PDP11/70

CACHE DIAGNOSTIC PART 1

MD-11-DEKBC-B

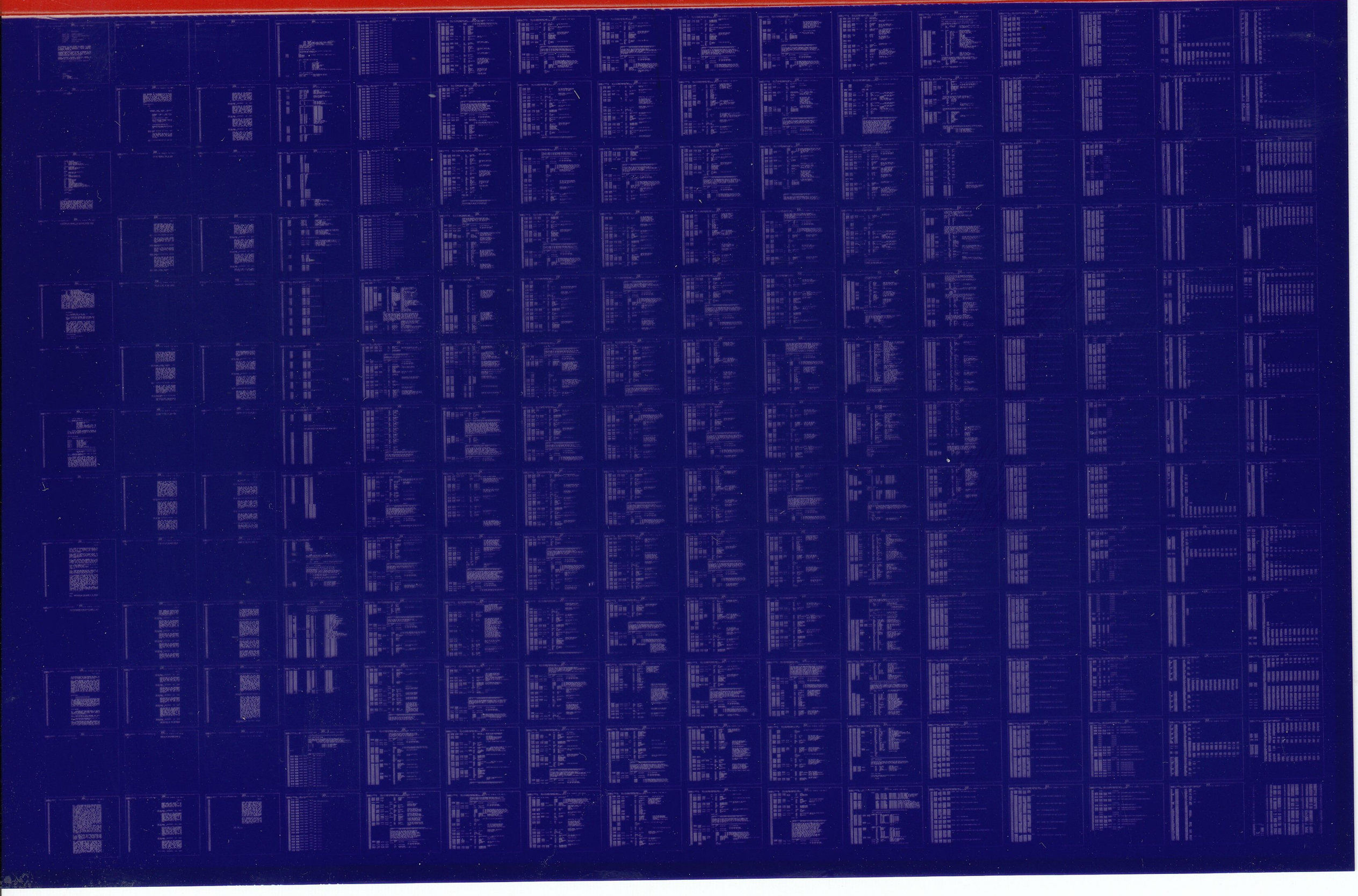
EP DEKBC DL A

NOV 1976

FICHE 1 OF 2

digital

MADE IN USA



PDP-11/70

CACHE DIAG PART 1

AH-0010B-MC

EP-DEKBC-B-DL-A

FICHE 1 OF 2

NOV 1976

digital

MADE IN USA

PDP11/70

CACHE DIAGNOSTIC PART 1

MD-11-DEKBC-B

EP-DEKBC-DL-A

FICHE 2 OF 2

NOV 1976

digital

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PDP-11/70

CACHE DIAG PART 1
AH-0010B-MC

EP-DEKBC-B-DL-A

FICHE 2 OF 2

NOV 1976
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MADE IN USA

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IDENTIFICATION

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

PRODUCT NAME: PDP-11/70 CACHE DIAGNOSTIC PART 1

DATE CREATED: 11-SEPT-75

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: ANTHONY VEZZA

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3.      LOADING PROCEDURE
        3.1     METHOD
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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

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                        AS THE DEFECTIVE COMPONENT;  THE IDENTIFIED COMPONENT SHOULD
                        RATHER BE TAKEN AS THE PROBABLE CAUSE OF THE FAILURE.  THERE
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ARE FOUR (4) MODULES (HEX BOARDS) IN THE CACHE UNIT:

CCB CACHE CONTROL BOARD
CDP 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 FAILTY 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 HEEDED, 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

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173
174                                 4.1     CONTROL SWITCH SETTINGS (SEE 5.1)
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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<9>=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

231 OCCURRED.

5.2.2 SCOPE THIS SUBROUTINE IS CALLED (VIA AN ICT 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.

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                                HALTS THE PROCESSOR IN THE SITUATION WHERE IT  CAN'T
                                CLEAR THE MAINTENANCE REGISTER.  HERE PROCEDING WITH
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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

346 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!

403
404	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 DEKBC

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

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

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519
520
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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

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577                                     HIT/MISS  REGISTER  AND  THE CONTROL
578                                     REGISTER.      THOSE     TESTS     HAVE
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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 COUNT 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

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                                        RETURN  DATA WITH THE PARITY BITS ON
                                        SO  AS  TO  NOT  CAUSE  MAIN  MEMORY
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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

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749                                     ERROR IN THE CACHE ADDRESS MEMORY OF
750                                     GROUP ZERO, FOR THE HIGH BYTE OF THE
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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 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.

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.

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

SCT 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.

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                                TEST 35 CACHE   MAINTENANCE   AND   ERROR
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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

```
980                                     ADDRESSES. 17777776. WILL BE USED TO
981                                     CAUSE  A  TIME  OUT ON THE UNIBUS AN
```

THE CONSEQUENT ABORT TO VECTOR ERRVEC.

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

```
1038                                    ADDRESS  OF  THE  FIRST  ERROR  IN A
1039                                    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 50 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 51 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 THROUGH 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

```
1152
1153                                    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,CND
```

```
                                .ENABL  ABS,AMA
                                .MCALL  .HEADER,.SWRHI,.1170,.SETUP,.$CATCH,.$ACT11,.$CMTAG
                                .MCALL  .$EOF,.$SCOPE,.$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-A5).
                        ;*
000001                  $TN=1
160000                  $SWR=160000     ;;HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYPOUT
167400                  $SWR=167400
000200                  $SWRMX=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
```

```
                        SLPSTK= STACK-200       ;;SUPERVISOR STACK
                        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                  SWR=    177570          ;;SWITCH REGISTER
                        DISPLAY=SWR

                        ;*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
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  SP,KSP          ;;KERNEL STACK POINTER
                        .EQUIV  SP,SSP          ;;SUPERVISOR STACK POINTER
                        .EQUIV  SP,USP          ;;USER STACK POINTER
                        .EQUIV  R7,PC           ;;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
                    000100          BIT06=  100
                    000040          BIT05=  40
                    000020          BIT04=  20
                    000010          BIT03=  10
                    000004          BIT02=  4
                    000002          BIT01=  2
                    000001          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
                        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
```

```
1434            177616                  UIPDR7= 177616
1435
1436                                    ;*USER "D" PAGE DESCRIPTOR REGISTORS
1437
1438            177620                  UDPDR0= 177620
1439            177622                  UDPDR1= 177622
1440            177624                  UDPDR2= 177624
1441            177626                  UDPDR3= 177626
1442            177630                  UDPDR4= 177630
1443            177632                  UDPDR5= 177632
1444            177634                  UDPDR6= 177634
1445            177636                  UDPDR7= 177636
1446
1447                                    ;*USER "I" PAGE ADDRESS REGISTERS
1448
1449            177640                  UIPAR0= 177640
1450            177642                  UIPAR1= 177642
1451            177644                  JIPAR2= 177644
1452            177646                  LIPAR3= 177646
1453            177650                  UIPAR4= 177650
1454            177652                  UIPAR5= 177652
1455            177654                  LIPAR6= 177654
1456            177656                  UIPAR7= 177656
1457
1458                                    ;*USER "D" PAGE ADDRESS REGISTERS
1459
1460            177660                  JDPAR0= 177660
1461            177662                  UDPAR1= 177662
1462            177664                  UDPAR2= 177664
1463            177666                  UDPAR3= 177666
1464            177670                  UDPAR4= 177670
1465            177672                  UDPAR5= 177672
1466            177674                  UDPAR6= 177674
1467            177676                  UDPAR7= 177676
1468
1469                                    ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS
1470
1471            172200                  SIPDR0= 172200
1472            172202                  SIPDR1= 172202
1473            172204                  SIPDR2= 172204
1474            172206                  SIPDR3= 172206
1475            172210                  SIPDR4= 172210
1476            172212                  SIPDR5= 172212
1477            172214                  SIPDR6= 172214
1478            172216                  SIPDR7= 172216
1479
1480                                    ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS
1481
1482            172220                  SDPDR0= 172220
1483            172222                  SDPDR1= 172222
1484            172224                  SDPDR2= 172224
1485            172226                  SDPDR3= 172226
1486            172230                  SDPDR4= 172230
1487            172232                  SDPDR5= 172232
1488            172234                  SDPDR6= 172234
1489            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



                                        .SBTL  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
170230                                  MAPL06 = 170230
170232                                  MAPH06 = 170232
170234                                  MAPL07 = 170234
170236                                  MAPH07 = 170236
170240                                  MAPL10 = 170240
170242                                  MAPH10 = 170242
170244                                  MAPL11 = 170244
170246                                  MAPH11 = 170246
170250                                  MAPL12 = 170250
170252                                  MAPH12 = 170252
170254                                  MAPL13 = 170254
170256                                  MAPH13 = 170256
170260                                  MAPL14 = 170260
170262                                  MAPH14 = 170262
170264                                  MAPL15 = 170264
170266                                  MAPH15 = 170266
170270                                  MAPL16 = 170270
170272                                  MAPH16 = 170272
170274                                  MAPL17 = 170274
170276                                  MAPH17 = 170276
170300                                  MAPL20 = 170300
170302                                  MAPH20 = 170302
170304                                  MAPL21 = 170304
```

```
1602            170306                  MAPH21 = 170306
1603            170310                  MAPL22 = 170310
1604            170312                  MAPH22 = 170312
1605            170314                  MAPL23 = 170314
1606            170316                  MAPH23 = 170316
1607            170320                  MAPL24 = 170320
1608            170320                  MAPH24 = 170320
1609            170324                  MAPL25 = 170324
1610            170326                  MAPH25 = 170326
1611            170330                  MAPL26 = 170330
1612            170332                  MAPH26 = 170332
1613            170334                  MAPL27 = 170334
1614            170336                  MAPH27 = 170336
1615            170340                  MAPL30 = 170340
1616            170342                  MAPH30 = 170342
1617            170344                  MAPL31 = 170344
1618            170346                  MAPH31 = 170346
1619            170350                  MAPL32 = 170350
1620            170352                  MAPH32 = 170352
1621            170354                  MAPL33 = 170354
1622            170356                  MAPH33 = 170356
1623            170360                  MAPL34 = 170360
1624            170362                  MAPH34 = 170362
1625            170364                  MAPL35 = 170364
1626            170366                  MAPH35 = 170366
1627            170370                  MAPL36 = 170370
1628            170372                  MAPH36 = 170372
1629            170374                  MAPL37 = 170374
1630            170376                  MAPH37 = 170376
1631                                    .EQUIV  MAPL00,MAPL0
1632                                    .EQUIV  MAPH00,MAPH0
1633                                    .EQUIV  MAPL01,MAPL1
1634                                    .EQUIV  MAPH01,MAPH1
1635                                    .EQUIV  MAPL02,MAPL2
1636                                    .EQUIV  MAPH02,MAPH2
1637                                    .EQUIV  MAPL03,MAPL3
1638                                    .EQUIV  MAPH03,MAPH3
1639                                    .EQUIV  MAPL04,MAPL4
1640                                    .EQUIV  MAPH04,MAPH4
1641                                    .EQUIV  MAPL05,MAPL5
1642                                    .EQUIV  MAPH05,MAPH5
1643                                    .EQUIV  MAPL06,MAPL6
1644                                    .EQUIV  MAPH06,MAPH6
1645                                    .EQUIV  MAPL07,MAPL7
1646                                    .EQUIV  MAPH07,MAPH7
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
```

```
                    000011                  TAB=11
                    000044                  S1M0=44
                    000030                  S0M1=30
                    000054                  S1M0M1=54
                    000034                  S0M0M1=34
                    000014                  M1M0=14
                    000014                  M0M1=M1M0
                    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

                                            .SBTTL  STARTING ADDRESS(ES)
                    000200                          .=200

000200  000137  003010                        JMP     @#START         ;;JUMP TO STARTING ADDRESS OF PROGRAM

                                            ;;**************************************************************

                                            .SBTTL          ACT11 HOOKS

                                            ;*THE FOLLOWING LOCATIONS ARE SETUP TO BE USED WITH ACT11
                                            ;*
                                            ;*LOCATION 46 WILL CONTAIN THE ADDRESS OF THE LOCICAL
                                            ;*END OF THE PROGRAM.
                                            ;*LOCATION 52 IS USED TO SPECIFY PROGRAM OPERATING REQUIREMENTS
                                            ;*AND/OR RESTRICTIONS. THIS IS ACCOMPLISHED BY SETTING VARICUS BITS
                                            ;*TO A ONE OR A ZERO. THE BITS JSED AND THERE MEANING ARE:
                                            ;*
                                            ;*      BIT 15=1 PROGRAM SHOULD BE POWER FAILED WHILE RUNNING
                                            ;*           =0 NO POWER FAIL DESIRED
                                            ;*
                                            ;*      BIT 14=1 PROGRAM RUN TIME IS MEMORY SIZE DEPENDENT
                                            ;*           =0 RUN TIME IS NOT MEMORY SIZE DEPENDENT
                                            ;*
                                            ;*      BITS 13-0  MUST BE ZERO'S

