  005012                        KBD3:                                 ;DONE!
1325
1326                                        ;;*****************************************************************
1327                                        ;*TEST 6        CACHE HIT/MISS AND CONTROL REGISTER SIMPLE HIT TEST
1328                                        ;*
1329                                        ;*THIS IS A TEST OF THE HIT/MISS REGISTER AND THE
1330                                        ;*THE FORCE MISS BITS OF THE CONTROL REGISTER.
1331                                        ;*WHAT IS DONE IS TO SEE IF ANY HITS AT ALL ARE
1332                                        ;*POSSIBLE WITH THE CONTROL REGISTER CLEARED.  THEN THE
1333                                        ;*SAME IS DONE WITH EACH GROUP DISABLE ONE AT A TIME.
1334                                        ;*BY DISABLED IS MEANT THAT THE FORCE MISS BIT IS SET
1335                                        ;*IN THE CONTROL REGISTER FOR THE DISABLED GROUP AND THE
1336                                        ;*FORCE SELECT BIT IS SET FOR THE OTHER GROUP.
1337                                        ;*
1338                                        ;;*****************************************************************
1339  005012  000004                TST6:   SCOPE
1340  005014  012737  000040  001302        MOV     #40,$TIMES          ;;DO 40 ITERATIONS
1341          000006                KA=$TN-1
1342                                                                      ;SET THE SKAD REGISTER
1343  005022  012737  005362  030646        MOV     #TST7,SKAD          ;IN CASE THE TEST ABORTS.
1344
1345  005030  113737  001102  001232        MOVB    $TSTNM,$TMP0
1346
1347
1348  005036  104416                        SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1349  005040  104420                        SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
1350  005042  005037  005246               CLR     KAFLG
1351  005046  005037  177746        KA1:   CLR     @#CONTRL            ;BOTH GROUPS ENABLED.
1352  005052  012737  005046  001110        MOV     #KA1,$LPERR
1353  005060  012700  005070               MOV     #KA2,R0
1354  005064  012701  000020               MOV     #20,R1
1355
1356  005070  005720                KA2:    TST     (R0)+               ;SET UP HITS IN BOTH
1357  005072  077102                        SOB     R1,KA2              ;GROUPS
1358  005074  000240                        NOP
1359  005076  000240                        NOP
1360  005100  000240                        NOP
1361  005102  000240                        NOP
1362  005104  013702  177752               MOV     @#HITMIS,R2         ;SHOULD HAVE ALL HITS.
1363  005110  022702  000077               CMP     #77,R2
1364  005114  001055                        BNE     KAERR1
1365
1366  005116  012737  005116  001110  KA3:  MOV     #KA3,$LPERR
1367  005124  012737  000044  177746        MOV     #S1M0,@#CONTRL      ;DISABLE GROUP ZERO.
1368  005132  012700  005142               MOV     #KA4,R0
1369  005136  012701  000020               MOV     #20,R1
1370  005142  005720                KA4:    TST     (R0)+               ;SET UP HITS IN GROUP 1
```

```
1371  005144  077102                          SOB     R1,.A4
1372  005146  000240                          NOP
1373  005150  000240                          NOP
1374  005152  000240                          NOP
1375  005154  000240                          NOP
1376  005156  013702  177752                  MOV     @#HITMIS,R2     ;SHOULD HAVE ALL HITS.
1377  005162  022702  000077                  CMP     #77,R2
1378  005166  001037                          BNE     KAERR2
1379  005170  012737  005170  000110  KA5:    MOV     #KA5,$LERR
1380  005176  012737  000030  177746          MOV     #SDMI,@#CONTRL  ;DISABLE GROUP ONE.
1381  005204  012700  005214                  MOV     #KA6,R0
1382  005210  012701  000020                  MOV     #20,R1
1383  005214  005720                  KA6:    TST     (R0)+           ;SET UP HITS IN GROUP ZERO.
1384  005216  077102                          SOB     R1,KA6
1385  005220  000240                          NOP
1386  005222  000240                          NOP
1387  005224  000240                          NOP
1388  005226  000240                          NOP
1389  005230  013702  177752                  MOV     @#HITMIS,R2     ;SHOULD HAVE SIX HITS.
1390  005234  022702  000077                  CMP     #77,R2
1391  005240  001021                          BNE     KAERR3
1392  005242  000137  005320                  JMP     KADONE
1393
1394  005246  000000          KAFLG:  .WORD   0               ;ERROR FLAG.
1395
1396  005250                  KAERR1:                         ;FAILED TO GET HITS
1397  005250  010237  001236          MOV     R2,$TMP2        ;WITH THE CONTROL
1398  005254  104067          1$:     ERROR   67              ;REGISTER CLEAR!
1399  005256  052737  000001  005246  BIS     #BIT0,KAFLG
1400  005264  000714                  BR      KA3
1401  005266                  KAERR2:                         ;FAILED TO GET HITS
1402  005266  010237  001236          MOV     R2,$TMP2        ;WITH THE CONTROL REGISTER
1403  005272  104070          1$:     ERROR   70              ;SET TO FORCE SELECT GROUP
1404  005274  052737  000002  005246  BIS     #BIT1,KAFLG     ;ONE FORCE MISS GROUP ZERO.
1405  005302  000732                  BR      KA5
1406  005304                  KAERR3:                         ;FAILED TO GET HITS
1407  005304  010237  001236          MOV     R2,$TMP2        ;WITH THE CONTROL REGISER
1408  005310  104071          1$:     ERROR   71              ;SET TO FORCE SELECT GROUP
1409  005312  052737  000004  005246  BIS     #BIT2,KAFLG     ;ZERO AND FORCE MISS GROUP ONE.
1410  005320  005037  177746  KADONE: CLR     @#CONTRL
1411  005324  022737  000007  005246          CMP     #7,KAFLG        ;IF THE TEST FAILED FOR ALL
1412  005332  001004                  BNE     KAD2            ;THREE CONDITIONS OF THE
1413  005334  012737  177777  031070          MOV     #-1,HIMFLG      ;CONTROL REGISTER SIGNAL
1414  005342  000407                  BR      KAD3            ;A BAD HIT/MISS REGISTER.
1415
1416  005344  032737  000006  005246  KAD2:   BIT     #6,KAFLG        ;IF THE TEST FAILED ONLY WHEN
1417  005352  001403                  BEQ     KAD3            ;THE CONTROL REGISTER WAS SET
1418  005354  012737  177777  031100          MOV     #-1,CONFL2      ;SIGNAL A BAD CONTROL REGISTER.
1419  005362                  KAD3:                           ;DONE!!
1420
1421
1422                                  ;;*****************************************************************
1423                                  ;*TEST 7        CACHE CONTROL REGISTER, FORCE SELECT-FORCE MISS, GROUP 0 TEST
1424                                  ;*
1425                                  ;*THIS IS A TEST OF THE CONTROL REGISTER FUNCTIONS
1426                                  ;*OF FORCE MISS AND FORCE SELECTION. AN ADDRESS IS
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1427                                    ;*MADE A HIT IN GROUP ONE; THEN ANOTHER ADDRESS, WHOSE
1428                                    ;*HIT WOULD BE MUTUALLY EXCLUSIVE WITH THE FIRST ADDRESS
1429                                    ;*IN ONLY ONE GROUP, IS MADE A HIT WHILE FORCING
1430                                    ;*SELECTION OF GROUP ZERO; THEN SEE IF THE FIRST ADDRESS
1431                                    ;*IS STILL A HIT IN GROUP ONE; FINALLY TURN ON THE FORCE
1432                                    ;*MISS GROUP ZERO BIT AND SEE IF THE SECOND ADDRESS'
1433                                    ;*HIT IN GROUP ZERO CAN BE FORCED TO A MISS.
1434                                    ;*
1435                                    ;;*****************************************************************
1436  005362  000004                TST7:   SCOPE
1437  005364  012737  000040  001302        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
1438           000007                KD=$TN-1
1439                                                                  ;SET THE SKAD REGISTER
1440  005372  012737  005712  030646        MOV     #TST10,SKAD     ;IN CASE THE TEST ABORTS.
1441
1442  005400  113737  001102  001232        MOVB    $TSTNM,$TMP0
1443  005406  012737  030522  000114        MOV     #SPUR,@#CACHVEC ;EXPECT NO ERRORS.
1444
1445  005414  104416                        SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1446  005416  104420                        SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
1447
1448  005420  012700  005710        K1D:    MOV     #KTMP2D,R0      ;DETERMINE THE TEST LOCATIONS.
1449  005424  042700  176003                BIC     #176003,R0
1450  005430  010001                        MOV     R0,R1
1451  005432  062701  140000                ADD     #TESTR1,R1
1452  005436  010137  001252                MOV     R1,$TMP10
1453  005442  005037  001254                CLR     $TMP11
1454  005446  010002                        MOV     R0,R2
1455  005450  062702  142000                ADD     #TESTR2,R2
1456  005454  010237  001256                MOV     R2,$TMP12
1457  005460  005037  001260                CLR     $TMP13
1458
1459  005464  012737  000044  177746 K2D:    MOV     #SIMO,@#CONTRL  ;MAKE (R1) A HIT IN
1460  005472  005711                        TST     (R1)            ;GROUP GRM.
1461  005474  005711                        TST     (R1)
1462  005476  032737  000010  177752        BIT     #10,@#HITMIS
1463  005504  001007                        BNE     K3D
1464
1465                                                                  ;REPORT ERROR, UNABLE
1466  005506  012737  000001  001236        MOV     #1,$TMP2        ;GET A HIT IN GROUP GRM.
1467  005514  012737  000044  001240        MOV     #SIMO,$TMP3
1468  005522  104075                1$:     ERROR   75
1469
1470  005524  012703  000030        K3D:    MOV     #SOMI,R3
1471  005530  042703  000017                BIC     #17,R3
1472  005534  010337  177746                MOV     R3,@#CONTRL     ;FORCE SELECT GROUP GRS.
1473  005540  005712                        TST     (R2)            ;MAKE (R2) A HIT IN GROUP
1474  005542  005712                        TST     (R2)            ;GRS.
1475  005544  032737  000010  177752        BIT     #10,@#HITMIS
1476  005552  001006                        BNE     K4D
1477                                                                  ;IF NOT, ERROR UNABLE TO
1478                                                                  ;GET A HIT IN GROUP 0
1479  005554  010337  001240                MOV     R3,$TMP3
1480  005560  104076                1$:     ERROR   76
1481  005562  012737  177777  031100        MOV     #-1,CONFL2
1482
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1483  005570  005037  177746          K4D:    CLR     @#CONTRL        ;NOW MAKE SURE (R1) IS
1484  005574  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
1485  005576  005711                          TST     (R1)            ;STILL A HIT IN GROUP
1486  005600  032737  000010  177752          BIT     #10,@#HITMIS    ;1, THAT IS MAKE SURE
1487  005606  001010                          BNE     K5D             ;GROUP 1 WASN'T WRITTEN
1488                                                                  ;WHILE FORCE SELECTING
1489                                                                  ;GROUP GRS.
1490  005610  012737  000001  001236          MOV     #1,$TMP2
1491  005616  012737  000000  001240          MOV     #0,$TMP3
1492  005624  104077                  1$:     ERROR   77
1493  005626  000424                          BR      K6D
1494  005630  012703  000044          K5D:    MOV     #S1M0,R3        ;NOW SEE IF YOU CAN
1495  005634  042703  000063                  BIC     #63,R3          ;GET A MISS AT (R2)
1496  005640  010337  177746                  MOV     R3,@#CONTRL     ;BY FORCING MISSES
1497  005644  005712                          TST     (R2)            ;TO GRS.
1498  005646  032737  000010  177752          BIT     #10,@#HITMIS
1499  005654  001411                          BEQ     K6D             ;SHOULD BE A MISS.
1500                                                                  ;OTHERWISE ERROR!
1501  005656  012737  000000  001236          MOV     #0,$TMP2
1502  005664  010337  001240                  MOV     R3,$TMP3
1503  005670  104117                  1$:     ERROR   117
1504  005672  012737  177777  031100          MOV     #-1,CONFL2
1505
1506  005700  005037  177746          K6D:    CLR     @#CONTRL
1507  005704  000402                          BR      K7D
1508
1509  005706  000000                  KTMP1D:.WORD    0
1510  005710  000000                  KTMP2D:.WORD    0
1511
1512  005712                          K7D:                            ;DONE!
1513
1514
1515                                  ;;**************************************************************
1516                                  ;*TEST 10       CACHE CONTROL REGISTER, FORCE SELECT-FORCE MISS, GROUP 1 TEST
1517                                  ;*
1518                                  ;*THIS IS A TEST OF THE CONTROL REGISTER FUNCTIONS
1519                                  ;*OF FORCE MISS AND FORCE SELECTION. AN ADDRESS IS
1520                                  ;*MADE A HIT IN GROUP ZERO; THEN ANOTHER ADDRESS, WHOSE
1521                                  ;*HIT WOULD BE MUTUALLY EXCLUSIVE WITH THE FIRST ADDRESS
1522                                  ;*IN ONLY ONE GROUP, IS MADE A HIT WHILE FORCING
1523                                  ;*SELECTION OF GROUP ONE; THEN SEE IF THE FIRST ADDRESS
1524                                  ;*IS STILL A HIT IN GROUP ZERO; FINALLY TURN ON THE FORCE
1525                                  ;*MISS GROUP ONE BIT AND SEE IF THE SECOND ADDRESS'
1526                                  ;*HIT IN GROUP ONE CAN BE FORCED TO A MISS.
1527                                  ;*
1528                                  ;;**************************************************************
1529  005712  000004                  TST10:  SCOPE
1530  005714  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
1531          000010                  KE=$TN-1
1532                                                                  ;SET THE SKAD REGISTER
1533  005722  012737  006242  030646          MOV     #TST11,SKAD     ;IN CASE THE TEST ABORTS.
1534
1535  005730  113737  001102  001232          MOVB    $TSTNM,$TMP0
1536  005736  012737  030522  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO ERRORS.
1537
1538  005744  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
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1539  005746  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
1540
1541  005750  012700  006240          K1E:    MOV     #KTMP2E,R0      ;DETERMINE THE TEST LOCATIONS.
1542  005754  042700  176003                  BIC     #176003,R0
1543  005760  010001                          MOV     R0,R1
1544  005762  062701  140000                  ADD     #TESTR1,R1
1545  005766  010137  001252                  MOV     R1,$TMP10
1546  005772  005037  001254                  CLR     $TMP11
1547  005776  010002                          MOV     R0,R2
1548  006000  062702  142000                  ADD     #TESTR2,R2
1549  006004  010237  001256                  MOV     R2,$TMP12
1550  006010  005037  001260                  CLR     $TMP13
1551
1552  006014  012737  000030  177746  K2E:    MOV     #SOM1,@#CONTRL  ;MAKE (R1) A HIT IN
1553  006022  005711                          TST     (R1)            ;GROUP GRM.
1554  006024  005711                          TST     (R1)
1555  006026  032737  000010  177752          BIT     #10,@#HITMIS
1556  006034  001007                          BNE     K3E
1557
1558                                                                  ;REPORT ERROR, UNABLE
1559  006036  012737  000000  001236          MOV     #0,$TMP2        ;GET A HIT IN GROUP GRM.
1560  006044  012737  000030  001240          MOV     #SOM1,$TMP3
1561  006052  104075                  1$:     ERROR   75
1562
1563  006054  012703  000044          K3E:    MOV     #S1M0,R3
1564  006060  042703  000017                  BIC     #17,R3
1565  006064  010337  177746                  MOV     R3,@#CONTRL     ;FORCE SELECT GROUP GRS.
1566  006070  005712                          TST     (R2)            ;MAKE (R2) A HIT IN GROUP
1567  006072  005712                          TST     (R2)            ;GRS.
1568  006074  032737  000010  177752          BIT     #10,@#HITMIS
1569  006102  001006                          BNE     K4E
1570                                                                  ;IF NOT, ERROR UNABLE TO
1571                                                                  ;GET A HIT IN GROUP 1
1572  006104  010337  001240                  MOV     R3,$TMP3
1573  006110  104076                  1$:     ERROR   76
1574  006112  012737  177777  031100          MOV     #-1,CONFL2
1575
1576  006120  005037  177746          K4E:    CLR     @#CONTRL        ;NOW MAKE SURE (R1) IS
1577  006124  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
1578  006126  005711                          TST     (R1)            ;STILL A HIT IN GROUP
1579  006130  032737  000010  177752          BIT     #10,@#HITMIS    ;0, THAT IS MAKE SURE
1580  006136  001010                          BNE     K5E             ;GROUP 0 WASN'T WRITTEN
1581                                                                  ;WHILE FORCE SELECTING
1582                                                                  ;GROUP GRS.
1583  006140  012737  000000  001236          MOV     #0,$TMP2
1584  006146  012737  000001  001240          MOV     #1,$TMP3
1585  006154  104077                  1$:     ERROR   77
1586  006156  000424                          BR      K6E
1587  006160  012703  000030          K5E:    MOV     #SOM1,R3        ;NOW SEE IF YOU CAN
1588  006164  042703  000063                  BIC     #63,R3          ;GET A MISS AT (R2)
1589  006170  010337  177746                  MOV     R3,@#CONTRL     ;BY FORCING MISSES
1590  006174  005712                          TST     (R2)            ;TO GRS.
1591  006176  032737  000010  177752          BIT     #10,@#HITMIS
1592  006204  001411                          BEQ     K6E             ;SHOULD BE A MISS,
1593                                                                  ;OTHERWISE ERROR!
1594  006206  012737  000001  001236          MOV     #1,$TMP2
```

```
1595  006214  010337  001240                  MOV     R3,$TMP3
1596  006220  104117                  1$:     ERROR   117
1597  006222  012737  177777  031100          MOV     #-1,CONFL2
1598
1599  006230  005037  177746          K6E:    CLR     @#CONTRL
1600  006234  000402                          BR      K7E
1601
1602  006236  000000                  KTMP1E:.WORD    0
1603  006240  000000                  KTMP2E:.WORD    0
1604
1605  006242                          K7E:                            ;DONE!
1606
1607
1608                                  ;;**************************************************************
1609                                  ;*TEST 11       CACHE HIT/MISS REGISTER PATTERNS TEST
1610                                  ;*
1611                                  ;*THIS IS A TEST OF THE HIT/MISS REGISTER WHICH
1612                                  ;*FLOATS DIFFERENT PATTERNS OF HITS AND MISSES
1613                                  ;*THROUGH THAT REGISTER. THIS IS DONE FIRST WITH
1614                                  ;*BOTH GROUPS ENABLE; THEN WITH GROUP ZERO DISABLED
1615                                  ;*THAT IS FORCING SELECTION OF GROUP ONE AND FORCING
1616                                  ;*MISSES TO GROUP ZERO; FINALLY WITH GROUP ONE
1617                                  ;*DISABLED.
1618                                  ;*
1619                                  ;;**************************************************************
1620  006242  000004                  TST11:  SCOPE
1621  006244  012737  000020  001302          MOV     #20,$TIMES      ;;DO 20 ITERATIONS
1622           000011                 KC=$TN-1
1623                                                                  ;SET THE SKAD REGISTER
1624  006252  012737  007054  030646          MOV     #TST12,SKAD     ;IN CASE THE TEST ABORTS.
1625
1626  006260  113737  001102  001232          MOVB    $TSTNM,$TMP0
1627  006266  012737  030522  000114          MOV     #SPUR,@#CACHVEC
1628
1629  006274  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
1630  006276  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
1631  006300  005037  006736                  CLR     KCCON           ;TEST THE BOTH GROUPS
1632  006304  012737  000002  006740          MOV     #2,KCFLG1       ;ENABLED CONDITION FIRST.
1633  006312  012737  006326  001110  KC0:    MOV     #KC1,$LPERR
1634  006320  012737  006744  006742          MOV     #KCTBL,KCPTR    ;KCPTR IS A POINTER TO
1635                                                                  ;THE TABLE OF 12-BIT PATTERNS
1636                                                                  ;WHICH WILL BE FLOATED
1637                                                                  ;THROUGH THE REGISTER.
1638
1639  006326  012701  140000          KC1:    MOV     #TESTR1,R1      ;MAKE THIS CODE MISSES
1640  006332  012702  142000                  MOV     #TESTR2,R2      ;TO BOTH GROUPS!
1641  006336  012700  001000                  MOV     #1000,R0
1642  006342  012737  000030  177746  1$:     MOV     #SOM1,@#CONTRL
1643  006350  005721                          TST     (R1)+
1644  006352  012737  000044  177746          MOV     #S1M0,@#CONTRL
1645  006360  005722                          TST     (R2)+
1646  006362  077011                          SOB     R0,1$
1647
1648  006364  017702  000352                  MOV     @KCPTR,R2       ;GET THE HIT/MISS PATTERN
1649  006370  012700  006452                  MOV     #KC3,R0         ;AND MAKE THE INSTRUCTIONS
1650  006374  012701  000007                  MOV     #7,R1           ;BETWEEN KC3 AND KC9
```

```
1651  006400  013737  006736  177746          MOV     KCCON,@#CONTRL  ;HITS AND MISSES SO THAT
1652  006406  000403                          BR      KC2.5           ;WHEN THAT CODE IS EXECUTED
1653  006410  006302                  KC2:    ASL     R2              ;THIS PATTERN WILL BE FLOATED
1654  006412  103001                          BCC     KC2.5           ;THROUGH THE HIT/MISS REGISTER.
1655  006414  005710                          TST     (R0)            ;MAKE (R0) A HIT!
1656  006416  062700  000002          KC2.5:  ADD     #2,R0
1657  006422  006302                          ASL     R2
1658  006424  103001                          BCC     1$
1659  006426  005710                          TST     (R0)            ;MAKE (R0) A HIT!
1660  006430  062700  000006          1$:     ADD     #6,R0
1661  006434  077113                          SOB     R1,KC2
1662
1663  006436  012705  177752                  MOV     #HITMIS,R5      ;NOW THAT THE HITS
1664  006442  000403                          BR      KC3             ;AND MISSES HAVE BEEN
1665                                                                  ;APPROPRIATELY ESTABLISHED
1666                                                                  ;EXECUTE THE CODE AND
1667                                                                  ;CAUSE THE PATTERN TO FLOAT
1668                                                                  ;THROUGH THE HIT/MISS
1669                                                                  ;REGISTER.
1670
1671
1672          006444                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
1673          006444                          LOC=-4&LOC
1674          006450                          LOC=LOC+4
1675          006450                          .=LOC
1676
1677  006450  000000                          HALT
1678  006452  000240                  KC3:    NOP                     ;THE HALT'S HERE ARE NOT
1679  006454  000402                          BR      KC4             ;EXECUTED, THEY ARE FILLERS.
1680  006456  000000                          HALT                    ;THE ADDRESS OF THE HIT AND
1681  006460  000000                          HALT                    ;MISS REGISTER IS IN R5.
1682  006462  011500                  KC4:    MOV     (R5),R0         ;NOTE THAT THE HIT/MISS
1683  006464  000402                          BR      KC5             ;REGISTER IS READ EVERY
1684  006466  000000                          HALT                    ;TWO CYCLES AND SAVED IN
1685  006470  000000                          HALT                    ;A PROCESSOR GENERAL
1686  006472  011501                  KC5:    MOV     (R5),R1         ;PURPOSE REGISTER.
1687  006474  000402                          BR      KC6
1688  006476  000000                          HALT
1689  006500  000000                          HALT
1690  006502  011502                  KC6:    MOV     (R5),R2
1691  006504  000402                          BR      KC7
1692  006506  000000                          HALT
1693  006510  000000                          HALT
1694  006512  011503                  KC7:    MOV     (R5),R3
1695  006514  000402                          BR      KC8
1696  006516  000000                          HALT
1697  006520  000000                          HALT
1698  006522  011504                  KC8:    MOV     (R5),R4
1699  006524  000402                          BR      KC9
1700  006526  000000                          HALT
1701  006530  000000                          HALT
1702  006532  011505                  KC9:    MOV     (R5),R5         ;CAN SAVE PATTERN IN R5
1703                                                                  ;SINCE THE ADDRESS IS
1704                                                                  ;NO LONGER NEEDED.
1705  006534  042700  177774          KC10:   BIC     #177774,R0      ;GET THE PATTERNS READ
1706  006540  010037  006770                  MOV     R0,KCR0         ;FROM THE HIT/MISS REGISTER
```

```
1707  006544  042701  017760            BIC     #17760,R1       ;INTO LOCATIONS KCR0
1708  006550  010137  006772            MOV     R1,KCR1         ;THROUGH KCR5 SO THE
1709  006554  010237  006774            MOV     R2,KCR2         ;GENERAL PURPOSE REGISTERS
1710  006560  010337  006776            MOV     R3,KCR3         ;CAN BE USED FOR OTHER
1711  006564  010437  007000            MOV     R4,KCR4         ;THINGS
1712  006570  010537  007002            MOV     R5,KCR5
1713
1714  006574  017701  000142    KC11:   MOV     @KCPTR,R1
1715  006600  005000                    CLR     R0
1716  006602  012702  000006            MOV     #6,R2           ;PUT THE EXPECTED VALUES
1717  006606  012703  007004            MOV     #KCE0,R3        ;IN KCE0 THROUGH KCE5!
1718  006612  073027  000003    KC12:   ASHC    #2,R0
1719  006616  042700  177700            BIC     #177700,R0
1720  006622  010023                    MOV     R0,(R3)+
1721  006624  077206                    SOB     R2,KC12
1722
1723  006626  012700  006770            MOV     #KCR0,R0
1724  006632  012701  007004            MOV     #KCE0,R1        ;MAKE SURE THE PATTERNS
1725  006636  012702  000006            MOV     #6,R2           ;WHICH WERE READ FROM
1726  006642  022021            KC13:   CMP     (R0)+,(R1)+     ;THE HIT AND MISS REGISTER
1727  006644  001402                    BEQ     KC14            ;MATCH THE EXPECTED
1728  006646  000137  007020            JMP     KCERR           ;PATTERNS.
1729  006652  077205            KC14:   SOB     R2,KC13
1730
1731  006654  062737  000002  006742  KC15:   ADD     #2,KCPTR                ;MOVE POINTER TO NEXT
1732  006662  023727  006742  006766        CMP     KCPTR,#KCTBLB   ;PATTERN AND IF ALL THE
1733  006670  001402                    BEQ     1$              ;PATTERNS HAVEN'T BEEN
1734  006672  000137  006326            JMP     KC1             ;TESTED GO TO KC1 TO TEST
1735                                                            ;THIS NEXT PATTERN.
1736  006676  005337  006740    1$:     DEC     KCFLG1          ;IF ALL THE PATERNS HAVE BEEN
1737  006702  100002                    BPL     KC16            ;TESTED WITH THAT GROUP CONFIGURATION
1738  006704  000137  007050            JMP     KCDONE          ;SO GO TO THE NEXT CONFIGURATION.
1739                                                            ;OR DONE!!
1740  006710  001405            KC16:   BEQ     KC17
1741  006712  012737  000044  006736    MOV     #S1M0,KCCON     ;BOTH GROUPS ENABLED CONFIGURATION
1742  006720  000137  006312            JMP     KC0             ;HAS BEEN TESTED SO NOW TEST GROUP
1743                                                            ;ZERO DISABLED CONFIGURATION.
1744  006724  012737  000030  006736  KC17:   MOV     #S0M1,KCCON     ;BOTH GROUPS ENABLED AND GROUP ZERO
1745                                                            ;DISABLED CONFIGURATIONS HAVE BOTH
1746                                                            ;BEEN TESTED SO FINALLY TEST THE
1747  006732  000137  006312            JMP     KC0             ;GROUP ONE DISABLED CONFIGURATION.
1748
1749
1750  006736  000000            KCCON:  .WORD   0               ;PATTERN BEING USED IN THE CONTROL REGISTER
1751
1752  006740  000000            KCFLG1: .WORD   0               ;FLAG USED TO DETERMINE THE CONFIGURATION
1753                                                            ;BEING TESTED.
1754  006742  000000            KCPTR:  .WORD   0               ;POINTER USED TO POINT TO THE PATTERN
1755                                                            ;BEING TESTED IN KCTBL.
1756
1757  006744  000000            KCTBL.  .WORD   0               ;PATTERNS WHICH ARE
1758  006746  002000                    .WORD   002000          ;FLOATED THROUGH THE HIT/MISS
1759  006750  177760                    .WORD   177760          ;REGISTER. ONLY THE UPPER
1760  006752  175760                    .WORD   175760          ;12 BITS HAVE ANY SIGNIFICANCE!!
1761  006754  125240                    .WORD   125240
1762  006756  146300                    .WORD   146300
```

```
006760 161600                      .WORD   161600
006762 100020                      .WORD   100020
006764 077740                      .WORD   077740
006766 000000             KCTSLB:  .WORD   0

006770 000000             KCR0:    .WORD   0              ;STORAGE FOR THE PATTERNS READ
006772 000000             KCR1:    .WORD   0              ;OUT OF THE HUIT/MISS REGISTER.
006774 000000             KCR2:    .WORD   0
006776 000000             KCR3:    .WORD   0
007000 000000             KCR4:    .WORD   0
007002 000000             KCR5:    .WORD   0

007004 000000             KCE0:    .WORD   0              ;EXPECTED VALUES FOR THE PATTERNS
007006 000000             KCE1:    .WORD   0              ;READ FROM THE HIT/MISS REGISTER.
007010 000000             KCE2:    .WORD   0
007012 000000             KCE3:    .WORD   0
007014 000000             KCE4:    .WORD   0
007016 000000             KCE5:    .WORD   0

007020                    KCERR:                          ;REPORT THE PATTERN READ FROM THE
007020 013737 006736 001236        MOV     KCCON,$TMP2    ;HIT/MISS REGISTER WAS NOT THE EXPECTED
007026 104120             1$:      ERROR   120            ;VALUE.
007030 012737 177777 031100        MOV     #-1,CONFL2
007036 012737 177777 031104        MOV     #-1,HIMFL2
007044 000137 006654               JMP     KC1$

007050 005037 177746      KCDONE:  CLR     @#CONTRL       ;DONE!!

                          ;;*************************************************************
                          ;*TEST 12        CACHE CONTROL AND HIT/MISS REGISTERS EVALUATION ROUTINE
                          ;*
                          ;*THIS IS NOT A TEST. THIS ROUTINE IS USED TO LOOK AT THE RESULTS
                          ;*OF TST5 THROUGH TST10, WHICH TESTED THE HIT/MISS REGISTER
                          ;*AND THE CONTROL REGISTER. THOSE TESTS HAVE SIGNALLED A BAD
                          ;*REGISTER USING THE FLAGS, CONFL2 AND HIMFL2, REPRESENTING THE
                          ;*CONTROL AND HIT/MISS REGISTERS RESPECTIVELY. IF ONE OF THESE
                          ;*REGISTERS WAS FOUND TO BE BAD THE FLAG SHOULD BE A -1. WHILE A
                          ;*ZERO FLAG INDICATES THAT THOSE TESTS FOUND THAT REGISTER
                          ;*FUNCTIONAL. THIS ROUTINE LOOKS AT THE FLAGS, CONFL2 AND HIMFL2,
                          ;*WHICH ARE CONSIDERED TO BE LOCAL AND TRANSFERS THE INDICATORS
                          ;*THEY CONTAIN TO THE GLOBAL FLAGS, CONFLG AND HIMFLG. THESE GLOBAL
                          ;*FLAGS ARE USED TO DESIGNATE TO THE REST OF THE PROGRAM THE FUNCTIONALITY
                          ;*OR DISFUNCTIONALITY OF THOSE REGISTERS.
                          ;*
                          ;;*************************************************************
007054 000004             TST12:   SCOPE
       000012             KY=$TN-1
007056 005737 031100               TST     CONFL2
007062 001403                      BEQ     KY1
007064 012737 177777 031064        MOV     #-1,CONFLG
007072 005737 031104      KY1:     TST     HIMFL2
007076 001403                      BEQ     KY2
007100 012737 177777 031070        MOV     #-1,HIMFLG
007106                    KY2:                            ;DONE

                          ;;*****************************************************`************
```

```
                                        ;*TEST 13       CACHE CONTROL LOGIC, 'RANDOM' FLIP FLOP TEST
                                        ;*
                                        ;*THIS IS A TEST OF THE 'RANDOM' CONTROL SIGNAL.
                                        ;*A TEST IS MADE TO INSURE THAT THE 'RANDOM' FLIP-FLOP IS NOT STUCK
                                        ;*AND IS TOGGLED ONCE FOR EVERY 'BUST' CYCLE INITIATED BY
                                        ;*THE PROCESSOR. 'BUST' IS BUS START, A SIGNAL PRODUCED BY
                                        ;*THE PROCESSOR WHENEVER IT THINKS IT IS ABOUT TO DO A MEMORY CYCLE.
                                        ;*THE RANDOM FLIP FLOP IS USED IN THE CACHE TO DETERMINE WHICH
                                        ;*GROUP TO WRITE IN THE EVENT OF A READ MISS CYCLE. IF THIS FLIP FLOP IS
                                        ;*SET THEN GROUP ZERO IS WRITTEN; IF CLEAR THEN GROUP ONE IS WRITTEN.
                                        ;*
                                        ;;*****************************************************************
007106  000004                        TST13:  SCOPE
007110  012737  000040  001302                MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
                000013          KF=$TN-1
                                                                        ;SET THE SKAD REGISTER
007116  012737  007342  030646                MOV     #TST14,SKAD     ;IN CASE THE TEST ABORTS.

007124  113737  001102  001232                MOVB    $TSTNM,$TMP0
007132  012737  030522  000114                MOV     #SPUR,@#CACHVEC ;EXPECT NO PARITY ERRORS.

007140  104416                                SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
007142  104420                                SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
007144  012700  007340          KF1:    MOV     #KFTMP2,R0      ;ESTABLISH A LOCATION FOR THE
                                                                ;HITS TO BE MADE WHICH WON'T
                                                                ;INTERFER WITH THE HITS CAUSED
                                                                ;BY EXECUTION OF THIS CODE!

007150  042700  176003                        BIC     #176003,R0
007154  010001                                MOV     R0,R1
007156  062701  140000                        ADD     #TESTR1,R1
007162  010002                                MOV     R0,R2
007164  062702  142000                        ADD     #TESTR2,R2

007170  012737  000044  177746                MOV     #SIMO,@#CONTRL  ;MAKE THOSE TWO TEST LOCATIONS
007176  005710                                TST     (R0)            ;(R1) AND (R2) MISSES IN BOTH
                                                                        ;GROUPS BY MAKING (R0) A HIT
                                                                        ;IN BOTH GROUPS.

007200  005710                                TST     (R0)

                                                                        ;SEE IF REFERENCE ADDRESS
007202  032737  000010  177752                BIT     #10,@#HITMIS    ;IS A HIT.
007210  001006                                BNE     KF2
                                                                        ;IF NOT ERROR!
007212  010037  001236                        MOV     R0,$TMP2
007216  012737  000001  001234                MOV     #1,$TMP1
007224  104001                                ERROR   1

007226  012737  000030  177746  KF2:    MOV     #SOMI,@#CONTRL
007234  005710                                TST     (R0)

007236  005710                                TST     (R0)
```

```
1875
1876  007240  032737  000010  177752          BIT     #10,@#HITMIS    ;SEE IF REFERENCE ADDRESS
1877  007246  001006                          BNE     KF3             ;IS A HIT.
1878                                                                  ;IF NOT ERROR!
1879  007250  010037  001236                  MOV     R0,$TMP2
1880  007254  012737  000000  001234          MOV     #0,$TMP1
1881  007262  104001                          ERROR   1
1882
1883
1884
1885
1886  007264  005037  177746          KF3:    CLR     @#CONTR         ;NOW THAT THE ADDRESSES (R1)
1887                                                                  ;AND (R2) ARE MISSES, REFERENCING
1888                                                                  ;THEM BOTH EACH IN CONSECUTIVE
1889                                                                  ;REFERNCES SHOULD CAUSE THEM BOTH
1890                                                                  ;TO BE MADE HITS IF THE RANDOM
1891                                                                  ;FLIP FLOP TOGGLES INBETWEEN THE
1892                                                                  ;TWO CYCLES!
1893                                                                  ;NOTE THAT THESE TWO ADDRESSES
1894                                                                  ;(R1) AND (R2) ARE SUCH THAT
1895                                                                  ;IF THE RANDOM FLIP FLOP DIDN'T TOGGLE
1896                                                                  ;THE HITS AT THE ADDRESSES
1897                                                                  ;WOULD BE MUTUALLY EXCLUSIVE,
1898                                                                  ;THAT IS BOTH THESE ADDRESSES
1899                                                                  ;CAN'T BE HITS IN THE SAME GROUP!
1900
1901  007270  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
1902  007272  021112                          CMP     (R1),(R2)       ;HERE BOTH THE OPERAND FETCHES
1903                                                                  ;SHOULD BE MISSES.
1904  007274  021112                          CMP     (R1),(R2)       ;HERE BOTH THE OPERAND FETCHES
1905                                                                  ;SHOULD BE HITS!
1906  007276  013705  177752                  MOV     @#HITMIS,R5
1907  007302  005105                          COM     R5
1908  007304  032705  000014                  BIT     #14,R5          ;BOTH HITS ELSE ERROR.
1909  007310  001411                          BEQ     KF4
1910
1911  007312  010137  001236                  MOV     R1,$TMP2        ;REPORT THE ERROR.
1912  007316  005037  001240                  CLR     $TMP3
1913  007322  010237  001242                  MOV     R2,$TMP4
1914  007326  005037  001244                  CLR     $TMP5
1915
1916  007332  104121                  1$:     ERROR   121
1917  007334  000402                  KF4:    BR      KF5
1918
1919  007336  000000                  KFTMP1: .WORD   0               ;USED TO DETERMINE THE TEST
1920  007340  000000                  KFTMP2: .WORD   0               ;ADDRESSES.
1921
1922  007342                          KF5:                            ;DONE!
1923
1924                                  ;;**************************************************
1925                                  ;*TEST 14       CACHE MAINTENANCE REGISTER COUNT PATTERN TEST
1926                                  ;*
1927                                  ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE MAINTENANCE REGISTER'S
1928                                  ;*BITS 15 TO 4. THIS IS DONE TO INSURE THAT THESE BITS ARE SETABLE
1929                                  ;*AND THAT THE DATA PATH TO THE REGISTERS IS VIABLE. MISSES ARE FORCED
1930                                  ;*TO BOTH GROUPS SO THAT NO CACHE DATA OR ADDRESS MEMORY
```

```
                                        ;*ERRORS SHOULD OCCUR. ALSO ANY CYCLES DONE TO MAIN MEMORY
                                        ;*ARE INSURED, BY PROPER SELECTION OF INSTRUCTIONS, TO RETURN
                                        ;*DATA WITH THE PARITY BITS ON SO AS TO NOT CAUSE MAIN MEMORY PARITY
                                        ;*ERRORS BY SETTING THE MAIN MEMORY MAINTENANCE FUNCTION WHICH WOULD
                                        ;*EFFECTIVELY FORCE THE PARITY BITS READ FROM MAIN MEMORY TO A
                                        ;*ONE. SINCE THESE PARITY ARE ALREADY ONES, NO ERRORS SHOULD OCCUR.
                                        ;*
                                        ;;*****************************************************************
007342  000004                  TST14:  SCOPE
007344  012737  000020  001302          MOV     #20,$TIMES      ;;DO 20 ITERATIONS
        000014                  MA=$TN-1
                                                                ;SET THE SKAD REGISTER
007352  012737  007624  030646          MOV     #TST15,SKAD     ;IN CASE THE TEST ABORTS.

007360  113737  001102  001232          MOVB    $TSTNM,$TMPO

007366  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
007370  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
007372  012737  007526  000114          MOV     #MAERR,@#CACHVEC        ;IN CASE AN ERROR OCCURS WHILE
                                                                ;RUNNING A COUNT PATTERN
                                                                ;THROUGH THE MAINTENANCE
                                                                ;REGISTER SET UP THE PARITY ERROR
                                                                ;TRAP VECTOR; NOTE THAT NO ERRORS
                                                                ;SHOULD OCCUR IF THIS REGISTER
                                                                ;AND THE PARITY LOGIC IS FUNCTIONING
                                                                ;PROPERLY!
007400  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.

007406  012701  177750                  MOV     #MAINT,R1
007412  005004                          CLR     R4
007414  012737  007426  001110          MOV     #MA1,$LPERR
007422  012700  170000                  MOV     #170000,R0

007426  000240                  MA1:    NOP                     ;NOTE, THE CODE IN THIS ARE
007430  010411                          MOV     R4,(R1)         ;MA1 THROUGH MA2, ASSEMBLES TO
007432  011102                          MOV     (R1),R2         ;MACHINE CODE WHICH WILL
007434  005011                          CLR     (R1)            ;HAVE THE PARITY BITS ON, 1'S!
                                                                ;THE PATTERN IS LOADDED INTO THE
                                                                ;MAINETENANCE REGISTER, READ BACK
                                                                ;AND THE MAINTENANCE REGISTER
                                                                ;IS CLEARED.
007436  030011                          BIT     R0,(R1)         ;SEE IF ANY OF THE HIGH ORDER
                                                                ;FOUR BITS, 15 TO 12,
                                                                ;THE BITS WHICH CONTROL THE
                                                                ;MAIN MEMORY DATA PARITY MAINTENANCE
                                                                ;FUNCTION ARE STUCK ON.
007440  001402                          BEQ     .+6             ;IF SO, THEN ALL THAT CAN
007442  000000                          HALT                    ;BE DONE IS TO HALT!!!!!
                                                                ;FOR IF CONTROL IS PASSED TO
                                                                ;ANY OTHER PART OF THIS PROGRAM
                                                                ;THERE WOULD BE NO CONTROL
                                                                ;OVER WHAT KIND OF DATA WOULD
                                                                ;BE READ FROM MAIN MEMORY AND
                                                                ;MAIN MEMORY DATA PARITY ERRORS
                                                                ;WOULD BE LIKELY TO OCCUR.
007444  000240                  MA2:    NOP
```

```
1987
1988  007446  011105                        MOV     (R1),R5         ;SEE IF ANY OF THE LOW ORDER
1989  007450  001410                        BEQ     MA3             ;BITS, 11 THROUGH 0, ARE STUCK
1990                                                                 ;AT ONE.
1991                                                                 ;IF SO REPORT THE ERROR.
1992  007452  010437  001236                MOV     R4,$TMP2
1993  007456  010537  001240                MOV     R5,$TMP3
1994  007462  104122                1$:     ERROR   122
1995  007464  012737  177777  031066        MOV     #-1,MANFLG      ;??????????????GO ON???????????
1996
1997  007472  020402                MA3:    CMP     R4,R2           ;SEE IF THE PATTERN WRITTEN MATCHES
1998  007474  001410                        BEQ     MA4             ;THE PATTERN READ.
1999
2000                                                                 ;IF NOT REPORT THE ERROR.
2001  007476  010437  001236                MOV     R4,$TMP2
2002  007502  010237  001240                MOV     R2,$TMP3
2003  007506  104123                1$:     ERROR   123
2004  007510  012737  177777  031102        MOV     #-1,MANFL2
2005
2006  007516  062704  000020        MA4:    ADD     #20,R4          ;INCREMENT THE COUNT PATTERN.
2007  007522  001341                        BNE     MA1
2008  007524  000432                        BR      MADONE
2009
2010  007526                        MAERR:                          ;TRAP TO HERE IN THE EVENT
2011                                                                 ;THAT A PARITY ERROR OCCURS
2012                                                                 ;WHILE RUNNING THIS COUNT
2013                                                                 ;PATTERN TEST.
2014  007526  032737  000400  177744        BIT     #400,@#MEMERR   ;SEE IF THE ERROR WAS A MAINTENANCE
2015  007534  001005                        BNE     MAERR1          ;ERROR, CAUSED BY A MAINTENANCE
2016                                                                 ;FUNCTION. IF NOT GO TO THE
2017  007536  012737  030522  000114        MOV     #SPUR,@#CACHVEC ;SPUR ROUTINE WHICH HANDLES SUCH UNEXPECTED
2018  007544  000137  030522                JMP     SPUR            ;ERRORS.
2019
2020  007550  013737  177744  001242  MAERR1: MOV     @#MEMERR,$TMP4  ;IF THE ERROR WAS CAUSED BY A
2021  007556  013737  177740  001234        MOV     @#LOADRS,$TMP1  ;MAINT FUNCTION THEN REPORT THE
2022  007564  013737  177742  001236        MOV     @#HIADRS,$TMP2  ;FAILURE OF THAT REGISTER.
2023  007572  012637  001240                MOV     (SP)+,$TMP3
2024  007576  005726                        TST     (SP)+
2025  007600  104124                1$:     ERROR   124
2026  007602  012737  177777  031102        MOV     #-1,MANFL2
2027
2029  007610  000742                        BR      MA4             ;RETURN TO THE TEST.
2029
2030  007612  005037  177746  MADONE: CLR     @#CONTRL        ;DONE
2031  007616  012737  030522  000114        MOV     #SPUR,@#CACHVEC
2032
2033
2034
2035
2036                                ;;*****************************************************************
2037                                ;*TEST 15       CACHE MAINTENANCE AND ERROR REGISTERS TEST 1
2038                                ;*
2039                                ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY
2040                                ;*ERROR ON THE MAIN MEMORY ADDRESS AND CONTROL LINES, AND ALSO A TEST
2041                                ;*OF THE ERROR REGISTER'S ABILITY TO APPROPRIATELY SET TO 104402. THE
2042                                ;*REFERENCE CAUSING THIS ERROR WILL BE MADE FROM THE CPU DIRECTLY TO
```

```
2043                                    ;*THE CACHE.
2044                                    ;*
2045                                    ;;**********************************************************************
2046  007624  000004                    TST15:  SCOPE
2047  007626  012737  000040  001302            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2048          000015                    MAB=$TN-1
2049                                                                    ;SET THE SKAD REGISTER
2050  007634  012737  010122  030646            MOV     #TST16,SKAD     ;IN CASE THE TEST ABORTS.
2051
2052  007642  113737  001102  001232            MOVB    $TSTNM,$TMP0
2053
2054  007650  104415                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2055  007652  104416                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2056  007654  104417                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2057  007656  104420                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2058  007660  012737  007730  000114            MOV     #MABRR0,@#CACHVEC       ;SET UP FOR THE ERROR.
2059
2060  007666  012704  000002                    MOV     #2,R4           ;THIS IS THE PATTERN THAT WILL
2061  007672  012702  177750                    MOV     #MAINT,R2       ;BE PUT IN THE MAINTENANCE REG.
2062  007676  012737  000014  177746            MOV     #MDMI,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
2063
2064  007704  000240                            NOP                     ;FOR SCOPING.
2065  007706  010412                            MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
2066  007710  005012                            CLR     (R2)            ;THE REFERENCE WHICH FETCHES
2067                                                                    ;THIS INSTRUCTION SHOULD
2068                                                                    ;CAUSE THE ABORT!
2069
2070  007712                            MAB2:                           ;NO ABORT OCCURRED REPORT THE ERROR
2071  007712  010437  001236                    MOV     R4,$TMP2
2072  007716  104127                    1$:     ERROR   127
2073  007720  012737  177777  031102            MOV     #-1,MANFL2
2074  007726  000474                            BR      MABDON
2075
2076  007730  022737  104402  177744   MABRR0:  CMP     #104402,@#MEMERR        ;WHEN THE TRAP IS MADE TO THIS LOCATION
2077  007736  001036                            BNE     MABRR4          ;MAKE SURE THE ERROR REGISTER IS
2078                                                                    ;SET CORRECTLY. IF NOT GO TO MABRR4.
2079  007740  022626                    MABRR1:  CMP     (SP)+,(SP)+     ;OTHERWISE RESET THE STACK.
2080  007742  012737  177777  177744    MABR15:  MOV     #-1,@#MEMERR    ;ATTEMPT TO CLEAR THE ERROR REGISTER.
2081  007750  005737  177744                    TST     @#MEMERR
2082  007754  001416                            BEQ     MABRR3
2083
2084  007756                            MABRR2:                         ;REPORT ERROR REGISTER WON'T CLEAR!
2085  007756  013737  177740  001236            MOV     @#LOADRS,$TMP2
2086  007764  013737  177742  001240            MOV     @#HIADRS,$TMP3
2087  007772  013737  177744  001242            MOV     @#MEMERR,$TMP4
2088  010000  104130                    1$:     ERROR   130
2089  010002  012737  177777  031062            MOV     #-1,MMRFLG
2090  010010  000443                            BR      MABDON
2091
2092  010012  022737  177740  177740   MABRR3:  CMP     #177740,@#LOADRS        ;MAKE SURE THE ADDRESS
2093  010020  001356                            BNE     MABRR2          ;REGISTER RESET.
2094  010022  022737  000003  177742            CMP     #3,@#HIADRS
2095  010030  001352                            BNE     MABRR2
2096  010032  000432                            BR      MABDON
2097
2098  010034                            MABRR4:                         ;REPORT ERROR REGISTER NOT SET CORRECTLY!!
```

```
2099  010034  012637  001236          MOV     (SP)+,$TMP2
2100  010040  005726                  TST     (SP)+
2101  010042  013737  177740  001240  MOV     @#LOADRS,$TMP3
2102  010050  013737  177742  001242  MOV     @#HIADRS,$TMP4
2103  010056  012737  000002  001244  MOV     #2,$TMP5
2104  010064  012737  104402  001246  MOV     #104402,$TMP6
2105  010072  013737  177744  001250  MOV     @#MEMERR,$TMP7
2106  010100  104131          1$:     ERROR   131
2107  010102  012737  177777  031102  MOV     #-1,MANFL2
2108  010110  012737  177777  031076  MOV     #-1,MMRFL2
2109  010116  000711                  BR      MABR15          ;GO SEE IF THE ERROR REGISTER
2110                                                          ;CAN BE CLEARED.
2111  010120  104410          MABDON: RSET                    ;DONE!!
2112
2113
2114                          ;;*****************************************************************
2115                          ;*TEST 16       CACHE MAINTENANCE AND ERROR REGISTERS TEST 2
2116                          ;*
2117                          ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
2118                          ;*A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S LOW BYTE,
2119                          ;*WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
2120                          ;*
2121                          ;;*****************************************************************
2122  010122  000004          TST16:  SCOPE
2123  010124  012737  000040  001302  MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2124           000016          MB=$TN-1
2125                                                          ;SET THE SKAD REGISTER
2126  010132  012737  010440  030646  MOV     #TST17,SKAD     ;IN CASE THE TEST ABORTS.
2127
2128  010140  113737  001102  001232  MOVB    $TSTNM,$TMP0
2129
2130  010146  104415                  SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2131  010150  104416                  SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2132  010152  104417                  SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2133  010154  104420                  SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2134  010156  012737  010236  000114  MOV     #MBERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
2135  010164  012704  010000          MOV     #10000,R4       ;PATERN TO BE PUT INTO THE
2136  010170  012702  177750          MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
2137  010174  012737  000014  177746  MOV     #MDM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
2138  010202  000402                  BR      MB1
2139
2140           010204                 LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
2141           010204                 LOC=-4&LOC
2142           010210                 LOC=LOC+4
2143           010210                 .=LOC
2144
2145  010210  000240          MB1:    NOP
2146  010212  010412                  MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
2147  010214  005701          MB2:    TST     R1              ;THIS IS A DUMMY INSTRUCTION
2148                                                          ;WITH THE APPROPRIATE PARITY
2149                                                          ;WHOSE FETCH WILL CAUSE THE ERROR.
2150  010216  005012                  CLR     (R2)
2151
2152  010220                  MB3:                            ;REPORT ERROR.  MAINTENANCE
2153  010220  010437  001236          MOV     R4,$TMP2        ;FUNCTION FAILED TO
2154                                                          ;CAUSE ERROR.
```

```
2155  010224  104127                  1$:     ERROR   127
2156  010226  012737  177777  031102  MOV     #-1,MANFL2
2157  010234  000500                  BR      MBDONE
2158
2159  010236  022737  104404  177744  MBERR0: CMP     #104404,@#MEMERR        ;DID THE ERROR REGISTER
2160  010244  001042                  BNE     69$             ;SET PROPERLY?
2161
2162  010246  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
2163  010250  005037  177572          65$:    CLR     @#MMR0
2164  010254  005037  172516          CLR     @#MMR3
2165  010260  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
2166  010266  005737  177744          TST     @#MEMERR        ;REGISTER.
2167  010272  001416                  BEQ     68$
2168
2169  010274                          66$:                    ;ERROR REGISTER WON'T
2170  010274  013737  177740  001236  MOV     @#LOADRS,$TMP2  ;CLEAR
2171  010302  013737  177742  001240  MOV     @#HIADRS,$TMP3
2172  010310  013737  177744  001242  MOV     @#MEMERR,$TMP4
2173
2174  010316  104130                  67$:    ERROR   130
2175  010320  012737  177777  031062  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
2176  010326  000443                  BR      MBDONE
2177
2178  010330  022737  177740  177740  69$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2179  010336  001356                  BNE     66$             ;UNLOCKED.
2180  010340  022737  000003  177742  CMP     #3,@#HIADRS
2181  010346  001352                  BNE     66$
2182  010350  000432                  BR      MBDONE
2183
2184  010352                          69$:                    ;REPORT ERROR REGISTER
2185  010352  012637  001236          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
2186  010356  005726                  TST     (SP)+           ;RESET THE STACK.
2187  010360  013737  177740  001240  MOV     @#LOADRS,$TMP3
2188  010366  013737  177742  001242  MOV     @#HIADRS,$TMP4
2189  010374  012737  010000  001244  MOV     #10000,$TMP5
2190  010402  012737  104404  001246  MOV     #104404,$TMP6
2191  010410  013737  177744  001250  MOV     @#MEMERR,$TMP7
2192
2193  010416  104131                  70$:    ERROR   131
2194  010420  012737  177777  031102  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
2195  010426  012737  177777  031076  MOV     #-1,MMRFL2
2196  010434  000705                  BR      65$
2197  010436  104410                  MBDONE: RESET
2198
2199                                  ;;*****************************************************************
2200                                  ;*TEST 17        CACHE MAINTENANCE AND ERROR REGISTERS TEST 3
2201                                  ;*
2202                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
2203                                  ;*A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S HIGH BYTE,
2204                                  ;*WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
2205                                  ;*
2206                                  ;;*****************************************************************
2207  010440  000004                  TST17:  SCOPE
2208  010442  012737  000040  001302  MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
2209          000017                  MC=$TN-1
2210                                                          ;SET THE SKAD REGISTER
```

```
2211  010450  012737  010754  030646          MOV     #TST20,SKAD     ;IN CASE THE TEST ABORTS.
2212
2213  010456  113737  001102  001232          MOVB    $TSTNM,$TMP0
2214
2215  010464  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2216  010466  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2217  010470  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2218  010472  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2219  010474  012737  010552  000114          MOV     #MCERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
2220  010502  012704  020000                  MOV     #20000,R4       ;PATTERN TO BE USED IN THE
2221  010506  012702  177750                  MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
2222  010512  012737  000014  177746          MOV     #MDM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
2223  010520  000401                          BR      MC1
2224
2225          010522                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
2226          010520                          LOC=-4&LOC
2227          010524                          LOC=LOC+4
2228          010524                          .=LOC
2229
2230  010524  000240                  MC1:    NOP
2231  010526  010412                          MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
2232  010530  005701                  MC2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
2233                                                                  ;SHOULD CAUSE THE ABORT.
2234  010532  005012                          CLR     (R2)
2235
2236  010534                          MC3:                            ;REPORT ERROR.  MAINTENANCE
2237  010534  010437  001236                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
2238                                                                  ;CAUSE ERROR.
2239  010540  104127                  1$:     ERROR   127
2240  010542  012737  177777  031102  MOV     #-1,MANFL2
2241  010550  000500                          BR      MCDONE
2242
2243  010552  022737  104404  177744  MCERR0: CMP     #104404,@#MEMERR        ;DID THE ERROR REGISTER
2244  010560  001042                          BNE     69$             ;SET PROPERLY?
2245
2246  010562  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
2247  010564  005037  177572          65$:    CLR     @#MMR0
2248  010570  005037  172516                  CLR     @#MMR3
2249  010574  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
2250  010602  005737  177744                  TST     @#MEMERR        ;REGISTER.
2251  010606  001416                          BEQ     68$
2252
2253  010610                          66$:                            ;ERROR REGISTER WON'T
2254  010610  013737  177740  001236          MOV     @#LOADRS,$TMP2  ;CLEAR
2255  010616  013737  177742  001240          MOV     @#HIADRS,$TMP3
2256  010624  013737  177744  001242          MOV     @#MEMERR,$TMP4
2257
2258  010632  104130                  67$:    ERROR   130
2259  010634  012737  177777  031062          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
2260  010642  000443                          BR      MCDONE
2261
2262  010644  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2263  010652  001356                          BNE     66$             ;UNLOCKED.
2264  010654  022737  000003  177742          CMP     #3,@#HIADRS
2265  010662  001352                          BNE     65$
2266  010664  000432                          BR      MCDONE
```

```
2267
2268  010666                                  69$:                                    ;REPORT ERROR REGISTER
2269  010666  012637  001236                          MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
2270  010672  005726                                  TST     (SP)+                   ;RESET THE STACK.
2271  010674  013737  177740  001240                  MOV     @#LOADRS,$TMP3
2272  010702  013737  177742  001242                  MOV     @#HIADRS,$TMP4
2273  010710  012737  020000  001244                  MOV     #20000,$TMP5
2274  010716  012737  104404  001246                  MOV     #104404,$TMP6
2275  010724  013737  177744  001250                  MOV     @#MEMERR,$TMP7
2276
2277  010732  104131                          70$:    ERROR   131
2278  010734  012737  177777  031102                  MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
2279  010742  012737  177777  031076                  MOV     #-1,MMRFL2
2280  010750  000705                                  BR      65$
2281  010752  104410                          MCDONE: RSET
2282
2283                                          ;;**************************************************************
2284                                          ;*TEST 20        CACHE MAINTENANCE AND ERROR REGISTERS TEST 4
2285                                          ;*
2286                                          ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
2287                                          ;*A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S LOW BYTE,
2288                                          ;*WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
2289                                          ;*
2290                                          ;;**************************************************************
2291  010754  000004                          TST20:  SCOPE
2292  010756  012737  000040  001302                  MOV     #40,$TIMES              ;;DO 40 ITERATIONS
2293          000020                          MD=$TN-1
2294                                                                                  ;SET THE SKAD REGISTER
2295  010764  012737  011274  030646                  MOV     #TST21,SKAD             ;IN CASE THE TEST ABORTS.
2296
2297  010772  113737  001102  001232                  MOVB    $TSTNM,$TMP0
2298
2299  011000  104415                                  SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2300  011002  104416                                  SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2301  011004  104417                                  SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2302  011006  104420                                  SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2303  011010  012737  011072  000114                  MOV     #MDERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
2304  011016  012704  040000                          MOV     #40000,R4               ;PATTERN TO BE PUT IN THE
2305  011022  012702  177750                          MOV     #MAINT,R2               ;MAINTENANCE REGISTER.
2306  011026  012737  000014  177746                  MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
2307  011034  000402                                  BR      MD1
2308
2309          011036                                  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
2310          011034                                  LOC=-4&LOC
2311          011040                                  LOC=LOC+4
2312          011040                                  .=LOC
2313
2314  011040  000240                                  NOP
2315  011042  000240                          MD1:    NOP
2316  011044  010412                                  MOV     R4,(R2)                 ;SET THE MAINTENANCE REGISTER.
2317  011046  005701                          MD2:    TST     R1                      ;THE FETCH OF THIS INSTRUCTION
2318                                                                                  ;SHOULD CAUSE THE MAIN MEMORY
2319                                                                                  ;DATA PARITY ABORT.
2320  011050  005012                                  CLR     (R2)
2321  011052  000240                                  NOP
2322
```

```
2323  011054                          MD3:                                    ;REPORT ERROR.  MAINTENANCE
2324  011054  010437  001236                  MOV     R4,$TMP2                ;FUNCTION FAILED TO
2325                                                                            ;CAUSE ERROR.
2326  011060  104127                  1$:     ERROR   127
2327  011062  012737  177777  031102  MOV     #-1,MANFL2
2328  011070  000500                          BR      MDDONE
2329
2330  011072  022737  104410  177744  MDERRO: CMP     #104410,@#MEMERR        ;DID THE ERROR REGISTER
2331  011100  001042                          BNE     69$                     ;SET PROPERLY?
2332
2333  011102  022626                  64$:    CMP     (SP)+,(SP)+             ;RESET THE STACK
2334  011104  005037  177572          65$:    CLR     @#MMR0
2335  011110  005037  172516                  CLR     @#MMR3
2336  011114  012737  177777  177744          MOV     #-1,@#MEMERR            ;TRY TO CLEAR THE ERROR
2337  011122  005737  177744                  TST     @#MEMERR                ;REGISTER.
2338  011126  001416                          BEQ     68$
2339
2340  011130                          66$:                                    ;ERROR REGISTER WON'T
2341  011130  013737  177740  001236          MOV     @#LOADRS,$TMP2          ;CLEAR
2342  011136  013737  177742  001240          MOV     @#HIADRS,$TMP3
2343  011144  013737  177744  001242          MOV     @#MEMERR,$TMP4
2344
2345  011152  104130                  67$:    ERROR   130
2346  011154  012737  177777  031062          MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
2347  011162  000443                          BR      MDDONE
2348
2349  011164  022737  177740  177740  68$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
2350  011172  001356                          BNE     66$                     ;UNLOCKED.
2351  011174  022737  000003  177742          CMP     #3,@#HIADRS
2352  011202  001352                          BNE     66$
2353  011204  000432                          BR      MDDONE
2354
2355  011206                          69$:                                    ;REPORT ERROR REGISTER
2356  011206  012637  001236                  MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
2357  011212  005726                          TST     (SP)+                   ;RESET THE STACK.
2358  011214  013737  177740  001240          MOV     @#LOADRS,$TMP3
2359  011222  013737  177742  001242          MOV     @#HIADRS,$TMP4
2360  011230  012737  040000  001244          MOV     #40000,$TMP5
2361  011236  012737  104410  001246          MOV     #104410,$TMP6
2362  011244  013737  177744  001250          MOV     @#MEMERR,$TMP7
2363
2364  011252  104131                  70$:    ERROR   131
2365  011254  012737  177777  031102          MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
2366  011262  012737  177777  031076          MOV     #-1,MMRFL2
2367  011270  000705                          BR      65$
2368  011272  104410                  MDDONE: RSET
2369
2370                                          ;;*****************************************************************
2371                                          ;*TEST 21        CACHE MAINTENANCE AND ERROR REGISTERS TEST 5
2372                                          ;*
2373                                          ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
2374                                          ;*A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S HIGH BYTE,
2375                                          ;*WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
2376                                          ;*
2377                                          ;;*****************************************************************
2378  011274  000004                  TST21:  SCOPE
```

```
 2379  011276  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 2380          000021                  ME=$TN-1
 2381                                                  ;SET THE SKAD REGISTER
 2382  011304  012737  011614  030646          MOV     #TST22,SKAD     ;IN CASE THE TEST ABORTS.
 2383
 2384  011312  113737  001102  001232          MOVB    $TSTNM,$TMP0
 2385
 2386  011320  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 2387  011322  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 2388  011324  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 2389  011326  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 2390  011330  012737  011412  000114          MOV     #MEERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
 2391  011336  012704  100000                  MOV     #100000,R4      ;PATTERN TO BE PUT IN THE
 2392  011342  012702  177750                  MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
 2393  011346  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
 2394  011354  000402                          BR      ME1
 2395
 2396          011356                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
 2397          011354                          LOC=-4&LOC
 2398          011360                          LOC=LOC+4
 2399          011360                          .=LOC
 2400
 2401  011360  000240                          NOP
 2402  011362  000240                  ME1:    NOP
 2403  011364  010412                          MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
 2404  011366  005701                  ME2:    TST     R1              ;THE FETCH OF THIS INSTRUSTION
 2405                                                  ;SHOULD CAUSE THE ABORT.
 2406  011370  005012                          CLR     (R2)
 2407  011372  000240                          NOP
 2408
 2409  011374                          ME3:                            ;REPORT ERROR.  MAINTENANCE
 2410  011374  010437  001236                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
 2411                                                  ;CAUSE ERROR.
 2412  011400  104127                  1$:     ERROR   127
 2413  011402  012737  177777  031102  MOV     #-1,MANFL2
 2414  011410  000500                          BR      MEDONE
 2415
 2416  011412  022737  104410  177744  MEERRO: CMP     #104410,@#MEMERR        ;DID THE ERROR REGISTER
 2417  011420  001042                          BNE     69$             ;SET PROPERLY?
 2418
 2419  011422  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
 2420  011424  005037  177572          65$:    CLR     @#MMR0
 2421  011430  005037  172516                  CLR     @#MMR3
 2422  011434  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
 2423  011442  005737  177744                  TST     @#MEMERR        ;REGISTER.
 2424  011446  001416                          BEQ     68$
 2425
 2426  011450                          66$:                            ;ERROR REGISTER WON'T
 2427  011450  013737  177740  001236          MOV     @#LOADRS,$TMP2  ;CLEAR
 2428  011456  013737  177742  001240          MOV     @#HIADRS,$TMP3
 2429  011464  013737  177744  001242          MOV     @#MEMERR,$TMP4
 2430
 2431  011472  104130                  67$:    ERROR   130
 2432  011474  012737  177777  031062          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 2433  011502  000443                          BR      MEDONE
 2434
```

```
2435  011504  022737  177740  177740  69$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2436  011512  001356                          BNE     66$              ;UNLOCKED.
2437  011514  022737  000003  177742          CMP     #3,@#HIADRS
2438  011522  001352                          BNE     66$
2439  011524  000432                          BR      MEDONE
2440
2441  011526                          69$:                             ;REPORT ERROR REGISTER
2442  011526  012637  001236                  MOV     (SP)+,$TMP2      ;NOT SET AS EXPECTED.
2443  011532  005726                          TST     (SP)+            ;RESET THE STACK.
2444  011534  013737  177740  001240          MOV     @#LOADRS,$TMP3
2445  011542  013737  177742  001242          MOV     @#HIADRS,$TMP4
2446  011550  012737  100000  001244          MOV     #100000,$TMP5
2447  011556  012737  104410  001246          MOV     #104410,$TMP6
2448  011564  013737  177744  001250          MOV     @#MEMERR,$TMP7
2449
2450  011572  104131                  70$:    ERROR   131
2451  011574  012737  177777  031102          MOV     #-1,MANFL2       ;SIGNAL BAD REGISTER
2452  011602  012737  177777  031076          MOV     #-1,MMRFL2
2453  011610  000705                          BR      65$
2454  011612  104410                  MEDONE: RSET
2455
2456                                  ;;*****************************************************************
2457                                  ;*TEST 22        CACHE MAINTENANCE AND ERROR REGISTERS TEST 6
2458                                  ;*
2459                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
2460                                  ;*A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S LOW BYTE,
2461                                  ;*WHEN THAT WORD IS THE UNWANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
2462                                  ;*
2463                                  ;;*****************************************************************
2464  011614  000004                  TST22:  SCOPE
2465  011616  012737  000040  001302          MOV     #40,$TIMES       ;;DO 40 ITERATIONS
2466           000022                 MF=$TN-1
2467                                                                   ;SET THE SKAD REGISTER
2468  011624  012737  012130  030546          MOV     #TST23,SKAD      ;IN CASE THE TEST ABORTS.
2469
2470  011632  113737  001102  001232          MOVB    $TSTNM,$TMP0
2471  011640  012737  011726  000114          MOV     #MFERR0,@#CACHVEC        ;SET UP FOR THE ERROR.
2472  011646  012704  010000                  MOV     #10000,R4        ;PATTERN TO BE LOADED INTO THE
2473  011652  012702  177750                  MOV     #MAINT,R2        ;MAINTENANCE REGISTER.
2474  011656  012737  000014  177746          MOV     #MOM1,@#CONTRL   ;FORCE MISSES TO BOTH GROUPS.
2475  011664  012705  011706                  MOV     #MF2,R5          ;A REFERENCE TO THIS ADDRESS
2476                                                                   ;WILL CAUSE A PARITY TRAP BECAUSE
2477                                                                   ;THE OTHER WORD IN THE PAIR
2478                                                                   ;WILL HAVE THE APPROPRIATE
2479                                                                   ;PARITY TO CAUSE THE MAINTENANCE
2480                                                                   ;FUNCTION WHICH WILL BE SET
2481                                                                   ;TO FORCE THE ERROR.
2482  011670  000401                          BR      MF1
2483
2484           011672                         LOC=.                    ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
2485           011670                         LOC=-4&LOC
2486           011674                         LOC=LOC+4
2487           011674                         .=LOC
2488
2489  011674  000240                  MF1:    NOP
2490  011676  010412                          MOV     R4,(P2)          ;SET THE MAINTENANCE REGISTER.
```

```
2491  011700  021503                    CMP     (R5),R2         ;THIS REFERENCE TO (R5) WILL CAUSE A
2492  011702  005012                    CLR     (R2)            ;PARITY TRAP SINCE THE OTHER IN THAT
2493                                                            ;PAIR WILL CAUSE A PARITY ERROR.
2494  011704  005701                    TST     R1              ;THIS WORD WILL CAUSE THE ERROR
2495  011706  000240            MF2:    NOP                     ;WHEN THIS WORD IS REFERENCED.
2496
2497  011710                    MF3:                            ;REPORT ERROR.  MAINTENANCE
2498  011710  010437  001336            MOV     R4,$TMP2        ;FUNCTION FAILED TO
2499                                                            ;CAUSE ERROR.
2500  011714  104127            1$:     ERROR   127
2501  011716  012737  177777  031102    MOV     #-1,MANFL2
2502  011724  000500                    BR      MFDONE
2503
2504  011726  022737  004404  177744  MFERR0: CMP     #4404,@#MEMERR  ;DID THE ERROR REGISTER
2505  011734  001042                    BNE     69$             ;SET PROPERLY?
2506
2507  011736  022626                    CMP     (SP)+,(SP)+     ;RESET THE STACK
2508  011740  005037  177572            CLR     @#MMR0
2509  011744  005037  172516            CLR     @#MMR3
2510  011750  012737  177777  177744    MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
2511  011756  005737  177744            TST     @#MEMERR        ;REGISTER.
2512  011762  001416                    BEQ     68$
2513
2514  011764                    66$:                            ;ERROR REGISTER WON'T
2515  011764  013737  177740  001236    MOV     @#LOADRS,$TMP2  ;CLEAR
2516  011772  013737  177742  001240    MOV     @#HIADRS,$TMP3
2517  012000  013737  177744  001242    MOV     @#MEMERR,$TMP4
2518
2519  012006  104130            67$:    ERROR   130
2520  012010  012737  177777  031062    MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
2521  012016  000443                    BR      MFDONE
2522
2523  012020  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2524  012026  001356                    BNE     66$             ;UNLOCKED.
2525  012030  022737  000003  177742    CMP     #3,@#HIADRS
2526  012036  001352                    BNE     66$
2527  012040  000432                    BR      MFDONE
2528
2529  012042                    69$:                            ;REPORT ERROR REGISTER
2530  012042  012637  001236            MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
2531  012046  005726                    TST     (SP)+           ;RESET THE STACK.
2532  012050  013737  177740  001240    MOV     @#LOADRS,$TMP3
2533  012056  013737  177742  001242    MOV     @#HIADRS,$TMP4
2534  012064  012737  010000  001244    MOV     #10000,$TMP5
2535  012072  012737  004404  001246    MOV     #4404,$TMP6
2536  012100  013737  177744  001250    MOV     @#MEMERR,$TMP7
2537
2538  012106  104131            70$:    ERROR   131
2539  012110  012737  177777  031102    MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
2540  012116  012737  177777  031076    MOV     #-1,MMRFL2
2541  012124  000705                    BR      65$
2542  012126  104410            MFDONE: RSET
2543
2544                                    ;;*****************************************************************
2545                                    ;*TEST 23       CACHE MAINTENANCE AND ERROR REGISTERS TEST 7
2546                                    ;*
```

```
                                        ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
                                        ;*A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S LOW BYTE,
                                        ;*WHEN THAT WORD IS THE UNWANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
                                        ;*
                                        ;;*************************************************************
012130  000004                TST23:  SCOPE
012132  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000023          MG=$TN-1
                                                                ;SET THE SKAD REGISTER
012140  012737  012450  030646          MOV     #TST24,SKAD     ;IN CASE THE TEST ABORTS.

012146  113737  001102  001232          MOVB    $TSTNM,$TMP0

012154  104415                         SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
012156  104416                         SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
012160  104417                         SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
012162  104420                         SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
012164  012704  040000                MOV     #40000,R4       ;THIS PATTERN WILL BE PUT IN THE
012170  012704  177750                MOV     #MAINT,R4       ;MAINTENANCE REGISTER.
012174  012737  012246  000114        MOV     #MGERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
012202  012737  000014  177746        MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
012210  000401                      BR      MG1

        012212                  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        012210                  LOC=-4&LOC
        012214                  LOC=LOC+4
        012214                  .=LOC

012214  000240          MG1:    NOP
012216  010412                  MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
012220  000240                  NOP                     ;THE REFERENCE TO THIS NOP
012222  005701          MG2:    TST     R1              ;SHOULD CAUSE A PARITY ERROR TO OCCUR AT
                                                        ;MG2, RESULTING IN A TRAP!
012224  005012                  CLR     (R2)
012226  000240                  NOP

012230                  MG3:                            ;REPORT ERROR.  MAINTENANCE
012230  010437  001236                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                        ;CAUSE ERROR.
012234  104127          1$:     ERROR   127
012236  012737  177777  031102  MOV     #-1,MANFL2
012244  000500                  BR      MGDONE

012246  022737  004410  177744  MGERR0: CMP     #4410,@#MEMERR  ;DID THE ERROR REGISTER
012254  001042                  BNE     69$             ;SET PROPERLY?

012256  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
012260  005037  177572          65$:    CLR     @#MMR0
012264  005037  172516                  CLR     @#MMR3
012270  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
012276  005737  177744                  TST     @#MEMERR        ;REGISTER.
012302  001416                      BEQ     68$

012304                  66$:                            ;ERROR REGISTER WON'T
012304  013737  177740  001236          MOV     @#LOADRS,$TMP2  ;CLEAR
012312  013737  177742  001240          MOV     @#HIADRS,$TMP3
```

```
2603  012320  013737  177744  001242          MOV     @#MEMERR,$TMP4
2604
2605  012326  104130                  67$:    ERROR   130
2606  012330  012737  177777  031C62          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
2607  012336  000443                          BR      MGDONE
2608
2609  012340  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2610  012346  001356                          BNE     66$             ;UNLOCKED.
2611  012350  022737  000003  177742          CMP     #3,@#HIADRS
2612  012356  001352                          BNE     66$
2613  012360  000432                          BR      MGDONE
2614
2615  012362                          69$:                            ;REPORT ERROR REGISTER
2616  012362  012637  001236                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
2617  012366  005726                          TST     (SP)+           ;RESET THE STACK.
2618  012370  013737  177740  001240          MOV     @#LOADRS,$TMP3
2619  012376  013737  177742  001242          MOV     @#HIADRS,$TMP4
2620  012404  012737  040000  001244          MOV     #40000,$TMP5
2621  012412  012737  004410  001246          MOV     #4410,$TMP6
2622  012420  013737  177744  001250          MOV     @#MEMERR,$TMP7
2623
2624  012426  104131                  70$:    ERROR   131
2625  012430  012737  177777  031102          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
2626  012436  012737  177777  031076          MOV     #-1,MMRFL2
2627  012444  000705                          BR      65$
2628  012446  104410              MGDONE:     RSET
2629
2630
2631                                  ;;*****************************************************************
2632                                  ;*TEST 24       CACHE MAINTENANCE AND ERROR REGISTERS TEST 10
2633                                  ;*
2634                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
2635                                  ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ZERO, FOR THE
2636                                  ;*LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
2637                                  ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
2638                                  ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CP
2639                                  ;*TO THE CACHE.
2640                                  ;*
2641                                  ;;*****************************************************************
2642  012450  000004          TST24:  SCOPE
2643  012452  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2644          000024          MH=$TN-1
2645                                                                  ;SET THE SKAD REGISTER
2646  012460  012737  013014  030646          MOV     #TST25,SKAD     ;IN CASE THE TEST ABORTS.
2647
2648  012466  113737  001102  001232          MOVB    $TSTNM,$TMP0
2649
2650  012474  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2651  012476  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2652  012500  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2653  012502  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2654  012504  012737  012612  000114          MOV     #MHERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
2655  012512  012704  000400                  MOV     #400,R4 ;PATTERN TO BE PUT IN MAINT. REG.
2656  012516  012702  177750                  MOV     #MAINT,R2
2657  012522  012737  000030  177746          MOV     #SOM1,@#CONTRL  ;FORCE SELECT GROUP 0 AND
2658                                                                  ;FORCE MISS THE OTHER
```

```
2659
2660  012530  012705  012572                MOV     #MH1,R5         ;GROUP
2661  012534  005715                        TST     (R5)            ;MAKE MH1 A HIT IN
2662  012536  005715                        TST     (R5)            ;GROUP GP.
2663
2664                                                                  ;SEE IF REFERENCE ADDRESS
2665  012540  032737  000010  177752        BIT     #10,@#HITMIS    ;IS A HIT.
2666  012546  001007                        BNE     1$
2667                                                                  ;IF NOT ERROR!
2668  012550  010537  001236                MOV     R5,$TMP2
2669  012554  012737  000000  001234        MOV     #0,$TMP1
2670  012562  104001                        ERROR   1
2671
2672  012564  104411                        SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
2673
2674  012566  000240            1$:         NOP                     ;PUT THE PATTERN IN THE
2675  012570  010412                        MOV     R4,(R2)         ;MAINTENANCE REGISTER.
2676  012572  005012            MH1:        CLR     (R2)            ;THE FETCH OF THIS NEXT
2677                                                                  ;INSTRUCTION SHOULD CAUSE
2678                                                                  ;A PARITY ERROR IN THE
2679                                                                  ;CACHE ADDRESS MEMORY GROUP GP.
2680
2681
2682  012574                    MH2:                                ;REPORT ERROR.  MAINTENANCE
2683  012574  010437  001236                MOV     R4,$TMP2        ;FUNCTION FAILED TO
2684                                                                  ;CAUSE ERROR.
2685  012600  104127            1$:         ERROR   127
2686  012602  012737  177777  031102  MOV   #-1,MANFL2
2687  012610  000500                        BR      MHDONE
2688
2689  012612  022737  004420  177744  MHERRO: CMP   #4420,@#MEMERR  ;DID THE ERROR REGISTER
2690  012620  001042                        BNE     69$             ;SET PROPERLY?
2691
2692  012622  022626                64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
2693  012624  005037  177572        65$:    CLR     @#MMR0
2694  012630  005037  172516                CLR     @#MMR3
2695  012634  012737  177777  177744        MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
2696  012642  005737  177744                TST     @#MEMERR        ;REGISTER.
2697  012646  001416                        BEQ     68$
2698
2699  012650                    66$:                                ;ERROR REGISTER WON'T
2700  012650  013737  177740  001236        MOV     @#LOADRS,$TMP2  ;CLEAR
2701  012656  013737  177742  001240        MOV     @#HIADRS,$TMP3
2702  012664  013737  177744  001242        MOV     @#MEMERR,$TMP4
2703
2704  012672  104130            67$:        ERROR   130
2705  012674  012737  177777  031062        MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
2706  012702  000443                        BR      MHDONE
2707
2708  012704  022737  177740  177740  68$:    CMP   #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
2709  012712  001356                        BNE     66$             ;UNLOCKED.
2710  012714  022737  000003  177742        CMP     #3,@#HIADRS
2711  012722  001352                        BNE     66$
2712  012724  000432                        BR      MHDONE
2713
2714  012726                    69$:                                ;REPORT ERROR REGISTER
```

GC5


```
012726  012637  001236                  MOV     (SP)+,$TMP2       ;NOT SET AS EXPECTED.
012732  005726                          TST     (SP)+             ;RESET THE STACK.
012734  013737  177740  001240          MOV     @#LOADRS,$TMP3
012742  013737  177742  001242          MOV     @#HIADRS,$TMP4
012750  012737  000400  001244          MOV     #400,$TMP5
012756  012737  004420  001246          MOV     #4420,$TMP6
012764  013737  177744  001250          MOV     @#MEMERR,$TMP7

012772  104131                  70$:    ERROR   131
012774  012737  177777  001102          MOV     #-1,MANFL2        ;SIGNAL BAD REGISTER
013002  012737  177777  001076          MOV     #-1,MMRFL2
013010  000705                          BR      65$
013012  104410                  MHDONE: RSET


                                ;;*************************************************************
                                ;*TEST 25        CACHE MAINTENANCE AND ERROR REGISTERS TEST 11
                                ;*
                                ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
                                ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ZERO, FOR THE
                                ;*HIGH BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
                                ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
                                ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
                                ;*TO THE CACHE.
                                ;*
                                ;;*************************************************************
013014  000004                  TST25:  SCOPE
013016  012737  000040  001302          MOV     #40,$TIMES        ;;DO 40 ITERATIONS
        000025                  MI=$TN-1
                                                                  ;SET THE SKAD REGISTER
013024  012737  013360  020646          MOV     #TST26,SKAD       ;IN CASE THE TEST ABORTS.

013032  113737  001102  001232          MOVB    $TSTNM,$TMP0

013040  104415                          SKPBER            ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
013042  104416                          SKPBCN            ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
013044  104417                          SKPBMN            ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
013046  104420                          SKPBHM            ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
013050  012737  013156  000114          MOV     #MIERR0,@#CACHVEC     ;SET UP FOR THE ERROR.
013056  012704  001000                  MOV     #1000,R4          ;PATTERN TO BE PUT IN MAINT. REG.
013062  012702  177750                  MOV     #MAINT,R2
013066  012737  000030  177746          MOV     #S0M1,@#CONTRL    ;FORCE SELECT GROUP 0 AND
                                                                  ;FORCE MISS THE OTHER
                                                                  ;GROUP
013074  012705  013136                  MOV     #MI1,R5           ;MAKE MI1 A HIT IN
013100  005715                          TST     (R5)              ;GROUP GP.
013102  005715                          TST     (R5)

                                                                  ;SEE IF REFERENCE ADDRESS
013104  032737  000010  177752          BIT     #10,@#HITMIS      ;IS A HIT.
013112  001007                          BNE     1$
                                                                  ;IF NOT ERROR!
013114  010537  001236                  MOV     R5,$TMP2
013120  012737  000000  001234          MOV     #0,$TMP1
013126  104001                          ERROR   1
```

```
013130  104411                            SKIPT                         ;ERROR FATAL. GO TO NEXT TEST.

013132  000240                    1$:     NOP                           ;PUT THE PATTERN IN THE
013134  012412                            MOV     R4, R2                ;MAINTENANCE REGISTER.
013136  005012                    MI1:    CLR     R2                    ;THE FETCH OF THIS NEXT
                                                                        ;INSTRUCTION SHOULD CAUSE
                                                                        ;A PARITY ERROR IN THE
                                                                        ;CACHE ADDRESS MEMORY GROUP 0P.


013140                            MI2:                                  ;REPORT ERROR.  MAINTENANCE
013140  010437  001236                    MOV     R4,$TMP2              ;FUNCTION FAILED TO
                                                                        ;CAUSE ERROR.
013144  104127                    1$:     ERROR   127
013146  012737  177777  031102    MOV     #-1,MANFL2
013154  000500                            BR      MIDONE

013156  022737  004420  177744    MIERRO: CMP     #4420,@#MEMERR        ;DID THE ERROR REGISTER
013164  001042                            BNE     69$                   ;SET PROPERLY?

013166  022626                    64$:    CMP     (SP)+,(SP)+           ;RESET THE STACK
013170  005037  177572            65$:    CLR     @#MMR0
013174  005037  172516                    CLR     @#MMR3
013200  012737  177777  177744            MOV     #-1,@#MEMERR          ;TRY TO CLEAR THE ERROR
013206  005737  177744                    TST     @#MEMERR              ;REGISTER.
013212  001416                            BEQ     68$

013214                            66$:                                  ;ERROR REGISTER WON'T
013214  013737  177740  001236            MOV     @#LOADRS,$TMP2        ;CLEAR
013222  013737  177742  001240            MOV     @#HIADRS,$TMP3
013230  013737  177744  001242            MOV     @#MEMERR,$TMP4

013236  104130                    67$:    ERROR   130
013240  012737  177777  031062            MOV     #-1,MMRFLG            ;SIGNAL BAD REGISTER
013246  000443                            BR      MIDONE

013250  022737  177740  177740    68$:    CMP     #177740,@#LOADRS      ;SEE IF ADDRESS REGISTER
013256  001356                            BNE     66$                   ;UNLOCKED.
013260  022737  000003  177742            CMP     #3,@#HIADRS
013266  001352                            BNE     66$
013270  000432                            BR      MIDONE

013272                            69$:                                  ;REPORT ERROR REGISTER
013272  012637  001236                    MOV     (SP)+,$TMP2           ;NOT SET AS EXPECTED.
013276  005726                            TST     (SP)+                 ;RESET THE STACK.
013300  013737  177740  001240            MOV     @#LOADRS,$TMP3
013306  013737  177742  001242            MOV     @#HIADRS,$TMP4
013314  012737  001000  001244            MOV     #1000,$TMP5
013322  012737  004420  001246            MOV     #4420,$TMP6
013330  013737  177744  001250            MOV     @#MEMERR,$TMP7

013336  104131                    70$:    ERROR   131
013340  012737  177777  031102            MOV     #-1,MANFL2            ;SIGNAL BAD REGISTER
013346  012737  177777  031076            MOV     #-1,MMRFL2
013354  000705                            BR      65$
013356  104410                    MIDONE: RSET
```

```
                                        ;;**********************************************************************
                                        ;*TEST 26       CACHE MAINTENANCE AND ERROR REGISTERS TEST 12
                                        ;*
                                        ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
                                        ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ONE, FOR THE
                                        ;*LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
                                        ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
                                        ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
                                        ;*TO THE CACHE.
                                        ;*
                                        ;;**********************************************************************
013360  000024                  TST26:  SCOPE
013362  012737  000040  001302          MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
        000026          MJ=$TN-1
                                                                ;SET THE SKAD REGISTER
013370  012737  013724  030646          MOV     #TST27,SKAD     ;IN CASE THE TEST ABORTS.

013376  113737  001102  001232          MOVB    $TSTNM,$TMP0

013404  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
013406  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
013410  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
013412  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
013414  012737  013522  000114          MOV     #MJERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
013422  012704  002000                  MOV     #2000,R4        ;PATTERN TO BE PUT IN MAINT. REG.
013426  012702  177750                  MOV     #MAINT,R2
013432  012737  000044  177746          MOV     #SIMO,@#CONTRL  ;FORCE SELECT GROUP 1 AND
                                                                ;FORCE MISS THE OTHER
                                                                ;GROUP
013440  012705  013502                  MOV     #MJ1,R5         ;MAKE MJ1 A HIT IN
013444  005715                          TST     (R5)            ;GROUP GP.
013446  005715                          TST     (R5)

                                                                ;SEE IF REFERENCE ADDRESS
013450  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
013456  001007                          BNE     1$

                                                                ;IF NOT ERROR!
013460  010537  001236                  MOV     R5,$TMP2
013464  012737  000001  001234          MOV     #1,$TMP1
013472  104001                          ERROR   1

013474  104411                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

013476  000240                  1$:     NOP                     ;PUT THE PATTERN IN THE
013500  010412                          MOV     R4,(R2)         ;MAINTENANCE REGISTER.
013502  005012                  MJ1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                                ;INSTRUCTION SHOULD CAUSE
                                                                ;A PARITY ERROR IN THE
                                                                ;CACHE ADDRESS MEMORY GROUP GP.

013504                          MJ2:                            ;REPORT ERROR.  MAINTENANCE
013504  010437  001236                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
```

```
013510  104127                          1$:     ERROR   127
013512  012737  177777  031102          MOV     #-1,MANFL2
013520  000500                                  BR      MJDONE

013522  022737  004440  177744  MJERRO: CMP     #4440,@#MEMERR  ;DID THE ERROR REGISTER
013530  001042                                  BNE     69$             ;SET PROPERLY?

013532  022626                          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
013534  005037  177572                  65$:    CLR     @#MMR0
013540  005037  172516                          CLR     @#MMR3
013544  012737  177777  177744                  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
013552  005737  177744                          TST     @#MEMERR        ;REGISTER.
013556  001416                                  BEQ     68$

013560                                  66$:                            ;ERROR REGISTER WON'T
013560  013737  177740  001236                  MOV     @#LOADRS,$TMP2  ;CLEAR
013566  013737  177742  001240                  MOV     @#HIADRS,$TMP3
013574  013737  177744  001242                  MOV     @#MEMERR,$TMP4

013602  104130                          67$:    ERROR   130
013604  012737  177777  031062                  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
013612  000443                                  BR      MJDONE

013614  022737  177740  177740          68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
013622  001356                                  BNE     66$             ;UNLOCKED.
013624  022737  000003  177742                  CMP     #3,@#HIADRS
013632  001352                                  BNE     66$
013634  000432                                  BR      MJDONE

013636                                  69$:                            ;REPORT ERROR REGISTER
013636  012637  001236                          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
013642  005726                                  TST     (SP)+           ;RESET THE STACK.
013644  013737  177740  001240                  MOV     @#LOADRS,$TMP3
013652  013737  177742  001242                  MOV     @#HIADRS,$TMP4
013660  012737  002000  001244                  MOV     #2000,$TMP5
013666  012737  004440  001246                  MOV     #4440,$TMP6
013674  013737  177744  001250                  MOV     @#MEMERR,$TMP7

013702  104131                          70$:    ERROR   131
013704  012737  177777  031102                  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
013712  012737  177777  031076                  MOV     #-1,MMRFL2
013720  000705                                  BR      65$
013722  104410                          MJDONE: RSET


                                        ;;*****************************************************************
                                        ;*TEST 27        CACHE MAINTENANCE AND ERROR REGISTERS TEST 13
                                        ;*
                                        ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
                                        ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ONE, FOR THE
                                        ;*HIGH BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
                                        ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
                                        ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
                                        ;*TO THE CACHE.
                                        ;*
                                        ;;*****************************************************************
```

```
2939  013724  000004                    TST27:  SCOPE
2940  013726  012737  000040  001302            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2941          000027                    Mk=$TN-1
2942                                                                    ;SET THE SKAD REGISTER
2943  013734  012737  014270  030646            MOV     #TST30,SKAD     ;IN CASE THE TEST ABORTS.
2944
2945  013742  113737  001102  001232            MOVB    $TSTNM,$TMP0
2946
2947  013750  104415                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
2948  013752  104416                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2949  013754  104417                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2950  013756  104420                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2951  013760  012737  014066  000114            MOV     #MKERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
2952  013766  012704  004000                    MOV     #4000,R4        ;PATTERN TO BE PUT IN MAINT. REG.
2953  013772  012702  177750                    MOV     #MAINT,R2
2954  013776  012737  000044  177746            MOV     #S1MD,@#CONTRL  ;FORCE SELECT GROUP 1 AND
2955                                                                    ;FORCE MISS THE OTHER
2956                                                                    ;GROUP
2957  014004  012705  014046                    MOV     #MK1,R5         ;MAKE MK1 A HIT IN
2958  014010  005715                            TST     (R5)            ;GROUP GP.
2959  014012  005715                            TST     (R5)
2960
2961                                                                    ;SEE IF REFERENCE ADDRESS
2962  014014  032737  000010  177752            BIT     #10,@#HITMIS    ;IS A HIT.
2963  014022  001007                            BNE     1$
2964                                                                    ;IF NOT ERROR!
2965  014024  010537  001236                    MOV     R5,$TMP2
2966  014030  012737  000001  001234            MOV     #1,$TMP1
2967  014036  104001                            ERROR   1
2968
2969  014040  104411                            SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
2970
2971  014042  000240                    1$:     NOP                     ;PUT THE PATTERN IN THE
2972  014044  010412                            MOV     R4,(R2)         ;MAINTENANCE REGISTER.
2973  014046  005012                    MK1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
2974                                                                    ;INSTRUCTION SHOULD CAUSE
2975                                                                    ;A PARITY ERROR IN THE
2976                                                                    ;CACHE ADDRESS MEMORY GROUP GP.
2977
2978
2979  014050                    MK2:                                    ;REPORT ERROR.  MAINTENANCE
2980  014050  010437  001236            MOV     R4,$TMP2                ;FUNCTION FAILED TO
2981                                                                    ;CAUSE ERROR.
2982  014054  104127                    1$:     ERROR   127
2983  014056  012737  177777  031102    MO'     #-1,MANFL2
2984  014064  000500                            BR      MKDONE
2985
2986  014066  022737  004440  177744    MKERR0: CMP     #4440,@#MEMERR  ;DID THE ERROR REGISTER
2987  014074  001042                            BNE     69$             ;SET PROPERLY?
2988
2989  014076  022626                    64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
2990  014100  005037  177572            65$:    CLR     @#MMR0
2991  014104  005037  172516                    CLR     @#MMR3
2992  014110  012737  177777  177744            MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
2993  014116  005737  177744                    TST     @#MEMERR        ;REGISTER.
2994  014122  001416                            BEQ     68$
```

```
2995
2996  014124                                  66$:                                    ;ERROR REGISTER WON'T
2997  014124  013737  177740  001236                MOV     @#LOADRS,$TMP2          ;CLEAR
2998  014132  013737  177742  001240                MOV     @#HIADRS,$TMP3
2999  014140  013737  177744  001242                MOV     @#MEMERR,$TMP4
3000
3001  014146  104130                          67$:  ERROR   130
3002  014150  012737  177777  031062                MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
3003  014156  000443                                BR      MKDONE
3004
3005  014160  022737  177740  177740          68$:  CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
3006  014166  001356                                BNE     66$                     ;UNLOCKED.
3007  014170  022737  000003  177742                CMP     #3,@#HIADRS
3008  014176  001352                                BNE     66$
3009  014200  000432                                BR      MKDONE
3010
3011  014202                                  69$:                                    ;REPORT ERROR REGISTER
3012  014202  012637  001236                      MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
3013  014206  005726                                TST     (SP)+                   ;RESET THE STACK.
3014  014210  013737  177740  001240                MOV     @#LOADRS,$TMP3
3015  014216  013737  177742  001242                MOV     @#HIADRS,$TMP4
3016  014224  012737  004000  001244                MOV     #4000,$TMP5
3017  014232  012737  004440  001246                MOV     #4440,$TMP6
3018  014240  013737  177744  001250                MOV     @#MEMERR,$TMP7
3019
3020  014246  104131                          70$:  ERROR   131
3021  014250  012737  177777  031102                MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
3022  014256  012737  177777  031076                MOV     #-1,MMRFL2
3023  014264  000705                                BR      65$
3024  014266  104410                      MKDONE:   RSET
3025
3026
3027                                            ;;*****************************************************************
3028                                            ;*TEST 30       CACHE MAINTENANCE AND ERROR REGISTERS TEST 14
3029                                            ;*
3030                                            ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
3031                                            ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ZERO, FOR THE
3032                                            ;*LOW BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
3033                                            ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
3034                                            ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
3035                                            ;*TO THE CACHE.
3036                                            ;*
3037                                            ;;*****************************************************************
3038  014270  000004                      TST30:  SCOPE
3039  014272  012737  000040  001302                MOV     #40,$TIMES              ;;DO 40 ITERATIONS
3040          000030                      ML=$TN-1
3041                                                                                ;SET THE SKAD REGISTER
3042  014300  012737  014534  030646                MOV     #TST31,SKAD             ;IN CASE THE TEST ABORTS.
3043
3044  014306  113737  001102  001232                MOVB    $TSTNM,$TMP0
3045
3046  014314  104415                                SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
3047  014316  104416                                SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3048  014320  104417                                SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
3049  014322  104420                                SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3050  014324  012737  014432  000114                MOV     #MLERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
```

```
3051  014332  012704  000020                    MOV     #20,R4  ;PATTERN TO BE PUT IN MAINT. REG.
3052  014336  012702  177750                    MOV     #MAINT,R2
3053  014342  012737  000030  177746            MOV     #SDMI.@#CONTRL  ;FORCE SELECT GROUP 0 AND
3054                                                                    ;FORCE MISS THE OTHER
3055                                                                    ;GROUP
3056  014350  012705  014412                    MOV     #ML1,R5         ;MAKE ML1 A HIT IN
3057  014354  005715                            TST     (R5)            ;GROUP GP.
3058  014356  005715                            TST     (R5)
3059
3060                                                                    ;SEE IF REFERENCE ADDRESS
3061  014360  032737  000010  177752            BIT     #10,@#HITMIS    ;IS A HIT.
3062  014366  001007                            BNE     1$
3063                                                                    ;IF NOT ERROR!
3064  014370  010537  001236                    MOV     R5,$TMP2
3065  014374  012737  000000  001234            MOV     #0,$TMP1
3066  014402  104001                            ERROR   1
3067
3068  014404  104411                            SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
3069
3070  014406  000240                  1$:       NOP                     ;PUT THE PATTERN IN THE
3071  014410  010412                            MOV     R4,(R2)         ;MAINTENANCE REGISTER.
3072  014412  005012                  ML1:      CLR     (R2)            ;THE FETCH OF THIS NEXT
3073                                                                    ;INSTRUCTION SHOULD CAUSE
3074                                                                    ;A PARITY ERROR IN THE
3075                                                                    ;CACHE DATA MEMORY GROUP GP.
3076
3077
3078  014414                  ML2:                                      ;REPORT ERROR.  MAINTENANCE
3079  014414  010437  001236                    MOV     R4,$TMP2        ;FUNCTION FAILED TO
3080                                                                    ;CAUSE ERROR.
3081  014420  104127                  1$:       ERROR   127
3082  014422  012737  177777  031102  MOV       #-1,MANFL2
3083  014430  000500                            BR      MLDONE
3084
3085  014432  022737  004500  177744  MLERRO:   CMP     #4500,@#MEMERR  ;DID THE ERROR REGISTER
3086  014440  001042                            BNE     69$             ;SET PROPERLY?
3087
3088  014442  022626                  64$:      CMP     (SP)+,(SP)+     ;RESET THE STACK
3089  014444  005037  177572          65$:      CLR     @#MMR0
3090  014450  005037  172516                    CLR     @#MMR3
3091  014454  012737  177777  177744            MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3092  014462  005737  177744                    TST     @#MEMERR        ;REGISTER.
3093  014466  001416                            BEQ     68$
3094
3095  014470                  66$:                                      ;ERROR REGISTER WON'T
3096  014470  013737  177740  001236            MOV     @#LOADRS,$TMP2  ;CLEAR
3097  014476  013737  177742  001240            MOV     @#HIADRS,$TMP3
3098  014504  013737  177744  001242            MOV     @#MEMERR,$TMP4
3099
3100  014512  104130                  67$:      ERROR   130
3101  014514  012737  177777  031062            MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
3102  014522  000443                            BR      MLDONE
3103
3104  014524  022737  177740  177740  69$:      CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
3105  014532  001356                            BNE     66$             ;UNLOCKED.
3106  014534  022737  000003  177742            CMP     #3,@#HIADRS
```

```
3107  014542  001352                          BNE     66$
3108  014544  000432                          BR      MLDONE
3109
3110  014546                          69$:                                    ;REPORT ERROR REGISTER
3111  014546  012637  001236                  MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
3112  014552  005726                          TST     (SP)+                   ;RESET THE STACK.
3113  014554  013737  177740  001240          MOV     @#LOADRS,$TMP3
3114  014562  013737  177742  001242          MOV     @#HIADRS,$TMP4
3115  014570  012737  000020  001244          MOV     #20,$TMP5
3116  014576  012737  004500  001246          MOV     #4500,$TMP6
3117  014604  013737  177744  001250          MOV     @#MEMERR,$TMP7
3118
3119  014612  104131                  70$:    ERROR   131
3120  014614  012737  177777  031102          MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
3121  014622  012737  177777  031076          MOV     #-1,MMRFL2
3122  014630  000705                          BR      65$
3123  014632  104410                  MLDONE: RSET
3124
3125
3126                                  ;;*****************************************************************
3127                                  ;*TEST 31        CACHE MAINTENANCE AND ERROR REGISTERS TEST 15
3128                                  ;*
3129                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
3130                                  ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ZERO, FOR THE
3131                                  ;*HIGH BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
3132                                  ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
3133                                  ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
3134                                  ;*TO THE CACHE.
3135                                  ;*
3136                                  ;;*****************************************************************
3137  014634  000004                  TST31:  SCOPE
3138  014636  012737  000040  001302          MOV     #40,$TIMES              ;;DO 40 ITERATIONS
3139          000031                  MN=$TN-1
3140                                                                          ;SET THE SKAD REGISTER
3141  014644  012737  015200  030646          MOV     #TST32,SKAD             ;IN CASE THE TEST ABORTS.
3142
3143  014652  113737  001102  001232          MOVB    $TSTNM,$TMP0
3144
3145  014660  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
3146  014662  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3147  014664  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
3148  014666  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3149  014670  012737  014776  000114          MOV     #NMERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
3150  014676  012704  000040                  MOV     #40,R4  ;PATTERN TO BE PUT IN MAINT. REG.
3151  014702  012702  177750                  MOV     #MAINT,R2
3152  014706  012737  000030  177746          MOV     #SOM1,@#CONTRL  ;FORCE SELECT GROUP 0 AND
3153                                                                  ;FORCE MISS THE OTHER
3154                                                                  ;GROUP
3155  014714  012705  014756                  MOV     #NM1,R5                 ;MAKE NM1 A HIT IN
3156  014720  005715                          TST     (R5)                    ;GROUP GP.
3157  014722  005715                          TST     (R5)
3158
3159                                                                          ;SEE IF REFERENCE ADDRESS
3160  014724  032737  000010  177752          BIT     #10,@#HITMIS            ;IS A HIT.
3161  014732  001007                          BNE     1$
3162                                                                          ;IF NOT ERROR!
```

```
014734  012537  001236          MOV     R5,$TMP2
014740  012737  000000  001234  MOV     #0,$TMP1
014746  104001                  ERROR   1

014750  104411                  SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

014752  000240          13:     NOP                     ;PUT THE PATTERN IN THE
014754  010412                  MOV     R4,(R2)         ;MAINTENANCE REGISTER.
014756  005012          NM1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                        ;INSTRUCTION SHOULD CAUSE
                                                        ;A PARITY ERROR IN THE
                                                        ;CACHE DATA MEMORY GROUP GP.

014760                  NM2:                            ;REPORT ERROR.  MAINTENANCE
014760  010437  001236          MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                        ;CAUSE ERROR.
014764  104127          15:     ERROR   127
014766  012737  177777  031102  MOV     #-1,MANFL2
014774  000500                  BR      NMDONE

014776  022737  004500  177744  NMERR0: CMP     #4500,@#MEMERR  ;DID THE ERROR REGISTER
015004  001042                  BNE     69$             ;SET PROPERLY?