                    000204                  $SVPC=.                 ;;SAVE LOCATION COUNTER
                    000046                  .=46                    ;;SET LOCATION COUNTER
000046  026334                              .WORD   $ENDAD          ;;SET LOC.46 TO ADDRESS $ENDAD
                    000052                  .=52                    ;;SET LOCATION COUNTER
000052  000000                              .WORD   0               ;;SET LOC.52 TO ZERO
                    000204                  .=$SVPC                 ;; RESTORE LOCATION COUNTER
```

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

                                        .SBTTL  COMMON TAGS

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

                001100                          .=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
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  OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0               ;;CONTAINS  OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000  000000  000000          .WORD   0,0,0           ;;RESERVED--NOT TO BE USED
001136  177560                  $TKS:   177560                  ;;TTY KBD STATUS
001140  177562                  $TKB:   177562                  ;;TTY KBD BUFFER
001142  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG.
001144  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG.
001146     000                  $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001147     002                  $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001150     012                  $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001151     000                  $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001152  000000                  $REGAD: .WORD   0               ;;CONTAINS THE  FROM
                                                                ;;WHICH  ($REGO) WAS OBTAINED
001154  000000                  $REGO:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001156  000000                  $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001160  000000                  $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001162  000000                  $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001164  000000                  $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001166  000000                  $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001170  000000                  $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001172  000000                  $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001174  000000                  $REG10: .WORD   0               ;;CONTAINS (($REGAD)+20)
001176  000000                  $REG11: .WORD   0               ;;CONTAINS (($REGAD)+22)
001200  000000                  $REG12: .WORD   0               ;;CONTAINS (($REGAD)+24)
001202  000000                  $REG13: .WORD   0               ;;CONTAINS (($REGAD)+26)
001204  000000                  $REG14: .WORD   0               ;;CONTAINS (($REGAD)+30)
001206  000000                  $REG15: .WORD   0               ;;CONTAINS (($REGAD)+32)
001210  000000                  $REG16: .WORD   0               ;;CONTAINS (($REGAD)+34)
001212  000000                  $REG17: .WORD   0               ;;CONTAINS (($REGAD)+36)
001214  000000                  $REG20: .WORD   0               ;;CONTAINS (($REGAD)+40)
001216  000000                  $REG21: .WORD   0               ;;CONTAINS (($REGAD)+42)
001220  000000                  $REG22: .WORD   0               ;;CONTAINS (($REGAD)+44)
001222  000000                  $REG23: .WORD   0               ;;CONTAINS (($REGAD)+46)
001224  000000                  $TMP0:  .WORD   0               ;;USER DEFINED
```

```
 1764  001226  000000                $TMP1:   .WORD   0                ;;USER DEFINED
 1765  001230  000000                $TMP2:   .WORD   0                ;;USER DEFINED
 1766  001232  000000                $TMP3:   .WORD   0                ;;USER DEFINED
 1767  001234  000000                $TMP4:   .WORD   0                ;;USER DEFINED
 1768  001236  000000                $TMP5:   .WORD   0                ;;USER DEFINED
 1769  001240  000000                $TMP6:   .WORD   0                ;;USER DEFINED
 1770  001242  000000                $TMP7:   .WORD   0                ;;USER DEFINED
 1771  001244  000000                $TMP10:  .WORD   0                ;;USER DEFINED
 1772  001246  000000                $TMP11:  .WORD   0                ;;USER DEFINED
 1773  001250  000000                $TMP12:  .WORD   0                ;;USER DEFINED
 1774  001252  000000                $TMP13:  .WORD   0                ;;USER DEFINED
 1775  001254  000000                $TMP14:  .WORD   0                ;;USER DEFINED
 1776  001256  000000                $TMP15:  .WORD   0                ;;USER DEFINED
 1777  001260  000000                $TMP16:  .WORD   0                ;;USER DEFINED
 1778  001262  000000                $TMP17:  .WORD   0                ;;USER DEFINED
 1779  001264  000000                $TMP20:  .WORD   0                ;;USER DEFINED
 1780  001266  000000                $TMP21:  .WORD   0                ;;USER DEFINED
 1781  001270  000000                $TMP22:  .WORD   0                ;;USER DEFINED
 1782  001272  000000                $TMP23:  .WORD   0                ;;USER DEFINED
 1783  001274  000000                $TIMES:  0                        ;;MAX. NUMBER OF ITERATIONS
 1784  001276  000000                $ESCAPE: 0                        ;;ESCAPE ON ERROR
 1785  001300  177607  000377       $BELL:   .ASCIZ  <207><377><377>  ;;CODE FOR BELL
 1786  001304     077                $QUES:   .ASCII  /?/              ;;QUESTION MARK
 1787  001305     015                $CRLF:   .ASCII  <15>             ;;CARRIAGE RETURN
 1788  001306  000012                $LF:     .ASCIZ  <12>             ;;LINE FEED
```

```
1789                                    ;;*****************************************************************
1790
1791                                    .SBTTL  ERROR POINTER TABLE
1792
1793                                    ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
1794                                    ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
1795                                    ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
1796                                    ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
1797                                    ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
1798
1799                                    ;*      EM              ;;POINTS TO THE ERROR MESSAGE
1800                                    ;*      DH              ;;POINTS TO THE DATA HEADER
1801                                    ;*      DT              ;;POINTS TO THE DATA
1802                                    ;*      DF              ;;POINTS TO THE DATA FORMAT
1803
1804
1805  001310                            $ERRTB:
1806
1807
1808
1809                                    ;ERROR TABLE FOR ERROR TYPE OUT:
1810                                    ;ITEM 1
1811  001310  034763  046334  050460            .WORD   EM1,DH1,DT1,DF1
1812  001316  050263
1813                                    ;ITEM 0
1814  001320  000000  000000  000000            .WORD   0,0,0,0
1815  001326  000000
1816                                    ;ITEM 0
1817  001330  000000  000000  000000            .WORD   0,0,0,0
1818  001336  000000
1819                                    ;ITEM 0
1820  001340  000000  000000  000000            .WORD   0,0,0,0
1821  001346  000000
1822                                    ;ITEM 0
1823  001350  000000  000000  000000            .WORD   0,0,0,0
1824  001356  000000
1825                                    ;ITEM 0
1826  001360  000000  000000  000000            .WORD   0,0,0,0
1827  001366  000000
1828                                    ;ITEM 0
1829  001370  000000  000000  000000            .WORD   0,0,0,0
1830  001376  000000
1831                                    ;ITEM 0
1832  001400  000000  000000  000000            .WORD   0,0,0,0
1833  001406  000000
1834                                    ;ITEM 0
1835  001410  000000  000000  000000            .WORD   0,0,0,0
1836  001416  000000
1837                                    ;ITEM 0
1838  001420  000000  000000  000000            .WORD   0,0,0,0
1839  001426  000000
1840                                    ;ITEM 0
1841  001430  000000  000000  000000            .WORD   0,0,0,0
1842  001436  000000
1843                                    ;ITEM 14
1844  001440  035050  046407  050472            .WORD   EM14,DH14,DT14,DF14
```

```
 1845  001446  050267
 1846                                  ;ITEM 15
 1847  001450  035107  046502  050506          .WORD   EM15,DH15,DT15,DF15
 1848  001456  050274
 1849                                  ;ITEM 0
 1850  001460  000000  000000  000000          .WORD   0,0,0,0
 1851  001466  000000
 1852                                  ;ITEM 0
 1853  001470  000000  000000  000000          .WORD   0,0,0,0
 1854  001476  000000
 1855                                  ;ITEM 0
 1856  001500  000000  000000  000000          .WORD   0,0,0,0
 1857  001506  000000
 1858                                  ;ITEM 0
 1859  001510  000000  000000  000000          .WORD   0,0,0,0
 1860  001516  000000
 1861                                  ;ITEM 0
 1862  001520  000000  000000  000000          .WORD   0,0,0,0
 1863  001526  000000
 1864                                  ;ITEM 0
 1865  001530  000000  000000  000000          .WORD   0,0,0,0
 1866  001536  000000
 1867                                  ;ITEM 0
 1868  001540  000000  000000  000000          .WORD   0,0,0,0
 1869  001546  000000
 1870                                  ;ITEM 0
 1871  001550  000000  000000  000000          .WORD   0,0,0,0
 1872  001556  000000
 1873                                  ;ITEM 0
 1874  001560  000000  000000  000000          .WORD   0,0,0,0
 1875  001566  000000
 1876                                  ;ITEM 0
 1877  001570  000000  000000  000000          .WORD   0,0,0,0
 1878  001576  000000
 1879                                  ;ITEM 0
 1880  001600  000000  000000  000000          .WORD   0,0,0,0
 1881  001606  000000
 1882
 1883                                  ;ITEM 0
 1884  001610  000000  000000  000000          .WORD   0,0,0,0
 1885  001616  000000
 1886                                  ;ITEM 0
 1887  001620  000000  000000  000000          .WORD   0,0,0,0
 1888  001626  000000
 1889                                  ;ITEM 0
 1890  001630  000000  000000  000000          .WORD   0,0,0,0
 1891  001636  000000
 1892                                  ;ITEM 0
 1893  001640  000000  000000  000000          .WORD   0,0,0,0
 1894  001646  000000
 1895                                  ;ITEM 0
 1896  001650  000000  000000  000000          .WORD   0,0,0,0
 1897  001656  000000
 1898                                  ;ITEM 0
 1899  001660  000000  000000  000000          .WORD   0,0,0,0
 1900  001666  000000
```

```
                                                ;ITEM 0
001670  000000  000000  000000                        .WORD   0,0,0,0
001676  000000
                                                ;ITEM 0
001700  000000  000000  000000                        .WORD   0,0,0,0
001706  000000
                                                ;ITEM 0
001710  000000  000000  000000                        .WORD   0,0,0,0
001716  000000
                                                ;ITEM 0
001720  000000  000000  000000                        .WORD   0,0,0,0
001726  000000
                                                ;ITEM 0
001730  000000  000000  000000                        .WORD   0,0,0,0
001736  000000
                                                ;ITEM 0
001740  000000  000000  000000                        .WORD   0,0,0,0
001746  000000
                                                ;ITEM 0
001750  000000  000000  000000                        .WORD   0,0,0,0
001756  000000
                                                ;ITEM 0
001760  000000  000000  000000                        .WORD   0,0,0,0
001766  000000
                                                ;ITEM 0
001770  000000  000000  000000                        .WORD   0,0,0,0
001776  000000
                                                ;ITEM 0
002000  000000  000000  000000                        .WORD   0,0,0,0
002006  000000
                                                ;ITEM 0
002010  000000  000000  000000                        .WORD   0,0,0,0
002016  000000
                                                ;ITEM 0
002020  000000  000000  000000                        .WORD   0,0,0,0
002026  000000
                                                ;ITEM 0
002030  000000  000000  000000                        .WORD   0,0,0,0
002036  000000
                                                ;ITEM 0
002040  000000  000000  000000                        .WORD   0,0,0,0
002046  000000

                                                ;ITEM 55
002050  035157  046526  050514                        .WORD   EM55,DH55,DT55,DF55
002056  050276
                                                ;ITEM 56
002060  035323  046526  050514                        .WORD   EM56,DH56,DT56,DF56
002066  050276
                                                ;ITEM 57
002070  035470  046526  050514                        .WORD   EM57,DH57,DT57,DF57
002076  050276
                                                ;ITEM 60
002100  035612  046526  050514                        .WORD   EM60,DH60,DT60,DF60
002106  050276
                                                ;ITEM 61
```

```
 1957  002110  035736  046526  050514          .WORD   EM61,DH61,DT61,DF61
 1958  002116  050276
 1959                                  ;ITEM 62
 1960  002120  036066  046526  050514          .WORD   EM62,DH62,DT62,DF62
 1961  002126  050276
 1962                                  ;ITEM 63
 1963  002130  036214  046603  050526          .WORD   EM63,DH63,DT63,DF63
 1964  002136  050302
 1965                                  ;ITEM 64
 1966  002140  036433  046705  050540          .WORD   EM64,DH64,DT64,DF64
 1967  002146  050302
 1968                                  ;ITEM 65
 1969  002150  036630  046760  050550          .WORD   EM65,DH65,DT65,DF65
 1970  002156  050302
 1971                                  ;ITEM 66
 1972  002160  037213  047062  050562          .WORD   EM66,DH66,DT66,DF66
 1973  002166  050302
 1974                                  ;ITEM 67
 1975  002170  037275  047135  050540          .WORD   EM67,DH67,DT67,DF67
 1976  002176  050302
 1977                                  ;ITEM 70
 1978  002200  037512  047135  050540          .WORD   EM70,DH70,DT70,DF70
 1979  002206  050302
 1980                                  ;ITEM 71
 1981  002210  037770  047135  050540          .WORD   EM71,DH71,DT71,DF71
 1982  002216  050302
 1983                                  ;ITEM 72
 1984  002220  040246  047135  050540          .WORD   EM72,DH72,DT72,DF72
 1985  002226  050302
 1986                                  ;ITEM 73
 1987  002230  040470  047135  050540          .WORD   EM73,DH73,DT73,DF73
 1988  002236  050302
 1989                                  ;ITEM 74
 1990  002240  040754  047135  050540          .WORD   EM74,DH74,DT74,DF74
 1991  002246  050302
 1992
 1993                                  ;ITEM 75
 1994  002250  041240  047232  050576          .WORD   EM75,DH75,DT75,DF75
 1995  002256  050307
 1996                                  ;ITEM 76
 1997  002260  041240  047232  050612          .WORD   EM76,DH76,DT76,DF76
 1998  002266  050307
 1999                                  ;ITEM 77
 2000  002270  041377  047327  050626          .WORD   EM77,DH77,DT77,DF77
 2001  002276  050314
 2002                                  ;ITEM 0
 2003  002300  000000  000000  000000          .WORD   0,0,0,0
 2004  002306  000000
 2005                                  ;ITEM 0
 2006  002310  000000  000000  000000          .WORD   0,0,0,0
 2007  002316  000000
 2008                                  ;ITEM 0
 2009  002320  000000  000000  000000          .WORD   0,0,0,0
 2010  002326  000000
 2011                                  ;ITEM 0
 2012  002330  000000  000000  000000          .WORD   0,0,0,0
```

```
002336  000000
                                        ;ITEM 0
002340  000000  000000  000000                .WORD   0,0,0,0
002346  000000
                                        ;ITEM 0
002350  000000  000000  000000                .WORD   0,0,0,0
002356  000000
                                        ;ITEM 0
002360  000000  000000  000000                .WORD   0,0,0,0
002366  000000
                                        ;ITEM 0
002370  000000  000000  000000                .WORD   0,0,0,0
002376  000000
                                        ;ITEM 0
002400  000000  000000  000000                .WORD   0,0,0,0
002406  000000
                                        ;ITEM 0
002410  000000  000000  000000                .WORD   0,0,0,0
002416  000000
                                        ;ITEM 0
002420  000000  000000  000000                .WORD   0,0,0,0
002426  000000

                                        ;ITEM 0
002430  000000  000000  000000                .WORD   0,0,0,0
002436  000000
                                        ;ITEM 0
002440  000000  000000  000000                .WORD   0,0,0,0
002446  000000
                                        ;ITEM 0
002450  000000  000000  000000                .WORD   0,0,0,0
002456  000000
                                        ;ITEM 0
002460  000000  000000  000000                .WORD   0,0,0,0
002466  000000
                                        ;ITEM 117
002470  041535  047232  050612                .WORD   EM117,DH117,DT117,DF117
002476  050307
                                        ;ITEM 120
002500  041664  047353  050654                .WORD   EM120,DH120,DT120,DF120
002506  050326
                                        ;ITEM 121
002510  042077  047427  050744                .WORD   EM121,DH121,DT121,DF121
002516  050361
                                        ;ITEM 122
002520  042300  047471  050756                .WORD   EM122,DH122,DT122,DF122
002526  050365
                                        ;ITEM 123
002530  042430  047553  050756                .WORD   EM123,DH123,DT123,DF123
002536  050365
                                        ;ITEM 124
002540  042631  046407  050770                .WORD   EM124,DH124,DT124,DF124
002546  050371

                                        ;ITEM 0
002550  000000  000000  000000                .WORD   0,0,0,0
002556  000000
```

```
2069
2070  002560  000000  000000  000000          ;ITEM 0
2071  002566  000000                  .WORD   0,0,0,0
2072
2073  002570  043037  047723  051010          ;ITEM 127
2074  002576  050415                  .WORD   EM127,DH127,DT127,DF127
2075
2076  002600  043221  047765  051042          ;ITEM 130
2077  002606  050401                  .WORD   EM130,DH130,DT130,DF130
2078
2079
2080  002610  043273  050043  051054          ;ITEM 131
2081  002616  050420                  .WORD   EM131,DH131,DT131,DF131
2082
2083  002620  045406  047613  051010          ;ITEM 132
2084  002626  050401                  .WORD   EM132,DH132,DT132,DF132
2085
2086  002630  045545  047650  051020          ;ITEM 133
2087  002636  050405                  .WORD   EM133,DH133,DT133,DF133
2088
2089  002640  045717  050122  051102          ;ITEM 134
2090  002646  050432                  .WORD   EM134,DH134,DT134,DF134
2091
2092  002650  046065  047327  051122          ;ITEM 135
2093  002656  050441                  .WORD   EM135,DH135,DT135,DF135
2094
2095  002660  000000  000000  000000          ;ITEM 0
2096  002666  000000                  .WORD   0,0,0,0
2097
2098  002670  000000  000000  000000          ;ITEM 0
2099  002676  000000                  .WORD   0,0,0,0
2100
2101  002700  043520  045324  045374          ;ITEM 140
2102  002706  045367                  .WORD   EM140,DH140,DT140,DF140
2103
2104  002710  044061  045324  045374          ;ITEM 141
2105  002716  045367                  .WORD   EM141,DH141,DT141,DF141
2106
2107  002720  044421  045324  045374          ;ITEM 142
2108  002726  045367                  .WORD   EM142,DH142,DT142,DF142
2109
2110  002730  044763  045324  045374          ;ITEM 143
2111  002736  045367                  .WORD   EM143,DH143,DT143,DF143
2112
2113  002740  000000  000000  000000          ;ITEM 0
2114  002746  000000                  .WORD   0,0,0,0
2115
2116  002750  000000  000000  000000          ;ITEM 0
2117  002756  000000                  .WORD   0,0,0,0
2118
2119  002760  000000  000000  000000          ;ITEM 0
2120  002766  000000                  .WORD   0,0,0,0
2121
2122  002770  000000  000000  000000          ;ITEM 0
2123  002776  000000                  .WORD   0,0,0,0
2124
                                        ;ITEM 150
```

```
                003000  046250  050177  051150          .WORD   EM150,DH150,DT150,DF150
                003006  050453
                
                
                
                
                
                003010  005037  001102          START:  CLR     $TSTNM
                003014  012737  000340  177776          MOV     #340,@#PS       ;;LOCK OUT ALL INTERRUPTS
                003022  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
                003026  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
                003030  022706  001136                  CMP     #$TKS,R6        ;;DONE?
                003034  001374                          BNE     .-6             ;;LOOP BACK IF NO
                003036  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                003042  012737  026370  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
                003050  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
                003056  012737  026644  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
                003064  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
                003072  012737  030016  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
                003100  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
                003106  012737  030076  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
                003114  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
                003122  013737  026264  026256          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
                003130  005037  001274                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
                003134  005037  001276                  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
                003162  005227  177777                  INC     #-1             ;;FIRST TIME?
                003166  001043                          BNE     64$             ;;BRANCH IF NO
                003170  022737  026334  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
                003176  001437                          BEQ     64$             ;;BRANCH IF YES
                003200  104400  003206                  TYPE    ,65$            ;;TYPE ASCIZ STRING
                003204  000434                          BR      64$             ;;GET OVER THE ASCIZ
                                                ;;65$:  .ASCIZ  <CRLF>'MAINDEC-11-DEKBC-B  PDP 11/70 CACHE DIAGNOSTIC PART 1'<CRLF>
                003276                          64$:
                                                ;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
                                                ;MUST DO IS TYPE ↑C (CONTROL-C), WHILE THIS PROGRAM IS RUNNING.
                                                ;THIS WILL AUTOMATICALLY RESTORE THE TOP PART OF MEMORY TO IT'S STATE
                                                ;BEFORE THIS PROGRAM WAS STARTED! AFTER THE MONITOR (OR LOADER) HAS BEEN
                                                ;RESTORED THIS PROGRAM WILL HALT.
                003276  005237  031130          LOOP:   INC     MONF            ;INCREMENT THE FLAG WHICH INDICATES
                003302  001013                          BNE     TOP             ;WHETHER OR NOT THE TOP OF MEMORY
                                                                                ;IN THE FIRST 28K HAS BEEN SAVED.
                003304  013737  000060  031126          MOV     @#TKVEC,MONTTY  ;SAVE THE INITIAL CONTENTS OF THE TTY KEYBOARD
                                                                                ;VECTOR.
                003312  012700  002734                  MOV     #!D1500,R0      ;IF NOT THEN SAVE IT.
                003316  012701  051166                  MOV     #BOTTOM+4,R1    ;SAVE IT AT THE BOTTOM OF THIS PROGRAM.
                003322  012702  160000                  MOV     #160000,R2      ;GET THE ADDRESS OF THE END OF THE MONITOR.
                003326  014221                  1$:     MOV     -(R2),(R1)+     ;SAVE 1500 (DEC) LOCATIONS (WORDS)
                003330  077002                          SOB     R0,1$
                003332  012737  000044  177770  TOP:    MOV     #44,@#177770    ;SET TO SYNC SCOPE (OSCILLOSCOPE)
                                                                                ;ON A NOP INSTRUCTION.
                
                003340  012737  031006  000060          MOV     #RESMON,@#TKVEC ;SET UP THE KEYBORD INTERRUPT VECTOR.
```

```
2181  003346  012737  000340  000062          MOV     #340,@#TKVEC+2
2182  003354  005077  175560                  CLR     @$TKB           ;MAKE SURE THE BUFFER IS CLEAR
2183  003360  152777  000100  175550          BISB    #BIT6,@$TKS     ;TURN ON INTERRUPT ENABLE FOR THE KEYBOARD.
2184
2185  003366  012737  000352  000004          MOV     #CPSPUR,@#ERRVEC        ;SET UP FOR UNEXPECTED ERRORS.
2186  003374  012737  030400  000114          MOV     #SPUR,@#CACHVEC
2187
2188
2189
2190
2191
2192
2193
2194
2195                                  ;;**********************************************************************
2196                                  ;*TEST 1         CACHE REGISTERS RESPONSE TEST
2197                                  ;*
2198                                  ;*REFERENCE EACH CACHE REGISTER MAKING SURE SUCH
2199                                  ;*REFERENCES DO NOT TIME OUT.
2200                                  ;*
2201                                  ;;**********************************************************************
2202  003402  000004                  $TST1:  SCOPE
2203  003404  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2204          000001                  JA=$TN-1
2205                                                                  ;SET THE SKAD REGISTER
2206  003412  012737  003756  030524          MOV     #TST2,SKAD      ;IN CASE THE TEST ABORTS.
2207
2208  003420  113737  001102  001224          MOVB    $TSTNM,$TMPC
2209  003426  012737  030400  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO PARITY ERRORS.
2210  003434  012701  030734                  MOV     #LOAFLG,R1      ;CLEAR THE REGISTER FLAGS
2211  003440  012700  000014                  MOV     #14,R0
2212  003444  005021                  64$:    CLR     (R1)+
2213  003446  077002                          SOB     R0,64$
2214  003450  013737  000004  003526          MOV     @#ERRVEC,JATMP  ;SAVE THE OLD CONTENTS OF VECTOR ERRVEC.
2215  003456  012737  003530  000004          MOV     #JAERR,@#ERRVEC ;SET UP THE TIME OUT
2216                                                                  ;VECTOR
2217  003464  012700  177740                  MOV     #LOADRS,R0
2218  003470  012737  003476  001110          MOV     #JA1,$LPERR
2219
2220  003476  000240                  JA1:    NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
2221  003500  005710                          TST     (R0)            ;REFERENCE EACH CACHE REGISTER
2222                                                                  ;MAKING SURE EACH DOESN'T TIME OUT.
2223
2224  003502  062700  000002          JA2:    ADD     #2,R0
2225  003506  020027  177752                  CMP     R0,#HITMIS
2226  003512  101771                          BLOS    JA1
2227
2228  003514  013737  003526  000004  JA3:    MOV     JATMP,@#ERRVEC  ;RESET THE CPU TRAP VECTOR.
2229  003522  000137  003752                  JMP     JADONE
2230
2231  003526  000000                  JATMP:  .WORD   0               ;SAVE THE OLD CONTENTS OF
2232                                                                  ;VECTOR ERRVEC HERE.
2233
2234  003530  032737  000020  177766  JAERR:  BIT     #20,@#CPUERR
2235  003536  001005                          BNE     JAERR1          ;MAKE SURE THE ERROR
2236  003540  013737  003526  000004  JAERR0: MOV     JATMP,@#ERRVEC  ;IF NOT RESET VECTOR ERRVEC AND GO TO
2237  003546  000177  174232                  JMP     @ERRVEC         ;THE ROUTINE WHICH HANDLES CPU ERRORS.
2238  003552  021627  003502          JAERR1: CMP     (SP),#JA2       ;OTHERWISE REPORT THE FACT THAT A CACHE
2239  003556  001370                          BNE     JAERR0          ;REGISTER REFERENCE TIMED OUT!
2240  003560  012637  001226                  MOV     (SP)+,$TMP1
2241  003564  005726                          TST     (SP)+
2242  003566  010037  001232                  MOV     R0,$TMP3
```

```
2237  003572  012737  000077  001234          MOV     #77,$TMP4
2238  003600  020027  177740                  CMP     R0,#LOADRS
2239  003604  001005                          BNE     JAERR2
2240  003606  012737  177777  030734          MOV     #-1,LOAFLG
2241  003614  104055                  1$:     ERROR   55
2242  003616  000451                          BR      JAERR9
2243
2244  003620  020027  177742          JAERR2: CMP     R0,#HIADRS
2245  003624  001005                          BNE     JAERR3
2246  003626  012737  177777  030736          MOV     #-1,HIAFLG
2247  003634  104056                  1$:     ERROR   56
2248  003636  000441                          BR      JAERR9
2249
2250  003640  020027  177744          JAERR3: CMP     R0,#MEMERR
2251  003644  001005                          BNE     JAERR4
2252  003646  012737  177777  030740          MOV     #-1,MMRFLG
2253  003654  104057                  1$:     ERROR   57
2254  003656  000431                          BR      JAERR9
2255
2256  003660  020027  177746          JAERR4: CMP     R0,#CONTRL
2257  003664  001005                          BNE     JAERR5
2258  003666  012737  177777  030742          MOV     #-1,CONFLG
2259  003674  104060                  1$:     ERROR   60
2260  003676  000421                          BR      JAERR9
2261
2262  003700  020027  177750          JAERR5: CMP     R0,#MAINT
2263  003704  001005                          BNE     JAERR6
2264  003706  012737  177777  030744          MOV     #-1,MANFLG
2265  003714  104061                  1$:     ERROR   61
2266  003716  000411                          BR      JAERR9
2267
2268  003720  020027  177752          JAERR6: CMP     R0,#HITMIS
2269  003724  001005                          BNE     JAERR7
2270  003726  012737  177777  030746          MOV     #-1,HIMFLG
2271  003734  104062                  1$:     ERROR   62
2272  003736  000401                          BR      JAERR9
2273
2274  003740  000000                  JAERR7: HALT                    ;???
2275
2276  003742  005037  177766          JAERR9: CLR     @#CPUERR
2277  003746  000137  003502                  JMP     JA2
2278
2279  003752  005037  177766          JADONE: CLR     @#CPUERR        ;DONE!
2280
2281                                  ;;*****************************************************************
2282                                  ;*TEST 2        CACHE REGISTERS DATA PATH, READ ZEROES TEST
2283                                  ;*
2284                                  ;*THIS TEST CHECKS THE ABILITY OF THE CACHE REGISTER
2285                                  ;*DATA PATHS TO PASS 0'S BY FIRST WRITING THEN READING
2286                                  ;*0'S AT THE CONTROL AND MAINTENANCE REGISTERS.
2287                                  ;*
2288                                  ;;*****************************************************************
2289  003756  000004                  TST2:   SCOPE
2290          000002                  JB=$TN-1
2291                                                          ;SET THE SKAD REGISTER
2292  003760  012737  004112  030524          MOV     #TST3,SKAD      ;IN CASE THE TEST ABORTS.
```

```
2293
2294  003766  113737  001102  001224          MOVB    $TSTNM,$TMPO
2295  003774  012737  030400  000114          MOV     #SPUR,@#CACHVEC
2296
2297  004002  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2298  004004  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
2299  004006  012737  004014  001110          MOV     #JB1,$LPERR
2300  004014  005037  177746          JB1:    CLR     @#CONTRL        ;WRITE ZEROES
2301  004020  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
2302  004022  013700  177746                  MOV     @#CONTRL,R0     ;READ.ZEROES
2303  004026  005700                          TST     R0
2304  004030  001430                          BEQ     JBDONE
2305  004032  005037  177750          JB2:    CLR     @#MAINT
2306  004036  013701  177750                  MOV     @#MAINT,R1
2307  004042  005701                          TST     R1
2308  004044  001414                          BEQ     JBERR2
2309
2310  004046                          JBERR1:                         ;BOTH READ ZEROES FAILED.
2311  004046  010037  001230                  MOV     R0,$TMP2
2312  004052  010137  001232                  MOV     R1,$TMP3
2313  004056  104063                  1$:     ERROR   63
2314  004060  012737  177777  030742          MOV     #-1,CONFLG      ;SIGNAL BAD REGISTERS
2315  004066  012737  177777  030744          MOV     #-1,MANFLG
2316  004074  000406                          BR      JBDONE
2317
2318  004076                          JBERR2:                         ;ONLY THE READ OF THE
2319  004076  010037  001230                  MOV     R0,$TMP2        ;CONTROL REGISTER FAILED.
2320  004102  104064                  1$:     ERROR   64
2321  004104  012737  177777  030742          MOV     #-1,CONFLG
2322
2323  004112                          JBDONE:                         ;DONE!!!
2324
2325                                          ;;**************************************************************
2326                                          ;*TEST 3        CACHE REGISTERS DATA PATH, READ ONES TEST
2327                                          ;*
2328                                          ;*THIS TEST PERFORMS A READ OF BOTH THE HIGH ORDER AND
2329                                          ;*LOW ORDER ERROR ADDRESS REGISTER. THIS IS DONE TO MAKE
2330                                          ;*SURE THAT THE REGISTERS' DATA PATHS CAN PASS ONES. NOTE THAT
2331                                          ;*THE LOW ORDER ADDRESS REGISTER SHOULD CONTAIN A
2332                                          ;*177740 AND THE HIGH ORDER REGISTER SHOULD CONTAIN
2333                                          ;*000003; THIS LEAVES THE DATA PATH LINE'S BITS 2,3 AND 4
2334                                          ;*UNTESTED FOR THEIR AVAILITY TO PASS ONES. THIS WILL
2335                                          ;*BE CHECKED IN THE COUNT PATTERN TST4.
2336                                          ;*
2337                                          ;;**************************************************************
2338  004112  000004                  TST3:   SCOPE
2339  004114  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2340          000003                  JC=$TN-1
2341                                                                  ;SET THE SKAD REGISTER
2342  004122  012737  004254  030524          MOV     #TST4,SKAD      ;IN CASE THE TEST ABORTS.
2343
2344  004130  113737  001102  001224          MOVB    $TSTNM,$TMPO
2345
2346
2347  004136  104426                          SKPBAD          ;IF THE ERROR ADDRESS REG IS BAD SKIP THIS TEST.
2348  004140  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
```

```
2349  004142  012737  177777  177744          MOV     #-1,@#MEMERR    ;MAKE SURE THE ERROR REGISTERS ARE UNLOCKED
2350  004150  012737  004156  001110          MOV     #JC1,$LPERR
2351
2352  004156  000240                  JC1:    NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
2353  004160  013700  177740                  MOV     @#LOADRS,R0
2354  004164  013701  177742                  MOV     @#HIADRS,R1     ;READ THE REGISTERS.
2355  004170  022700  177740                  CMP     #177740,R0
2356  004174  001003                          BNE     JCERR1
2357  004176  022701  000003          JC2:    CMP     #3,R1
2358  004202  001424                          BEQ     JCDONE
2359
2360  004204  012737  004222  001226  JCERR1: MOV     #1$,$TMP1       ;BAD DATA WAS READ FROM THEM!!
2361  004212  010037  001230                  MOV     R0,$TMP2
2362  004216  010137  001232                  MOV     R1,$TMP3
2363  004222  104065                  1$:     ERROR   65
2364  004224  022700  000003                  CMP     #3,R0
2365  004230  001403                          BEQ     2$
2366  004232  012737  177777  030734          MOV     #-1,LOAFLG
2367  004240  022700  177740          2$:     CMP     #177740,R0
2368  004244  001403                          BEQ     JCDONE
2369  004246  012737  177777  030736          MOV     #-1,HIAFLG
2370
2371  004254                          JCDONE:                         ;DONE!
2372
2373
2374                                  ;;**********************************************************************
2375                                  ;*TEST 4        CACHE CONTROL REGISTER COUNT PATTERN TEST
2376                                  ;*
2377                                  ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE CACHE CONTROL
2378                                  ;*REGISTER FOR THE PURPOSE OF CHECKING OUT THE
2379                                  ;*DATA RELIABILITY OF BOTH THE REGISTER BITS AND THE
2380                                  ;*DATA PATHS LINES.
2381                                  ;*
2382                                  ;;**********************************************************************
2383  004254  000004                  TST4:   SCOPE
2384  004256  012737  000004  001274          MOV     #4,$TIMES       ;;DO 4 ITERATIONS
2385
2386          000004                  JD=$TN-1
2387                                                                  ;SET THE SKAD REGISTER
2388  004264  012737  004372  030524          MOV     #TST5,SKAD      ;IN CASE THE TEST ABORTS.
2389
2390  004272  113737  001102  001224          MOVB    $TSTNM,$TMP0
2391
2392
2393  004300  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2394
2395  004302  012700  177746                  MOV     #CONTRL,R0
2396  004306  005002                          CLR     R2
2397  004310  012737  004316  001110          MOV     #JD1,$LPERR
2398  004316  000240                  JD1:    NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
2399  004320  010210                          MOV     R2,(R0)         ;WRITE THE REGISTER.
2400  004322  011001                          MOV     (R0),R1         ;READ BACK THE REGISTER AND MAKE SURE
2401  004324  010203                          MOV     R2,R3           ;THE DATA IS CORRECT.
2402  004326  042703  177700                  BIC     #177700,R3
2403  004332  020301                          CMP     R3,R1
2404  004334  001003                          BNE     JDERR1
```

```
2405  004336  077211                    JD2:    SOB     R2,JD1
2406  004340  005010                            CLR     (R0)
2407  004342  000413                            BR      JDDONE
2408  004344                            JDERR1:                         ;REPORT THE ERROR!
2409  004344  010237  001230                    MOV     R2,$TMP2
2410  004350  010137  001232                    MOV     R1,$TMP3
2411  004354  010337  001234                    MOV     R3,$TMP4
2412  004360  104066                    1$:     ERROR   66
2413  004362  012737  177777  030742            MOV     #-1,CONFLG
2414  004370  000762                            BR      JD2
2415  004372                            JDDONE:
2416
2417
2418                                    ;;*****************************************************************
2419                                    ;*TEST 5        CACHE HIT/MISS AND CONTROL REGISTER SIMPLE MISSES TEST
2420                                    ;*
2421                                    ;*THIS IS A TEST OF THE HIT/MISS REGISTER AND THE
2422                                    ;*CONTRL REGISTER'S ABILITY TO FORCE MISSES. ZEROES ARE
2423                                    ;*FLOATED THROUGH THE HIT/MISS REGISTER.
2424                                    ;*
2425                                    ;;*****************************************************************
2426  004372  000004                    TST5:   SCOPE
2427  004374  012737  000040  001274            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2428           000005                    KB=$TN-1
2429                                                                    ;SET THE SKAD REGISTER
2430  004402  012737  004724  030524            MOV     #TST6,SKAD      ;IN CASE THE TEST ABORTS.
2431
2432  004410  113737  001102  001224            MOVB    $TSTNM,$TMP0
2433
2434
2435  004416  104432                            SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
2436  004420  104436                            SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
2437  004422  005037  004614                    CLR     KBFLG
2438  004426  012737  000014  177746    KB1:    MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
2439  004434  012737  004426  001110            MOV     #KB1,$LPERR
2440
2441  004442  012700  004452                    MOV     #KB2,R0
2442  004446  012701  000020                    MOV     #20,R1
2443  004452  005720                    KB2:    TST     (R0)+
2444  004454  077102                            SOB     R1,KB2
2445  004456  000240                            NOP                     ;GET SIX FORCED MISSES.
2446  004460  000240                            NOP
2447  004462  000240                            NOP
2448  004464  000240                            NOP
2449  004466  013702  177752                    MOV     @#HITMIS,R2     ;SHOULD HAVE REGISTERED
2450  004472  001051                            BNE     KBERR1          ;SIX MISSES.
2451
2452  004474  012737  004474  001110    KB3:    MOV     #KB3,$LPERR
2453  004502  012737  000054  177746            MOV     #S1MOM1,@#CONTRL        ;SELECT GROUP ONE, MISS GROUP
2454  004510  012700  004520                    MOV     #KB4,R0         ;ZERO AND GROUP ONE.
2455  004514  012701  000020                    MOV     #20,R1
2456  004520  005720                    KB4:    TST     (R0)+
2457  004522  077102                            SOB     R1,KB4
2458  004524  000240                            NOP
2459  004526  000240                            NOP
2460  004530  000240                            NOP
```

```
2461  004532  000240                        NOP
2462  004534  013702  177752                MOV     @#HITMIS,R2     ;SHOULD HAVE SIX MISSES.
2463  004540  001035                        BNE     KBERR2
2464
2465  004542  012737  004542  001110  KB5:  MOV     #KB5,$LPERR
2466  004550  012737  000034  177746        MOV     #SOMOM1,@#CONTRL        ;SELECT GROUP 0, MISS GROUP 0
2467  004556  012700  004566                MOV     #KB6,R0         ;AND GROUP 1.
2468  004562  012701  000020                MOV     #20,R1
2469  004566  005720              KB6:      TST     (R0)+
2470  004570  077102                        SOB     R1,KB6
2471  004572  000240                        NOP
2472  004574  000240                        NOP
2473  004576  000240                        NOP
2474  004600  000240                        NOP
2475  004602  013702  177752                MOV     @#HITMIS,R2     ;SHOULD HAVE SIX MISSES.
2476  004606  001021                        BNE     KBERR3
2477  004610  000137  004666                JMP     KBDONE
2478
2479
2480  004614  000000              KBFLG:    .WORD   0               ;ERROR FLAG.
2481
2482  004616                      KBERR1:                           ;GOT HITS WHILE FORCING
2483  004616  010237  001230                MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS.
2484  004622  104072              1$:       ERROR   72
2485  004624  052737  000001  004614        BIS     #BIT0,KBFLG
2486  004632  000720                        BR      KB3
2487  004634                      KBERR2:                           ;GO HITS WHILE FORCING
2488  004634  010237  001230                MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS
2489  004640  104073              1$:       ERROR   73              ;AND SELECTING GROUP 1
2490  004642  052737  000002  004614        BIS     #BIT1,KBFLG
2491  004650  000734                        BR      KB5
2492  004652                      KBERR3:                           ;GO HITS WHILE FORCING
2493  004652  010237  001230                MOV     R2,$TMP2        ;MISSES TO BOTH GROUPS
2494  004656  104074              1$:       ERROR   74              ;AND SELECTING GROUP 0.
2495  004660  052737  000004  004614        BIS     #BIT2,KBFLG
2496
2497  004666  005037  177746  KBDONE:  CLR      @#CONTRL
2498  004672  022737  000007  004614        CMP     #7,KBFLG        ;IF THE TEST DETECTED
2499  004700  001003                        BNE     KBD2            ;HITS FOR ALL OF THE
2500  004702  012737  177777  030762        MOV     #-1,HIMFL2      ;THREE CONDITION USED IN
2501                                                                ;THE CONTROL REGISTER
2502                                                                ;SIGNAL A BAD HIT/MISS
2503                                                                ;REGISTER.
2504  004710  005737  004614        KBD2:   TST     KBFLG           ;IF LESS THEN THREE (BUT
2505  004714  001403                        BEQ     KBD3            ;MORE THAN ZERO) CONTRL
2506  004716  012737  177777  030756        MOV     #-1,CONFL2      ;PATTERNS FAILED SIGNAL
2507                                                                ;A BAD CONTROL REGISTER.
2508  004724                      KBD3:                             ;DONE!
2509
2510                              ;;*****************************************************************
2511                              ;*TEST 6        CACHE HIT/MISS AND CONTROL REGISTER SIMPLE HIT TEST
2512                              ;*
2513                              ;*THIS IS A TEST OF THE HIT/MISS REGISTER AND THE
2514                              ;*THE FORCE MISS BITS OF THE CONTROL REGISTER.
2515                              ;*WHAT IS DONE IS TO SEE IF ANY HITS AT ALL ARE
2516                              ;*POSSIBLE WITH THE CONTROL REGISTER CLEARED.  THEN THE
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```
                                        ;*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.
                                        ;*
                                        ;**************************************************************
004724  000004                    TST6:   SCOPE
004726  012737  000040  001274            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000006                  KA=$TN-1
                                                                    ;SET THE SKAD REGISTER
004734  012737  005274  030524            MOV     #TST7,SKAD      ;IN CASE THE TEST ABORTS.

004742  113737  001102  001224            MOVB    $TSTNM,$TMP0

004750  104432                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
004752  104436                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
004754  005037  005160                    CLR     KAFLG
004760  005037  177746            KA1:    CLR     @#CONTRL        ;BOTH GROUPS ENABLED.
004764  012737  004760  001110            MOV     #KA1,$LPERR
004772  012700  005002                    MOV     #KA2,R0
004776  012701  000020                    MOV     #20,R1

005002  005720                    KA2:    TST     (R0)+           ;SET UP HITS IN BOTH
005004  077102                            SOB     R1,KA2          ;GROUPS
005006  000240                            NOP
005010  000240                            NOP
005012  000240                            NOP
005014  000240                            NOP
005016  013702  177752                    MOV     @#HITMIS,R2     ;SHOULD HAVE ALL HITS.
005022  022702  000077                    CMP     #77,R2
005026  001055                            BNE     KAERR1

005030  012737  005030  001110    KA3:    MOV     #KA3,$LPERR
005036  012737  000044  177746            MOV     #S1M0,@#CONTRL  ;DISABLE GROUP ZERO.
005044  012700  005054                    MOV     #KA4,R0
005050  012701  000020                    MOV     #20,R1
005054  005720                    KA4:    TST     (R0)+           ;SET UP HITS IN GROUP 1
005056  077102                            SOB     R1,KA4
005060  000240                            NOP
005062  000240                            NOP
005064  000240                            NOP
005066  000240                            NOP
005070  013702  177752                    MOV     @#HITMIS,R2     ;SHOULD HAVE ALL HITS.
005074  022702  000077                    CMP     #77,R2
005100  001037                            BNE     KAERR2
005102  012737  005102  001110    KA5:    MOV     #KA5,$LPERR
005110  012737  000030  177746            MOV     #S0M1,@#CONTRL  ;DISABLE GROUP ONE.
005116  012700  005126                    MOV     #KA6,R0
005122  012701  000020                    MOV     #20,R1
005126  005720                    KA6:    TST     (R0)+           ;SET UP HITS IN GROUP ZERO.
005130  077102                            SOB     R1,KA6
005132  000240                            NOP
005134  000240                            NOP
005136  000240                            NOP
005140  000240                            NOP
```

```
2573  005142  013702  177752          MOV     @#HITMIS,R2     ;SHOULD HAVE SIX HITS.
2574  005146  022702  000077          CMP     #77,R2
2575  005152  001021                  BNE     KAERR3
2576  005154  000137  005232          JMP     KADONE
2577
2578  005160  000000          KAFLG:  .WORD   0               ;ERROR FLAG.
2579
2580  005162                  KAERR1:                         ;FAILED TO GET HITS
2581  005162  01C237  001230          MOV     R2,$TMP2        ;WITH THE CONTROL
2582  005166  104067          1$:     ERROR   67              ;REGISTER CLEAR!
2583  005170  052737  000001  005160  BIS     #BIT0,KAFLG
2584  005176  000714                  BR      KA3
2585  005200                  KAERR2:                         ;FAILED TO GET HITS
2586  005200  010237  001230          MOV     R2,$TMP2        ;WITH THE CONTROL REGISTER
2587  005204  104070          1$:     ERROR   70              ;SET TO FORCE SELECT GROUP
2588  005206  052737  000002  005160  BIS     #BIT1,KAFLG     ;ONE FORCE MISS GROUP ZERO.
2589  005214  000732                  BR      KA5
2590  005216                  KAERR3:                         ;FAILED TO GET HITS
2591  005216  010237  001230          MOV     R2,$TMP2        ;WITH THE CONTROL REGISER
2592  005222  104071          1$:     ERROR   71              ;SET TO FORCE SELECT GROUP
2593  005224  052737  000004  005160  BIS     #BIT2,KAFLG     ;ZERO AND FORCE MISS GROUP ONE.
2594  005232  005037  177746  KADONE: CLR     @#CONTRL
2595  005236  022737  000007  005160  CMP     #7,KAFLG        ;IF THE TEST FAILED FOR ALL
2596  005244  001004                  BNE     KAD2            ;THREE CONDITIONS OF THE
2597  005246  012737  177777  030746  MOV     #-1,HIMFLG      ;CONTROL REGISTER SIGNAL
2598  005254  000407                  BR      KAD3            ;A BAD HIT/MISS REGISTER.
2599
2600  005256  032737  000006  005160  KAD2:   BIT     #6,KAFLG        ;IF THE TEST FAILED ONLY WHEN
2601  005264  001403                  BEQ     KAD3            ;THE CONTROL REGISTER WAS SET
2602  005266  012737  177777  030756  MOV     #-1,CONFL2      ;SIGNAL A BAD CONTROL REGISTER.
2603  005274                  KAD3:                           ;DONE!!
2604
2605
2606                                  ;;*****************************************************************
2607                                  ;*TEST 7        CACHE CONTROL REGISTER, FORCE SELECT-FORCE MISS, GROUP 0 TEST
2608                                  ;*
2609                                  ;*THIS IS A TEST OF THE CONTROL REGISTER FUNCTIONS
2610                                  ;*OF FORCE MISS AND FORCE SELECTION. AN ADDRESS IS
2611                                  ;*MADE A HIT IN GROUP ONE; THEN ANOTHER ADDRESS, WHOSE
2612                                  ;*HIT WOULD BE MUTUALLY EXCLUSIVE WITH THE FIRST ADDRESS
2613                                  ;*IN ONLY ONE GROUP, IS MADE A HIT WHILE FORCING
2614                                  ;*SELECTION OF GROUP ZERO; THEN SEE IF THE FIRST ADDRESS
2615                                  ;*IS STILL A HIT IN GROUP ONE; FINALLY TURN ON THE FORCE
2616                                  ;*MISS GROUP ZERO BIT AND SEE IF THE SECOND ADDRESS'
2617                                  ;*HIT IN GROUP ZERO CAN BE FORCED TO A MISS.
2618                                  ;*
2619                                  ;;*****************************************************************
2620  005274  000004          TST7:   SCOPE
2621  005276  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
2622           000007          KD=$TN-1
2623                                          ;SET THE SKAD REGISTER
2624  005304  012737  005624  030524          MOV     #TST10,SKAD     ;IN CASE THE TEST ABORTS.
2625
2626  005312  113737  001102  001224          MOVB    $TSTNM,$TMP0
2627  005320  012737  030400  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO ERRORS.
2628
```

```
 2629  005326  104433                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 2630  005330  104436                          SKPBHM          ;IF THE HIT-MISS REGISTER IS BAD SKIP THIS TEST.
 2631
 2632  005332  012700  005622          K1D:    MOV     #KTMP2D,R0      ;DETERMINE THE TEST LOCATIONS.
 2633  005336  042700  176003                  BIC     #176003,R0
 2634  005342  010001                          MOV     R0,R1
 2635  005344  062701  140000                  ADD     #TESTR1,R1
 2636  005350  010137  001244                  MOV     R1,$TMP10
 2637  005354  005037  001246                  CLR     $TMP11
 2638  005360  010002                          MOV     R0,R2
 2639  005362  062702  142000                  ADD     #TESTR2,R2
 2640  005366  010237  001250                  MOV     R2,$TMP12
 2641  005372  005037  001252                  CLR     $TMP13
 2642
 2643  005376  012737  000044  177746  K2D:    MOV     #SIM0,@#CONTRL  ;MAKE (R1) A HIT IN
 2644  005404  005711                          TST     (R1)            ;GROUP 0RM.
 2645  005406  005711                          TST     (R1)
 2646  005410  032737  000010  177752          BIT     #10,@#HITMIS
 2647  005416  001007                          BNE     K3D
 2648
 2649                                                                  ;REPORT ERROR, UNABLE
 2650  005420  012737  000001  001230          MOV     #1,$TMP2        ;GET A HIT IN GROUP 0RM.
 2651  005426  012737  000044  001232          MOV     #SIM0,$TMP3
 2652  005434  104075                  1$:     ERROR   75
 2653
 2654  005436  012703  000030          K3D:    MOV     #SOM1,R3
 2655  005442  042703  000017                  BIC     #17,R3
 2656  005446  010337  177746                  MOV     R3,@#CONTRL     ;FORCE SELECT GROUP 0RS.
 2657  005452  005712                          TST     (R2)            ;MAKE (R2) A HIT IN GROUP
 2658  005454  005712                          TST     (R2)            ;0RS.
 2659  005456  032737  000010  177752          BIT     #10,@#HITMIS
 2660  005464  001006                          BNE     K4D
 2661                                                                  ;IF NOT, ERROR UNABLE TO
 2662                                                                  ;GET A HIT IN GROUP 0
 2663  005466  010337  001232                  MOV     R3,$TMP3
 2664  005472  104076                  1$:     ERROR   76
 2665  005474  012737  177777  030756          MOV     #-1,CONFL2
 2666
 2667  005502  005037  177746          K4D:    CLR     @#CONTRL        ;NOW MAKE SURE (R1) IS
 2668  005506  000240                          NOP                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
 2669  005510  005711                          TST     (R1)            ;STILL A HIT IN GROUP
 2670  005512  032737  000010  177752          BIT     #10,@#HITMIS    ;1, THAT IS MAKE SURE
 2671  005520  001010                          BNE     K5D             ;GROUP 1 WASN'T WRITTEN
 2672                                                                  ;WHILE FORCE SELECTING
 2673                                                                  ;GROUP 0RS.
 2674  005522  012737  000001  001230          MOV     #1,$TMP2
 2675  005530  012737  000000  001232          MOV     #0,$TMP3
 2676  005536  104077                  1$:     ERROR   77
 2677  005540  000424                          BR      K6D
 2678  005542  012703  000044          K5D:    MOV     #SIM0,R3        ;NOW SEE IF YOU CAN
 2679  005546  042703  000063                  BIC     #63,R3          ;GET A MISS AT (R2)
 2680  005552  010337  177746                  MOV     R3,@#CONTRL     ;BY FORCING MISSES
 2681  005556  005712                          TST     (R2)            ;TO 0RS.
 2682  005560  032737  000010  177752          BIT     #10,@#HITMIS
 2683  005566  001411                          BEQ     K6D             ;SHOULD BE A MISS.
 2684                                                                  ;OTHERWISE ERROR!
```

```
 2685  005570  012737  000000  001230          MOV     #0,$TMP2
 2686  005576  010337  001232                  MOV     R3,$TMP3
 2687  005602  104411                  1$:     ERROR   11
 2688  005604  012737  177777  030756          MOV     #-1,CONFL2
 2689
 2690
 2691  005612  005037  177746          K6D:    CLR     @#CONTRL
 2692  005616  000402                          BR      K7D
 2693
 2694  005620  000000                  KTMP1D:.WORD    0
 2695  005622  000000                  KTMP2D:.WORD    0
 2696
 2697  005624                          K7D:                            ;DONE!


                                        ;;**********************************************************************
                                        ;*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.
                                        ;*
                                        ;;**********************************************************************
 2724  005624  000004                  TST10:  SCOPE
 2725  005626  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 2726          000010                  KE=$TN-1
 2727                                                                  ;SET THE SKAD REGISTER
 2728  005634  012737  006154  030524          MOV     #TST11,SKAD     ;IN CASE THE TEST ABORTS.
 2729
 2730  005642  113737  001102  001224          MOVB    $TSTNM,$TMP0
 2731  005650  012737  030400  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO ERRORS.
 2732
 2733  005656  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 2734  005660  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 2735
 2736  005662  012700  006152          K1E:    MOV     #KTMP2E,R0      ;DETERMINE THE TEST LOCATIONS.
 2737  005666  042700  176003                  BIC     #176003,R0
 2738  005672  010001                          MOV     R0,R1
 2739  005674  062701  140000                  ADD     #TESTR1,R1
 2740  005700  010137  001244                  MOV     R1,$TMP10
 2741  005704  005037  001246                  CLR     $TMP11
 2742  005710  010002                          MOV     R0,R2
 2743  005712  062702  142000                  ADD     #TESTR2,R2
 2744  005716  010237  001250                  MOV     R2,$TMP12
 2745  005722  005037  001252                  CLR     $TMP13
 2746
 2747  005726  012737  000030  177746  K2E:    MOV     #SOM1,@#CONTRL  ;MAKE (R1) A HIT IN
 2748  005734  005711                          TST     (R1)            ;GROUP SRM.
 2749  005736  005711                          TST     (R1)
 2750  005740  032737  000010  177752          BIT     #10,@#HITMIS
 2751  005746  001007                          BNE     K3E
```

```
                                                                        ;REPORT ERROR, UNABLE
005750  012737  000000  001230          MOV     #0,$TMP2              ;GET A HIT IN GROUP GPM.
005756  012737  000030  001232          MOV     #SOM1,$TMP3
005764  104075                  1$:     ERROR   75

005766  012703  000044          K3E:    MOV     #S1M0,R3
005772  042703  000017          K3E:    BIC     #17,R3
005776  010337  177746                  MOV     R3,@#CONTRL             ;FORCE SELECT GROUP GRS.
006002  005712                          TST     (R2)                    ;MAKE (R2) A HIT IN GROUP
006004  005712                          TST     (R2)                    ;GRS.
006006  032737  000010  177752          BIT     #10,@#HITMIS
006014  001006                          BNE     K4E
                                                                        ;IF NOT, ERROR UNABLE TO
                                                                        ;GET A HIT IN GROUP 1
006016  010337  001232                  MOV     R3,$TMP3
006022  104076                  1$:     ERROR   76
006024  012737  177777  030756          MOV     #-1,CONFL2

006032  005037  177746          K4E:    CLR     @#CONTRL                ;NOW MAKE SURE (R1) IS
006036  000240                          NOP                             ;FOR SCOPING WITH AN OSCILLOSCOPE!
006040  005711                          TST     (R1)                    ;STILL A HIT IN GROUP
006042  032737  000010  177752          BIT     #10,@#HITMIS            ;0, THAT IS MAKE SURE
006050  001010                          BNE     K5E                     ;GROUP 0 WASN'T WRITTEN
                                                                        ;WHILE FORCE SELECTING
                                                                        ;GROUP GRS.
006052  012737  000000  001230          MOV     #0,$TMP2
006060  012737  000001  001232          MOV     #1,$TMP3
006066  104077                  1$:     ERROR   77
006070  000424                          BR      K6E
006072  012703  000030          K5E:    MOV     #SOM1,R3                ;NOW SEE IF YOU CAN
006076  042703  000063          K5E:    BIC     #63,R3                  ;GET A MISS AT (R2)
006102  010337  177746                  MOV     R3,@#CONTRL             ;BY FORCING MISSES
006106  005712                          TST     (R2)                    ;TO GRS.
006110  032737  000010  177752          BIT     #10,@#HITMIS
006116  001411                          BEQ     K6E                     ;SHOULD BE A MISS.
                                                                        ;OTHERWISE ERROR!
006120  012737  000001  001230          MOV     #1,$TMP2
006126  010337  001232                  MOV     R3,$TMP3
006132  104117                  1$:     ERROR   117
006134  012737  177777  030756          MOV     #-1,CONFL2

006142  005037  177746          K6E:    CLR     @#CONTRL
006146  000402                          BR      K7E

006150  000000          KTMP1E:.WORD    0
006152  000000          KTMP2E:.WORD    0

006154                  K7E:                                            ;DONE!


;;*****************************************************************
;*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.
                                        ;*
                                        ;;*****************************************************************
006154  000004                  TST11:  SCOPE
006156  012737  000020  001274          MOV     #20.,$TIMES     ;;DO 20 ITERATIONS
        000011          KC=$TN-1
                                                                ;SET THE SKAD REGISTER
006164  012737  006764  030524          MOV     #TST12,SKAD     ;IN CASE THE TEST ABORTS.

006172  113737  001102  001224          MOVB    $TSTNM,$TMP0
006200  012737  030400  000114          MOV     #SPUR,@#CACHVEC

006206  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
006210  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
006212  005037  006646                  CLR     KCCON           ;TEST THE BOTH GROUPS
006216  012737  000002  006650          MOV     #2,KCFLG1       ;ENABLED CONDITION FIRST.
006224  012737  006240  001110  KC0:    MOV     #KC1,$LPERR
006232  012737  006654  006652          MOV     #KCTBL,KCPTR    ;KCPTR IS A POINTER TO
                                                                ;THE TABLE OF 12-BIT PATTERNS
                                                                ;WHICH WILL BE FLOATED
                                                                ;THROUGH THE REGISTER.

006240  012701  140000          KC1:    MOV     #TESTR1,R1      ;MAKE THIS CODE MISSES
006244  012702  142000                  MOV     #TESTR2,R2      ;TO BOTH GROUPS!
006250  012700  001000                  MOV     #1000,R0
006254  012737  000030  177746  1$:     MOV     #SOM1,@#CONTRL
006262  005721                          TST     (R1)+
006264  012737  000044  177746          MOV     #S1M0,@#CONTRL
006272  005722                          TST     (R2)+
006274  077011                          SOB     R0,1$

006276  017702  000350                  MOV     @KCPTR,R2       ;GET THE HIT/MISS PATTERN
006302  012700  006362                  MOV     #KC3,R0         ;AND MAKE THE INSTRUCTIONS
006306  012701  000007                  MOV     #7,R1           ;BETWEEN KC3 AND KC9
006312  013737  006646  177746          MOV     KCCON,@#CONTRL  ;HITS AND MISSES SO THAT
006320  000403                          BR      KC2.5           ;WHEN THAT CODE IS EXECUTED
006322  006302                  KC2:    ASL     R2              ;THIS PATTERN WILL BE FLOATED
006324  103001                          BCC     KC2.5           ;THROUGH THE HIT/MISS REGISTER.
006326  005710                          TST     (R0)            ;MAKE (R0) A HIT!
006330  062700  000002          KC2.5:  ADD     #2,R0
006334  006302                          ASL     R2
006336  103001                          BCC     1$
006340  005710                          TST     (R0)            ;MAKE (R0) A HIT!
006342  062700  000006          1$:     ADD     #6,R0
006346  077113                          SOB     R1,KC2

006350  012705  177752                  MOV     #HITMIS,R5      ;NOW THAT THE HITS
006354  000402                          BR      KC3             ;AND MISSES HAVE BEEN
                                                                ;APPROPRIATELY ESTABLISHED
                                                                ;EXECUTE THE CODE AND
                                                                ;CAUSE THE PATTERN TO FLOAT
                                                                ;THROUGH THE HIT MISS
```

```
                                                                  ;REGISTER.
            006356                       LOC=.                    ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
            006354                       LOC=-4&LOC
            006360                       LOC=LOC+4
            006360                       .=LOC
   006360   000000                       HALT
   006362   000240               KC3:    NOP                          ;THE HALT'S HERE ARE NOT
   006364   000402                       BR      KC4                  ;EXECUTED, THEY ARE FILLERS.
   006366   000000                       HALT                         ;THE ADDRESS OF THE HIT AND
   006370   000000                       HALT                         ;MISS REGISTER IS IN R5.
   006372   011500               KC4:    MOV     (R5),R0              ;NOTE THAT THE HIT/MISS
   006374   000402                       BR      KC5                  ;REGISTER IS READ EVERY
   006376   000000                       HALT                         ;TWO CYCLES AND SAVED IN
   006400   000000                       HALT                         ;A PROCESSOR GENERAL
   006402   011501               KC5:    MOV     (R5),R1              ;PURPOSE REGISTER.
   006404   000402                       BR      KC6
   006406   000000                       HALT
   006410   000000                       HALT
   006412   011502               KC6:    MOV     (R5),R2
   006414   000402                       BR      KC7
   006416   000000                       HALT
   006420   000000                       HALT
   006422   011503               KC7:    MOV     (R5),R3
   006424   000402                       BR      KC8
   006426   000000                       HALT
   006430   000000                       HALT
   006432   011504               KC8:    MOV     (R5),R4
   006434   000402                       BR      KC9
   006436   000000                       HALT
   006440   000000                       HALT
   006442   011505               KC9:    MOV     (R5),R5              ;CAN SAVE PATTERN IN R5
                                                                      ;SINCE THE ADDRESS IS
                                                                      ;NO LONGER NEEDED.
   006444   042700   177774      KC10:   BIC     #177774,R0           ;GET THE PATTERNS READ
   006450   010037   006700              MOV     R0,KCR0              ;FROM THE HIT/MISS REGISTER
   006454   042701   017760              BIC     #17760,R1            ;INTO LOCATIONS KCR0
   006460   010137   006702              MOV     R1,KCR1              ;THROUGH KCR5 SO THE
   006464   010237   006704              MOV     R2,KCR2              ;GENERAL PURPOSE REGISTERS
   006470   010337   006706              MOV     R3,KCR3              ;CAN BE USED FOR OTHER
   006474   010437   006710              MOV     R4,KCR4              ;THINGS
   006500   010537   006712              MOV     R5,KCR5
   006504   017701   000142      KC11:   MOV     @KCPTR,R1
   006510   005000                       CLR     R0
   006512   012702   000006              MOV     #6,R2                ;PUT THE EXPECTED VALUES
   006516   012703   006714              MOV     #KCE0,R3             ;IN KCE0 THROUGH KCE5!
   006522   073027   000002      KC12:   ASHC    #2,R0
   006526   042700   177700              BIC     #177700,R0
   006532   010023                       MOV     R0,(R3)+
   006534   077206                       SOB     R2,KC12
   006536   012700   006700              MOV     #KCR0,R0
   006542   012701   006714              MOV     #KCE0,R1             ;MAKE SURE THE PATTERNS
```

```
006546  012702  000006                    MOV     #6,R2            ;WHICH WERE READ FROM
006552  022021                    KC13:   CMP     (R0)+,(R1)+      ;THE HIT AND MISS REGISTER
006554  001402                            BEQ     KC14             ;MATCH THE EXPECTED
006556  000137  006730                    JMP     KCERR            ;PATTERNS.
006562  077205                    KC14:   SOB     R2,KC13

006564  062737  000002  006652    KC15:   ADD     #2,KCPTR                 ;MOVE POINTER TO NEXT
006572  023727  006652  006676            CMP     KCPTR,#KCTBLB    ;PATTERN AND IF ALL THE
006600  001402                            BEQ     1$               ;PATTERNS HAVEN'T BEEN
006602  000137  006240                    JMP     KC1              ;TESTED GO TO KC1 TO TEST
                                                                   ;THIS NEXT PATTERN.
006606  005337  006650            1$:     DEC     KCFLG1           ;IF ALL THE PATERNS HAVE BEEN
006612  100002                            BPL     KC16             ;TESTED WITH THAT GROUP CONFIGURATION
006614  000137  006760                    JMP     KCDONE           ;SO GO TO THE NEXT CONFIGURATION.
                                                                   ;OR DONE!!
006620  001405                    KC16:   BEQ     KC17
006622  012737  000044  006646            MOV     #SIMO,KCCON      ;BOTH GROUPS ENABLED CONFIGURATION
006630  000137  006224                    JMP     KC0              ;HAS BEEN TESTED SO NOW TEST GROUP
                                                                   ;ZERO DISABLED CONFIGURATION.
006634  012737  000030  006646    KC17:   MOV     #S0M1,KCCON      ;BOTH GROUPS ENABLED AND GROUP ZERO
                                                                   ;DISABLED CONFIGURATIONS HAVE BOTH
                                                                   ;BEEN TESTED SO FINALLY TEST THE
006642  000137  006224                    JMP     KC0              ;GROUP ONE DISABLED CONFIGURATION.


006646  000030                    KCCON:  .WORD   0                ;PATTERN BEING USED IN THE CONTROL REGISTER

006650  000000                    KCFLG1: .WORD   0                ;FLAG USED TO DETERMINE THE CONFIGURATION
                                                                   ;BEING TESTED.
006652  000000                    KCPTR:  .WORD   0                ;POINTER USED TO POINT TO THE PATTERN
                                                                   ;BEING TESTED IN KCTBL.

006654  000000                    KCTBL:  .WORD   0                ;PATTERNS WHICH ARE
006656  002000                            .WORD   002000           ;FLOATED THROUGH THE HIT/MISS
006660  177760                            .WORD   177760           ;REGISTER. ONLY THE UPPER
006662  175760                            .WORD   175760           ;12 BITS HAVE ANY SIGNIFICANCE!!
006664  125240                            .WORD   125240
006666  146300                            .WORD   146300
006670  161600                            .WORD   161600
006672  100020                            .WORD   100020
006674  077740                            .WORD   077740
006676  000000                    KCTBLB: .WORD   0

006700  000000                    KCR0:   .WORD   0                ;STORAGE FOR THE PATTERNS READ
006702  000000                    KCR1:   .WORD   0                ;OUT OF THE HUIT/MISS REGISTER.
006704  000000                    KCR2:   .WORD   0
006706  000000                    KCR3:   .WORD   0
006710  000000                    KCR4:   .WORD   0
006712  000000                    KCR5:   .WORD   0

006714  000000                    KCE0:   .WORD   0                ;EXPECTED VALUES FOR THE PATTERNS
006716  000000                    KCE1:   .WORD   0                ;READ FROM THE HIT/MISS REGISTER.
006720  000000                    KCE2:   .WORD   0
006722  000000                    KCE3:   .WORD   0
006724  000000                    KCE4:   .WORD   0
006726  000000                    KCE5:   .WORD   0
```

```
                                KCERR:                          ;REPORT THE PATTERN READ FROM THE
006730  005730  013737  006646  001230          MOV     kCCON,$TMP2     ;HIT MISS REGISTER WAS NOT THE EXPECTED
006736  104120                  1$:     ERROR   120             ;VALUE.
006740  012737  177777  030756          MOV     #-1,CONFL2
006746  012737  177777  030762          MOV     #-1,HIMFL2
006754  000137  006564                  JMP     KC15

006760  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.
                                ;*
                                ;;*****************************************************************
006764  000004                  TST12:  SCOPE
        000012                  KY=$TN-1
006766  005737  030756                  TST     CONFL2
006772  001403                          BEQ     KY1
006774  012737  177777  030742          MOV     #-1,CONFLG
007002  005737  030762          KY1:    TST     HIMFL2
007006  001403                          BEQ     KY2
007010  012737  177777  030746          MOV     #-1,HIMFLG
007016                          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.
                                ;*
                                ;;*****************************************************************
007016  000004                  TST13:  SCOPE
007020  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000013                  KF=$TN-1
                                                                ;SET THE SKAD REGISTER
007026  012737  007252  030524          MOV     #TST14,SKAD     ;IN CASE THE TEST ABORTS.
```

```
3021  007034  113737  001102  001224          MOVB    $TSTNM,$TMPC
3022  007042  012737  030400  000114          MOV     #SPUR,@#CACHVEC ;EXPECT NO PARITY ERRORS.
3023
3024  007050  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3025  007052  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3026  007054  012700  007250          KF1:    MOV     #KFTMP2,R0      ;ESTABLISH A LOCATION FOR THE
3027                                                                  ;HITS TO BE MADE WHICH WON'T
3028                                                                  ;INTERFER WITH THE HITS CAUSED
3029                                                                  ;BY EXECUTION OF THIS CODE!
3030  007060  042700  176003                  BIC     #176003,R0
3031  007064  010001                          MOV     R0,R1
3032  007066  062701  140000                  ADD     #TESTR1,R1
3033  007072  010002                          MOV     R0,R2
3034  007074  062702  142000                  ADD     #TESTR2,R2
3035
3036  007100  012737  000044  177746          MOV     #S1M0,@#CONTRL  ;MAKE THOSE TWO TEST LOCATIONS
3037  007106  005710                          TST     (R0)            ;(R1) AND (R2) MISSES IN BOTH
3038                                                                  ;GROUPS BY MAKING (R0) A HIT
3039                                                                  ;IN BOTH GROUPS.
3040
3041  007110  005710                          TST     (R0)
3042
3043                                                                  ;SEE IF REFERENCE ADDRESS
3044  007112  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
3045  007120  001006                          BNE     KF2
3046                                                                  ;IF NOT ERROR!
3047  007122  010037  001230                  MOV     R0,$TMP2
3048  007126  012737  000001  001226          MOV     #1,$TMP1
3049  007134  104001                          ERROR   1
3050
3051
3052
3053
3054  007136  012737  000030  177746  KF2:    MOV     #S0M1,@#CONTRL
3055  007144  005710                          TST     (R0)
3056
3057  007146  005710                          TST     (R0)
3058
3059                                                                  ;SEE IF REFERENCE ADDRESS
3060  007150  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
3061  007156  001006                          BNE     KF3
3062                                                                  ;IF NOT ERROR!
3063  007160  010037  001230                  MOV     R0,$TMP2
3064  007164  012737  000000  001226          MOV     #0,$TMP1
3065  007172  104001                          ERROR   1
3066
3067
3068
3069
3070  007174  005037  177746          KF3:    CLR     @#CONTRL        ;NOW THAT THE ADDRESSES (R1)
3071                                                                  ;AND (R2) ARE MISSES, REFERENCING
3072                                                                  ;THEM BOTH EACH IN CONSECUTIVE
3073                                                                  ;REFERNCES SHOULD CAUSE THEM BOTH
3074                                                                  ;TO BE MADE HITS IF THE RANDOM
3075                                                                  ;FLIP FLOP TOGGLES INBETWEEN THE
3076                                                                  ;TWO CYCLES!
```

```
                                                        ;NOTE THAT THESE TWO ADDRESSES
                                                        ;(R1) AND (R2) ARE SUCH THAT
                                                        ;IF THE RANDOM FLIP FLOP DIDN'T TOGGLE
                                                        ;THE HITS AT THE ADDRESSES
                                                        ;WOULD BE MUTUALLY EXCLUSIVE.
                                                        ;THAT IS BOTH THESE ADDRESSES
                                                        ;CAN'T BE HITS IN THE SAME GROUP!
007200  000240                    NOP                 ;FOR SCOPING WITH AN OSCILLOSCOPE!
007202  021112                    CMP     (R1),(R2)   ;HERE BOTH THE OPERAND FETCHES
                                                        ;SHOULD BE MISSES.
007204  021112                    CMP     (R1),(R2)   ;HERE BOTH THE OPERAND FETCHES
                                                        ;SHOULD BE HITS!
007206  013705  177752            MOV     @#HITMIS,R5
007212  005105                    COM     R5
007214  032705  000014            BIT     #14,R5      ;BOTH HITS ELSE ERROR.
007220  001411                    BEQ     KF4

007222  010137  001230            MOV     R1,$TMP2    ;REPORT THE ERROR.
007226  005037  001232            CLR     $TMP3
007232  010237  001234            MOV     R2,$TMP4
007236  005037  001236            CLR     $TMP5

007242  104121            1$:     ERROR   121
007244  000402            KF4:    BR      KF5

007246  000000            KFTMP1: .WORD   0           ;USED TO DETERMINE THE TEST
007250  000000            KFTMP2: .WORD   0           ;ADDRESSES.

007252                    KF5:                        ;DONE!

                                                        ;;*****************************************************************
                                                        ;*TEST 14       CACHE MAINTENANCE REGISTER COUNT 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.
                                                        ;*
                                                        ;;*****************************************************************
007252  000004            TST14:  SCOPE
007254  012737  000020  001274            MOV     #20.,$TIMES     ;;DO 20 ITERATIONS
        000014          MA=$TN-1
                                                        ;SET THE SKAD REGISTER
007262  012737  007534  030524            MOV     #TST15,SKAD     ;IN CASE THE TEST ABORTS.

007270  113737  001102  001224            MOVB    $TSTNM,$TMP0

007276  104432                            SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
007300  104434                            SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
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3133  007302  012737  007436  000114          MOV     #MAERR,@#CACHVEC        ;IN CASE AN ERROR OCCUPS WHILE
3134                                                                          ;RUNNING A COUNT PATTERN
3135                                                                          ;THROUGH THE MAINTENANCE
3136                                                                          ;REGISTER SET UP THE PARITY ERROR
3137                                                                          ;TRAP VECTOR; NOTE THAT NO ERRORS
3138                                                                          ;SHOULD OCCUR IF THIS REGISTER
3139                                                                          ;AND THE PARITY LOGIC IS FUNCTIONING
3140                                                                          ;PROPERLY!
3141  007310  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
3142
3143  007316  012701  177750                  MOV     #MAINT,R1
3144  007322  005004                          CLR     R4
3145  007324  012737  007336  001110          MOV     #MA1,$LPERR
3146  007332  012700  170000                  MOV     #170000,R0
3147
3148  007336  000240                  MA1:    NOP                             ;NOTE, THE CODE IN THIS ARE
3149  007340  010411                          MOV     R4,(R1)                 ;MA1 THROUGH MA2, ASSEMBLES TO
3150  007342  011102                          MOV     (R1),R2                 ;MACHINE CODE WHICH WILL
3151  007344  005011                          CLR     (R1)                    ;HAVE THE PARITY BITS ON, 1'S!
3152                                                                          ;THE PATTERN IS LOADDED INTO THE
3153                                                                          ;MAINETENANCE REGISTER, READ BACK
3154                                                                          ;AND THE MAINTENANCE REGISTER
3155                                                                          ;IS CLEARED.
3156  007346  030011                          BIT     R0,(R1)                 ;SEE IF ANY OF THE HIGH ORDER
3157                                                                          ;FOUR BITS, 15 TO 12,
3158                                                                          ;THE BITS WHICH CONTROL THE
3159                                                                          ;MAIN MEMORY DATA PARITY MAINTENANCE
3160                                                                          ;FUNCTION ARE STUCK ON.
3161  007350  001402                          BEQ     .+6                     ;IF SO, THEN ALL THAT CAN
3162  007352  000000                          HALT                            ;BE DONE IS TO HALT!!!!!
3163                                                                          ;FOR IF CONTROL IS PASSED TO
3164                                                                          ;ANY OTHER PART OF THIS PROGRAM
3165                                                                          ;THERE WOULD BE NO CONTROL
3166                                                                          ;OVER WHAT KIND OF DATA WOULD
3167                                                                          ;BE READ FROM MAIN MEMORY AND
3168                                                                          ;MAIN MEMORY DATA PARITY ERRORS
3169                                                                          ;WOULD BE LIKELY TO OCCUR.
3170  007354  000240                  MA2:    NOP
3171
3172  007356  011105                          MOV     (R1),R5                 ;SEE IF ANY OF THE LOW ORDER
3173  007360  001410                          BEQ     MA3                     ;BITS, 11 THROUGH 0, ARE STUCK
3174                                                                          ;AT ONE.
3175                                                                          ;IF SO REPORT THE ERROR.
3176  007362  010437  001230                  MOV     R4,$TMP2
3177  007366  010537  001232                  MOV     R5,$TMP3
3178  007372  104122                  1$:     ERROR   122
3179  007374  012737  177777  030744          MOV     #-1,MANFLG              ;??????????????GO ON???????????
3180
3181  007402  020402                  MA3:    CMP     R4,R2                   ;SEE IF THE PATTERN WRITTEN MATCHES
3182  007404  001410                          BEQ     MA4                     ;THE PATTERN READ.
3183
3184                                                                          ;IF NOT REPORT THE ERROR.
3185  007406  010437  001230                  MOV     R4,$TMP2
3186  007412  010237  001232                  MOV     R2,$TMP3
3187  007416  104123                  1$:     ERROR   123
3188  007420  012737  177777  030760          MOV     #-1,MANFL2
```

```
3189
3190  007426  062704  000020          MA4:    ADD     #20,R4          ;INCREMENT THE COUNT PATTERN.
3191  007432  001341                          BNE     MA1
3192  007434  000432                          BR      MADONE
3193
3194  007436                          MAERR:                          ;TRAP TO HERE IN THE EVENT
3195                                                                  ;THAT A PARITY ERROR OCCURS
3196                                                                  ;WHILE RUNNING THIS COUNT
3197                                                                  ;PATTERN TEST.
3198  007436  032737  000400  177744        BIT     #400,@#MEMERR   ;SEE IF THE ERROR WAS A MAINTENANCE
3199  007444  001005                        BNE     MAERR1          ;ERROR, CAUSED BY A MAINTENANCE
3200                                                                  ;FUNCTION. IF NOT GO TO THE
3201  007446  012737  030400  000114        MOV     #SPUR,@#CACHVEC ;SPUR ROUTINE WHICH HANDLES SUCH UNEXPECTED
3202  007454  000137  030400                JMP     SPUR            ;ERRORS.
3203
3204  007460  013737  177744  001234  MAERR1: MOV     @#MEMERR,$TMP4  ;IF THE ERROR WAS CAUSED BY A
3205  007466  013737  177740  001226        MOV     @#LOADRS,$TMP1  ;MAINT FUNCTION THEN REPORT THE
3206  007474  013737  177742  001230        MOV     @#HIADRS,$TMP2  ;FAILURE OF THAT REGISTER.
3207  007502  012637  001232                MOV     (SP)+,$TMP3
3208  007506  005726                        TST     (SP)+
3209  007510  104124                1$:     ERROR   124
3210  007512  012737  177777  030760        MOV     #-1,MANFL2
3211
3212  007520  000742                        BR      MA4             ;RETURN TO THE TEST.
3213
3214  007522  005037  177746  MADONE: CLR     @#CONTRL        ;DONE
3215  007526  012737  030400  000114        MOV     #SPUR,@#CACHVEC
3216
3217
3218
3219
3220                                  ;;**************************************************************
3221                                  ;*TEST 15       CACHE MAINTENANCE AND ERROR REGISTERS TEST 1
3222                                  ;*
3223                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE A PARITY
3224                                  ;*ERROR ON THE MAIN MEMORY ADDRESS AND CONTROL LINES, AND ALSO A TEST
3225                                  ;*OF THE ERROR REGISTER'S ABILITY TO APPROPRIATELY SET TO 104402. THE
3226                                  ;*REFERENCE CAUSING THIS ERROR WILL BE MADE FROM THE CPU DIRECTLY TO
3227                                  ;*THE CACHE.
3228                                  ;*
3229                                  ;;**************************************************************
3230  007534  000004                  TST15:  SCOPE
3231  007536  012737  000040  001274        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
3232          000015                  MAB=$TN-1
3233                                                                  ;SET THE SKAD REGISTER
3234  007544  012737  010032  030524        MOV     #TST16,SKAD     ;IN CASE THE TEST ABORTS.
3235
3236  007552  113737  001102  001224        MOVB    $TSTNM,$TMP0
3237
3238  007560  104430                        SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
3239  007562  104432                        SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3240  007564  104434                        SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
3241  007566  104436                        SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3242  007570  012737  007640  000114        MOV     #MABRR0,@#CACHVEC       ;SET UP FOR THE ERROR.
3243
3244  007576  012704  000002                MOV     #2,R4           ;THIS IS THE PATTERN THAT WILL
```

```
3245  007602  012702  177750              MOV     #MAINT,R2       ;BE PUT IN THE MAINTENANCE REG.
3246  007606  012737  000014  177746      MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
3247
3248  007614  000240                      NOP                     ;FOR SCOPING.
3249  007616  010412                      MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
3250  007620  005012                      CLR     (R2)            ;THE REFERENCE WHICH FETCHES
3251                                                              ;THIS INSTRUCTION SHOULD
3252                                                              ;CAUSE THE ABORT!
3253
3254  007622                      MAB2:                           ;NO ABORT OCCURRED REPORT THE ERROR
3255  007622  010437  001230              MOV     R4,$TMP2
3256  007626  104127              1$:     ERROR   127
3257  007630  012737  177777  030760      MOV     #-1,MANFL2
3258  007636  000474                      BR      MABDON
3259
3260  007640  022737  104402  177744  MABRR0: CMP     #104402,@#MEMERR        ;WHEN THE TRAP IS MADE TO THIS LOCATION
3261  007646  001036                      BNE     MABRR4          ;MAKE SURE THE ERROR REGISTER IS
3262                                                              ;SET CORRECTLY. IF NOT GO TO MABRR4.
3263  007650  022626              MABRR1: CMP     (SP)+,(SP)+     ;OTHERWISE RESET THE STACK.
3264  007652  012737  177777  177744  MABR15: MOV     #-1,@#MEMERR    ;ATTEMPT TO CLEAR THE ERROR REGISTER.
3265  007660  005737  177744              TST     @#MEMERR
3266  007664  001416                      BEQ     MABRR3
3267
3268  007666                      MABRR2:                         ;REPORT ERROR REGISTER WON'T CLEAR!
3269  007666  013737  177740  001230      MOV     @#LOADRS,$TMP2
3270  007674  013737  177742  001232      MOV     @#HIADRS,$TMP3
3271  007702  013737  177744  001234      MOV     @#MEMERR,$TMP4
3272  007710  104130              1$:     ERROR   130
3273  007712  012737  177777  030740      MOV     #-1,MMRFLG
3274  007720  000443                      BR      MABDON
3275
3276  007722  022737  177740  177740  MABRR3: CMP     #177740,@#LOADRS        ;MAKE SURE THE ADDRESS
3277  007730  001356                      BNE     MABRR2          ;REGISTER RESET.
3278  007732  022737  000003  177742      CMP     #3,@#HIADRS
3279  007740  001352                      BNE     MABRR2
3280  007742  000432                      BR      MABDON
3281
3282  007744                      MABRR4:                         ;REPORT ERROR REGISTER NOT SET CORRECTLY!!
3283  007744  012637  001230              MOV     (SP)+,$TMP2
3284  007750  005726                      TST     (SP)+
3285  007752  013737  177740  001232      MOV     @#LOADRS,$TMP3
3286  007760  013737  177742  001234      MOV     @#HIADRS,$TMP4
3287  007766  012737  000002  001236      MOV     #2,$TMP5
3288  007774  012737  104402  001240      MOV     #104402,$TMP6
3289  010002  013737  177744  001242      MOV     @#MEMERR,$TMP7
3290  010010  104131              1$:     ERROR   131
3291  010012  012737  177777  030760      MOV     #-1,MANFL2
3292  010020  012737  177777  030754      MOV     #-1,MMRFL2
3293  010026  000711                      BR      MABR15          ;GO SEE IF THE ERROR REGISTER
3294                                                              ;CAN BE CLEARED.
3295  010030  104416              MABDON: RSET                    ;DONE!!
3296
3297
3298                              ;;*****************************************************************
3299                              ;*TEST 16        CACHE MAINTENANCE AND ERROR REGISTERS TEST 2
3300                              ;*
```

```
3301                                    ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
3302                                    ;*A PARITY ERROR ON THE MAIN MEMORY EVEN WORD'S LOW BYTE,
3303                                    ;*WHEN THAT WORD IS THE WANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
3304                                    ;*
3305                                    ;;*****************************************************************
3306  010032  000004                    TST16:  SCOPE
3307  010034  012737  000040  001274            MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
3308           000016                   MB=$TN-1
3309                                                    ;SET THE SKAD REGISTER
3310  010042  012737  010350  030524            MOV     #TST17,SKAD     ;IN CASE THE TEST ABORTS.
3311
3312  010050  113737  001102  001224            MOVB    $TSTNM,$TMP0
3313
3314  010056  104430                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
3315  010060  104432                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
3316  010062  104434                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
3317  010064  104436                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
3318  010066  012737  010146  000114            MOV     #MBERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
3319  010074  012704  010000                    MOV     #10000,R4       ;PATERN TO BE PUT INTO THE
3320  010100  012702  177750                    MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
3321  010104  012737  000014  177746            MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
3322  010112  000402                            BR      MB1
3323
3324           010114                           LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
3325           010114                           LOC=-4&LOC
3326           010120                           LOC=LOC+4
3327           010120                           .=LOC
3328
3329  010120  000240                    MB1:    NOP
3330  010122  010412                            MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
3331  010124  005701                    MB2:    TST     R1              ;THIS IS A DUMMY INSTRUCTION
3332                                                                    ;WITH THE APPROPRIATE PARITY
3333                                                                    ;WHOSE FETCH WILL CAUSE THE ERROR.
3334  010126  005012                            CLR     (R2)
3335
3336  010130                            MB3:                            ;REPORT ERROR.  MAINTENANCE
3337  010130  010437  001230                    MOV     R4,$TMP2        ;FUNCTION FAILED TO
3338                                                                    ;CAUSE ERROR.
3339  010134  104127                    1$:     ERROR   127
3340  010136  012737  177777  030760    MOV     #-1,MANFL2
3341  010144  000500                            BR      MBDONE
3342
3343  010146  022737  104404  177744    MBERR0: CMP     #104404,@#MEMERR        ;DID THE ERROR REGISTER
3344  010154  001042                            BNE     69$             ;SET PROPERLY?
3345
3346  010156  022626                    64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
3347  010160  005037  177572            65$:    CLR     @#MMR0
3348  010164  005037  172516                    CLR     @#MMR3
3349  010170  012737  177777  177744            MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3350  010176  005737  177744                    TST     @#MEMERR        ;REGISTER.
3351  010202  001416                            BEQ     68$
3352
3353  010204                            66$:                            ;ERROR REGISTER WON'T
3354  010204  013737  177740  001230            MOV     @#LOADRS,$TMP2  ;CLEAR
3355  010212  013737  177742  001232            MOV     @#HIADRS,$TMP3
3356  010220  013737  177744  001234            MOV     @#MEMERR,$TMP4
```

```
010226  104130                      67$:    ERROR   130
010230  012737  177777  030740              MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
010236  000443                              BR      MBDONE

010240  022737  177740  177740      68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
010246  001356                              BNE     66$              ;UNLOCKED.
010250  022737  000003  177742              CMP     #3,@#HIADRS
010256  001352                              BNE     66$
010260  000432                              BR      MBDONE

010262                              69$:                             ;REPORT ERROR REGISTER
010262  012637  001230                      MOV     (SP)+,$TMP2      ;NOT SET AS EXPECTED.
010266  005726                              TST     (SP)+            ;RESET THE STACK.
010270  013737  177740  001232              MOV     @#LOADRS,$TMP3
010276  013737  177742  001234              MOV     @#HIADRS,$TMP4
010304  012737  010000  001236              MOV     #10000,$TMP5
010312  012737  104404  001240              MOV     #104404,$TMP6
010320  013737  177744  001242              MOV     @#MEMERR,$TMP7

010326  104131                      70$:    ERROR   131
010330  012737  177777  030760              MOV     #-1,MANFL2       ;SIGNAL BAD REGISTER
010336  012737  177777  030754              MOV     #-1,MMRFL2
010344  000705                              BR      65$
010346  104416                      MBDONE: RSET

                                    ;;*****************************************************************
                                    ;*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.
                                    ;*
                                    ;;*****************************************************************
010350  000004                      TST17:  SCOPE
010352  012737  000040  001274              MOV     #40,$TIMES       ;;DO 40 ITERATIONS
        000017                      MC=$TN-1
                                                                     ;SET THE SKAD REGISTER
010360  012737  010664  030524              MOV     #TST20,SKAD      ;IN CASE THE TEST ABORTS.

010366  113737  001102  001224              MOVB    $TSTNM,$TMP0

010374  104430                              SKPBER           ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
010376  104432                              SKPBCN           ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
010400  104434                              SKPBMN           ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
010402  104436                              SKPBHM           ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
010404  012737  010462  000114              MOV     #MCERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
010412  012704  020000                      MOV     #20000,R4        ;PATTERN TO BE USED IN THE