015006  022626          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
015010  005037  177572  65$:    CLR     @#MMR0
015014  005037  172516          CLR     @#MMR3
015020  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
015026  005737  177744          TST     @#MEMERR        ;REGISTER.
015032  001416                  BEQ     68$

015034          66$:                                    ;ERROR REGISTER WON'T
015034  013737  177740  001236  MOV     @#LOADRS,$TMP2  ;CLEAR
015042  013737  177742  001240  MOV     @#HIADRS,$TMP3
015050  013737  177744  001242  MOV     @#MEMERR,$TMP4

015056  104130          67$:    ERROR   130
015060  012737  177777  031062  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
015066  000443                  BR      NMDONE

015070  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
015076  001356                  BNE     66$             ;UNLOCKED.
015100  022737  000003  177742  CMP     #3,@#HIADRS
015106  001352                  BNE     66$
015110  000432                  BR      NMDONE

015112          69$:                                    ;REPORT ERROR REGISTER
015112  012637  001236          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
015116  005726                  TST     (SP)+           ;RESET THE STACK.
015120  013737  177740  001240  MOV     @#LOADRS,$TMP3
015126  013737  177742  001242  MOV     @#HIADRS,$TMP4
015134  012737  000040  001244  MOV     #40,$TMP5
015142  012737  004500  001246  MOV     #4500,$TMP6
015150  013737  177744  001250  MOV     @#MEMERR,$TMP7

015156  104131          70$:    ERROR   131
```

```
3219  015160  012737  [illegible]  031102          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
3220  015166  012737  [illegible]  031104          MOV     #-1,MMRFL2
3221  015174  000705                               BR      65$
3222  015176  104413                     NMCONE:   RSET
3223
3224
3225                                     ;;*****************************************************************
3226                                     ;*TEST 32       CACHE MAINTENANCE AND ERROR REGISTERS TEST 16
3227                                     ;*
3228                                     ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
3229                                     ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE
3230                                     ;*LOW BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
3231                                     ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
3232                                     ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
3233                                     ;*TO THE CACHE.
3234                                     ;*
3235                                     ;;*****************************************************************
3236  015200  000004                     TST32:  SCOPE
3237  015202  012737  000040  001302             MOV     #40.,STIMES     ;.DO 40 ITERATIONS
3238           000032                     MO=STN-1
3239                                                                     ;SET THE SKAD REGISTER
3240  015210  012737  015544  030646             MOV     #TST33,SKAD     ;IN CASE THE TEST ABORTS.
3241
3242  015216  113737  001102  001232             MOVB    STSTNM,STMP0
3243
3244  015224  104415                             SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
3245  015226  104416                             SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3246  015230  104417                             SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
3247  015232  104420                             SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3248  015234  012737  015342  000114             MOV     #MOERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
3249  015242  012704  000100                     MOV     #100,R4 ;PATTERN TO BE PUT IN MAINT. REG.
3250  015246  012702  177750                     MOV     #MAINT,R2
3251  015252  012737  000044  177746             MOV     #S1MO,@#CONTRL  ;FORCE SELECT GROUP 1 AND
3252                                                                     ;FORCE MISS THE OTHER
3253                                                                     ;GROUP
3254  015260  012705  015322                     MOV     #MO1,R5         ;MAKE MO1 A HIT IN
3255  015264  005715                             TST     (R5)            ;GROUP GP.
3256  015266  005715                             TST     (R5)
3257
3258                                                                     ;SEE IF REFERENCE ADDRESS
3259  015270  032737  000010  177752             BIT     #10,@#HITMIS    ;IS A HIT.
3260  015276  001007                             BNE     1$
3261                                                                     ;IF NOT ERROR!
3262  015300  010537  001236                     MOV     R5,STMP2
3263  015304  012737  000001  001234             MOV     #1,STMP1
3264  015312  104001                             ERROR   1
3265
3266  015314  104411                             SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
3267
3268  015316  000240                     1$:     NOP                     ;PUT THE PATTERN IN THE
3269  015320  010412                             MOV     R4,(R2)         ;MAINTENANCE REGISTER.
3270  015322  005012                     MO1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
3271                                                                     ;INSTRUCTION SHOULD CAUSE
3272                                                                     ;A PARITY ERROR IN THE
3273                                                                     ;CACHE DATA MEMORY GROUP GP.
3274
```

```
3275
3276  015324                          M02:                                ;REPORT ERROR.  MAINTENANCE
3277  015324  010437  001236                MOV     R4,$TMP2            ;FUNCTION FAILED TO
3278                                                                      ;CAUSE ERROR.
3279  015330  104127                  1$:     ERROR   127
3280  015332  012737  177777  031102  MOV     #-1,MANFL2
3281  015340  000500                          BR      MODONE
3282
3283  015342  022737  004600  177744  MOERR0: CMP     #4600,@#MEMERR      ;DID THE ERROR REGISTER
3284  015350  001042                          BNE     69$                 ;SET PROPERLY?
3285
3286  015352  022626                  64$:    CMP     (SP)+,(SP)+         ;RESET THE STACK
3287  015354  005037  177572          65$:    CLR     @#MMR0
3288  015360  005037  172516                  CLR     @#MMR3
3289  015364  012737  177777  177744          MOV     #-1,@#MEMERR        ;TRY TO CLEAR THE ERROR
3290  015372  005737  177744                  TST     @#MEMERR            ;REGISTER.
3291  015376  001416                          BEQ     68$
3292
3293  015400                          66$:                                ;ERROR REGISTER WON'T
3294  015400  013737  177740  001236          MOV     @#LOADRS,$TMP2      ;CLEAR
3295  015406  013737  177742  001240          MOV     @#HIADRS,$TMP3
3296  015414  013737  177744  001242          MOV     @#MEMERR,$TMP4
3297
3298  015422  104130                  67$:    ERROR   130
3299  015424  012737  177777  031062          MOV     #-1,MMRFLG          ;SIGNAL BAD REGISTER
3300  015432  000443                          BR      MODONE
3301
3302  015434  022737  177740  177740  68$:    CMP     #177740,@#LOADRS    ;SEE IF ADDRESS REGISTER
3303  015442  001356                          BNE     66$                 ;UNLOCKED.
3304  015444  022737  000003  177742          CMP     #3,@#HIADRS
3305  015452  001352                          BNE     66$
3306  015454  000432                          BR      MODONE
3307
3308  015456                          69$:                                ;REPORT ERROR REGISTER
3309  015456  012637  001236                  MOV     (SP)+,$TMP2         ;NOT SET AS EXPECTED.
3310  015462  005726                          TST     (SP)+               ;RESET THE STACK.
3311  015464  013737  177740  001240          MOV     @#LOADRS,$TMP3
3312  015472  013737  177742  001242          MOV     @#HIADRS,$TMP4
3313  015500  012737  000100  001244          MOV     #100,$TMP5
3314  015506  012737  004600  001246          MOV     #4600,$TMP6
3315  015514  013737  177744  001250          MOV     @#MEMERR,$TMP7
3316
3317  015522  104131                  70$:    ERROR   131
3318  015524  012737  177777  031102          MOV     #-1,MANFL2          ;SIGNAL BAD REGISTER
3319  015532  012737  177777  031076          MOV     #-1,MMRFL2
3320  015540  000705                          BR      65$
3321  015542  104410                  MODONE: RSET
3322
3323
3324                                  ;;*****************************************************************
3325                                  ;*TEST 33       CACHE MAINTENANCE AND ERROR REGISTERS TEST 17
3326                                  ;*
3327                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
3328                                  ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE
3329                                  ;*HIGH BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
3330                                  ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
```

```
                                        ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
                                        ;*TO THE CACHE.
                                        ;*
                                        ;;**********************************************************************
015544  000004                        $T33:   SCOPE
015546  012737  000040  001302                MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
        000033                  MP=$TN-1
                                                                        ;SET THE SKAD REGISTER
015554  012737  016110  030646                MOV     #$T34,@SKAD     ;IN CASE THE TEST ABORTS.

015562  113737  001102  001232                MOVB    $TSTNM,$TMP0

015570  104415                               SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
015572  104416                               SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
015574  104417                               SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
015576  104420                               SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
015600  012737  015706  000114                MOV     #MPERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
015606  012704  000200                        MOV     #200,R4 ;PATTERN TO BE PUT IN MAINT. REG.
015612  012702  177750                        MOV     #MAINT,R2
015616  012737  000044  177746                MOV     #S1MO,@#CONTRL  ;FORCE SELECT GROUP 1 AND
                                                                        ;FORCE MISS THE OTHER
                                                                        ;GROUP
015624  012705  015666                        MOV     #MP1,R5         ;MAKE MP1 A HIT IN
015630  005715                               TST     (R5)            ;GROUP GP.
015632  005715                               TST     (R5)

                                                                        ;SEE IF REFERENCE ADDRESS
015634  032737  000010  177752                BIT     #10,@#HITMIS    ;IS A HIT.
015642  001007                               BNE     1$
                                                                        ;IF NOT ERROR!
015644  010537  001236                        MOV     R5,$TMP2
015650  012737  000001  001234                MOV     #1,$TMP1
015656  104001                               ERROR   1

015660  104411                               SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

015662  000240                       1$:     NOP                     ;PUT THE PATTERN IN THE
015664  010412                               MOV     R4,(R2)         ;MAINTENANCE REGISTER.
015666  005012                       MP1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                                        ;INSTRUCTION SHOULD CAUSE
                                                                        ;A PARITY ERROR IN THE
                                                                        ;CACHE DATA MEMORY GROUP GP.

015670                               MP2:                            ;REPORT ERROR.  MAINTENANCE
015670  010437  001236                        MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                        ;CAUSE ERROR.
015674  104127                       1$:     ERROR   127
015676  012737  177777  031102  MOV     #-1,MANFL2
015704  000500                               BR      MPDONE

015706  022737  004600  177744  MPERRO: CMP     #4600,@#MEMERR  ;DID THE ERROR REGISTER
015714  001042                               BNE     69$             ;SET PROPERLY?

015716  022626                       64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
015720  005037  177572                65$:    CLR     @#MMR0
```

```
3387  015724  005037  172516          CLR     @#MMR3
3388  015730  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3389  015736  005737  177744          TST     @#MEMERR        ;REGISTER.
3390  015742  001416                  BEQ     68$
3391
3392  015744                  66$:                            ;ERROR REGISTER WON'T
3393  015744  013737  177740  001236  MOV     @#LOADRS,$TMP2  ;CLEAR
3394  015752  013737  177742  001240  MOV     @#HIADRS,$TMP3
3395  015760  013737  177744  001242  MOV     @#MEMERR,$TMP4
3396
3397  015766  104130          67$:    ERROR   130
3398  015770  012737  177777  031062  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
3399  015776  000443                  BR      MPDONE
3400
3401  016000  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
3402  016006  001356                  BNE     66$             ;UNLOCKED.
3403  016010  022737  000003  177742  CMP     #3,@#HIADRS
3404  016016  001352                  BNE     66$
3405  016020  000432                  BR      MPDONE
3406
3407  016022                  69$:                            ;REPORT ERROR REGISTER
3408  016022  012637  001236  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
3409  016026  005726          TST     (SP)+           ;RESET THE STACK.
3410  016030  013737  177740  001240  MOV     @#LOADRS,$TMP3
3411  016036  013737  177742  001242  MOV     @#HIADRS,$TMP4
3412  016044  012737  000200  001244  MOV     #200,$TMP5
3413  016052  012737  004600  001246  MOV     #4600,$TMP6
3414  016060  013737  177744  001250  MOV     @#MEMERR,$TMP7
3415
3416  016066  104131          70$:    ERROR   131
3417  016070  012737  177777  031102  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
3418  016076  012737  177777  031076  MOV     #-1,MMRFL2
3419  016104  000705                  BR      65$
3420  016106  104412          MPDONE: RSET
3421
3422
3423
3424
3425
3426                          ;;**********************************************************
3427                          ;*TEST 34       CACHE MAINTENANCE AND ERROR REGISTERS TEST 20
3428                          ;*
3429                          ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
3430                          ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
3431                          ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
3432                          ;*THE MAINTENANCE REGISTER IS USED TO MAKE THAT REFERENCE CAUSE A
3433                          ;*MAIN MEMORY ADDRESS AND CONTROL LINES PARITY ERROR ON THE
3434                          ;*MAIN MEMORY BUS.
3435                          ;*
3436                          ;;**********************************************************
3437  016110  000004          TST34:  SCOPE
3438  016112  012737  000040  001302  MOV     #40,$TIMES      ;;DO 40 ITERATIONS
3439          000034          MR=$TN-1
3440                                                          ;SET THE SKAD REGISTER
3441  016120  012737  016540  030646  MOV     #TST35,SKAD     ;IN CASE THE TEST ABORTS.
3442
```

```
016126  113737  001102  001232          MOVB    $TSTNM,$TMPO

016134  104415                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
016136  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
016140  104417                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
016142  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
016144  104412                          MMSKIP
016146  012737  016330  000114          MOV     #MRERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
016154  012737  030474  000004          MOV     #CPSPLR,@#ERRVEC        ;NOTE THAT WHEN THIS ERROR
                                                                        ;ON THE MAIN MEMORY ADDRESS
                                                                        ;AND CONTROL LINES OCCURS
                                                                        ;A TIME OUT WILL RESULT ON THE
                                                                        ;UNIBUS!! THIS WILL CAUSE A
                                                                        ;TRAP TO VECTOR ERRVEC BEFORE
                                                                        ;THE TRAP TO CACHVEC OCCURS! BOTH
                                                                        ;WILL OCCUR!
016162  012746  177777                  MOV     #-1,-(SP)               ;PUT A MARKER ON THE STACK

016166  012700  172340                  MOV     #KIPARO,R0      ;SET UP MEMORY MANAGEMENT
                                                                ;TO RELOCATE EVERYTHING
016172  012702  172300                  MOV     #KIPDRO,R2      ;THROUGH THE UNIBUS
016176  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
016202  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
016204  012705  170200                  MOV     #MAPLOO,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
016210  012722  077406          64$:    MOV     #77406,(R2)+
016214  010401                          MOV     R4,R1
016216  072127  000006                  ASH     #6,R1
016222  010125                          MOV     R1,(R5)+
016224  005025                          CLR     (R5)+
016226  010410                          MOV     R4,(R0)
016230  062720  170000                  ADD     #170000,(R0)+
016234  062704  000200                  ADD     #200,R4
016240  077315                          SOB     R3,64$
016242  012710  177600                  MOV     #177600,(R0)
016246  012712  077406                  MOV     #77406,(R2)

016252  012737  000060  172516          MOV     #60,@#MMR3              ;TURN ON THE MAPPING BOX AND
016260  012737  000001  177572          MOV     #1,@#MMR0               ;ENABLE 22 BIT MODE ADDRESSING.

016266  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
016274  012702  177750                  MOV     #MAINT,R2
016300  000240                          NOP                             ;FOR SCOPING WITH AN OSCILLOSCOPE!
016302  012712  000002                  MOV     #2,(R2)                 ;SET UP THE FORCE ERROR BIT IN
                                                                        ;THE MAINTENANCE REGISTER.
016306  005012                          CLR     (R2)                    ;THE FETCH OF THIS INSTRUCTION
                                                                        ;SHOULD RESULT IN A PARITY ERROR
                                                                        ;ON THE MAIN MEMORY ADDRESS AND CONTROL
                                                                        ;LINES. BECAUSE THIS REFERENCE
                                                                        ;IS BEING MADE OVER THE UNIBUS
                                                                        ;A UNIBUS TIME OUT WILL OCCUR
                                                                        ;RESULTING IN AN ABORT TO VECTOR
                                                                        ;ERRVEC. THEN IMMEDIATELY FOLLOWING
                                                                        ;THIS ABORT TO ERRVEC, THE
                                                                        ;PARITY ERROR WILL CAUSE A TRAP
                                                                        ;TO CACHVEC!!!
```

```
3499
3500  016310                          MR1:                                    ;REPORT FAILURE OF THE MAINTENANCE
3501  016310  012737  000002  001236        MOV     #2,$TMP2                ;TO FORCE THE ERROR.
3502  016316  104127                  1$:     ERROR   127
3503  016320  012737  177777  031102        MOV     #-1,MANFL2
3504  016326  000503                        BR      MRDONE
3505
3506  016330  022766  177777  000010  MRERRO: CMP     #-1,10.(SP)             ;DID 2 TRAPS OCCUR? SEE WHERE
3507                                                                          ;THE MARKER IS ON THE STACK!
3508  016336  001401                        BEQ     MR2
3509  016340  104000                        ERROR
3510
3511  016342  022737  002402  177744  MR2:    CMP     #2402,@#MEMERR          ;DID THE ERROR REGISTER GET
3512  016350  001430                        BEQ     MR3                     ;SET CORRECTLY.
3513
3514                                                                          ;IF NOT REPORT THE ERROR.
3515  016352  022626                        CMP     (SP)+,(SP)+
3516  016354  012637  001236                MOV     (SP)+,$TMP2
3517  016360  022626                        CMP     (SP)+,(SP)+
3518  016362  013737  177740  001240        MOV     @#LOADRS,$TMP3
3519  016370  013737  177742  001242        MOV     @#HIADRS,$TMP4
3520  016376  012737  000002  001244        MOV     #2,$TMP5
3521  016404  012737  002402  001246        MOV     #2402,$TMP6
3522  016412  013737  177744  001250        MOV     @#MEMERR,$TMP7
3523  016420  104131                  1$:     ERROR   131
3524  016422  012737  177777  031102        MOV     #-1,MANFL2
3525  016430  000402                        BR      MR4
3526
3527  016432  062706  000012          MR3:    ADD     #12,SP                  ;RESET THE STACK.
3528
3529  016436  005037  177572          MR4:    CLR     @#MMR0
3530  016442  005037  172516                  CLR     @#MMR3
3531  016446  012737  177777  177744        MOV     #-1,@#MEMERR            ;TRY TO CLR THE ERROR REG.
3532  016454  005737  177744                TST     @#MEMERR
3533  016460  001416                        BEQ     MR6
3534
3535  016462                          MR5:                                    ;THE ERROR REGISTER WON'T CLR.
3536  016462  013737  177740  001236        MOV     @#LOADRS,$TMP2
3537  016470  013737  177742  001240        MOV     @#HIADRS,$TMP3
3538  016476  013737  177744  001242        MOV     @#MEMERR,$TMP4
3539  016504  104130                  1$:     ERROR   130
3540  016506  012737  177777  031062        MOV     #-1,MMRFLG
3541  016514  000410                        BR      MRDONE
3542
3543  016516  022737  177740  177740  MR6:    CMP     #177740,@#LOADRS        ;SEE IF THE ADDRESS REGISTER
3544  016524  001356                        BNE     MR5                     ;GOT RESET.
3545  016526  022737  000003  177742        CMP     #3,@#HIADRS
3546  016534  001352                        BNE     MR5
3547
3548  016536  104410          MRDONE: RSET
3549
3550                                  ;;*****************************************************************
3551                                  ;*TEST 35       CACHE MAINTENANCE AND ERROR REGISTERS TEST 21
3552                                  ;*
3553                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
3554                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
```

```
                                        ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
                                        ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A MAIN MEMORY DATA
                                        ;*PARITY ERROR ON THAT REFERENCE WHICH IS TO AN EVEN WORD IN THE
                                        ;*PAIR, WHICH IS ALSO THE WANTED WORD.
                                        ;*
                                        ;;*************************************************************
016540  000004                    TST35:  SCOPE
016542  012737  000040  001302            MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
                000036          MS=$TN-1
                                                                    ;SET THE SKAD REGISTER
016550  012737  017160  030646            MOV     #TST36,SKAD     ;IN CASE THE TEST ABORTS.

016556  113737  001102  001232            MOVB    $TSTNM,$TMP0

016564  104415                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
016566  104416                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
016570  104417                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
016572  104420                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
016574  104412                            MMSKIP
016576  012737  016756  000114            MOV     #MSERR0,@#CACHVEC       ;SET UP FOR THE ERROR

016604  012700  172340                    MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                    ;TO RELOCATE EVERYTHING
016610  012702  172300                    MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
016614  012703  000007                    MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
016620  005004                            CLR     R4              ;BY PASSIVELY IS MEANT
016622  012705  170200                    MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
                                                                    ;RELOCATED TO THEMSELVES.
016626  012722  077406          64$:      MOV     #77406,(R2)+
016632  010401                            MOV     R4,R1
016634  072127  000006                    ASH     #6,R1
016640  010125                            MOV     R1,(R5)+
016642  005025                            CLR     (R5)+
016644  010410                            MOV     R4,(R0)
016646  062720  170000                    ADD     #170000,(R0)+
016652  062704  000200                    ADD     #200,R4
016656  077315                            SOB     R3,64$
016660  012710  177600                    MOV     #177600,(R0)
016664  012712  077406                    MOV     #77406,(R2)

016670  012737  000060  172516            MOV     #60,@#MMR3              ;TURN THE MAP AND ENABLE
016676  012737  000001  177572            MOV     #1,@#MMR0               ;22 BIT MODE ADDRESSING.
016704  012704  010000                    MOV     #10000,R4               ;PATTERN FOR THE MAINTENANCE
016710  012702  177750                    MOV     #MAINT,R2               ;REGISTER.
016714  012737  000014  177746            MOV     #M1M0,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
016722  000402                            BR      MS1

                016724                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                016724                  LOC=-4&LOC
                016730                  LOC=LOC+4
                016730                  .=LOC

016730  000240                  MS1:    NOP
016732  010412                          MOV     R4,(R2)                 ;TURN ON THE MAINTENANCE REGISTER.
016734  005701                  MS2:    TST     R1
016736  005012                          CLR     (R2)
```

```
                                        MS3:                                    ;REPORT ERROR.  MAINTENANCE
016740 010437 001236                            MOV     R4,$TMP2                ;FUNCTION FAILED TO
                                                                                ;CAUSE ERROR.
016744 104127                           1$:     ERROR   127
016746 012737 177777 031102             MSERR0: MOV     #-1,MANFL2
016754 000500                                   BR      MSDONE

016756 022737 023404 177744             MSERR0: CMP     #23404,@#MEMERR         ;DID THE ERROR REGISTER
016764 001042                                   BNE     69$                     ;SET PROPERLY?

016766 022626                           64$:    CMP     (SP)+,(SP)+             ;RESET THE STACK
016770 005037 177572                    65$:    CLR     @#MMR0
016774 005037 172516                            CLR     @#MMR3
017000 012737 177777 177744                     MOV     #-1,@#MEMERR            ;TRY TO CLEAR THE ERROR
017006 005737 177744                            TST     @#MEMERR                ;REGISTER.
017012 001416                                   BEQ     68$

017014                                  66$:                                    ;ERROR REGISTER WON'T
017014 013737 177740 001236                     MOV     @#LOADRS,$TMP2          ;CLEAR
017022 013737 177742 001240                     MOV     @#HIADRS,$TMP3
017030 013737 177744 001242                     MOV     @#MEMERR,$TMP4

017036 104130                           67$:    ERROR   130
017040 012737 177777 031062                     MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
017046 000443                                   BR      MSDONE

017050 022737 177740 177740             68$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
017056 001356                                   BNE     66$                     ;UNLOCKED.
017060 022737 000003 177742                     CMP     #3,@#HIADRS
017066 001352                                   BNE     66$
017070 000432                                   BR      MSDONE

017072                                  69$:                                    ;REPORT ERROR REGISTER
017072 012637 001236                            MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
017076 005726                                   TST     (SP)+                   ;RESET THE STACK.
017100 013737 177740 001240                     MOV     @#LOADRS,$TMP3
017106 013737 177742 001242                     MOV     @#HIADRS,$TMP4
017114 012737 010000 001244                     MOV     #10000,$TMP5
017122 012737 023404 001246                     MOV     #23404,$TMP6
017130 013737 177744 001250                     MOV     @#MEMERR,$TMP7

017136 104131                           70$:    ERROR   131
017140 012737 177777 031102                     MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
017146 012737 177777 031075                     MOV     #-1,MMRFL2
017154 000705                                   BR      65$
017156 104410                           MSDONE: RSET

                                        ;;**************************************************************
                                        ;*TEST 36       CACHE MAINTENANCE AND ERROR REGISTERS TEST 22
                                        ;*
                                        ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
                                        ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
                                        ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
                                        ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A MAIN MEMORY DATA
                                        ;*PARITY ERROR ON THAT REFERENCE WHICH IS TO AN ODD WORD IN THE
```

```
                                        ;*PAIR, WHICH IS ALSO THE WANTED WORD.
                                        ;*
                                        ;**************************************************************************
017160  000024                TST36:  SCOPE
017162  012737  000040  001302        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000036                  MT=$TN-1
                                                                ;SET THE SKAD REGISTER
017170  012737  017604  030646        MOV     #TST37,SKAD     ;IN CASE THE TEST ABORTS.

017176  113737  001102  001232        MOVB    $TSTNM,$TMP0

017204  104415                       SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
017206  104416                       SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
017210  104417                       SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
017212  104420                       SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
017214  104412                       MMSKIP

017216  012700  172340              MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                            ;TO RELOCATE EVERYTHING
017222  012702  172300              MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
017226  012703  000007              MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
017232  005004                      CLR     R4              ;BY PASSIVELY IS MEANT
017234  012705  170200              MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
                                                            ;RELOCATED TO THEMSELVES.
017240  012722  077406      64$:    MOV     #77406,(R2)+
017244  010401                      MOV     R4,R1
017246  072127  000006              ASH     #6,R1
017252  010125                      MOV     R1,(R5)+
017254  005025                      CLR     (R5)+
017256  010410                      MOV     R4,(R0)
017260  062720  170000              ADD     #170000,(R0)+
017264  062704  000200              ADD     #200,R4
017270  077315                      SOB     R3,64$
017272  012710  177600              MOV     #177600,(R0)
017276  012712  077406              MOV     #77406,(R2)

017302  012737  000060  172516      MOV     #60,@#MMR3      ;TURN ON THE MAP AND 22-BIT
017310  012737  000001  177572      MOV     #1,@#MMR0       ;MODE ADDRESSING.
017316  012737  017402  000114      MOV     #MTERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
017324  012737  000014  177746      MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
017332  012704  040000              MOV     #40000,R4       ;PATTERN TO BE PUT IN MAINT.
017336  012702  177750              MOV     #MAINT,R2       ;REG.
017342  000403                      BR      MT1

        017344                  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        017344                  LOC=-4&LOC
        017350                  LOC=LOC+4
        017350                  .=LOC

017350  000240                  NOP
017352  000240          MT1:    NOP                     ;NOP FOR SCOPING WITH AN OSCILLOSCOPE!!
017354  010412                  MOV     R4,(R2)         ;SET THE MAINT. REG.
017356  005701                  TST     R1              ;THE REFERENCE TO THIS INSTRUCTION SHOULD CAUSE A PARITY
017360  005012                  CLR     (R2)            ;ABORT CAUSED BY DETECTION OF BAD PARITY ON
017362  000240                  NOP                     ;THE WANTED, ODD, WORD IN THIS PAIR.
```

```
3723
3724  017364                          MT2:                                    ;REPORT ERROR.  MAINTENANCE
3725  017364  010437  001236                MOV     R4,$TMP2                ;FUNCTION FAILED TO
3726                                                                          ;CAUSE ERROR.
3727  017370  104127                  1$:     ERROR   127
3728  017372  012737  177777  031102        MOV     #-1,MANFL2
3729  017400  000500                        BR      MTDONE
3730
3731  017402  022737  023410  177744  MTERR0: CMP     #23410,@#MEMERR         ;DID THE ERROR REGISTER
3732  017410  001042                        BNE     69$                     ;SET PROPERLY?
3733
3734  017412  022626                  64$:    CMP     (SP)+,(SP)+             ;RESET THE STACK
3735  017414  005037  177572          65$:    CLR     @#MMR0
3736  017420  005037  172516                  CLR     @#MMR3
3737  017424  012737  177777  177744        MOV     #-1,@#MEMERR            ;TRY TO CLEAR THE ERROR
3738  017432  005737  177744                TST     @#MEMERR                ;REGISTER.
3739  017436  001416                        BEQ     68$
3740
3741  017440                          66$:                                    ;ERROR REGISTER WON'T
3742  017440  013737  177740  001236        MOV     @#LOADRS,$TMP2          ;CLEAR
3743  017446  013737  177742  001240        MOV     @#HIADRS,$TMP3
3744  017454  013737  177744  001242        MOV     @#MEMERR,$TMP4
3745
3746  017462  104130                  67$:    ERROR   130
3747  017464  012737  177777  031062        MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
3748  017472  000443                        BR      MTDONE
3749
3750  017474  022737  177740  177740  68$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
3751  017502  001356                        BNE     66$                     ;UNLOCKED.
3752  017504  022737  000003  177742        CMP     #3,@#HIADRS
3753  017512  001352                        BNE     66$
3754  017514  000432                        BR      MTDONE
3755
3756  017516                          69$:                                    ;REPORT ERROR REGISTER
3757  017516  012637  001236                MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
3758  017522  005726                        TST     (SP)+                   ;RESET THE STACK.
3759  017524  013737  177740  001240        MOV     @#LOADRS,$TMP3
3760  017532  013737  177742  001242        MOV     @#HIADRS,$TMP4
3761  017540  012737  040000  001244        MOV     #40000,$TMP5
3762  017546  012737  023410  001246        MOV     #23410,$TMP6
3763  017554  013737  177744  001250        MOV     @#MEMERR,$TMP7
3764
3765  017562  104131                  70$:    ERROR   131
3766  017564  012737  177777  031102        MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
3767  017572  012737  177777  031076        MOV     #-1,MMRFL2
3768  017600  000705                        BR      65$
3769  017602  104410                  MTDONE: RSET
3770
3771                                  ;;**************************************************************
3772                                  ;*TEST 37       CACHE MAINTENANCE AND ERROR REGISTERS TEST 23
3773                                  ;*
3774                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
3775                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
3776                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
3777                                  ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY
3778                                  ;*PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE
```

```
                                        ;*LOW BYTE OF THAT ADDRESS .
                                        ;*
                                        ;;*****************************************************************
017604  000004                          TST37:  SCOPE
017606  012737  000040  001302                  MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000037                          MJ=$TN-1
                                                                        ;SET THE SKAD REGISTER
017614  012737  020224  330646                  MOV     #TST40,SKAD     ;IN CASE THE TEST ABORTS.

017622  113737  001102  001232                  MOVB    $TSTNM,$TMP0

017630  104415                                  SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
017632  104416                                  SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
017634  104417                                  SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
017636  104420                                  SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
017640  104412                                  MMSKIP

017642  012700  172340                        MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                        ;TO RELOCATE EVERYTHING
017646  012702  172300                        MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
017652  012703  000007                        MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
017656  005004                                CLR     R4              ;BY PASSIVELY IS MEANT
017660  012705  170200                        MOV     #MAPL00,R5      ;THAT ADDRESS ARE
                                                                        ;RELOCATED TO THEMSELVES.
017664  012722  077406                64$:    MOV     #77406,(R2)+
017670  010401                                MOV     R4,R1
017672  072127  000006                        ASH     #6,R1
017676  010125                                MOV     R1,(R5)+
017700  005025                                CLR     (R5)+
017702  010410                                MOV     R4,(R0)
017704  062720  170000                        ADD     #170000,(R0)+
017710  062704  000200                        ADD     #200,R4
017714  077315                                SOB     R3,64$
017716  012710  177600                        MOV     #177600,(R0)
017722  012712  077406                        MOV     #77406,(R2)

017726  012737  000060  172516                MOV     #60,@#MMR3      ;TURN ON THE MAP AND
017734  012737  000001  177572                MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
017742  012737  020022  000114                MOV     #MUERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
017750  012737  000030  177746                MOV     #SDM1,@#CONTRL  ;SELECT GROUP ADDRESS
017756  012704  000400                        MOV     #400,R4 ;PATTERN TO BE LOADED IN THE
017762  012702  177750                        MOV     #MAINT,R2       ;MAINTENANCE REG.
017766  000403                                BR      MU1

                017770                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                017770                  LOC=-4&LOC
                017774                  LOC=LOC+4
                017774                  .=LOC

017774  000240                          NOP
017776  000240                  MU1:    NOP
020000  010412                          MOV     R4,(R2)         ;SET THE MAINT REG.
020002  005012                          CLR     (R2)            ;THIS FETCH SHOULD CAUSE
                                                                ;A PARITY ERROR IN GROUP
                                                                ;ADDRESS 0 MEMORY
```

```
3835  020004                          MU2:                                ;REPORT ERROR.  MAINTENANCE
3836  020004  010437  031236                MOV     R4,$TMP2            ;FUNCTION FAILED TO
3837                                                                      ;CAUSE ERROR.
3838  020010  104127                  1$:    ERROR   127
3839  020012  012737  177777  031102  MOV     #-1,MANFL2
3840  020020  000500                  BR      MUDONE
3841
3842  020022  022737  002420  177744  MUERRO: CMP     #2420,@#MEMERR      ;DID THE ERROR REGISTER
3843  020030  001042                  BNE     69$                         ;SET PROPERLY?
3844
3845  020032  022626                  64$:    CMP     (SP)+,(SP)+         ;RESET THE STACK
3846  020034  005037  177572          65$:    CLR     @#MMR0
3847  020040  005037  172516          CLR     @#MMR3
3848  020044  012737  177777  177744  MOV     #-1,@#MEMERR        ;TRY TO CLEAR THE ERROR
3849  020052  005737  177744          TST     @#MEMERR            ;REGISTER.
3850  020056  001416                  BEQ     68$
3851
3852  020060                          66$:                                ;ERROR REGISTER WON'T
3853  020060  013737  177740  001236  MOV     @#LOADRS,$TMP2      ;CLEAR
3854  020066  013737  177742  001240  MOV     @#HIADRS,$TMP3
3855  020074  013737  177744  001242  MOV     @#MEMERR,$TMP4
3856
3857  020102  104130                  67$:    ERROR   130
3858  020104  012737  177777  031062  MOV     #-1,MMRFLG          ;SIGNAL BAD REGISTER
3859  020112  000443                  BR      MUDONE
3860
3861  020114  022737  177740  177740  68$:    CMP     #177740,@#LOADRS    ;SEE IF ADDRESS REGISTER
3862  020122  001356                  BNE     66$                 ;UNLOCKED.
3863  020124  022737  000003  177742  CMP     #3,@#HIADRS
3864  020132  001352                  BNE     66$
3865  020134  000432                  BR      MUDONE
3866
3867  020136                          69$:                                ;REPORT ERROR REGISTER
3868  020136  012637  001236          MOV     (SP)+,$TMP2         ;NOT SET AS EXPECTED.
3869  020142  005726                  TST     (SP)+               ;RESET THE STACK.
3870  020144  013737  177740  001240  MOV     @#LOADRS,$TMP3
3871  020152  013737  177742  001242  MOV     @#HIADRS,$TMP4
3872  020160  012737  000400  001244  MOV     #400,$TMP5
3873  020166  012737  002420  001246  MOV     #2420,$TMP6
3874  020174  013737  177744  001250  MOV     @#MEMERR,$TMP7
3875
3876  020202  104131                  70$:    ERROR   131
3877  020204  012737  177777  031102  MOV     #-1,MANFL2          ;SIGNAL BAD REGISTER
3878  020212  012737  177777  031076  MOV     #-1,MMRFL2
3879  020220  000705                  BR      65$
3880  020222  104410                  MUDONE: RSET
3881
3882                                  ;;*****************************************************************
3883                                  ;*TEST 40        CACHE MAINTENANCE AND ERROR REGISTERS TEST 24
3884                                  ;*
3885                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
3886                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
3887                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
3888                                  ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY
3889                                  ;*PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE
3890                                  ;*LOW BYTE OF THAT ADDRESS .
```

```
                                        ;*
                                        ;;*****************************************************************
020224 000004                   $ST40:  SCOPE
020226 012737 000040 001302             MOV     #40,$TIMES      ;;DO 40 ITERATIONS
                        MV=$TN-1
                                                                ;SET THE SKAD REGISTER
020234 012737 030644 030646             MOV     #$ST41,SKAD     ;IN CASE THE TEST ABORTS.

020242 113737 001102 001232             MOVB    $TSTNM,$TMP0

020250 104415                           SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
020252 104416                           SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
020254 104417                           SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
020256 104420                           SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
020260 104412                           MMSKIP

020262 012700 172340                    MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                ;TO RELOCATE EVERYTHING
020266 012702 172300                    MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
020272 012703 000007                    MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
020276 005004                           CLR     R4              ;BY PASSIVELY IS MEANT
020300 012705 170200                    MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
020304 012722 077406            64$:    MOV     #77406,(R2)+
020310 010401                           MOV     R4,R1
020312 072127 000006                    ASH     #6,R1
020316 010125                           MOV     R1,(R5)+
020320 005025                           CLR     (R5)+
020322 010410                           MOV     R4,(R0)
020324 062720 170000                    ADD     #170000,(R0)+
020330 062704 000200                    ADD     #200,R4
020334 077315                           SOB     R3,64$
020336 012710 177600                    MOV     #177600,(R0)
020342 012712 077406                    MOV     #77406,(R2)

020346 012737 000060 172516             MOV     #60,@#MMR3      ;TURN ON THE MAP AND
020354 012737 000001 177572             MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
020362 012737 020442 000114             MOV     #MVERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
020370 012737 000044 177746             MOV     #S1M0,@#CONTRL  ;SELECT GROUP ADDRESS
020376 012704 002000                    MOV     #2000,R4        ;PATTERN TO BE LOADED IN THE
020402 012702 177750                    MOV     #MAINT,R2       ;MAINTENANCE REG.
020406 000403                           BR      MV1

                        020410          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                        020410          LOC=-4&LOC
                        020414          LOC=LOC+4
                        020414          .=LOC

020414 000240                           NOP
020416 000240                   MV1:    NOP
020420 010412                           MOV     R4,(R2)         ;SET THE MAINT REG.
020422 005012                           CLR     (R2)            ;THIS FETCH SHOULD CAUSE
                                                                ;A PARITY ERROR IN GROUP
                                                                ;ADDRESS 1 MEMORY

020424                          MV2:                            ;REPORT ERROR.  MAINTENANCE
```

```
3947  020424  012737  001236                      MOV     #4,$TMP2        ;FUNCTION FAILED TO
3948                                                                        ;CAUSE ERROR.
3949  020430  104127                      1$:     ERROR   127
3950  020432  012737  177777  031102      MOV     #-1,MANFL2
3951  020440  000500                      BR      MVDONE
3952
3953  020442  022737  002440  177744  MVERRO: CMP     #2440,@#MEMERR  ;DID THE ERROR REGISTER
3954  020450  001042                      BNE     69$             ;SET PROPERLY?
3955
3956  020452  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
3957  020454  005037  177572          65$:    CLR     @#MMR0
3958  020460  005037  172516                  CLR     @#MMR3
3959  020464  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3960  020472  005737  177744                  TST     @#MEMERR        ;REGISTER.
3961  020476  001416                          BEQ     68$
3962
3963  020500                          66$:                            ;ERROR REGISTER WON'T
3964  020500  013737  177740  001236          MOV     @#LOADRS,$TMP2  ;CLEAR
3965  020506  013737  177742  001240          MOV     @#HIADRS,$TMP3
3966  020514  013737  177744  001242          MOV     @#MEMERR,$TMP4
3967
3968  020522  104130                  67$:    ERROR   130
3969  020524  012737  177777  031062          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
3970  020532  000443                          BR      MVDONE
3971
3972  020534  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
3973  020542  001356                          BNE     66$             ;UNLOCKED.
3974  020544  022737  000003  177742          CMP     #3,@#HIADRS
3975  020552  001352                          BNE     66$
3976  020554  000432                          BR      MVDONE
3977
3978  020556                          69$:                            ;REPORT ERROR REGISTER
3979  020556  012637  001236                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
3980  020562  005726                          TST     (SP)+           ;RESET THE STACK.
3981  020564  013737  177740  001240          MOV     @#LOADRS,$TMP3
3982  020572  013737  177742  001242          MOV     @#HIADRS,$TMP4
3983  020600  012737  002000  001244          MOV     #2000,$TMP5
3984  020606  012737  002440  001246          MOV     #2440,$TMP6
3985  020614  013737  177744  001250          MOV     @#MEMERR,$TMP7
3986
3987  020622  104131                  70$:    ERROR   131
3988  020624  012737  177777  031102          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
3989  020632  012737  177777  031076          MOV     #-1,MMRFL2
3990  020640  000705                          BR      65$
3991  020642  104410                  MVDONE: RSET
3992
3993                                  ;;*****************************************************************
3994                                  ;*TEST 41        CACHE MAINTENANCE AND ERROR REGISTERS TEST 25
3995                                  ;*
3996                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
3997                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
3998                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
3999                                  ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY
4000                                  ;*PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE
4001                                  ;*LOW BYTE OF THAT DATA .
4002                                  ;*
```

```
4003
4004  020644  000004                ;;*****************************************************************
4005  020646  012737  000040  001302  TST41:  SCOPE
4006          000041                        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
4007                                MW=$TN-1
4008  020654  012737  021264  000646        MOV     #TST42,SKAD     ;SET THE SKAD REGISTER
4009                                                                ;IN CASE THE TEST ABORTS.
4010  020662  113737  001102  001232        MOVB    $TSTNM,$TMP0
4011
4012  020670  104415                        SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
4013  020672  104416                        SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
4014  020674  104417                        SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
4015  020676  104420                        SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
4016  020700  104412                        MMSKIP
4017
4018  020702  012700  172340              MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
4019                                                                ;TO RELOCATE EVERYTHING
4020  020706  012702  172300              MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
4021  020712  012703  000007              MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
4022  020716  005004                      CLR     R4              ;BY PASSIVELY IS MEANT
4023  020720  012705  170200              MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
4024                                                                ;RELOCATED TO THEMSELVES.
4025  020724  012722  077406  64$:       MOV     #77406,(R2)+
4026  020730  010401                      MOV     R4,R1
4027  020732  072127  000006              ASH     #6,R1
4028  020736  010125                      MOV     R1,(R5)+
4029  020740  005025                      CLR     (R5)+
4030  020742  010410                      MOV     R4,(R0)
4031  020744  062720  170000              ADD     #170000,(R0)+
4032  020750  062704  000200              ADD     #200,R4
4033  020754  077315                      SOB     R3,64$
4034  020756  012710  177600              MOV     #177600,(R0)
4035  020762  012712  077406              MOV     #77406,(R2)
4036
4037  020766  012737  000060  172516      MOV     #60,@#MMR3      ;TURN ON THE MAP AND
4038  020774  012737  000001  177572      MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
4039  021002  012737  021062  000114      MOV     #MWERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
4040  021010  012737  000030  177746      MOV     #SOM1,@#CONTRL  ;SELECT GROUP DATA
4041  021016  012704  000020              MOV     #20,R4  ;PATTERN TO BE LOADED IN THE
4042  021022  012702  177750              MOV     #MAINT,R2       ;MAINTENANCE REG.
4043  021026  000403                      BR      MW1
4044
4045          021030                      LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4046          021030                      LOC=-4&LOC
4047          021034                      LOC=LOC+4
4048          021034                      .=LOC
4049
4050  021034  000240                      NOP
4051  021036  000240          MW1:        NOP
4052  021040  010412                      MOV     R4,(R2)         ;SET THE MAINT REG.
4053  021042  005012                      CLR     (R2)            ;THIS FETCH SHOULD CAUSE
4054                                                                ;A PARITY ERROR IN GROUP
4055                                                                ;DATA 0 MEMORY
4056
4057  021044          MW2:                                        ;REPORT ERROR.  MAINTENANCE
4058  021044  010437  001236              MOV     R4,$TMP2        ;FUNCTION FAILED TO
```

```
                                                                        ;CAUSE ERROR.
021350  104127                  1$:     ERROR   127
021352  012737  177777  031102  MOV     #-1,MANFL2
021360  000500                  BR      MWDONE

021062  022737  002500  177744  MWERR0: CMP     #2500,@#MEMERR  ;DID THE ERROR REGISTER
021070  001042                  BNE     69$             ;SET PROPERLY?

021072  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
021074  005037  177572          65$:    CLR     @#MMR0
021100  005037  172516          CLR     @#MMR3
021104  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
021112  005737  177744          TST     @#MEMERR        ;REGISTER.
021116  001416                  BEQ     68$

021120                          66$:                    ;ERROR REGISTER WON'T
021120  013737  177740  001236  MOV     @#LOADRS,$TMP2  ;CLEAR
021126  013737  177742  001240  MOV     @#HIADRS,$TMP3
021134  013737  177744  001242  MOV     @#MEMERR,$TMP4

021142  104130                  67$:    ERROR   130
021144  012737  177777  031062  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
021152  000443                  BR      MWDONE

021154  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
021162  001356                  BNE     66$             ;UNLOCKED.
021164  022737  000003  177742  CMP     #3,@#HIADRS
021172  001352                  BNE     66$
021174  000432                  BR      MWDONE

021176                          69$:                    ;REPORT ERROR REGISTER
021176  012637  001236          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
021202  005726                  TST     (SP)+           ;RESET THE STACK.
021204  013737  177740  001240  MOV     @#LOADRS,$TMP3
021212  013737  177742  001242  MOV     @#HIADRS,$TMP4
021220  012737  000020  001244  MOV     #20,$TMP5
021226  012737  002500  001246  MOV     #2500,$TMP6
021234  013737  177744  001250  MOV     @#MEMERR,$TMP7

021242  104131                  70$:    ERROR   131
021244  012737  177777  031102  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
021252  012737  177777  031076  MOV     #-1,MMRFL2
021260  000705                  BR      65$
021262  104410                  MWDONE: RSET

                                ;;*****************************************************************
                                ;*TEST 42        CACHE MAINTENANCE AND ERROR REGISTERS TEST 26
                                ;*
                                ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
                                ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
                                ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
                                ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY
                                ;*PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE
                                ;*LOW BYTE OF THAT DATA .
                                ;*
                                ;;*****************************************************************
```

```
                                TST42:  SCOPE
021264  000334                          
021266  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
                000042          MX=$TN-1
                                                                ;SET THE SKAD REGISTER
021274  012737  021704  000646          MOV     #TST43,SKAD     ;IN CASE THE TEST ABORTS.

021302  113737  001102  001332          MOVB    $TSTNM,$TMP0

                                        SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
021310  104415                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
021312  104416                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
021314  104417                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
021316  104420                          MMSKIP
021320  104412

021322  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                ;TO RELOCATE EVERYTHING
021326  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
021332  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
021336  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
021340  012705  170200                  MOV     #MAPL00,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
021344  012722  077406          64$:    MOV     #77406,(R2)+
021350  010401                          MOV     R4,R1
021352  072127  000006                  ASH     #6,R1
021356  010125                          MOV     R1,(R5)+
021360  005025                          CLR     (R5)+
021362  010410                          MOV     R4,(R0)
021364  062720  170000                  ADD     #170000,(R0)+
021370  062704  000200                  ADD     #200,R4
021374  077315                          SOB     R3,64$
021376  012710  177600                  MOV     #177600,(R0)
021402  012712  077406                  MOV     #77406,(R2)

021406  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
021414  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
021422  012737  021502  000114          MOV     #MXERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
021430  012737  000044  177746          MOV     #S1M0,@#CONTRL  ;SELECT GROUP DATA
021436  012704  000100                  MOV     #100,R4 ;PATTERN TO BE LOADED IN THE
021442  012702  177750                  MOV     #MAINT,R2       ;MAINTENANCE REG.
021446  000403                          BR      MX1

                021450                  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                021450                  LOC=-4&LOC
                021454                  LOC=LOC+4
                021454                  .=LOC

021454  000240                          NOP
021456  000240                  MX1:    NOP
021460  010412                          MOV     R4,(R2)         ;SET THE MAINT REG.
021462  005012                          CLR     (R2)            ;THIS FETCH SHOULD CAUSE
                                                                ;A PARITY ERROR IN GROUP
                                                                ;DATA 1 MEMORY

021464                          MX2:                            ;REPORT ERROR.  MAINTENANCE
021464  010437  001236                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
```

```
4171  021470  104127                  1$:     ERROR   127
4172  021472  012737  177777  031102  MOV     #-1,MANFL2
4173  021500  000500                  BR      MXDONE
4174
4175  021502  022737  002600  177744  MXERR0: CMP     #2600,@#MEMERR  ;DID THE ERROR REGISTER
4176  021510  001042                  BNE     69$             ;SET PROPERLY?
4177
4178  021512  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
4179  021514  005037  177572          65$:    CLR     @#MMR0
4180  021520  005037  172516          CLR     @#MMR3
4181  021524  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
4182  021532  005737  177744          TST     @#MEMERR        ;REGISTER.
4183  021536  001416                  BEQ     68$
4184
4185  021540                          66$:                    ;ERROR REGISTER WON'T
4186  021540  013737  177740  001236  MOV     @#LOADRS,$TMP2  ;CLEAR
4187  021546  013737  177742  001240  MOV     @#HIADRS,$TMP3
4188  021554  013737  177744  001242  MOV     @#MEMERR,$TMP4
4189
4190  021562  104130                  67$:    ERROR   130
4191  021564  012737  177777  031062  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
4192  021572  000443                  BR      MXDONE
4193
4194  021574  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
4195  021602  001356                  BNE     66$             ;UNLOCKED.
4196  021604  022737  000003  177742  CMP     #3,@#HIADRS
4197  021612  001352                  BNE     66$
4198  021614  000432                  BR      MXDONE
4199
4200  021616                          69$:                    ;REPORT ERROR REGISTER
4201  021616  012637  001236          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
4202  021622  005726                  TST     (SP)+           ;RESET THE STACK.
4203  021624  013737  177740  001240  MOV     @#LOADRS,$TMP3
4204  021632  013737  177742  001242  MOV     @#HIADRS,$TMP4
4205  021640  012737  000100  001244  MOV     #100,$TMP5
4206  021646  012737  002600  001246  MOV     #2600,$TMP6
4207  021654  013737  177744  001250  MOV     @#MEMERR,$TMP7
4208
4209  021662  104131                  70$:    ERROR   131
4210  021664  012737  177777  031102  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
4211  021672  012737  177777  031076  MOV     #-1,MMRFL2
4212  021700  000705                  BR      65$
4213  021702  104400                  MXDONE: RSET
4214
4215                                  ;;*****************************************************************
4216                                  ;*TEST 43       CACHE ERROR REGISTER UNIBUS TIME OUT TEST
4217                                  ;*
4218                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO COMPREHEND A
4219                                  ;*CPU TO UNIBUS THROUGH THE MAP TO THE CACHE REFERENCE WHICH
4220                                  ;*TIMES OUT IN MAIN MEMORY. MANY SUCH NON-EXISTENT MEMORY LOCATIONS
4221                                  ;*ARE CONVIENTLY GUARENTEED TO EXIST! ALL THE ADDRESSES
4222                                  ;*FROM 17000000 THROUGH 17777776 ARE ADDRESSES
4223                                  ;*WHICH CAN NOT EXIST. HERE ONLY ONE OF THESE ADDRESSES, 17777776,
4224                                  ;*WILL BE USED TO CAUSE A TIME OUT ON THE UNIBUS AN THE CONSEQUENT
4225                                  ;*ABORT TO VECTOR ERRVEC.
4226                                  ;*
```

```
                                        ;;*****************************************************************
021724 000004                   TST43:  SCOPE
021726 012737 000340 001302             MOV     #40,$TIMES      ;;DO 40 ITERATIONS
       000043                   MG=$TN-1
                                                                ;SET THE SKAD REGISTER
021714 012737 022334 000646             MOV     #TST44,SKAD     ;IN CASE THE TEST ABORTS.

021722 113737 001102 001232             MOVB    $TSTNM,$TMP0
021730 012737 000522 000114             MOV     #SPUR,@#CACHVEC         ;EXPECT NO PARITY ERRORS.

021736 104415                           SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
021740 104416                           SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
021742 104417                           SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
021744 104420                           SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
021746 104412                           MMSKIP

021750 012700 172340                    MOV     #KIPAR0,R0      ;INITIALLY PUT MEMORY
021754 012701 077406                    MOV     #77406,R1       ;MANAGEMENT IN A 'PASSIVE'
021760 012702 172300                    MOV     #KIPDR0,R2      ;STATE, THAT IS MAP ALL
021764 012703 000010                    MOV     #10,R3          ;VIRTUAL ADDRESSES ON TO
021770 010122                   64$:    MOV     R1,(R2)+        ;THEMSELVES AS PHYSICAL
021772 077302                           SOB     R3,64$          ;ADDRESSES.
021774 005020                           CLR     (R0)+
021776 012720 000200                    MOV     #200,(R0)+
022002 012720 000400                    MOV     #400,(R0)+
022006 012720 000600                    MOV     #600,(R0)+
022012 012720 001000                    MOV     #1000,(R0)+
022016 012720 001200                    MOV     #1200,(R0)+
022022 012720 001400                    MOV     #1400,(R0)+
022026 012710 177600                    MOV     #177600,(R0)

022032 012737 000060 172516             MOV     #60,@#MMR3              ;TURN ON THE MAPPING BOX
022040 012737 000001 177572             MOV     #1,@#MMR0               ;AND 22 BIT MODE ADDRESSING.
022046 012737 170000 172354             MOV     #170000,@#KIPAR6        ;MAKE KIPAR6 RELOCATE
                                                                        ;TO THE UNIBUS.
022054 012737 022126 000004             MOV     #MQERR,@#ERRVEC         ;SET UP THE TIME OUT VECTOR.

022062 012737 177776 170200             MOV     #-2,@#MAPL00            ;SET THE MAP REGISTER 0
022070 012737 000077 170202             MOV     #77,@#MAPH00
022076 012700 140000                    MOV     #140000,R0              ;THIS IS THE VIRTUAL ADDRESS OF THE
                                                                        ;TEST ADDRESS. IT WILL RELOCATE
                                                                        ;THROUGH KIPAR6 TO THE UNIBUS AS
                                                                        ;A 000000. FROM THE UNIBUS
                                                                        ;IT WILL BE RELOCATED THROUGH
                                                                        ;MAP REGISTER 0 TO THE CACHE WHERE
                                                                        ;IT WILL TRY TO REFERENCE
                                                                        ;17777776, AND HOPEFULLY TIME OUT.
022102 000240                           NOP                             ;FOR SCOPING WITH AN OSCILLOSCOPE!
022104 005710                           TST     (R0)                    ;MAKE THE REFERENCE!