010416  012702  177750                      MOV     #MAINT,R2        ;MAINTENANCE REGISTER.
010422  012737  000014  177746              MOV     #MOM1,@#CONTRL   ;FORCE MISSES TO BOTH GROUPS.
010430  000401                              BR      MC1

        010432                              LOC=.            ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        010430                              LOC=-4&LOC
        010434                              LOC=LOC+4
        010434                              .=LOC
```

```
3413
3414  010434  000240                    MC1:    NOP
3415  010436  010412                            MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
3416  010440  005701                    MC2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
3417                                              ;SHOULD CAUSE THE ABORT.
3418  010442  005012                            CLR     (R2)
3419
3420  010444                            MC3:                            ;REPORT ERROR.  MAINTENANCE
3421  010444  010437  001230                    MOV     R4,$TMP2        ;FUNCTION FAILED TO
3422                                              ;CAUSE ERROR.
3423  010450  104127                    1$:     ERROR   127
3424  010452  012737  177777  030760    MOV     #-1,MANFL2
3425  010460  000500                            BR      MCDONE
3426
3427  010462  022737  104404  177744    MCERR0: CMP     #104404,@#MEMERR        ;DID THE ERROR REGISTER
3428  010470  001042                            BNE     69$             ;SET PROPERLY?
3429
3430  010472  022626                    64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
3431  010474  005037  177572            65$:    CLR     @#MMR0
3432  010500  005037  172516                    CLR     @#MMR3
3433  010504  012737  177777  177744            MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3434  010512  005737  177744                    TST     @#MEMERR        ;REGISTER.
3435  010516  001416                            BEQ     68$
3436
3437  010520                            66$:                            ;ERROR REGISTER WON'T
3438  010520  013737  177740  001230            MOV     @#LOADRS,$TMP2  ;CLEAR
3439  010526  013737  177742  001232            MOV     @#HIADRS,$TMP3
3440  010534  013737  177744  001234            MOV     @#MEMERR,$TMP4
3441
3442  010542  104130                    67$:    ERROR   130
3443  010544  012737  177777  030740            MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
3444  010552  000443                            BR      MCDONE
3445
3446  010554  022737  177740  177740    68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
3447  010562  001356                            BNE     66$             ;UNLOCKED.
3448  010564  022737  000003  177742            CMP     #3,@#HIADRS
3449  010572  001352                            BNE     66$
3450  010574  000432                            BR      MCDONE
3451
3452  010576                            69$:                            ;REPORT ERROR REGISTER
3453  010576  012637  001230                    MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
3454  010602  005726                            TST     (SP)+           ;RESET THE STACK.
3455  010604  013737  177740  001232            MOV     @#LOADRS,$TMP3
3456  010612  013737  177742  001234            MOV     @#HIADRS,$TMP4
3457  010620  012737  020000  001236            MOV     #20000,$TMP5
3458  010626  012737  104404  001240            MOV     #104404,$TMP6
3459  010634  013737  177744  001242            MOV     @#MEMERR,$TMP7
3460
3461  010642  104131                    70$:    ERROR   131
3462  010644  012737  177777  030760            MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
3463  010652  012737  177777  030754            MOV     #-1,MMRFL2
3464  010660  000705                            BR      65$
3465  010662  104416                    MCDONE: RSET
3466
3467                                    ;;**********************************************************************
3468                                    ;*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.
                                        ;*
                                        ;**************************************************************
010654  000004                        TST20:  SCOPE
010666  012737  000040  001274                MOV     #40.,$TIMES     ;;DO 40 ITERATIONS
        000020                  MD=$TN-1
                                                                        ;SET THE SKAD REGISTER
010674  012737  011204  030524                MOV     #TST21,SKAD     ;IN CASE THE TEST ABORTS.

010732  113737  001102  001224                MOVB    $TSTNM,$TMP0

010710  104430                               SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
010712  104432                               SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
010714  104434                               SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
010716  104436                               SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
010720  012737  011002  000114                MOV     #MDERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
010726  012704  040000                        MOV     #40000,R4       ;PATTERN TO BE PUT IN THE
010732  012702  177750                        MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
010736  012737  000014  177746                MOV     #MDMI,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
010744  000402                               BR      MD1

                010746                  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                010744                  LOC=-4&LOC
                010750                  LOC=LOC+4
                010750                  .=LOC

010750  000240                          NOP
010752  000240                  MD1:    NOP
010754  010412                          MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
010756  005701                  MD2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
                                                                ;SHOULD CAUSE THE MAIN MEMORY
                                                                ;DATA PARITY ABORT.
010760  005012                          CLR     (R2)
010762  000240                          NOP

010764                          MD3:                            ;REPORT ERROR.  MAINTENANCE
010764  013437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
010770  104127                  1$:     ERROR   127
010772  012737  177777  030760  MOV     #-1,MANFL2
011000  000500                          BR      MDDONE

011002  022737  104410  177744  MDERR0: CMP     #104410,@#MEMERR        ;DID THE ERROR REGISTER
011010  001042                          BNE     69$             ;SET PROPERLY?

011012  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
011014  005037  177572          65$:    CLR     @#MMR0
011020  005037  172516                  CLR     @#MMR3
011024  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
011032  005737  177744                  TST     @#MEMERR        ;REGISTER.
011036  001416                          BEQ     68$

011040                          66$:                            ;ERROR REGISTER WON'T
```

```
011040  013737  177740  001230            MOV     @#LOADRS,$TMP2   ;CLEAR
011046  013737  177742  001232            MOV     @#HIADRS,$TMP3
011054  013737  177744  001234            MOV     @#MEMERR,$TMP4

011062  104130                    67$:    ERROR   130
011064  012737  177777  030740            MOV     #-1,MMRFLG       ;SIGNAL BAD REGISTER
011072  000443                            BR      MDDONE

011074  022737  177740  177740    68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
011102  001356                            BNE     66$              ;UNLOCKED.
011104  022737  000003  177742            CMP     #3,@#HIADRS
011112  001352                            BNE     66$
011114  000432                            BR      MDDONE

011116                            69$:                             ;REPORT ERROR REGISTER
011116  012637  001230                    MOV     (SP)+,$TMP2      ;NOT SET AS EXPECTED.
011122  005726                            TST     (SP)+            ;RESET THE STACK.
011124  013737  177740  001232            MOV     @#LOADRS,$TMP3
011132  013737  177742  001234            MOV     @#HIADRS,$TMP4
011140  012737  040000  001236            MOV     #40000,$TMP5
011146  012737  104410  001240            MOV     #104410,$TMP6
011154  013737  177744  001242            MOV     @#MEMERR,$TMP7

011162  104131                    70$:    ERROR   131
011164  012737  177777  030760            MOV     #-1,MANFL2       ;SIGNAL BAD REGISTER
011172  012737  177777  030754            MOV     #-1,MMRFL2
011200  000705                            BR      65$
011202  104416                    MDDONE: RSET

                                  ;;*****************************************************************
                                  ;*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.
                                  ;*
                                  ;;*****************************************************************
011204  000004                    TST21:  SCOPE
011206  012737  000040  001274            MOV     #40,$TIMES       ;;DO 40 ITERATIONS
        000021                    ME=$TN-1
                                                                   ;SET THE SKAD REGISTER
011214  012737  011524  030524            MOV     #TST22,SKAD      ;IN CASE THE TEST ABORTS.

011222  113737  001102  001224            MOVB    $TSTNM,$TMP0

011230  104430                            SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
011232  104432                            SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
011234  104434                            SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
011236  104436                            SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
011240  012737  011322  000114            MOV     #MEERR0,@#CACHVEC     ;SET UP FOR THE ERROR.
011246  012704  100000                    MOV     #100000,R4       ;PATTERN TO BE PUT IN THE
011252  012702  177750                    MOV     #MAINT,R2        ;MAINTENANCE REGISTER.
011256  012737  000014  177746            MOV     #MOM1,@#CONTRL   ;FORCE MISSES TO BOTH GROUPS.
011264  000402                            BR      ME1

        011266                            LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
```

```
 3581            011264                          LOC=-4&LOC
 3582            011270                          LOC=LOC+4
 3583            011270                          .=LOC
 3584
 3585  011270    000240                          NOP
 3586  011272    000240                  ME1:    NOP
 3587  011274    010412                          MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
 3588  011276    005701                  ME2:    TST     R1              ;THE FETCH OF THIS INSTRUSTION
 3589                                              ;SHOULD CAUSE THE ABORT.
 3590  011300    005012                          CLR     (R2)
 3591  011302    000240                          NOP
 3592
 3593  011304                            ME3:                            ;REPORT ERROR.  MAINTENANCE
 3594  011304    010437  001230                    MOV     R4,$TMP2        ;FUNCTION FAILED TO
 3595                                              ;CAUSE ERROR.
 3596  011310    104127                  1$:     ERROR   127
 3597  011312    012737  177777  030760  MOV     #-1,MANFL2
 3598  011320    000500                          BR      MEDONE
 3599
 3600  011322    022737  104410  177744  MEERRO: CMP     #104410,@#MEMERR        ;DID THE ERROR REGISTER
 3601  011330    001042                          BNE     69$             ;SET PROPERLY?
 3602
 3603  011332    022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
 3604  011334    005037  177572          65$:    CLR     @#MMR0
 3605  011340    005037  172516                  CLR     @#MMR3
 3606  011344    012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
 3607  011352    005737  177744                  TST     @#MEMERR        ;REGISTER.
 3608  011356    001416                          BEQ     68$
 3609
 3610  011360                            66$:                            ;ERROR REGISTER WON'T
 3611  011360    013737  177740  001230          MOV     @#LOADRS,$TMP2  ;CLEAR
 3612  011366    013737  177742  001232          MOV     @#HIADRS,$TMP3
 3613  011374    013737  177744  001234          MOV     @#MEMERR,$TMP4
 3614
 3615  011402    104130                  67$:    ERROR   130
 3616  011404    012737  177777  030740          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 3617  011412    000443                          BR      MEDONE
 3618
 3619  011414    022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 3620  011422    001356                          BNE     66$             ;UNLOCKED.
 3621  011424    022737  000003  177742          CMP     #3,@#HIADRS
 3622  011432    001352                          BNE     66$
 3623  011434    000432                          BR      MEDONE
 3624
 3625  011436                            69$:                            ;REPORT ERROR REGISTER
 3626  011436    012637  001230                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
 3627  011442    005726                          TST     (SP)+           ;RESET THE STACK.
 3628  011444    013737  177740  001232          MOV     @#LOADRS,$TMP3
 3629  011452    013737  177742  001234          MOV     @#HIADRS,$TMP4
 3630  011460    012737  100000  001236          MOV     #100000,$TMP5
 3631  011466    012737  104410  001240          MOV     #104410,$TMP6
 3632  011474    013737  177744  001242          MOV     @#MEMERR,$TMP7
 3633
 3634  011502    104131                  70$:    ERROR   131
 3635  011504    012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 3636  011512    012737  177777  030754          MOV     #-1,MMRFL2
```

```
011520  000735                  BR      65$
011522  104416          MEDONE: RSET

                        ;;**************************************************************
                        ;*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.
                        ;*
                        ;;**************************************************************
011524  000004          TST22:  SCOPE
011526  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000022          MF=$TN-1
                                                                ;SET THE SKAD REGISTER
011534  012737  012040  030524          MOV     #TST23,SKAD     ;IN CASE THE TEST ABORTS.

011542  113737  001102  001224          MOVB    $TSTNM,$TMP0
011550  012737  011636  000114          MOV     #MFERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
011556  012704  010000                  MOV     #10000,R4       ;PATTERN TO BE LOADED INTO THE
011562  012702  177750                  MOV     #MAINT,R2       ;MAINTENANCE REGISTER.
011566  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
011574  012705  011616                  MOV     #MF2,R5         ;A REFERENCE TO THIS ADDRESS
                                                                ;WILL CAUSE A PARITY TRAP BECAUSE
                                                                ;THE OTHER WORD IN THE PAIR
                                                                ;WILL HAVE THE APPROPRIATE
                                                                ;PARITY TO CAUSE THE MAINTENANCE
                                                                ;FUNCTION WHICH WILL BE SET
                                                                ;TO FORCE THE ERROR.
011600  000431                  BR      MF1

                        011602  LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                        011600  LOC=-4$LOC
                        011604  LOC=LOC+4
                        011604  .=LOC

011604  000240          MF1:    NOP
011606  010412                  MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER.
011610  021502                  CMP     (R5),R2         ;THIS REFERENCE TO (R5) WILL CAUSE A
011612  005012                  CLR     (R2)            ;PARITY TRAP SINCE THE OTHER IN THAT
                                                        ;PAIR WILL CAUSE A PARITY ERROR.
011614  005701                  TST     R1              ;THIS WORD WILL CAUSE THE ERROR
011616  000240          MF2:    NOP                     ;WHEN THIS WORD IS REFERENCED.

011620                  MF3:                            ;REPORT ERROR.  MAINTENANCE
011620  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
011624  104127          1$:     ERROR   127
011626  012737  177777  030760  MOV     #-1,MANFL2
011634  000500                  BR      MFDONE

011636  022737  004404  177744  MFERR0: CMP     #4404,@#MEMERR  ;DID THE ERROR REGISTER
011644  001042                  BNE     69$             ;SET PROPERLY?

011646  022626          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
011650  005037  177572  65$:    CLR     @#MMR0
```

```
 3693  011654  005037  172516                    CLR     @#MMR3
 3694  011660  012737  177777  177744            MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
 3695  011666  005737  177744                    TST     @#MEMERR        ;REGISTER.
 3696  011672  001416                            BEQ     68$
 3697
 3698  011674                          66$:                            ;ERROR REGISTER WON'T
 3699  011674  013737  177740  001230            MOV     @#LOADRS,$TMP2  ;CLEAR
 3700  011702  013737  177742  001232            MOV     @#HIADRS,$TMP3
 3701  011710  013737  177744  001234            MOV     @#MEMERR,$TMP4
 3702
 3703  011716  104130                  67$:      ERROR   130
 3704  011720  012737  177777  030740            MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 3705  011726  000443                            BR      MFDONE
 3706
 3707  011730  022737  177740  177740  68$:      CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 3708  011736  001356                            BNE     66$             ;UNLOCKED.
 3709  011740  022737  000003  177742            CMP     #3,@#HIADRS
 3710  011746  001352                            BNE     66$
 3711  011750  000432                            BR      MFDONE
 3712
 3713  011752                          69$:                            ;REPORT ERROR REGISTER
 3714  011752  012637  001230                    MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
 3715  011756  005726                            TST     (SP)+           ;RESET THE STACK.
 3716  011760  013737  177740  001232            MOV     @#LOADRS,$TMP3
 3717  011766  013737  177742  001234            MOV     @#HIADRS,$TMP4
 3718  011774  012737  010000  001236            MOV     #10000,$TMP5
 3719  012002  012737  004404  001240            MOV     #4404,$TMP6
 3720  012010  013737  177744  001242            MOV     @#MEMERR,$TMP7
 3721
 3722  012016  104131                  70$:      ERROR   131
 3723  012020  012737  177777  030760            MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 3724  012026  012737  177777  030754            MOV     #-1,MMRFL2
 3725  012034  000705                            BR      65$
 3726  012036  104416                  MFDONE:   RSET
 3727
 3728                                            ;;*****************************************************************
 3729                                            ;*TEST 23       CACHE MAINTENANCE AND ERROR REGISTERS TEST 7
 3730                                            ;*
 3731                                            ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY TO FORCE
 3732                                            ;*A PARITY ERROR ON THE MAIN MEMORY ODD WORD'S LOW BYTE,
 3733                                            ;*WHEN THAT WORD IS THE UNWANTED WORD IN THE PAIR GOTTEN FROM MEMORY.
 3734                                            ;*
 3735                                            ;;*****************************************************************
 3736  012040  000004                  TST23:    SCOPE
 3737  012042  012737  000040  001274            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 3738          000023                  MG=$TN-1
 3739                                                                    ;SET THE SKAD REGISTER
 3740  012050  012737  012360  030524            MOV     #TST24,SKAD     ;IN CASE THE TEST ABORTS.
 3741
 3742  012056  113737  001102  001224            MOVB    $TSTNM,$TMP0
 3743
 3744  012064  104430                            SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 3745  012066  104432                            SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 3746  012070  104434                            SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 3747  012072  104436                            SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 3748  012074  012704  040000                    MOV     #40000,R4       ;THIS PATTERN WILL BE PUT IN THE
```

```
012100  012704  177750                  MOV     #MAINT,R4          ;MAINTENANCE REGISTER.
012104  012737  012156  000114          MOV     #MGERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
012112  012737  000014  177746          MOV     #MOM1,@#CONTRL     ;FORCE MISSES TO BOTH GROUPS.
012120  000401                          BR      MG1

        012122                          LOC=.              ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        012120                          LOC=-4&LOC
        012124                          LOC=LOC+4
        012124                          .=LOC

012124  000240                  MG1:    NOP
012126  010412                          MOV     R4,(R2)            ;SET THE MAINTENANCE REGISTER.
012130  000240                          NOP                        ;THE REFERENCE TO THIS NOP
012132  005701                  MG2:    TST     R1                 ;SHOULD CAUSE A PARITY ERROR TO OCCUR AT
                                                                   ;MG2, RESULTING IN A TRAP!
012134  005012                          CLR     (R2)
012136  000240                          NOP

012140                          MG3:                               ;REPORT ERROR.  MAINTENANCE
012140  010437  001230                  MOV     R4,$TMP2           ;FUNCTION FAILED TO
                                                                   ;CAUSE ERROR.
012144  104127                  1$:     ERROR   127
012146  012737  177777  030760  MOV     #-1,MANFL2
012154  000500                          BR      MGDONE

012156  022737  004410  177744  MGERRO: CMP     #4410,@#MEMERR     ;DID THE ERROR REGISTER
012164  001042                          BNE     69$                ;SET PROPERLY?

012166  022626                  64$:    CMP     (SP)+,(SP)+        ;RESET THE STACK
012170  005037  177572          65$:    CLR     @#MMR0
012174  005037  172516                  CLR     @#MMR3
012200  012737  177777  177744          MOV     #-1,@#MEMERR       ;TRY TO CLEAR THE ERROR
012206  005737  177744                  TST     @#MEMERR           ;REGISTER.
012212  001416                          BEQ     68$

012214                          66$:                               ;ERROR REGISTER WON'T
012214  013737  177740  001230          MOV     @#LOADRS,$TMP2     ;CLEAR
012222  013737  177742  001232          MOV     @#HIADRS,$TMP3
012230  013737  177744  001234          MOV     @#MEMERR,$TMP4

012236  104130                  67$:    ERROR   130
012240  012737  177777  030740          MOV     #-1,MMRFLG         ;SIGNAL BAD REGISTER
012246  000443                          BR      MGDONE

012250  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
012256  001356                          BNE     66$                ;UNLOCKED.
012260  022737  000003  177742          CMP     #3,@#HIADRS
012266  001352                          BNE     66$
012270  000432                          BR      MGDONE

012272                          69$:                               ;REPORT ERROR REGISTER
012272  012637  001230                  MOV     (SP)+,$TMP2        ;NOT SET AS EXPECTED.
012276  005726                          TST     (SP)+              ;RESET THE STACK.
012300  013737  177740  001232          MOV     @#LOADRS,$TMP3
012306  013737  177742  001234          MOV     @#HIADRS,$TMP4
012314  012737  040000  001236          MOV     #40000,$TMP5
```

```
 3805  012322  012737  004410  001240          MOV     #4410,$TMP6
 3806  012330  013737  177744  001242          MOV     @#MEMERR,$TMP7
 3807
 3808  012336  104131                  70$:     ERROR   131
 3809  012340  012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 3810  012346  012737  177777  030754          MOV     #-1,MMRFL2
 3811  012354  000705                          SR      65$
 3812  012356  104416              MGDONE:     RSET
 3813
 3814
 3815                                ;;*****************************************************************
 3816                                ;*TEST 24       CACHE MAINTENANCE AND ERROR REGISTERS TEST 10
 3817                                ;*
 3818                                ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
 3819                                ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ZERO, FOR THE
 3820                                ;*LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
 3821                                ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
 3822                                ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
 3823                                ;*TO THE CACHE.
 3824                                ;*
 3825                                ;;*****************************************************************
 3826  012360  000004              TST24:  SCOPE
 3827  012362  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 3829          000024              MH=$TN-1
 3829                                                                  ;SET THE SKAD REGISTER
 3830  012370  012737  012724  030524          MOV     #TST25,SKAD     ;IN CASE THE TEST ABORTS.
 3831
 3832  012376  113737  001102  001224          MOVB    $TSTNM,$TMP0
 3833
 3834  012404  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 3835  012406  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 3836  012410  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 3837  012412  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 3838  012414  012737  012522  000114          MOV     #MHERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
 3839  012422  012704  000400                  MOV     #400,R4 ;PATTERN TO BE PUT IN MAINT. REG.
 3840  012426  012702  177750                  MOV     #MAINT,R2
 3841  012432  012737  000030  177746          MOV     #SOM1,@#CONTRL  ;FORCE SELECT GROUP 0 AND
 3842                                                                  ;FORCE MISS THE OTHER
 3843                                                                  ;GROUP
 3844  012440  012705  012502                  MOV     #MH1,R5         ;MAKE MH1 A HIT IN
 3845  012444  005715                          TST     (R5)            ;GROUP 0P.
 3846  012446  005715                          TST     (R5)
 3847
 3848                                                                  ;SEE IF REFERENCE ADDRESS
 3849  012450  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
 3850  012456  001007                          BNE     1$
 3851                                                                  ;IF NOT ERROR!
 3852  012460  010537  001230                  MOV     R5,$TMP2
 3853  012464  012737  000000  001226          MOV     #0,$TMP1
 3854  012472  104001                          ERROR   1
 3855
 3856  012474  104420                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
 3857
 3858  012476  000240              1$:         NOP                     ;PUT THE PATTERN IN THE
 3859  012500  010412                          MOV     R4,(R2)         ;MAINTENANCE REGISTER.
 3860  012502  005012              MH1:        CLR     (R2)            ;THE FETCH OF THIS NEXT
```

```
                                                                ;INSTRUCTION SHOULD CAUSE
                                                                ;A PARITY ERROR IN THE
                                                                ;CACHE ADDRESS MEMORY GROUP GP.

012504                          MH2:                            ;REPORT ERROR.  MAINTENANCE
012504  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
012510  104127                  1$:     ERROR   127
012512  012737  177777  030760  MOV     #-1,MANFL2
012520  000500                  BR      MHDONE

012522  022737  004420  177744  MHERR0: CMP     #4420,@#MEMERR  ;DID THE ERROR REGISTER
012530  001042                  BNE     69$             ;SET PROPERLY?

012532  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
012534  005037  177572          55$:    CLR     @#MMR0
012540  005037  172516          CLR     @#MMR3
012544  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
012552  005737  177744          TST     @#MEMERR        ;REGISTER.
012556  001416                  BEQ     68$

012560                          66$:                            ;ERROR REGISTER WON'T
012560  013737  177740  001230  MOV     @#LOADRS,$TMP2  ;CLEAR
012566  013737  177742  001232  MOV     @#HIADRS,$TMP3
012574  013737  177744  001234  MOV     @#MEMERR,$TMP4

012602  104130                  67$:    ERROR   130
012604  012737  177777  030740  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
012612  000443                  BR      MHDONE

012614  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
012622  001356                  BNE     66$             ;UNLOCKED.
012624  022737  000003  177742  CMP     #3,@#HIADRS
012632  001352                  BNE     66$
012634  000432                  BR      MHDONE

012636                          69$:                            ;REPORT ERROR REGISTER
012636  012637  001230          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
012642  005726                  TST     (SP)+           ;RESET THE STACK.
012644  013737  177740  001232  MOV     @#LOADRS,$TMP3
012652  013737  177742  001234  MOV     @#HIADRS,$TMP4
012660  012737  000400  001236  MOV     #400,$TMP5
012666  012737  004420  001240  MOV     #4420,$TMP6
012674  013737  177744  001242  MOV     @#MEMERR,$TMP7

012702  104131                  70$:    ERROR   131
012704  012737  177777  030760  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
012712  012737  177777  030754  MOV     #-1,MMRFL2
012720  000705                  BR      65$
012722  104416          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.
                                        ;*
                                        ;;*****************************************************************
012724  000004                TST25:  SCOPE
012726  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000025                  MI=$TN-1
                                                                ;SET THE SKAD REGISTER
012734  012737  013270  030524          MOV     #TST26,SKAD     ;IN CASE THE TEST ABORTS.

012742  113737  001102  001224          MOVB    $TSTNM,$TMP0

012750  104430                        SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
012752  104432                        SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
012754  104434                        SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
012756  104436                        SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
012760  012737  013066  000114          MOV     #MIERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
012766  012704  001000                  MOV     #1000,R4        ;PATTERN TO BE PUT IN MAINT. REG.
012772  012702  177750                  MOV     #MAINT,R2
012776  012737  000030  177746          MOV     #SOMI,@#CONTRL  ;FORCE SELECT GROUP 0 AND
                                                                ;FORCE MISS THE OTHER
                                                                ;GROUP
013004  012705  013046                  MOV     #MI1,R5         ;MAKE MI1 A HIT IN
013010  005715                          TST     (R5)            ;GROUP GP.
013012  005715                          TST     (R5)

                                                                ;SEE IF REFERENCE ADDRESS
013014  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
013022  001007                          BNE     1$
                                                                ;IF NOT ERROR!
013024  010537  001230                  MOV     R5,$TMP2
013030  012737  000000  001226          MOV     #0,$TMP1
013036  104001                          ERROR   1

013040  104420                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

013042  000240                  1$:     NOP                     ;PUT THE PATTERN IN THE
013044  010412                          MOV     R4,(R2)         ;MAINTENANCE REGISTER.
013046  005012                  MI1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                                ;INSTRUCTION SHOULD CAUSE
                                                                ;A PARITY ERROR IN THE
                                                                ;CACHE ADDRESS MEMORY GROUP GP.

013050                          MI2:                            ;REPORT ERROR.  MAINTENANCE
013050  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
013054  104127                  1$:     ERROR   127
013056  012737  177777  030760  MOV     #-1,MANFL2
013064  000500                          BR      MIDONE

013066  022737  004420  177744  MIERRO: CMP     #4420,@#MEMERR  ;DID THE ERROR REGISTER
```

```
3973  013074  001042                        BNE     69$             ;SET PROPERLY?
3974
3975  013076  022626                64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
3976  013100  005037  177572        65$:    CLR     @#MMR0
3977  013104  005037  172516                CLR     @#MMR3
3978  013110  012737  177777  177744        MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
3979  013116  005737  177744                TST     @#MEMERR        ;REGISTER.
3980  013122  001416                        BEQ     68$
3981
3982  013124                  66$:                                    ;ERROR REGISTER WON'T
3983  013124  013737  177740  001230        MOV     @#LOADRS,$TMP2  ;CLEAR
3984  013132  013737  177742  001232        MOV     @#HIADRS,$TMP3
3985  013140  013737  177744  001234        MOV     @#MEMERR,$TMP4
3986
3987  013146  104130                67$:    ERROR   130
3988  013150  012737  177777  030740        MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
3989  013156  000443                        BR      MIDONE
3990
3991  013160  022737  177740  177740  68$:  CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
3992  013166  001356                        BNE     66$             ;UNLOCKED.
3993  013170  022737  000003  177742        CMP     #3,@#HIADRS
3994  013176  001352                        BNE     66$
3995  013200  000432                        BR      MIDONE
3996
3997  013202                  69$:                                    ;REPORT ERROR REGISTER
3998  013202  012637  001230                MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
3999  013206  005726                        TST     (SP)+           ;RESET THE STACK.
4000  013210  013737  177740  001232        MOV     @#LOADRS,$TMP3
4001  013216  013737  177742  001234        MOV     @#HIADRS,$TMP4
4002  013224  012737  001000  001236        MOV     #1000,$TMP5
4003  013232  012737  004420  001240        MOV     #4420,$TMP6
4004  013240  013737  177744  001242        MOV     @#MEMERR,$TMP7
4005
4006  013246  104131                70$:    ERROR   131
4007  013250  012737  177777  030760        MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
4008  013256  012737  177777  030754        MOV     #-1,MMRFL2
4009  013264  000705                        BR      65$
4010  013266  104416                MIDONE: RSET
4011
4012
4013                                    ;;**************************************************************
4014                                    ;*TEST 26       CACHE MAINTENANCE AND ERROR REGISTERS TEST 12
4015                                    ;*
4016                                    ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
4017                                    ;*TO FORCE A PARITY ERROR IN THE CACHE ADDRESS MEMORY OF GROUP ONE, FOR THE
4018                                    ;*LOW BYTE OF THE ADDRESS WORD. ALSO TESTED IS THE ERROR REGISTER'S
4019                                    ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
4020                                    ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
4021                                    ;*TO THE CACHE.
4022                                    ;*
4023                                    ;;**************************************************************
4024  013270  000004                TST26:  SCOPE
4025  013272  012737  000040  001274        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
4026          000026                MJ=$TN-1
4027                                                                  ;SET THE SKAD REGISTER
4028  013300  012737  013634  030524        MOV     #TST27,SKAD     ;IN CASE THE TEST ABORTS.
```

```
4029
4030  013306  113737  001102  001224          MOVB    $TSTNM,$TMP0
4031
4032  013314  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
4033  013316  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
4034  013320  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
4035  013322  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
4036  013324  012737  013432  000114          MOV     #MJERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
4037  013332  012704  002000                  MOV     #2000,R4        ;PATTERN TO BE PUT IN MAINT. REG.
4038  013336  012702  177750                  MOV     #MAINT,R2
4039  013342  012737  000044  177746          MOV     #SIMO,@#CONTRL  ;FORCE SELECT GROUP 1 AND
4040                                                                  ;FORCE MISS THE OTHER
4041                                                                  ;GROUP
4042  013350  012705  013412                  MOV     #MJ1,R5         ;MAKE MJ1 A HIT IN
4043  013354  005715                          TST     (R5)            ;GROUP GP.
4044  013356  005715                          TST     (R5)
4045
4046                                                                  ;SEE IF REFERENCE ADDRESS
4047  013360  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A HIT.
4048  013366  001007                          BNE     1$
4049                                                                  ;IF NOT ERROR!
4050  013370  010537  001230                  MOV     R5,$TMP2
4051  013374  012737  000001  001226          MOV     #1,$TMP1
4052  013402  104001                          ERROR   1
4053
4054  013404  104420                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
4055
4056  013406  000240          1$:     NOP                             ;PUT THE PATTERN IN THE
4057  013410  010412                  MOV     R4,(R2)                 ;MAINTENANCE REGISTER.
4058  013412  005012          MJ1:    CLR     (R2)                    ;THE FETCH OF THIS NEXT
4059                                                                  ;INSTRUCTION SHOULD CAUSE
4060                                                                  ;A PARITY ERROR IN THE
4061                                                                  ;CACHE ADDRESS MEMORY GROUP GP.
4062
4063
4064  013414                  MJ2:                                    ;REPORT ERROR.  MAINTENANCE
4065  013414  010437  001230          MOV     R4,$TMP2                ;FUNCTION FAILED TO
4066                                                                  ;CAUSE ERROR.
4067  013420  104127          1$:     ERROR   127
4068  013422  012737  177777  030760  MOV     #-1,MANFL2
4069  013430  000500                  BR      MJDONE
4070
4071  013432  022737  004440  177744  MJERR0: CMP     #4440,@#MEMERR  ;DID THE ERROR REGISTER
4072  013440  001042                  BNE     69$             ;SET PROPERLY?
4073
4074  013442  022626          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
4075  013444  005037  177572  65$:    CLR     @#MMR0
4076  013450  005037  172516          CLR     @#MMR3
4077  013454  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
4078  013462  005737  177744          TST     @#MEMERR        ;REGISTER.
4079  013466  001416                  BEQ     68$
4080
4081  013470                  66$:                            ;ERROR REGISTER WON'T
4082  013470  013737  177740  001230          MOV     @#LOADRS,$TMP2  ;CLEAR
4083  013476  013737  177742  001232          MOV     @#HIADRS,$TMP3
4084  013504  013737  177744  001234          MOV     @#MEMERR,$TMP4
```

```
013512  104130                          67$:    ERROR   130
013514  012737  177777  030740                  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
013522  000443                                  BR      MJDONE

013524  022737  177740  177740          65$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
013532  001356                                  BNE     66$             ;UNLOCKED.
013534  022737  000003  177742                  CMP     #3,@#HIADRS
013542  001352                                  BNE     66$
013544  000432                                  BR      MJDONE

013546                                  69$:                            ;REPORT ERROR REGISTER
013546  012637  001230                          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
013552  005726                                  TST     (SP)+           ;RESET THE STACK.
013554  013737  177740  001232                  MOV     @#LOADRS,$TMP3
013562  013737  177742  001234                  MOV     @#HIADRS,$TMP4
013570  012737  002000  001236                  MOV     #2000,$TMP5
013576  012737  004440  001240                  MOV     #4440,$TMP6
013604  013737  177744  001242                  MOV     @#MEMERR,$TMP7

013612  104131                          70$:    ERROR   131
013614  012737  177777  030760                  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
013622  012737  177777  030754                  MOV     #-1,MMRFL2
013630  000705                                  BR      65$
013632  104416                          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.
                                        ;*
                                        ;;*****************************************************************
013634  000004                          TST27:  SCOPE
013636  012737  000040  001274                  MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000027                          MK=$TN-1
                                                                        ;SET THE SKAD REGISTER
013644  012737  014200  030524                  MOV     #TST30,SKAD     ;IN CASE THE TEST ABORTS.

013652  113737  001102  001224                  MOVB    $TSTNM,$TMP0

013660  104430                                  SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
013662  104432                                  SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
013664  104434                                  SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
013666  104436                                  SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
013670  012737  013776  000114                  MOV     #MKERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
013676  012704  004000                          MOV     #4000,R4        ;PATTERN TO BE PUT IN MAINT. REG.
013702  012702  177750                          MOV     #MAINT,R2
013706  012737  000044  177746                  MOV     #S1M0,@#CONTRL  ;FORCE SELECT GROUP 1 AND
                                                                        ;FORCE MISS THE OTHER
                                                                        ;GROUP
```

```
 4141  013714  012705  013756                MOV     #MK1,R5         ;MAKE MK1 A HIT IN
 4142  013720  005715                        TST     (R5)            ;GROUP GP.
 4143  013722  005715                        TST     (R5)
 4144
 4145                                                                  ;SEE IF REFERENCE ADDRESS
 4146  013724  032737  000010  177752        BIT     #10,@#HITMIS    ;IS A HIT.
 4147  013732  001007                        BNE     1$
 4148                                                                  ;IF NOT ERROR!
 4149  013734  010537  001230                MOV     R5,$TMP2
 4150  013740  012737  000001  001226        MOV     #1,$TMP1
 4151  013746  104001                        ERROR   1
 4152
 4153  013750  104420                        SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
 4154
 4155  013752  000240            1$:         NOP                     ;PUT THE PATTERN IN THE
 4156  013754  010412                        MOV     R4,(R2)         ;MAINTENANCE REGISTER.
 4157  013756  005012            MK1:        CLR     (R2)            ;THE FETCH OF THIS NEXT
 4158                                                                  ;INSTRUCTION SHOULD CAUSE
 4159                                                                  ;A PARITY ERROR IN THE
 4160                                                                  ;CACHE ADDRESS MEMORY GROUP GP.
 4161
 4162
 4163  013760            MK2:                                        ;REPORT ERROR.  MAINTENANCE
 4164  013760  010437  001230                MOV     R4,$TMP2        ;FUNCTION FAILED TO
 4165                                                                  ;CAUSE ERROR.
 4166  013764  104127            1$:         ERROR   127
 4167  013766  012737  177777  030760  MOV   #-1,MANFLG
 4168  013774  000500                        BR      MKDONE
 4169
 4170  013776  022737  004440  177744  MKERR0: CMP   #4440,@#MEMERR  ;DID THE ERROR REGISTER
 4171  014004  001042                        BNE     69$             ;SET PROPERLY?
 4172
 4173  014006  022626            64$:        CMP     (SP)+,(SP)+     ;RESET THE STACK
 4174  014010  005037  177572    65$:        CLR     @#MMR0
 4175  014014  005037  172516                CLR     @#MMR3
 4176  014020  012737  177777  177744        MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
 4177  014026  005737  177744                TST     @#MEMERR        ;REGISTER.
 4178  014032  001416                        BEQ     68$
 4179
 4180  014034            66$:                                        ;ERROR REGISTER WON'T
 4181  014034  013737  177740  001230        MOV     @#LOADRS,$TMP2  ;CLEAR
 4182  014042  013737  177742  001232        MOV     @#HIADRS,$TMP3
 4183  014050  013737  177744  001234        MOV     @#MEMERR,$TMP4
 4184
 4185  014056  104130            67$:        ERROR   130
 4186  014060  012737  177777  030740        MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 4187  014066  000443                        BR      MKDONE
 4188
 4189  014070  022737  177740  177740  68$:  CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 4190  014076  001356                        BNE     66$             ;UNLOCKED.
 4191  014100  022737  000003  177742        CMP     #3,@#HIADRS
 4192  014106  001352                        BNE     66$
 4193  014110  000432                        BR      MKDONE
 4194
 4195  014112            69$:                                        ;REPORT ERROR REGISTER
 4196  014112  012637  001230                MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
```

```
                                        TST     (SP)+           ;RESET THE STACK.
                                        MOV     @#LOADRS,$TMP3
                                        MOV     @#HIADRS,$TMP4
                                        MOV     #4000,$TMP5
                                        MOV     #4440,$TMP6
                                        MOV     @#MEMERR,$TMP7

                                70$:    ERROR   131
                                        MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
                                        MOV     #-1,MMRFL2
                                        BR      65$
                                MKDONE: RSET


                                ;;*****************************************************************
                                ;*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.
                                ;*
                                ;;*****************************************************************
                                TST30:  SCOPE
                                        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
                                ML=$TN-1
                                                                ;SET THE SKAD REGISTER
                                        MOV     #TST31,SKAD     ;IN CASE THE TEST ABORTS.

                                        MOVB    $TSTNM,$TMP0

                                        SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
                                        SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
                                        SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
                                        SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
                                        MOV     #MLERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
                                        MOV     #20,R4  ;PATTERN TO BE PUT IN MAINT. REG.
                                        MOV     #MAINT,R2
                                        MOV     #SCM1,@#CONTRL  ;FORCE SELECT GROUP 0 AND
                                                                ;FORCE MISS THE OTHER
                                                                ;GROUP
                                        MOV     #ML1,R5         ;MAKE ML1 A HIT IN
                                        TST     (R5)            ;GROUP GP.
                                        TST     (R5)

                                                                ;SEE IF REFERENCE ADDRESS
                                        BIT     #10,@#HITMIS    ;IS A HIT.
                                        BNE     1$
                                                                ;IF NOT ERROR!
                                        MOV     R5,$TMP2
                                        MOV     #0,$TMP1
                                        ERROR   1

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