022106                          MQ1:                                    ;NO TIME OUT OCCURRED. REPORT
022106 012737 177776 001236             MOV     #-2,$TMP2               ;THE ERROR.
022114 012737 000077 001240             MOV     #77,$TMP3
022122 104132                   1$:     ERROR   132
022124 000502                           BR      MQDONE
```

```
4283  022136  032737  000020  177766  MQERR:  BIT     #20,@#CPUERR            ;SEE IF A TIME OUT HAS CAUSED
4284  022144  001002                          BNE     MQ2                     ;AN ABORT TO THIS ROUTINE.
4285  022146  000137  030474                  JMP     CPSPUR                  ;IF NOT GO TO THE SPURIOUS
4286                                                                          ;UNEXPECTED, CPU ERROR HANDLER.
4287  022152  022737  000000  177744  MQ2:    CMP     #0,@#MEMERR             ;OTHERWISE SEE IF THE ERROR
4288  022160  001427                          BEQ     MQ3                     ;REGISTER GOT SET CORRECTLY.
4289
4290                                                                  ;IF IT IS NOT SET CORRECTLY REPORT ERROR.
4291  022162  012637  031236                  MOV     (SP)+,$TMP2
4292  022166  005726                          TST     (SP)+
4293  022170  013737  177740  001240          MOV     @#LOADRS,$TMP3
4294  022176  013737  177742  001242          MOV     @#HIADRS,$TMP4
4295  022204  012737  177776  001244          MOV     #-2,$TMP5
4296  022212  012737  000077  001246          MOV     #77,$TMP6
4297  022220  013737  177744  001250          MOV     @#MEMERR,$TMP7
4298  022226  104133          ;               ERROR   133
4299  022230  012737  177777  031376          MOV     #-1,MMRFL2
4300  022236  000401                          BR      MQ4
4301
4302  022240  022626          MQ3:    CMP     (SP)+,(SP)+             ;RESET THE STACK
4303
4304  022242  005037  177572  MQ4:    CLR     @#MMR0
4305  022246  005037  172516          CLR     @#MMR3
4306  022252  012737  177777  177744  MOV     #-1,@#MEMERR            ;TRY TO CLEAR THE ERROR REGISTER.
4307  022260  005737  177744          TST     @#MEMERR
4308  022264  001416                  BEQ     MQ6
4309
4310  022266                  MQ5:                            ;REPORT THE FAILURE OF THE ERROR
4311  022266  013737  177740  031236          MOV     @#LOADRS,$TMP2          ;REGISTER TO CLEAR!
4312  022274  013737  177742  001240          MOV     @#HIADRS,$TMP3
4313  022302  013737  177744  001242          MOV     @#MEMERR,$TMP4
4314  022310  104130          ;               ERROR   130
4315  022312  012737  177777  031062          MOV     #-1,MMRFLG
4316  022320  000410                          BR      MQDONE
4317
4318  022322  022737  177740  177740  MQ6:    CMP     #177740,@#LOADRS        ;SEE IF THE ADDRESS REGISTER
4319  022330  001356                          BNE     MQ5                     ;GOT RESET.
4320  022332  022737  000003  177742          CMP     #3,@#HIADRS
4321  022340  001352                          BNE     MQ5
4322
4323  022342  104410          MQDONE: RSET
4324
4325                          ;;*****************************************************************
4326                          ;*TEST 44       CACHE CONTROL REGISTER DISABLE TRAPS TEST 1
4327                          ;*
4328                          ;*THIS IS A TEST OF THE CONTROL REGISTER'S ABILITY TO DISABLE A TRAP
4329                          ;*OCCURRING AS THE RESULT OF A MAIN MEMORY DATA PARITY ERROR IN THE
4330                          ;*UNWANTED WORD OF THE REFERENCED PAIR. THE MAINTENANCE REGISTER IS
4331                          ;*USED TO FORCE AN ERROR ON THE LOW BYTE OF THE ODD WORD WHEN REFERENCING
4332                          ;*THE EVEN WORD OF THAT PAIR.
4333                          ;*
4334                          ;;*****************************************************************
4335  022344  000004          TST44:  SCOPE
4336  022346  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
4337          000044          KV=$TN-1
4338                                                                  ;SET THE SKAD REGISTER
```

```
 4339  022344  012737  022510  000646          MOV     #TST45,$KAD     ;IN CASE THE TEST ABORTS.
 4340
 4341  022352  113737  001102  001232          MOVB    $TSTNM,$TMP3
 4342
 4343  022360  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4344  022362  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4345  022364  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 4346  022366  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4347  022370  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
 4348  022376  052737  000001  177746          BIS     #BIT0,@#CONTRL          ;DISABLE 'WARNING' TRAPS.
 4349  022404  012737  022446  000114          MOV     #KVERR,@#CACHVEC                ;SET UP FOR THE ERROR ABOUT TO BE FORCED
 4350  022412  012704  040000                  MOV     #40000,R4               ;PATTERN FOR THE MAINTENANCE
 4351  022416  012702  177750                  MOV     #MAINT,R2               ;REGISTER.
 4352  022422  000402                          BR      KV1
 4353
 4354          022424                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
 4355          022424                          LOC=-4&LOC
 4356          022430                          LOC=LOC+4
 4357          022430                          .=LOC
 4358
 4359  022430  000240                  KV1:    NOP
 4360  022432  010412                          MOV     R4,(R2)                 ;SET THE MAINTENANCE REGISTER
 4361  022434  000240                          NOP                             ;WHEN THIS NOP IS FETCHED AN ERROR
 4362  022436  005701                  KV2:    TST     R1                      ;WILL BE RECOGNIZED BECAUSE OF THE
 4363                                                                          ;CONTENTS OF THE LOCATION KV2!
 4364                                                                          ;THIS PARITY ERROR WOULD
 4365                                                                          ;NORMALLY RELUT IN A TRAP BUT
 4366                                                                          ;BECAUSE TRAPS HAVE BEEN DISABLED
 4367                                                                          ;NONE SHOULD OCCUR!!!
 4368  022440  005012                          CLR     (R2)
 4369  022442  000240                          NOP
 4370  022444  000420                          BR      KVDONE                  ;GOOD, NO TRAP OCCURRED!
 4371
 4372  022446                          KVERR:                          ;COME HERE IF A TRAP OCCURS
 4373  022446  012637  001236                  MOV     (SP)+,$TMP2             ;AND REPORT THE ERROR.
 4374  022452  005726                          TST     (SP)+
 4375  022454  013737  177746  001240          MOV     @#CONTRL,$TMP3
 4376  022462  013737  177740  001242          MOV     @#LOADRS,$TMP4
 4377  022470  013737  177742  001244          MOV     @#HIADRS,$TMP5
 4378  022476  013737  177744  001246          MOV     @#MEMERR,$TMP6
 4379  022504  104134                  1$:     ERROR   134
 4380
 4381  022506  104410                  KVDONE: RSET
 4382
 4383
 4384
 4385                                          ;;*****************************************************************
 4386                                          ;*TEST 45       CACHE CONTROL REGISTER DISABLE TRAPS TEST 2
 4387                                          ;*
 4388                                          ;*THIS IS A TEST OF THE CONTROL REGISTER'S DISABLE TRAPS FUNCTION.
 4389                                          ;*IT IS ATTEMPTED TO DISABLE A TRAP RESULTING FROM A CACHE ADDRESS
 4390                                          ;*MEMORY PARITY ERROR. THE MAINTENANCE REGISTER WILL BE USED TO
 4391                                          ;*FORCE THE ERROR ON THE LOW BYTE OF THE ADDRESS, IN THE ADDRESS MEMORY
 4392                                          ;*OF GROUP 0.
 4393                                          ;*
 4394                                          ;;*****************************************************************
```

```
4395  022510  000024                    TST45:  SCOPE
4396  022512  012737  000040  001302            MOV     #40.,STIMES     ;;DO 40 ITERATIONS
4397          000045                    KX=STN-1
4398                                                                    ;SET THE SKAC REGISTER
4399  022520  012737  022710  030646            MOV     #TST46,SKAD     ;IN CASE THE TEST ABORTS.
4400
4401  022526  113737  001102  001232            MOVB    $TSTNM,$TMP0
4402
4403  022534  104415                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
4404  022536  104416                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
4405  022540  104417                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
4406  022542  104420                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
4407  022544  012737  000030  177746            MOV     #SDM1,@#CONTRL  ;USE GROUP ZERO
4408  022552  012700  022640                    MOV     #KX2,R0         ;MAKE KX2 A HIT IN GROUP
4409  022556  005710                            TST     (R0)            ;ZERO.
4410  022560  005710                            TST     (R0)
4411
4412                                                                    ;SEE IF REFERENCE ADDRESS
4413  022562  032737  000010  177752            BIT     #10.,@#HITMIS   ;IS A HIT.
4414  022570  001007                            BNE     KX1
4415                                                                    ;IF NOT ERROR!
4416  022572  010037  001236                    MOV     R0,$TMP2
4417  022576  012737  000000  001234            MOV     #0,$TMP1
4418  022604  104001                            ERROR   1
4419
4420  022606  104411                            SKIFT                   ;ERROR FATAL. GO TO NEXT TEST.
4421
4422  022610  052737  000001  177746  KX1:      BIS     #BIT0,@#CONTRL  ;DISABLE 'WARNING' TRAPS.
4423  022616  012737  022646  000114            MOV     #KXERR,@#CACHVEC        ;SET UP FOR ERROR WHICH
4424                                                                    ;SHOULD NOT TRAP!
4425  022624  012704  000400                    MOV     #400,R4         ;PATTERN FOR MAINT REG.
4426  022630  012702  177750                    MOV     #MAINT,R2
4427  022634  000240                            NOP
4428  022636  010412                            MOV     R4,(R2)         ;SET THE MAINT. REG.
4429  022640  005012                    KX2:    CLR     (R2)            ;THE FETCH OF THIS
4430  022642  000240                            NOP                     ;INSTRUCTION SHOULD CAUSE
4431  022644  000420                            BR      KXDONE          ;A CACHE  MEMORY
4432                                                                    ;PARITY ERROR WHICH
4433                                                                    ;NORMALLY SHOULD TRAP
4434                                                                    ;BUT HERE NO TRAP SHOULD
4435                                                                    ;OCCUR FOR TRAPS HAVE BEEN DISABLED.
4436
4437  022646                            KXERR:                          ;A TRAP HAS ERRONEOUSLY
4438  022646  012637  001236                    MOV     (SP)+,$TMP2     ;TAKEN PLACE, REPORT
4439  022652  005726                            TST     (SP)+           ;UNABLE TO DISABLE TRAPS.
4440  022654  013737  177746  001240            MOV     @#CONTRL,$TMP3
4441  022662  013737  177740  001242            MOV     @#LOADRS,$TMP4
4442  022670  013737  177742  001244            MOV     @#HIADRS,$TMP5
4443  022676  013737  177744  001246            MOV     @#MEMERR,$TMP6
4444
4445  022704  104134                    1$:     ERROR   134
4446
4447  022706  104410                    KXDONE: RSET
4448
4449
4450                                    ;;**********************************************************************
```

```
                                        ;*TEST 46       CACHE CONTROL REGISTER DISABLE TRAPS TEST 3
                                        ;*
                                        ;*THIS IS A TEST OF THE CONTROL REGISTER'S DISABLE TRAPS FUNCTION.
                                        ;*IT IS ATTEMPTED TO DISABLE A TRAP RESULTING FROM A CACHE
                                        ;*MEMORY PARITY ERROR. THE MAINTENANCE REGISTER WILL BE USED TO
                                        ;*FORCE THE ERROR ON THE LOW BYTE OF THE , IN THE  MEMORY
                                        ;*OF GROUP 0.
                                        ;*
                                        ;**************************************************************
022710  000004                  TST46:  SCOPE
022712  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000046          KZ=$TN-1
                                                                ;SET THE SKAD REGISTER
022720  012737  023110  030646          MOV     #TST47,SKAD     ;IN CASE THE TEST ABORTS.

022726  113737  001102  001232          MOVB    $TSTNM,$TMP0

022734  104415                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
022736  104416                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
022740  104417                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
022742  104420                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
022744  012737  000030  177746          MOV     #SOM1,@#CONTRL  ;USE GROUP ZERO
022752  012700  023040                  MOV     #KZ2,R0         ;MAKE KZ2 A HIT IN GROUP
022756  005710                          TST     (R0)            ;ZERO.
022760  005710                          TST     (R0)

                                                                ;SEE IF REFERENCE ADDRESS
022762  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
022770  001007                          BNE     KZ1
                                                                ;IF NOT ERROR!
022772  010037  001236                  MOV     R0,$TMP2
022776  012737  000000  001234          MOV     #0,$TMP1
023004  104001                          ERROR   1

023006  104411                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

023010  052737  000001  177746  KZ1:    BIS     #BIT0,@#CONTRL  ;DISABLE 'WARNING' TRAPS.
023016  012737  023046  000114          MOV     #KZERR,@#CACHVEC        ;SET UP FOR ERROR WHICH
                                                                ;SHOULD NOT TRAP!
023024  012704  000020                  MOV     #20,R4          ;PATTERN FOR MAINT REG.
023030  012702  177750                  MOV     #MAINT,R2
023034  000240                          NOP
023036  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
023040  005012          KZ2:    CLR     (R2)                    ;THE FETCH OF THIS
023042  000240                          NOP                     ;INSTRUCTION SHOULD CAUSE
023044  000420                          BR      KZDONE          ;A CACHE  MEMORY
                                                                ;PARITY ERROR WHICH
                                                                ;NORMALLY SHOULD TRAP
                                                                ;BUT HERE NO TRAP SHOULD
                                                                ;OCCUR FOR TRAPS HAVE BEEN DISABLED.

023046          KZERR:                                          ;A TRAP HAS ERRONEOUSLY
023046  012637  001236                  MOV     (SP)+,$TMP2     ;TAKEN PLACE, REPORT
023052  005726                          TST     (SP)+           ;UNABLE TO DISABLE TRAPS.
023054  013737  177746  001240          MOV     @#CONTRL,$TMP3
023062  013737  177740  001242          MOV     @#LOADRS,$TMP4
```

```
4507  023070  013737  177742  001244          MOV     @#HIADRS,$TMP5
4508  023076  013737  177744  001246          MOV     @#MEMERR,$TMP6
4509
4510  023104  104134                  1$:     ERROR   134
4511
4512  023106  104410                  KIDONE: RSET
4513
4514
4515
4516
4517
4518                                  ;;*****************************************************************
4519                                  ;*TEST 47       CACHE ERROR REGISTER LOCK UP TEST 1
4520                                  ;*
4521                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON
4522                                  ;*THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE
4523                                  ;*ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST
4524                                  ;*ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED
4525                                  ;*ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO
4526                                  ;*THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST
4527                                  ;*REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU
4528                                  ;*TO THE CACHE DIRECTLY.
4529                                  ;*THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU
4530                                  ;*TO THE CACHE DIRECTLY.
4531                                  ;*
4532                                  ;;*****************************************************************
4533  023110  000004                  TST47:  SCOPE
4534  023112  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
4535          000047                  NA=$TN-1
4536                                                                  ;SET THE SKAD REGISTER
4537  023120  012737  023474  030646          MOV     #TST50,SKAD     ;IN CASE THE TEST ABORTS.
4538
4539  023126  113737  001102  001232          MOVB    $TSTNM,$TMP0
4540
4541  023134  104415                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
4542  023136  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
4543  023140  104417                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
4544  023142  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
4545  023144  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
4546
4547
4548  023152  012737  023226  000114          MOV     #NA3,@#CACHVEC          ;SET UP FOR THE ERROR.
4549  023160  012704  010000                  MOV     #10000,R4               ;PATTERN TO BE PUT IN
4550  023164  012702  177750                  MOV     #MAINT,R2               ;THE MAINT. REG.
4551  023170  000401                          BR      NA1
4552
4553          023172                          LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4554          023170                          LOC=-4&LOC
4555          023174                          LOC=LOC+4
4556          023174                          .=LOC
4557
4558  023174  000240                  NA1:    NOP
4559  023176  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
4560  023200  005701                  NA2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4561  023202  005012                          CLR     (R2)            ;SHOULD CAUSE AN ABORT!
4562  023204  000240                          NOP
```

```
4563                                                                    ;IF NONE OCCURS REPORT
4564  023206  012737  010000  001236          MOV     #10000,$TMP2      ;ERROR!
4565  023214  104127                  1$:     ERROR   127
4566  023216  012737  177777  031102          MOV     #-1,MANFL2
4567  023224  000522                  BR      NADONE
4568
4569
4570  023226                          NA3:
4571
4572  023226  012737  023302  000114          MOV     #NA6,@#CACHVEC          ;SET UP FOR THE ERROR.
4573  023234  012704  010000                  MOV     #10000,R4               ;PATTERN TO BE PUT IN
4574  023240  012702  177750                  MOV     #MAINT,R2               ;THE MAINT. REG.
4575  023244  000401                          BR      NA4
4576
4577          023246                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4578          023244                          LOC=-4&LOC
4579          023250                          LOC=LOC+4
4580          023250                          .=LOC
4581
4582  023250  000240                  NA4:    NOP
4583  023252  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
4584  023254  005701                  NA5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4585  023256  005012                          CLR     (R2)            ;SHOULD CAUSE AN ABORT!
4586  023260  000240                          NOP
4587                                                                  ;IF NONE OCCURS REPORT
4588  023262  012737  010000  001236          MOV     #10000,$TMP2    ;ERROR!
4589  023270  104127                  1$:     ERROR   127
4590  023272  012737  177777  031102          MOV     #-1,MANFL2
4591  023300  000474                  BR      NADONE
4592
4593
4594  023302                          NA6:
4595
4596  023302  062706  000010                  ADD     #10,SP          ;RESET THE STACK.
4597  023306  022737  144404  177744          CMP     #144404,@#MEMERR        ;SEE IF THE ERROR REGISTER
4598  023314  001004                          BNE     NA7             ;IS SET CORRECTLY.
4599  023316  022737  023200  177740          CMP     #NA2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
4600  023324  001422                          BEQ     NA8             ;IS SET CORRECTLY.
4601
4602  023326                          NA7:                            ;NOT SET CORRECTLY!
4603  023326  012737  144404  001236          MOV     #144404,$TMP2   ;REPORT FAILURE.
4604  023334  013737  177744  001240          MOV     @#MEMERR,$TMP3
4605  023342  012737  023200  001242          MOV     #NA2,$TMP4
4606  023350  005037  001244                  CLR     $TMP5
4607  023354  013737  177740  001246          MOV     @#LOADRS,$TMP6
4608  023362  013737  177742  001250          MOV     @#HIADRS,$TMP7
4609
4610  023370  104135                  1$:     ERROR   135
4611
4612  023372  005037  177572          NA8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
4613  023376  005037  172516                  CLR     @#MMR3
4614  023402  012737  177777  177744          MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
4615  023410  005737  177744                  TST     @#MEMERR        ;ERROR REG.
4616  023414  001416                          BEQ     NA10
4617
4618  023416                          NA9:                            ;WON'T CLEAR!
```

```
 4619  023416  013737  177740  001236          MOV     @#LOADRS,$TMP2
 4620  023424  013737  177742  001240          MOV     @#HIADRS,$TMP3
 4621  023432  013737  177744  001242          MOV     @#MEMERR,$TMP4
 4622
 4623  023440  104130                  1$:     ERROR   130
 4624  023442  012737  177777  001062          MOV     #-1,MMRFLG
 4625  023450  000410                          BR      NADONE
 4626
 4627  023452  022737  177740  177740  NA1C:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGISTER
 4628  023460  001356                          BNE     NA9              ;WAS RESET
 4629  023462  022737  000003  177742          CMP     #3,@#HIADRS
 4630  023470  001352                          BNE     NA9
 4631
 4632  023472  104410                  NADONE: RESET
 4633
 4634
 4635                                          ;;**********************************************************************
 4636                                          ;*TEST 50       CACHE ERROR REGISTER LOCK UP TEST 2
 4637                                          ;*
 4638                                          ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON
 4639                                          ;*THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE
 4640                                          ;*ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST
 4641                                          ;*ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED
 4642                                          ;*ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO
 4643                                          ;*THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST
 4644                                          ;*REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU
 4645                                          ;*TO THE CACHE DIRECTLY.
 4646                                          ;*THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU
 4647                                          ;*TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.
 4648                                          ;*
 4649                                          ;;**********************************************************************
 4650  023474  000004                  TST50:  SCOPE
 4651  023476  012737  000040  001302          MOV     #40,$TIMES       ;;DO 40 ITERATIONS
 4652          000050                  NB=$TN-1
 4653                                                                   ;SET THE SKAD REGISTER
 4654  023504  012737  024164  030646          MOV     #TST51,SKAD      ;IN CASE THE TEST ABORTS.
 4655
 4656  023512  113737  001102  001232          MOVB    $TSTNM,$TMP0
 4657
 4658  023520  104415                          SKPBER                   ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4659  023522  104416                          SKPBCN                   ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4660  023524  104417                          SKPBMN                   ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 4661  023526  104420                          SKPBHM                   ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4662  023530  104412                          MMSKIP
 4663
 4664  023532  012700  172340                  MOV     #KIPAR0,R0       ;SET UP MEMORY MANAGEMENT
 4665                                                                   ;TO RELOCATE EVERYTHING
 4666  023536  012702  172300                  MOV     #KIPDR0,R2       ;THROUGH THE UNIBUS
 4667  023542  012703  000007                  MOV     #7,R3            ;MAP PASSIVELY TO MEMORY.
 4668  023546  005004                          CLR     R4               ;BY PASSIVELY IS MEANT
 4669  023550  012705  170200                  MOV     #MAPLOO,R5       ;THAT ADDRESS ARE
 4670                                                                   ;RELOCATED TO THEMSELVES.
 4671  023554  012722  077406          64$:    MOV     #77406,(R2)+
 4672  023560  010401                          MOV     R4,R1
 4673  023562  072127  000006                  ASH     #6,R1
 4674  023566  010125                          MOV     R1,(R5)+
```

```
4675  023570  005025                          CLR     (R5)+
4676  023572  010410                          MOV     R4,(R0)
4677  023574  062720  170000                  ADD     #170000,(R3)+
4678  023600  062704  000200                  ADD     #200,R4
4679  023604  077315                          SOB     R3,64$
4680  023606  012710  177600                  MOV     #177600,(R0)
4681  023612  012712  077406                  MOV     #77406,(R2)
4682
4683  023616  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
4684
4685
4686  023624  012737  023732  000114          MOV     #NB3,@#CACHVEC          ;SET UP FOR THE ERROR.
4687  023632  012704  010000                  MOV     #10000,R4               ;PATTERN TO BE PUT IN
4688  023636  012702  177750                  MOV     #MAINT,R2               ;THE MAINT. REG.
4689  023642  000402                          BR      NB1
4690
4691          023644                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4692          023644                          LOC=-4&LOC
4693          023650                          LOC=LOC+4
4694          023650                          .=LOC
4695
4696  023650  000240                  NB1:    NOP
4697  023652  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
4698  023654  005701                  NB2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4699  023656  005012                          CLR     (R2)            ;SHOULD CAUSE AN ABORT!
4700  023660  000240                          NOP
4701                                                                  ;IF NONE OCCURS REPORT
4702  023662  012737  010000  001236          MOV     #10000,$TMP2    ;ERROR!
4703  023670  104127                  1$:     ERROR   127
4704  023672  012737  177777  031102          MOV     #-1,MANFL2
4705  023700  000530                  BR      NBDONE
4706
4707
4708  023702                          NB3:
4709
4710  023702  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
4711  023710  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
4712  023716  012737  023772  000114          MOV     #NB6,@#CACHVEC  ;SET UP FOR ERROR
4713  023724  012704  010000                  MOV     #10000,R4       ;PATTERN TO BE PUT IN
4714  023730  012702  177750                  MOV     #MAINT,R2       ;THE MAINT. REG.
4715  023734  000401                          BR      NB4
4716
4717          023736                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4718          023734                          LOC=-4&LOC
4719          023740                          LOC=LOC+4
4720          023740                          .=LOC
4721
4722  023740  000240                  NB4:    NOP
4723  023742  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
4724  023744  005701                  NB5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4725  023746  005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
4726  023750  000240                          NOP                     ;AND UNIBUS PB ASSERTED!
4727                                                                  ;NO ABORT OCCURRED!
4728  023752  012737  010000  001236          MOV     #10000,$TMP2    ;REPORT FAILURE
4729  023760  104127                  1$:     ERROR   127
4730  023762  012737  177777  031066          MOV     #-1,MANFLG
```

```
4731  023770  000474                        BR      .+1000
4732
4733
4734  023772                        NB6:
4735
4736  023772  062706  000010                ADD     #10,SP          ;RESET THE STACK.
4737  023776  022737  137404  177744        CMP     #137404,@#MEMERR        ;SEE IF THE ERROR REGISTER
4738  024004  001004                        BNE     NB7             ;IS SET CORRECTLY.
4739  024006  022737  023654  177740        CMP     #NB2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
4740  024014  001422                        BEQ     NB8             ;IS SET CORRECTLY.
4741
4742  024016                        NB7:                            ;NOT SET CORRECTLY!
4743  024016  012737  137404  001236        MOV     #137404,$TMP2   ;REPORT FAILURE.
4744  024024  013737  177744  001240        MOV     @#MEMERR,$TMP3
4745  024032  012737  023654  001242        MOV     #NB2,$TMP4
4746  024040  005037  001244                CLR     $TMP5
4747  024044  013737  177740  001246        MOV     @#LOADRS,$TMP6
4748  024052  013737  177742  001250        MOV     @#HIADRS,$TMP7
4749
4750  024060  104135                1$:     ERROR   135
4751
4752  024062  005037  177572        NB8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
4753  024066  005037  172516                CLR     @#MMR3
4754  024072  012737  177777  177744        MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
4755  024100  005737  177744                TST     @#MEMERR        ;ERROR REG.
4756  024104  001416                        BEQ     NB10
4757
4758  024106                        NB9:                            ;WON'T CLEAR!
4759  024106  013737  177740  001236        MOV     @#LOADRS,$TMP2
4760  024114  013737  177742  001240        MOV     @#HIADRS,$TMP3
4761  024122  013737  177744  001242        MOV     @#MEMERR,$TMP4
4762
4763  024130  104130                1$:     ERROR   130
4764  024132  012737  177777  031062        MOV     #-1,MMRFLG
4765  024140  000410                        BR      NBDONE
4766
4767  024142  022737  177740  177740  NB10: CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGISTER
4768  024150  001356                        BNE     NB9             ;HAS RESET
4769  024152  022737  000003  177742        CMP     #3,@#HIADRS
4770  024160  001352                        BNE     NB9
4771
4772  024162  104410                NBDONE: RSET
4773
4774
4775                                ;;*****************************************************************
4776                                ;*TEST 51       CACHE ERROR REGISTER LOCK UP TEST 3
4777                                ;*
4778                                ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON
4779                                ;*THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE
4780                                ;*ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST
4781                                ;*ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED
4782                                ;*ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO
4783                                ;*THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST
4784                                ;*REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU
4785                                ;*TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.
4786                                ;*THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CP
```

```
                                        ;*TO THE CACHE DIRECTLY.
                                        ;*
                                        ;;*****************************************************************
024164  000004                    TST51:  SCOPE
024166  012737  000040  001302            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000051              NC=$TN-1
                                                                    ;SET THE SKAD REGISTER
024174  012737  024564  000646            MOV     #TST52,SKAD     ;IN CASE THE TEST ABORTS.

024202  113737  001102  001332            MOVB    $TSTNM,$TMP0

024210  104415                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
024212  104416                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
024214  104417                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
024216  104420                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
024220  104412                            MMSKIP

024222  012700  172340                    MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                    ;TO RELOCATE EVERYTHING
024226  012702  172300                    MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
024232  012703  000007                    MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
024236  005004                            CLR     R4              ;BY PASSIVELY IS MEANT
024240  012705  170200                    MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
                                                                    ;RELOCATED TO THEMSELVES.
024244  012722  077406            64$:    MOV     #77406,(R2)+
024250  010401                            MOV     R4,R1
024252  072127  000006                    ASH     #6,R1
024256  010125                            MOV     R1,(R5)+
024260  005025                            CLR     (R5)+
024262  010410                            MOV     R4,(R0)
024264  062720  170000                    ADD     #170000,(R0)+
024270  062704  000200                    ADD     #200,R4
024274  077315                            SOB     R3,64$
024276  012710  177600                    MOV     #177600,(R0)
024302  012712  077406                    MOV     #77406,(R2)

024306  012737  000014  177746            MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.

024314  012737  000060  172516            MOV     #60,@#MMR3      ;TURN ON THE MAP AND
024322  012737  000001  177572            MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
024330  012737  024406  000114            MOV     #NC3,@#CACHVEC  ;SET UP FOR ERROR
024336  012704  010000                    MOV     #10000,R4       ;PATTERN TO BE PUT IN
024342  012702  177750                    MOV     #MAINT,R2       ;THE MAINT. REG.
024346  000402                            BR      NC1

        024350                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        024350                          LOC=-4&LOC
        024354                          LOC=LOC+4
        024354                          .=LOC

024354  000240              NC1:        NOP
024356  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
024360  005701              NC2:        TST     R1              ;THE FETCH OF THIS INSTRUCTION
024362  005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
024364  000240                          NOP                     ;AND UNIBUS PB ASSERTED!
```

```
4943                                                                    ;NO ABORT OCCURRED!
4944  024366  012737  010000  001236        MOV     #10000,$TMP2      ;REPORT FAILURE
4945  024374  104127                1$:     ERROR   127
4946  024376  012737  177777  031066        MOV     #-1,MANFLG
4947  024404  000526                        BR      NCDONE
4948
4949
4950  024406  005037  177572        NC3:    CLR     @#MMR0                  ;TURN OFF MEMORY MANAGEMENT.
4951  024412  005037  172516                CLR     @#MMR3
4952
4953  024416  012737  024472  000114        MOV     #NC6,@#CACHVEC          ;SET UP FOR THE ERROR.
4954  024424  012704  010000                MOV     #10000,R4               ;PATTERN TO BE PUT IN
4955  024430  012702  177750                MOV     #MAINT,R2               ;THE MAINT. REG.
4956  024434  000401                        BR      NC4
4957
4958          024436                        LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4959          024434                        LOC=-4&LOC
4960          024440                        LOC=LOC+4
4961          024440                        .=LOC
4962
4963  024440  000240        NC4:    NOP
4964  024442  010412                MOV     R4,(R2)         ;SET THE MAINT. REG.
4965  024444  005701        NC5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4966  024446  005012                CLR     (R2)            ;SHOULD CAUSE AN ABORT!
4967  024450  000240                NOP
4968                                                        ;IF NONE OCCURS REPORT
4969  024452  012737  010000  001236        MOV     #10000,$TMP2    ;ERROR!
4970  024460  104127                1$:     ERROR   127
4971  024462  012737  177777  031102        MOV     #-1,MANFL2
4972  024470  000474                BR      NCDONE
4973
4974
4975  024472                        NC6:
4976
4977  024472  062706  000010                ADD     #10,SP          ;RESET THE STACK.
4978  024476  022737  167404  177744        CMP     #167404,@#MEMERR        ;SEE IF THE ERROR REGISTER
4979  024504  001004                        BNE     NC7             ;IS SET CORRECTLY.
4980  024506  022737  024360  177740        CMP     #NC2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
4981  024514  001422                        BEQ     NC8             ;IS SET CORRECTLY.
4982
4983  024516                        NC7:                            ;NOT SET CORRECTLY!
4984  024516  012737  167404  001236        MOV     #167404,$TMP2   ;REPORT FAILURE.
4985  024524  013737  177744  001240        MOV     @#MEMERR,$TMP3
4986  024532  012737  024360  001242        MOV     #NC2,$TMP4
4987  024540  005037  001244                CLR     $TMP5
4988  024544  013737  177740  001246        MOV     @#LOADRS,$TMP6
4989  024552  013737  177742  001250        MOV     @#HIADRS,$TMP7
4990
4991  024560  104135                1$:     ERROR   135
4992
4993  024562  005037  177572        NC8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
4994  024566  005037  172516                CLR     @#MMR3
4995  024572  012737  177777  177744        MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
4996  024600  005737  177744                TST     @#MEMERR        ;ERROR REG.
4997  024604  001416                        BEQ     NC10
4998
```

```
 4899  024636                          NC9:                            ;WON'T CLEAR!
 4900  024636  013737  177740  001236          MOV     @#LOADRS,$TMP2
 4901  024644  013737  177742  001240          MOV     @#HIADRS,$TMP3
 4902  024652  013737  177744  001242          MOV     @#MEMERR,$TMP4
 4903
 4904  024660  104130                  1$:     ERROR   130
 4905  024662  012737  177777  031062          MOV     #-1,MMRFLG
 4906  024670  000410                          BR      NCDONE
 4907
 4908  024672  022737  177740  177740  NC10:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGISTER
 4909  024700  001356                          BNE     NC9             ;HAS RESET
 4910  024702  022737  000003  177742          CMP     #3,@#HIADRS
 4911  024710  001352                          BNE     NC9
 4912
 4913  024712  104410                  NCDONE: RSET
 4914
 4915
 4916                                          ;;*****************************************************************
 4917                                          ;*TEST 52       CACHE ERROR REGISTER LOCK UP TEST 4
 4918                                          ;*
 4919                                          ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO LOCK UP ON
 4920                                          ;*THE FIRST ERROR WHEN A SERIES OF ERRORS OCCUR. ALSO TESTED IS THE
 4921                                          ;*ERROR ADDRESS'S ABILITY TO LOCK ON THE ADDRESS OF THE FIRST
 4922                                          ;*ERROR IN A SEQUENCE OF ERRORS. IN THIS TEST TWO ERROR ARE FORCED
 4923                                          ;*ON TOP OF EACH OTHER, BOTH OF THEM WILL BE ERRORS TO
 4924                                          ;*THE MAIN MEMORY WANTED WORD DATA PARITY ERRORS! THE FIRST
 4925                                          ;*REFERENCE RESULTING IN AN ERROR WILL BE MADE FROM THE CPU
 4926                                          ;*TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.
 4927                                          ;*THE SECOND EPROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU
 4928                                          ;*TO THE UNIBUS THROUGH THE MAPPING BOX TO THE CACHE.
 4929                                          ;*
 4930                                          ;;*****************************************************************
 4931  024714  000004                  TST52:  SCOPE
 4932  024716  012737  000040  001302          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 4933                   000052          ND=$TN-1
 4934                                                                  ;SET THE SKAD REGISTER
 4935  024724  012737  025370  030646          MOV     #TST53,SKAD     ;IN CASE THE TEST ABORTS.
 4936
 4937  024732  113737  001102  001232          MOVB    $TSTNM,$TMP0
 4938
 4939  024740  104415                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4940  024742  104416                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4941  024744  104417                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SkIP TEST.
 4942  024746  104420                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4943  024750  104412                          MMSKIP
 4944
 4945  024752  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
 4946                                                                  ;TO RELOCATE EVERYTHING
 4947  024756  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
 4948  024762  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
 4949  024766  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
 4950  024770  012705  170200                  MOV     #MAPLOO,R5      ;THAT ADDRESS ARE
 4951                                                                  ;RELOCATED TO THEMSELVES.
 4952  024774  012722  077406          64$:    MOV     #77406,(R2)+
 4953  025000  010401                          MOV     R4,R1
 4954  025002  072127  000006                  ASH     #6,R1
```

```
4955  024756  010125                          MOV     P1,(R5)+
4956  024760  005025                          CLR     (R5)+
4957  024762  010410                          MOV     R4,(R0)
4958  024764  062720  170000                  ADD     #170000,(R0)+
4959  024770  062704  000200                  ADD     #200,R4
4960  024774  077315                          SOB     R3,64$
4961  024776  012710  177600                  MOV     #177600,(R0.
4962  025002  012712  077406                  MOV     #77406,(R2)
4963
4964  025006  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
4965
4966
4967  025014  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
4968  025022  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
4969  025030  012737  025106  000114          MOV     #ND3,@#CACHVEC  ;SET UP FOR ERROR
4970  025036  012704  010000                  MOV     #10000,R4       ;PATTERN TO BE PUT IN
4971  025042  012702  177750                  MOV     #MAINT,R2       ;THE MAINT. REG.
4972  025046  000402                          BR      ND1
4973
4974          025050                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
4975          025050                          LOC=-4&LOC
4976          025054                          LOC=LOC+4
4977          025054                          .=LOC
4978
4979  025054  000240                  ND1:    NOP
4980  025056  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
4981  025060  005701                  ND2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
4982  025062  005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
4983  025064  000240                          NOP                     ;AND UNIBUS PB ASSERTED!
4984                                                                  ;NO ABORT OCCURRED!
4985  025066  012737  010000  001236          MOV     #10000,$TMP2    ;REPORT FAILURE
4986  025074  104127                  1$:     ERROR   127
4987  025076  012737  177777  031066          MOV     #-1,MANFLG
4988  025104  000530                          BR      NDDONE
4989
4990
4991  025106                          ND3:
4992
4993  025106  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
4994  025114  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
4995  025122  012737  025176  000114          MOV     #ND6,@#CACHVEC  ;SET UP FOR ERROR
4996  025130  012704  010000                  MOV     #10000,R4       ;PATTERN TO BE PUT IN
4997  025134  012702  177750                  MOV     #MAINT,R2       ;THE MAINT. REG.
4998  025140  000401                          BR      ND4
4999
5000          025142                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5001          025140                          LOC=-4&LOC
5002          025144                          LOC=LOC+4
5003          025144                          .=LOC
5004
5005  025144  000240                  ND4:    NOP
5006  025146  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
5007  025150  005701                  ND5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
5008  025152  005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
5009  025154  000240                          NOP                     ;AND UNIBUS PB ASSERTED!
5010                                                                  ;NO ABORT OCCURRED!
```

```
5011  025156  012737  010000  001236          MOV     #10000,$TMP2    ;REPORT FAILURE
5012  025164  104127          1$:     ERROR   127
5013  025166  012737  177777  031066          MOV     #-1,MANFLG
5014  025174  000474                          BR      ND5ONE
5015
5016
5017  025176                          ND6:
5018
5019  025176  062706  000010                  ADD     #10,SP          ;RESET THE STACK.
5020  025202  022737  033404  177744          CMP     #33404,@#MEMERR ;SEE IF THE ERROR REGISTER
5021  025210  001004                          BNE     ND7             ;IS SET CORRECTLY.
5022  025212  022737  025060  177740          CMP     #ND2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
5023  025220  001422                          BEQ     ND8             ;IS SET CORRECTLY.
5024
5025  025222                          ND7:                            ;NOT SET CORRECTLY!
5026  025222  012737  033404  001236          MOV     #33404,$TMP2    ;REPORT FAILURE.
5027  025230  013737  177744  001240          MOV     @#MEMERR,$TMP3
5028  025236  012737  025060  001242          MOV     #ND2,$TMP4
5029  025244  005037  001244                  CLR     $TMP5
5030  025250  013737  177740  001246          MOV     @#LOADRS,$TMP6
5031  025256  013737  177742  001250          MOV     @#HIADRS,$TMP7
5032
5033  025264  104135          1$:     ERROR   135
5034
5035  025266  005037  177572          ND8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
5036  025272  005037  172516                  CLR     @#MMR3
5037  025276  012737  177777  177744          MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
5038  025304  005737  177744                  TST     @#MEMERR        ;ERROR REG.
5039  025310  001416                          BEQ     ND10
5040
5041  025312                          ND9:                            ;WON'T CLEAR!
5042  025312  013737  177740  001236          MOV     @#LOADRS,$TMP2
5043  025320  013737  177742  001240          MOV     @#HIADRS,$TMP3
5044  025326  013737  177744  001242          MOV     @#MEMERR,$TMP4
5045
5046  025334  104130          1$:     ERROR   130
5047  025336  012737  177777  031062          MOV     #-1,MMRFLG
5048  025344  000410                          BR      ND5ONE
5049
5050  025346  022737  177740  177740  ND10:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGSTER
5051  025354  001356                          BNE     ND9             ;HAS RESET
5052  025356  022737  000003  177742          CMP     #3,@#HIADRS
5053  025364  001352                          BNE     ND9
5054
5055  025366  104410          ND5ONE: RSET
5056
5057
5058                                  ;;*****************************************************************
5059                                  ;*TEST 53        MAIN MEMORY DATA PARITY CHECKERS LOW BYTE TEST
5060                                  ;*
5061                                  ;*THIS IS A TEST OF THE TWO MAIN MEMORY DATA PARITY CHECKERS
5062                                  ;*FOR THE LOW BYTE, ONE FOR EACH OF THE EVEN AND ODD WORD.
5063                                  ;*THE MAINTENANCE REGISTER IS USED TO FORCE A PARITY
5064                                  ;*ERROR AT EVERY DATA PATTERN, WHICH HAS A ZERO PARITY
5065                                  ;*BIT, THAT CAN BE WRITTEN INTO AN 8-BIT BYTE. NOTE
5066                                  ;*THAT MAIN MEMORY HAS ODD PARITY WHICH MEANS THAT
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                                        ;*A BYTE WILL HAVE A ZERO PARITY BIT IF THERE ARE
                                        ;*AN ODD NUMBER OF BITS SET (1) IN THAT BYTE. THE PARITY
                                        ;*BIT WOULD BE ONE (SET) FOR A BYTE WHICH HAD NO BITS
                                        ;*SET (1) OR A BYTE WHICH HAD AN EVEN NUMBER OF BITS SET (1).
                                        ;*THE MAINTENANCE FUNCTION FOR THE MAIN MEMORY DATA
                                        ;*PARITY CHECKERS WORKS IN SUCH A WAY AS TO
                                        ;*EFFECTIVELY FORCE THE BYTES PARITY BIT TO ONE (SET), SO
                                        ;*THAT IF THE PARITY BIT FOR THAT BYTE HAD BEEN ZERO
                                        ;*AN ERROR OCCURS! IF THE BYTE'S PARITY BIT WAS
                                        ;*ALREADY ONE THEN NO ERROR OCCURS!
                                        ;*
                                        ;;*****************************************************************
025370  000004                  TST53:  SCOPE
025372  012737  000020  001302          MOV     #20,$TIMES      ;;DO 20 ITERATIONS
        000054                  UA=$TN
                                                                ;SET THE SKAD REGISTER
025400  012737  025744  030646          MOV     #TST54,SKAD     ;IN CASE THE TEST ABORTS.

025406  113737  001102  001232          MOVB    $TSTNM,$TMPO
025414  012737  030522  000114          MOV     #SPUR,@#CACHVEC

025422  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
025430  005000                          CLR     R0              ;INITIALIZE

025432  012737  025432  001110  UA1:    MOV     #UA1,$LPERR
025440  004737  031106                  JSR     PC,PARCNT       ;SEE IF THE CURRENT TEST
025444  032702  000001                  BIT     #BIT0,R2        ;PATTERN HAS THE PARITY BIT
025450  001002                          BNE     UA2             ;OFF, IF NOT GO TO NEXT
025452  000137  025724                  JMP     UA7             ;PATTERN

025456  012737  025630  000114  UA2:    MOV     #UAER1,@#CACHVEC        ;SET UP FOR THE ERROR, EVEN WORD.
025464  012704  010000                  MOV     #10000,R4       ;THIS IS A PATTERN WHICH
025470  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED INTO THE
                                                                ;MAINTENANCE REGISTER
                                                                ;WILL FORCE AN ERROR ON
                                                                ;THE MAIN MEMORY EVEN
025474  012701  025624                  MOV     #UATMP1,R1      ;WORD LOW BYTE
025500  010011                          MOV     R0,(R1)
025502  010412                          MOV     R4,(R2)         ;SET THE MAINT REG
025504  021101                          CMP     (R1),R1         ;THE REFERENCE TO (R1),
                                                                ;UATMP1 SHOULD CAUSE
                                                                ;AN ERROR.
025506  005012                          CLR     (R2)
025510  005012                          CLR     (R2)

025512                          UA3:
                                                                ;THE ERROR DIDN'T OCCUR!
025512  010037  001236                  MOV     R0,$TMP2        ;REPORT FAILURE
025516  012737  025624  001240          MOV     #UATMP1,$TMP3
025524  005037  001242                  CLR     $TMP4
025530  104140                  64$:    ERROR   140

025532  012737  025670  000114  UA4:    MOV     #UAER2,@#CACHVEC        ;SET UP FOR THE ERROR
025540  012737  025532  001110          MOV     #UA4,$LPERR     ;ON THE ODD WORD.
025546  012704  040000                  MOV     #40000,R4       ;THIS IS A PATTERN WHICH
025552  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED IN THE MAINTENANCE
```

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5123
5124  025556  012701  025625                  MOV     #UATMP2,R1      ;REGISTER WILL CAUSE AN ERROR
5125  025562  010011                          MOV     R0,(R1)         ;ON THE ODD WORD, LOW BYTE.
5126  025564  000240                          NOP                     ;SET THE MAINT REG. AND
5127  025566  010412                          MOV     R4,(R2)         ;REFERENCE (R1), UATMP2, AND
5128  025570  021101                          CMP     (R1),R1         ;CAUSE THE ERROR.
5129
5130  025572  005012                          CLR     (R2)
5131  025574  005012                          CLR     (R2)
5132
5133  025576                          UA5:
5134                                                                  ;THE ERROR DIDN'T OCCUR!
5135  025576  010037  001236                  MOV     R0,$TMP2        ;REPORT FAILURE
5136  025602  012737  025626  001240          MOV     #UATMP2,$TMP3
5137  025610  005037  001242                  CLR     $TMP4
5138  025614  104141                  64$:    ERROR   141
5139
5140  025616  000442                  UA6:    BR      UA7
5141
5142
5143          025620                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5144          025620                          LOC=-4&LOC
5145          025624                          LOC=LOC+4
5146          025624                          .=LOC
5147
5148  025624  000000                  UATMP1:.WORD    0
5149  025626  000000                  UATMP2:.WORD    0
5150
5151  025630                          UAER1:
5152  025630  022737  104404  177744          CMP     #104404,@#MEMERR        ;MAKE SURE THE ERROR
5153  025636  001402                          BEQ     2$              ;REGISTER IS SET PROPERLY
5154  025640  000137  030522          1$:     JMP     SPUR
5155  025644  022737  025624  177740  2$:     CMP     #UATMP1,@#LOADRS        ;MAKE SURE THE ERROR
5156  025652  001372                          BNE     1$              ;OCCURRED AT THE CORRECT
5157                                                                  ;ADDRESS.
5158  025654  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
5159  025656  012737  177777  177744          MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.
5160  025664  000137  025532                  JMP     UA4             ;GO TEST THE ODD WORD
5161
5162  025670                          UAER2:
5163  025670  022737  104410  177744          CMP     #104410,@#MEMERR        ;MAKE SURE THE ERROR
5164  025676  001402                          BEQ     2$              ;REGISTER IS SET PROPERLY
5165  025700  000137  030522          1$:     JMP     SPUR
5166  025704  022737  025626  177740  2$:     CMP     #UATMP2,@#LOADRS        ;MAKE SURE THE ERROR
5167  025712  001372                          BNE     1$              ;OCCURRED AT THE CORRECT
5168                                                                  ;ADDRESS.
5169  025714  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
5170  025716  012737  177777  177744          MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.
5171
5172  025724  022700  000377          UA7:    CMP     #377,R0         ;INCREMENT THE TEST PATTERN
5173  025730  001404                          BEQ     UA8
5174  025732  062700  000001                  ADD     #1,R0
5175  025736  000137  025432                  JMP     UA1
5176
5177  025742  104410                  UA8:    RSET
5178
```

```
5179                                    ;;*****************************************************************
5180                                    ;*TEST 54       MAIN MEMORY DATA PARITY CHECKERS HIGH BYTE TEST
5181                                    ;*
5182                                    ;*THIS IS A TEST OF THE TWO MAIN MEMORY DATA PARITY CHECKERS
5183                                    ;*FOR THE HIGH BYTE, ONE FOR EACH OF THE EVEN AND ODD WORD.
5184                                    ;*THE MAINTENANCE REGISTER IS USED TO FORCE A PARITY
5185                                    ;*ERROR AT EVERY DATA PATTERN, WHICH HAS A ZERO PARITY
5186                                    ;*BIT, THAT CAN BE WRITTEN INTO AN 8-BIT BYTE. NOTE
5187                                    ;*THAT MAIN MEMORY HAS ODD PARITY WHICH MEANS THAT
5188                                    ;*A BYTE WILL HAVE A ZERO PARITY BIT IF THERE ARE
5189                                    ;*AN ODD NUMBER OF BITS SET (1) IN THAT BYTE. THE PARITY
5190                                    ;*BIT WOULD BE ONE (SET) FOR A BYTE WHICH HAD NO BITS
5191                                    ;*SET (1) OR A BYTE WHICH HAD AN EVEN NUMBER OF BITS SET (1).
5192                                    ;*THE MAINTENANCE FUNCTION FOR THE MAIN MEMORY DATA
5193                                    ;*PARITY CHECKERS WORKS IN SUCH A WAY AS TO
5194                                    ;*EFFECTIVELY FORCE THE BYTES PARITY BIT TO ONE (SET), SO
5195                                    ;*THAT IF THE PARITY BIT FOR THAT BYTE HAD BEEN ZERO
5196                                    ;*AN ERROR OCCURS! IF THE BYTE'S PARITY BIT WAS
5197                                    ;*ALREADY ONE THEN NO ERROR OCCURS!
5198                                    ;*
5199                                    ;*****************************************************************
5200  025744  000004                    TST54:  SCOPE
5201  025746  012737  000020  001302            MOV     #20,$TIMES      ;;DO 20 ITERATIONS
5202          000055                    UB=$TN
5203                                                                    ;SET THE SKAD REGISTER
5204  025754  012737  026320  030646            MOV     #TST55,SKAD     ;IN CASE THE TEST ABORTS.
5205
5206  025762  113737  001102  001232            MOVB    $TSTNM,$TMPO
5207  025770  012737  030522  000114            MOV     #SPUR,@#CACHVEC
5208
5209  025776  012737  000014  177746            MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
5210  026004  005000                            CLR     R0              ;INITIALIZE
5211
5212  026006  012737  026006  001110  UB1:     MOV     #UB1,$LPERR
5213  026014  004737  031106                    JSR     PC,PARCNT       ;SEE IF THE CURRENT TEST
5214  026020  032702  000001                    BIT     #BIT0,R2        ;PATTERN HAS THE PARITY BIT
5215  026024  001002                            BNE     UB2             ;OFF, IF NOT GO TO NEXT
5216  026026  000137  026300                    JMP     UB7             ;PATTERN
5217
5218  026032  012737  026204  000114  UB2:     MOV     #UBER1,@#CACHVEC        ;SET UP FOR THE ERROR, EVEN WORD.
5219  026040  012704  020000                    MOV     #20000,R4       ;THIS IS A PATTERN WHICH
5220  026044  012702  177750                    MOV     #MAINT,R2       ;WHEN LOADED INTO THE
5221                                                                    ;MAINTENANCE REGISTER
5222                                                                    ;WILL FORCE AN ERROR ON
5223                                                                    ;THE MAIN MEMORY EVEN
5224  026050  012701  026200                    MOV     #UBTMP1,R1      ;WORD HIGH BYTE
5225  026054  010011                            MOV     R0,(R1)
5226  026056  010412                            MOV     R4,(R2)         ;SET THE MAINT REG
5227  026060  021101                            CMP     (R1),R1         ;THE REFERENCE TO (R1).
5228                                                                    ;UBTMP1 SHOULD CAUSE
5229                                                                    ;AN ERROR.
5230  026062  005012                            CLR     (R2)
5231  026064  005012                            CLR     (R2)
5232
5233  026066                            UB3:
5234                                                                    ;THE ERROR DIDN'T OCCUR!
```

```
5235  026066  010037  001236                  MOV     R0,$TMP2        ;REPORT FAILURE
5236  026072  012737  026200  001240          MOV     #UBTMP1,$TMP3
5237  026100  005037  001242                  CLR     $TMP4
5238  026104  104142                  64$:    ERROR   142
5239
5240  026106  012737  026244  000114  UB4:    MOV     #UBER2,@#CACHVEC        ;SET UP FOR THE ERROR
5241  026114  012737  026106  001110          MOV     #UB4,$LPERR     ;ON THE ODD WORD.
5242  026122  012704  100000                  MOV     #100000,R4      ;THIS IS A PATTERN WHICH
5243  026126  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED IN THE MAINTENANCE
5244                                                                  ;REGISTER WILL CAUSE AN ERROR
5245  026132  012701  026202                  MOV     #UBTMP2,R1      ;ON THE ODD WORD, LOW BYTE.
5246  026136  010011                          MOV     R0,(R1)         ;SET THE MAINT REG. AND
5247  026140  000240                          NOP
5248  026142  010412                          MOV     R4,(R2)         ;REFERENCE (R1), UBTMP2, AND
5249  026144  021101                          CMP     (R1),R1         ;CAUSE THE ERROR.
5250
5251  026146  005012                          CLR     (R2)
5252  026150  005012                          CLR     (R2)
5253
5254  026152                           UB5:
5255                                                                  ;THE ERROR DIDN'T OCCUR!
5256  026152  010037  001236                  MOV     R0,$TMP2        ;REPORT FAILURE
5257  026156  012737  026202  001240          MOV     #UBTMP2,$TMP3
5258  026164  005037  001242                  CLR     $TMP4
5259  026170  104143                  64$:    ERROR   143
5260
5261  026172  000442                  UB6:    BR      UB7
5262
5263
5264          026174                          LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5265          026174                          LOC=-4&LOC
5266          026200                          LOC=LOC+4
5267          026200                          .=LOC
5268
5269  026200  000000                  UBTMP1:.WORD    0
5270  026202  000000                  UBTMP2:.WORD    0
5271
5272  026204                           UBER1:
5273  026204  022737  104404  177744          CMP     #104404,@#MEMERR        ;MAKE SURE THE ERROR
5274  026212  001402                          BEQ     2$              ;REGISTER IS SET PROPERLY
5275  026214  000137  030522          1$:     JMP     SPUR
5276  026220  022737  026200  177740  2$:     CMP     #UBTMP1,@#LOADRS        ;MAKE SURE THE ERROR
5277  026226  001372                          BNE     1$              ;OCCURRED AT THE CORRECT
5278                                                                  ;ADDRESS.
5279  026230  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
5280  026232  012737  177777  177744          MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.
5281  026240  000137  026106                  JMP     UB4             ;GO TEST THE ODD WORD
5282
5283  026244                           UBER2:
5284  026244  022737  104410  177744          CMP     #104410,@#MEMERR        ;MAKE SURE THE ERROR
5285  026252  001402                          BEQ     2$              ;REGISTER IS SET PROPERLY
5286  026254  000137  030522          1$:     JMP     SPUR
5287  026260  022737  026202  177740  2$:     CMP     #UBTMP2,@#LOADRS        ;MAKE SURE THE ERROR
5288  026266  001372                          BNE     1$              ;OCCURRED AT THE CORRECT
5289                                                                  ;ADDRESS.
5290  026270  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
```

```
5291  026272  012737  177777  177744          MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.
5292
5293  026300  022700  177400          LB7:    CMP     #177400,R0              ;INCREMENT THE TEST PATTERN
5294  026304  001404                          BEQ     LB8
5295  026306  062700  000400                  ADD     #400,R0
5296  026312  000137  026300                  JMP     JB1
5297
5298  026316  104410                  LB8:    RSET
5299
5300  026320                          TST55:
5301
5302
5303                                  .SBTTL  END OF PASS ROUTINE
5304
5305                                  ;;**************************************************************
5306                                  ;*INCREMENT THE PASS NUMBER ($PASS)
5307                                  ;*INDICATE END-OF-PROGRAM AFTER 1 PASSES THRU THE PROGRAM
5308                                  ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
5309                                  ;*IF THERES A MONITOR GO TO IT
5310                                  ;*IF THERE ISN'T JUMP TO LOOP
5311
5312  026320                          $EOP:
5313  026320  000004                          SCOPE
5314  026322  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
5315  026326  005037  001302                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
5316  026332  005237  001100                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
5317  026336  042737  100000  001100          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
5318  026344  005327                          DEC     (PC)+           ;;LOOP?
5319  026346  000001                  $EOPCT: .WORD   1
5320  026350  003031                          BGT     $DOAGN          ;;YES
5321  026352  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
5322  026354  000001                  $ENDCT: .WORD   1
5323  026356  026346                          $EOPCT
5324  026360  104401  026443                  TYPE    ,$ENDMG         ;;TYPE "END PASS #"
5325  026364  013746  001100                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
5326  026370  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
5327  026372  104401  026440                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
5328  026376  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
5329  026402  001414                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
5330  026404  012703  125252                  MOV     #125252,R3
5331  026410  004737  031156                  JSR     PC,CHAINQ
5332  026414  013700  000042                  MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
5333  026420  001405                          BEQ     $DOAGN          ;;RETURN ADDRESS
5334  026422  000005                          RESET                   ;;CLEAR THE WORLD
5335  026424  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
5336  026426  000240                          NOP                     ;;SAVE ROOM
5337  026430  000240                          NOP                     ;;FOR
5338  026432  000240                          NOP                     ;;ACT11
5339  026434                          $DOAGN:
5340  026434  000137                          JMP     @(PC)+          ;;RETURN
5341  026436  003364                  $RTNAD: .WORD   LOOP
5342  026440     377     377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
5343  026443     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
5344  026450  050040  051501  020123
5345  026456  000043
5346
```

```
                                        .SBTTL  SCOPE HANDLER ROUTINE

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                        ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY:7:0
                                        ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY(15:08)
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW14=1         LOOP ON TEST
                                        ;*SW11=1         INHIBIT ITERATIONS
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*SW08=1         LOOP ON TEST IN SWR(6:0)
                                        ;*CALL
                                        ;*      SCOPE           ;;SCOPE=IOT

026460                                  $SCOPE:
026460  032777  040000  152452  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
026466  001114                         BNE     $OVER           ;;YES IF SW14=1
                                        ;*****START OF CODE FOR THE XOR TESTER*****
026470  000416                         $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
026472  013746  000004                         MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
026476  012737  026516  000004                 MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
026504  005737  177060                         TST     @#177060        ;;TIME OUT ON XOR?
026510  012637  000004                         MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
026514  000466                         BR      $SVLAD          ;;GO TO THE NEXT TEST
026516  022626                 5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
026520  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
026524  000426                         BR      7$              ;;LOOP ON THE PRESENT TEST
026526                                  6$:;*****END OF CODE FOR THE XOR TESTER*****
026526  032777  000400  152404                 BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
026534  001407                         BEQ     2$              ;;BR IF NO
026536  017746  152376                 MOV     @SWR,-(SP)      ;;SET DESIRED TEST NUM. FROM SWR
026542  042716  000200                 BIC     #$SWRMK,(SP)    ;;STRIP AWAY UNDESIRED BITS
026546  122637  001102                 CMPB    (SP)+,$TSTNM    ;;ON THE RIGHT TEST?
026552  001462                         BEQ     $OVER           ;;BR IF YES
026554  105737  001103                 2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
026560  001421                         BEQ     3$              ;;BR IF NO
026562  123737  001115  001103                 CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
026570  101015                         BHI     3$              ;;BR IF NO
026572  032777  001000  152340                 BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
026600  001404                         BEQ     4$              ;;BR IF NO
026602  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
026610  000443                         BR      $OVER
026612  105037  001103                 4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
026616  005037  001302                 CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
026622  000415                         BR      1$              ;;ESCAPE TO THE NEXT TEST
026624  032777  004000  152306  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
026632  001011                         BNE     1$              ;;BR IF YES
026634  005737  001100                 TST     $PASS           ;;IF FIRST PASS OF PROGRAM
026640  001406                         BEQ     1$              ;;      INHIBIT ITERATIONS
026642  005237  001104                 INC     $ICNT           ;;INCREMENT ITERATION COUNT
026646  023737  001302  001104                 CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
026654  002021                         BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
026656  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
026664  013737  026734  001302                 MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
026672  105237  001102                 $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
```

```
005403  026676  011637  001136          MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
005404  026702  011637  001110          MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
005405  026706  005037  001304          CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
005406  026712  112737  000001  001115  MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
005407  026720  013777  001132  152214  $ONER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
005408  026726  013716  001136          MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
005409  026732  000002                  RTI                     ;;FIXES PS
005410  026734  000001          $MXCNT: 1                       ;;MAX. NUMBER OF ITERATIONS
005411
005412                                  .SBTTL  ERROR HANDLER ROUTINE
005413
005414                                  ;;**********************************************************************
005415                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
005416                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
005417                                  ;*AND GO TO ERTYPE ON ERROR
005418                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
005419                                  ;*SW15=1         HALT ON ERROR
005420                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
005421                                  ;*SW10=1         BELL ON ERROR
005422                                  ;*SW09=1         LOOP ON ERROR
005423                                  ;*CALL
005424                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
005425
005426  026736                  $ERROR:
005427  026736  105237  001103  7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
005428  026742  001775                  BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
005429  026744  013777  001102  152170  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
005430  026752  032777  002000  152160  BIT     #BIT10,@SWR     ;;BELL ON ERROR?
005431  026760  001402                  BEQ     1$              ;;NO - SKIP
005432  026762  104401  001306          TYPE    ,$BELL          ;;RING BELL
005433  026766  005237  001112  1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
005434  026772  011637  001116          MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
005435  026776  162737  000002  001116  SUB     #2,$ERRPC
005436  027004  117737  152106  001114  MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
005437  027012  032777  020000  152120  BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
005438  027020  001004                  BNE     20$             ;;SKIP TYPEOUTS
005439  027022  004737  031352          JSR     PC,ERTYPE       ;;GO TO USER ERROR ROUTINE
005440  027026  104401  001313          TYPE    ,$CRLF
005441  027032                  20$:
005442  027032  005777  152102  2$:     TST     @SWR            ;;HALT ON ERROR
005443  027036  100001                  BPL     3$              ;;SKIP IF CONTINUE
005444  027040  000000                  HALT                    ;;HALT ON ERROR!
005445  027042  032777  001000  152070  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
005446  027050  001402                  BEQ     4$              ;;BR IF NO
005447  027052  013716  001110          MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
005448  027056  005737  001304  4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
005449  027062  001402                  BEQ     5$              ;;BR IF NONE
005450  027064  013716  001304          MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
005451  027070                  5$:
005452  027070  022737  026424  000042  CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
005453  027076  001001                  BNE     6$              ;;BRANCH IF NO
005454  027100  000000                  HALT                    ;;YES
005455  027102                  6$:
005456  027102  012737  177777  177744  MOV     #-1,@#MEMERR
005457  027110  005037  177766          CLR     @#CPUERR
005458  027114  000002                  RTI
```