```
014316  000240                      1$:     NOP                     ;PUT THE PATTERN IN THE
014320  010412                              MOV     R4,(R2)         ;MAINTENANCE REGISTER.
014322  005012                      ML1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                                    ;INSTRUCTION SHOULD CAUSE
                                                                    ;A PARITY ERROR IN THE
                                                                    ;CACHE DATA MEMORY GROUP GP.


014324                              ML2:                            ;REPORT ERROR.  MAINTENANCE
014324  010437  001230                      MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                    ;CAUSE ERROR.
014330  104127                      1$:     ERROR   127
014332  012737  177777  030760      MOV     #-1,MANFL2
014340  000500                              BR      MLDONE

014342  022737  004500  177744      MLERRO: CMP     #4500,@#MEMERR  ;DID THE ERROR REGISTER
014350  001042                              BNE     69$             ;SET PROPERLY?

014352  022626                      64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
014354  005037  177572              65$:    CLR     @#MMR0
014360  005037  172516                      CLR     @#MMR3
014364  012737  177777  177744              MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
014372  005737  177744                      TST     @#MEMERR        ;REGISTER.
014376  001416                              BEQ     68$

014400                              66$:                            ;ERROR REGISTER WON'T
014400  013737  177740  001230              MOV     @#LOADRS,$TMP2  ;CLEAR
014406  013737  177742  001232              MOV     @#HIADRS,$TMP3
014414  013737  177744  001234              MOV     @#MEMERR,$TMP4

014422  104130                      67$:    ERROR   130
014424  012737  177777  030740              MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
014432  000443                              BR      MLDONE

014434  022737  177740  177740      68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
014442  001356                              BNE     66$             ;UNLOCKED.
014444  022737  000003  177742              CMP     #3,@#HIADRS
014452  001352                              BNE     66$
014454  000432                              BR      MLDONE

014456                              69$:                            ;REPORT ERROR REGISTER
014456  012637  001230                      MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
014462  005726                              TST     (SP)+           ;RESET THE STACK.
014464  013737  177740  001232              MOV     @#LOADRS,$TMP3
014472  013737  177742  001234              MOV     @#HIADRS,$TMP4
014500  012737  000020  001236              MOV     #20,$TMP5
014506  012737  004500  001240              MOV     #4500,$TMP6
014514  013737  177744  001242              MOV     @#MEMERR,$TMP7

014522  104131                      70$:    ERROR   131
014524  012737  177777  030760              MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
014532  012737  177777  030754              MOV     #-1,MMRFL2
014540  000705                              BR      65$
014542  104416                      MLDONE: RSET
```

```
                                        ;;*****************************************************************
                                        ;*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.
                                        ;*
                                        ;;*****************************************************************
014544  000004                  TST31:  SCOPE
014546  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000031                  MN=$TN-1
                                                                ;SET THE SKAD REGISTER
014554  012737  015110  030524          MOV     #TST32,SKAD     ;IN CASE THE TEST ABORTS.

014562  113737  001102  001224          MOVB    $TSTNM,$TMP0

014570  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
014572  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
014574  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
014576  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
014600  012737  014736  000114          MOV     #NMERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
014606  012704  000040                  MOV     #40,R4  ;PATTERN TO BE PUT IN MAINT. REG.
014612  012702  177750                  MOV     #MAINT,R2
014616  012737  000030  177746          MOV     #SOM1,@#CONTRL  ;FORCE SELECT GROUP 0 AND
                                                                ;FORCE MISS THE OTHER
                                                                ;GROUP
014624  012705  014666                  MOV     #NM1,R5         ;MAKE NM1 A HIT IN
014630  005715                          TST     (R5)            ;GROUP 0P.
014632  005715                          TST     (R5)

                                                                ;SEE IF REFERENCE ADDRESS
014634  032737  000010  177752          BIT     #10,@#HITMIS    ;IS A "HIT".
014642  001007                          BNE     1$
                                                                ;IF NOT ERROR!
014644  010537  001230                  MOV     R5,$TMP2
014650  012737  000000  001226          MOV     #0,$TMP1
014656  104001                          ERROR   1

014660  104420                          SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

014662  000240                  1$:     NOP                     ;PUT THE PATTERN IN THE
014664  010412                          MOV     R4,(R2)         ;MAINTENANCE REGISTER.
014666  005012                  NM1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
                                                                ;INSTRUCTION SHOULD CAUSE
                                                                ;A PARITY ERROR IN THE
                                                                ;CACHE DATA MEMORY GROUP 0P.

014670                          NM2:                            ;REPORT ERROR.  MAINTENANCE
014670  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
014674  104127                  1$:     ERROR   127
```

```
 4365  014676  012737  177777  030760  MOV     #-1,MANFL2
 4366  014704  000500                  BR      NMDONE
 4367
 4368  014706  022737  004500  177744  NMERR0: CMP     #4500,@#MEMERR  ;DID THE ERROR REGISTER
 4369  014714  001042                  BNE     69$             ;SET PROPERLY?
 4370
 4371  014716  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
 4372  014720  005037  177572          65$:    CLR     @#MMR0
 4373  014724  005037  172516          CLR     @#MMR3
 4374  014730  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
 4375  014736  005737  177744          TST     @#MEMERR        ;REGISTER.
 4376  014742  001416                  BEQ     68$
 4377
 4378  014744                          66$:                    ;ERROR REGISTER WON'T
 4379  014744  013737  177740  001230  MOV     @#LOADRS,$TMP2  ;CLEAR
 4380  014752  013737  177742  001232  MOV     @#HIADRS,$TMP3
 4381  014760  013737  177744  001234  MOV     @#MEMERR,$TMP4
 4382
 4383  014766  104130                  67$:    ERROR   130
 4384  014770  012737  177777  030740  MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 4385  014776  000443                  BR      NMDONE
 4386
 4387  015000  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 4388  015006  001356                  BNE     66$             ;UNLOCKED.
 4389  015010  022737  000003  177742  CMP     #3,@#HIADRS
 4390  015016  001352                  BNE     66$
 4391  015020  000432                  BR      NMDONE
 4392
 4393  015022                          69$:                    ;REPORT ERROR REGISTER
 4394  015022  012637  001230          MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
 4395  015026  005726                  TST     (SP)+           ;RESET THE STACK.
 4396  015030  013737  177740  001232  MOV     @#LOADRS,$TMP3
 4397  015036  013737  177742  001234  MOV     @#HIADRS,$TMP4
 4398  015044  012737  000040  001236  MOV     #40,$TMP5
 4399  015052  012737  004500  001240  MOV     #4500,$TMP6
 4400  015060  013737  177744  001242  MOV     @#MEMERR,$TMP7
 4401
 4402  015066  104131                  70$:    ERROR   131
 4403  015070  012737  177777  030760  MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 4404  015076  012737  177777  030754  MOV     #-1,MMRFL2
 4405  015104  000705                  BR      65$
 4406  015106  104416                  NMDONE: RSET
 4407
 4408
 4409                                  ;;**********+**********************************************************
 4410                                  ;*TEST 32        CACHE MAINTENANCE AND ERROR REGISTERS TEST 16
 4411                                  ;*
 4412                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
 4413                                  ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE
 4414                                  ;*LOW BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
 4415                                  ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
 4416                                  ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
 4417                                  ;*TO THE CACHE.
 4418                                  ;*
 4419                                  ;;**********************************************************************
 4420  015110  000004                  TST32:  SCOPE
```

```
015112  012737  000040  001274            MOV     #40,$TIMES          ;;DO 40 ITERATIONS
        000032                    M0=$TN-1
                                                                      ;SET THE SKAD REGISTER
015120  012737  015454  030524            MOV     #TST33,SKAD         ;IN CASE THE TEST ABORTS.

015126  113737  001102  001224            MOVB    $TSTNM,$TMP0

015134  104430                            SKPBER              ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
015136  104432                            SKPBCN              ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
015140  104434                            SKPBMN              ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
015142  104436                            SKPBHM              ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
015144  012737  015252  000114            MOV     #MOERRO,@#CACHVEC        ;SET UP FOR THE ERROR.
015152  012704  000100                    MOV     #100,R4 ;PATTERN TO BE PUT IN MAINT. REG.
015156  012702  177750                    MOV     #MAINT,R2
015162  012737  000044  177746            MOV     #S1M0,@#CONTRL      ;FORCE SELECT GROUP 1 AND
                                                                      ;FORCE MISS THE OTHER
                                                                      ;GROUP
015170  012705  015232                    MOV     #M01,R5             ;MAKE M01 A HIT IN
015174  005715                            TST     (R5)                ;GROUP GP.
015176  005715                            TST     (R5)

                                                                      ;SEE IF REFERENCE ADDRESS
015200  032737  000010  177752            BIT     #10,@#HITMIS        ;IS A HIT.
015206  001007                            BNE     1$
                                                                      ;IF NOT ERROR!
015210  010537  001230                    MOV     R5,$TMP2
015214  012737  000001  001226            MOV     #1,$TMP1
015222  104001                            ERROR   1

015224  104420                            SKIPT                       ;ERROR FATAL. GO TO NEXT TEST.

015226  000240                    1$:     NOP                         ;PUT THE PATTERN IN THE
015230  010412                            MOV     R4,(R2)             ;MAINTENANCE REGISTER.
015232  005012                    M01:    CLR     (R2)                ;THE FETCH OF THIS NEXT
                                                                      ;INSTRUCTION SHOULD CAUSE
                                                                      ;A PARITY ERROR IN THE
                                                                      ;CACHE DATA MEMORY GROUP GP.


015234                            M02:                                ;REPORT ERROR.  MAINTENANCE
015234  010437  001230                    MOV     R4,$TMP2            ;FUNCTION FAILED TO
                                                                      ;CAUSE ERROR.
015240  104127                    1$:     ERROR   127
015242  012737  177777  030760    MOV     #-1,MANFL2
015250  000500                            BR      MODONE

015252  022737  004600  177744    MOERRO: CMP     #4600,@#MEMERR      ;DID THE ERROR REGISTER
015260  001042                            BNE     69$                 ;SET PROPERLY?

015262  022626                    64$:    CMP     (SP)+,(SP)+         ;RESET THE STACK
015264  005037  177572            65$:    CLR     @#MMR0
015270  005037  172516                    CLR     @#MMR3
015274  012737  177777  177744            MOV     #-1,@#MEMERR        ;TRY TO CLEAR THE ERROR
015302  005737  177744                    TST     @#MEMERR            ;REGISTER.
015306  001416                            BEQ     68$
```

```
 4477  015310                          66$:                                    ;ERROR REGISTER WON'T
 4478  015310  013737  177740  001230          MOV     @#LOADRS,$TMP2          ;CLEAR
 4479  015316  013737  177742  001232          MOV     @#HIADRS,$TMP3
 4480  015324  013737  177744  001234          MOV     @#MEMERR,$TMP4
 4481
 4482  015332  104130                  67$:    ERROR   130
 4483  015334  012737  177777  030740          MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
 4484  015342  000443                          BR      MODONE
 4485
 4486  015344  022737  177740  177740  68$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
 4487  015352  001356                          BNE     66$                     ;UNLOCKED.
 4488  015354  022737  000003  177742          CMP     #3,@#HIADRS
 4489  015362  001352                          BNE     66$
 4490  015364  000432                          BR      MODONE
 4491
 4492  015366                          69$:                                    ;REPORT ERROR REGISTER
 4493  015366  012637  001230                  MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
 4494  015372  005726                          TST     (SP)+                   ;RESET THE STACK.
 4495  015374  013737  177740  001232          MOV     @#LOADRS,$TMP3
 4496  015402  013737  177742  001234          MOV     @#HIADRS,$TMP4
 4497  015410  012737  000100  001236          MOV     #100,$TMP5
 4498  015416  012737  004600  001240          MOV     #4600,$TMP6
 4499  015424  013737  177744  001242          MOV     @#MEMERR,$TMP7
 4500
 4501  015432  104131                  70$:    ERROR   131
 4502  015434  012737  177777  030760          MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
 4503  015442  012737  177777  030754          MOV     #-1,MMRFL2
 4504  015450  000705                          BR      65$
 4505  015452  104416          MODONE: RSET
 4506
 4507
 4508                                  ;;**************************************************************
 4509                                  ;*TEST 33       CACHE MAINTENANCE AND ERROR REGISTERS TEST 17
 4510                                  ;*
 4511                                  ;*THIS IS A TEST OF THE MAINTENANCE REGISTER'S ABILITY
 4512                                  ;*TO FORCE A PARITY ERROR IN THE CACHE DATA MEMORY OF GROUP ONE, FOR THE
 4513                                  ;*HIGH BYTE OF THE DATA WORD. ALSO TESTED IS THE ERROR REGISTER'S
 4514                                  ;*ABILITY TO SET CORRECTLY FOR THIS ERROR.
 4515                                  ;*THE REFERENCE RESULTING IN THIS ERROR IS MADE DIRECTLY FROM THE CPU
 4516                                  ;*TO THE CACHE.
 4517                                  ;*
 4518                                  ;;**************************************************************
 4519  015454  000004          TST33:  SCOPE
 4520  015456  012737  000040  001274          MOV     #40,$TIMES              ;;DO 40 ITERATIONS
 4521           000033          MP=$TN-1
 4522                                                                          ;SET THE SKAD REGISTER
 4523  015464  012737  016020  030524          MOV     #TST34,SKAD             ;IN CASE THE TEST ABORTS.
 4524
 4525  015472  113737  001102  001224          MOVB    $TSTNM,$TMP0
 4526
 4527  015500  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4528  015502  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4529  015504  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 4530  015506  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4531  015510  012737  015616  000114          MOV     #MPERRO,@#CACHVEC       ;SET UP FOR THE ERROR.
 4532  015516  012704  000200                  MOV     #200,R4 ;PATTERN TO BE PUT IN MAINT. REG.
```

```
4533  015522  012702  177750                MOV     #MAINT,R2
4534  015526  012737  000044  177746        MOV     #SIMO.@#CONTRL  ;FORCE SELECT GROUP 1 AND
4535                                                                ;FORCE MISS THE OTHER
4536                                                                ;GROUP
4537  015534  012705  015576                MOV     #MP1,R5         ;MAKE MP1 A HIT IN
4538  015540  005715                        TST     (R5)            ;GROUP GP.
4539  015542  005715                        TST     (R5)
4540
4541                                                                ;SEE IF REFERENCE ADDRESS
4542  015544  032737  000010  177752        BIT     #10,@#HITMIS    ;IS A HIT.
4543  015552  001007                        BNE     1$
4544                                                                ;IF NOT ERROR!
4545  015554  010537  001230                MOV     R5,$TMP2
4546  015560  012737  000001  001226        MOV     #1,$TMP1
4547  015566  104001                        ERROR   1
4548
4549  015570  104420                        SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
4550
4551  015572  000240                1$:     NOP                     ;PUT THE PATTERN IN THE
4552  015574  010412                        MOV     R4,(R2)         ;MAINTENANCE REGISTER.
4553  015576  005012                MP1:    CLR     (R2)            ;THE FETCH OF THIS NEXT
4554                                                                ;INSTRUCTION SHOULD CAUSE
4555                                                                ;A PARITY ERROR IN THE
4556                                                                ;CACHE DATA MEMORY GROUP GP.
4557
4558
4559  015600                        MP2:                            ;REPORT ERROR.  MAINTENANCE
4560  015600  010437  001230                MOV     R4,$TMP2        ;FUNCTION FAILED TO
4561                                                                ;CAUSE ERROR.
4562  015604  104127                1$:     ERROR   127
4563  015606  012737  177777  030760  MOV   #-1,MANFL2
4564  015614  000500                        BR      MPDONE
4565
4566  015616  022737  004600  177744  MPERRO: CMP   #4600,@#MEMERR  ;DID THE ERROR REGISTER
4567  015624  001042                        BNE     69$             ;SET PROPERLY?
4568
4569  015626  022626                64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
4570  015630  005037  177572        65$:    CLR     @#MMR0
4571  015634  005037  172516                CLR     @#MMR3
4572  015640  012737  177777  177744        MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
4573  015646  005737  177744                TST     @#MEMERR        ;REGISTER.
4574  015652  001416                        BEQ     68$
4575
4576  015654                        66$:                            ;ERROR REGISTER WON'T
4577  015654  013737  177740  001230        MOV     @#LOADRS,$TMP2  ;CLEAR
4578  015662  013737  177742  001232        MOV     @#HIADRS,$TMP3
4579  015670  013737  177744  001234        MOV     @#MEMERR,$TMP4
4580
4581  015676  104130                67$:    ERROR   130
4582  015700  012737  177777  030740        MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
4583  015706  000443                        BR      MPDONE
4584
4585  015710  022737  177740  177740  68$:    CMP   #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
4586  015716  001356                        BNE     66$             ;UNLOCKED.
4587  015720  022737  000003  177742        CMP     #3,@#HIADRS
4588  015726  001352                        BNE     66$
```

```
 4589  015730  000432                          BR      MPDONE
 4590
 4591  015732                          69$:                                    ;REPORT ERROR REGISTER
 4592  015732  012637  001230                  MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
 4593  015736  005726                          TST     (SP)+                   ;RESET THE STACK.
 4594  015740  013737  177740  001232          MOV     @#LOADRS,$TMP3
 4595  015746  013737  177742  001234          MOV     @#HIADRS,$TMP4
 4596  015754  012737  000200  001236          MOV     #200,$TMP5
 4597  015762  012737  004600  001240          MOV     #4600,$TMP6
 4598  015770  013737  177744  001242          MOV     @#MEMERR,$TMP7
 4599
 4600  015776  104131                  70$:    ERROR   131
 4601  016000  012737  177777  030760          MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
 4602  016006  012737  177777  030754          MOV     #-1,MMRFL2
 4603  016014  000705                          BR      65$
 4604  016016  104416                  MPDONE: RSET
 4605
 4606
 4607
 4608
 4609
 4610                                  ;;**************************************************************
 4611                                  ;*TEST 34       CACHE MAINTENANCE AND ERROR REGISTERS TEST 20
 4612                                  ;*
 4613                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
 4614                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
 4615                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
 4616                                  ;*THE MAINTENANCE REGISTER IS USED TO MAKE THAT REFERENCE CAUSE A
 4617                                  ;*MAIN MEMORY ADDRESS AND CONTROL LINES PARITY ERROR ON THE
 4618                                  ;*MAIN MEMORY BUS.
 4619                                  ;*
 4620                                  ;**************************************************************
 4621  016020  000004                  TST34:  SCOPE
 4622  016022  012737  000040  001274          MOV     #40,$TIMES              ;;DO 40 ITERATIONS
 4623          000034                  MR=$TN-1
 4624                                                                          ;SET THE SKAD REGISTER
 4625  016030  012737  016450  030524          MOV     #TST35,SKAD             ;IN CASE THE TEST ABORTS.
 4626
 4627  016036  113737  001102  001224          MOVB    $TSTNM,$TMP0
 4628
 4629  016044  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4630  016046  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4631  016050  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 4632  016052  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4633  016054  104422                          MMSKIP
 4634  016056  012737  016240  000114          MOV     #MRERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
 4635  016064  012737  030352  000004          MOV     #CPSPUR,@#ERRVEC        ;NOTE THAT WHEN THIS ERROR
 4636                                                                          ;ON THE MAIN MEMORY ADDRESS
 4637                                                                          ;AND CONTROL LINES OCCURS
 4638                                                                          ;A TIME OUT WILL RESULT ON THE
 4639                                                                          ;UNIBUS!! THIS WILL CAUSE A
 4640                                                                          ;TRAP TO VECTOR ERRVEC BEFORE
 4641                                                                          ;THE TRAP TO CACHVEC OCCURS! BOTH
 4642                                                                          ;WILL OCCUR!
 4643  016072  012746  177777                  MOV     #-1,-(SP)               ;PUT A MARKER ON THE STACK
 4644
```

```
4645  016076  012700  172340              MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
4646                                                              ;TO RELOCATE EVERYTHING
4647  016102  012702  172300              MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
4648  016106  012703  000007              MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
4649  016112  005004                      CLR     R4              ;BY PASSIVELY IS MEANT
4650  016114  012705  170200              MOV     #MAPL00,R5      ;THAT ADDRESS ARE
4651                                                              ;RELOCATED TO THEMSELVES.
4652  016120  012722  077406      64$:    MOV     #77406,(R2)+
4653  016124  010401                      MOV     R4,R1
4654  016126  072127  000006              ASH     #6,R1
4655  016132  010125                      MOV     R1,(R5)+
4656  016134  005025                      CLR     (R5)+
4657  016136  010410                      MOV     R4,(R0)
4658  016140  062720  170000              ADD     #170000,(R0)+
4659  016144  062704  000200              ADD     #200,R4
4660  016150  077315                      SOB     R3,64$
4661  016152  012710  177600              MOV     #177600,(R0)
4662  016156  012712  077406              MOV     #77406,(R2)
4663
4664  016162  012737  000060  172516      MOV     #60,@#MMR3              ;TURN ON THE MAPPING BOX AND
4665  016170  012737  000001  177572      MOV     #1,@#MMR0               :ENABLE 22 BIT MODE ADDRESSING.
4666
4667  016176  012737  000014  177746      MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
4668  016204  012702  177750              MOV     #MAINT,R2
4669  016210  000240                      NOP                             ;FOR SCOPING WITH AN OSCILLOSCOPE!
4670  016212  012712  000002              MOV     #2,(R2)                 ;SET UP THE FORCE ERROR BIT IN
4671                                                                      ;THE MAINTENANCE REGISTER.
4672  016216  005012                      CLR     (R2)                    ;THE FETCH OF THIS INSTRUCTION
4673                                                                      ;SHOULD RESULT IN A PARITY ERROR
4674                                                                      ;ON THE MAIN MEMORY ADDRESS AND CONTROL
4675                                                                      ;LINES. BECAUSE THIS REFERENCE
4676                                                                      ;IS BEING MADE OVER THE UNIBUS
4677                                                                      ;A UNIBUS TIME OUT WILL OCCUR
4678                                                                      ;RESULTING IN AN ABORT TO VECTOR
4679                                                                      ;ERRVEC. THEN IMMEDIATELY FOLLOWING
4680                                                                      ;THIS ABORT TO ERRVEC, THE
4681                                                                      ;PARITY ERROR WILL CAUSE A TRAP
4682                                                                      ;TO CACHVEC!!!
4683
4684  016220                      MR1:                                    ;REPORT FAILURE OF THE MAINTENANCE
4685  016220  012737  000002  001230        MOV     #2,$TMP2            ;TO FORCE THE ERROR.
4686  016226  104127              1$:     ERROR   127
4687  016230  012737  177777  030760        MOV     #-1,MANFL2
4688  016236  000503                      BR      MRDONE
4689
4690  016240  022766  177777  000010  MRERR0: CMP     #-1,10(SP)          ;DID 2 TRAPS OCCUR? SEE WHERE
4691                                                                      ;THE MARKER IS ON THE STACK!
4692  016246  001401                      BEQ     MR2
4693  016250  104000                      EPROR
4694
4695  016252  022737  002402  177744  MR2:    CMP     #2402,@#MEMERR      ;DID THE ERROR REGISTER GET
4696  016260  001430                      BEQ     MR3                     ;SET CORRECTLY.
4697
4698                                                                      ;IF NOT REPORT THE ERROR.
4699  016262  022626                      CMP     (SP)+,(SP)+
4700  016264  012637  001230              MOV     (SP)+,$TMP2
```

```
4701  016270  022626                        CMP     (SP)+,(SP)+
4702  016272  013737  177740  001232        MOV     @#LOADRS,$TMP3
4703  016300  013737  177742  001234        MOV     @#HIADRS,$TMP4
4704  016306  012737  000002  001236        MOV     #2,$TMP5
4705  016314  012737  002402  001240        MOV     #2402,$TMP6
4706  016322  013737  177744  001242        MOV     @#MEMERR,$TMP7
4707  016330  104131                1$:     ERROR   131
4708  016332  012737  177777  030760        MOV     #-1,MANFL2
4709  016340  000402                        BR      MR4
4710
4711  016342  062706  000012        MR3:    ADD     #12,SP                  ;RESET THE STACK.
4712
4713  016346  005037  177572        MR4:    CLR     @#MMR0
4714  016352  005037  172516                CLR     @#MMR3
4715  016356  012737  177777  177744        MOV     #-1,@#MEMERR            ;TRY TO CLR THE ERROR REG.
4716  016364  005737  177744                TST     @#MEMERR
4717  016370  001416                        BEQ     MR6
4718
4719  016372                        MR5:                                    ;THE ERROR REGISTER WON'T CLR.
4720  016372  013737  177740  001230        MOV     @#LOADRS,$TMP2
4721  016400  013737  177742  001232        MOV     @#HIADRS,$TMP3
4722  016406  013737  177744  001234        MOV     @#MEMERR,$TMP4
4723  016414  104130                1$:     ERROR   130
4724  016416  012737  177777  030740        MOV     #-1,MMRFLG
4725  016424  000410                        BR      MRDONE
4726
4727  016426  022737  177740  177740  MR6:  CMP     #177740,@#LOADRS        ;SEE IF THE ADDRESS REGISTER
4728  016434  001356                        BNE     MR5                     ;GOT RESET.
4729  016436  022737  000003  177742        CMP     #3,@#HIADRS
4730  016444  001352                        BNE     MR5
4731
4732  016446  104416                MRDONE: RSET
4733
4734                                        ;;*****************************************************************
4735                                        ;*TEST 35       CACHE MAINTENANCE AND ERROR REGISTERS TEST 21
4736                                        ;*
4737                                        ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
4738                                        ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
4739                                        ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
4740                                        ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A MAIN MEMORY DATA
4741                                        ;*PARITY ERROR ON THAT REFERENCE WHICH IS TO AN EVEN WORD IN THE
4742                                        ;*PAIR, WHICH IS ALSO THE WANTED WORD.
4743                                        ;*
4744                                        ;;*****************************************************************
4745  016450  000004                TST35:  SCOPE
4746  016452  012737  000040  001274        MOV     #40,$TIMES              ;;DO 40 ITERATIONS
4747          000035                MS=$TN-1
4748                                                                        ;SET THE SKAD REGISTER
4749  016460  012737  017070  030524        MOV     #TST36,SKAD             ;IN CASE THE TEST ABORTS.
4750
4751  016466  113737  001102  001224        MOVB    $TSTNM,$TMP0
4752
4753  016474  104430                        SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
4754  016476  104432                        SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
4755  016500  104434                        SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
4756  016502  104436                        SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
```

```
                                        MMSKIP
016504  104422
016506  012737  016666  000114        MOV     #MSERR0,@#CACHVEC       ;SET UP FOR THE ERROR

016514  012700  172340                MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                              ;TO RELOCATE EVERYTHING
016520  012702  172300                MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
016524  012703  000007                MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
016530  005004                        CLR     R4              ;BY PASSIVELY IS MEANT
016532  012705  170200                MOV     #MAPLOC,R5      ;THAT ADDRESS ARE
                                                              ;RELOCATED TO THEMSELVES.
016536  012722  077406        64$:    MOV     #77406,(R2)+
016542  010401                        MOV     R4,R1
016544  072127  000006                ASH     #6,R1
016550  010125                        MOV     R1,(R5)+
016552  005025                        CLR     (R5)+
016554  010410                        MOV     R4,(R0)
016556  062720  170000                ADD     #170000,(R0)+
016562  062704  000200                ADD     #200,R4
016566  077315                        SOB     R3,64$
016570  012710  177600                MOV     #177600,(R0)
016574  012712  077406                MOV     #77406,(R2)

016600  012737  000060  172516        MOV     #60,@#MMR3              ;TURN THE MAP AND ENABLE
016606  012737  000001  177572        MOV     #1,@#MMR0               ;22 BIT MODE ADDRESSING.
016614  012704  010000                MOV     #10000,R4               ;PATTERN FOR THE MAINTENANCE
016620  012702  177750                MOV     #MAINT,R2               ;REGISTER.
016624  012737  000014  177746        MOV     #M1M0,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
016632  000402                        BR      MS1

                                        LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        016634                          LOC=-4&LOC
        016634                          LOC=LOC+4
        016640                          .=LOC

016640  000240                MS1:    NOP
016642  010412                        MOV     R4,(R2)                 ;TURN ON THE MAINTENANCE REGISTER.
016644  005701                MS2:    TST     R1
016646  005012                        CLR     (R2)

016650                        MS3:                                    ;REPORT ERROR.  MAINTENANCE
016650  010437  001230                MOV     R4,$TMP2                ;FUNCTION FAILED TO
                                                                      ;CAUSE ERROR.
016654  104127                1$:     ERROR   127
016656  012737  177777  030760  MOV   #-1,MANFL2
016664  000500                        BR      MSDONE

016666  022737  023404  177744  MSER0:  CMP     #23404,@#MEMERR ;DID THE ERROR REGISTER
016674  001042                        BNE     69$             ;SET PROPERLY?

016676  022626                64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
016700  005037  177572        65$:    CLR     @#MMR0
016704  005037  172516                CLR     @#MMR3
016710  012737  177777  177744        MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
016716  005737  177744                TST     @#MEMERR        ;REGISTER.
016722  001416                        BEQ     68$
```

```
                                66$:                                    ;ERROR REGISTER WON'T
016724                                  MOV     @#LOADRS,$TMP2          ;CLEAR
016734                                  MOV     @#HIADRS,$TMP3
016744                                  MOV     @#MEMERR,$TMP4

016746 104130                   67$:    ERROR   130
016752 012737  177777 030740            MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
016760 000443                           BR      MSDONE

016762 012737  177740 177740    68$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
016770 001356                           BNE     66$                     ;UNLOCKED.
016772 012737  000003 177742            CMP     #3,@#HIADRS
017000 001352                           BNE     66$
017002 000432                           BR      MSDONE

                                69$:                                    ;REPORT ERROR REGISTER
017004 012637  001230                   MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
017010 005726                           TST     (SP)+                   ;RESET THE STACK.
017012 013737  177740 001232            MOV     @#LOADRS,$TMP3
017020 013737  177742 001234            MOV     @#HIADRS,$TMP4
017026 012737  010000 001236            MOV     #10000,$TMP5
017034 012737  023404 001240            MOV     #23404,$TMP6
017042 013737  177744 001242            MOV     @#MEMERR,$TMP7

017050 104131                   70$:    ERROR   131
017052 012737  177777 030760            MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
017060 012737  177777 030754            MOV     #-1,MMRFL2
017066 000705                           BR      65$
017070 104416                   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.
                        ;*
                        ;;*****************************************************************
017072 000004           TST36:  SCOPE
017074 012737  000040 001274            MOV     #40,$TIMES              ;;DO 40 ITERATIONS
                000036  MT=$TN-1
                                                                        ;SET THE SKAD REGISTER
017102 012737  017516 030524            MOV     #TST37,SKAD             ;IN CASE THE TEST ABORTS.

017110 113737  001102 001224            MOVB    $TSTNM,$TMP0

017116 104430                           SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
017120 104432                           SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
017122 104434                           SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
017124 104436                           SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
017126 104422                           MMSKIP

017130 012700  172340                   MOV     #KIPAR0,R0              ;SET UP MEMORY MANAGEMENT
```

```
                                                        ;TO RELOCATE EVERYTHING
017132  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
017136  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
017142  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
017144  012705  170200                  MOV     #MAPL00,R5      ;THAT ADDRESS ARE
                                                        ;RELOCATED TO THEMSELVES.
017150  012722  077406          64$:    MOV     #77406,(R2)+
017154  010401                          MOV     R4,R1
017156  072127  000006                  ASH     #6,R1
017162  010125                          MOV     R1,(R5)+
017164  005025                          CLR     (R5)+
017166  010410                          MOV     R4,(R0)
017170  062720  170000                  ADD     #170000,(R0)+
017174  062704  000200                  ADD     #200,R4
017200  077315                          SOB     R3,64$
017202  012710  177600                  MOV     #177600,(R0)
017206  012712  077406                  MOV     #77406,(R2)

017212  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND 22-BIT
017220  012737  000001  177572          MOV     #1,@#MMR0       ;MODE ADDRESSING.
017226  012737  017312  000114          MOV     #MTERR0,@#CACHVEC       ;SET UP FOR THE ERROR.
017234  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
017242  012704  040000                  MOV     #40000,R4       ;PATTERN TO BE PUT IN MAINT.
017246  012702  177750                  MOV     #MAINT,R2       ;REG.
017252  000403                          BR      MT1

        017254                          LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        017254                          LOC=-4&LOC
        017260                          LOC=LOC+4
        017260                          .=LOC

017260  000240                          NOP
017262  000240                  MT1:    NOP                     ;NOP FOR SCOPING WITH AN OSCILLOSCOPE!!
017264  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
017266  005701                          TST     R1              ;THE REFERENCE TO THIS INSTRUCTION SHOULD CAUSE A PARITY
017270  005012                          CLR     (R2)            ;ABORT CAUSED BY DETECTION OF BAD PARITY ON
017272  000240                          NOP                     ;THE WANTED, ODD, WORD IN THIS PAIR.


017274                          MT2:                            ;REPORT ERROR.  MAINTENANCE
017274  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
017300  104127                  1$:     ERROR   127
017302  012737  177777  030760  MOV     #-1,MANFL2
017310  000500                          BR      MTDONE

017312  022737  023410  177744  MTERR0: CMP     #23410,@#MEMERR ;DID THE ERROR REGISTER
017320  001042                          BNE     69$             ;SET PROPERLY?

017322  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
017324  005037  177572          65$:    CLR     @#MMR0
017330  005037  172516                  CLR     @#MMR3
017334  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
017342  005737  177744                  TST     @#MEMERR        ;REGISTER.
017346  001416                          BEQ     69$
```

```
 4925  017350                          66$:                                    ;ERROR REGISTER WON'T
 4926  017350  013737  177740  001230          MOV     @#LOADRS,$TMP2          ;CLEAR
 4927  017356  013737  177742  001232          MOV     @#HIADRS,$TMP3
 4928  017364  013737  177744  001234          MOV     @#MEMERR,$TMP4
 4929
 4930  017372  104130                  67$:    ERROR   130
 4931  017374  012737  177777  030740          MOV     #-1,MMRFLG              ;SIGNAL BAD REGISTER
 4932  017402  000443                          BR      MTDONE
 4933
 4934  017404  022737  177740  177740  69$:    CMP     #177740,@#LOADRS        ;SEE IF ADDRESS REGISTER
 4935  017412  001356                          BNE     66$                     ;UNLOCKED.
 4936  017414  022737  000003  177742          CMP     #3,@#HIADRS
 4937  017422  001352                          BNE     66$
 4938  017424  000432                          BR      MTDONE
 4939
 4940  017426                          69$:                                    ;REPORT ERROR REGISTER
 4941  017426  012637  001230                  MOV     (SP)+,$TMP2             ;NOT SET AS EXPECTED.
 4942  017432  005726                          TST     (SP)+                   ;RESET THE STACK.
 4943  017434  013737  177740  001232          MOV     @#LOADRS,$TMP3
 4944  017442  013737  177742  001234          MOV     @#HIADRS,$TMP4
 4945  017450  012737  040000  001236          MOV     #40000,$TMP5
 4946  017456  012737  023410  001240          MOV     #23410,$TMP6
 4947  017464  013737  177744  001242          MOV     @#MEMERR,$TMP7
 4948
 4949  017472  104131                  70$:    ERROR   131
 4950  017474  012737  177777  030760          MOV     #-1,MANFL2              ;SIGNAL BAD REGISTER
 4951  017502  012737  177777  030754          MOV     #-1,MMRFL2
 4952  017510  000705                          BR      65$
 4953  017512  104416                  MTDONE: RSET
 4954
 4955                                          ;;*****************************************************************
 4956                                          ;*TEST 37       CACHE MAINTENANCE AND ERROR REGISTERS TEST 23
 4957                                          ;*
 4958                                          ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
 4959                                          ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
 4960                                          ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
 4961                                          ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY
 4962                                          ;*PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE
 4963                                          ;*LOW BYTE OF THAT ADDRESS .
 4964                                          ;*
 4965                                          ;;*****************************************************************
 4966  017514  000004                  TST37:  SCOPE
 4967  017516  012737  000040  001274          MOV     #40,$TIMES              ;;DO 40 ITERATIONS
 4968          000037                  MU=$TN-1
 4969                                                                          ;SET THE SKAD REGISTER
 4970  017524  012737  020134  030524          MOV     #TST40,SKAD             ;IN CASE THE TEST ABORTS.
 4971
 4972  017532  113737  001102  001224          MOVB    $TSTNM,$TMP0
 4973
 4974  017540  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 4975  017542  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 4976  017544  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 4977  017546  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 4978  017550  104422                          MMSKIP
 4979
 4980  017552  012700  172340                  MOV     #KIPAR0,R0              ;SET UP MEMORY MANAGEMENT
```

```
                                                                ;TO RELOCATE EVERYTHING
017556  012702  172300                MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
017562  012703  000037                MOV     #7.R3           ;MAP PASSIVELY TO MEMORY,
017566  005004                        CLR     R4              ;BY PASSIVELY IS MEANT
017570  012705  170200                MOV     #MAPLOO,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
017574  012722  077406        64$:    MOV     #77406,(R2)+
017600  010401                        MOV     R4,R1
017602  072127  000006                ASH     #6,R1
017606  010125                        MOV     R1,(R5)+
017610  005025                        CLR     (R5)+
017612  010410                        MOV     R4,(R0)
017614  062720  170000                ADD     #170000,(R0)+
017620  062704  000200                ADD     #200,R4
017624  077315                        SOB     R3,64$
017626  012710  177600                MOV     #177600,(R0)
017632  012712  077406                MOV     #77406,(R2)

017636  012737  000060  172516        MOV     #60,@#MMR3      ;TURN ON THE MAP AND
017644  012737  000001  177572        MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
017652  012737  017732  000114        MOV     #MUERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
017660  012737  000030  177746        MOV     #SOM1,@#CONTR   ;SELECT GROUP ADDRESS
017666  012704  000400                MOV     #400,R4 ;PATTERN TO BE LOADED IN THE
017672  012702  177750                MOV     #MAINT,R2       ;MAINTENANCE REG.
017676  000403                        BR      MU1

                017700                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                017700                  LOC=-4$_00
                017704                  LOC=LOC+4
                017704                  .=LOC

017704  000240                  MU1:    NOP
017706  000240                  MU2:    NOP
017710  010412                          MOV     R4,(R2)         ;SET THE MAINT REG.
017712  005012                          CLR     (R2)            ;THIS FETCH SHOULD CAUSE
                                                                ;A PARITY ERROR IN GROUP
                                                                ;ADDRESS 0 MEMORY

017714                          MU2:                            ;REPORT ERROR.  MAINTENANCE
017714  013437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                ;CAUSE ERROR.
017720  104127                  1$:     ERROR   127
017722  012737  177777  030760  MOV     #-1,MANFL2
017730  000500                          BR      MUDONE

017732  022737  002420  177744  MUERR0: CMP     #2420,@#MEMERR  ;DID THE ERROR REGISTER
017740  001042                          BNE     69$             ;SET PROPERLY?

017742  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
017744  005037  177572          65$:    CLR     @#MMR0
017750  005037  172516                  CLR     @#MMR3
017754  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
017762  005737  177744                  TST     @#MEMERR        ;REGISTER.
017766  001416                          BEQ     68$

017770                          66$:                            ;ERROR REGISTER WON'T
```

```
 5037  017770  013737  177740  001230          MOV     @#LOADRS,$TMP2  ;CLEAR
 5038  017776  013737  177742  001232          MOV     @#HIADRS,$TMP3
 5039  020004  013737  177744  001234          MOV     @#MEMERR,$TMP4
 5040
 5041  020012  104130                  67$:    ERROR   130
 5042  020014  012737  177777  030740          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 5043  020022  000443                          BR      MUDONE
 5044
 5045  020024  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 5046  020032  001356                          BNE     66$             ;UNLOCKED.
 5047  020034  022737  000003  177742          CMP     #3,@#HIADRS
 5048  020042  001352                          BNE     66$
 5049  020044  000432                          BR      MUDONE
 5050
 5051  020046                          69$:                            ;REPORT ERROR REGISTER
 5052  020046  012637  001230                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
 5053  020052  005726                          TST     (SP)+           ;RESET THE STACK.
 5054  020054  013737  177740  001232          MOV     @#LOADRS,$TMP3
 5055  020062  013737  177742  001234          MOV     @#HIADRS,$TMP4
 5056  020070  012737  000400  001236          MOV     #400,$TMP5
 5057  020076  012737  002420  001240          MOV     #2420,$TMP6
 5058  020104  013737  177744  001242          MOV     @#MEMERR,$TMP7
 5059
 5060  020112  104131                  70$:    ERROR   131
 5061  020114  012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 5062  020122  012737  177777  030754          MOV     #-1,MMRFL2
 5063  020130  000705                          BR      65$
 5064  020132  104416                  MUDONE: RSET
 5065
 5066                                          ;;*****************************************************************
 5067                                          ;*TEST 40       CACHE MAINTENANCE AND ERROR REGISTERS TEST 24
 5068                                          ;*
 5069                                          ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
 5070                                          ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
 5071                                          ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
 5072                                          ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE ADDRESS MEMORY
 5073                                          ;*PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE
 5074                                          ;*LOW BYTE OF THAT ADDRESS .
 5075                                          ;*
 5076                                          ;;*****************************************************************
 5077  020134  000004                  TST40:  SCOPE
 5078  020136  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 5079          000040                  MV=$TN-1
 5080                                                                  ;SET THE SKAD REGISTER
 5081  020144  012737  020554  030524          MOV     #TST41,SKAD     ;IN CASE THE TEST ABORTS.
 5082
 5083  020152  113737  001102  001224          MOVB    $TSTNM,$TMP0
 5084
 5085  020160  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 5086  020162  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 5087  020164  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 5088  020166  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 5089  020170  104422                          MMSKIP
 5090
 5091  020172  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
 5092                                                                  ;TO RELOCATE EVERYTHING
```

```
5093  020176  012702  172300          MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
5094  020202  012703  000007          MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
5095  020206  005004                  CLR     R4              ;BY PASSIVELY IS MEAN
5096  020210  012705  170200          MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
5097                                                          ;RELOCATED TO THEMSELVES.
5098  020214  012722  077405  64$:    MOV     #77406,-(R2)+
5099  020220  010401                  MOV     R4,R1
5100  020222  072127  000006          ASH     #6,R1
5101  020226  010125                  MOV     R1,(R5)+
5102  020230  005025                  CLR     (R5)+
5103  020232  010410                  MOV     R4,(R0)
5104  020234  062720  170000          ADD     #170000,(R0)+
5105  020240  062704  000200          ADD     #200,R4
5106  020244  077315                  SOB     R3,64$
5107  020246  012710  177600          MOV     #177600,(R0)
5108  020252  012712  077406          MOV     #77406,(R2
5109
5110  020256  012737  000060  172516  MOV     #60,@#MMR3      ;TURN ON THE MAP AND
5111  020264  012737  000001  177572  MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
5112  020272  012737  020352  000114  MOV     #MVERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
5113  020300  012737  000044  177746  MOV     #S1M0,@#CONTRL  ;SELECT GROUP ADDRESS
5114  020306  012704  002000          MOV     #2000,R4        ;PATTERN TO BE LOADED IN THE
5115  020312  012702  177750          MOV     #MAINT,R2       ;MAINTENANCE REG.
5116  020316  000403                  BR      MV1
5117
5118          020320                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5119          020320                  LOC=-4$LOC
5120          020324                  LOC=LOC+4
5121          020324                  .=LOC
5122
5123  020324  000240                  NOP
5124  020326  000240          MV1:    NOP
5125  020330  010412                  MOV     R4, R2          ;SET THE MAINT REG.
5126  020332  005012                  CLR     (R2)            ;THIS FETCH SHOULD CAUSE
5127                                                          ;A PARITY ERROR IN GROUP
5128                                                          ;ADDRESS 1 MEMORY
5129
5130  020334          MV2:                                    ;REPORT ERROR.  MAINTENANCE
5131  020334  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
5132                                                          ;CAUSE ERROR.
5133  020340  104127          1$:     ERROR   127
5134  020342  012737  177777  030760  MOV     #-1,MANFL2
5135  020350  000500                  BR      MVDONE
5136
5137  020352  022737  002440  177744  MVERR0: CMP     #2440,@#MEMERR  ;DID THE ERROR REGISTER
5138  020360  001042                  BNE     69$             ;SET PROPERLY?
5139
5140  020362  022626          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
5141  020364  005037  177572  65$:    CLR     @#MMR0
5142  020370  005037  172516          CLR     @#MMR3
5143  020374  012737  177777  177744  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
5144  020402  005737  177744          TST     @#MEMERR        ;REGISTER.
5145  020406  001416                  BEQ     68$
5146
5147  020410          66$:                                    ;ERROR REGISTER WON'T
5148  020410  013737  177740  001230          MOV     @#LOADRS,$TMP2  ;CLEAR
```

```
 5148  020416  013737  177742  001232          MOV     @#HIADRS,$TMP3
 5150  020424  013737  177744  001234          MOV     @#MEMERR,$TMP4
 5151
 5152  020432  104130                  67$:    ERROR   130
 5153  020434  012737  177777  030740          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
 5154  020442  000443                          BR      MVDONE
 5155
 5156  020444  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
 5157  020452  001356                          BNE     66$             ;UNLOCKED.
 5158  020454  022737  000003  177742          CMP     #3,@#HIADRS
 5159  020462  001352                          BNE     66$
 5160  020464  000432                          BR      MVDONE
 5161
 5162  020466                          69$:                            ;REPORT ERROR REGISTER
 5163  020466  012637  001230                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
 5164  020472  005726                          TST     (SP)+           ;RESET THE STACK.
 5165  020474  013737  177740  001232          MOV     @#LOADRS,$TMP3
 5166  020502  013737  177742  001234          MOV     @#HIADRS,$TMP4
 5167  020510  012737  002000  001236          MOV     #2000,$TMP5
 5168  020516  012737  002440  001240          MOV     #2440,$TMP6
 5169  020524  013737  177744  001242          MOV     @#MEMERR,$TMP7
 5170
 5171  020532  104131                  70$:    ERROR   131
 5172  020534  012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
 5173  020542  012737  177777  030754          MOV     #-1,MMRFL2
 5174  020550  000705                          BR      65$
 5175  020552  104416                  MVDONE: RSET
 5176
 5177                                  ;;**********************************************************
 5178                                  ;*TEST 41       CACHE MAINTENANCE AND ERROR REGISTERS TEST 25
 5179                                  ;*
 5180                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
 5181                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
 5182                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
 5183                                  ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY
 5184                                  ;*PARITY ERROR IN GROUP 0 ON THAT REFERENCE. THE ERROR IS ON THE
 5185                                  ;*LOW BYTE OF THAT DATA .
 5186                                  ;*
 5187                                  ;;**********************************************************
 5188  020554  000004                  TST41:  SCOPE
 5189  020556  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 5190          000041                  MW=$TN-1
 5191                                                                  ;SET THE SKAD REGISTER
 5192  020564  012737  021174  030524          MOV     #TST42,SKAD     ;IN CASE THE TEST ABORTS.
 5193
 5194  020572  113737  001102  001224          MOVB    $TSTNM,$TMP0
 5195
 5196  020600  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
 5197  020602  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
 5198  020604  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
 5199  020606  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
 5200  020610  104422                          MMSKIP
 5201
 5202  020612  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
 5203                                                                  ;TO RELOCATE EVERYTHING
 5204  020616  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
```

```
020622  012703  000007                          MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
020626  005004                                  CLR     R4              ;BY PASSIVELY IS MEANT
020630  012705  170200                          MOV     #MAPL00,R5      ;THAT ADDRESS ARE
                                                                        ;RELOCATED TO THEMSELVES.
020634  012722  077406                  64$:    MOV     #77406,(R2)+
020640  010401                                  MOV     R4,R1
020642  072127  000006                          ASH     #6,R1
020646  010125                                  MOV     R1,(R5)+
020650  005025                                  CLR     (R5)+
020652  010410                                  MOV     R4,(R0)
020654  062720  170000                          ADD     #170000,(R0)+
020660  062704  000200                          ADD     #200,R4
020664  077315                                  SOB     R3,64$
020666  012710  177600                          MOV     #177600,(R0)
020672  012712  077406                          MOV     #77406,(R2)

020676  012737  000060  172516                  MOV     #60,@#MMR3      ;TURN ON THE MAP AND
020704  012737  000001  177572                  MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
020712  012737  020772  000114                  MOV     #MWERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
020720  012737  000030  177746                  MOV     #SOM1,@#CONTRL  ;SELECT GROUP DATA
020726  012704  000020                          MOV     #20,R4  ;PATTERN TO BE LOADED IN THE
020732  012702  177750                          MOV     #MAINT,R2       ;MAINTENANCE REG.
020736  000403                                  BR      MW1

        020740                                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        020740                                  LOC=-4&LOC
        020744                                  LOC=LOC+4
        020744                                  .=LOC

020744  000240                                  NOP
020746  000240                          MW1:    NOP
020750  010412                                  MOV     R4, R2)         ;SET THE MAINT REG.
020752  005012                                  CLR     (R2)            ;THIS FETCH SHOULD CAUSE
                                                                        ;A PARITY ERROR IN GROUP
                                                                        ;DATA 0 MEMORY

020754                                  MW2:                            ;REPORT ERROR.  MAINTENANCE
020754  010437  001230                          MOV     R4,$TMP2        ;FUNCTION FAILED TO
                                                                        ;CAUSE ERROR.
020760  104127                          1$:     ERROR   127
020762  012737  177777  030760  MOV     #-1,MANFL2
020770  000500                                  BR      MWDONE

020772  022737  002500  177744  MWERR0: CMP     #2500,@#MEMERR  ;DID THE ERROR REGISTER
021000  001042                                  BNE     69$             ;SET PROPERLY?

021002  022626                          64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
021004  005037  177572                  65$:    CLR     @#MMR0
021010  005037  172516                          CLR     @#MMR3
021014  012737  177777  177744                  MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
021022  005737  177744                          TST     @#MEMERR        ;REGISTER.
021026  001416                                  BEQ     68$

021030                                  66$:                            ;ERROR REGISTER WON'T
021030  013737  177740  001230                  MOV     @#LOADRS,$TMP2  ;CLEAR
021036  013737  177742  001232                  MOV     @#HIADRS,$TMP3
```

```
5261  021044  013737  177744  001234          MOV     @#MEMERR,$TMP4
5262
5263  021052  104130                  67$:    ERROR   130
5264  021054  012737  177777  030740          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
5265  021062  000443                          BR      MWDONE
5266
5267  021064  022737  177740  177740  69$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
5268  021072  001356                          BNE     66$             ;UNLOCKED.
5269  021074  022737  000003  177742          CMP     #3,@#HIADRS
5270  021102  001352                          BNE     66$
5271  021104  000432                          BR      MWDONE
5272
5273  021106                          69$:                            ;REPORT ERROR REGISTER
5274  021106  012637  001230                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
5275  021112  005726                          TST     (SP)+           ;RESET THE STACK.
5276  021114  013737  177740  001232          MOV     @#LOADRS,$TMP3
5277  021122  013737  177742  001234          MOV     @#HIADRS,$TMP4
5278  021130  012737  000020  001236          MOV     #20,$TMP5
5279  021136  012737  002500  001240          MOV     #2500,$TMP6
5280  021144  013737  177744  001242          MOV     @#MEMERR,$TMP7
5281
5282  021152  104131                  70$:    ERROR   131
5283  021154  012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
5284  021162  012737  177777  030754          MOV     #-1,MMRFL2
5285  021170  000705                          BR      65$
5286  021172  104416                  MWDONE: RSET
5287
5288                                  ;;**************************************************************
5289                                  ;*TEST 42       CACHE MAINTENANCE AND ERROR REGISTERS TEST 26
5290                                  ;*
5291                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO SET CORRECTLY
5292                                  ;*AS THE RESULT OF A CPU REFERENCE WHICH RELOCATED THROUGH THE MEMORY
5293                                  ;*MANAGEMENT UNIT TO THE UNIBUS AND THROUGH THE UNIBUS MAP TO THE CACHE.
5294                                  ;*THE MAINTENANCE REGISTER IS USED TO CAUSE A CACHE DATA MEMORY
5295                                  ;*PARITY ERROR IN GROUP 1 ON THAT REFERENCE. THE ERROR IS ON THE
5296                                  ;*LOW BYTE OF THAT DATA .
5297                                  ;*
5298                                  ;;**************************************************************
5299  021174  000004                  TST42:  SCOPE
5300  021176  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
5301          000042                  MX=$TN-1
5302                                                                  ;SET THE SKAD REGISTER
5303  021204  012737  021614  030524          MOV     #TST43,SKAD     ;IN CASE THE TEST ABORTS.
5304
5305  021212  113737  001102  001224          MOVB    $TSTNM,$TMP0
5306
5307  021220  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
5308  021222  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
5309  021224  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
5310  021226  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
5311  021230  104422                          MMSKIP
5312
5313  021232  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
5314                                                                  ;TO RELOCATE EVERYTHING
5315  021236  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
5316  021242  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
```

```
5317  021246  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
5318  021250  012705  170200                  MOV     #MAPLOO,R5      ;THAT ADDRESS ARE
5319                                                                  ;RELOCATED TO THEMSELVES.
5320  021254  012722  077406          64$:    MOV     #77406,(R2)+
5321  021260  010401                          MOV     R4,R1
5322  021262  072127  000006                  ASH     #6.R1
5323  021266  010125                          MOV     R1,(R5)+
5324  021270  005025                          CLR     (R5)+
5325  021272  010410                          MOV     R4,(R0)
5326  021274  062720  170000                  ADD     #170000,(R0)+
5327  021300  062704  000200                  ADD     #200,R4
5328  021304  077315                          SOB     R3,64$
5329  021306  012710  177600                  MOV     #177600,(R0)
5330  021312  012712  077406                  MOV     #77406,(R2)
5331
5332  021316  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
5333  021324  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
5334  021332  012737  021412  000114          MOV     #MXERR0,@#CACHVEC       ;SETUP FOR THE ERROR.
5335  021340  012737  000044  177746          MOV     #S1M0,@#CONTRL  ;SELECT GROUP DATA
5336  021346  012704  000100                  MOV     #100,R4 ;PATTERN TO BE LOADED IN THE
5337  021352  012702  177750                  MOV     #MAINT,R2       ;MAINTENANCE REG.
5338  021356  000403                          BR      MX1
5339
5340          021360                          LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5341          021360                          LOC=-4&LOC
5342          021364                          LOC=LOC+4
5343          021364                          .=LOC
5344
5345  021364  000240                          NOP
5346  021366  000240                  MX1:    NOP
5347  021370  010412                          MOV     R4,(R2)         ;SET THE MAINT REG.
5348  021372  005012                          CLR     (R2)            ;THIS FETCH SHOULD CAUSE
5349                                                                  ;A PARITY ERROR IN GROUP
5350                                                                  ;DATA I MEMORY
5351
5352  021374                          MX2:                            ;REPORT ERROR.  MAINTENANCE
5353  021374  010437  001230                  MOV     R4,$TMP2        ;FUNCTION FAILED TO
5354                                                                  ;CAUSE ERROR.
5355  021400  104127                  1$:     ERROR   127
5356  021402  012737  177777  030760  MOV     #-1,MANFL2
5357  021410  000500                          BR      MXDONE
5358
5359  021412  022737  002600  177744  MXERR0: CMP     #2600,@#MEMERR  ;DID THE ERROR REGISTER
5360  021420  001042                          BNE     69$             ;SET PROPERLY?
5361
5362  021422  022626                  64$:    CMP     (SP)+,(SP)+     ;RESET THE STACK
5363  021424  005037  177572          65$:    CLR     @#MMR0
5364  021430  005037  172516                  CLR     @#MMR3
5365  021434  012737  177777  177744          MOV     #-1,@#MEMERR    ;TRY TO CLEAR THE ERROR
5366  021442  005737  177744                  TST     @#MEMERR        ;REGISTER.
5367  021446  001416                          BEQ     68$
5368
5369  021450                          66$:                            ;ERROR REGISTER WON'T
5370  021450  013737  177740  001230          MOV     @#LOADRS,$TMP2  ;CLEAR
5371  021456  013737  177742  001232          MOV     @#HIADRS,$TMP3
5372  021464  013737  177744  001234          MOV     @#MEMERR,$TMP4
```

```
5373
5374  021472  104130                  67$:    ERROR   130
5375  021474  012737  177777  030740          MOV     #-1,MMRFLG      ;SIGNAL BAD REGISTER
5376  021502  000443                          BR      MXDONE
5377
5378  021504  022737  177740  177740  68$:    CMP     #177740,@#LOADRS ;SEE IF ADDRESS REGISTER
5379  021512  001356                          BNE     66$             ;UNLOCKED.
5380  021514  022737  000003  177742          CMP     #3,@#HIADRS
5381  021522  001352                          BNE     66$
5382  021524  000432                          BR      MXDONE
5383
5384  021526                          69$:                            ;REPORT ERROR REGISTER
5385  021526  012637  001230                  MOV     (SP)+,$TMP2     ;NOT SET AS EXPECTED.
5386  021532  005726                          TST     (SP)+           ;RESET THE STACK.
5387  021534  013737  177740  001232          MOV     @#LOADRS,$TMP3
5388  021542  013737  177742  001234          MOV     @#HIADRS,$TMP4
5389  021550  012737  000100  001236          MOV     #100,$TMP5
5390  021556  012737  002600  001240          MOV     #2600,$TMP6
5391  021564  013737  177744  001242          MOV     @#MEMERR,$TMP7
5392
5393  021572  104131                  70$:    ERROR   131
5394  021574  012737  177777  030760          MOV     #-1,MANFL2      ;SIGNAL BAD REGISTER
5395  021602  012737  177777  030754          MOV     #-1,MMRFL2
5396  021610  000705                          BR      65$
5397  021612  104416                  MXDONE: RSET
5398
5399                                  ;;**************************************************************
5400                                  ;*TEST 43       CACHE ERROR REGISTER UNIBUS TIME OUT TEST
5401                                  ;*
5402                                  ;*THIS IS A TEST OF THE ERROR REGISTER'S ABILITY TO COMPREHEND A
5403                                  ;*CPU TO UNIBUS THROUGH THE MAP TO THE CACHE REFERENCE WHICH
5404                                  ;*TIMES OUT IN MAIN MEMORY. MANY SUCH NON-EXISTENT MEMORY LOCATIONS
5405                                  ;*ARE CONVIENTLY GUARENTEED TO EXIST! ALL THE ADDRESSES
5406                                  ;*FROM 17000000 THROUGH 17777776 ARE ADDRESSES
5407                                  ;*WHICH CAN NOT EXIST. HERE ONLY ONE OF THESE ADDRESSES, 17777776,
5408                                  ;*WILL BE USED TO CAUSE A TIME OUT ON THE UNIBUS AN THE CONSEQUENT
5409                                  ;*ABORT TO VECTOR ERRVEC.
5410                                  ;*
5411                                  ;;**************************************************************
5412  021614  000004                  TST43:  SCOPE
5413  021616  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
5414          000043                  MQ=$TN-1
5415                                                                  ;SET THE SKAD REGISTER
5416  021624  012737  022244  030524          MOV     #TST44,SKAD     ;IN CASE THE TEST ABORTS.
5417
5418  021632  113737  001102  001224          MOVB    $TSTNM,$TMP0
5419  021640  012737  030400  000114          MOV     #SPUR,@#CACHVEC         ;EXPECT NO PARITY ERRORS.
5420
5421  021646  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
5422  021650  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
5423  021652  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
5424  021654  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
5425  021656  104422                          MMSKIP
5426
5427  021660  012700  172340                  MOV     #KIPAR0,R0      ;INITIALLY PUT MEMORY
5428  021664  012701  077406                  MOV     #77406,R1       ;MANAGEMENT IN A 'PASSIVE'
```

```
5429  021670  012702  172300              MOV     #KIPDR0,R2      ;STATE, THAT IS MAP ALL
5430  021674  012703  000010              MOV     #10,R3          ;VIRTUAL ADDRESSES ON TO
5431  021700  010122                64$:  MOV     R1,(R2)+        ;THEMSELVES AS PHYSICAL
5432  021702  077302                      SOB     R3,64$          ;ADDRESSES.
5433  021704  005020                      CLR     (R0)+
5434  021706  012720  000200              MOV     #200,(R0)+
5435  021712  012720  000400              MOV     #400,(R0)+
5436  021716  012720  000600              MOV     #600,(R0)+
5437  021722  012720  001000              MOV     #1000,(R0)+
5438  021726  012720  001200              MOV     #1200,(R0)+
5439  021732  012720  001400              MOV     #1400,(R0)+
5440  021736  012710  177600              MOV     #177600,(R0)
5441
5442  021742  012737  000060  172516      MOV     #60,@#MMR3              ;TURN ON THE MAPPING BOX
5443  021750  012737  000001  177572      MOV     #1,@#MMR0               ;AND 22 BIT MODE ADDRESSING.
5444  021756  012737  170000  172354      MOV     #170000,@#KIPAR6        ;MAKE KIPAR6 RELOCATE
5445                                                                      ;TO THE UNIBUS.
5446  021764  012737  022036  000004      MOV     #MQERR,@#ERRVEC         ;SET UP THE TIME OUT VECTOR.
5447
5448  021772  012737  177776  170200      MOV     #-2,@#MAPL00            ;SET THE MAP REGISTER 0
5449  022000  012737  000077  170202      MOV     #77,@#MAPH00
5450  022006  012700  140000              MOV     #140000,R0              ;THIS IS THE VIRTUAL ADDRESS OF THE
5451                                                                      ;TEST ADDRESS. IT WILL RELOCATE
5452                                                                      ;THROUGH KIPAR6 TO THE UNIBUS AS
5453                                                                      ;A 000000. FROM THE UNIBUS
5454                                                                      ;IT WILL BE RELOCATED THROUGH
5455                                                                      ;MAP REGISTER 0 TO THE CACHE WHERE
5456                                                                      ;IT WILL TRY TO REFERENCE
5457                                                                      ;17777776, AND HOPEFULLY TIME OUT.
5458  022012  000240              NOP                                     ;FOR SCOPING WITH AN OSCILLOSCOPE!
5459  022014  005710              TST     (R0)                            ;MAKE THE REFERENCE!
5460
5461  022016                MQ1:                                          ;NO TIME OUT OCCURRED, REPORT
5462  022016  012737  177776  001230      MOV     #-2,$TMP2               ;THE ERROR.
5463  022024  012737  000077  001232      MOV     #77,$TMP3
5464  022032  104132                1$:   ERROR   132
5465  022034  000502                      BR      MQDONE
5466
5467  022036  032737  000020  177766 MQERR: BIT    #20,@#CPUERR            ;SEE IF A TIME OUT HAS CAUSED
5468  022044  001002                      BNE     MQ2                     ;AN ABORT TO THIS ROUTINE.
5469  022046  000137  030352              JMP     CPSPUR                  ;IF NOT GO TO THE SPURIOUS
5470                                                                      ;UNEXPECTED, CPU ERROR HANDLER.
5471  022052  022737  000000  177744 MQ2:  CMP     #0,@#MEMERR             ;OTHERWISE SEE IF THE ERROR
5472  022060  001427                      BEQ     MQ3                     ;REGISTER GOT SET CORRECTLY.
5473
5474                                                        ;IF IT IS NOT SET CORRECTLY REPORT ERROR.
5475  022062  012637  001230              MOV     (SP)+,$TMP2
5476  022066  005726                      TST     (SP)+
5477  022070  013737  177740  001232      MOV     @#LOADRS,$TMP3
5478  022076  013737  177742  001234      MOV     @#HIADRS,$TMP4
5479  022104  012737  177776  001236      MOV     #-2,$TMP5
5480  022112  012737  000077  001240      MOV     #77,$TMP6
5481  022120  013737  177744  001242      MOV     @#MEMERR,$TMP7
5482  022126  104133                1$:   ERROR   133
5483  022130  012737  177777  030754      MOV     #-1,MMRFL2
5484  022136  000401                      BR      MQ4
```

```
5485
5486  022140  022626                    MQ3:    CMP     (SP)+,(SP)+             ;RESET THE STACK
5487
5488  022142  005037  177572            MQ4:    CLR     @#MMR0
5489  022146  005037  172516                    CLR     @#MMR3
5490  022152  012737  177777  177744            MOV     #-1,@#MEMERR            ;TRY TO CLEAR THE ERROR REGISTER.
5491  022160  005737  177744                    TST     @#MEMERR
5492  022164  001416                            BEQ     MQ6
5493
5494  022166                    MQ5:                                    ;REPORT THE FAILURE OF THE ERROR
5495  022166  013737  177740  001230            MOV     @#LOADRS,$TMP2          ;REGISTER TO CLEAR!
5496  022174  013737  177742  001232            MOV     @#HIADRS,$TMP3
5497  022202  013737  177744  001234            MOV     @#MEMERR,$TMP4
5498  022210  104130                    1$:     ERROR   130
5499  022212  012737  177777  030740            MOV     #-1,MMRFLG
5500  022220  000410                            BR      MQDONE
5501
5502  022222  022737  177740  177740  MQ6:      CMP     #177740,@#LOADRS        ;SEE IF THE ADDRESS REGISTER
5503  022230  001356                            BNE     MQ5                     ;GOT RESET.
5504  022232  022737  000003  177742            CMP     #3,@#HIADRS
5505  022240  001352                            BNE     MQ5
5506
5507  022242  104416            MQDONE: RSET
5508
5509                            ;;**************************************************************
5510                            ;*TEST 44        CACHE CONTROL REGISTER DISABLE TRAPS TEST 1
5511                            ;*
5512                            ;*THIS IS A TEST OF THE CONTROL REGISTER'S ABILITY TO DISABLE A TRAP
5513                            ;*OCCURRING AS THE RESULT OF A MAIN MEMORY DATA PARITY ERROR IN THE
5514                            ;*UNWANTED WORD OF THE REFERENCED PAIR. THE MAINTENANCE REGISTER IS
5515                            ;*USED TO FORCE AN ERROR ON THE LOW BYTE OF THE ODD WORD WHEN REFERENCING
5516                            ;*THE EVEN WORD OF THAT PAIR.
5517                            ;*
5518                            ;;**************************************************************
5519  022244  000004            TST44:  SCOPE
5520  022246  012737  000040  001274            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
5521          000044            KV=$TN-1
5522                                                    ;SET THE SKAD REGISTER
5523  022254  012737  022420  030524            MOV     #TST45,SKAD     ;IN CASE THE TEST ABORTS.
5524
5525  022262  113737  001102  001224            MOVB    $TSTNM,$TMP0
5526
5527  022270  104430                            SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
5528  022272  104432                            SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
5529  022274  104434                            SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
5530  022276  104436                            SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
5531  022300  012737  000014  177746            MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.
5532  022306  052737  000001  177746            BIS     #BIT0,@#CONTRL          ;DISABLE 'WARNING' TRAPS.
5533  022314  012737  022356  000114            MOV     #KVERR,@#CACHVEC                ;SET UP FOR THE ERROR ABOUT TO BE FORCED
5534  022322  012704  040000                    MOV     #40000,R4               ;PATTERN FOR THE MAINTENANCE
5535  022326  012702  177750                    MOV     #MAINT,R2               ;REGISTER.
5536  022332  000402                            BR      KV1
5537
5538          022334                            LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
5539          022334                            LOC=-4&LOC
5540          022340                            LOC=LOC+4
```

```
                    022340                          .=LOC
                    
022340  000240      KV1:    NOP
022342  010412              MOV     R4,(R2)         ;SET THE MAINTENANCE REGISTER
022344  000240              NOP                     ;WHEN THIS NOP IS FETCHED AN ERROR
022346  005701      KV2:    TST     R1              ;WILL BE RECOGNIZED BECAUSE OF THE
                                                    ;CONTENTS OF THE LOCATION KV2!
                                                    ;THIS PARITY ERROR WOULD
                                                    ;NORMALLY RELUT IN A TRAP BUT
                                                    ;BECAUSE TRAPS HAVE BEEN DISABLED
                                                    ;NONE SHOULD OCCUR!!!
022350  005012              CLR     (R2)
022352  000240              NOP
022354  000420              BR      KVDONE          ;GOOD, NO TRAP OCCURRED!

022356                      KVERR:                  ;COME HERE IF A TRAP OCCURS
022356  012637  001230              MOV     (SP)+,$TMP2     ;AND REPORT THE ERROR.
022362  005726              TST     (SP)+
022364  013737  177746  001232    MOV     @#CNTRL,$TMP3
022372  013737  177740  001234    MOV     @#LOADRS,$TMP4
022400  013737  177742  001236    MOV     @#HIADRS,$TMP5
022406  013737  177744  001240    MOV     @#MEMERR,$TMP6
022414  104134      1$:     ERROR   134

022416  104416      KVDONE: RSET


                    ;;*****************************************************************
                    ;*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.
                    ;*
                    ;;*****************************************************************
022420  000004      TST45:  SCOPE
022422  012737  000040  001274        MOV     #40,$TIMES      ;;DO 40 ITERATIONS
                    000045      KX=$TN-1
                                                    ;SET THE SKAD REGISTER
022430  012737  022620  030524        MOV     #TST46,SKAD     ;IN CASE THE TEST ABORTS.

022436  113737  001102  001224        MOVB    $TSTNM,$TMP0

022444  104430                      SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
022446  104432                      SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
022450  104434                      SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
022452  104436                      SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
022454  012737  000030  177746    MOV     #SOM1,@#CNTRL   ;USE GROUP ZERO
022462  012700  022550            MOV     #KX2,R0         ;MAKE KX2 A HIT IN GROUP
022466  005710                    TST     (R0)            ;ZERO.
022470  005710                    TST     (R0)

                                                    ;SEE IF REFERENCE ADDRESS
```

```
                                BIT     #10,@#HITMIS    ;IS A HIT.
                                BNE     KX1
                                                        ;IF NOT ERROR!
                                MOV     R0,$TMP2
                                MOV     #0,$TMP1
                                ERROR   1
                                SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.

                        KX1:    BIS     #BIT0,@#CONTRL  ;DISABLE 'WARNING' TRAPS.
                                MOV     #KXERR,@#CACHVEC        ;SET UP FOR ERROR WHICH
                                                        ;SHOULD NOT TRAP!
                                MOV     #400,R4         ;PATTERN FOR MAINT REG.
                                MOV     #MAINT,R2
                                NOP
                                MOV     R4,(R2)         ;SET THE MAINT. REG.
                        KX2:    CLR     (R2)            ;THE FETCH OF THIS
                                NOP                     ;INSTRUCTION SHOULD CAUSE
                                BR      KXDONE          ;A CACHE  MEMORY
                                                        ;PARITY ERROR WHICH
                                                        ;NORMALLY SHOULD TRAP
                                                        ;BUT HERE NO TRAP SHOULD
                                                        ;OCCUR FOR TRAPS HAVE BEEN DISABLED.

                        KXERR:                          ;A TRAP HAS ERRONEOUSLY
                                MOV     (SP)+,$TMP2     ;TAKEN PLACE, REPORT
                                TST     (SP)+           ;UNABLE TO DISABLE TRAPS.
                                MOV     @#CONTRL,$TMP3
                                MOV     @#LOADRS,$TMP4
                                MOV     @#HIADRS,$TMP5
                                MOV     @#MEMERR,$TMP6

                        1$:     ERROR   134

                        KXDONE: RSET


                        ;;*****************************************************************
                        ;*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.
                        ;*
                        ;;*****************************************************************
                        TST46:  SCOPE
                                MOV     #40,$TIMES      ;;DO 40 ITERATIONS
                        KZ=$TN-1
                                                        ;SET THE SKAD REGISTER
                                MOV     #TST47,SKAD     ;IN CASE THE TEST ABORTS.