D10


```
                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

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

027116                          $SAVREG:
027116  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
027120  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
027122  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
027124  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
027126  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
027130  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
027132  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
027136  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
027142  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
027146  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
027152  000002                          RTI

                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*         RESREG
027154                          $RESREG:
027154  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
027160  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
027164  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
027170  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
027174  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
027176  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
027200  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
027202  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
027204  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
027206  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
027210  000002                          RTI

                                .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.
                                ;*
```

E10


```
                                        ;*CALL:
                                        ;*1) USING A TRAP INSTRUCTION
                                        ;*        TYPE    ,MESADR          ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                        ;*OR
                                        ;*        TYPE
                                        ;*        MESADR
                                        ;*
027212  105737  001157                  $TYPE:  TSTB    $TPFLG           ;;IS THERE A TERMINAL?
027216  100002                                  BPL     1$               ;;BR IF YES
027220  000000                                  HALT                     ;;HALT HERE IF NO TERMINAL
027222  000407                                  BR      3$               ;;LEAVE
027224  010046                          1$:     MOV     R0,-(SP)         ;;SAVE R0
027226  017600  000002                          MOV     @2(SP),R0        ;;GET ADDRESS OF ASCIZ STRING
027232  112046                          2$:     MOVB    (R0)+,-(SP)      ;;PUSH CHARACTER TO BE TYPED ONTO STACK
027234  001005                                  BNE     4$               ;;BR IF IT ISN'T THE TERMINATOR
027236  005726                                  TST     (SP)+            ;;IF TERMINATOR POP IT OFF THE STACK
027240  012600                          60$:    MOV     (SP)+,R0         ;;RESTORE R0
027242  062716  000002                  3$:     ADD     #2,(SP)          ;;ADJUST RETURN PC
027246  000002                                  RTI                      ;;RETURN
027250  122716  000011                  4$:     CMPB    #HT,(SP)         ;;BRANCH IF <HT>
027254  001430                                  BEQ     8$
027256  122716  000200                          CMPB    #CRLF,(SP)       ;;BRANCH IF NOT <CRLF>
027262  001006                                  BNE     5$
027264  005726                                  TST     (SP)+            ;;POP  <CR><LF> EQUIV
027266  104401                                  TYPE                     ;;TYPE A CR AND LF
027270  001313                                  $CRLF
027272  105037  027426                          CLRB    $CHARCNT         ;;CLEAR CHARACTER COUNT
027276  000755                                  BR      2$               ;;GET NEXT CHARACTER
027300  004737  027362                  5$:     JSR     PC,$TYPEC        ;;GO TYPE THIS CHARACTER
027304  123726  001156                  6$:     CMPB    $FILLC,(SP)+     ;;IS IT TIME FOR FILLER CHARS.?
027310  001350                                  BNE     2$               ;;IF NO GO GET NEXT CHAR.
027312  013746  001154                          MOV     $NULL,-(SP)      ;;GET # OF FILLER CHARS. NEEDED
                                                                         ;;AND THE NULL CHAR.
027316  105366  000001                  7$:     DECB    1(SP)            ;;DOES A NULL NEED TO BE TYPED?
027322  002770                                  BLT     6$               ;;BR IF NO--GO POP THE NULL OFF OF STACK
027324  004737  027362                          JSR     PC,$TYPEC        ;;GO TYPE A NULL
027330  105337  027426                          DECB    $CHARCNT         ;;DO NOT COUNT AS A COUNT
027334  000770                                  BR      7$               ;;LOOP

                                        ;HORIZONTAL TAB PROCESSOR

027336  112716  000040                  8$:     MOVB    #' ,(SP)         ;;REPLACE TAB WITH SPACE
027342  004737  027362                  9$:     JSR     PC,$TYPEC        ;;TYPE A SPACE
027346  132737  000007  027426                  BITB    #7,$CHARCNT      ;;BRANCH IF NOT AT
027354  001372                                  BNE     9$               ;;TAB STOP
027356  005726                                  TST     (SP)+            ;;POP SPACE OFF STACK
027360  000724                                  BR      2$               ;;GET NEXT CHARACTER
027362  105777  151562                  $TYPEC: TSTB    @$TPS            ;;WAIT UNTIL PRINTER IS READY
027366  100375                                  BPL     $TYPEC
027370  116677  000002  151554                  MOVB    2(SP),@$TPB      ;;LOAD CHAR TO BE TYPED INTO DATA REG.
027376  122766  000015  000002                  CMPB    #CR,2(SP)        ;;IS CHARACTER A CARRIAGE RETURN?
027404  001003                                  BNE     1$               ;;BRANCH IF NO
027406  105037  027426                          CLRB    $CHARCNT         ;;YES--CLEAR CHARACTER COUNT
027412  000406                                  BR      $TYPEX           ;;EXIT
027414  122766  000012  000002          1$:     CMPB    #LF,2(SP)        ;;IS CHARACTER A LINE FEED?
```

```
027432  001402                  BEQ     $TYPEX          ;;BRANCH IF YES
027434  105237  000000          INCB    .PC,#           ;;COUNT THE CHARACTER
027436  000000          $C-$PCNT:.WORD  C               ;;CHARACTER COUNT STORAGE
027440  000207          $TYPEX: RTS     PC


                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

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

027432  017646  000000  $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
027436  116637  000001  027655  MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
027444  112637  027657          MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
027450  062716  000002          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
027454  000406                  BR      $TYPON
027456  112737  000001  027655  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
027464  112737  000006  027657          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
027472  112737  000005  027654  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
027500  010346                  MOV     R3,-(SP)        ;;SAVE R3
027502  010446                  MOV     R4,-(SP)        ;;SAVE R4
027504  010546                  MOV     R5,-(SP)        ;;SAVE R5
027506  113704  027657          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
027512  005404                  NEG     R4
027514  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
027520  110437  027656          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
027524  113704  027655          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
027530  016605  000012          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
027534  005003                  CLR     R3              ;;CLEAR THE OUTPUT WORD
027536  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
027540  000404                  BR      3$              ;;GO DO MSB
027542  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
027544  006105                  ROL     R5
027546  006105                  ROL     R5
027550  010503                  MOV     R5,R3
027552  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
```

```
027554 105337 027655            DECB    $OMODE          ;;TYPE THIS DIGIT?
027560 100016                   BPL     7$              ;;BR IF NO
027562 042703 177770            BIC     #177770,R3      ;;GET RID OF JUNK
027566 001002                   BNE     4$              ;;TEST FOR 0
027570 005704                   TST     R4              ;;SUPPRESS THIS 0?
027572 001403                   BEQ     5$              ;;BR IF YES
027574 005204           4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
027576 052703 000060            BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
027602 052703 000040    5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
027606 110337 027652            MOVB    R3,8$           ;;SAVE FOR TYPING
027612 104401 027652            TYPE    ,8$             ;;GO TYPE THIS DIGIT
027616 105337 027654    7$:     DECB    $OCNT           ;;COUNT BY 1
027622 003347                   BGT     2$              ;;BR IF MORE TO DO
027624 002402                   BLT     6$              ;;BR IF DONE
027626 005204                   INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
027630 000744                   BR      2$              ;;GO DO THE LAST DIGIT
027632 012605           6$:     MOV     (SP)+,R5        ;;RESTORE R5
027634 012604                   MOV     (SP)+,R4        ;;RESTORE R4
027636 012603                   MOV     (SP)+,R3        ;;RESTORE R3
027640 016666 000002 000004     MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
027646 012616                   MOV     (SP)+,(SP)
027650 000002                   RTI                     ;;RETURN
027652    000           8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
027653    000                   .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
027654    000           $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
027655    000           $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
027656 000000           $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE

                        .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

                        ;;*************************************************************
                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                        ;*REPLACED WITH SPACES.
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                        ;*      TYPDS                   ;;GO TO THE ROUTINE

027660                  $TYPDS:
027660 010046                   MOV     R0,-(SP)        ;;PUSH R0 ON STACK
027662 010146                   MOV     R1,-(SP)        ;;PUSH R1 ON STACK
027664 010246                   MOV     R2,-(SP)        ;;PUSH R2 ON STACK
027666 010346                   MOV     R3,-(SP)        ;;PUSH R3 ON STACK
027670 010546                   MOV     R5,-(SP)        ;;PUSH R5 ON STACK
027672 012746 020200            MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
027676 016605 000020            MOV     20(SP),R5       ;;GET THE INPUT NUMBER
027702 100004                   BPL     1$              ;;BR IF INPUT IS POS.
027704 005405                   NEG     R5              ;;MAKE THE BINARY NUMBER POS.
027706 112766 000055 000001     MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
027714 005000           1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
027716 012703 030074            MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
027722 112723 000040            MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
027726 005002           2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
027730 016001 030064            MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
```

```
5693  027734  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
5694  027736  002402                          BLT     4$              ;;BR IF DONE
5695  027740  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
5696  027742  000774                          BR      2$
5697  027744  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
5698  027746  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
5699  027750  001002                          BNE     5$              ;;FALL THROUGH IF 0
5700  027752  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
5701  027754  100407                          BMI     7$              ;;BR IF YES
5702  027756  106316                  5$:     ASLB    (SP)            ;;MSD?
5703  027760  103003                          BCC     6$              ;;BR IF NO
5704  027762  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
5705  027770  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
5706  027774  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
5707  030000  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
5708  030002  005720                          TST     (R0)+           ;;JUST INCREMENTING
5709  030004  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
5710  030010  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
5711  030012  003002                          BGT     9$              ;;GO TO EXIT
5712  030014  010502                          MOV     R5,R2           ;;GET THE LSD
5713  030016  000764                          BR      6$              ;;GO CHANGE TO ASCII
5714  030020  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
5715  030022  100003                          BPL     9$              ;;BR IF NO
5716  030024  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
5717  030032  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
5718  030034  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
5719  030036  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
5720  030040  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5721  030042  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5722  030044  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
5723  030046  104401  030074                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
5724  030052  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
5725  030060  012616                          MOV     (SP)+,(SP)
5726  030062  000002                          RTI                     ;;RETURN TO USER
5727  030064  023420                  $DTBL:  10000.
5728  030066  001750                          1000.
5729  030070  000144                          100.
5730  030072  000012                          10.
5731  030074  000004                  $DBLK:  .BLKW   4
5732
5733                                          .SBTTL  TRAP DECODER
5734
5735                                          ;;**************************************************************
5736                                          ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
5737                                          ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
5738                                          ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
5739                                          ;*GO TO THAT ROUTINE.
5740
5741  030104  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
5742  030106  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
5743  030112  005740                          TST     -(R0)           ;;BACKUP BY 2
5744  030114  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
5745  030116  006300                          ASL     R0              ;;POSITION FOR INDEXING
5746  030120  016000  030140                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
5747  030124  000200                          RTS     R0              ;;GO TO ROUTINE
5748
```

```
                                        ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

030126  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
030130  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
030136  000002                          RTI                     ;;RESTORE THE PSW

                                        .SBTTL  TRAP TABLE

                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE "TRAP" INSTRUCTION.

                                        ;       ROUTINE
                                        ;       -------
030140  030126                $TRPAD: .WORD   $TRAP2
030142  027212                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
030144  027456                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
030146  027432                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
030150  027472                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
030152  027660                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

030154  027116                        $SAVREG ;;CALL=SAVREG   TRAP+6(104406)  SAVE R0-R5 ROUTINE
030156  027154                        $RESREG ;;CALL=RESREG   TRAP+7(104407)  RESTORE R0-R5 ROUTINE

030160  030650                        CLEAN   ;;CALL=RSET     TRAP+10(104410) GO RESET ALL REGISTERS.
030162  030620                        ABORTT  ;;CALL=SKIPT    TRAP+11(104411) THIS WILL SKIP TO THE NEXT TEST
030164  031254                        MMDES   ;;CALL=MMSKIP   TRAP+12(104412) IF SWITCH # IS ON SKIP TO THE NEXT TEST
030166  031276                        MSIZER  ;;CALL=SIZE     TRAP+13(104413) DETERMINE THE HIGHEST ADDRESS IN MEMORY
030170  030740                        SKBADR  ;;CALL=SKPBAD   TRAP+14(104414) SKIP TEST IF ERROR ADDRESS REGISTER IS I
030172  030764                        SKBERR  ;;CALL=SKPBER   TRAP+15(104415) SKIP TEST IF ERROR REGISTER IS INOPERATI
030174  031002                        SKBCNR  ;;CALL=SKPBCN   TRAP+16(104416) SKIP TEST IF CONTROL REGISTER IS INOPERA
030176  031020                        SKBMNR  ;;CALL=SKPBMN   TRAP+17(104417) SKIP TEST IF MAINTENANCE REGISTER IS INO
030200  031036                        SKBHMR  ;;CALL=SKPBHM   TRAP+20(104420) SKIP TEST IF HIT/MISS REGISTER IS IN OPE

                                .SBTTL  POWER DOWN AND UP ROUTINES

                                ;;**************************************************************
                                ;POWER DOWN ROUTINE
030202  012737  030346  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
030210  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
030216  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
030220  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
030222  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
030224  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
030226  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
030230  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
030232  017746  150702                MOV     @$WR,-(SP)      ;;PUSH @SWR ON STACK
030236  010637  030352                MOV     SP,$SAVR6       ;;SAVE SP
030242  012737  030254  000024        MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
030250  000000                        HALT
030252  000776                        BR      .-2             ;;HANG UP

                                ;;**************************************************************
                                ;POWER UP ROUTINE
030254  012737  030346  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
```

```
 5795  030262  013706  030352                  MOV     $SAVR6,SP       ;;GET SP
 5796  030266  005037  030352                  CLR     $SAVR6          ;;WAIT LOOP FOR THE **
 5797  030272  005237  030352          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
 5798  030276  001375                  BNE     1$              ;;OF  WORD
 5799  030300  012677  152634                  MOV     (SP)+,@#PSW     ;;POP STACK INTO @#PSW
 5800  030304  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
 5801  030306  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
 5802  030310  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
 5803  030312  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
 5804  030314  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
 5805  030316  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
 5806  030320  012737  030336  000034  $PWRDN: MOV     #$PWRMG,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
 5807  030326  012737  000340  000036          MOV     #340,@#PWRVEC+2 ;;PRIO:7
 5808  030334  104401                  TYPE                    ;;REPORT THE POWER FAILURE
 5809  030336  032127                  $PWRMG: .WORD   POWERM           ;;POWER FAIL MESSAGE POINTER
 5810  030340  012716                  MOV     (PC)+,(SP)      ;;RESTART AT START
 5811  030342  003016                  $PWRAD: .WORD   START           ;;RESTART ADDRESS
 5812  030344  000002                  RTI
 5813  030346  000000                  $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
 5814  030350  000776                  BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
 5815  030352  000000                  $SAVR6: 0                       ;;PUT THE SP HERE
 5816
 5817                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
 5818
 5819                                  ;;**************************************************************
 5820                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
 5821                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
 5822                                  ;*CALL
 5823                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 5824                                  ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
 5825                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
 5826
 5827
 5828  030354  104406                  $DB2O:  SAVREG                  ;;SAVE ALL REGISTERS
 5829  030356  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
 5830  030362  012705  030473                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
 5831  030366  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
 5832  030372  012703  177770                  MOV     #^C7,R3         ;;MASK
 5833  030376  012100                  MOV     (R1)+,R0        ;;LOWER WORD
 5834  030400  012101                  MOV     (R1)+,R1        ;;HIGH WORD
 5835  030402  005002                  CLR     R2              ;;TERMINATOR
 5836  030404  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
 5837  030406  010002                  MOV     R0,R2           ;;GET THIS DIGIT
 5838  030410  005304                  DEC     R4              ;;COUNT THIS CHARACTER
 5839  030412  003007                  BGT     3$              ;;BR IF NOT THE LAST DIGIT
 5840  030414  001405                  BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
 5841  030416  005205                  INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
 5842  030420  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
 5843  030424  104407                  RESREG                  ;;RESTORE ALL REGISTERS
 5844  030426  000207                  RTS     PC              ;;RETURN TO USER
 5845  030430  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
 5846  030432  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
 5847  030434  006000                  ROR     R0              ;;      THE NEXT OCTAL DIGIT
 5848  030436  006001                  ROR     R1
 5849  030440  006000                  ROR     R0
 5850  030442  006001                  ROR     R1
```

```
005851  030444  006000                          ROR     R0
005852  030446  040302                          BIC     #3,R2           ;;MASK OUT ALL JUNK
005853  030450  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
005854  030454  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
005855  030456  000016                  $DCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
005856
005857                                  ;THIS ROUTINE IS CALLED BY UNEXPECTED TRAPS TO VECTOR ERRVEC.
005858                                  ;THE ERROR IS REPORTED AND CONTROL IS TRANSFERRED BACK TO THE TEST
005859                                  ;FOLLOWING THE ONE THAT WAS INTERRUPTED WHEN THE ERROR OCCURRED!
005860  030474  011637  001234          CPSPUR: MOV     (SP),$TMP1
005861  030500  012737  030516  001236          MOV     #1$,$TMP2
005862  030506  013737  177756  001240          MOV     @#CPUERR,$TMP3
005863  030514  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
005864  030516  104150                  1$:     ERROR   150
005865  030520  104411                          SKIPT
005866
005867                                  ;THIS ROUTINE HANDLE UNEXPECTED TRAPS TO #CACHVEC.
005868  030522  012737  030612  000114  $PUR:   MOV     #10$,@#CACHVEC
005869  030530  013700  177744                  MOV     @#MEMERR,R0
005870  030534  032700  000014                  BIT     #14,R0          ;SEE IF IT WAS A MAIN MEMORY PARITY ERROR.
005871  030540  001403                          BEQ     9$
005872  030542  013700  177740                  MOV     @#LOADRS,R0     ;IF IT WAS THEN THE BAD PARITY IS
005873  030546  005710                          TST     (R0)            ;CACHED AND MUST BE PURGED!!!!!
005874  030550  012737  030522  000114  9$:     MOV     #SPUR,@#CACHVEC
005875  030556  013737  177744  001242          MOV     @#MEMERR,$TMP4  ;TRAP HERE IF AN UNEXPECTED
005876  030564  013737  177740  001234          MOV     @#LOADRS,$TMP1  ;ERROR. PARITY, OCCURS.
005877  030572  013737  177742  001236          MOV     @#HIADRS,$TMP2
005878  030600  011637  001240                  MOV     (SP),$TMP3
005879  030604  022626                          CMP     (SP)+,(SP)+
005880  030606  104014                  1$:     ERROR   14
005881  030610  104411                          SKIPT                   ;?????
005882  030612  022626                  10$:    CMP     (SP)+,(SP)+
005883  030614  000137  030550                  JMP     9$
005884
005885                                  ;THIS ROUTINE IS CALLED BY THE TRAP CATCHER CALL SKIPT.
005886                                  ;IT TELLS THE USER THAT THE CURRENT TEST HAS BEEN
005887                                  ;ABORTED AND THAT CONTROL IS BEING PASSED TO THE NEXT TEST.
005888  030620  011637  001234          ABORTT: MOV     (SP),$TMP1
005889  030624  112737  000015  001114          MOVB    #15,$ITEMB
005890  030632  022626                          CMP     (SP)+,(SP)+
005891  030634  004737  031352                  JSR     PC,ERTYPE
005892  030640  104410                          RSET
005893  030642  000177  000000                  JMP     @SKAD           ;GO TO @SKAD, WHICH SHOULD
005894                                                                  ;BE SET TO THE
005895  030646  000000                  SKAD:   .WORD   0               ;ADDRESS OF THE NEXT TEST.
005896
005897
005898                                  ;THIS ROUTINE IS CALLED BY THE TRAP CATCHER CALL RSET. IT CLEARS ALL
005899                                  ;THE IMPORTANE REGISTERS AND RESETS THE STACK.
005900  030650                          CLEAN:
005901
005902  030650  012737  030522  000114          MOV     #SPUR,@#CACHVEC
005903  030656  012737  030474  000004          MOV     #CPSPUR,@#ERRVEC
005904  030664  011637  030736                  MOV     (SP),BACKAD
005905  030670  012706  001100                  MOV     #STACK,SP
005906  030674  005037  177750                  CLR     @#MAINT         ;CLEAR ALL CONTROL AND ERROR
```

```
 5907  030700  005037  177572                CLR     @#MMR0          ;REGISTERS.
 5908  030704  005037  172516                CLR     @#MMR3
 5909  030710  005037  177746                CLR     @#CONTRL
 5910  030714  012737  177777  177744        MOV     #-1,@#MEMERR
 5911  030722  005037  177766                CLR     @#CPUERR
 5912  030726  005037  177776                CLR     @#PSW
 5913  030732  000177  000000                JMP     @BACKAD
 5914  030736  000000              BACKAD:   .WORD   0
 5915
 5916
 5917                                  ;COME HERE TO TEST THE REGISTER FLAGS AND USE THEM TO DETERMINE WHETHER
 5918                                  ;OR NOT TO SKIP A TEST WHICH RELIES ON THE FUNCTIONALLITY OF THAT REGISTER
 5919                                  ;TO BE PROPERLY RUN.
 5920                                  ;THESE ROUTINES ARE CALLED BY THE TRAP CATCHER CALLS:
 5921                                  ;       SKPBAD          SKIPT IF BAD ERROR ADDRESS REGISTER
 5922                                  ;       SKPBER          SKIPT IF BAD ERROR REGISTER
 5923                                  ;       SKPBCN          SKIPT IF BAD CONTROL REGISTER
 5924                                  ;       SKPBMN          SKIPT IF BAD MAINTENANCE REGISTER
 5925                                  ;       SKPBHM          SKIPT IF BAD HIT/MISS REGISTER
 5926                                  ;
 5927
 5928  030740  005737  031056          SKBADR:  TST     LOAFLG
 5929  030744  001004                           BNE     1$
 5930  030746  005737  031060                   TST     HIAFLG
 5931  030752  001001                           BNE     1$
 5932  030754  000002                           RTI
 5933  030756  104401                1$:      TYPE
 5934  030760  033111                           .WORD   ADRNG
 5935  030762  000433                           BR      SKRNG
 5936
 5937  030764  005737  031062          SKBERR:  TST     MMRFLG
 5938  030770  001001                           BNE     1$
 5939  030772  000002                           RTI
 5940  030774  104401                1$:      TYPE
 5941  030776  033221                           .WORD   ERRNG
 5942  031000  000424                           BR      SKRNG
 5943
 5944  031002  005737  031064          SKBCNR:  TST     CONFLG
 5945  031006  001001                           BNE     1$
 5946  031010  000002                           RTI
 5947  031012  104401                1$:      TYPE
 5948  031014  033321                           .WORD   CNRNG
 5949  031016  000415                           BR      SKRNG
 5950
 5951  031020  005737  031066          SKBMNR:  TST     MANFLG
 5952  031024  001001                           BNE     1$
 5953  031026  000002                           RTI
 5954  031030  104401                1$:      TYPE
 5955  031032  033423                           .WORD   MNRNG
 5956  031034  000406                           BR      SKRNG
 5957
 5958  031036  005737  031070          SKBHMR:  TST     HIMFLG
 5959  031042  001001                           BNE     1$
 5960  031044  000002                           RTI
 5961  031046  104401                1$:      TYPE
 5962  031050  033531                           .WORD   HMRNG
```

```
 5963
 5964  031052  022626                SKRNG:  CMP     (SP)+,(SP)+             ;RESET THE STACK AND GO TO THE
 5965  031054  104411                        SKIPT                           ;NEXT TEST!!!!!
 5966
 5967  031056  000000                LOAFLG: .WORD   0                       ;THESE ARE FLAGS USED TO DESIGNATE
 5968  031060  000000                HIAFLG: .WORD   0                       ;EITHER A GOOD OR A BAD REGISTER.
 5969  031062  000000                MMRFLG: .WORD   0                       ;GOOD WILL BE DESIGNATED BY A
 5970  031064  000000                CONFLG: .WORD   0                       ;0 BAD BY A NOT ZERO!!
 5971  031066  000000                MANFLG: .WORD   0
 5972  031070  000000                HIMFLG: .WORD   0
 5973  031072  000000                LOAFL2: .WORD   0
 5974  031074  000000                HIAFL2: .WORD   0
 5975  031076  000000                MMRFL2: .WORD   0
 5976  031100  000000                CONFL2: .WORD   0
 5977  031102  000000                MANFL2: .WORD   0
 5978  031104  000000                HIMFL2: .WORD   0
 5979
 5980                                ;THIS ROUTINE IS CALLED TO DETERMINE THE PARITY OF
 5981                                ;A DATA PATTERN. THE PATTERN WHICH IS TAKEN BY THIS
 5982                                ;ROUTINE AS ITS ARGUMENT SHOULD BE PUT IN R0. THEN
 5983                                ;TRANSFER CONTROL HERE BY EXECUTING:
 5984                                ;       JSR     PC,PARCNT
 5985                                ;WHEN THIS ROUTINE RETURNS THE NUMBER OF ON,(1), BITS
 5986                                ;IN R0 IS LEFT IN R2. THIS WOULD BE A NUMBER BETWEEN
 5987                                ;0 AND 16.
 5988  031106  012701  000001       PARCNT: MOV     #1,R1
 5989  031112  005002                        CLR     R2
 5990  031114  030100                1$:     BIT     R1,R0
 5991  031116  001401                        BEQ     2$
 5992  031120  005202                        INC     R2
 5993  031122  006301                2$:     ASL     R1
 5994  031124  103373                        BCC     1$
 5995  031126  000207                        RTS     PC
 5996
 5997                                ;THIS ROUTINE IS CALLED TO RESTORE THE TOP 1500 (DEC) WORDS IN THE
 5998                                ;FIRST 28K OF MEMORY. THIS SHOULD EFFECTIVELY RESTORE ANY MONITOR
 5999                                ;OR LOADER THAT WAS PRESENT BEFORE THIS PROGRAM BEGAN EXECUTION.
 6000                                ;CONTROL IS PASSED TO THIS ROUTINE BY AN INTERRUPT FROM THE TTY KEYBOARD
 6001                                ;WHEN ANY CHARACTER IS TYPED ON THE KEYBOARD. IF THE CHARACTER.
 6002                                ;TURNS OUT TO BE A ↑C (CONTROL-C) THEN MEMORY IS RESTORED. IF THE
 6003                                ;CHARACTER IS NOT ↑C THEN A RETURN IS MADE TO THE TEST FOLLOWING
 6004                                ;THE ONE WHOSE EXECUTION WAS INTERRUPTED BY THE KEYBOARD INTERRUPT.
 6005  031130  017700  150012        RESMON: MOV     @$TKB,R0
 6006  031134  104410                        RSET
 6007  031136  005003                        CLR     R3
 6008  031140  042700  000200              BIC     #BIT7,R0        ;GET THE CHARACTER, INITIALIZE THE REGISTERS
 6009  031144  022700  000003              CMP     #3,R0           ;AND SEE IF THE CHARACTER WAS ↑C.
 6010  031150  001027                      BNE     NOCNC           ;BRANCH AND GO TO NEXT TEST IF NOT.
 6011  031152  104401                      TYPE                    ;ECHOE THE CONTROL-C AS '↑C'
 6012  031154  032064                      .WORD   CONCMS
 6013  031156  012704  002734        CHAINQ: MOV     #↑D1500,R4              ;AND RESTORE THE MONITOR.
 6014  031162  012701  051310              MOV     #BOTTOM+4,R1
 6015  031166  012702  160000              MOV     #160000,R2
 6016  031172  012142                1$:     MOV     (R1)+,-(R2)
 6017  031174  077402                      SOB     R4,1$
 6018  031176  012737  177777  031252      MOV     #-1,MONF        ;RESET THE MONITOR RESTORED FLAG.
```

```
 6019  031204  020327  125252                CMP     R3,#125252      ;SEE IF THE MONITOR IS BEING RESTORED
 6020                                                                  ;BY THE .$EOP ROUTINE.
 6021  031210  001001                        BNE     STOP            ;IF NOT GO HALT, OTHERWISE RETURN TO .$EOP
 6022  031212  000207                        RTS     PC
 6023  031214  104401                STOP:   TYPE                    ;TYPE THE MONITOR RESTORED MESSAGE.
 6024  031216  032070                        .WORD   MMESRS
 6025  031220  013737  031250  000060        MOV     MONTTY,@#TKVEC
 6026  031226  000000                        HALT                    ;AND HALT!!
 6027  031230  005077  147712        NOCNC:  CLR     @$TKB           ;NOT CONTROL C SO RETURN TO NEXT TEST.
 6028  031234  152777  000100  147702        BISB    #BIT6,@$TKS
 6029  031242  104410                        RSET
 6030  031244  000177  177376                JMP     @SKAD           ;RETURN.
 6031  031250  000000                MONTTY: .WORD   0               ;TEMPORARY STORAGE FOR THE INITIAL
 6032                                                                  ;CONTENTS OF THE TTY KEYBOARD INTERRUPT VECTOR.
 6033  031252  177777                MONF:   .WORD   177777          ;FLAG, IF NOT -1 THE MONITOR IS SAVED!!
 6034
 6035
 6036                                ;THIS ROUTINE IS CALLED BY THE TRAP CALL MMSKIP. IT LOOKS
 6037                                ;AT THE SWITCH REGISTER AND DETERMINES WHETHER OR NOT
 6038                                ;SWITCH #7 IS ON. IF SO THE CURRENT TEST IS SKIPPED
 6039                                ;AND THE NEXT TEST IS ENTERED. A SSKAD MUST BE ISSUED
 6040                                ;BEFORE THE MMSKIP.
 6041                                ;THE PURPOSE OF SWITCH #7 IS TO CAUSE THE DELETION OF THE
 6042                                ;EXECUTION OF ANY TEST WHICH RELIES ON MEMORY MANAGEMENT
 6043                                ;FOR ITS OPERATION.
 6044
 6045  031254  032737  000200  001140 MMDES:  BIT     #SW7,@#SWR
 6046  031262  001001                        BNE     1$              ;IS THE SWITCH ON?
 6047  031264  000002                        RTI                     ;NO, SO RETURN.
 6048  031266  022626                1$:     CMP     (SP)+,(SP)+
 6049  031270  104410                        RSET
 6050  031272  000177  177350                JMP     @SKAD           ;YES, GO TO THE NEXT TEST.
 6051                                ;THIS ROUTINE IS CALLED TO DETERMINE THE HIGHEST POSSIBLE
 6052                                ;ADDRESS IN MEMORY. IT IS CALLED THUS, BY TRAP CALL SIZE:
 6053                                ;               SIZE
 6054                                ;       LOORDA: .WORD   0
 6055                                ;       HIORDA: .WORD   0
 6056                                ;       NXTINST:
 6057                                ;THE LOW ORDER 16-BITS OF THE ADDRESS ARE LEFT IN THE
 6058                                ;WORD DIRECTLY FOLLOWING THE CALL. THE HIGH ORDER 6-BITS
 6059                                ;ARE LEFT IN THE NEXT WORD AND CONTROL IS RETURNED
 6060                                ;TO THE THIRD WORD FOLLOWING THE CALL.
 6061  031276  010046                MSIZER: MOV     R0,-(SP)        ;SAVE THE CONTENTS OF R0 AND R1
 6062  031300  010146                        MOV     R1,-(SP)        ;GET THE ADDRESS OF
 6063  031302  016600  000004                MOV     4(SP),R0        ;THE CALL OF THE STACK.
 6064  031306  013710  177760                MOV     @#SIZELO,(R0)
 6065  031312  005060  000002                CLR     2(R0)
 6066  031316  012701  000006                MOV     #6,R1           ;ROTATE THE 16-BIT 'BLOCK'
 6067                                                                  ;NUMBER 6-BITS TO THE
 6068  031322  006310                1$:     ASL     (R0)            ;LEFT AND TURN ON LOW ORDER
 6069  031324  006160  000002                ROL     2(R0)           ;BITS 1-5 LEAVING BIT-0
 6070  031330  077104                        SOB     R1,1$           ;OFF SO AS TO CREATE
 6071  031332  052710  000076                BIS     #76,(R0)        ;THE 22-BIT PHYSICAL ADDRESS OF
 6072                                                                  ;THE HIGHEST WORD IN
 6073                                                                  ;MEMORY.
 6074  031336  022020                        CMP     (R0)+,(R0)+     ;DETERMINE THE RETURN ADDRESS
```

```
031340  010066  000004          MOV     R0,4(SP)        ;AND LEAVE ON THE STACK FOR
                                                        ;AN RTI.
031344  012601                  MOV     (SP)+,R1        ;RESTORE R1 AND R0.
031346  012600                  MOV     (SP)+,R0
031350  000002                  RTI                     ;RETURN
                        ;THIS ROUTINE IS USED TO TYPE AN ERROR MESSAGE
                        ;WHICH IS IN THE DATA TABLE. IT IS CALLED BY
                        ;THE $ERROR ROUTINE OR BY FIRST SETTING THE $ITEMB
                        ;BYTE EQUAL TO THE ERROR TABLE ITEM NUMBER THAT IS
                        ;TO BE PRINTED OUT AND THEN EXECUTING A JSR PC,ERTYPE
031352  104401          ERTYPE: TYPE
031354  001313                  .WORD   $CRLF
031356  010046                  MOV     R0,-(SP)        ;SAVE R0
031360  005000                  CLR     R0
031362  113700  001114          MOVB    $ITEMB,R0       ;GET THE ITEM NUMBER
031366  001005                  BNE     1$              ;ZERO?
031370  013746  001116          MOV     $ERRPC,-(SP)    ;YES, TYPE JUST THE PC
031374  104432                  TYPOC                   ;OF THE ERROR CALL.
031376  000137  031714          JMP     ERT5
031402  005300          1$:     DEC     R0              ;MAKE R0 AN INDEX FOR THE
031404  072027  000003          ASH     #3,R0           ;ERROR TABLE
031410  062700  001316          ADD     #$ERRTB,R0
031414  012037  031424          MOV     (R0)+,2$        ;TYPE EM, ERROR MESSAGE.
031420  001404                  BEQ     3$
031422  104401                  TYPE
031424  000000          2$:     .WORD   0
031426  104401                  TYPE
031430  001313                  .WORD   $CRLF
031432  012037  031442  3$:     MOV     (R0)+,4$        ;TYPE DH, DATA HEADER
031436  001404                  BEQ     5$
031440  104401                  TYPE
031442  000000          4$:     .WORD   0
031444  104401                  TYPE
031446  001313                  .WORD   $CRLF
031450  010146          5$:     MOV     R1,-(SP)        ;SAVE R1
031452  012001                  MOV     (R0)+,R1        ;GET DT, DATA TABLE ADDRESS
031454  001002                  BNE     6$
031456  000137  031712          JMP     ERT4            ;JMP IF NO ERROR TABLE.
031462  012000          6$:     MOV     (R0)+,R0        ;GET DF, DATA FORMAT ADDRESS
031464  105710          ERT1:   TSTB    (R0)            ;DATA FORMAT ENTRY EQUALS
031466  001003                  BNE     7$              ;ZERO?
031470  013146                  MOV     @(R1)+,-(SP)    ;YES, SO TYPE A 16-BIT
031472  104402                  TYPOC                   ;OCTAL NUMBER
031474  000500                  BR      ERT2
031476  122710  000001  7$:     CMPB    #1,(R0)         ;FORMAT EQUALS 1?
031502  001003                  BNE     8$
031504  013146                  MOV     @(R1)+,-(SP)    ;YES, TYPE A DECIMAL NUMBER
031506  104405                  TYPDS
031510  000472                  BR      ERT2
031512  122710  000002  8$:     CMPB    #2,(R0)         ;FORMAT 2?
031516  001012                  BNE     9$
031520  012146          85$:    MOV     (R1)+,-(SP)     ;YES, TYPE A 22-BIT NUMBR
031522  004737  030354          JSR     PC,$DB2O        ;CALL $DB2O TO CONVERT THE
031526  062716  000003          ADD     #3,(SP)         ;BINARY TO ASCII
```

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031532  012637  031540                  MOV     (SP)+,29$       ;TYPE THE STRING
031536  104401                          TYPE
031540  000000                  29$:    .WORD   0
031542  000455                          BR      ERT2

031544  122710  000004          9$:     CMPB    #4,(R0)         ;FORMAT 4?
031550  001004                          BNE     10$
031552  013146                          MOV     @(R1)+,-(SP)    ;YES, TYPE A 16-BIT
031554  104403                          TYPOS                   ;OCTAL NUMBER SUPRESSING
031556     016                          .BYTE   16              ;LEADING ZEROES
031557     000                          .BYTE   0
031560  000446                          BR      ERT2
031562  122710  000003          10$:    CMPB    #3,(R0)         ;FORMAT 3?
031566  001007                          BNE     11$
031570  013146                          MOV     @(R1)+,-(SP)    ;YES CONVERT 16-BIT
031572  012737  177777  031720          MOV     #-1,TVADFL      ;VIRTUAL ADDRESS TO 32-BIT
031600  004737  031726                  JSR     PC,TYPVAD       ;PHYSICAL ADDRESS AND TYPE
031604  000434                          BR      ERT2            ;RELOCATE ONLY IF SEG. IS ON!
031606  122710  000005          11$:    CMPB    #5,(R0)         ;FORMAT 5?
031612  001005                          BNE     12$
031614  012137  031622                  MOV     (R1)+,20$       ;PRINT ASCIZ STRING
031620  104401                          TYPE
031622  000000                  20$:    .WORD   0
031624  000426                          BR      ERT3

031626  122710  000006          12$:    CMPB    #6,(R0)         ;FORMAT 6
031632  001005                          BNE     13$
031634  005037  031720                  CLR     TVADFL
031640  004737  031726                  JSR     PC,TYPVAD
031644  000414                          BR      ERT2

031646  122710  000007          13$:    CMPB    #7,(R0)         ;FORMAT 7?
031652  001010                          BNE     14$
031654  012146                          MOV     (R1)+,-(SP)
031656  004737  030354                  JSR     PC,$DB20
031662  012637  031670                  MOV     (SP)+,45$
031666  104401                          TYPE
031670  000000                  45$:    .WORD   0
031672  000401                          BR      ERT2

031674  000000                  14$:    HALT                    ;?????

031676  104401                  ERT2:   TYPE                    ;PRINT A TAB AFTER TYPING AN
031700  032174                          .WORD   $TAB            ;ERROR TABLE ENTRY OF ALL MODES
                                                                ;EXCEPT ASCIZ
031702  005200                  ERT3:   INC     R0              ;POINT TO THE NEXT FORMAT BYTE
031704  005711                          TST     (R1)            ;IS THERE ANOTHER ENTRY?
031706  001401                          BEQ     ERT4
031710  000665                          BR      ERT1            ;YES, PROCESS IT
                                                                ;OTHERWISE:
031712  012601                  ERT4:   MOV     (SP)+,R1        ;RESTORE R1
031714  012600                  ERT5:   MOV     (SP)+,R0        ;RESTORE R0
031716  000207                          RTS     PC              ;AND RETURN

031720  000000                  TVADFL: .WORD   0               ;FLAG USED TO TELL TYVAD
                                                                ;WHETHER TO CONDITIONALLY
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                                                        ;OR UNCONDITIONALLY RELOCATE
                                                        ;WHEN TYPING AN ADDRESS.
                                                        ;-1 OR 0 RESPECTIVELY

031722  000000                TVADLO: .WORD   0           ;REGISTERS FOR THE 22-BIT
031724  000000                TVADHI: .WORD   0           ;ADDRESS COMPUTED BY TYVAD.