                                MOVB    $TSTNM,$TMP0

                                SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
```

```
                                SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
                                SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
                                SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
022646  104432
022650  104434
022652  104436
022654  012737  000030  177746  MOV     #SOM1,@#CONTRL  ;USE GROUP ZERO
022662  012700  022750          MOV     #KZ2,R0         ;MAKE KZ2 A HIT IN GROUP
022666  005710                  TST     (R0)            ;ZERO.
022670  005710                  TST     (R0)
                                                        ;SEE IF REFERENCE ADDRESS
022672  032737  000010  177752  BIT     #10,@#HITMIS    ;IS A HIT.
022700  001007                  BNE     KZ1
                                                        ;IF NOT ERROR!
022702  010037  001230          MOV     R0,$TMP2
022706  012737  000000  001226  MOV     #0,$TMP1
022714  104001                  ERROR   1
022716  104420                  SKIPT                   ;ERROR FATAL. GO TO NEXT TEST.
022720  052737  000001  177746  KZ1:    BIS     #BIT0,@#CONTRL  ;DISABLE 'WARNING' TRAPS.
022726  012737  022756  000114          MOV     #KZERR,@#CACHVEC        ;SET UP FOR ERROR WHICH
                                                        ;SHOULD NOT TRAP!
022734  012704  000020                  MOV     #20,R4          ;PATTERN FOR MAINT REG.
022740  012702  177750                  MOV     #MAINT,R2
022744  000240                          NOP
022746  010412                  MOV     R4,(R2)         ;SET THE MAINT. REG.
022750  005012          KZ2:    CLR     (R2)            ;THE FETCH OF THIS
022752  000240                  NOP                     ;INSTRUCTION SHOULD CAUSE
022754  000420                  BR      KZDONE          ;A CACHE  MEMORY
                                                        ;PARITY ERROR WHICH
                                                        ;NORMALLY SHOULD TRAP
                                                        ;BUT HERE NO TRAP SHOULD
                                                        ;OCCUR FOR TRAPS HAVE BEEN DISABLED.

022756          KZERR:                                  ;A TRAP HAS ERRONEOUSLY
022756  012637  001230          MOV     (SP)+,$TMP2     ;TAKEN PLACE, REPORT
022762  005726                  TST     (SP)+           ;UNABLE TO DISABLE TRAPS.
022764  013737  177746  001232  MOV     @#CONTRL,$TMP3
022772  013737  177740  001234  MOV     @#LOADRS,$TMP4
023000  013737  177742  001236  MOV     @#HIADRS,$TMP5
023006  013737  177744  001240  MOV     @#MEMERR,$TMP6

023014  104134          1$:     ERROR   134

023016  104416          KZDONE: RSET


;;*****************************************************************
;*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
;*EPROR 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.
                                        ;*
                                        ;;**************************************************************
023020  000004                  TST47:  SCOPE
023022  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000047                  NA=$TN-1
                                                                ;SET THE SKAD REGISTER
023030  012737  023404  000524          MOV     #TST50,SKAD     ;IN CASE THE TEST ABORTS.

023036  113737  001102  001224          MOVB    $TSTNM,$TMP0

023044  104430                          SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
023046  104432                          SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
023050  104434                          SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
023052  104436                          SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
023054  012737  000014  177746          MOV     #MOM1.3#CONTRL          ;FORCE MISSES TO BOTH GROUPS.


023062  012737  023136  000114          MOV     #NA3,3#CACHVEC          ;SET UP FOR THE ERROR.
023070  012704  010000                  MOV     #10000,R4               ;PATTERN TO BE PUT IN
023074  012702  177750                  MOV     #MAINT,R2               ;THE MAINT. REG.
023100  000401                          BR      NA1

        023102                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        023100                          LOC=-4&LOC
        023104                          LOC=LOC+4
        023104                          .=LOC

023104  000240                  NA1:    NOP
023106  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
023110  005701                  NA2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
023112  005012                          CLR     (R2)            ;SHOULD CAUSE AN ABORT!
023114  000240                          NOP
                                                                ;IF NONE OCCURS REPORT
023116  012737  010000  001230          MOV     #10000,$TMP2    ;ERROR!
023124  104127                  1$:     ERROR   127
023126  012737  177777  030760          MOV     #-1,MANFL2
023134  000522                  BR      NADONE


023136                          NA3:

023136  012737  023212  000114          MOV     #NA6,3#CACHVEC          ;SET UP FOR THE ERROR.
023144  012704  010000                  MOV     #10000,R4               ;PATTERN TO BE PUT IN
023150  012702  177750                  MOV     #MAINT,R2               ;THE MAINT. REG.
023154  000401                          BR      NA4

        023156                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
        023154                          LOC=-4&LOC
        023160                          LOC=LOC+4
        023160                          .=LOC
```

```
023160 000240                           NA4:    NOP
023162 010412                                   MOV     R4,(R2)                 ;SET THE MAINT. REG.
023164 005701                           NA5:    TST     R1                      ;THE FETCH OF THIS INSTRUCTION
023166 005012                                   CLR     (R2)                    ;SHOULD CAUSE AN ABORT!
023170 000240                                   NOP
                                                                                ;IF NONE OCCURS REPORT
023172 012737 010000 001230                     MOV     #10000,$TMP2            ;ERROR!
023200 104127                           1$:     ERROR   127
023202 012737 177777 030760                     MOV     #-1,MANFL2
023210 000474                           BR      NADONE


023212                                  NA6:

023212 062706 000010                            ADD     #10,SP                  ;RESET THE STACK.
023216 022737 144404 177744                     CMP     #144404,@#MEMERR                ;SEE IF THE ERROR REGISTER
023224 001004                                   BNE     NA7                     ;IS SET CORRECTLY.
023226 022737 023110 177740                     CMP     #NA2,@#LOADRS           ;SEE IF THE ADDRESS REGISTER
023234 001422                                   BEQ     NA8                     ;IS SET CORRECTLY.

023236                                  NA7:                                    ;NOT SET CORRECTLY!
023236 012737 144404 001230                     MOV     #144404,$TMP2           ;REPORT FAILURE.
023244 013737 177744 001232                     MOV     @#MEMERR,$TMP3
023252 012737 023110 001234                     MOV     #NA2,$TMP4
023260 005037 001236                            CLR     $TMP5
023264 013737 177740 001240                     MOV     @#LOADRS,$TMP6
023272 013737 177742 001242                     MOV     @#HIADRS,$TMP7

023300 104135                           1$:     ERROR   135

023302 005037 177572                    NA8:    CLR     @#MMR0                  ;TURN OFF MEMORY MANAGEMENT.
023306 005037 172516                            CLR     @#MMR3
023312 012737 177777 177744                     MOV     #-1,@#MEMERR            ;SEE IF YOU CAN CLR THE
023320 005737 177744                            TST     @#MEMERR                ;ERROR REG.
023324 001416                                   BEQ     NA10

023326                                  NA9:                                    ;WON'T CLEAR!
023326 013737 177740 001230                     MOV     @#LOADRS,$TMP2
023334 013737 177742 001232                     MOV     @#HIADRS,$TMP3
023342 013737 177744 001234                     MOV     @#MEMERR,$TMP4

023350 104130                           1$:     ERROR   130
023352 012737 177777 030740                     MOV     #-1,MMRFLG
023360 000410                                   BR      NADONE

023362 022737 177740 177740             NA10:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGSTER
023370 001356                                   BNE     NA9             ;HAS RESET
023372 022737 000003 177742                     CMP     #3,@#HIADRS
023400 001352                                   BNE     NA9

023402 104416                           NADONE: RSET



                                        ;;*****************************************************************
                                        ;*TEST 50       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.
                                        ;*
                                        ;;*****************************************************************
023404  000004                TST50:  SCOPE
023406  012737  000040  001274        MOV     #40.$TIMES      ;;DO 40 ITERATION
        000050
NB=$TN-1
                                                                ;SET THE SKAD REGISTER
023414  012737  024074  030524        MOV     #TST51,SKAD     ;IN CASE THE TEST ABORTS.

023422  113737  001102  001224        MOVB    $TSTNM,$TMPC

023430  104430                        SKPBER                  ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
023432  104432                        SKPBCN                  ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
023434  104434                        SKPBMN                  ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
023436  104436                        SKPBHM                  ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
023440  104422                        MMSKIP

023442  012700  172340                MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                ;TO RELOCATE EVERYTHING
023446  012702  172300                MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
023452  012703  000007                MOV     #7,R3           ;MAP PASSIVELY TO MEMORY.
023456  005004                        CLR     R4              ;BY PASSIVELY IS MEANT
023460  012705  170200                MOV     #MAPLOD,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
023464  012722  077406        64$:    MOV     #77406,(R2)+
023470  010401                        MOV     R4,R1
023472  072127  000006                ASH     #6,R1
023476  010125                        MOV     R1,(R5)+
023500  005025                        CLR     (R5)+
023502  010410                        MOV     R4,(R0)
023504  062720  170000                ADD     #170000,(R0)+
023510  062704  000200                ADD     #200,R4
023514  077315                        SOB     R3,64$
023516  012710  177600                MOV     #177600,(R0)
023522  012712  077406                MOV     #77406,(R2)

023526  012737  000014  177746        MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.


023534  012737  023612  000114        MOV     #NB3,@#CACHVEC          ;SET UP FOR THE ERROR.
023542  012704  010000                MOV     #10000,R4               ;PATTERN TO BE PUT IN
023546  012702  177750                MOV     #MAINT,R2               ;THE MAINT. REG.
023552  000402                        BR      NB1

                                        LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                023554                  LOC=-4&LOC
```

```
                    023560                          LOC=LOC+4
                    023560                          .=LOC

023560  000240              NB1:    NOP
023562  010412                      MOV     R4,(R2)         ;SET THE MAINT. REG.
023564  005701              NB2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
023566  005012                      CLR     (R2)            ;SHOULD CAUSE AN ABORT!
023570  000240                      NOP
                                                            ;IF NONE OCCURS REPORT
023572  012737  010000  001230      MOV     #10000,$TMP2    ;ERROR!
023600  104127              1$:     ERROR   127
023602  012737  177777  000760      MOV     #-1,MANFL2
023610  000530                      BR      NBDONE

023612              NB3:

023612  012737  000060  172516      MOV     #60,@#MMR3      ;TURN ON THE MAP AND
023620  012737  000001  177572      MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
023626  012737  023702  000114      MOV     #NB6,@#CACHVEC  ;SET UP FOR ERROR
023634  012704  010000              MOV     #10000,R4       ;PATTERN TO BE PUT IN
023640  012702  177750              MOV     #MAINT,R2       ;THE MAINT. REG.
023644  000401                      BR      NB4

                    023646                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                    023644                          LOC=-4&LOC
                    023650                          LOC=LOC+4
                    023650                          .=LOC

023650  000240              NB4:    NOP
023652  010412                      MOV     R4,(R2)         ;SET THE MAINT. REG.
023654  005701              NB5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
023656  005012                      CLR     (R2)            ;SHOULD CASE AN ABORT
023660  000240                      NOP                     ;AND UNIBUS PB ASSERTED!
                                                            ;NO ABORT OCCURRED!
023662  012737  010000  001230      MOV     #10000,$TMP2    ;REPORT FAILURE
023670  104127              1$:     ERROR   127
023672  012737  177777  030744      MOV     #-1,MANFLG
023700  000474                      BR      NBDONE

023702              NB6:

023702  062706  000010              ADD     #10,SP          ;RESET THE STACK.
023706  022737  137404  177744      CMP     #137404,@#MEMERR        ;SEE IF THE ERROR REGISTER
023714  001004                      BNE     NB7             ;IS SET CORRECTLY.
023716  022737  023564  177740      CMP     #NB2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
023724  001422                      BEQ     NB8             ;IS SET CORRECTLY.

023726              NB7:                                    ;NOT SET CORRECTLY!
023726  012737  137404  001230      MOV     #137404,$TMP2   ;REPORT FAILURE.
023734  013737  177744  001232      MOV     @#MEMERR,$TMP3
023742  012737  023564  001234      MOV     #NB2,$TMP4
023750  005037  001236              CLR     $TMP5
023754  013737  177740  001240      MOV     @#LOADRS,$TMP6
023762  013737  177742  001242      MOV     @#HIADRS,$TMP7
```

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023770	104135				1$:	ERROR	135

023772	005037	177572			NB8:	CLR	@#MMR0			;TURN OFF MEMORY MANAGEMENT.
023776	005037	172516				CLR	@#MMR3
024002	012737	177777	177744			MOV	#-1,@#MEMERR		;SEE IF YOU CAN CLR THE
024010	005737	177744				TST	@#MEMERR		;ERROR REG.
024014	001416					BEQ	NB10

024016						NB9:				;WON'T CLEAR!
024016	013737	177740	001230			MOV	@#LOADRS,$TMP2
024024	013737	177742	001232			MOV	@#HIADRS,$TMP3
024032	013737	177744	001234			MOV	@#MEMERR,$TMP4

024040	104130				1$:	ERROR	130
024042	012737	177777	030740			MOV	#-1,MMRFLG
024050	000410					BR	NBDONE

024052	022737	177740	177740		NB10:	CMP	#177740,@#LOADRS ;SEE IF THE ADDRESS REGSTER
024060	001356					BNE	NB9			;HAS RESET
024062	022737	000003	177742			CMP	#3,@#HIADRS
024070	001352					BNE	NB9

024072	104416				NBDONE: RSET


				;;*************************************************************
				;*TEST 51	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 THROUGH THE MAPPING BOX TO THE CACHE.
				;*THE SECOND ERROR WILL BE BECAUSE OF A REFERENCE FROM THE CPU
				;*TO THE CACHE DIRECTLY.
				;*
				;;*************************************************************
024074	000004				TST51:	SCOPE
024076	012737	000040	001274			MOV	#40,$TIMES		;;DO 40 ITERATIONS
	000051				NC=$TN-1
									;SET THE SKAD REGISTER
024104	012737	024574	030524			MOV	#TST52,SKAD		;IN CASE THE TEST ABORTS

024112	113737	001102	001224			MOVB	$TSTNM,$TMP0

024120	104430					SKPBER			;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
024122	104432					SKPBCN			;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
024124	104434					SKPBMN			;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
024126	104436					SKPBHM			;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
024130	104422					MMSKIP

024132	012700	172340				MOV	#KIPAR0,R0		;SET UP MEMORY MANAGEMENT
```

```
                                                                ;TO RELOCATE EVERYTHING
                                                                ;THROUGH THE UNIBUS
                                                                ;MAP PASSIVELY TO MEMORY,
                                                                ;BY PASSIVELY IS MEANT
                                                                ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
024154  012722  077406          64$:  MOV     #77406,(R2)+
024160  010401                        MOV     R4,R1
024162  072127  000006                ASH     #6,R1
024166  010125                        MOV     R1,(R5)+
024170  005025                        CLR     (R5)+
024172  010410                        MOV     R4,(R0)
024174  062720  170000                ADD     #170000,(R0)+
024200  062704  000200                ADD     #200,R4
024204  077315                        SOB     R3,64$
024206  012710  177600                MOV     #177600,(R0)
024212  012712  077406                MOV     #77406,(R2)

024216  012737  000014  177746        MOV     #MOM1,@#CNTRL           ;FORCE MISSES TO BOTH GROUPS.


024224  012737  000060  172516        MOV     #60,@#MMR3      ;TURN ON THE MAP AND
024232  012737  000001  177572        MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
024240  012737  024316  000114        MOV     #NC3,@#CACHVEC  ;SET UP FOR ERROR
024246  012704  010000                MOV     #10000,R4       ;PATTERN TO BE PUT IN
024252  012702  177750                MOV     #MAINT,R2       ;THE MAINT. REG.
024256  000402                        BR      NC1

                024260                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                024260                  LOC=-4&LOC
                024264                  LOC=LOC+4
                024264                  .=LOC

024264  000240                  NC1:    NOP
024266  010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
024270  005701                  NC2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
024272  005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
024274  000240                          NOP                     ;AND UNIBUS PB ASSERTED!
                                                                ;NO ABORT OCCURRED!
024276  012737  010000  001230          MOV     #10000,$TMP2    ;REPORT FAILURE
024304  104127                  1$:     ERROR   127
024306  012737  177777  030744        MOV     #-1,MANFLG
024314  000526                        BR      NCDONE


024316  005037  177572          NC3:  CLR     @#MMR0                  ;TURN OFF MEMORY MANAGEMENT.
024322  005037  172516                CLR     @#MMR3

024326  012737  024402  000114        MOV     #NC6,@#CACHVEC          ;SET UP FOR THE ERROR.
024334  012704  010000                MOV     #10000,R4               ;PATTERN TO BE PUT IN
024340  012702  177750                MOV     #MAINT,R2               ;THE MAINT. REG.
024344  000401                        BR      NC4

                024346                  LOC=.           ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                024344                  LOC=-4&LOC
                024350                  LOC=LOC+4
```

```
                024350                          .=LOC
                
024350  000240            NC4:    NOP
024352  010412                    MOV     R4,(R2)         ;SET THE MAINT. REG.
024354  005701            NC5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
024356  005012                    CLR     (R2)            ;SHOULD CAUSE AN ABORT!
024360  000240                    NOP
                                                        ;IF NONE OCCURS REPORT
024362  012737  010000  001230      MOV     #10000,$TMP2    ;ERROR!
024370  104127            1$:     ERROR   127
024372  012737  177777  030760      MOV     #-1,MANFL2
024400  000474            BR      NCDONE

024402                    NC6:

024402  062706  000010              ADD     #10,SP          ;RESET THE STACK.
024406  022737  167404  177744      CMP     #167404,@#MEMERR        ;SEE IF THE ERROR REGISTER
024414  001004                      BNE     NC7             ;IS SET CORRECTLY.
024416  022737  024270  177740      CMP     #NC2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
024424  001422                      BEQ     NC8             ;IS SET CORRECTLY.

024426                    NC7:                            ;NOT SET CORRECTLY!
024426  012737  167404  001230      MOV     #167404,$TMP2   ;REPORT FAILURE.
024434  013737  177744  001232      MOV     @#MEMERR,$TMP3
024442  012737  024270  001234      MOV     #NC2,$TMP4
024450  005037  001236              CLR     $TMP5
024454  013737  177740  001240      MOV     @#LOADRS,$TMP6
024462  013737  177742  001242      MOV     @#HIADRS,$TMP7

024470  104135            1$:     ERROR   135

024472  005037  177572    NC8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
024476  005037  172516              CLR     @#MMR3
024502  012737  177777  177744      MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
024510  005737  177744              TST     @#MEMERR        ;ERROR REG.
024514  001416                      BEQ     NC10

024516                    NC9:                            ;WON'T CLEAR!
024516  013737  177740  001230      MOV     @#LOADRS,$TMP2
024524  013737  177742  001232      MOV     @#HIADRS,$TMP3
024532  013737  177744  001234      MOV     @#MEMERR,$TMP4

024540  104130            1$:     ERROR   130
024542  012737  177777  030740      MOV     #-1,MMRFLG
024550  000410                      BR      NCDONE

024552  022737  177740  177740  NC10:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGSTER
024560  001356                      BNE     NC9             ;HAS RESET
024562  022737  000003  177742      CMP     #3,@#HIADRS
024570  001352                      BNE     NC9

024572  104416            NCDONE: RSET

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

```
                                        ;*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.
                                        ;*
                                        ;**************************************************************
024574  000004                  TST52:  SCOPE
024576  012737  000040  001274          MOV     #40,$TIMES      ;;DO 40 ITERATIONS
        000052                  ND=$TN-1
                                                                ;SET THE SKAD REGISTER
024604  012737  025300  030524          MOV     #TST53,SKAD     ;IN CASE THE TEST ABORTS.

024612  113737  001102  001224          MOVB    $TSTNM,$TMPO

024620  104430                          SKPBER          ;IF THE ERROR REGISTER IS BAD SKIP THIS TEST.
024622  104432                          SKPBCN          ;IF THE CONTROL REGISTER IS BAD SKIP THIS TEST.
024624  104434                          SKPBMN          ;IF THE MAINTENANCE REGISER IS BAD SKIP TEST.
024626  104436                          SKPBHM          ;IF THE HIT/MISS REGISTER IS BAD SKIP THIS TEST.
024630  104422                          MMSKIP

024632  012700  172340                  MOV     #KIPAR0,R0      ;SET UP MEMORY MANAGEMENT
                                                                ;TO RELOCATE EVERYTHING
024636  012702  172300                  MOV     #KIPDR0,R2      ;THROUGH THE UNIBUS
024642  012703  000007                  MOV     #7,R3           ;MAP PASSIVELY TO MEMORY,
024646  005004                          CLR     R4              ;BY PASSIVELY IS MEANT
024650  012705  170200                  MOV     #MAPL00,R5      ;THAT ADDRESS ARE
                                                                ;RELOCATED TO THEMSELVES.
024654  012722  077406          64$:    MOV     #77406,(R2)+
024660  010401                          MOV     R4,R1
024662  072127  000006                  ASH     #6,R1
024666  010125                          MOV     R1,(R5)+
024670  005025                          CLR     (R5)+
024672  010410                          MOV     R4,(R0)
024674  062720  170000                  ADD     #170000,(R0)+
024700  062704  000200                  ADD     #200,R4
024704  077315                          SOB     R3,64$
024706  012710  177600                  MOV     #177600,(R0)
024712  012712  077406                  MOV     #77406,(R2)

024716  012737  000014  177746          MOV     #MOM1,@#CONTRL          ;FORCE MISSES TO BOTH GROUPS.

024724  012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
024732  012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
024740  012737  025016  000114          MOV     #ND3,@#CACHVEC  ;SET UP FOR ERROR
024746  012704  010000                  MOV     #10000,R4       ;PATTERN TO BE PUT IN
024752  012702  177750                  MOV     #MAINT,R2       ;THE MAINT. REG.
024756  000402                          BR      ND1
```

```
6157
6158            024760                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
6159            024760                          LOC=-4&LOC
6160            024764                          LOC=LOC+4
6161            024764                          .=LOC
6162
6163  024764   000240                  ND1:    NOP
6164  024766   010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
6165  024770   005701                  ND2:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
6166  024772   005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
6167  024774   000240                          NOP                     ;AND UNIBUS PB ASSERTED!
6168                                                                   ;NO ABORT OCCURRED!
6169  024776   012737  010000  001230          MOV     #10000,$TMP2    ;REPORT FAILURE
6170  025004   104127                  1$:     ERROR   127
6171  025006   012737  177777  030744          MOV     #-1,MANFLG
6172  025014   000530                          BR      NDDONE
6173
6174
6175  025016                          ND3:
6176
6177  025016   012737  000060  172516          MOV     #60,@#MMR3      ;TURN ON THE MAP AND
6178  025024   012737  000001  177572          MOV     #1,@#MMR0       ;22-BIT MODE ADDRESSING
6179  025032   012737  025106  000114          MOV     #ND6,@#CACHVEC  ;SET UP FOR ERROR
6180  025040   012704  010000                  MOV     #10000,R4       ;PATTERN TO BE PUT IN
6181  025044   012702  177750                  MOV     #MAINT,R2       ;THE MAINT. REG.
6182  025050   000401                          BR      ND4
6183
6184            025052                          LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
6185            025050                          LOC=-4&LOC
6186            025054                          LOC=LOC+4
6187            025054                          .=LOC
6188
6189  025054   000240                  ND4:    NOP
6190  025056   010412                          MOV     R4,(R2)         ;SET THE MAINT. REG.
6191  025060   005701                  ND5:    TST     R1              ;THE FETCH OF THIS INSTRUCTION
6192  025062   005012                          CLR     (R2)            ;SHOULD CASE AN ABORT
6193  025064   000240                          NOP                     ;AND UNIBUS PB ASSERTED!
6194                                                                   ;NO ABORT OCCURRED!
6195  025066   012737  010000  001230          MOV     #10000,$TMP2    ;REPORT FAILURE
6196  025074   104127                  1$:     ERROR   127
6197  025076   012737  177777  030744          MOV     #-1,MANFLG
6198  025104   000474                          BR      NDDONE
6199
6200
6201  025106                          ND6:
6202
6203  025106   062706  000010                  ADD     #10,SP          ;RESET THE STACK.
6204  025112   022737  033404  177744          CMP     #33404,@#MEMERR ;SEE IF THE ERROR REGISTER
6205  025120   001004                          BNE     ND7             ;IS SET CORRECTLY.
6206  025122   022737  024770  177740          CMP     #ND2,@#LOADRS   ;SEE IF THE ADDRESS REGISTER
6207  025130   001422                          BEQ     ND8             ;IS SET CORRECTLY.
6208
6209  025132                          ND7:                            ;NOT SET CORRECTLY!
6210  025132   012737  033404  001230          MOV     #33404,$TMP2    ;REPORT FAILURE.
6211  025140   013737  177744  001232          MOV     @#MEMERR,$TMP3
6212  025146   012737  024770  001234          MOV     #ND2,$TMP4
```

```
6213  025154  005037  001236                  CLR     $TMP5
6214  025160  013737  177740  001240          MOV     @#LOADRS,$TMP6
6215  025166  013737  177742  001242          MOV     @#HIADRS,$TMP7
6216
6217  025174  104135                  1$:     ERROR   135
6218
6219  025176  005037  177572          ND8:    CLR     @#MMR0          ;TURN OFF MEMORY MANAGEMENT.
6220  025202  005037  172516                  CLR     @#MMR3
6221  025206  012737  177777  177744          MOV     #-1,@#MEMERR    ;SEE IF YOU CAN CLR THE
6222  025214  005737  177744                  TST     @#MEMERR        ;ERROR REG.
6223  025220  001416                          BEQ     ND10
6224
6225  025222                          ND9:                            ;WON'T CLEAR!
6226  025222  013737  177740  001230          MOV     @#LOADRS,$TMP2
6227  025230  013737  177742  001232          MOV     @#HIADRS,$TMP3
6228  025236  013737  177744  001234          MOV     @#MEMERR,$TMP4
6229
6230  025244  104130                  1$:     ERROR   130
6231  025246  012737  177777  030740          MOV     #-1,MMRFLG
6232  025254  000410                          BR      NDDONE
6233
6234  025256  022737  177740  177740  ND10:   CMP     #177740,@#LOADRS ;SEE IF THE ADDRESS REGSTER
6235  025264  001356                          BNE     ND9             ;HAS RESET
6236  025266  022737  000003  177742          CMP     #3,@#HIADRS
6237  025274  001352                          BNE     ND9
6238
6239  025276  104416                  NDDONE: RSET
6240
6241
6242                                  ;;*****************************************************************
6243                                  ;*TEST 53       MAIN MEMORY DATA PARITY CHECKERS LOW BYTE TEST
6244                                  ;*
6245                                  ;*THIS IS A TEST OF THE TWO MAIN MEMORY DATA PARITY CHECKERS
6246                                  ;*FOR THE LOW BYTE, ONE FOR EACH OF THE EVEN AND ODD WORD.
6247                                  ;*THE MAINTENANCE REGISTER IS USED TO FORCE A PARITY
6248                                  ;*ERROR AT EVERY DATA PATTERN, WHICH HAS A ZERO PARITY
6249                                  ;*BIT, THAT CAN BE WRITTEN INTO AN 8-BIT BYTE. NOTE
6250                                  ;*THAT MAIN MEMORY HAS ODD PARITY WHICH MEANS THAT
6251                                  ;*A BYTE WILL HAVE A ZERO PARITY BIT IF THERE ARE
6252                                  ;*AN ODD NUMBER OF BITS SET (1) IN THAT BYTE. THE PARITY
6253                                  ;*BIT WOULD BE ONE (SET) FOR A BYTE WHICH HAD NO BITS
6254                                  ;*SET (1) OR A BYTE WHICH HAD AN EVEN NUMBER OF BITS SET (1).
6255                                  ;*THE MAINTENANCE FUNCTION FOR THE MAIN MEMORY DATA
6256                                  ;*PARITY CHECKERS WORKS IN SUCH A WAY AS TO
6257                                  ;*EFFECTIVELY FORCE THE BYTES PARITY BIT TO ONE (SET), SO
6258                                  ;*THAT IF THE PARITY BIT FOR THAT BYTE HAD BEEN ZERO
6259                                  ;*AN ERROR OCCURS! IF THE BYTE'S PARITY BIT WAS
6260                                  ;*ALREADY ONE THEN NO ERROR OCCURS!
6261                                  ;*
6262                                  ;*****************************************************************
6263  025300  000004          TST53:  SCOPE
6264  025302  012737  000020  001274          MOV     #20.,$TIMES     ;;DO 20 ITERATIONS
6265          000054          UA=$TN
6266                                                                  ;SET THE SKAD REGISTER
6267  025310  012737  025654  030524          MOV     #TST54,SKAD     ;IN CASE THE TEST ABORTS.
6268
```

```
  6259  025316  113737  001102  001224          MOVB    $TSTNM,$TMP0
  6260  025324  012737  030400  000114          MOV     #SPUR,@#CACHVEC
  6261
  6262  025332  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
  6263  025340  005000                          CLR     R0              ;INITIALIZE
  6264
  6265  025342  012737  025342  001110  UA1:    MOV     #UA1,$LPERR
  6266  025350  004737  030764                  JSR     PC,PARCNT       ;SEE IF THE CURRENT TEST
  6267  025354  032702  000001                  BIT     #BIT0,R2        ;PATTERN HAS THE PARITY BIT
  6268  025360  001002                          BNE     UA2             ;OFF, IF NOT GO TO NEXT
  6269  025362  000137  025634                  JMP     UA7             ;PATTERN
  6270
  6271  025366  012737  025540  000114  UA2:    MOV     #UAER1,@#CACHVEC        ;SET UP FOR THE ERROR, EVEN WORD.
  6272  025374  012704  010000                  MOV     #10000,R4       ;THIS IS A PATTERN WHICH
  6273  025400  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED INTO THE
  6274                                                                  ;MAINTENANCE REGISTER
  6275                                                                  ;WILL FORCE AN ERROR ON
  6276                                                                  ;THE MAIN MEMORY EVEN
  6277  025404  012701  025534                  MOV     #UATMP1,R1      ;WORD LOW BYTE
  6278  025410  010011                          MOV     R0,(R1)
  6279  025412  010412                          MOV     R4,(R2)         ;SET THE MAINT REG
  6280  025414  021101                          CMP     (R1),R1         ;THE REFERENCE TO (R1),
  6281                                                                  ;UATMP1 SHOULD CAUSE
  6282                                                                  ;AN ERROR.
  6283  025416  005012                          CLR     (R2)
  6284  025420  005012                          CLR     (R2)
  6285
  6286  025422                          UA3:
  6287                                                                  ;THE ERROR DIDN'T OCCUR!
  6288  025422  010037  001230                  MOV     R0,$TMP2        ;REPORT FAILURE
  6289  025426  012737  025534  001232          MOV     #UATMP1,$TMP3
  6290  025434  005037  001234                  CLR     $TMP4
  6291  025440  104140                  64$:    ERROR   140
  6292
  6293  025442  012737  025600  000114  UA4:    MOV     #UAER2,@#CACHVEC        ;SET UP FOR THE ERROR
  6294  025450  012737  025442  001110          MOV     #UA4,$LPERR     ;ON THE ODD WORD.
  6295  025456  012704  040000                  MOV     #40000,R4       ;THIS IS A PATTERN WHICH
  6296  025462  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED IN THE MAINTENANCE
  6297                                                                  ;REGISTER WILL CAUSE AN ERROR
  6298  025466  012701  025536                  MOV     #UATMP2,R1      ;ON THE ODD WORD, LOW BYTE.
  6299  025472  010011                          MOV     R0,(R1)         ;SET THE MAINT REG. AND
  6300  025474  000240                          NOP
  6301  025476  010412                          MOV     R4,(R2)         ;REFERENCE (R1), UATMP2, AND
  6302  025500  021101                          CMP     (R1),R1         ;CAUSE THE ERROR.
  6303
  6304  025502  005012                          CLR     (R2)
  6305  025504  005012                          CLR     (R2)
  6306
  6307  025506                          UA5:
  6308                                                                  ;THE ERROR DIDN'T OCCUR!
  6309  025506  010037  001230                  MOV     R0,$TMP2        ;REPORT FAILURE
  6310  025512  012737  025536  001232          MOV     #UATMP2,$TMP3
  6311  025520  005037  001234                  CLR     $TMP4
  6312  025524  104141                  64$:    ERROR   141
  6313
  6314  025526  000442                  UA6:    BR      UA7
```

```
                                        LOC=.                   ;GET THE PC TO AN EVEN WOPD BOUNDARY!!!
                                        LOC=-4&LOC
                                        LOC=LOC+4
                                        .=LOC

                              UATMP1::.WORD     0
                              UATMP2::.WORD     0

                              UAER1:
                                        CMP     #104404,@#MEMERR        ;MAKE SURE THE ERROR
                                        BEQ     2$                      ;REGISTER IS SET PROPERLY
                              1$:       JMP     SPUR
                              2$:       CMP     #UATMP1,@#LOADRS        ;MAKE SURE THE ERROR
                                        BNE     1$                      ;OCCURRED AT THE CORRECT
                                                                        ;ADDRESS.
                                        CMP     (SP)+,(SP)+             ;RESET THE STACK
                                        MOV     #-1,@#MEMERR            ;CLEAR THE ERROR REGISTERS.
                                        JMP     UA4                     ;GO TEST THE ODD WORD

                              UAER2:
                                        CMP     #104410,@#MEMERR        ;MAKE SURE THE ERROR
                                        BEQ     2$                      ;REGISTER IS SET PROPERLY
                              1$:       JMP     SPUR
                              2$:       CMP     #UATMP2,@#LOADRS        ;MAKE SURE THE ERROR
                                        BNE     1$                      ;OCCURRED AT THE CORRECT
                                                                        ;ADDRESS.
                                        CMP     (SP)+,(SP)+             ;RESET THE STACK
                                        MOV     #-1,@#MEMERR            ;CLEAR THE ERROR REGISTERS.

                              UA7:      CMP     #377,R0                 ;INCREMENT THE TEST PATTERN
                                        BEQ     UA8
                                        ADD     #1,R0
                                        JMP     UA1

                              UA8:      RSET

                              ;;*****************************************************************
                              ;*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!
                                        ;*
                                        ;;*****************************************************************
025554  000004                  $TST54: SCOPE
025556  012737  000020  001274          MOV     #20.,$TIMES     ;;DO 20 ITERATIONS
        000055          UB=$TN
                                                                ;SET THE SKAD REGISTER
025664  012737  026230  030524          MOV     #TST55,SKAD     ;IN CASE THE TEST ABORTS.