                            ;ROUTINE WHICH CONVERTS A 16-BIT ADDRESS TO A 22-BIT
                            ;ADDRESS. IF TVADFL IS -1, THEN CONVERT TO THE 22-BIT
                            ;REAL ADDRESS DEPENDENT ON SEG BEING ON OR OFF FOR RELOCATION.
                            ;IF TVADFL IS ZERO THEN UNCONDITIONAL USE THE KERNAL
                            ;PAR WHICH IS APPROPIATE TO DO RELOCATION.
031726  104406              TYPVAD: SAVREG
031730  016601  000002              MOV     2(SP),R1        ;GET THE VIRTUAL
031734  010137  031722              MOV     R1,TVADLO       ;ADDRESS
031740  005037  031724              CLR     TVADHI
031744  005737  031720              TST     TVADFL          ;CONDITIONALLY RELOCATE?
031750  001404                      BEQ     1$
031752  032737  000001  177572      BIT     #1,@#MMR0       ;YES, SEE IF MEMORY
031760  001424                      BEQ     2$              ;MANAGEMENT IS ON
031762  005000              1$:     CLR     R0              ;RELOCATE
031764  073027  000003              ASHC    #3,R0           ;LEFT SHIFT R0 AND R1
031770  006300                      ASL     R0              ;THREE PLACES. R0 ONE
                                                        ;MORE SO THAT IT CONTAINS
                                                        ;2 X THE UPPER 3-BITS OF
031772  000241                      CLC                     ;THE VIRTUAL ADDRESS
031774  006001                      ROR     R1              ;RESTORE R1 TO THE OFFSET
031776  006001                      ROR     R1              ;OF THE VIRTUAL ADDRESS
032000  006001                      ROR     R1              ;TO THE PAR
032002  062700  172340              ADD     #KIPAR0,R0      ;DETERMINE THE CORRECT PAR'S
                                                        ;ADDRESS
032006  011003                      MOV     (R0),R3         ;GET ITS CONTENTS
032010  005002                      CLR     R2
032012  073227  000006              ASHC    #6,R2           ;MAKE THE BLOCK COUNT
                                                        ;A 22-BIT ADDRESS.
032016  060103                      ADD     R1,R3           ;ADD THE OFFSET TO THE
032020  005502                      ADC     R2              ;BASE ADDRESS

032022  010237  031724              MOV     R2,TVADHI
032026  010337  031722              MOV     R3,TVADLO
032032  012746  031722      2$:     MOV     #TVADLO,-(SP)   ;CALL $DB2O TO CONVERT THE
032036  004737  030354              JSR     PC,$DB2O        ;22-BIT
032042  062716  000003              ADD     #3,(SP)         ;TYPE ONLY 8 DIGITS.
032046  012637  032054              MOV     (SP)+,3$
032052  104401                      TYPE
032054  000000              3$:     .WORD   0
032056  104407                      RESREG                  ;RESTORE THE REGISTERS
032060  012616                      MOV     (SP)+,(SP)      ;LEAVE ONLY THE RETURN
                                                        ;ADDRESS ON THE STACK.
032062  000207                      RTS     PC              ;RETURN

                            ;SPECIAL MESSAGES:

032064  041536  000200      CONCMS: .ASCIZ  '^C'<CRLF>

032070  047515  044516  047524  MMESRS: .ASCIZ  'MONITOR (OR LOADER) RESTORED!'<CRLF>
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6243  032076  020122  047450  020122
6244  032104  047514  042101  051105
6245  032112  020051  042522  052123
6246  032120  051117  042105  100041
6247  032126     000
6248
6249  032127     200  047520  042527  POWERM: .ASCIZ   <CR_F 'POWER FAILURE, PROGRAM RESTARTING'<CR_F><CR_F.
6250  032134  020122  040506  046111
6251  032142  051125  026105  050040
6252  032150  047522  051107  046501
6253  032156  051040  051505  040524
6254  032164  052122  047111  100107
6255  032172  000200
6256
6257  032174  000011                  STAB:   .ASCIZ  <TAB>
6258
6259  032176  042600  050130  041505  MTA5:   .ASCII  <CRLF>'EXPECTED DATA:'<CRLF>
6260  032204  042524  020.04  040504
6261  032212  040524  100072
6262  032216  051107  052517  020120          .ASCIZ  'GROUP 0.GROUP 1.MEM EV.'<TAB>'MEM CCD.'<CRLF>
6263  032224  027060  051107  052517
6264  032232  020120  027061  042515
6265  032240  020115  053105  004456
6266  032246  042515  020115  042117
6267  032254  027104  000200
6268
6269  032260  042200  052101  020101  MTA11:  .ASCII  <CRLF>'DATA WRITTEN.'<TAB>'TEST ADD-    TAB>'ERROR REG.'<CRLF>
6270  032266  051127  052111  042524
6271  032274  027116  052011  051505
6272  032302  020124  042101  051104
6273  032310  004456  051105  047522
6274  032316  020122  042522  027107
6275  032324     200
6276
6277  032325     040  047111  000040  MTA17:  .ASCIZ  ' IN '
6278
6279  032332  054105  042520  052103  MTB17:  .ASCIZ  'EXPECTED DATA:'<CRLF>
6280  032340  042105  042040  052101
6281  032346  035101  000200
6282
6283  032352  054502  042524  004456  MTC17:  .ASCIZ  'BYTE.'<TAB>
6284  032360     000
6285
6286  032361     127  051117  027104  MTA20:  .ASCIZ  'WORD.'<TAB>
6287  032366  000011
6288
6289  032370  054105  042520  052103  MTA21:  .ASCII  'EXPECTED DATA:'<CRLF>
6290  032376  042105  042040  052101
6291  032404  035101     200
6292  032407     110  052111  020123          .ASCIZ  'HITS IN GROUP 0.'<TAB>'/'<TAB>'HITS IN GROUP 1. '<CRLF>
6293  032414  047111  043440  047522
6294  032422  050125  030040  004456
6295  032430  004457  044510  051524
6296  032436  044440  020116  051107
6297  032444  052517  020120  027061
6298  032452  100040     000
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6299
6300                032325                  MTB21=MTA17
6301
6302  032455     200  042524  052123  MTA43:  .ASCII  <CRLF>'TEST ADDRESS.'<TAB>'ERROR ADRS REG.' <TAB
6303  032462  040440  042104  042522
6304  032470  051523  004456  051105
6305  032476  047522  020122  042101
6306  032504  051522  051040  043505
6307  032512  004456
6308  032514  051105  047522  020122          .ASCIZ  'ERROR REG.'<CRLF>
6309  032522  042522  027107  000200
6310
6311  032530  053600  047522  042524  MTA45:  .ASCIZ  <CRLF>'WROTE. 377'<TAB>'IN BYTE. '
6312  032536  020056  033463  004467
6313  032544  047111  041040  052131
6314  032552  027105  000040
6315
6316  032556  051200  040505  020104  MTB45:  .ASCIZ  <CRLF>'READ DATA. '
6317  032564  040504  040524  020056
6318  032572     000
6319
6320  032573     011  047111  053440  MTC45:  .ASCIZ  <TAB>'IN WORD. '
6321  032600  051117  027104  000040
6322
6323  032606  053600  047522  042524  MTA5C:  .ASCIZ  <CRLF>'WROTE. 000'<TAB>'IN BYTE. '
6324  032614  020056  030060  004460
6325  032622  047111  041040  052131
6326  032630  027105  000040
6327
6328  032634  042600  052116  051105  PDMSG1: .ASCII  <CRLF>'ENTERING CACHE ADDRESS MEMORY POWER UP '
6329  032642  047111  020107  040503
6330  032650  044103  020105  042101
6331  032656  051104  051505  020123
6332  032664  042515  047515  054522
6333  032672  050040  053517  051105
6334  032700  052440  020120
6335  032704  047111  040526  044514          .ASCII  'INVALIDATOR TEST.'<CRLF>
6336  032712  040504  047524  020122
6337  032720  042524  052123  100056
6338  032726  046120  040505  042523          .ASCII  'PLEASE GO THROUGH A POWER DOWN, POWER UP '
6339  032734  043440  020117  044124
6340  032742  047522  043525  020110
6341  032750  020101  047520  042527
6342  032756  020122  047504  047127
6343  032764  020054  047520  042527
6344  032772  020122  050125     040
6345  032777     123  050505  042525          .ASCIZ  'SEQUENCE.'<CRLF>
6346  033004  041516  027105  000200
6347
6348  033012  041600  041501  042510  PDMSG2: .ASCII  <CRLF>'CACHE ADDRESS MEMORY POWER UP INVALIDATOR'
6349  033020  040440  042104  042522
6350  033026  051523  046440  046505
6351  033034  051117  020131  047520
6352  033042  042527  020122  050125
6353  033050  044440  053116  046101
6354  033056  042111  052101  051117
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6355  033064  052040  051505  020124          .ASCIZ  ' TEST DID NOT FAIL.' <CR><LF>
6356  033072  044504  020104  047516
6357  033100  020124  040506  046111
6358  033106  100056     000
6359
6360  033111     105  051122  051117  ADRMG:  .ASCII  'ERROR ADDRESS REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
6361  033116  040440  042104  042522
6362  033124  051523  051040  043505
6363  033132  051511  042524  020122
6364  033140  042516  042105  042105
6365  033146  043040  051117  052040
6366  033154  051505  026124  041200
6367  033162  052125  044440  020124
6368  033170  040510  020123  042502
6369  033176  047105     040
6370  033201     106  040514  043507          .ASCII  'FLAGGED AS BAD!'
6371  033206  042105  040440  020123
6372  033214  040502  020504     000
6373
6374  033221     105  051122  051117  ERRMG:  .ASCII  'ERROR REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
6375  033226  051040  043505  051511
6376  033234  042524  020122  042516
6377  033242  042105  042105  043040
6378  033250  051117  052040  051505
6379  033256  026124  041200  052125
6380  033264  044440  020124  040510
6381  033272  020123  042502  047105
6382  033300     040
6383  033301     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
6384  033306  042105  040440  020123
6385  033314  040502  020504     000
6386
6387  033321     103  047117  051124  CNRMG:  .ASCII  'CONTROL REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
6388  033326  046117  051040  043505
6389  033334  051511  042524  020122
6390  033342  042516  042105  042105
6391  033350  043040  051117  052040
6392  033356  051505  026124  041200
6393  033364  052125  044440  020124
6394  033372  040510  020123  042502
6395  033400  047105     040
6396  033403     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
6397  033410  042105  040440  020123
6398  033416  040502  020504     000
6399  033423     115  044501  052116  MNRMG:  .ASCII  'MAINTENANCE REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
6400  033430  047105  047101  042503
6401  033436  051040  043505  051511
6402  033444  042524  020122  042516
6403  033452  042105  042105  043040
6404  033460  051117  052040  051505
6405  033466  026124  041200  052125
6406  033474  044440  020124  040510
6407  033502  020123  042502  047105
6408  033510     040
6409  033511     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
6410  033516  042105  040440  020123
```

```
033524  040502  020504     000

033531     110  052111  046457  HMNG:  .ASCII  'HIT MISS REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
033536  051511  020123  042522
033544  044507  052123  051105
033552  047040  042505  042504
033560  020104  047506  020122
033566  042524  052123  100054
033574  052502  020124  052111
033602  044040  051501  041040
033610  042505  020116
033614  046106  043501  042507         .ASCIZ  'FLAGGED AS BAD!'
033622  020104  051501  041040
033630  042101  000041

033634  040600  042104  042522  MTA77: .ASCIZ  <CRLF>'ADDRESS:  '
033642  051523  020072  000040

033650  051440  047510  046125  MTB77: .ASCIZ  ' SHOULD HAVE BEEN A HIT IN GROUP '
033656  020104  040510  042526
033664  041040  042505  020116
033672  020101  044510  020124
033700  047111  043440  047522
033706  050125  000040

033712  043101  042524  020122  MTC77: .ASCIZ  'AFTER REFERENCING'<CRLF>'ADDRESS:  '
033720  042522  042506  042522
033726  041516  047111  100107
033734  042101  051104  051505
033742  035123  020040     000

033747     040  044127  046111  MTD77. .ASCIZ  ' WHILE FORCING SELECTION OF GROUP '
033754  020105  047506  041522
033762  047111  020107  042523
033770  042514  052103  047511
033776  020116  043117  043440
034004  047522  050125  000040

034012  040600  051122  051117  MTA101: .ASCII <CRLF>'ARROR ADRS REG.'<TAB>'ERROR REG.'<TAB>
034020  040440  051104  020123
034026  042522  027107  042411
034034  051122  051117  051040
034042  043505  004456
034046  054105  042520  052103         .ASCIZ  'EXPECTED ERR.'<TAB>'PATTERN PUT IN MAINT REG.'<CRLF>
034054  042105  042440  051122
034062  004456  040520  052124
034070  051105  020116  052520
034076  020124  047111  046440
034104  044501  052116  051040
034112  043505  100056     000

034117     200  043101  042524  MTA120: .ASCIZ <CRLF>'AFTER 2ND CYCLE READ  '
034124  020122  047062  020104
034132  054503  046103  020105
034140  042522  042101  020040
034146     000
```

```
034147     200 043101 042524  MTB120: .ASCIZ  <CRLF>'AFTER 4TH CYCLE READ  '
034154  020122 052064 020110
034162  054503 046103 020105
034170  042522 042101 020040
034176     000

034177     200 043101 042524  MTC120: .ASCIZ  <CRLF>'AFTER 6TH CYCLE READ  '
034204  020122 052066 020110
034212  054503 046103 020105
034220  042522 042101 020040
034226     000
034227     200 043101 042524  MTD120: .ASCIZ  <CRLF>'AFTER 8TH CYCLE READ  '
034234  020122 052070 020110
034242  054503 046103 020105
034250  042522 042101 020040
034256     000

034257     200 043101 042524  MTE120: .ASCIZ  <CRLF>'AFTER 10TH CYCLE READ '
034264  020122 030061 044124
034272  041440 041531 042514
034300  051040 040505 020104
034306     000

034307     200 043101 042524  MTF120: .ASCIZ  <CRLF>'AFTER 12TH CYCLE READ '
034314  020122 031061 044124
034322  041440 041531 042514
034330  051040 040505 020104
034336     000

034337     106 047522 020115  MTG120: .ASCIZ  'FROM THE HIT/MISS REG. EXPECTED '
034344  044124 020105 044510
034352  027524 044515 051523
034360  051040 043505 020056
034366  054105 042520 052103
034374  042105 000040

034400  052200 042510 050040  MTA124: .ASCIZ  <CRLF>'THE PATTERN BEING USED IN THE MAINTENANCE '
034406  052101 042524 047122
034414  041040 044505 043516
034422  052440 042523 020104
034430  047111 052040 042510
034436  046440 044501 052116
034444  047105 047101 042503
034452     040
034453     122 043505 051511          .ASCIZ  'REGISTER WAS: '
034460  042524 020122 040527
034466  035123 000040

034472  051200 043105 051105  MTA126: .ASCIZ  <CRLF>'REFERENCED ADDRESS:'<TAB>
034500  047105 042503 020104
034506  042101 051104 051505
034514  035123 000011

034520  040600 051122 051117  MTB126: .ASCIZ  <CRLF>'ARROR ADDRESS REGISTER:'<TAB>
034526  040440 042104 042522
```

```
6523  034534  051523  051040  043505
6524  034542  051511  042524  035122
6525  034550  000011
6526
6527  034552  050200  052101  042524  MTA131: .ASCIZ  <CRLF>'PATTERN BEING USED IN THE MAINTENANCE REGISTER:'<TAB>
6528  034560  047122  041040  044505
6529  034566  043516  052440  042523
6530  034574  020104  047111  052040
6531  034602  042510  046440  044501
6532  034610  052116  047105  047101
6533  034616  042503  051040  043505
6534  034624  051511  042524  035122
6535  034632  000011
6536
6537  034634  042600  050130  041505  MTB131: .ASCIZ  <CRLF>'EXPECTED ERROR REGISTER:'<TAB>
6538  034642  042524  020104  051105
6539  034650  047522  020122  042522
6540  034656  044507  052123  051105
6541  034664  004472     000
6542
6543  034667     200  047507  020124  MTC131: .ASCIZ  <CRLF>'GOT ERROR REGISTER:'<TAB>
6544  034674  051105  047522  020122
6545  034702  042522  044507  052123
6546  034710  051105  004472     000
6547
6548  034715     200  051105  047522  MTA13+: .ASCIZ  <CRLF>'ERROR ADR REG.'<TAB>'ERROR REG.'<CRLF>
6549  034722  020122  042101  020122
6550  034730  042522  027107  042411
6551  034736  051122  051117  051040
6552  034744  043505  100056     000
6553
6554  034751     200  054105  042520  MTA135: .ASCIZ  <CRLF>'EXPECTED ERROR REG.:  '
6555  034756  052103  042105  042440
6556  034764  051122  051117  051040
6557  034772  043505  035056  020040
6558  035000     000
6559
6560  035001     107  052117  042440  MTB135: .ASCIZ  'GOT ERROR REG.:  '
6561  035006  051122  051117  051040
6562  035014  043505  035056  020040
6563  035022     000
6564
6565  035023     200  054105  042520  MTC135: .ASCIZ  <CRLF>'EXPECTED ERROR ADR REG.:  '
6566  035030  052103  042105  042440
6567  035036  051122  051117  040440
6568  035044  051104  051040  043505
6569  035052  035056  020040     000
6570
6571  035057     107  052117  042440  MTD135: .ASCIZ  'GOT ERROR ADR REG.:  '
6572  035064  051122  051117  040440
6573  035072  051104  051040  043505
6574  035100  035056  020040     000
6575
6576
6577                                  ;THESE ARE THE ERROR MESSAGES:
6578
```

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6579  035105  101     051040  043105  EM1:    .ASCIZ  'A REFERENCE WHICH SHOULD HAVE BEEN A HIT WAS A MISS.'
6580  035112  051105  047105  042503
6581  035120  053440  044510  044103
6582  035126  051440  047510  046125
6583  035134  020104  040510  042526
6584  035142  041040  042505  020116
6585  035150  020101  044510  020124
6586  035156  040527  020123  020101
6587  035164  044515  051523  000056
6588
6589
6590  035172  052600  042516  050130  EM14:   .ASCIZ  <CRLF>'UNEXPECTED PARITY ERROR TRAP.'
6591  035200  041505  042524  020104
6592  035206  040520  044522  054524
6593  035214  042440  051122  051117
6594  035222  052040  040522  027120
6595  035230  000
6596
6597  035231  052     025052  042524  EM15:   .ASCIZ  '***TEST ABORTED! GOING TO NEXT TEST.***'
6598  035236  052123  040440  047502
6599  035244  052122  042105  020041
6600  035252  047507  047111  020107
6601  035260  047524  047040  054105
6602  035266  020124  042524  052123
6603  035274  025056  025052  000
6604  035301  103     041501  042510  EM55:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
6605  035306  051040  043505  051511
6606  035314  042524  020122  042522
6607  035322  050123  047117  042523
6608  035330  052040  051505  020124
6609  035336  040506  046111  042105
6610  035344  100056
6611  035346  020101  042522  042506          .ASCII  'A REFERENCE TO THE LOW ORDER ERROR ADDRESS REGISTER '
6612  035354  042522  041516  020105
6613  035362  047524  052040  042510
6614  035370  046040  053517  047440
6615  035376  042122  051105  042440
6616  035404  051122  051117  040440
6617  035412  042104  042522  051523
6618  035420  051040  043505  051511
6619  035426  042524  020122
6620  035432  044524  042515  020104          .ASCIZ  'TIMED OUT.'
6621  035440  052517  027124  000
6622
6623  035445  103     041501  042510  EM56:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
6624  035452  051040  043505  051511
6625  035460  042524  020122  042522
6626  035466  050123  047117  042523
6627  035474  052040  051505  020124
6628  035502  040506  046111  042105
6629  035510  100056
6630  035512  020101  042522  042506          .ASCII  'A REFERENCE TO THE HIGH ORDER ERROR ADDRESS REGISTER '
6631  035520  042522  041516  020105
6632  035526  047524  052040  042510
6633  035534  044040  043511  020110
6634  035542  051117  042504  020122
```

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6635  035550  051105  047522  020122
6636  035556  042101  051104  051505
6637  035564  020123  042522  044507
6638  035572  052123  051105     040
6639  035577     124  046511  042105          .ASCIZ  'TIMED OUT.'
6640  035604  047440  052125  000056
6641
6642  035612  040503  044103  020105  EM57:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
6643  035620  042522  044507  052123
6644  035626  051105  051040  051505
6645  035634  047520  051516  020105
6646  035642  042524  052123  043040
6647  035650  044501  042514  027104
6648  035656     200
6649  035657     101  051040  043105          .ASCIZ  'A REFERENCE TO THE ERROR REGISTER TIMED OUT.'
6650  035664  051105  047105  042503
6651  035672  052040  020117  044124
6652  035700  020105  051105  047522
6653  035706  020122  042522  044507
6654  035714  052123  051105  052040
6655  035722  046511  042105  047440
6656  035730  052125  000056
6657
6658  035734  040503  044103  020105  EM60:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
6659  035742  042522  044507  052123
6660  035750  051105  051040  051505
6661  035756  047520  051516  020105
6662  035764  042524  052123  043040
6663  035772  044501  042514  027104
6664  036000     200
6665  036001     101  051040  043105          .ASCIZ  'A REFERENCE TO THE CONTROL REGISTER TIMED OUT.'
6666  036006  051105  047105  042503
6667  036014  052040  020117  044124
6668  036022  020105  047503  052116
6669  036030  047522  020114  042522
6670  036036  044507  052123  051105
6671  036044  052040  046511  042105
6672  036052  047440  052125  000056
6673
6674  036060  040503  044103  020105  EM61:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
6675  036066  042522  044507  052123
6676  036074  051105  051040  051505
6677  036102  047520  051516  020105
6678  036110  042524  052123  043040
6679  036116  044501  042514  027104
6680  036124     200
6681  036125     101  051040  043105          .ASCIZ  'A REFERENCE TO THE MAINTENANCE REGISTER TIMED OUT.'
6682  036132  051105  047105  042503
6683  036140  052040  020117  044124
6684  036146  020105  040515  047111
6685  036154  042524  040516  041516
6686  036162  020105  042522  044507
6687  036170  052123  051105  052040
6688  036176  046511  042105  047440
6689  036204  052125  000056
6690
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 6691  036310  040503  044103  020105  EM62:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
 6692  036316  042522  044507  052123
 6693  036324  051105  051040  051505
 6694  036332  047520  051516  020105
 6695  036340  042524  052123  043040
 6696  036346  044501  042514  027104
 6697  036354     200
 6698  036355     101  051040  043105          .ASCIZ  'A REFERENCE TO THE HIT/MISS REGISTER TIMED OUT.'<CRLF>
 6699  036362  051105  047105  042503
 6700  036370  052040  020117  044124
 6701  036376  020105  044510  027524
 6702  036304  044515  051523  051040
 6703  036312  043505  051511  042524
 6704  036320  020122  044524  042515
 6705  036326  020104  052517  027124
 6706  036334  000200
 6707
 6708  036336  040503  044103  020105  EM63:   .ASCII  'CACHE REGISTER DATA PATHS, READ ZEROES, TEST FAILED.'
 6709  036344  042522  044507  052123
 6710  036352  051105  042040  052101
 6711  036360  020101  040520  044124
 6712  036366  026123  051040  040505
 6713  036374  020104  042532  047522
 6714  036402  051505  020054  042524
 6715  036410  052123  043040  044501
 6716  036416  042514  027104
 6717  036422  053600  047522  042524          .ASCII  <CRLF>'WROTE ZEROES BUT READ BACK NON-ZERO DATA '
 6718  036430  055040  051105  042517
 6719  036436  020123  052502  020124
 6720  036444  042522  042101  041040
 6721  036452  041501  020113  047516
 6722  036460  026516  042532  047522
 6723  036466  042040  052101  020101
 6724  036474  051106  046517  041040          .ASCIZ  'FROM BOTH'<CRLF>'THE CONTROL AND MAINTENANCE REGISTERS.'
 6725  036502  052117  100110  044124
 6726  036510  020105  047503  052116
 6727  036516  047522  020114  047101
 6728  036524  020104  040515  047111
 6729  036532  042524  040516  041516
 6730  036540  020105  042522  044507
 6731  036546  052123  051105  027123
 6732  036554     000
 6733
 6734  036555     103  041501  042510  EM64:   .ASCII  'CACHE REGISTER DATA PATH, READ ZEROES, TEST FAILED.'
 6735  036562  051040  043505  051511
 6736  036570  042524  020122  040504
 6737  036576  040524  050040  052101
 6738  036604  026110  051040  040505
 6739  036612  020104  042532  047522
 6740  036620  051505  020054  042524
 6741  036626  052123  043040  044501
 6742  036634  042514  027104
 6743  036640  053600  047522  042524          .ASCII  <CRLF>'WROTE ZEROES BUT READ BACK NON-ZERO DATA FROM '
 6744  036646  055040  051105  042517
 6745  036654  020123  052502  020124
 6746  036662  042522  042101  041040
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6747  036670  041501  020113  047516
6748  036676  036516  042532  047522
6749  036704  042040  052101  020101
6750  036712  051106  046517     040
6751  036717     200  044124  020105          .ASCIZ  <CRLF>'THE MAINTENANCE REGISTER.'
6752  036724  040515  047111  042524
6753  036732  040516  041516  020105
6754  036740  042522  044507  052123
6755  036746  051105  000056
6756
6757  036752  040503  044103  020105  EM65:   .ASCII  'CACHE REGISTER DATA PATHS, READ ONES, REST FAILED.'<CRLF>
6758  036760  042522  044507  052123
6759  036766  051105  042040  052101
6760  036774  020101  040520  044124
6761  037002  026123  051040  040505
6762  037010  020104  047117  051505
6763  037016  020054  042522  052123
6764  037024  043040  044501  042514
6765  037032  027104     200
6766  037035     106  044501  042514          .ASCII  'FAILED TO READ CORRECT DATA FROM THE ADDRESS REGISTER'
6767  037042  020104  047524  051040
6768  037050  040505  020104  047503
6769  037056  051122  041505  020124
6770  037064  040504  040524  043040
6771  037072  047522  020115  044124
6772  037100  020105  042101  051104
6773  037106  051505  020123  042522
6774  037114  044507  052123  051105
6775  037122  044440  020116  044124          .ASCII  ' IN THE CLEAR STATE.'<CRLF>'THE LOW ORDER ADDRESS '
6776  037130  020105  046103  040505
6777  037136  020122  052123  052101
6778  037144  027105  052200  042510
6779  037152  046040  053517  047440
6780  037160  042122  051105  040440
6781  037166  042104  042522  051523
6782  037174     040
6783  037175     123  047510  046125          .ASCII  'SHOULD HAVE BEEN SET TO: 177740'<CRLF>
6784  037202  020104  040510  042526
6785  037210  041040  042505  020116
6786  037216  042523  020124  047524
6787  037224  020072  033461  033467
6788  037232  030064     200
6789  037235     124  042510  044040          .ASCII  'THE HIGH ORDER ADDRESS REGISTER SHOULD HAVE BEEN '
6790  037242  043511  020110  051117
6791  037250  042504  020122  042101
6792  037256  051104  051505  020123
6793  037264  042522  044507  052123
6794  037272  051105  051440  047510
6795  037300  046125  020104  040510
6796  037306  042526  041040  042505
6797  037314  020116
6798  037316  042523  020124  047524          .ASCIZ  'SET TO: 000003'
6799  037324  020072  030060  030060
6800  037332  031460     000
6801
6802  037335     103  041501  042510  EM66:   .ASCIZ  'CACHE CONTROL REGISTER COUNT PATTERN TEST FAILED.'
```

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6803  037342  041440  047117  051124
6804  037350  046117  051040  043505
6805  037356  051511  042524  020122
6806  037364  047503  047125  020124
6807  037372  040520  052124  051105
6808  037400  020116  042524  052123
6809  037406  043040  044501  042514
6810  037414  027104     000
6811
6812  037417     103  041501  042510  EM6?:   .ASCII  'CACHE HIT MISS AND CONTROL REGISTER TEST FAILED.'
6813  037424  044040  052111  046457
6814  037432  051511  020123  047101
6815  037440  020104  047503  052116
6816  037446  047522  020114  042522
6817  037454  044507  052123  051105
6818  037462  052040  051505  020124
6819  037470  040506  046111  042105
6820  037476     056
6821  037477     200  044527  044124          .ASCII  <CR_F>'WITH THE CONTROL REGISTER CLEAR, THE HIT/MISS '
6822  037504  052040  042510  041440
6823  037512  047117  051124  046117
6824  037520  051040  043505  051511
6825  037526  042524  020122  046103
6826  037534  040505  026122  052040
6827  037542  042510  044040  052111
6828  037550  046457  051511  020123
6829  037556  042522  044507  052123          .ASCIZ  'REGISTER SHOULD'<CRLF>'HAVE SHOWN SIX HITS (000077).'
6830  037564  051105  051440  047510
6831  037572  046125  100104  040510
6832  037600  042526  051440  047510
6833  037606  047127  051440  054111
6834  037614  044040  052111  020123
6835  037622  030050  030060  033460
6836  037630  024467  000056
6837
6838  037634  040503  044103  020105  EM7C:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
6839  037642  044510  027524  044515
6840  037650  051523  040440  042116
6841  037656  041440  047117  051124
6842  037664  046117  051040  043505
6843  037672  051511  042524  020122
6844  037700  042524  052123  043040
6845  037706  044501  042514  027104
6846  037714  053600  044510  042514          .ASCII  <CR_F>'WHILE FORCING SELECTION OF GROUP 1 AND FORCING '
6847  037722  043040  051117  044503
6848  037730  043516  051440  046105
6849  037736  041505  044524  047117
6850  037744  047440  020106  051107
6851  037752  052517  020120  020061
6852  037760  047101  020104  047506
6853  037766  041522  047111  020107
6854  037774  044515  051523  051505          .ASCII  'MISSES TO GROUP 0,'<CRLF>'THE HIT/MISS REGISTER '
6855  040002  052040  020117  051107
6856  040010  052517  020120  026060
6857  040016  052200  042510  044040
6858  040024  052111  046457  051511
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 6859  040032  020123  042522  044507
 6860  040040  052123  051105     040
 6861  040045     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX HITS (000077).'
 6862  040052  020104  040510  042526
 6863  040060  051440  047510  047127
 6864  040066  051440  054111  044040
 6865  040074  052111  020123  030050
 6866  040102  030060  033460  024467
 6867  040110  000056
 6868
 6869  040112  040503  044103  020105  EM71:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 6870  040120  044510  027524  044515
 6871  040126  051523  040440  042116
 6872  040134  041440  047117  051124
 6873  040142  046117  051040  043505
 6874  040150  051511  042524  020122
 6875  040156  042524  052123  043040
 6876  040164  044501  042514  027104
 6877  040172  053600  044510  042514          .ASCII  <CRLF>'WHILE FORCING SELECTION OF GROUP 0 AND FORCING '
 6878  040200  043040  051117  044503
 6879  040206  043516  051440  046105
 6880  040214  041505  044524  047117
 6881  040222  047440  020106  051107
 6882  040230  052517  020120  020060
 6883  040236  047101  020104  047506
 6884  040244  041522  047111  020107
 6885  040252  044515  051523  051505          .ASCII  'MISSES TO GROUP 1.'<CRLF>'THE HIT/MISS REGISTER '
 6886  040260  052040  020117  051107
 6887  040266  052517  020120  026061
 6888  040274  052200  042510  044040
 6889  040302  052111  046457  051511
 6890  040310  020123  042522  044507
 6891  040316  052123  051105     040
 6892  040323     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX HITS (000077).'
 6893  040330  020104  040510  042526
 6894  040336  051440  047510  047127
 6895  040344  051440  054111  044040
 6896  040352  052111  020123  030050
 6897  040360  030060  033460  024467
 6898  040366  000056
 6899
 6900  040370  040503  044103  020105  EM72:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 6901  040376  044510  027524  044515
 6902  040404  051523  040440  042116
 6903  040412  041440  047117  051124
 6904  040420  046117  051040  043505
 6905  040426  051511  042524  020122
 6906  040434  042524  052123  043040
 6907  040442  044501  042514  027104
 6908  040450  044127  046111  020105          .ASCII  'WHILE FORCING MISSES TO BOTH GROUPS, THE HIT/MISS '
 6909  040456  047506  041522  047111
 6910  040464  020107  044515  051523
 6911  040472  051505  052040  020117
 6912  040500  047502  044124  043440
 6913  040506  047522  050125  026123
 6914  040514  052040  042510  044040
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6915  040522  052111  046457  051511
6916  040530  020123
6917  040532  042522  044507  052123          .ASCIZ  'REGISTER'<CR><LF>'SHOULD HAVE SHOWN SIX MISSES (000000).'
6918  040540  051105  051600  047510
6919  040546  046125  020104  040510
6920  040554  042526  051440  047510
6921  040562  047127  051440  054111
6922  040570  046440  051511  042523
6923  040576  020123  030060  030060
6924  040604  030060  024460  000056
6925
6926  040612  040503  044103  020105  EM73:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
6927  040620  044510  027524  044515
6928  040626  051523  040440  042116
6929  040634  041440  047117  051124
6930  040642  046117  051040  043505
6931  040650  051511  042524  020122
6932  040656  042524  052123  043040
6933  040664  044501  042514  027104
6934  040672  053600  044510  042514          .ASCII  <CR><LF>'WHILE FORCING MISSES TO BOTH GROUPS AND FORCING '
6935  040700  043040  051117  044503
6936  040706  043516  046440  051511
6937  040714  042523  020123  047524
6938  040722  041040  052117  020110
6939  040730  051107  052517  051520
6940  040736  040440  042116  043040
6941  040744  051117  044503  043516
6942  040752     040
6943  040753     123  046105  041505          .ASCII  'SELECTION OF GROUP 1.'<CR><LF>'THE HIT/MISS REGISTER '
6944  040760  044524  047117  047440
6945  040766  020106  051107  052517
6946  040774  020120  026061  052200
6947  041002  042510  044040  052111
6948  041010  046457  051511  020123
6949  041016  042522  044507  052123
6950  041024  051105     040
6951  041027     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX MISSES (000000).'
6952  041034  020104  040510  042526
6953  041042  051440  047510  047127
6954  041050  051440  054111  046440
6955  041056  051511  042523  020123
6956  041064  030050  030060  030060
6957  041072  024460  000056
6958
6959  041076  040503  044103  020105  EM74:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
6960  041104  044510  027524  044515
6961  041112  051523  040440  042116
6962  041120  041440  047117  051124
6963  041126  046117  051040  043505
6964  041134  051511  042524  020122
6965  041142  042524  052123  043040
6966  041150  044501  042514  027104
6967  041156  053600  044510  042514          .ASCII  <CRLF>'WHILE FORCING MISSES TO BOTH GROUPS AND FORCING '
6968  041164  043040  051117  044503
6969  041172  043516  046440  051511
6970  041200  042523  020123  047524
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6971   041206  041040  052117  020110
6972   041214  051107  052517  051523
6973   041222  040440  042116  043040
6974   041230  051117  044503  043516
6975   041236     040
6976   041237     123  046105  041505          .ASCII  'SELECTION OF GROUP 3.' CRLF 'THE HIT/MISS REGISTER '
6977   041244  044524  047117  047440
6978   041252  020106  051107  052517
6979   041260  020120  026060  052200
6980   041266  042510  044040  052111
6981   041274  046457  051511  020123
6982   041302  042522  044507  052123
6983   041310  051105     040
6984   041313     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX MISSES (000000).'
6985   041320  020104  040510  042526
6986   041326  051440  047510  047127
6987   041334  051440  054111  046440
6988   041342  051511  042523  020123
6989   041350  030050  030060  030060
6990   041356  024460  000056
6991
6992   041362  047503  052116  047522  EM75:   .ASCII  'CONTROL REGISTER TEST FAILED.'<CRLF>'FAILED TO GET '
6993   041370  020114  042522  044507
6994   041376  052123  051105  052040
6995   041404  051505  020124  040506
6996   041412  046111  042105  100056
6997   041420  040506  046111  042105
6998   041426  052040  020117  042507
6999   041434  020124
7000   041436  020101  044510  020124          .ASCIZ  'A HIT ON A REFERENCE WHICH SHOULD HAVE BEEN A HIT.'
7001   041444  047117  040440  051040
7002   041452  043105  051105  047105
7003   041460  042503  053440  044510
7004   041466  044103  051440  047510
7005   041474  046125  020104  040510
7006   041502  042526  041040  042505
7007   041510  020116  020101  044510
7008   041516  027124     000
7009
7010           041362                  EM76=EM75
7011
7012   041521     103  047117  051124  EM77:   .ASCII  'CONTROL REGISTER TEST FAILED.'<CRLF>'THE WRONG '
7013   041526  046117  051040  043505
7014   041534  051511  042524  020122
7015   041542  042524  052123  043040
7016   041550  044501  042514  027104
7017   041556  052200  042510  053440
7018   041564  047522  043516     040
7019   041571     107  047522  050125          .ASCIZ  'GROUP WAS WRITTEN WHILE FORCING SELECTION OF A GROUP.'
7020   041576  053440  051501  053440
7021   041604  044522  052124  047105
7022   041612  053440  044510  042514
7023   041620  043040  051117  044503
7024   041626  043516  051440  046105
7025   041634  041505  044524  047117
7026   041642  047440  020106  020101
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7027  041650  051107  052517  027120
7028  041656      000
7029
7030  041657      103  047117  051124  EM11T:  .ASCII  'CONTROL REGISTER TEST FAILED.' CR,LF>
7031  041664  046117  051040  043505
7032  041672  051511  042524  020122
7033  041700  042524  052123  043040
7034  041706  044501  042514  027104
7035  041714      200
7036  041715      107  052117  040440          .ASCII  'GOT A HIT IN THE GROUP TO WHICH MISSES ARE BEING FORCED.'
7037  041722  044040  052111  044440
7038  041730  020116  044124  020105
7039  041736  051107  052517  020120
7040  041744  047524  053440  044510
7041  041752  044103  046440  051511
7042  041760  042523  020123  051101
7043  041766  020105  042502  047111
7044  041774  020107  047506  041523
7045  042002  042105  000056
7046
7047  042006  044510  027524  044515  EM12D:  .ASCII  'HIT/MISS REGISTER PATTERNS TEST FAILED.'
7048  042014  051523  051040  043505
7049  042022  051511  042524  020122
7050  042030  040520  052124  051105
7051  042036  051516  052040  051505
7052  042044  020124  040506  046111
7053  042052  042105      056
7054  042055      200  042522  042101          .ASCII  <CRLF>'READ WRONG DATA FROM THE HIT/MISS REGISTER'<CRLF>
7055  042062  053440  047522  043516
7056  042070  042040  052101  020101
7057  042076  051106  046517  052040
7058  042104  042510  044040  052111
7059  042112  046457  051511  020123
7060  042120  042522  044507  052123
7061  042126  051105      200
7062  042131      127  044510  042514          .ASCIZ  'WHILE FLOATING A PATTERN OF HITS AND MISSES THROUGH IT.'
7063  042136  043040  047514  052101
7064  042144  047111  020107  020101
7065  042152  040520  052124  051105
7066  042160  020116  043117  044040
7067  042166  052111  020123  047101
7068  042174  020104  044515  051523
7069  042202  051505  052040  051110
7070  042210  052517  044107  044440
7071  042216  027124      000
7072
7073  042221      103  041501  042510  EM13I:  .ASCII  /CACHE CONTROL SIGNAL, THE 'RANDOM' SIGNAL, TEST FAILED.'
7074  042226  041440  047117  051124
7075  042234  046117  051440  043511
7076  042242  040516  026114  052040
7077  042250  042510  023440  040522
7078  042256  042116  046517  020047
7079  042264  044523  047107  046101
7080  042272  020054  042524  052123
7081  042300  043040  044501  042514
7082  042306  027104
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7093  042310  043E30  044501  042E14          .ASCII  <CRLF>'FAILED TO SET BITH BITS AT THE TWO TEST ADDRESSES '
7094  042316  020104  047524  043440
7095  042324  052105  041040  052117
7096  042332  020110  044510  051524
7097  042340  040440  020124  044124
7098  042346  020105  053524  020117
7099  042354  042524  052123  040440
7100  042362  042104  042522  051523
7101  042370  051505     40
7102  042373     127  044510  044103          .ASCIZ  'WHICH WERE REFERENCED.'
7103  042400  053440  051105  020105
7104  042406  042522  042506  042522
7105  042414  041516  042105  000056
7106
7107  042422  040515  047111  042524  EM133:  .ASCII  'MAINTENANCE REGISTER COUNT PATTERN TEST FAILED.'
7108  042430  040516  041516  020105
7109  042436  042522  044507  052123
7110  042444  051105  041440  052517
7111  042452  052116  050040  052101
7112  042460  042524  047122  052040
7113  042466  051505  020124  040506
7114  042474  046111  042105     056
7115  042501     200  044124  020105          .ASCII  <CRLF>'THE MAINTENANCE REGISTER WILL NOT CLEAR.'
7116  042506  040515  047111  042524
7117  042514  040516  041516  020105
7118  042522  042522  044507  052123
7119  042530  051105  053440  046111
7120  042536  020114  047516  020124
7121  042544  046103  040505  027122
7122
7123  042552  040503  044103  020105  EM123:  .ASCII  'CACHE MAINTENANCE REGISTER COUNT PATTERN TEST FAILED.'
7124  042560  040515  047111  042524
7125  042566  040516  041516  020105
7126  042574  042522  044507  052123
7127  042602  051105  041440  052517
7128  042610  052116  050040  052101
7129  042616  042524  047122  052040
7130  042624  051505  020124  040506
7131  042632  046111  042105     056
7132  042637     200  043101  042524          .ASCII  <CRLF>'AFTER WRITING A PATTERN IN THIS REGISTER '
7133  042644  020122  051127  052111
7134  042652  047111  020107  020101
7135  042660  040520  052124  051105
7136  042666  020116  047111  052040
7137  042674  044510  020123  042522
7138  042702  044507  052123  051105
7139  042710     040
7140  042711     106  044501  042514          .ASCIZ  'FAILED TO READ THAT PATTERN BACK.'
7141  042716  020104  047524  051040
7142  042724  040505  020104  044124
7143  042732  052101  050040  052101
7144  042740  042524  047122  041040
7145  042746  041501  027113     000
7146
7147  042753     101  020116  047125  EM124:  .ASCII  'AN UNEXPECTED ERROR OCCURRED WHILE RUNNING THE '
7148  042760  054105  042520  052103
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7139  042766  042105  042440  051122
7140  042774  051117  047440  041503
7141  043002  051125  042522  020104
7142  043010  044127  046111  020105
7143  043016  052522  047116  047111
7144  043024  020107  044124  020105
7145  043032  040515  047111  042524          .ASCII  'MAINTENANCE REGISTER'<CRLF>'COUNT PATTERN '
7146  043040  040516  041516  020105
7147  043046  042522  044507  052123
7148  043054  051105  041600  052517
7149  043062  052116  050040  052101
7150  043070  042524  047122     040
7151  043075     124  051505  027124          .ASCIZ  'TEST. NOTE MISSES WERE BEING FORCED TO BOTH GROUPS.'
7152  043102  047040  052117  020105
7153  043110  044515  051523  051505
7154  043116  053440  051105  020105
7155  043124  042502  047111  020107
7156  043132  047506  041522  042105
7157  043140  052040  020117  047502
7158  043146  044124  043440  047522
7159  043154  050125  027123     000
7160
7161  043161     115  044501  052116  EM127:  .ASCII  'MAINTENANCE REGISTER TEST FAILED.'<CRLF>
7162  043166  047105  047101  042503
7163  043174  051040  043505  051511
7164  043202  042524  020122  042524
7165  043210  052123  043040  044501
7166  043216  042514  027104     200
7167  043223     116  020117  051124          .ASCII  'NO TRAP OR ABORT OCCURRED WHEN THE PATTERN WAS PUT '
7168  043230  050101  047440  020122
7169  043236  041101  051117  020124
7170  043244  041517  052503  051122
7171  043252  042105  053440  042510
7172  043260  020116  044124  020105
7173  043266  040520  052124  051105
7174  043274  020116  040527  020123
7175  043302  052520  020124
7176  043306  047111  052040  042510          .ASCIZ  'IN THE MAINTENANCE REGISTER.'
7177  043314  046440  044501  052116
7178  043322  047105  047101  042503
7179  043330  051040  043505  051511
7180  043336  042524  027122     000
7181
7182  043343     105  051122  051117  EM130:  .ASCIZ  'ERROR REGISTER WILL NOT UNLOCK, OR CLEAR.'
7183  043350  051040  043505  051511
7184  043356  042524  020122  044527
7185  043364  046114  047040  052117
7186  043372  052440  046116  041517
7187  043400  026113  047440  020122
7188  043406  046103  040505  027122
7189  043414     000
7190
7191  043415     105  051122  051117  EM131:  .ASCII  'ERROR REGISTER AND MAINTENANCE REGISTER TEST FAILED.'
7192  043422  051040  043505  051511
7193  043430  042524  020122  047101
7194  043436  020104  040515  047111
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 7195  043444  042524  040516  041516
 7196  043452  020105  042522  044507
 7197  043460  052123  051105  052040
 7198  043466  051505  020124  040506
 7199  043474  046111  042105     056
 7200  043501     200  051105  047522          .ASCII  <CRLF>'ERROR REGISTEP IS INCORRECTLY SET'
 7201  043506  020122  042522  044507
 7202  043514  052123  051105  044440
 7203  043522  020123  047111  047503
 7204  043530  051122  041505  046124
 7205  043536  020131  042523     124
 7206  043543     200  047506  020122          .ASCIZ  <CRLF>'FOR THE ERROR THAT WAS FORCED USING THE MAINTENANCE REGISTER.'
 7207  043550  044124  020105  051105
 7208  043556  047522  020122  044124
 7209  043564  052101  053440  051501
 7210  043572  043040  051117  042503
 7211  043600  020104  051525  047111
 7212  043606  020107  044124  020105
 7213  043614  040515  047111  042524
 7214  043622  040516  041516  020105
 7215  043630  042522  044507  052123
 7216  043636  051105  000056
 7217
 7218  043642                          EM140:
 7219  043642  040515  047111  046440          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 7220  043650  046505  051117  020131
 7221  043656  040504  040524  050040
 7222  043664  051101  052111  020131
 7223  043672  044103  041505  042513
 7224  043700  051522  052040  051505
 7225  043706  020124  040506  046111
 7226  043714  042105     056
 7227  043717     200  047125  041101          .ASCII  <CRLF> 'UNABLE TO FORCE A PARITY ERROR, USING '
 7228  043724  042514  052040  020117
 7229  043732  047506  041522  020105
 7230  043740  020101  040520  044522
 7231  043746  054524  042440  051122
 7232  043754  051117  020054  051525
 7233  043762  047111  020107
 7234  043766  044124  020105  040515          .ASCII  'THE MAINTENANCE REGISTER,'<CRLF>
 7235  043774  047111  042524  040516
 7236  044002  041516  020105  042522
 7237  044010  044507  052123  051105
 7238  044016  100054
 7239  044020  052101  052040  042510          .ASCII  'AT THE MAIN MEMORY EVEN WORD, LOW BYTE, PARITY '
 7240  044026  046440  044501  020116
 7241  044034  042515  047515  054522
 7242  044042  042440  042526  020116
 7243  044050  047527  042122  020054
 7244  044056  047514  020127  054502
 7245  044064  042524  020054  040520
 7246  044072  044522  054524     040
 7247  044077     103  042510  045503          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
 7248  044104  051105  100054  051040
 7249  044112  040505  044504  043516
 7250  044120  040440  042040  052101
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 7251  044136  020101  040520  052124
 7252  044134  051105  020116  044127
 7253  044142  041511  020110
 7254  044146  044123  052517  042114          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
 7255  044154  044040  053101  020105
 7256  044162  040503  051525  042105
 7257  044170  040440  020116  051105
 7258  044176  047522  027122     000
 7259
 7260  044203                             EM141:
 7261  044203     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 7262  044210  042515  047515  054522
 7263  044216  042040  052101  020101
 7264  044224  040520  044522  054524
 7265  044232  041440  042510  045503
 7266  044240  051105  020123  042524
 7267  044246  052123  043040  044501
 7268  044254  042514  027104
 7269  044260  052600  040516  046102          .ASCII  <CRLF> 'UNABLE TO FORCE A PARITY ERROR. USING '
 7270  044266  020105  047524  043040
 7271  044274  051117  042503  040440
 7272  044302  050040  051101  052111
 7273  044310  020131  051105  047522
 7274  044316  026122  052440  044523
 7275  044324  043516     040
 7276  044327     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER,'<CRLF>
 7277  044334  044501  052116  047105
 7278  044342  047101  042503  051040
 7279  044350  043505  051511  042524
 7280  044356  026122     200
 7281  044361     101  020124  044124          .ASCII  'AT THE MAIN MEMORY ODD WORD, LOW BYTE, PARITY '
 7282  044366  020105  040515  047111
 7283  044374  046440  046505  051117
 7284  044402  020131  042117  020104
 7285  044410  047527  042122  020054
 7286  044416  047514  020127  054502
 7287  044424  042524  020054  040520
 7288  044432  044522  054524     040
 7289  044437     103  042510  045503          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
 7290  044444  051105  100054  051040
 7291  044452  040505  044504  043516
 7292  044460  040440  042040  052101
 7293  044466  020101  040520  052124
 7294  044474  051105  020116  044127
 7295  044502  041511  020110
 7296  044506  044123  052517  042114          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
 7297  044514  044040  053101  020105
 7298  044522  040503  051525  042105
 7299  044530  040440  020116  051105
 7300  044536  047522  027122     000
 7301
 7302  044543                             EM142:
 7303  044543     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 7304  044550  042515  047515  054522
 7305  044556  042040  052101  020101
 7306  044564  040520  044522  054524
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7307  044572  041440  042510  045503
7308  044630  051105  020123  042524
7309  044606  052123  043040  044501
7310  044614  042514  027104
7311  044620  052600  040516  046102          .ASCII   <CRLF> 'UNABLE TO FORCE A PARITY ERROR, USING '
7312  044626  020105  047524  043040
7313  044634  051117  042503  040440
7314  044642  050040  051101  052111
7315  044650  020131  051105  047522
7316  044656  026122  052440  044523
7317  044664  043516     040
7318  044667     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER,'<CRLF>
7319  044674  044501  052116  047105
7320  044702  047101  042503  051040
7321  044710  043505  051511  042524
7322  044716  026122     200
7323  044721     101  020124  044124          .ASCII  'AT THE MAIN MEMORY EVEN WORD, HIGH BYTE, PARITY '
7324  044726  020105  040515  047111
7325  044734  046440  046505  051117
7326  044742  020131  053105  047105
7327  044750  053440  051117  026104
7328  044756  044040  043511  020110
7329  044764  054502  042524  020057
7330  044772  040520  044522  054524
7331  045000     040
7332  045001     103  042510  045503          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
7333  045006  051105  100054  051040
7334  045014  040505  044504  043516
7335  045022  040440  042040  052101
7336  045030  020101  040520  052124
7337  045036  051105  020116  044127
7338  045044  041511  020110
7339  045050  044123  052517  042114          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
7340  045056  044040  053101  020105
7341  045064  040503  051525  042105
7342  045072  040440  020116  051105
7343  045100  047522  027122     000
7344
7345  045105                          EM143:
7346  045105     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
7347  045112  042515  047515  054522
7348  045120  042040  052101  020101
7349  045126  040520  044522  054524
7350  045134  041440  042510  045503
7351  045142  051105  020123  042524
7352  045150  052123  043040  044501
7353  045156  042514  027104
7354  045162  052600  040516  046102          .ASCII  <CRLF> 'UNABLE TO FORCE A PARITY ERROR, USING '
7355  045170  020105  047524  043040
7356  045176  051117  042503  040440
7357  045204  050040  051101  052111
7358  045212  020131  051105  047522
7359  045220  026122  052440  044523
7360  045226  043516     040
7361  045231     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER,'<CRLF>
7362  045236  044501  052116  047105
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7363  045244  047101  042503  051040
7364  045252  043505  051511  042524
7365  045260  026122     200
7366  045263     101  020124  044124          .ASCII  'AT THE MAIN MEMORY ODD WORD, HIGH BYTE, PARITY '
7367  045270  020105  040515  047111
7368  045276  046440  046505  051117
7369  045304  020131  042117  020104
7370  045312  047527  042122  020054
7371  045320  044510  044107  041040
7372  045326  052131  026105  050040
7373  045334  051101  052111  020131
7374  045342  044103  041505  042513          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
7375  045350  026122  020200  042522
7376  045356  042101  047111  020107
7377  045364  020101  040504  040524
7378  045372  050040  052101  042524
7379  045400  047122  053440  044510
7380  045406  044103     040
7381  045411     123  047510  046125          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
7382  045416  020104  040510  042526
7383  045424  041440  052501  042523
7384  045432  020104  047101  042440
7385  045440  051122  051117  000056
7386
7387  045446  020040  042524  052123  DH140:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'DATA.'<TAB>'ADDRESS.'
7388  045454  004456  040503  046114
7389  045462  040440  020124  041520
7390  045470  004456  040504  040524
7391  045476  004456  042101  051104
7392  045504  051505  027123     000
7393
7394          045446                  DH141=DH140
7395
7396          045446                  DH142=DH140
7397
7398          045446                  DH143=DH140
7399
7400  045511     004     003     000  DF140:  .BYTE   4,3,0,2
7401  045514     002
7402
7403          045511                  DF141=DF140
7404
7405          045511                  DF142=DF140
7406
7407          045511                  DF143=DF140
7408
7409          045516                          .EVEN
7410  045516  001232  001116  001236  DT140:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
7411  045524  001240  000000
7412
7413          045516                  DT141=DT140
7414
7415          045516                  DT142=DT140
7416
7417          045516                  DT143=DT140
7418
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7419
7420  045530  051105  047522  020122  EM132:  .ASCII  'ERROR REGISTER TEST WAS UNABLE TO CAUSE A TIME OUT.'
7421  045536  042522  044507  052123
7422  045544  051105  052040  051505
7423  045552  020124  040527  020123
7424  045560  047125  041101  042514
7425  045566  052040  020117  040503
7426  045574  051525  020105  020101
7427  045602  044524  042515  047440
7428  045610  052125     054
7429  045613     200  052101  040440          .ASCIZ  <CRLF>'AT AN ADDRESS WHICH SHOULD HAVE TIMED OUT.'
7430  045620  020116  042101  051104
7431  045626  051505  020123  044127
7432  045634  041511  020110  044123
7433  045642  052517  042114  044040
7434  045650  053101  020105  044524
7435  045656  042515  020104  052517
7436  045664  027124     000
7437
7438  045667     105  051122  051117  EM133:  .ASCII  'ERROR REGISTER TEST FAILED.'
7439  045674  051040  043505  051511
7440  045702  042524  020122  042524
7441  045710  052123  043040  044501
7442  045716  042514  027104
7443  045722  040600  052106  051105          .ASCII  <CRLF>'AFTER CAUSING A TIME OUT THE ERROR REGISTER SHOULD '
7444  045730  041440  052501  044523
7445  045736  043516  040440  052040
7446  045744  046511  020105  052517
7447  045752  020124  044124  020105
7448  045760  051105  047522  020122
7449  045766  042522  044507  052123
7450  045774  051105  051440  047510
7451  046002  046125  020104
7452  046006  040510  042526  041040          .ASCIZ  'HAVE BEEN SET TO : 000000.'
7453  046014  042505  020116  042523
7454  046022  020124  047524  035040
7455  046030  030040  030060  030060
7456  046036  027060     000
7457
7458  046041     103  047117  051124  EM134:  .ASCII  'CONTROL REGISTER, DISABLE TRAPS, TEST FAILED.'
7459  046046  046117  051040  043505
7460  046054  051511  042524  026122
7461  046062  042040  051511  041101
7462  046070  042514  052040  040522
7463  046076  051520  020054  042524
7464  046104  052123  043040  044501
7465  046112  042514  027104
7466  046116  040600  052040  040522          .ASCIZ  <CRLF>'A TRAP OCCURRED WITH BIT 0 SET IN THE CONTROL REGISTER.'
7467  046124  020120  041517  052503
7468  046132  051122  042105  053440
7469  046140  052111  020110  044502
7470  046146  020124  020060  042523
7471  046154  020124  047111  052040
7472  046162  042510  041440  047117
7473  046170  051124  046117  051040
7474  046176  043505  051511  042524
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 7475  046204  027122     000
 7476
 7477  046207     105  051122  051117  EM13S:  .ASCII  'ERROR REGISTER, LOCK UP, TEST FAILED.'
 7478  046214  051040  043505  051511
 7479  046222  042524  026122  046040
 7480  046230  041517  020113  050125
 7481  046236  020054  042524  052123
 7482  046244  043040  044501  042514
 7483  046252  027104
 7484  046254  040600  052106  051105          .ASCII  <CRLF>'AFTER FORCING MULTIPLE ERRORS, TWO, THE ERROR '
 7485  046262  043040  051117  044503
 7486  046270  043516  046440  046125
 7487  046276  044524  046120  020105
 7488  046304  051105  047522  051522
 7489  046312  020054  053524  026117
 7490  046320  052040  042510  042440
 7491  046326  051122  051117     040
 7492  046333     122  043505  051511          .ASCIZ  'REGISTERS WAS INCORRECTLY SET.'
 7493  046340  042524  051522  053440
 7494  046346  051501  044440  051516
 7495  046354  051117  042522  052103
 7496  046362  054514  051440  052105
 7497  046370  000056
 7498
 7499  046372  052600  042516  050130  EM15D:  .ASCIZ  <CRLF>'UNEXPECTED CPU ERROR TRAPPED TO VECTOR ERRVEC (4)!'
 7500  046400  041505  042524  020104
 7501  046406  050103  020125  051105
 7502  046414  047522  020122  051124
 7503  046422  050101  042520  020104
 7504  046430  047524  053040  041505
 7505  046436  047524  020122  051105
 7506  046444  053122  041505  024040
 7507  046452  024464  000041
 7508
 7509                                  ;THESE ARE DATA HEADERS:
 7510
 7511  046456  020040  042524  052123  DH1:    .ASCIZ  '  TEST.'<TAB>' GROUP.'<TAB>'PHYSICAL ADDR.'<TAB>'CALL AT PC.'
 7512  046464  004456  043440  047522
 7513  046472  050125  004456  044120
 7514  046500  051531  041511  046101
 7515  046506  040440  042104  027122
 7516  046514  041411  046101  020114
 7517  046522  052101  050040  027103
 7518  046530     000
 7519  046531     040  052040  051505  DH14:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'ERROR ADDR REG.'
 7520  046536  027124  041411  046101
 7521  046544  020114  052101  050040
 7522  046552  027103  042411  051122
 7523  046560  051117  040440  042104
 7524  046566  020122  042522  027107
 7525  046574  052011  040522  020120          .ASCII  <TAB>'TRAP AT PC.'<TAB>
 7526  046602  052101  050040  027103
 7527  046610     011
 7528  046611     105  051122  051117          .ASCIZ  'ERROR REG.'
 7529  046616  051040  043505  000056
 7530
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7553   046624  020040  042524  052123  DH15:   .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'
7554   046632  004456  040503  046114
7555   046640  040440  020124  041520
7556   046646  000056
7557
7558   046650  020040  042524  052123  DH55:   .ASCIZ  '  TEST.' TAB 'TRAP AT PC.' TAB'(CALL AT PC.'<TAB>'REG ADDRESS.'
7559   046656  004456  051124  050101
7560   046664  040440  020124  041520
7561   046672  004456  040503  046114
7562   046700  040440  020124  041520
7563   046706  004456  042522  020107
7564   046714  042101  051104  051505
7565   046722  027123     000
7566
7567                   046650                  DH56=DH55
7568
7569                   046650                  DH57=DH55
7570
7571                   046650                  DH60=DH55
7572
7573                   046650                  DH61=DH55
7574
7575                   046650                  DH62=DH55
7576
7577   046725     040  052040  051505  DH63:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'CONTROL.'
7578   046732  027124  041411  046101
7579   046740  020114  052101  050040
7580   046746  027103  041411  047117
7581   046754  051124  046117     056
7582   046761     115  044501  052116          .ASCIZ  'MAINT.'<TAB>'(DATA READ FROM EACH REGISTER)'
7583   046766  004456  042050  052101
7584   046774  020101  042522  042101
7585   047002  043040  047522  020115
7586   047010  040505  044103  051040
7587   047016  043505  051511  042524
7588   047024  024522     000
7589
7590   047027     040  052040  051505  DH64:   .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'CONTROL REGISTER DATA.'
7591   047034  027124  041411  046101
7592   047042  020114  052101  050040
7593   047050  027103  041411  047117
7594   047056  051124  046117  051040
7595   047064  043505  051511  042524
7596   047072  020122  040504  040524
7597   047100  000056
7598
7599   047102  020040  042524  052123  DH65:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'LOW ORD.'<TAB>'HIGH ORD.'
7600   047110  004456  040503  046114
7601   047116  040440  020124  041520
7602   047124  004456  047514  020127
7603   047132  051117  027104  044011
7604   047140  043511  020110  051117
7605   047146  027104
7606   047150  024011  040504  040524          .ASCIZ  <TAB>'(DATA READ FROM ADR. REG.)'
7607   047156  051040  040505  020104
7608   047164  051106  046517  040440
```

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 7587  047172  051104  020056  042522
 7588  047200  027107  000051
 7589
 7590  047204  020040  042524  052123  DH66:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'NOTE.'<TAB>'READ.'
 7591  047212  004456  040503  046114
 7592  047220  040440  020124  041520
 7593  047226  004456  051127  052117
 7594  047234  027105  051011  040505
 7595  047242  027104
 7596  047244  042411  050130  041505          .ASCIZ  <TAB>'EXPECTED.'
 7597  047252  042524  027124     000
 7598
 7599  047257     040  052040  051505  DH67:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN READ FROM THE '
 7600  047264  027124  041411  046101
 7601  047272  020114  052101  050040
 7602  047300  027103  050011  052101
 7603  047306  042524  047122  051040
 7604  047314  040505  020104  051106
 7605  047322  046517  052040  042510
 7606  047330     040
 7607  047331     110  052111  046457          .ASCIZ  'HIT/MISS REGISTER.'
 7608  047336  051511  020123  042522
 7609  047344  044507  052123  051105
 7610  047352  000056
 7611
 7612          047257                  DH70=DH67
 7613
 7614          047257                  DH71=DH67
 7615
 7616          047257                  DH72=DH67
 7617
 7618          047257                  DH73=DH67
 7619
 7620          047257                  DH74=DH67
 7621
 7622  047354  020040  042524  052123  DH75:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>' GROUP.'<TAB>
 7623  047362  004456  040503  046114
 7624  047370  040440  020124  041520
 7625  047376  004456  043440  047522
 7626  047404  050125  004456
 7627  047410  042101  051104  051505          .ASCIZ  'ADDRESS.'<TAB>'PATTERN IN CONTROL REG.'
 7628  047416  027123  050011  052101
 7629  047424  042524  047122  044440
 7630  047432  020116  047503  052116
 7631  047440  047522  020114  042522
 7632  047446  027107     000
 7633
 7634          047354                  DH76=DH75
 7635
 7636  047451     040  052040  051505  DH77:   .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'
 7637  047456  027124  041411  046101
 7638  047464  020114  052101  050040
 7639  047472  027103     000
 7640
 7641
 7642          047354                  DH117=DH75
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D13


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047475      040  052040  051505  DH120:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN IN CONTROL REG.'
047503   027124  041411  046101
047510   020114  052101  050040
047516   027103  050011  052101
047524   042524  047122  044440
047532   020116  047503  052116
047540   047522  020114  042522
047546   027107     000

047551      040  052040  051505  DH121:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TEST ADDRESS.'
047556   027124  041411  046101
047564   020114  052101  050040
047572   027103  052011  051505
047600   020124  042101  051104
047606   051505  027123     000

047613      040  052040  051505  DH122:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'WROTE.'<TAB>
047620   027124  041411  046101
047626   020114  052101  050040
047634   027103  053411  047522
047642   042524  004456
047646   044124  047105  041440          .ASCIZ  'THEN CLEARED AND READ.'
047654   042514  051101  042105
047662   040440  042116  051040
047670   040505  027104     000

047675      040  042524  052123  DH123:  .ASCIZ  ' TEST.'<TAB>'CALL AT PC.'<TAB>'WROTE.'<TAB>'READ.'
047702   004456  040503  046114
047710   040440  020124  041520
047716   004456  051127  052117
047724   027105  051011  040505
047732   027104     000

         046531                  DH124=DH14

047735      040  052040  051505  DH125:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'ADDRESS.'
047742   027124  041411  046101
047750   020114  052101  050040
047756   027103  040411  042104
047764   042522  051523  000056

047772   020040  042524  052123  DH126:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'
050000   004456  040503  046114
050006   040440  020124  041520
050014   004456  051124  050101
050022   040440  020124  041520
050030      056
050031      011  051105  047522          .ASCIZ  <TAB>'ERROR REG.'
050036   020122  042522  027107
050044      000

050045      040  052040  051505  DH127:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN USED.'
050052   027124  041411  046101
050060   020114  052101  050040
050066   027103  050011  052101
```

E13


```
050074  042524  047122  052440
050102  042523  027104     000

050107     040  052040  051505  DH130:  .ASCII  '  TEST.' TAB 'CALL AT PC.' TAB 'ERROR ADR REG.'
050114  027124  041411  046101
050122  020114  052101  050040
050130  027103  042411  051122
050136  051117  040440  051104
050144  051040  043505     056
050151     011  051105  047522          .ASCIZ  <TAB>'ERROR REG.'
050156  020122  042522  027107
050164     000

050165     040  052040  051505  DH131:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'<TAB>
050172  027124  041411  046101
050200  020114  052101  050047
050206  027103  052011  040522
050214  020120  052101  050040
050222  027103     011
050225     105  051122  051117          .ASCIZ  'ERROR ADR REG.'
050232  040440  051104  051040
050240  043505  000056

        047735                  DH132=DH125

        047772                  DH133=DH126

050244  020040  042524  052123  DH134:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'<TAB>
050252  004456  040503  046114
050260  040440  020124  041520
050266  004456  051124  050101
050274  040440  020124  041520
050302  004456
050304  047503  052116  047522          .ASCIZ  'CONTROL REG.'
050312  020114  042522  027107
050320     000

        047451                  DH135=DH77

050321     040  052040  051505  DH150:  .ASCIZ  '  TEST.'<TAB>'TRAP AT PC.'<TAB>'CALL AT PC.'<TAB>'CPU ERROR REGISTER.'
050326  027124  052011  040522
050334  020120  052101  050040
050342  027103  041411  046101
050350  020114  052101  050040
050356  027103  041411  052520
050364  042440  051122  051117
050372  051040  043505  051511
050400  042524  027122     000
                                ;THESE ARE DATA FORMAT DESIGNATORS FOR THE DATA TABLE:

050405     004     004     003  DF1:    .BYTE   4,4,3,3
050410     003

050411     004     003     007  DF14:   .BYTE   4,3,7,3,0
050414     003     000
```

```
7755  050416  004  003          DF15:   .BYTE   4,3
7756
7757  050420  004  003  003     DF55:   .BYTE   4,3,3,2
7758  050423  002
7759
7760          050420             DF56=DF55
7761          050420             DF57=DF55
7762          050420             DF60=DF55
7763          050420             DF61=DF55
7764          050420             DF62=DF55
7765
7766  050424  004  003  000     DF63:   .BYTE   4,3,0,0,0
7767  050427  000  000
7768
7769          050424             DF64=DF63
7770          050424             DF65=DF63
7771          050424             DF66=DF63
7772          050424             DF67=DF63
7773          050424             DF70=DF63
7774          050424             DF71=DF63
7775          050424             DF72=DF63
7776          050424             DF73=DF63
7777          050424             DF74=DF63
7778
7779  050431  004  003  004     DF75:   .BYTE   4,3,4,2,0
7780  050434  002  000
7781
7782          050431             DF76=DF75
7783
7784  050436  004  003  005     DF77:   .BYTE   4,3,5,2,5,0,5,2,5,0
7785  050441  002  005  000
7786  050444  005  002  005
7787  050447  000
7788
7789
7790          050431             DF117=DF75
7791
7792  050450  004  003  000     DF120:  .BYTE   4,3,0,5,0,5,0,5,0,5,0,5,0,5,0,5,0,5,0,5,0,5,0,5,0
7793  050453  005  000  005
7794  050456  000  005  000
7795  050461  005  000  005
7796  050464  000  005  000
7797  050467  005  000  005
7798  050472  000  005  000
```

```
7811  050475  005  003  005
7812  050500  005  005  005
7813
7814  050503  004  003  002  DF121:  .BYTE  4,3,2,2
7815  050506  002
7816
7817  050507  004  003  000  DF122:  .BYTE  4,3,0,0
7818  050512  000
7819
7820          050507              DF123=DF122
7821
7822  050513  004  003  007  DF124:  .BYTE  4,3,7,3,0,5,0,
7823  050516  003  000  005
7824  050521  000  000
7825
7826  050523  004  003  002  DF125:  .BYTE  4,3,2,0
7827  050526  000
7828
7829  050527  004  003  003  DF126:  .BYTE  4,3,3,0,5,2,5,2
7830  050532  000  005  002
7831  050535  005  002
7832
7833  050537  004  003  000  DF127:  .BYTE  4,3,0
7834
7835          050523              DF130=DF125
7836
7837  050542  004  003  003  DF131:  .BYTE  4,3,3,2,5,0,5,0,5,0
7838  050545  002  005  000
7839  050550  005  000  005
7840  050553  000
7841
7842          050523              DF132=DF125
7843
7844          050527              DF133=DF126
7845
7846  050554  004  003  003  DF134:  .BYTE  4,3,3,0,5,2,0
7847  050557  000  005  002
7848  050562  000
7849
7850  050563  004  003  005  DF135:  .BYTE  4,3,5,0,5,0,5,2,5,2
7851  050566  000  005  000
7852  050571  005  002  005
7853  050574  002
7854
7855  050575  004  003  003  DF150:  .BYTE  4,3,3,0
7856  050600  000
7857
7858          050602              .EVEN
7859
7860                              ;THESE ARE DATA TABLES:
7861
7862  050602  001232  001234  001236  DT1:    .WORD  $TMP0,$TMP1,$TMP2,$ERRPC,0
7863  050610  001116  000000
7864
7865  050614  001232  001116  001234  DT14:   .WORD  $TMP0,$ERRPC,$TMP1,$TMP3,$TMP4,0
7866  050622  001240  001242  000000
```

```
050630  001232  001234  000000  DT15:   .WORD   $TMP0,$TMP1,0

050636  001232  001234  001116  DT55:   .WORD   $TMP0,$TMP1,$ERRPC,$TMP3,0
050644  001240  000000

        050636                  DT56=DT55

        050636                  DT57=DT55

        050636                  DT60=DT55

        050636                  DT61=DT55

        050636                  DT62=DT55

050650  001232  001116  001236  DT63:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
050656  001240  000000

050662  001232  001116  001236  DT64:   .WORD   $TMP0,$ERRPC,$TMP2,0
050670  000000

050672  001232  001116  001236  DT65:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
050700  001240  000000

050704  001232  001116  001236  DT66:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,$TMP4,0
050712  001240  001242  000000

        050662                  DT67=DT64

        050662                  DT70=DT64

        050662                  DT71=DT64

        050662                  DT72=DT64

        050662                  DT73=DT64

        050662                  DT74=DT64

050720  001232  001116  001236  DT75:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP10,$TMP3,0
050726  001252  001240  000000

050734  001232  001116  001236  DT76:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP12,$TMP3,0
050742  001256  001240  000000

050750  001232  001116  033634  DT77:   .WORD   $TMP0,$ERRPC,MTA77,$TMP10,MTB77,$TMP2,MTC77
050756  001252  033650  001236
050764  033712
050766  001256  033747  001240          .WORD   $TMP12,MTD77,$TMP3,0
050774  000000

        050734                  DT117=DT76

050776  001232  001116  001236  DT120:  .WORD   $TMP0,$ERRPC,$TMP2,MTA120,KCR0,MTG120,KCE0
```

```
MAINDEC-11-DEKBC-B     PDP 11 TO CACHE DIAGNOSTIC PART 1     MACY11 27 (332)  30-DEC-78  11:48  PAGE 144
DEKBCB.P11     DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE

 7923  051004  034117  006770  034337
 7924  051012  007004
 7925  051014  034147  006772  034337          .WORD   MTB120,KCR1,MTG120,KCE1
 7926  051022  007006
 7927  051024  034177  006774  034337          .WORD   MTC120,KCR2,MTG120,KCE2
 7928  051032  007010
 7929  051034  034227  006776  034337          .WORD   MTD120,KCR3,MTG120,KCE3
 7930  051042  007012
 7931  051044  034257  007000  034337          .WORD   MTE120,KCR4,MTG120,KCE4
 7932  051052  007014
 7933  051054  034307  007002  034337          .WORD   MTF120,KCR5,MTG120,KCE5,0
 7934  051062  007016  000000
 7935
 7936  051066  001232  001116  001236  DT121:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP4,0
 7937  051074  001242  000000
 7938
 7939  051100  001232  001116  001236  DT122:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
 7940  051106  001240  000000
 7941
 7942          051100                  DT123=DT122
 7943
 7944  051112  001232  001116  001234  DT124:  .WORD   $TMP0,$ERRPC,$TMP1,$TMP3,$TMP4,MTA124,$TMP6,0
 7945  051120  001240  001242  034400
 7946  051126  001246  000000
 7947
 7948  051132  001232  001116  001236  DT125:  .WORD   $TMP0,$ERRPC,$TMP2,0
 7949  051140  000000
 7950
 7951  051142  001232  001116  001236  DT126:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP7,MTA125,$TMP5,MTB126,$TMP3,0
 7952  051150  001250  034472  001244
 7953  051156  034520  001240  000000
 7954
 7955          051132                  DT127=DT125
 7956
 7957  051164  001232  001116  001236  DT130:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP4,0
 7958  051172  001242  000000
 7959
 7960  051176  001232  001116  001236  DT131:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,MTA131,$TMP5
 7961  051204  001240  034552  001244
 7962  051212  034634  001246  034667          .WORD   MTB131,$TMP6,MTC131,$TMP7,0
 7963  051220  001250  000000
 7964
 7965          051132                  DT132=DT125
 7966
 7967          051142                  DT133=DT126
 7968
 7969  051224  001232  001116  001236  DT134:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,MTA134,$TMP4,$TMP5,0
 7970  051232  001240  034715  001242
 7971  051240  001246  000000
 7972
 7973  051244  001232  001116  034751  DT135:  .WORD   $TMP0,$ERRPC,MTA135,$TMP2,MTB135,$TMP3
 7974  051252  001236  035001  001240
 7975  051260  035023  001242  035057          .WORD   MTC135,$TMP4,MTD135,$TMP6,0
 7976  051266  001246  000000
 7977
 7978  051272  001232  001234  001236  DT150:  .WORD   $TMP0,$TMP1,$TMP2,$TMP3,0
```

```
7979  051300  001240  000000
7980
7981  051304  000000  000000  000000  BOTTOM: .WORD   0,0,0
7982          057312                          .=.+6000
7983  057312                                BOTPRG:
7984          000001                          .END
```

K13


```
ABORTT   030620     5765    5999#
ADRNG    033111     5934    5960#
BACKAD   030736     5904*   5913    5914#
BIT0   = 000001      185#   1301    1399    4348    4422    4487    5093    5214
BIT00  = 000001      175#    185
BIT01  = 000002      174#    184
BIT02  = 000004      173#    183
BIT03  = 000010      172#    182
BIT04  = 000020      171#    181
BIT05  = 000040      170#    180
BIT06  = 000100      169#    179
BIT07  = 000200      168#    178
BIT08  = 000400      167#    177     5376
BIT09  = 001000      166#    176     5386    5445
BIT1   = 000002      184#   1306    1404
BIT10  = 002000      165#   5430
BIT11  = 004000      164#   5393
BIT12  = 010000      163#
BIT13  = 020000      162#   5437
BIT14  = 040000      161#   5362
BIT15  = 100000      160#
BIT2   = 000004      183#   1311    1409
BIT3   = 000010      182#
BIT4   = 000020      181#
BIT5   = 000040      180#
BIT6   = 000100      179#    999    6028
BIT7   = 000200      178#   6008
BIT8   = 000400      177#
BIT9   = 001000      176#
BOTPRG   057312     7983#
BOTTOM   051304      989    6014    7981#
BPTVEC = 000014      192#
CACHVE = 000114      200#   1002*   1019*   1111*   1443*   1536*   1627*   1838*   1949*   2017*   2031*   2058*   2134*
                    2219*   2303*   2390*   2471*   2566*   2654*   2753*   2852*   2951*   3050*   3149*   3248*   3347*
                    3450*   3574*   3705*   3817*   3928*   4039*   4150*   4235*   4349*   4423*   4489*   4548*   4572*
                    4686*   4712*   4828*   4853*   4969*   4995*   5086*   5097*   5119*   5207*   5218*   5240*   5869*
                    5874*   5902*
CHAINQ   031156     5331    6013#
CLEAN    030650     5764    5900#
CNRNG    033321     5948    6387#
CONCMS   032064     6012    6240#
CONFLG   031064     1074*   1130*   1137*   1229*   1812*   5944    5970#
CONFL2   031100     1322*   1418*   1481*   1504*   1574*   1597*   1785*   1810    5976#
CONTRL = 177746      209#   1072    1116*   1118    1211    1254*   1269*   1292*   1313*   1351*   1367*   1390*   1410*
                    1459*   1472*   1483*   1496*   1506*   1552*   1565*   1576*   1589*   1599*   1642*   1644*   1651*
                    1789*   1852*   1870*   1886*   1957*   2030*   2062*   2137*   2222*   2306*   2393*   2474*   2567*
                    2657*   2756*   2855*   2954*   3053*   3152*   3251*   3350*   3483*   3599*   3706*   3818*   3929*
                    4040*   4151*   4347*   4348*   4375    4407*   4422*   4440    4472*   4487*   4505    4545*   4693*
                    4823*   4964*   5088*   5209*   5909*
CPSPUR   030474     1001    3451    4285    5860#   5903
CPUERR = 177766      221#   1044    1092*   1095*   4283    5457*   5862    5911*
CR     = 000015       97#   5566    5576
CRLF   = 000200       98#    974    5537    5576    6240    6242    6249    6259    6262    6269    6279    6289    6292
                    6302    6308    6311    6316    6323    6328    6335    6345    6348    6355    6360    6374    6387
                    6399    6413    6426    6436    6449    6454    6462    6468    6474    6479    6485    6491    6504
                    6516    6521    6527    6537    6543    6548    6554    6565    6590    6604    6623    6642    6658
```

```
                        6674    6691    6698    6717    6724    6743    6751    6757    6775    6793    6821    6829    6846
                        6854    6977    6895    6917    6934    6943    6967    6976    6992    7012    7030    7054    7083
                        7105    7122    7145    7161    7200    7206    7227    7234    7247    7269    7278    7289    7311
                        7318    7332    7354    7367    7374    7429    7443    7466    7484    7499
DDISP = 177570           91*     529     954
DF1     050405          507    7749*
DF117 = 050431          845    7802*
DF120   050450          848    7804*
DF121   050503          851    7814*
DF122   050507          854    7817*   7920
DF123 = 050507          857    7820*
DF124   050513          860    7822*
DF125   050523         7826*   7835    7942
DF126   050527         7829*   7844
DF127   050537          869    7833*
DF130 = 050523          872    7835*
DF131   050542          875    7837*
DF132 = 050523          879    7842*
DF133 = 050527          882    7844*
DF134   050554          885    7846*
DF135   050563          888    7850*
DF14    050411          640    7752*
DF140   045511          897    7400*   7403    7405    7407
DF141 = 045511          900    7403*
DF142 = 045511          903    7405*
DF143 = 045511          906    7407*
DF15    050416          643    7755*
DF150   050575          921    7855*
DF55    050420          741    7757*   7760    7762    7764    7766    7768
DF56  = 050420          744    7760*
DF57  = 050420          747    7762*
DF60  = 050420          750    7764*
DF61  = 050420          753    7766*
DF62  = 050420          756    7768*
DF63    050424          759    7770*   7773    7775    7777    7779    7781    7783    7785    7787    7789
DF64  = 050424          762    7773*
DF65  = 050424          765    7775*
DF66  = 050424          768    7777*
DF67  = 050424          771    7779*
DF70  = 050424          774    7781*
DF71  = 050424          777    7783*
DF72  = 050424          780    7785*
DF73  = 050424          783    7787*
DF74  = 050424          786    7789*
DF75    050431          790    7791*   7794    7802
DF76  = 050431          793    7794*
DF77    050436          796    7796*
DH1     046456          607    7511*
DH117 = 047354          845    7642*
DH120   047475          848    7644*
DH121   047551          851    7653*
DH122   047613          854    7660*
DH123   047675          857    7670*
DH124 = 046531          860    7677*
DH125   047735         7679*   7722
DH126   047772         7685*   7724
```

DH127	050045	869	7695#					
DH130	050107	872	7702#					
DH131	050165	876	7712#					
DH132 =	047735	879	7722#					
DH133 =	047772	882	7724#					
DH134	050244	885	7726#					
DH135 =	047451	888	7736#					
DH14	046531	640	7519#	7677				
DH140	045446	897	7397#	7394	7396	7398		
DH141 =	045446	900	7394#					
DH142 =	045446	903	7396#					
DH143 =	045446	906	7398#					
DH15	046624	643	7531#					
DH150	050321	921	7738#					
DH55	046650	741	7536#	7545	7547	7549	7551	7553
DH56 =	046650	744	7545#					
DH57 =	046650	747	7547#					
DH60 =	046650	750	7549#					
DH61 =	046650	753	7551#					
DH62 =	046650	756	7553#					
DH63	046725	759	7555#					
DH64	047027	762	7568#					
DH65	047102	765	7577#					
DH66	047204	768	7590#					
DH67	047257	771	7599#	7612	7614	7616	7618	7620
DH70 =	047257	774	7612#					
DH71 =	047257	777	7614#					
DH72 =	047257	780	7616#					
DH73 =	047257	783	7618#					
DH74 =	047257	786	7620#					
DH75	047354	790	7622#	7634	7642			
DH76 =	047354	793	7634#					
DH77	047451	796	7636#	7736				
DISPLA	001142	529#	954#	962#	5407#	5429#		
DISPRE	000174	485#	962					
DSWR =	177570	90#	528	953				
DT1	050602	607	7862#					
DT117 =	050734	845	7920#					
DT120	050776	848	7922#					
DT121	051066	851	7936#					
DT122	051100	854	7939#	7942				
DT123 =	051100	857	7942#					
DT124	051112	860	7944#					
DT125	051132	7948#	7955	7965				
DT126	051142	7951#	7967					
DT127 =	051132	869	7955#					
DT130	051164	872	7957#					
DT131	051176	876	7960#					
DT132 =	051132	879	7965#					
DT133 =	051142	882	7967#					
DT134	051224	885	7969#					
DT135	051244	888	7973#					
DT14	050614	640	7865#					
DT140	045516	897	7410#	7413	7415	7417		
DT141 =	045516	900	7413#					
DT142 =	045516	903	7415#					

```
DT143 = 045516            906    7417#
DT15    050630            643    7868#
DT150   051272            921    7978#
DT55    050636            741    7871#   7874    7876    7878    7880    7882
DT56  = 050636            744    7874#
DT57  = 050636            747    7876#
DT60  = 050636            750    7878#
DT61  = 050636            753    7880#
DT62  = 050636            756    7882#
DT63    050650            759    7894#
DT64    050662            762    7887#   7896    7898    7900    7902    7904    7906
DT65    050672            765    7890#
DT66    050704            768    7893#
DT67  = 050662            771    7896#
DT70  = 050662            774    7898#
DT71  = 050662            777    7900#
DT72  = 050662            780    7902#
DT73  = 050662            783    7904#
DT74  = 050662            786    7906#
DT75    050720            790    7908#
DT76    050734            793    7911#   7920
DT77    050750            796    7914#
EMTVEC= 000030            195#    937#    938#
EM1     035105            607    6579#
EM117   041657            845    7030#
EM120   042006            848    7047#
EM121   042221            851    7073#
EM122   042422            854    7097#
EM123   042552            857    7113#
EM124   042753            860    7137#
EM127   043161            869    7161#
EM130   043343            872    7182#
EM131   043415            876    7191#
EM132   045530            879    7420#
EM133   045667            882    7438#
EM134   046041            885    7458#
EM135   046207            888    7477#
EM14    035172            640    6590#
EM140   043642            897    7218#
EM141   044203            900    7260#
EM142   044543            903    7302#
EM143   045105            906    7345#
EM15    035231            643    6597#
EM150   046372            921    7499#
EM55    035301            741    6604#
EM56    035445            744    6623#
EM57    035612            747    6642#
EM60    035734            750    6658#
EM61    036060            753    6674#
EM62    036210            756    6691#
EM63    036336            759    6708#
EM64    036555            762    6734#
EM65    036752            765    6757#
EM66    037335            768    6802#
EM67    037417            771    6812#
EM70    037634            774    6838#
```

```
EMT1      040112     777    6869#
EMT2      040370     780    6900#
EMT3      040612     783    6926#
EMT4      041076     786    6959#
EMT5      041362     790    6992#   7010
EMT6   =  041362     793    7010#
EMT7      041521     796    7012#
ERRNG     033221    5941    6374#
ERRVEC=   000004     198#    951     952*    963*   1001*   1024    1025*   1039*   1046*   1047    3451*   4252*   5367
                    5368*   5370*   5373*   5903*
ERTYPE    031352    5439    5891    6085#
ERT1      031464    6115#   6179
ERT2      031676    6119    6124    6134    6142    6148    6160    6169    6173#
ERT3      031702    6154    6176#
ERT4      031710    6113    6179    6181#
ERT5      031714    6093    6182#
GNS    =  ******     484     973    5754    5755    5756    5757    5759    5761    5762    5764    5765    5766    5767
                    5768    5769    5770    5771    5772
HIADRS=   177742     207#   1060    1170    2022    2086    2094    2102    2171    2180    2188    2255    2264    2272
                    2342    2351    2359    2428    2437    2445    2516    2525    2533    2602    2611    2619    2701
                    2710    2718    2800    2809    2817    2899    2908    2916    2998    3007    3015    3097    3106
                    3114    3196    3205    3213    3295    3304    3312    3394    3403    3411    3519    3537    3545
                    3631    3640    3648    3743    3752    3760    3854    3963    3871    3965    3974    3982    4076
                    4085    4093    4187    4196    4204    4294    4312    4320    4377    4442    4507    4608    4620
                    4629    4748    4760    4769    4889    4901    4910    5031    5043    5052    5677
HIAFLG    031060    1062*   1185*   5930    5968#
HIAFL2    031074    5974#
HIMFLG    031070    1086*   1413*   1815*   5958    5972#
HIMFL2    031104    1316*   1786*   1813    5978#
HITMIS=   177752     211#   1035    1084    1265    1278    1291    1362    1376    1399    1462    1475    1486    1498
                    1555    1568    1579    1591    1663    1860    1876    1906    2665    2764    2863    2962    3061
                    3160    3259    3358    4413    4478
HMRNG     032531    5962    6413#
HT     =  000011      95#   5535    5576
IOTVEC=   000020     193#    935*    936*
JA     =  000001    1014#
JADONE    004040    1039    1095#
JAERR     003616    1025    1044#
JAERR0    003626    1046#   1049
JAERR1    003640    1045    1048#
JAERR2    003706    1055    1060#
JAERR3    003726    1061    1066#
JAERR4    003746    1067    1072#
JAERR5    003766    1073    1078#
JAERR6    004006    1079    1084#
JAERR7    004026    1085    1090#
JAERR9    004030    1058    1064    1070    1076    1082    1088    1092#
JATMP     003614    1024*   1038    1041#   1046
JA1       003564    1028    1030#   1036
JA2       003570    1034#   1048    1093
JA3       003602    1038#
JB     =  000002    1106#
JBDONE    004200    1120    1132    1139#
JBERR1    004134    1126#
JBERR2    004164    1124    1134#
JB1       004102    1115    1116#
```

```
JB2      004120          1121#
JC     = 000003          1155#
JCDONE   004342          1174    1184    1187#
JCERR1   004272          1172    1176#
JC1      004244          1166    1168#
JC2      004264          1173#
JD     = 000004          1143    1202#
JDDONE   004460          1223    1231#
JDERR1   004432          1220    1224#
JD1      004404          1213    1214#   1221
JD2      004424          1221#   1230
KA     = 000005          1341#
KADONE   005320          1392    1410#
KAD2     005344          1412    1416#
KAD3     005362          1414    1417    1419#
KAERR1   005250          1364    1396#
KAERR2   005266          1378    1401#
KAERR3   005304          1391    1406#
KAFLG    005246          1350*   1394#   1399*   1404*   1409*   1411    1416
KA1      005046          1351#   1352
KA2      005070          1353    1356#   1357
KA3      005116          1366#   1400
KA4      005142          1368    1370#   1371
KA5      005170          1379#   1405
KA6      005214          1381    1383#   1384
KB     = 000005          1244#   1793
KBDONE   004754          1293    1313#
KBD2     004776          1315    1320#
KBD3     005012          1321    1324#
KBERR1   004704          1266    1298#
KBERR2   004722          1279    1303#
KBERR3   004740          1292    1308#
KBFLG    004702          1253*   1296#   1301*   1306*   1311*   1314    1320
KB1      004514          1254#   1255
KB2      004540          1257    1259#   1260
KB3      004562          1268#   1302
KB4      004606          1270    1272#   1273
KB5      004630          1281#   1307
KB6      004654          1283    1285#   1286
KC     = 000011          1622#
KCCON    006736          1631*   1651    1741*   1744*   1750#   1783
KCDONE   007050          1738    1789#
KCERR    007020          1728    1782#
KCE0     007004          1717    1724    1775#   7922
KCE1     007006          1776#   7925
KCE2     007010          1777#   7927
KCE3     007012          1778#   7929
KCE4     007014          1779#   7931
KCE5     007016          1780#   7933
KCFLG1   006740          1632*   1736*   1752#
KCPTR    006742          1634*   1648    1714    1731*   1732    1754#
KCR0     006770          1706*   1723    1768#   7922
KCR1     006772          1708*   1769#   7925
KCR2     006774          1709*   1770#   7927
KCR3     006776          1710*   1771#   7929
KCR4     007000          1711*   1772#   7931
```

```
KCRS      007002        1712*   1773#   7933
KCTBL     006744        1634    1757#
KCTSUB    006766        1732    1766#
KC0       006312        1633#   1742    1747
KC1       006326        1632    1639#   1734
KC10      006534        1705#
KC11      006574        1714#
KC12      006612        1719#   1721
KC13      006642        1726#   1729
KC14      006652        1727    1729#
KC15      006654        1731#   1787
KC16      006710        1737    1740#
KC17      006724        1740    1744#
KC2       006410        1653#   1661
KC2.5     006416        1652    1654    1656#
KC3       006452        1649    1664    1679#
KC4       006462        1679    1682#
KC5       006472        1683    1686#
KC6       006502        1687    1690#
KC7       006512        1691    1694#
KC8       006522        1695    1698#
KC9       006532        1699    1702#
KD      = 000007        1438#
KDPAR0= 172360           363#
KDPAR1= 172362           364#
KDPAR2= 172364           365#
KDPAR3= 172366           366#
KDPAR4= 172370           367#
KDPAR5= 172372           368#
KDPAR6= 172374           369#
KDPAR7= 172376           370#
KDPDR0= 172320           341#
KDPDR1= 172322           342#
KDPDR2= 172324           343#
KDPDR3= 172326           344#
KDPDR4= 172330           345#
KDPDR5= 172332           346#
KDPDR6= 172334           347#
KDPDR7= 172336           348#
KE      = 000010        1531#   1793
KERSTK= 001100            81#
KF      = 000013        1833#
KFTMP1    007336        1919#
KFTMP2    007340        1842    1920#
KF1       007144        1842#
KF2       007226        1861    1870#
KF3       007264        1877    1886#
KF4       007334        1909    1917#
KF5       007342        1917    1922#
KIPAR0= 172340           352#   3461    3576    3694    3796    3907    4018    4129    4243    4664    4924    4945    6216
KIPAR1= 172342           353#
KIPAR2= 172344           354#
KIPAR3= 172346           355#
KIPAR4= 172350           356#
KIPAR5= 172352           357#
KIPAR6= 172354           358#   4260*
```

```
KIPAR7= 172356            359#
KIPDR0= 172300            330#  3463  3578  3686  3798  3909  4020  4131  4245  4666  4736  4747
KIPDR1= 172302            331#
KIPDR2= 172304            332#
KIPDR3= 172306            333#
KIPDR4= 172310            334#
KIPDR5= 172312            335#
KIPDR6= 172314            336#
KIPDR7= 172316            337#
KSP    =.000006           116#
KTMP1D  005706           1509#
KTMP1E  006236           1602#
KTMP2D  005710           1448  1510#
KTMP2E  006240           1541  1603#
KV     = 000044          4337#
KVDONE  022506           4370  4381#
KVERR   022446           4349  4372#
KV1     022430           4352  4359#
KV2     022436           4362#
KX     = 000045          4397#
KXDONE  022706           4431  4447#
KXERR   022646           4423  4437#
KX1     022610           4414  4422#
KX2     022640           4408  4429#
KY     = 000012          1809#
KY1     007072           1811  1813#
KY2     007106           1814  1816#
KZ     = 000046          4462#
KZDONE  023106           4496  4512#
KZERR   023046           4488  4502#
KZ1     023010           4479  4487#
KZ2     023040           4473  4494#
K1D     005420           1448#
K1E     005750           1541#
K2D     005464           1459#
K2E     006014           1552#
K3D     005524           1463  1470#
K3E     006054           1556  1563#
K4D     005570           1476  1483#
K4E     006120           1569  1576#
K5D     005630           1487  1494#
K5E     006160           1580  1587#
K6D     005700           1493  1499  1506#
K6E     006230           1586  1592  1599#
K7D     005712           1507  1512#
K7E     006242           1600  1605#
LF     = 000012            96#  5570  5576
LKS    = 177546            92#
LKVEC  = 000100           199#
LOADRS= 177740            206#  1027  1054  1169  2021  2085  2092  2101  2170  2178  2197  2254  2262
                         2271  2341  2349  2358  2427  2435  2444  2515  2523  2532  2601  2609  2618
                         2700  2708  2717  2799  2807  2816  2898  2906  2915  2997  3005  3014  3096
                         3104  3113  3195  3203  3212  3294  3302  3311  3393  3401  3410  3518  3536
                         3543  3630  3638  3647  3742  3750  3759  3853  3861  3870  3964  3972  3981
                         4075  4083  4092  4186  4194  4203  4293  4311  4318  4376  4441  4506  4599
                         4607  4619  4627  4739  4747  4759  4767  4880  4899  4900  4908  5022  5030
```

```
                    5042    5050    5155    5166    5276    5287    5372    5376
LOOP    000364      1220    1056*   1182*   5928    5967#
LOOP2   000356      5973#
LOOP3   000346      1672#   1673#   1674#   1675    2140#   2141#   2142#   2143    2225#   2226#   2227#   2232    2233#
LOOP    = 000000    2310#   2311#   2312    2396#   2397#   2398#   2399    2484#   2485#   2486#   2487    2570#   2571#
                    2572#   2573    3602#   3603#   3604#   3605    3711#   3712#   3713#   3714    3823#   3824#   3825#
                    3826    3934#   3935#   3936#   3937    4045#   4046#   4047#   4048    4156#   4157#   4158#   4159
                    4554#   4555#   4556#   4557    4553#   4554#   4555#   4556    4577#   4578#   4579#   4580    4581#
                    4692#   4693#   4694    4717#   4718#   4719#   4720    4833#   4834#   4835#   4836    4858#   4859#
                    4860#   4861    4874#   4975#   4976#   4977    5000#   5001#   5002#   5003    5143#   5144#   5145#
                    5146    5264#   5265#   5266#   5267
LOOP    000364       983#   5341
MA      = 000014    1941#
MAB     = 000015    2048#
MABDON  010120      2074    2090    2095    2111#
MABRR0  007730      2058    2076#
MABRR1  007740      2079#
MABRR2  007756      2084#   2093    2095
MABRR3  010012      2082    2092#
MABRR4  010034      2077    2098#
MABR15  007742      2080#   2109
MAB2    007712      2070#
MADONE  007612      2008    2030#
MAERR   007526      1949    2010#
MAERR1  007550      2015    2020#
MAINT = 177750       210#   1078    1121*   1122    1959    2061    2136    2221    2305    2392    2473    2565    2656
                    2755    2854    2953    3052    3151    3250    3349    3484    3598    3708    3820    3931    4042
                    4153    4351    4426    4491    4550    4574    4688    4714    4830    4855    4971    4997    5099
                    5122    5220    5243    5906#
MANFLG  001066      1080*   1131*   1995*   4730*   4846*   4987*   5013*   5951    5971#
MANFL2  001102      2004*   2026*   2073*   2107*   2156*   2194*   2240*   2278*   2327*   2365*   2413*   2451*   2501*
                    2539*   2507*   2625*   2686*   2724*   2785*   2823*   2884*   2922*   2983*   3021*   3092*   3120*
                    3181*   3219*   3280*   3318*   3379*   3417*   3503*   3524*   3616*   3654*   3729*   3766*   3839*
                    3977*   3950*   3988*   4061*   4099*   4172*   4210*   4566*   4590*   4704*   4971*   5977*
MAPH0 = 170202       446#
MAPH00= 170202       382#    446     4265*
MAPH01= 170206       384#    448
MAPH02= 170212       386#    450
MAPH03= 170216       388#    452
MAPH04= 170222       390#    454
MAPH05= 170226       392#    456
MAPH06= 170232       394#    458
MAPH07= 170236       396#    460
MAPH1 = 170206       448#
MAPH10= 170242       398#
MAPH11= 170246       400#
MAPH12= 170252       402#
MAPH13= 170256       404#
MAPH14= 170262       406#
MAPH15= 170266       408#
MAPH16= 170272       410#
MAPH17= 170276       412#
MAPH2 = 170212       450#
MAPH20= 170302       414#
MAPH21= 170306       416#
MAPH22= 170312       418#
```

```
MAPH23= 170316      420#
MAPH24= 170320      422#
MAPH25= 170326      424#
MAPH26= 170332      426#
MAPH27= 170336      428#
MAPH3 = 170216      452#
MAPH30= 170342      430#
MAPH31= 170346      432#
MAPH32= 170352      434#
MAPH33= 170356      436#
MAPH34= 170362      438#
MAPH35= 170366      440#
MAPH36= 170372      442#
MAPH37= 170376      444#
MAPH4 = 170222      454#
MAPH5 = 170226      456#
MAPH6 = 170232      458#
MAPH7 = 170236      460#
MAPL0 = 170200      445#
MAPL00= 170200      381#    445    3466   3581   3689   3801   3912   4023   4134   4264*  4669   4809   4950
MAPL01= 170204      383#    447
MAPL02= 170210      385#    449
MAPL03= 170214      387#    451
MAPL04= 170220      389#    453
MAPL05= 170224      391#    455
MAPL06= 170230      393#    457
MAPL07= 170234      395#    459
MAPL1 = 170204      447#
MAPL10= 170240      397#
MAPL11= 170244      399#
MAPL12= 170250      401#
MAPL13= 170254      403#
MAPL14= 170260      405#
MAPL15= 170264      407#
MAPL16= 170270      409#
MAPL17= 170274      411#
MAPL2 = 170210      449#
MAPL20= 170300      413#
MAPL21= 170304      415#
MAPL22= 170310      417#
MAPL23= 170314      419#
MAPL24= 170320      421#
MAPL25= 170324      423#
MAPL26= 170330      425#
MAPL27= 170334      427#
MAPL3 = 170214      451#
MAPL30= 170340      429#
MAPL31= 170344      431#
MAPL32= 170350      433#
MAPL33= 170354      435#
MAPL34= 170360      437#
MAPL35= 170364      439#
MAPL36= 170370      441#
MAPL37= 170374      443#
MAPL4 = 170220      453#
MAPL5 = 170224      455#
```

```
MAPL6 = 170230           457#
MAPL7 = 170234           459#
MA1     007426          1961    1964#   2007
MA2     007444          1986#
MA3     007472          1989    1997#
MA4     007516          1998    2006#   2028
MB    = 000016          2124#
MBDONE  010436          2157    2176    2182    2197#
MBERRO  010236          2134    2159#
MB1     010210          2138    2145#
MB2     010214          2147#
MB3     010220          2152#
MC    = 000017          2209#
MCDONE  010752          2241    2260    2266    2281#
MCERRO  010552          2219    2243#
MC1     010524          2223    2230#
MC2     010530          2232#
MC3     010534          2236#
MD    = 000020          2293#
MDDONE  011272          2328    2347    2353    2369#
MDERRO  011072          2303    2330#
MD1     011042          2307    2315#
MD2     011046          2317#
MD3     011054          2323#
ME    = 000021          2380#
MEDONE  011612          2414    2433    2439    2454#
MEERRO  011412          2390    2416#
MEMERR= 177744           208#   1066    1165*   2014    2020    2076    2080*   2081    2087    2105    2159    2165*   2166
                        2172    2191    2243    2249*   2250    2256    2275    2330    2336*   2337    2343    2362    2416
                        2422*   2423    2429    2448    2504    2510*   2511    2517    2536    2590    2596*   2597    2603
                        2622    2689    2695*   2696    2702    2721    2788    2794*   2795    2801    2820    2887    2893*
                        2894    2900    2919    2986    2992*   2993    2999    3018    3085    3091*   3092    3098    3117
                        3184    3190*   3191    3197    3216    3263    3289*   3290    3296    3315    3382    3388*   3389
                        3395    3414    3511    3522    3531*   3532    3538    3619    3625*   3626    3632    3651    3731
                        3737*   3738    3744    3763    3842    3848*   3849    3855    3874    3953    3959*   3960    3966
                        3985    4064    4070*   4071    4077    4096    4175    4181*   4182    4188    4207    4297    4297
                        4306*   4307    4313    4378    4443    4508    4597    4604    4614*   4615    4621    4737    4744
                        4754*   4755    4761    4878    4885    4895*   4896    4902    5020    5027    5037*   5038    5044
                        5152    5159*   5163    5170*   5273    5280*   5284    5291*   5456*   5869    5875    5910*
ME1     011362          2394    2402#
ME2     011366          2404#
ME3     011374          2409#
MF    = 000022          2466#
MFDONE  012126          2502    2521    2527    2542#
MFERRO  011726          2471    2504#
MF1     011674          2482    2489#
MF2     011706          2475    2495#
MF3     011710          2497#
MG    = 000023          2554#
MGDONE  012446          2588    2607    2613    2628#
MGERRO  012246          2566    2590#
MG1     012214          2568    2575#
MG2     012222          2578#
MG3     012230          2583#
MH    = 000024          2644#
MHDONE  013012          2687    2706    2712    2727#
```

```
MMERRO  012612          2654    2689*
MMI     012572          2660    2676*
MMI2    012574          2683*
MMI     =  000025       2743*
MMIDONE 013356          2786    2805    2811    2826*
MMIERRO 013156          2753    2788*
MMI1    013136          2759    2775*
MMI2    013140          2781*
MMJ     =  000026       2842*
MMJDONE 013722          2885    2904    2910    2925*
MMJERRO 013522          2852    2887*
MMJ1    013502          2859    2874*
MMJ2    013504          2880*
MMK     =  000027       2941*
MMKDONE 014266          2984    3003    3009    3024*
MMKERRO 014066          2951    2986*
MMK1    014046          2957    2973*
MMK2    014050          2979*
MML     =  000030       3040*
MMLDONE 014632          3083    3102    3108    3123*
MMLERRO 014432          3050    3085*
MML1    014412          3056    3072*
MML2    014414          3078*
MMMDES  031254          5766    6045*
MMMESRS 032070          6024    6242*
MMMRFLG 031062          1068*   2089*   2175*   2259*   2346*   2432*   2520*   2606*   2705*   2804*   2903*   3002*   3101*
                        3200*   3299*   3398*   3540*   3635*   3747*   3858*   3969*   4080*   4191*   4315*   4624*   4764*
                        4905*   5047*   5937    5969*
MMMRFL2 031076          2108*   2195*   2279*   2366*   2452*   2540*   2626*   2725*   2824*   2923*   3022*   3121*   3220*
                        3319*   3418*   3655*   3767*   3878*   3989*   4100*   4211*   4299*   5975*
MMMRQ   =  177572        231*    235    2163*   2247*   2334*   2420*   2508*   2594*   2693*   2792*   2891*   2990*   3089*
                        3188*   3287*   3386*   3481*   3529*   3596*   3623*   3704*   3735*   3816*   3846*   3927*   3957*
                        4038*   4068*   4149*   4179*   4259*   4304*   4612*   4711*   4752*   4827*   4853*   4893*   4968*
                        4994*   5035*   5907*   6205
MMMR1   =  177574        232*    236
MMMR2   =  177576        233*    237
MMMR3   =  172516        234*    238    2164*   2248*   2335*   2421*   2509*   2595*   2694*   2793*   2892*   2991*   3090*
                        3189*   3288*   3387*   3480*   3530*   3595*   3624*   3703*   3736*   3815*   3847*   3926*   3958*
                        4037*   4069*   4148*   4180*   4258*   4305*   4613*   4710*   4753*   4826*   4851*   4994*   4967*
                        4993*   5036*   5908*
MMSKIP=  104412         3449    3573    3682    3794    3905    4016    4127    4241    4662    4802    4943    5766*
MMVEC   =  000250        202*
MN      =  000031       3139*
MNRNG   033423          5955    6399*
MO      =  000032       3238*
MODONE  015542          3281    3300    3306    3321*
MOERRO  015342          3248    3283*
MONF    031252           983*   6018*   6033*
MONTTY  031250           986*   6025    6031*
MO1     015322          3254    3270*
MO2     015324          3276*
MP      =  000033       3337*
MPDONE  016106          3380    3399    3405    3420*
MPERRO  015706          3347    3382*
MP1     015666          3353    3369*
MP2     015670          3375*
```

```
MQ      = 000043        4230#
MQDONE  022332          4281    4316    4323#
MQERR   022126          4262    4283#
MQ1     022106          4277#
MQ2     022142          4284    4287#
MQ3     022230          4288    4302#
MQ4     022232          4300    4304#
MQ5     022256          4310#   4319    4321
MQ6     022312          4309    4318#
MR      = 000034        3439#
MRDONE  016536          3504    3541    3548#
MRERRO  016330          3450    3506#
MR1     016310          3500#
MR2     016342          3508    3511#
MR3     016432          3512    3527#
MR4     016436          3525    3529#
MR5     016462          3535#   3544    3546
MR6     016516          3533    3543#
MS      = 000035        3563#
MSDONE  017156          3617    3636    3642    3657#
MSERRO  016756          3574    3619#
MSIZER  031276          5767    6061#
MS1     016730          3600    3607#
MS2     016734          3609#
MS3     016740          3612#
MT      = 000036        3672#
MTA101  034012          6449#
MTA11   032260          6269#
MTA120  034117          6462#   7922
MTA124  034400          6504#   7944
MTA126  034472          6516#   7951
MTA131  034552          6527#   7960
MTA134  034715          6548#   7969
MTA135  034751          6554#   7973
MTA17   032325          6277#   6300
MTA20   032361          6286#
MTA21   032370          6289#
MTA43   032455          6302#
MTA45   032530          6311#
MTA5    032176          6259#
MTA50   032606          6323#
MTA77   033534          6426#   7914
MTB120  034147          6468#   7925
MTB126  034520          6521#   7951
MTB131  034634          6537#   7962
MTB135  035001          6560#   7973
MTB17   032332          6279#
MTB21 = 032325          6300#
MTB45   032556          6316#
MTB77   033650          6429#   7914
MTC120  034177          6474#   7927
MTC131  034667          6543#   7962
MTC135  035023          6565#   7975
MTC17   032352          6283#
MTC45   032573          6320#
MTC77   033712          6436#   7914
```

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MTDONE  017623          3729    3748    3754    3769#
MTD120  034227          6479#   7929
MTD135  035057          6571#   7975
MTD77   033747          6442#   7917
MTERRO  017402          3705    3731#
MTE120  034257          6485#   7931
MTF120  034307          6491#   7933
MTG120  034337          6497#   7922    7925    7927    7929    7931    7933
MT1     017352          3709    3717#
MT2     017364          3724#
MU    = 000037          3784#
MUDONE  020222          3840    3859    3865    3890#
MUERRO  020022          3817    3842#
MU1     017776          3821    3829#
MU2     020004          3835#
MV    = 000040          3895#
MVDONE  020642          3951    3970    3976    3991#
MVERRO  020442          3928    3953#
MV1     020416          3932    3940#
MV2     020424          3946#
MW    = 000041          4006#
MWDONE  021262          4062    4081    4087    4102#
MWERRO  021062          4039    4064#
MW1     021036          4043    4051#
MW2     021044          4057#
MX    = 000042          4117#
MXDONE  021702          4173    4192    4198    4213#
MXERRO  021502          4150    4175#
MX1     021456          4154    4162#
MX2     021464          4168#
MCM1  = 000014           474#   1254    1957    2062    2137    2222    2306    2393    2474    2567    3483    3705    4347
                        4545    4683    4823    4964    5088    5209
M1M0  = 000014           473#    474    3599
NA    = 000047          4535#
NADONE  023472          4567    4591    4625    4632#
NA1     023174          4551    4558#
NA10    023452          4616    4627#
NA2     023200          4560#   4599    4605
NA3     023226          4548    4570#
NA4     023250          4575    4582#
NA5     023254          4584#
NA6     023302          4572    4594#
NA7     023326          4598    4602#
NA8     023372          4600    4612#
NA9     023416          4618#   4628    4630
NB    = 000050          4652#
NBDONE  024162          4705    4731    4765    4773#
NB1     023650          4689    4696#
NB10    024142          4756    4767#
NB2     023654          4698#   4739    4745
NB3     023702          4686    4708#
NB4     023740          4715    4722#
NB5     023744          4724#
NB6     023772          4712    4734#
NB7     024016          4738    4742#
NB8     024062          4740    4752#
```

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NB9     024106          4758*   4769    4770
NC    = 000051          4792*
NCDONE  024662          4947    4972    4986    4913*
NC1     024354          4831    4838*
NC10    024642          4897    4908*
NC2     024360          4840*   4880    4896
NC3     024406          4828    4850*
NC4     024442          4856    4863*
NC5     024444          4865*
NC6     024472          4853    4875*
NC7     024516          4879    4883*
NC8     024562          4891    4893*
NC9     024606          4899*   4909    4911
ND    = 000052          4933*
NDDONE  025366          4989    5014    5048    5055*
ND1     025054          4972    4979*
ND10    025346          5039    5050*
ND2     025060          4981*   5022    5028
ND3     025106          4969    4991*
ND4     025144          4998    5005*
ND5     025150          5007*
ND6     025176          4995    5017*
ND7     025222          5021    5023*
ND8     025266          5023    5035*
ND9     025312          5041*   5051    5053
NMDONE  015176          3182    3201    3207    3222*
NMERRO  014776          3149    3184*
NM1     014756          3155    3171*
NM2     014760          3177*
NOCNC   031230          6010    6027*
PARCNT  031106          5092    5213    5988*
PC    =%000007           119*   5092*   5213*   5318*   5321*   5331*   5335*   5340    5439*   5544*   5551*   5558*   5572*
                        5574*   5810    5844*   5891*   5995*   6022*   6129*   6147*   6159*   6165*   6183*   6228*   6236*
PDMSG1  032634          6329*
PDMSG2  033012          6348*
PIRQ  = 177772            89*
PIRQVE= 000240           201*
POWERM  032127          5809    6249*
PR0   = 000000           122*
PR1   = 000040           123*
PR2   = 000100           124*
PR3   = 000140           125*
PR4   = 000200           126*
PR5   = 000240           127*
PR6   = 000300           128*
PR7   = 000340           129*
PS    = 177776            86*     87
PSW   = 177776            87*   5912*
PWRVEC= 000024           194*    941*    942*   5778*   5779*   5788*   5794*   5806*   5807*
RESMON  031130           996    6005*
RESREG= 104407          5762*   5843    6233
RESVEC= 000010           189*
RSET  = 104410          2111    2197    2281    2368    2454    2542    2629    2727    2826    2925    3024    3123    3222
                        3321    3420    3548    3657    3769    3880    3991    4102    4213    4323    4381    4447    4512
                        4632    4772    4913    5055    5177    5298    5764*   5892    6006    6029    6049
R0    =%000000           101*    109     988*    992*   1021*   1023*   1027*   1031    1034*   1035    1052    1054    1060
```

		1066	1072	1078	1084	1119*	1119	1127	1135	1169*	1171	1177	1180	1183
		1211*	1215*	1216	1222*	1257*	1259	1270*	1272	1283*	1285	1353*	1356	1368*
		1370	1381*	1383	1448*	1449*	1450	1454	1541*	1542*	1543	1547	1641*	1645*
		1649*	1655	1656*	1659	1660*	1682*	1705*	1706	1715*	1718*	1719*	1720	1723*
		1726	1842*	1846*	1847	1849	1853	1857	1863	1871	1873	1879	1962*	1972
		3461*	3473*	3474*	3477*	3576*	3583*	3589*	3592*	3684*	3696*	3697*	3700*	3796*
		3808*	3809*	3812*	3907*	3919*	3920*	3923*	4018*	4030*	4031*	4034*	4129*	4141*
		4142*	4145*	4243*	4249*	4250*	4251*	4252*	4253*	4254*	4255*	4256*	4266*	4275
		4408*	4409	4410	4416	4473*	4474	4475	4481	4664*	4676*	4677*	4680*	4804*
		4816*	4817*	4820*	4945*	4957*	4958*	4961*	5089*	5104	5114	5125	5135	5172
		5174*	5210*	5225	5235	5246	5256	5293	5295*	5328*	5332*	5335	5478	5503*
		5527	5528*	5529	5532*	5668	5678*	5682	5698	5699	5712*	5731	5732*	5733
		5734*	5735*	5736*	5737*	5780	5805*	5833*	5837	5847*	5849*	5851*	5869*	5870
		5872*	5873	5990	6005*	6008*	6009	6061	6063*	6064*	6065*	6068*	6069*	6071*
		6074	6075	6078*	6087	6088*	6089*	6095*	6096*	6097*	6098	6104	6111	6114*
		6115	6120	6126	6136	6143	6149	6156	6162	6176*	6182*	6207*	6208*	6209*
		6216*	6218											
R1	=%000001	102*	110	989*	991*	1020*	1022*	1122*	1123	1128	1170*	1173	1178	1216*
		1219	1226	1258*	1260*	1271*	1273*	1284*	1286*	1354*	1357*	1369*	1371*	1382*
		1384*	1450*	1451*	1452	1460	1461	1485	1543*	1544*	1545	1553	1554	1578
		1639*	1643	1650*	1661*	1686*	1707*	1708	1714*	1724*	1726	1847*	1848*	1902
		1904	1911	1959*	1965*	1966	1967*	1972	1988	2147	2232	2317	2404	2494
		2578	3469*	3470*	3471	3584*	3585*	3586	3609	3692*	3693*	3694	3719	3804*
		3805*	3806	3915*	3916*	3917	4026*	4027*	4028	4137*	4138*	4139	4244*	4247
		4362	4560	4584	4672*	4673*	4674	4698	4724	4812*	4813*	4814	4840	4865
		4953*	4954*	4955	4981	5007	5103*	5104*	5106	5124*	5125*	5128	5224*	5225*
		5227	5245*	5246*	5249	5479	5502*	5669	5682*	5683	5687	5711*	5781	5804*
		5829*	5833	5834*	5846*	5848*	5850*	5988*	5990	5993*	6014*	6016	6062	6066*
		6070*	6077*	6110	6111*	6117	6122	6128	6138	6145	6151	6164	6177	6181*
		6200*	6201	6213*	6214*	6215*	6222							
R10	=%000000	109*												
R11	=%000001	110*												
R12	=%000002	111*												
R13	=%000003	112*												
R14	=%000004	113*												
R15	=%000005	114*												
R2	=%000002	103*	111	990*	991	1212*	1215	1217	1221*	1225	1265*	1278*	1291*	1299
		1304	1309	1362*	1363	1376*	1377	1389*	1390	1397	1402	1407	1454*	1455*
		1456	1473	1474	1497	1547*	1548*	1549	1566	1567	1590	1640*	1645	1648*
		1653*	1657*	1690*	1709	1716*	1721*	1725*	1729*	1849*	1850*	1902	1904	1913
		1966*	1997	2002	2061*	2065*	2066*	2136*	2146*	2150*	2221*	2231*	2234*	2305*
		2316*	2320*	2392*	2403*	2406*	2473*	2490*	2491	2492*	2576*	2580*	2656*	2675*
		2676*	2755*	2774*	2775*	2854*	2873*	2874*	2953*	2972*	2973*	3052*	3071*	3072*
		3151*	3170*	3171*	3250*	3269*	3270*	3349*	3368*	3369*	3463*	3468*	3478*	3484*
		3486*	3489*	3578*	3583*	3593*	3598*	3608*	3610*	3686*	3691*	3701*	3708*	3718*
		3720*	3798*	3803*	3813*	3820*	3830*	3831*	3909*	3914*	3924*	3931*	3941*	3942*
		4020*	4025*	4035*	4042*	4052*	4053*	4131*	4136*	4146*	4153*	4163*	4164*	4245*
		4247*	4351*	4360*	4368*	4426*	4428*	4429*	4491*	4493*	4494*	4550*	4559*	4561*
		4574*	4583*	4585*	4666*	4671*	4681*	4688*	4697*	4699*	4714*	4723*	4725*	4806*
		4811*	4821*	4830*	4839*	4841*	4855*	4864*	4866*	4947*	4952*	4962*	4971*	4980*
		4982*	4997*	5006*	5008*	5093	5099*	5105*	5109*	5110*	5122*	5127*	5130*	5131*
		5214	5220*	5226*	5230*	5231*	5243*	5248*	5251*	5252*	5480	5501*	5670	5681*
		5685*	5688	5695*	5696*	5697	5702*	5710*	5782	5803*	5835*	5836	5837*	5852*
		5853*	5989*	5992*	6015*	6016*	6219*	6220*	6223*	6225				
R3	=%000003	104*	112	1217*	1218*	1219	1227	1470*	1471*	1472	1479	1494*	1495*	1496
		1502	1563*	1564*	1565	1572	1587*	1588*	1589	1595	1694*	1710	1717*	1720*

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                    3464*  3476*  3579*  3591*  3687*  3699*  3799*  3811*  3910*  3922*  4021*  4033*  4132*
                    4144*  4246*  4248*  4667*  4679*  4807*  4819*  4948*  4960*  5320*  5481   5500*  5610
                    5619*  5625*  5626*  5629*  5634*  5635*  5636   5645*  5671   5679*  5680*  5694*  5697*
                    5706*  5707*  5709*  5783   5802*  5832*  5845*  5852   6007*  6019   6218*  6222*  6226
R4      =%000004     105*   113    1698*  1711   1960*  1965   1992   1997   2001   2006*  2060*  2065   2071
                    2135*  2146   2153   2220*  2231   2237   2304*  2316   2324   2391*  2403   2410   2472*
                    2490   2498   2564*  2565*  2576   2584   2655*  2675   2683   2754*  2774   2782   2853*
                    2873   2881   2952*  2972   2980   3051*  3071   3079   3150*  3170   3178   3249*  3269
                    3277   3348*  3369   3376   3465*  3469   3473   3475*  3580*  3584   3588   3590*  3597*
                    3608   3613   3688*  3692   3696   3698*  3707*  3718   3725   3800*  3804   3808   3810*
                    3819*  3830   3836   3911*  3915   3919   3921*  3930*  3941   3947   4022*  4026   4030
                    4032*  4041*  4052   4058   4133*  4137   4141   4143*  4152*  4163   4169   4350*  4360
                    4425*  4429   4490*  4493   4549*  4559   4573*  4583   4668*  4672   4676   4678*  4687*
                    4697   4713*  4723   4808*  4812   4816   4818*  4829*  4839   4854*  4864   4949*  4953
                    4957   4959*  4970*  4980   4996*  5006   5098*  5105   5121*  5127   5219*  5226   5242*
                    5248   5482   5499*  5611   5613*  5614*  5615*  5616   5617*  5631   5633*  5641*  5644*
                    5784   5801*  5831*  5839*  6013*  6017*
RE      =%000005     106*   114    1663*  1682   1686   1690   1694   1698   1702*  1712   1906*  1907*  1908
                    1988*  1993   2475*  2491   2660*  2661   2662   2668   2759*  2760   2761   2767   2858*
                    2859   2860   2866   2957*  2958   2959   2965   3056*  3057   3058   3064   3155*  3156
                    3157   3163   3254*  3255   3256   3262   3353*  3354   3355   3361   3466*  3471*  3472*
                    3581*  3586*  3587*  3689*  3694*  3695*  3801*  3806*  3807*  3912*  3917*  3918*  4023*
                    4028*  4029*  4134*  4139*  4140*  4669*  4674*  4675*  4809*  4814*  4815*  4950*  4955*
                    4956*  5483   5498*  5612   5618*  5620*  5622*  5623*  5624*  5625   5643*  5672   5674*
                    5676*  5683*  5687*  5702   5708*  5785   5800*  5830*  5836*  5941*  5842
R6      =%000006     107*   929*   930*   931
R7      =%000007     108*
SAVREG= 104406      5761*  5828   6199
SDPAR0= 172260       319*
SDPAR1= 172262       320*
SDPAR2= 172264       321*
SDPAR3= 172266       322*
SDPAR4= 172270       323*
SDPAR5= 172272       324*
SDPAR6= 172274       325*
SDPAR7= 172276       326*
SDPDR0= 172220       297*
SDPDR1= 172222       298*
SDPDR2= 172224       299*
SDPDR3= 172226       300*
SDPDR4= 172230       301*
SDPDR5= 172232       302*
SDPDR6= 172234       303*
SDPDR7= 172236       304*
SIPAR0= 172240       308*
SIPAR1= 172242       309*
SIPAR2= 172244       310*
SIPAR3= 172246       311*
SIPAR4= 172250       312*
SIPAR5= 172252       313*
SIPAR6= 172254       314*
SIPAR7= 172256       315*
SIPDR0= 172200       286*
SIPDR1= 172202       287*
SIPDR2= 172204       288*
SIPDR3= 172206       289*
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SIPDR4=	172210	290*												
SIPDR5=	172212	291*												
SIPDR6=	172214	292*												
SIPDR7=	172216	293*												
SIZE =	104413	5767*												
SIZEHI=	177762	218*												
SIZELO=	177760	216*	6064											
SKAD	030646	1016*	1108*	1158*	1204*	1246*	1343*	1440*	1533*	1624*	1835*	1943*	2050*	2126*
		2211*	2295*	2382*	2469*	2556*	2646*	2745*	2844*	2943*	3042*	3141*	3240*	3339*
		3441*	3565*	3674*	3786*	3897*	4008*	4119*	4232*	4339*	4399*	4464*	4537*	4654*
		4794*	4935*	5093*	5204*	5893	5995*	6030	6050					
SKBADR	030740	5769	5928*											
SKBCNR	031002	5770	5944*											
SKBERR	030754	5769	5937*											
SKBHMR	031036	5772	5958*											
SKBMNR	031020	5771	5951*											
SKIPT =	104411	2672	2771	2870	2969	3068	3167	3266	3365	4420	4495	5765*	5865	5991
		5965												
SKPBAD=	104414	1163	5768*											
SKPBCN=	104416	1113	1209	1251	1348	1445	1538	1629	1840	1947	2055	2131	2216	2300
		2387	2561	2651	2750	2849	2948	3047	3146	3245	3344	3446	3570	3679
		3791	3902	4013	4124	4238	4344	4404	4469	4542	4659	4799	4940	5770*
SKPBER=	104415	1164	2054	2130	2215	2299	2386	2560	2650	2749	2848	2947	3046	3145
		3244	3343	3445	3569	3678	3790	3901	4012	4123	4237	4343	4403	4468
		4541	4658	4798	4939	5769*								
SKPBHM=	104420	1252	1349	1446	1539	1630	1841	2057	2133	2218	2302	2389	2563	2653
		2752	2851	2950	3049	3148	3247	3346	3448	3572	3681	3793	3904	4015
		4126	4240	4346	4406	4471	4544	4661	4801	4942	5772*			
SKPBMN=	104417	1114	1948	2056	2132	2217	2301	2388	2562	2652	2751	2850	2949	3048
		3147	3246	3345	3447	3571	3680	3792	3903	4014	4125	4239	4345	4405
		4470	4543	4660	4800	4941	5771*							
SKRNG	031052	5935	5942	5949	5956	5964*								
SP	=%000006	115*	116	117	118	933*	951*	959*	963	1048	1050	1051	2023	2024
		2079	2099	2100	2162	2185	2186	2246	2269	2270	2333	2356	2357	2419
		2442	2443	2507	2530	2531	2593	2616	2617	2692	2715	2716	2791	2814
		2815	2890	2913	2914	2989	3012	3013	3088	3111	3112	3187	3210	3211
		3286	3309	3310	3385	3408	3409	3459*	3506	3515	3516	3517	3527*	3622
		3645	3646	3734	3757	3759	3845	3868	3869	3956	3979	3980	4067	4090
		4091	4178	4201	4202	4291	4292	4302	4373	4374	4438	4439	4503	4504
		4596*	4736*	4877*	5019*	5158	5169	5279	5290	5325*	5367*	5370	5372	5373
		5378*	5379*	5380	5403	5404	5408*	5434	5447*	5450*	5478*	5479*	5480*	5481*
		5482*	5483*	5484*	5485*	5486*	5487*	5494*	5495*	5496*	5497*	5498	5499	5500
		5501	5502	5503	5527*	5528	5529*	5531	5532	5533*	5535	5537	5539	5545
		5547*	5549*	5557*	5561	5565	5566	5570	5602*	5603	5604	5605*	5610*	5611*
		5612*	5618	5643	5644	5645	5646*	5647*	5668*	5669*	5670*	5671*	5672*	5673*
		5674	5677*	5690	5692*	5694	5704	5706	5708	5709	5710	5711	5712	5714*
		5715*	5731*	5732	5742*	5743*	5780*	5781*	5782*	5783*	5784*	5785*	5786*	5787
		5795*	5799	5800	5801	5802	5803	5804	5805	5810*	5829	5842*	5860	5963
		5878	5879	5882	5888	5890	5904	5905*	5964	6048	6061*	6062*	6063	6075*
		6077	6078	6087*	6091*	6110*	6117*	6122*	6128*	6130*	6131	6138*	6145*	6164*
		6166	6181	6182	6200	6227*	6229*	6230	6234*					
SPUR	030522	1002	1019	1111	1443	1536	1627	1838	2017	2018	2031	4235	5086	5154
		5165	5207	5275	5286	5868*	5874	5902						
SR0	= 177572	235*												
SR1	= 177574	236*												
SR2	= 177576	237*												

```
SR3     = 172516            238#
SSP     = 000036            111#
STACK   = 001100            101#    91      92      93     933    5935
START   = 003016            400#   926#   5811
STKLMT= 177774              102#
STOP    = 031214           6021#  6023#
SUPSTK= 000000              103#
SWR     = 001140            698#    931    953#    955    961#   5362   5376   5378   5386   5393   5400   5407   5412
                           5446   5786   5799#  6045
SWREG   = 000176            486#    961
SW0     = 000001            157#
SW00    = 000001            147#    157
SW01    = 000002            146#    156
SW02    = 000004            145#    155
SW03    = 000010            144#    154
SW04    = 000020            143#    153
SW05    = 000040            142#    152
SW06    = 000100            141#    151
SW07    = 000200            140#    150
SW08    = 000400            139#    149
SW09    = 001000            138#    148
SW1     = 000002            156#
SW10    = 002000            137#
SW11    = 004000            136#
SW12    = 010000            135#
SW13    = 020000            134#
SW14    = 040000            133#
SW15    = 100000            132#
SW2     = 000004            155#
SW3     = 000010            154#
SW4     = 000020            153#
SW5     = 000040            152#
SW6     = 000100            151#
SW7     = 000200            150#   6045
SW8     = 000400            149#
SW9     = 001000            148#
SYSTID= 177764              220#
SOMOMI= 000034              472#   1282
SOMI    = 000030            470#   1380    1470    1552    1560    1587    1642    1744    1970    2657    2756    3053    3152
                           3818   4040    4407    4472
SIMO    = 000044            469#   1367    1459    1467    1494    1563    1644    1741    1852    2855    2954    3251    3350
                           3929   4151
SIMOMI= 000054              471#   1269
TAB     = 000011            468#   6257    6262    6269    6283    6286    6292    6302    6311    6320    6323    6449    6454
                           6516   6521    6527    6537    6543    6548    7387    7511    7519    7525    7531    7536    7555
                           7560   7568    7577    7584    7590    7596    7599    7622    7627    7636    7644    7653    7662
                           7670   7679    7685    7691    7695    7702    7708    7712    7726    7738
TBITVE= 000014              190#
TESTR1= 140000              475#   1451    1544    1639    1848
TESTR2= 142000              476#   1455    1548    1640    1850
TESTR3= 144000              477#
TKVEC   = 000060            197#    986     996#    997#   6025#
TOP     = 003420            984     993#
TPVEC   = 000064            198#
TRAPVE= 000034              196#    939#    940#
TRTVEC= 000014              191#
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TST1     003470           1012#
TST10    005712           1440     1529#
TST11    006242           1533     1620#
TST12    007054           1624     1809#
TST13    007106           1831#
TST14    007342           1935     1939#
TST15    007624           1943     2046#
TST16    010122           2050     2122#
TST17    010440           2126     2207#
TST2     004044           1016     1105#
TST20    010754           2211     2291#
TST21    011274           2295     2378#
TST22    011614           2382     2464#
TST23    012130           2468     2552#
TST24    012450           2556     2642#
TST25    013014           2646     2741#
TST26    013360           2745     2840#
TST27    013724           2844     2939#
TST3     004200           1108     1154#
TST30    014270           2943     3038#
TST31    014634           3042     3137#
TST32    015200           3141     3236#
TST33    015544           3240     3335#
TST34    016110           3339     3437#
TST35    016540           3441     3561#
TST36    017160           3565     3670#
TST37    017604           3674     3782#
TST4     004342           1158     1199#
TST40    020224           3786     3893#
TST41    020644           3897     4004#
TST42    021264           4008     4115#
TST43    021704           4119     4228#
TST44    022334           4232     4335#
TST45    022510           4339     4395#
TST46    022710           4399     4460#
TST47    023110           4464     4533#
TST5     004460           1204     1242#
TST50    023474           4537     4650#
TST51    024164           4654     4790#
TST52    024664           4794     4931#
TST53    025370           4935     5079#
TST54    025744           5083     5200#
TST55    026320           5204     5300#
TST6     005012           1246     1339#
TST7     005362           1343     1436#
TVADFL   031720           6146*    6158*    6185#    6203
TVADHI   031724           6192#    6202*    6225*
TVADLO   031722           6191#    6201*    6226*    6227
TYPDS  = 104405           5326     5758#    6123
TYPE   = 104401            971     5324     5327     5432     5440     5540     5637     5713     5754#    5909     5933     5940     5947
                          5954     5961     6011     6023     6085     6100     6102     6106     6108     6132     6152     6167     6173
                          6231
TYPOC  = 104402           5755#    6092     6118
TYPON  = 104404           5757#
TYPOS  = 104403           5756#    6139
TYPVAD   031726           6147     6159     6199#
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```
UA     = 000054          5081#
UAER1    025630          5099    5151#
UAER2    025670          5119    5162#
UATMP1   025624          5103    5115    5148#   5155
UATMP2   025626          5124    5136    5149#   5166
UA1      025432          5091#   5175
UA2      025456          5094    5097#
UA3      025512          5112#
UA4      025532          5119#   5120    5160
UA5      025576          5133#
UA6      025616          5140#
UA7      025724          5095    5140    5172#
UA8      025742          5173    5177#
UB     = 000055          5202#
UBER1    026204          5219    5272#
UBER2    026244          5240    5283#
UBTMP1   026200          5224    5236    5269#   5276
UBTMP2   026202          5245    5257    5270#   5287
UB1      026006          5212#   5296
UB2      026032          5215    5218#
UB3      026066          5233#
UB4      026106          5240#   5241    5281
UB5      026152          5254#
UB6      026172          5261#
UB7      026300          5216    5261    5293#
UB8      026316          5294    5298#
UDPAR0=  177660           275#
UDPAR1=  177662           276#
UDPAR2=  177664           277#
UDPAR3=  177666           278#
UDPAR4=  177670           279#
UDPAR5=  177672           280#
UDPAR6=  177674           281#
UDPAR7=  177676           282#
UDPDR0=  177620           253#
UDPDR1=  177622           254#
UDPDR2=  177624           255#
UDPDR3=  177626           256#
UDPDR4=  177630           257#
UDPDR5=  177632           258#
UDPDR6=  177634           259#
UDPDR7=  177636           260#
UIPAR0=  177640           264#
UIPAR1=  177642           265#
UIPAR2=  177644           266#
UIPAR3=  177646           267#
UIPAR4=  177650           268#
UIPAR5=  177652           269#
UIPAR6=  177654           270#
UIPAR7=  177656           271#
UIPDR0=  177600           242#
UIPDR1=  177602           243#
UIPDR2=  177604           244#
UIPDR3=  177606           245#
UIPDR4=  177610           246#
UIPDR5=  177612           247#
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JIPDR6= 177614          249#
JIPDR7= 177616          249#
JSESTK= 000600           93#
JSP   =%000006          119#
$AUTOB  001134          525#
$BDADR  001122          520#
$BDDAT  001126          522#
$BELL   001306          588#  5432    5459
$CHARC  027426         5542#  5552#   5559    5568#   5573#
$CKSWR= ****** G       5761
$CMTAG  001100          509#   928     929     937     943     944     945
$CM1  = 000024          540#   541#    542#    543#    544#    545#    546#    547#    548#    549#    550#    551#    552#
                        553#   554#    555#    556#    557#    558#    559#    560#
$CM2  = 000050          540#   541#    542#    543#    544#    545#    546#    547#    548#    549#    550#    551#    552#
                        553#   554#    555#    556#    557#    558#    559#    560#
$CM3  = 000024          538#   540
$CM4  = 000024          560#   561#    562#    563#    564#    565#    566#    567#    568#    569#    570#    571#    572#
                        573#   574#    575#    576#    577#    578#    579#    580#
$CRLF   001313          584#  5440    5459    5541    5576    6096    6103    6109
$DBLK   030074         5679   5713    5721#
$DB20   030354         5828#  6129    6165    6228
$DOAGN  026434         5320   5329    5333    5339#
$DTBL   030064         5682   5717#
$ENDAD  026424          496    969    5335#   5452
$ENDCT  026354          943   5322#
$ENDMG  026443         5324   5343#
$ENULL  026440         5327   5342#
$EOP    026320         5312#
$EOPCT  026346          943#  5319#   5323
$ERFLG  001103          511#  5352    5382    5384    5390#   5411    5427#   5459
$ERMAX  001115          517#   946#   5384    5406#   5411
$ERROR  026736          937   5426#
$ERRPC  001116          518#  5434#   5435#   5436    5459    6091    7410    7862    7865    7871    7884    7887    7990
                       7893   7908    7911    7914    7922    7936    7939    7944    7948    7951    7957    7960    7969
                       7973
$ERRTB  001316          601#  6097
$ERTTL  001112          515#  5433#   5459
$ESCAP  001304          581#   945#   5405#   5448    5450    5459
$FILLC  001156          536#  5545    5576
$FILLS  001155          535#  5576
$GDADR  001120          519#
$GDDAT  001124          521#
$GET42  026376         5328#
$GTSWR= ****** U       5760
$HD   = 000003           59     60
$ICNT   001104          512#  5397#   5398    5400#   5410
$ILLUP  030346         5778   5794    5813#
$INTAG  001135          526#
$ITEMB  001114          516#  5436#   5459    5889#   6089
$LF     001314          585#  5459    5576
$LPADR  001106          513#   947#   5388#   5403#   5408    5410
$LPERR  001110          514#   948#   1028#   1115#   1166#   1213#   1255#   1268#   1281#   1352#   1366#   1379#   1633#
                       1961#  5091#   5120#   5212#   5241#   5388    5404#   5410    5447
$MAIL = ****** U         965   5403    5442    5529
$MXCNT  026734         5401   5410#
$NULL   001154          534#  5547    5576
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$NXTST= 000001          1005*  1007   1097*  1099   1141*  1143   1190*  1192   1234*  1236   1326*  1328   1422*
                        1424   1515*  1517   1608*  1610   1791*  1793   1818*  1820   1924*  1926   1928   2038
                        2114*  2116   2199*  2201   2283*  2285   2370*  2372   2456*  2458   2544*  2546   2631*
                        2633   2730*  2732   2829*  2831   2928*  2930   3027*  3029   3126*  3128   3225*  3227
                        3324*  3326   3426*  3428   3550*  3552   3659*  3661   3771*  3773   3882*  3884   3993*
                        3995   4104*  4106   4215*  4217   4325*  4327   4398*  4397   4450*  4452   4519*  4521
                        4635*  4637   4775*  4777   4916*  4918   5059*  5060   5179*  5181

$OCNT   027554          5609*  5638*  5651*
$OCTVL  030456          5930   5955*
$OMODE  027656          5604*  5608*  5613   5616*  5627*  5653*
$OVER   026720          5363   5381   5389   5399   5407*
$PASS   001100           509*  5316*  5317*  5325   5342   5395   5411
$PWRAD  030342          5811*
$PWRDN  030202           941   5778*  5836
$PWRMG  030336          5809*
$PWRUP  030254          5788   5794*
$QUES   001312           583*  5459   5575
$RDCHR= ****** U        5761
$RDDEC= ****** U        5761
$RDLIN= ****** U        5761
$RDOCT= ****** U        5761
$REGAD  001160           538*
$REG0   001162           540*
$REG1   001164           541*
$REG10  001202           548*
$REG11  001204           549*
$REG12  001206           550*
$REG13  001210           551*
$REG14  001212           552*
$REG15  001214           553*
$REG16  001216           554*
$REG17  001220           555*
$REG2   001166           542*
$REG20  001222           556*
$REG21  001224           557*
$REG22  001226           558*
$REG23  001230           559*
$REG3   001170           543*
$REG4   001172           544*
$REG5   001174           545*
$REG6   001176           546*
$REG7   001200           547*
$RESRE  027154          5493*  5762
$RTNAD  026436          5341*
$R2A  = ****** U        5763
$SAVRE  027116          5477*  5761
$SAVR6  030352          5787*  5795   5796*  5797*  5815*
$SCOPE  026460           935   5361*
$SETUP= 000037           462*   934    935    937    939    941    943    944    945    947    969    972   5314
                        5362   5427   5445   5452
$STUP = 177777           462*
$SVLAD  026672          5371   5402*
$SVPC = 000204           494*   499
$SWR  = 167400            59     60*    61*    68     69     70     71     72     73     74    580    581    582
                         944    945    947    948   1013   1106   1155   1200   1243   1340   1437   1530   1621
                        1809   1832   1940   2047   2123   2208   2292   2379   2465   2553   2643   2742   2841
```

		2940	3039	3138	3237	3336	3438	3538	3671	3793	3834	4035	4136	4239
		4336	4396	4461	4534	4651	4791	4832	5060	5201	5303	5345	5365	5440
		5342	5353	5354	5355	5356	5357	5362	5374	5376	5377	5382	5383	5384
		5391	5392	5393	5404	5407	5410	5418	5419	5420	5421	5422	5430	5437
		5442	5445	5459	5812									
$SWRMK=	000200	62*	74	75	5357	5358	5378	5379						
$TAB	032174	6174	6257*											
$TIMES	001302	500*	944*	1013*	1155*	1200*	1243*	1340*	1437*	1530*	1621*	1832*	1940*	2047*
		2123*	2208*	2293*	2379*	2465*	2553*	2643*	2742*	2841*	2940*	3039*	3138*	3237*
		3336*	3438*	3562*	3671*	3783*	3894*	4005*	4116*	4229*	4336*	4396*	4461*	4534*
		4651*	4791*	4932*	5080*	5201*	5315*	5391*	5398	5401*	5410			
$TKB	001146	531*	998*	6005	6027*									
$TKS	001144	530*	999*	6028*										
$TMP0	001232	560*	1018*	1110*	1160*	1206*	1248*	1345*	1442*	1535*	1626*	1837*	1945*	2052*
		2129*	2213*	2297*	2384*	2470*	2558*	2648*	2747*	2846*	2945*	3044*	3143*	3242*
		3341*	3443*	3567*	3676*	3788*	3899*	4010*	4121*	4234*	4341*	4401*	4466*	4539*
		4656*	4796*	4937*	5085*	5206*	7410	7862	7865	7868	7871	7884	7887	7890
		7893	7908	7911	7914	7922	7936	7939	7944	7948	7951	7957	7960	7969
		7973	7978											
$TMP1	001234	561*	1050*	1176*	1864*	1890*	2021*	2669*	2768*	2867*	2966*	3065*	3164*	3263*
		3362*	4417*	4482*	5860*	5876*	5898*	7862	7865	7869	7871	7944	7979	
$TMP10	001252	568*	1452*	1545*	7908	7914								
$TMP11	001254	569*	1453*	1546*										
$TMP12	001256	570*	1456*	1549*	7911	7917								
$TMP13	001260	571*	1457*	1550*										
$TMP14	001262	572*												
$TMP15	001264	573*												
$TMP16	001266	574*												
$TMP17	001270	575*												
$TMP2	001236	562*	1127*	1135*	1177*	1225*	1299*	1304*	1309*	1397*	1402*	1407*	1466*	1490*
		1501*	1559*	1583*	1594*	1783*	1863*	1879*	1911*	1992*	2001*	2022*	2071*	2085*
		2099*	2153*	2170*	2185*	2237*	2254*	2269*	2324*	2341*	2356*	2410*	2427*	2442*
		2498*	2515*	2530*	2584*	2601*	2616*	2668*	2683*	2700*	2715*	2767*	2782*	2799*
		2814*	2866*	2881*	2898*	2913*	2965*	2980*	2997*	3012*	3064*	3079*	3096*	3111*
		3163*	3178*	3195*	3210*	3262*	3277*	3294*	3309*	3361*	3376*	3393*	3408*	3501*
		3516*	3536*	3613*	3630*	3645*	3725*	3742*	3757*	3836*	3853*	3868*	3947*	3964*
		3979*	4058*	4075*	4090*	4169*	4186*	4201*	4278*	4291*	4311*	4373*	4416*	4438*
		4481*	4503*	4564*	4588*	4603*	4619*	4702*	4728*	4743*	4759*	4844*	4869*	4894*
		4900*	4985*	5011*	5026*	5042*	5114*	5135*	5235*	5256*	5861*	5877*	7410	7862
		7884	7887	7890	7893	7908	7911	7914	7922	7936	7939	7948	7951	7957
		7960	7969	7973	7978									
$TMP20	001272	576*												
$TMP21	001274	577*												
$TMP22	001276	578*												
$TMP23	001300	579*												
$TMP3	001240	563*	1052*	1129*	1178*	1226*	1467*	1479*	1491*	1502*	1560*	1572*	1594*	1595*
		1912*	1993*	2002*	2023*	2086*	2101*	2171*	2187*	2255*	2271*	2342*	2358*	2428*
		2444*	2516*	2532*	2602*	2618*	2701*	2717*	2800*	2816*	2899*	2915*	2998*	3014*
		3097*	3113*	3196*	3212*	3295*	3311*	3394*	3410*	3518*	3537*	3631*	3647*	3743*	
		3759*	3854*	3870*	3965*	3981*	4076*	4092*	4187*	4203*	4279*	4293*	4312*	4375*
		4440*	4505*	4604*	4620*	4744*	4760*	4885*	4901*	5027*	5043*	5115*	5136*	5236*
		5257*	5862*	5878*	7410	7865	7871	7884	7890	7893	7908	7911	7917	7939
		7944	7951	7960	7969	7973	7978							
$TMP4	001242	564*	1053*	1227*	1913*	2020*	2087*	2102*	2172*	2188*	2256*	2272*	2343*	2359*
		2429*	2445*	2517*	2533*	2603*	2619*	2702*	2718*	2801*	2817*	2900*	2916*	2999*
		3015*	3098*	3114*	3197*	3213*	3296*	3312*	3395*	3411*	3519*	3539*	3632*	3648*

```
MAINDEC-11-DEKBC-B      PDP 11/70 CACHE DIAGNOSTIC PART 1        MACY11 27(732)  30-DEC-75  11:48  PAGE 171
DEKBCB.P11      CROSS REFERENCE TABLE -- USER SYMBOLS

                          3744*  3760*  3855*  3871*  3966*  3982*  4077*  4093*  4188*  4204*  4299*  4315*  4376*
                          4441*  4506*  4605*  4621*  4745*  4761*  4886*  4902*  5028*  5044*  5116*  5137*  5237*
                          5258*  5875*  7865   7893   7936   7944   7957   7969   7975
$TMP5    001244            555*  1914*  2103*  2189*  2273*  2360*  2446*  2534*  2620*  2719*  2818*  2917*  3016*
                          3115*  3214*  3313*  3412*  3520*  3649*  3761*  3872*  3983*  4094*  4205*  4295*  4377*
                          4442*  4507*  4606*  4746*  4887*  5029*  7951   7960
$TMP6    001246            556*  2104*  2190*  2274*  2361*  2447*  2535*  2621*  2720*  2819*  2918*  3017*  3116*
                          3215*  3314*  3413*  3521*  3650*  3762*  3873*  3984*  4095*  4206*  4296*  4378*  4443*
                          4509*  4607*  4747*  4888*  5030*  7944   7962   7969   7975
$TMP7    001250            567*  2105*  2191*  2275*  2362*  2448*  2536*  2622*  2721*  2820*  2919*  3018*  3117*
                          3216*  3315*  3414*  3522*  3651*  3763*  3874*  3985*  4096*  4207*  4297*  4608*  4748*
                          4889*  5031*  7951   7962
$TN    = 000055             59*  1005   1013*  1014   1015   1097   1106*  1107   1141   1155*  1156   1157   1190
                          1200*  1202   1203   1234   1243*  1244   1245   1326   1340*  1341   1342   1422   1437*
                          1439   1439   1515   1530*  1531   1532   1608   1621*  1622   1623   1791   1809*  1818
                          1832*  1833   1834   1924   1940*  1941   1942   2036   2047*  2048   2049   2114   2123*
                          2124   2125   2199   2208*  2209   2210   2283   2292*  2293   2294   2370   2379*  2380
                          2391   2456   2465*  2466   2467   2544   2553*  2554   2555   2631   2643*  2644   2645
                          2730   2742*  2743   2744   2829   2841*  2842   2843   2928   2940*  2941   2942   3027
                          3039*  3040   3041   3126   3138*  3139   3140   3225   3237*  3238   3239   3324   3336*
                          3337   3338   3426   3438*  3439   3440   3550   3562*  3563   3564   3659   3671*  3672
                          3673   3771   3783*  3784   3785   3882   3894*  3895   3896   3993   4005*  4006   4007
                          4104   4116*  4117   4118   4215   4229*  4230   4231   4325   4336*  4337   4338   4385
                          4396*  4397   4398   4450   4461*  4462   4463   4518   4534*  4535   4536   4635   4651*
                          4652   4653   4775   4791*  4792   4793   4916   4932*  4933   4934   5058   5080*  5081
                          5082   5179   5201*  5202   5203
$TPB     001152            533*  5565*  5576
$TPFLG   001157            537*  5523   5576
$TPS     001150            532*  5563   5576
$TRAP    030104            939   5731*
$TRAP2   030126           5742*  5753
$TRP   = 000021           5746*  5755*  5756*  5757*  5758*  5759*  5761   5762*  5763*  5764   5765*  5766*  5767*
                          5768*  5769*  5770*  5771*  5772*  5773*
$TRPAD   030140           5735   5753*
$TSTNM   001102            510*   926*  1018   1110   1160   1206   1249   1345   1442   1535   1626   1837   1945
                          2052   2128   2213   2297   2384   2470   2558   2648   2747   2846   2945   3044   3143
                          3242   3341   3443   3567   3676   3798   3899   4010   4121   4234   4341   4401   4466
                          4539   4656   4796   4937   5095   5206   5314*  5352   5390   5402*  5407   5411   5429
                          5459
$TYPBN= ****** U          5759
$TYPDS   027660           5667*  5758
$TYPE    027212           5523*  5746   5754
$TYPEC   027362           5544   5551   5558   5563*  5564
$TYPEX   027430           5569   5571   5574*
$TYPOC   027456           5607*  5755
$TYPON   027472           5606   5609*  5757
$TYPOS   027432           5602*  5756
$XTSTR   026470           5265*
$$GET4=  000001           5330*  5332*
$OFILL   027655           5603*  5607*  5617   5652*
$4OCAT=  ****** U         5362   5439
.      = 057312            480*   484*   494    495*   497*   499*   507*   586    932    947    948   1672   1675*
                          1977   2140   2143*  2225   2228*  2309   2312*  2396   2399*  2494   2487*  2570   2573*
                          3602   3605*  3711   3714*  3823   3826*  3934   3937*  4045   4048*  4156   4159*  4354
                          4357*  4553   4556*  4577   4580*  4691   4694*  4717   4720*  4833   4836*  4858   4861*
                          4974   4977*  5000   5003*  5143   5146*  5264   5267*  5342   5346   5410   5411   5459
```

5576 5731# 5790 5814 5855# 7409# 7559# 7582#

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ADDDPA      37#
ADJLST      23#  1671    2139    2224    2309    2395    2483    2569    3621    3710    3822    3933    4044    4155    4266
            4552  4576    4690    4716    4832    4857    4973    4999    5142    5263
BYTLT1      26#
BYTLT2      25#
CHAIN        6#  5330
CLRMAC      28#  5905
CLRRFL      22#  1020
CMPDPA      36#
CNVDPA      35#
CNVMAP      30#
COMMEN       1#   461#
ENDCOM       1#   461#
ERCLR        6#  5456
ERROR       94#  1057    1063    1069    1075    1081    1087    1129    1136    1179    1228    1300    1305    1310    1398
            1403  1408    1468    1480    1492    1503    1561    1573    1585    1596    1784    1865    1891    1916    1994
            2003  2025    2072    2088    2106    2155    2174    2193    2239    2258    2277    2326    2345    2364    2412
            2431  2450    2500    2519    2538    2586    2605    2624    2670    2685    2704    2723    2769    2784    2803
            2822  2868    2883    2902    2921    2967    2982    3001    3047    3066    3081    3100    3119    3165    3180
            3199  3218    3264    3279    3298    3317    3363    3378    3397    3416    3502    3509    3523    3539    3615
            3634  3653    3727    3746    3765    3838    3857    3876    3949    3968    3987    4060    4079    4098    4171
            4190  4209    4280    4298    4314    4379    4418    4445    4483    4510    4565    4589    4610    4623    4703
            4729  4750    4763    4845    4870    4891    4904    4986    5012    5033    5046    5117    5138    5238    5259
            5864  5880
ESCAPE       1#   461#
GETPRI       1#   461#
GETSWR       1#   461#   972#
IIMAC1      12#
ITEMAC      24#   605
JJM1        43#
KKM1        33#
KKM2        34#
KMAC1       24#  1422    1515
KMAC5       17#  4398    4463
MMAC1       12#  2158    2242    2329    2415    2503    2599    2688    2787    2886    2985    3084    3183    3282    3381
            3618  3730    3841    3952    4063    4174
MMAC2       13#  2151    2235    2322    2408    2496    2592    2681    2780    2879    2978    3077    3176    3275    3374
            3611  3723    3834    3945    4056    4167
MMAC3       14#  2645    2744    2843    2942    3041    3140    3239    3338
MMAC4       15#  3785    3896    4007    4118
MMAC5       16#  3673
MMM1        40#
MMM2        41#
MSG       1004#  1007    1097#   1099    1189#   1192    1233#   1236    1326#   1328    1422#   1424    1515#   1517    1609#
            1610  1818#   1820    1924#   1926    2035#   2038    2114#   2116    2199#   2201    2283#   2285    2370#   2372
            2456#  2458   2544#   2546    2631#   2633    2730#   2732    2829#   2831    2928#   2930    3027#   3029    3126#
            3128  3225#   3227    3324#   3326    3426#   3428    3550#   3552    3659#   3661    3771#   3773    3882#   3884
            3993#  3995   4104#   4106    4215#   4217    4325#   4327    4385#   4387    4450#   4452    4518#   4520    4635#
            4637  4775#   4777    4916#   4918    5058#   5060    5179#   5181
MSG101     4516#  4528    4530    4645    4787
MSG102     4517#  4647    4785    4926    4928
MSG20      1421#  1424    1517
MSG200     5058#  5060    5181
MSG25      2033#  2116    2201    2285    2372    2458    2546
MSG27      2630#  2633    2732    2831    2930    3029    3128    3227    3326
MSG30      1791#  1793
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DEKBCB.P11 CROSS REFERENCE TABLE -- MACRO NAMES

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MSG300   7218*  7260   7302   7345
MSG31    3423*  3428   3552   3661   3773   3884   3995   4106
MSG32    3424*  3552   3661
MSG33    3425*  3773   3884   3995   4106
MSG6     1141*  1143
MSG98    4383*  4387   4452
MSG99    4515*  4520   4637   4777   4918
MULT        1*   461*
NEWTST      1*   461*  1005   1097   1141   1190   1234   1326   1422   1515   1608   1791   1818   1924   2036
         2114   2199   2283   2370   2456   2544   2631   2730   2829   2928   3027   3126   3225   3324   3426
         3550   3659   3771   3882   3993   4104   4215   4325   4385   4453   4518   4635   4775   4916   5058
         5179
NMAC1       18*  4547   4570   4685   4852
NMAC2       19*  4708   4825   4966   4991
NMAC3       21*  4594   4734   4875   5017
POP         1*   461*  5498   5708   5799   5800
PUSH        1*   461*  5478   5667   5780   5786
QQM1       42*
REPORT      1*   461*
SCOPE      95*  1012   1105   1154   1199   1242   1339   1436   1529   1620   1808   1831   1939   2046   2122
         2207   2291   2378   2464   2552   2642   2741   2840   2939   3038   3137   3236   3335   3437   3561
         3670   3782   3893   4004   4115   4228   4335   4395   4460   4533   4650   4790   4931   5079   5200
         5313
SETMAP     29*  3460   3575   3683   3795   3906   4017   4128   4663   4803   4944
SETMM      32*  4242
SETPRI      1*   461*
SETTRA   5746*  5755   5756   5757   5758   5761   5762   5764   5765   5766   5767   5768   5769   5770   5771
         5772
SETUP       1*   461*   927
SKBREX     22*  1112   1162   1208   1250   1347   1444   1537   1628   1839   1946   2053   2129   2214   2298
         2385   2559   2649   2748   2847   2946   3045   3144   3243   3342   3444   3568   3677   3789   3900
         4011   4122   4236   4342   4402   4467   4540   4657   4797   4938   5087   5208
SKIP        1*   461*
SLASH       1*   461*
SPACE     461*
SSKAD      37*  1015   1107   1157   1203   1245   1342   1439   1532   1623   1834   1942   2049   2125   2210
         2294   2381   2467   2555   2645   2744   2843   2942   3041   3140   3239   3338   3440   3564   3673
         3785   3896   4007   4118   4231   4339   4398   4463   4536   4653   4793   4934   5082   5203
STARS       1*   461*   492    503    586   1005   1011   1097   1104   1141   1153   1190   1198   1234   1241
         1326   1338   1422   1435   1515   1528   1608   1619   1791   1807   1818   1830   1924   1938   2036
         2045   2114   2121   2199   2206   2283   2290   2370   2377   2456   2463   2544   2551   2631   2641
         2730   2740   2829   2839   2928   2938   3027   3037   3126   3136   3225   3235   3324   3334   3426
         3436   3550   3560   3659   3669   3771   3781   3882   3892   3993   4003   4104   4114   4215   4227
         4325   4334   4385   4394   4450   4459   4518   4532   4635   4649   4775   4789   4916   4930   5058
         5079   5179   5199   5305   5349   5414   5462   5508   5579   5657   5725   5776   5792   5819
SWRSU       1*   461*   949*
THIT       38*  1858   1874   2663   2762   2861   2960   3059   3159   3257   3356   4411   4476
TOMAPO     27*
TOPAR3     31*
TRMTRP   5746*
TSTHIT     39*  1856   1872
TYPBIN      1*   461*
TYPDEC      1*   461*  5325
TYPNAM      1*   461*   965
TYPNUM      1*   461*
TYPOCS      1*   461*
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TYPOCT      1#    461#
TYPTXT      1#    461#
UMAC1       7#   5058   5179
UMAC2       9#   5151   5162   5272   5293
UMAC3      10#   5112   5133   5233   5254
$$CMRE    501#    540    541    542    543    544    545    546    547    548    549    550    551    552    553
           554    555    556    557    558    559
$$CMTM    501#    560    561    562    563    564    565    566    567    568    569    570    571    572    573
           574    575    576    577    579    579
$$ESCA      1#    461#
$$NEWT      1#    461#   1005   1097   1141   1190   1234   1326   1422   1515   1608   1791   1818   1924   2036
          2114   2199   2283   2370   2456   2544   2631   2730   2829   2928   3027   3126   3225   3324   3426
          3550   3659   3771   3882   3993   4104   4215   4325   4385   4450   4518   4635   4775   4916   5058
          5179
$$SET     5746#  5755   5756   5757   5758   5761   5762   5764   5765   5766   5767   5768   5769   5770   5771
          5772
$$SKIP      1#    461#
.EQUAT      1#
.HEADE      1#     45#     49
.KT11       1#
.SETUP      1#     46#    462
.SWRHI      1#     46#     64
.SWRLO     75#
.$ACT1      1#     45#    490
.$APTB      1#
.$APTH      1#
.$APTY      1#
.$ASTA      1#
.$CATC      1#     46#    478
.$CMTA      1#     46#    501
.$D82D      1#
.$DB20      1#     48#   5817
.$DIV       1#
.$EOP       1#     47#   5303
.$ERRO      1#     47#   5412
.$ERRT      1#
.$MULT      1#
.$POWE      1#     48#   5774
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
.$READ      1#
.$R2AZ      1#
.$SAVE      1#     47#   5460
.$SB2D      1#
.$SB20      1#
.$SCOP      1#     47#   5347
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#     48#   5723
.$TYPB      1#
.$TYPD      1#     48#   5655
.$TYPE      1#     47#   5506
.$TYPO      1#     47#   5577
.$40CA      1#
.1170       1#     46#     77
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ADC     6223
ADD     1334  1451  1455  1544  1548  1656  1660  1731  1848  1850  2006  3474  3475  3527  3589
        3590  3697  3698  3809  3810  3920  3921  4031  4032  4142  4143  4596  4677  4678  4736
        4817  4818  4877  4958  4959  5014  5174  5295  5533  5605  5615  5687  5853  5897  6130
        6216  6222  6229
ASH     3470  3585  3693  3805  3916  4027  4138  4573  4813  4954  6096
ASHC    1718  6208  6220
ASL     1653  1657  5735  5993  6068  6209
ASLB    5692
ASR     5845
BCC     1654  1658  5693  5994
BEQ      970  1120  1124  1174  1181  1184  1321  1417  1499  1592  1727  1733  1740  1811  1814
        1909  1977  1989  1998  2092  2167  2251  2338  2424  2512  2598  2697  2796  2995  2994
        3093  3192  3291  3390  3508  3512  3533  3627  3739  3850  3961  4072  4183  4288  4308
        4600  4616  4740  4756  4881  4897  5023  5039  5153  5164  5173  5274  5285  5294  5329
        5333  5377  5381  5383  5387  5396  5428  5431  5446  5449  5536  5571  5632  5840  5871
        5991  6099  6105  6178  6204  6206
BGE     5399
BGT     5320  5639  5701  5839
BHI     5385
BIC     1218  1449  1471  1495  1542  1564  1588  1705  1707  1719  1846  5317  5379  5629  5852
        6008
BIS     1301  1306  1311  1399  1404  1409  4348  4422  4487  5634  5635  5695  5696  6071
BISB     999  6028
BIT     1044  1416  1462  1475  1486  1498  1555  1568  1579  1591  1860  1876  1908  1972  2014
        2665  2764  2863  2962  3061  3160  3259  3358  4283  4413  4478  5093  5214  5362  5376
        5386  5393  5430  5437  5445  5870  5990  6045  6205
BITB    5559
BLOS    1036
BLT     5550  5640  5684  5700
BMI     5691
BNE      932   956   968   984  1045  1049  1055  1061  1067  1073  1079  1085  1172  1220  1266
        1279  1292  1315  1364  1378  1391  1412  1463  1476  1487  1556  1569  1580  1861  1877
        2007  2015  2077  2093  2095  2160  2179  2181  2244  2263  2265  2331  2350  2352  2417
        2436  2438  2505  2524  2526  2591  2610  2612  2666  2690  2709  2711  2765  2789  2808
        2810  2864  2888  2907  2909  2963  2987  3006  3008  3062  3086  3105  3107  3161  3185
        3204  3206  3260  3284  3303  3305  3359  3383  3402  3404  3544  3546  3620  3639  3641
        3732  3751  3753  3843  3862  3864  3954  3973  3975  4065  4084  4086  4176  4195  4197
        4284  4319  4321  4414  4479  4598  4628  4630  4738  4768  4770  4879  4909  4911  5021
        5051  5053  5094  5156  5167  5215  5277  5288  5363  5394  5438  5453  5530  5538  5546
        5560  5567  5630  5689  5798  5929  5931  5938  5945  5952  5959  6010  6021  6046  6090
        6112  6116  6121  6127  6137  6144  6150  6157  6163
BPL     1737  5443  5524  5564  5628  5675  5705
BR       958   972  1058  1064  1070  1076  1082  1088  1132  1223  1230  1302  1307  1400  1405
        1414  1493  1507  1586  1600  1652  1664  1679  1683  1687  1691  1695  1699  1917  2008
        2028  2074  2090  2096  2109  2138  2157  2176  2182  2196  2223  2241  2260  2266  2280
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ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

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RUN-TIME: 72 89 16 SECONDS
RUN-TIME RATIO: 341/179=1.9
CORE USED: 42K (83 PAGES)

Spooler runtime 30 Seconds, 185 KCS, 857 disk reads, 0 disk writes, 202 pages