025672  113737  001102  001224          MOVB    $TSTNM,$TMPO
025700  012737  030400  000114          MOV     #SPUR,@#CACHVEC

025706  012737  000014  177746          MOV     #MOM1,@#CONTRL  ;FORCE MISSES TO BOTH GROUPS.
025714  005000                          CLR     R0              ;INITIALIZE

025716  012737  025716  001110  UB1:    MOV     #UB1,$LPERR
025724  004737  030764                  JSR     PC,PARCNT       ;SEE IF THE CURRENT TEST
025730  032702  000001                  BIT     #BIT0,R2        ;PATTERN HAS THE PARITY BIT
025734  001002                          BNE     UB2             ;OFF, IF NOT GO TO NEXT
025736  000137  026210                  JMP     UB7             ;PATTERN

025742  012737  026114  000114  UB2:    MOV     #UBER1,@#CACHVEC        ;SET UP FOR THE ERROR, EVEN WORD.
025750  012704  020000                  MOV     #20000,R4       ;THIS IS A PATTERN WHICH
025754  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED INTO THE
                                                                ;MAINTENANCE REGISTER
                                                                ;WILL FORCE AN ERROR ON
                                                                ;THE MAIN MEMORY EVEN
025760  012701  026110                  MOV     #UBTMP1,R1      ;WORD HIGH BYTE
025764  010011                          MOV     R0,(R1)
025766  010412                          MOV     R4,(R2)         ;SET THE MAINT REG
025770  021101                          CMP     (R1),R1         ;THE REFERENCE TO (R1),
                                                                ;UBTMP1 SHOULD CAUSE
                                                                ;AN ERROR.
025772  005012                          CLR     (R2)
025774  005012                          CLR     (R2)

025776                  UB3:
                                                                ;THE ERROR DIDN'T OCCUR!
025776  010037  001230                  MOV     R0,$TMP2        ;REPORT FAILURE
026002  012737  026110  001232          MOV     #UBTMP1,$TMP3
026010  005037  001234                  CLR     $TMP4
026014  104142                  $4$:    ERROR   142

026016  012737  026154  000114  UB4:    MOV     #UBER2,@#CACHVEC        ;SET UP FOR THE ERROR
026024  012737  026016  001110          MOV     #UB4,$LPERR     ;ON THE ODD WORD.
026032  012704  100000                  MOV     #100000,R4      ;THIS IS A PATTERN WHICH
026036  012702  177750                  MOV     #MAINT,R2       ;WHEN LOADED IN THE MAINTENANCE
                                                                ;REGISTER WILL CAUSE AN ERROR
026042  012701  026112                  MOV     #UBTMP2,R1      ;ON THE ODD WORD, LOW BYTE.
026046  010011                          MOV     R0,(R1)         ;SET THE MAINT REG. AND
026050  000240                          NOP
026052  010412                          MOV     R4,(R2)         ;REFERENCE (R1), UBTMP2, AND
026054  021101                          CMP     (R1),R1         ;CAUSE THE ERROR.

026056  005012                          CLR     (R2)
026060  005012                          CLR     (R2)
```

```
                                UB5:
                                                                ;THE ERROR DIDN'T OCCUR!
026062  013037  001230                    MOV     R0,$TMP2        ;REPORT FAILURE
026066  012737  026112  001232            MOV     #UBTMP2,$TMP3
026074  005037  001234                    CLR     $TMP4
026100  104143                  64$:      ERROR   143

026102  000442                  UB6:      BR      UB7

                026104                    LOC=.                   ;GET THE PC TO AN EVEN WORD BOUNDARY!!!
                026104                    LOC=-4$LOC
                026110                    LOC=LOC+4
                026110                    .=LOC

026110  000000                  UBTMP1:.WORD    0
026112  000000                  UBTMP2:.WORD    0

026114                          UBER1:
026114  022737  104404  177744            CMP     #104404,@#MEMERR        ;MAKE SURE THE ERROR
026122  001402                            BEQ     2$              ;REGISTER IS SET PROPERLY
026124  000137  030400          1$:       JMP     SPUR
026130  022737  026110  177740  2$:       CMP     #UBTMP1,@#LOADRS        ;MAKE SURE THE ERROR
026136  001372                            BNE     1$              ;OCCURRED AT THE CORREC
                                                                ;ADDRESS.
026140  022626                            CMP     (SP)+,(SP)+     ;RESET THE STACK
026142  012737  177777  177744            MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.
026150  000137  026316                    JMP     UB4             ;GO TEST THE ODD WORD

026154                          UBER2:
026154  022737  104410  177744            CMP     #104410,@#MEMERR        ;MAKE SURE THE ERROR
026162  001402                            BEQ     2$              ;REGISTER IS SET PROPERLY
026164  000137  030400          1$:       JMP     SPUR
026170  022737  026112  177740  2$:       CMP     #UBTMP2,@#LOADRS        ;MAKE SURE THE ERROR
026176  001372                            BNE     1$              ;OCCURRED AT THE CORRECT
                                                                ;ADDRESS.
026200  022626                            CMP     (SP)+,(SP)+     ;RESET THE STACK
026202  012737  177777  177744            MOV     #-1,@#MEMERR    ;CLEAR THE ERROR REGISTERS.

026210  022700  177400          UB7:      CMP     #177400,R0              ;INCREMENT THE TEST PATTERN
026214  001404                            BEQ     UB8
026216  062700  000400                    ADD     #400,R0
026222  000137  025716                    JMP     UB1

026226  104416                  UB8:      RSET

026230                          TST55:


                                ;;*****************************************************************

                                .SBTTL  END OF PASS ROUTINE

                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*INDICATE END-OF-PROGRAM AFTER 1 PASSES THRU THE PROGRAM
```

```
                                        ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO LOOP

026230                                  $EOP:
026230  000004                                  SCOPE
026232  005037  001102                          CLR     $TSTNM          ;;ZERO THE TEST NUMBER
026236  005037  001274                          CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
026242  005237  001100                          INC     $PASS           ;;INCREMENT THE PASS NUMBER
026246  042737  100000  001100                  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
026254  005327                                  DEC     (PC)+           ;;LOOP?
026256  000001                          $EOPCT: .WORD   1
026260  003031                                  BGT     $DOAGN          ;;YES
026262  012737                                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
026264  000001                          $ENDCT: .WORD   1
026266  026256                                  $EOPCT
026270  104400  026350                          TYPE    ,$ENDMG         ;;TYPE "END PASS #"
026274  013746  001100                          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
026300  104410                                  TYPOS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
026302  104400  026365                          TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
026306  013700  000042                  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
026312  001414                                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
026314  012703  125252                          MOV     #125252,R3
026320  004737  031034                          JSR     PC,CHAINQ
026324  013700  000042                          MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
026330  001405                                  BEQ     $DOAGN          ;;RETURN ADDRESS
026332  000005                                  RESET                   ;;CLEAR THE WORLD
026334  004710                          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
026336  000240                                  NOP                     ;;SAVE ROOM
026340  000240                                  NOP                     ;;FOR
026342  000240                                  NOP                     ;;ACT11
026344                                  $DOAGN:
026344  000137  003276                          JMP     @#LOOP          ;;RETURN
026350  005015  047105  020104  $ENDMG: .ASCIZ  <15><12>'END PASS #'
026356  040520  051523  021440
026364     000
026365     377     377     000  $ENULL: .BYTE   -1,-1,0                 ;;NULL CHARACTER STRING

                                        ;;**************************************************************

                                        .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

026370                                  $SCOPE:
026370  006137  177570                          ROL     @#SWR           ;;LOOP ON PRESENT TEST?
026374  100514                                  BMI     $OVER           ;;YES IF SW14=1
```

```
 6549                                   ;*****START OF CODE FOR THE XOR TESTER*****
 6550  026376  000416                   $XTSTR: BR      6$                ;;IF RUNNING ON THE "XOR" TESTER CHANGE
 6551                                                                     ;;THIS INSTRUCTION TO A "NOP" (NOP=240
 6552  026400  013746  000004                   MOV     @#ERRVEC,-(SP)    ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 6553  026404  012737  026424  000004           MOV     #5$,@#ERRVEC      ;;SET FOR TIMEOUT
 6554  026412  005737  177060                   TST     @#177060          ;;TIME OUT ON XOR?
 6555  026416  012637  000004                   MOV     (SP)+,@#ERRVEC    ;;RESTORE THE ERROR VECTOR
 6556  026422  000466                           BR      $SVLAD            ;;GO TO THE NEXT TEST
 6557  026424  022626                   5$:     CMP     (SP)+,(SP)+       ;;CLEAR THE STACK AFTER A TIME OUT
 6558  026426  012637  000004                   MOV     (SP)+,@#ERRVEC    ;;RESTORE THE ERROR VECTOR
 6559  026432  000426                           BR      7$                ;;LOOP ON THE PRESENT TEST
 6560  026434                           6$:;*****END OF CODE FOR THE XOR TESTER*****
 6561  026434  032737  000400  177570           BIT     #BIT08,@#SWR      ;;LOOP ON SPEC. TEST?
 6562  026442  001407                           BEQ     2$                ;;BR IF NO
 6563  026444  013746  177570                   MOV     @#SWR,-(SP)       ;;SET DESIRED TEST NUM. FROM SWR
 6564  026450  042716  000200                   BIC     #$SWRMK,(SP)      ;;STRIP AWAY UNDESIRED BITS
 6565  026454  122637  001102                   CMPB    (SP)+,$TSTNM      ;;ON THE RIGHT TEST?
 6566  026460  001462                           BEQ     $OVER             ;;BR IF YES
 6567  026462  105737  001103           2$:     TSTB    $ERFLG            ;;HAS AN ERROR OCCURRED?
 6568  026466  001421                           BEQ     3$                ;;BR IF NO
 6569  026470  123737  001115  001103           CMPB    $ERMAX,$ERFLG     ;;MAX. ERRORS FOR THIS TEST OCCURRED?
 6570  026476  101015                           BHI     3$                ;;BR IF NO
 6571  026500  032737  001000  177570           BIT     #BIT09,@#SWR      ;;LOOP ON ERROR?
 6572  026506  001404                           BEQ     4$                ;;BR IF NO
 6573  026510  013737  001110  001106   7$:     MOV     $LPERR,$LPADR     ;;SET LOOP ADDRESS TO LAST SCOPE
 6574  026516  000443                           BR      $OVER
 6575  026520  105037  001103           4$:     CLRB    $ERFLG            ;;ZERO THE ERROR FLAG
 6576  026524  005037  001274                   CLR     $TIMES            ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
 6577  026530  000415                           BR      1$                ;;ESCAPE TO THE NEXT TEST
 6578  026532  032737  004000  177570   3$:     BIT     #BIT11,@#SWR      ;;INHIBIT ITERATIONS?
 6579  026540  001011                           BNE     1$                ;;BR IF YES
 6580  026542  005737  001100                   TST     $PASS             ;;IF FIRST PASS OF PROGRAM
 6581  026546  001406                           BEQ     1$                ;;      INHIBIT ITERATIONS
 6582  026550  005237  001104                   INC     $ICNT             ;;INCREMENT ITERATION COUNT
 6583  026554  023737  001274  001104           CMP     $TIMES,$ICNT      ;;CHECK THE NUMBER OF ITERATIONS MADE
 6584  026562  002021                           BGE     $OVER             ;;BR IF MORE ITERATION REQUIRED
 6585  026564  012737  000001  001104   1$:     MOV     #1,$ICNT          ;;REINITIALIZE THE ITERATION COUNTER
 6586  026572  013737  026642  001274           MOV     $MXCNT,$TIMES     ;;SET NUMBER OF ITERATIONS TO DO
 6587  026600  105237  001102           $SVLAD: INCB    $TSTNM            ;;COUNT TEST NUMBERS
 6588  026604  011637  001106                   MOV     (SP),$LPADR       ;;SAVE SCOPE LOOP ADDRESS
 6589  026610  011637  001110                   MOV     (SP),$LPERR       ;;SAVE ERROR LOOP ADDRESS
 6590  026614  005037  001276                   CLR     $ESCAPE           ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 6591  026620  112737  000001  001115           MOVB    #1,$ERMAX         ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 6592  026626  013737  001102  177570   $OVER:  MOV     $TSTNM,@#DISPLAY  ;;DISPLAY TEST NUMBER
 6593  026634  013716  001106                   MOV     $LPADR,(SP)       ;;FUDGE RETURN ADDRESS
 6594  026640  000002                           RTI                       ;;FIXES PS
 6595  026642  000001                   $MXCNT: 1                         ;;MAX. NUMBER OF ITERATIONS
 6596
 6597                                   ;;**************************************************************
 6598
 6599                                   .SBTTL  ERROR HANDLER ROUTINE
 6600
 6601                                   ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT.
 6602                                   ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 6603                                   ;*AND GO TO ERTYPE ON ERROR
 6604                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
```

```
                                        ;*SW15=1        HALT ON ERROR
                                        ;*              HALT CAN OCCUR BEFORE AND AFTER THE ERROR TYPEOUT
                                        ;*SW13=1        INHIBIT ERROR TYPEOUTS
                                        ;*SW10=1        BELL ON ERROR
                                        ;*SW09=1        LOOP ON ERROR
                                        ;*CALL
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

026644                                  $ERROR:
026644  105237  001103                  7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
026650  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
026652  013737  001102  177570          MOV     $TSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
026660  005737  177570                  TST     @#SWR           ;;HALT ON ERROR = 1?
026664  100001                          BPL     8$              ;;BRANCH IF NO
026666  000000                          HALT                    ;;YES--HALT
026670  032737  002000  177570  8$:     BIT     #BIT10,@#SWR    ;;BELL ON ERROR?
026676  001402                          BEQ     1$              ;;NO - SKIP
026700  104400  001300                  TYPE    ,$BELL          ;;RING BELL
026704  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
026710  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
026714  162737  000002  001116          SUB     #2,$ERRPC
026722  117737  152170  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
026730  032737  020000  177570          BIT     #BIT13,@#SWR    ;;SKIP TYPEOUT IF SET
026736  001004                          BNE     2$              ;;SKIP TYPEOUTS
026740  004737  031230                  JSR     PC,ERTYPE       ;;GO TO USER ERROR ROUTINE
026744  104400  001305                  TYPE    ,$CRLF
026750  005737  177570          2$:     TST     @#SWR           ;;HALT ON ERROR
026754  100001                          BPL     9$              ;;SKIP IF CONTINUE
026756  000000                          HALT                    ;;HALT ON ERROR!
026760  022737  026334  000042  9$:     CMP     #$ENDAD,42      ;;ACT-11?
026766  001001                          BNE     3$              ;;BRANCH IF NO
026770  000000                          HALT                    ;;YES
026772  032737  001000  177570  3$:     BIT     #BIT09,@#SWR    ;;LOOP ON ERROR SWITCH SET?
027000  001402                          BEQ     4$              ;;BR IF NO
027002  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
027006  005737  001276          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
027012  001402                          BEQ     5$              ;;BR IF NONE
027014  013716  001276                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
027020                          5$:
027020  012737  177777  177744          MOV     #-1,@#MEMERR
027026  005037  177766                  CLR     @#CPUERR
027032  000002                          RTI

                                        ;;**************************************************************

                                        .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

                                        $SAVREG:
027034
027034  010046                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
027036  010146                                MOV     R1,-(SP)        ;;PUSH R1 ON STACK
027040  010246                                MOV     R2,-(SP)        ;;PUSH R2 ON STACK
027042  010346                                MOV     R3,-(SP)        ;;PUSH R3 ON STACK
027044  010446                                MOV     R4,-(SP)        ;;PUSH R4 ON STACK
027046  010546                                MOV     R5,-(SP)        ;;PUSH R5 ON STACK
027050  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
027054  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
027060  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
027064  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
027070  000002                                RTI

                                        ;*RESTORE R0-R5
                                        ;*CALL:
                                        ;*      RESREG
027072                                  $RESREG:
027072  012666  000022                        MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
027076  012666  000022                        MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
027102  012666  000022                        MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
027106  012666  000022                        MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
027112  012605                                MOV     (SP)+,R5        ;;POP STACK INTO R5
027114  012604                                MOV     (SP)+,R4        ;;POP STACK INTO R4
027116  012603                                MOV     (SP)+,R3        ;;POP STACK INTO R3
027120  012602                                MOV     (SP)+,R2        ;;POP STACK INTO R2
027122  012601                                MOV     (SP)+,R1        ;;POP STACK INTO R1
027124  012600                                MOV     (SP)+,R0        ;;POP STACK INTO R0
027126  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:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                        ;*
                                        ;*CALL:
                                        ;*1) USING A TRAP INSTRUCTION
                                        ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                        ;*OR
                                        ;*      TYPE
                                        ;*      MESADR
                                        ;*
                                        ;*2) USING A JSR INSTRUCTION
                                        ;*      MOV     PS,-(SP)        ;;PUSH PROCESSOR STATUS WORD ON THE STACK
                                        ;*      JSR     PC,$TYPE        ;;CALL TYPE ROUTINE
                                        ;*      MESADDR                 ;;FIRST ADRESS OF MESSAGE
```

```
  6717  027130  105737  001151          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
  6718  027134  100002                          BPL     1$              ;;BR IF YES
  6719  027136  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
  6720  027140  000407                          BR      3$              ;;LEAVE
  6721  027142  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
  6722  027144  017600  000002                  MOV     2(SP),R0        ;;GET ADDRESS OF ASCIZ STRING
  6723  027150  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
  6724  027152  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
  6725  027154  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
  6726  027156  012600                          MOV     (SP)+,R0        ;;RESTORE R0
  6727  027160  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
  6728  027164  000002                          RTI                     ;;RETURN
  6729  027166  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
  6730  027172  001426                          BEQ     8$
  6731  027174  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT
  6732  027200  001004                          BNE     5$
  6733  027202  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
  6734  027204  104400  001305                  TYPE    ,$CRLF
  6735  027210  000757                          BR      2$              ;;GET NEXT CHARACTER
  6736  027212  004737  027274          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
  6737  027216  123726  001150          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
  6738  027222  001352                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
  6739  027224  013746  001146                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
  6740                                                                  ;;AND THE NULL CHAR.
  6741  027230  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
  6742  027234  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
  6743  027236  004737  027274                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
  6744  027242  105337  027340                  DECB    $CHARCNT        ;;DON'T COUNT THE NULL AS A CHARACTER
  6745  027246  000770                          BR      7$              ;;LOOP
  6746
  6747                                  ;;HORIZONTAL TAB PROCESSOR
  6748
  6749  027250  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
  6750  027254  004737  027274          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
  6751  027260  132737  000007  027340          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
  6752  027266  001372                          BNE     9$              ;;TAB STOP
  6753  027270  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
  6754  027272  000726                          BR      2$              ;;GET NEXT CHARACTER
  6755  027274  105777  151642          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
  6756  027300  100375                          BPL     $TYPEC
  6757  027302  116677  000002  151634          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
  6758  027310  122766  000015  000002          CMPB    #CR,2(SP)       ;;BRANCH IF
  6759  027316  001003                          BNE     1$              ;;NOT <CR>
  6760  027320  105037  027340                  CLRB    $CHARCNT        ;;
  6761  027324  000406                          BR      $TYPEX          ;;EXIT
  6762  027326  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;BRANCH IF
  6763  027334  001402                          BEQ     $TYPEX          ;;<LF>
  6764  027336  105227                          INCB    (PC)+           ;;INC SPACE
  6765  027340  000000                  $CHARCNT:.WORD  0               ;;COUNT
  6766  027342  000207                  $TYPEX: RTS     PC
  6767
  6768
  6769                                  ;;**************************************************************
  6770
  6771                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
  6772
```

```
                                        ;*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

027344  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
027350  116637  000001  027567          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
027356  112637  027571                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
027362  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
027366  000406                          BR      $TYPON
027370  112737  000001  027567  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
027376  112737  000006  027571          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
027404  112737  000005  027566  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
027412  010346                          MOV     R3,-(SP)        ;;SAVE R3
027414  010446                          MOV     R4,-(SP)        ;;SAVE R4
027416  010546                          MOV     R5,-(SP)        ;;SAVE R5
027420  113704  027571                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
027424  005404                          NEG     R4
027426  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
027432  110437  027570                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
027436  113704  027567                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
027442  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
027446  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
027450  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
027452  000404                          BR      3$              ;;GO DO MSB
027454  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
027456  006105                          ROL     R5
027460  006105                          ROL     R5
027462  010503                          MOV     R5,R3
027464  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
027466  105337  027570                  DECB    $OMODE          ;;TYPE THIS DIGIT?
027472  100016                          BPL     7$              ;;BR IF NO
027474  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
027500  001002                          BNE     4$              ;;TEST FOR 0
027502  005704                          TST     R4              ;;SUPPRESS THIS 0?
027504  001403                          BEQ     5$              ;;BR IF YES
027506  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
027510  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
027514  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
```

```
6829  027520  110337  027564                  MOVB    R3,8$           ;;SAVE FOR TYPING
6830  027524  104400  027564                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
6831  027530  105337  027566          7$:     DECB    $OCNT           ;;COUNT BY 1
6832  027534  003347                          BGT     2$              ;;BR IF MORE TO DO
6833  027536  002402                          BLT     6$              ;;BR IF DONE
6834  027540  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
6835  027542  000744                          BR      2$              ;;GO DO THE LAST DIGIT
6836  027544  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
6837  027546  012604                          MOV     (SP)+,R4        ;;RESTORE R4
6838  027550  012603                          MOV     (SP)+,R3        ;;RESTORE R3
6839  027552  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
6840  027560  012616                          MOV     (SP)+,(SP)
6841  027562  000002                          RTI                     ;;RETURN
6842  027564     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
6843  027565     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
6844  027566     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
6845  027567     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
6846  027570  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
6847
6848                                  ;;**************************************************************
6849
6850                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
6851
6852                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
6853                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
6854                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
6855                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
6856                                  ;*REPLACED WITH SPACES.
6857                                  ;*CALL:
6858                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
6859                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
6860
6861  027572                          $TYPDS:
6862  027572  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
6863  027574  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6864  027576  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6865  027600  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6866  027602  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
6867  027604  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
6868  027610  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
6869  027614  100004                          BPL     1$              ;;BR IF INPUT IS POS.
6870  027616  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
6871  027620  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
6872  027626  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
6873  027630  012703  030006                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
6874  027634  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
6875  027640  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
6876  027642  016001  027776                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
6877  027646  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
6878  027650  002402                          BLT     4$              ;;BR IF DONE
6879  027652  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
6880  027654  000774                          BR      3$
6881  027656  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
6882  027660  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
6883  027662  001002                          BNE     5$              ;;FALL THROUGH IF 0
6884  027664  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
```

```
6885  027666  100407                        BMI     7$              ;;BR IF YES
6886  027670  106316                5$:     ASLB    (SP)            ;;MSD?
6887  027672  103003                        BCC     6$              ;;BR IF NO
6888  027674  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
6889  027702  052702  000060        6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
6890  027706  052702  000040        7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
6891  027712  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
6892  027714  005720                        TST     (R0)+           ;;JUST INCREMENTING
6893  027716  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
6894  027722  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
6895  027724  003002                        BGT     8$              ;;GO TO EXIT
6896  027726  010502                        MOV     R5,R2           ;;GET THE LSD
6897  027730  000764                        BR      6$              ;;GO CHANGE TO ASCII
6898  027732  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
6899  027734  100003                        BPL     9$              ;;BR IF NO
6900  027736  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
6901  027744  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
6902  027746  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
6903  027750  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
6904  027752  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
6905  027754  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
6906  027756  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
6907  027760  104400  030006                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
6908  027764  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
6909  027772  012616                        MOV     (SP)+,(SP)
6910  027774  000002                        RTI                     ;;RETURN TO USER
6911  027776  023420                $DTBL:  10000.
6912  030000  001750                        1000.
6913  030002  000144                        100.
6914  030004  000012                        10.
6915  030006  000004                $DBLK:  .BLKW   4
6916
6917                                  ;;**************************************************************
6918
6919                                  .SBTTL  TRAP DECODER
6920
6921                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
6922                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
6923                                  ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
6924                                  ;*GO TO THAT ROUTINE.
6925
6926  030016  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
6927  030020  016600  000002                MOV     2(SP),R0        ;;GET TRAP ADDRESS
6928  030024  005740                        TST     -(R0)           ;;BACKUP BY 2
6929  030026  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
6930  030030  016000  030036                MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
6931  030034  000200                        RTS     R0              ;;GO TO ROUTINE
6932
6933
6934                                  .SBTTL  TRAP TABLE
6935
6936                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
6937                                  ;*BY THE "TRAP" INSTRUCTION.
6938
6939                                  ;       ROUTINE
6940                                  ;       -------
```

```
                                ;TRPAD:
                                        $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
                                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
                                        $TYPOS  ;;CALL=TYPOS    TRAP+4(104404)  TYPE OCTAL NUMBER (NO LEADING ZEROS,
                                        $TYPON  ;;CALL=TYPON    TRAP+6(104406)  TYPE OCTAL NUMBER (AS PER LAST CALL)
                                        $TYPDS  ;;CALL=TYPDS    TRAP+10(104410) TYPE DECIMAL NUMBER (WITH SIGN)
                                        $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
                                        $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE

                                        CLEAN   ;;CALL=RSET     TRAP+16(104416) GO RESET ALL REGISTERS.
                                        ABORTT  ;;CALL=SKIPT    TRAP+20(104420) THIS WILL SKIP TO THE NEXT TEST
                                        MMDES   ;;CALL=MMSKIP   TRAP+22(104422) IF SWITCH # IS ON SKIP TO THE NEXT TEST
                                        MSIZER  ;;CALL=SIZE     TRAP+24(104424) DETERMINE THE HIGHEST ADDRESS IN MEMORY
                                        SKBADR  ;;CALL=SKPBAD   TRAP+26(104426) SKIP TEST IF ERROR ADDRESS REGISTER IS I
                                        SKBERR  ;;CALL=SKPBER   TRAP+30(104430) SKIP TEST IF ERROR REGISTER IS INOPERATI
                                        SKBCNR  ;;CALL=SKPBCN   TRAP+32(104432) SKIP TEST IF CONTROL REGISTER IS INOPERA
                                        SKBMNR  ;;CALL=SKPBMN   TRAP+34(104434) SKIP TEST IF MAINTENANCE REGISTER IS INO
                                        SKBHMR  ;;CALL=SKPBHM   TRAP+36(104436) SKIP TEST IF HIT/MISS REGISTER IS IN OPE

                                ;;**************************************************************

                                .SBTTL  POWER DOWN AND UP ROUTINES

                                ;POWER DOWN ROUTINE
030076  012737  030224  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
030104  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
030112  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
030114  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
030116  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
030120  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
030122  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
030124  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
030126  010637  030230                  MOV     SP,$SAVR6       ;;SAVE SP
030132  012737  030144  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
030140  000000                          HALT
030142  000776                          BR      .-2             ;;HANG UP

                                ;POWER UP ROUTINE
030144  013706  030230          $PWRUP: MOV     $SAVR6,SP       ;;GET SP
030150  005037  030230                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
030154  005237  030230          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
030160  001375                          BNE     1$              ;;OF  WORD
030162  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
030164  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
030166  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
030170  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
030172  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
030174  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
030176  012737  030076  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
030204  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
030212  104400                          TYPE                    ;;REPORT THE POWER FAILURE
030214  030205          $PWRMG: .WORD   POWERM                  ;;POWER FAIL MESSAGE POINTER
030216  012716                          MOV     (PC)+,(SP)      ;;RESTART AT START
030220  003010          $PWRAD: .WORD   START                   ;;RESTART ADDRESS
030222  000002                          RTI
030224  000000          $ILLUP: HALT                            ;;THE POWER UP SEQUENCE WAS STARTED
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030226  000775                  BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
030230  000000          $SAVR6: 0                       ;;PUT THE SP HERE

                        ;;**************************************************************

                        .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE

                        ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                        ;*UNSIGNED OCTAL ASCIZ NUMBER.
                        ;*CALL
                        ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                        ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
                        ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK

030232  104412          $DB2O:  SAVREG                  ;;SAVE ALL REGISTERS
030234  016601  000002          MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
030240  012705  030351          MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
030244  012704  000014          MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
030250  012703  177770          MOV     #^C7,R3         ;;MASK
030254  012100                  MOV     (R1)+,R0        ;;LOWER WORD
030256  012101                  MOV     (R1)+,R1        ;;HIGH WORD
030260  005002                  CLR     R2              ;;TERMINATOR
030262  110245          1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
030264  010002                  MOV     R0,R2           ;;GET THIS DIGIT
030266  005304                  DEC     R4              ;;COUNT THIS CHARACTER
030270  003007                  BGT     3$              ;;BR IF NOT THE LAST DIGIT
030272  001405                  BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
030274  005205                  INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
030276  010566  000002          MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
030302  104414                  RESREG                  ;;RESTORE ALL REGISTERS
030304  000207                  RTS     PC              ;;RETURN TO USER
030306  006203          2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
030310  006001          3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
030312  006000                  ROR     R0              ;;      THE NEXT OCTAL DIGIT
030314  006001                  ROR     R1
030316  006000                  ROR     R0
030320  006001                  ROR     R1
030322  006000                  ROR     R0
030324  040302                  BIC     R3,R2           ;;MASK OUT ALL JUNK
030326  062702  000060          ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
030332  000753                  BR      1$              ;;GO PUT IT IN THE DATA TABLE
030334  000016          $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE

                        ;THIS ROUTINE IS CALLED BY UNEXPECTED TRAPS TO VECTOR ERRVEC.
                        ;THE ERROR IS REPORTED AND CONTROL IS TRANSFERRED BACK TO THE TEST
                        ;FOLLOWING THE ONE THAT WAS INTERRUPTED WHEN THE ERROR OCCURRED!
030352  011637  001226  CPSPUR: MOV     (SP),$TMP1
030356  012737  030374  001230          MOV     #1$,$TMP2
030364  013737  177766  001232          MOV     @#CPUERR,$TMP3
030372  022626                          CMP     (SP)+,(SP)+     ;RESET THE STACK
030374  104150          1$:     ERROR   150
030376  104420                  SKIPT

                        ;THIS ROUTINE HANDLE UNEXPECTED TRAPS TO #CACHVEC.
030400  012737  030470  000114  $PUR:   MOV     #10$,@#CACHVEC
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```
 7053  030406  013700  177744          MOV     @#MEMERR,R0
 7054  030412  032700  000014          BIT     #14,R0          ;SEE IF IT WAS A MAIN MEMORY PARITY ERROR.
 7055  030416  001403                  BEQ     9$
 7056  030420  013700  177740          MOV     @#LOADRS,R0     ;IF IT WAS THEN THE BAD PARITY IS
 7057  030424  005710                  TST     (R0)            ;CACHED AND MUST BE PURGED!!!!!
 7058  030426  012737  030400  000114  9$:     MOV     #SPUR,@#CACHVEC
 7059  030434  013737  177744  001234          MOV     @#MEMERR,$TMP4  ;TRAP HERE IF AN UNEXPECTED
 7060  030442  013737  177740  001226          MOV     @#LOADRS,$TMP1  ;ERROR, PARITY, OCCURS.
 7061  030450  013737  177742  001230          MOV     @#HIADRS,$TMP2
 7062  030456  011637  001232                  MOV     (SP),$TMP3
 7063  030462  022626                  CMP     (SP)+,(SP)+
 7064  030464  104014                  1$:     ERROR   14
 7065  030466  104420                          SKIPT                   ;?????
 7066  030470  022626                  10$:    CMP     (SP)+,(SP)+
 7067  030472  000137  030426          JMP     9$
 7068
 7069                                  ;THIS ROUTINE IS CALLED BY THE TRAP CATCHER CALL SKIPT.
 7070                                  ;IT TELLS THE USER THAT THE CURRENT TEST HAS BEEN
 7071                                  ;ABORTED AND THAT CONTROL IS BEING PASSED TO THE NEXT TEST.
 7072  030476  011637  001226          ABORTT: MOV     (SP),$TMP1
 7073  030502  112737  000015  001114          MOVB    #15,$ITEMB
 7074  030510  022626                  CMP     (SP)+,(SP)+
 7075  030512  004737  031230          JSR     PC,ERTYPE
 7076  030516  104416                  RSET
 7077  030520  000177  000000          JMP     @SKAD           ;GO TO @SKAD, WHICH SHOULD
 7078                                                          ;BE SET TO THE
 7079  030524  000000                  SKAD:   .WORD   0       ;ADDRESS OF THE NEXT TEST.
 7080
 7081
 7082                                  ;THIS ROUTINE IS CALLED BY THE TRAP CATCHER CALL RSET. IT CLEARS ALL
 7083                                  ;THE IMPORTANE REGISTERS AND RESETS THE STACK.
 7084  030526                          CLEAN:
 7085
 7086  030526  012737  030400  000114          MOV     #SPUR,@#CACHVEC
 7087  030534  012737  030352  000004          MOV     #CPSPUR,@#ERRVEC
 7088  030542  011637  030614                  MOV     (SP),BACKAD
 7089  030546  012706  001100                  MOV     #STACK,SP
 7090  030552  005037  177750                  CLR     @#MAINT         ;CLEAR ALL CONTROL AND ERROR
 7091  030556  005037  177572                  CLR     @#MMR0          ;REGISTERS.
 7092  030562  005037  172516                  CLR     @#MMR3
 7093  030566  005037  177746                  CLR     @#CONTRL
 7094  030572  012737  177777  177744          MOV     #-1,@#MEMERR
 7095  030600  005037  177766                  CLR     @#CPUERR
 7096  030604  005037  177776                  CLR     @#PSW
 7097  030610  000177  000000                  JMP     @BACKAD
 7098  030614  000000                  BACKAD: .WORD   0
 7099
 7100
 7101                                  ;COME HERE TO TEST THE REGISTER FLAGS AND USE THEM TO DETERMINE WHETHER
 7102                                  ;OR NOT TO SKIP A TEST WHICH RELIES ON THE FUNCTIONALITY OF THAT REGISTER
 7103                                  ;TO BE PROPERLY RUN.
 7104                                  ;THESE ROUTINES ARE CALLED BY THE TRAP CATCHER CALLS:
 7105                                  ;       SKPBAD          SKIPT IF BAD ERROR ADDRESS REGISTER
 7106                                  ;       SKPBER          SKIPT IF BAD ERROR REGISTER
 7107                                  ;       SKPBCN          SKIPT IF BAD CONTROL REGISTER
 7108                                  ;       SKPBMN          SKIPT IF BAD MAINTENANCE REGISTER
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                                        ;       SKPBHM          SKIPT IF BAD HIT/MISS REGISTER
                                        ;
                                        ;
030616  005737  030734          SKBADR: TST     LOAFLG
030622  001004                          BNE     1$
030624  005737  030736                  TST     HIAFLG
030630  001001                          BNE     1$
030632  000002                          RTI
030634  104400                  1$:     TYPE
030636  032767                          .WORD   ADRNG
030640  000433                          BR      SKRNG

030642  005737  030740          SKBERR: TST     MMRFLG
030646  001001                          BNE     1$
030650  000002                          RTI
030652  104400                  1$:     TYPE
030654  033077                          .WORD   ERRNG
030656  000424                          BR      SKRNG

030660  005737  030742          SKBCNR: TST     CONFLG
030664  001001                          BNE     1$
030666  000002                          RTI
030670  104400                  1$:     TYPE
030672  033177                          .WORD   CNRNG
030674  000415                          BR      SKRNG

030676  005737  030744          SKBMNR: TST     MANFLG
030702  001001                          BNE     1$
030704  000002                          RTI
030706  104400                  1$:     TYPE
030710  033301                          .WORD   MNRNG
030712  000406                          BR      SKRNG

030714  005737  030746          SKBHMR: TST     HIMFLG
030720  001001                          BNE     1$
030722  000002                          RTI
030724  104400                  1$:     TYPE
030726  033407                          .WORD   HMRNG

030730  022626                  SKRNG:  CMP     (SP)+,(SP)+             ;RESET THE STACK AND GO TO THE
030732  104420                          SKIPT                           ;NEXT TEST!!!!!

030734  000000                  LOAFLG: .WORD   0                       ;THESE ARE FLAGS USED TO DESIGNATE
030736  000000                  HIAFLG: .WORD   0                       ;EITHER A GOOD OR A BAD REGISTER.
030740  000000                  MMRFLG: .WORD   0                       ;GOOD WILL BE DESIGNATED BY A
030742  000000                  CONFLG: .WORD   0                       ;0 BAD BY A NOT ZERO!!
030744  000000                  MANFLG: .WORD   0
030746  000000                  HIMFLG: .WORD   0
030750  000000                  LOAFL2: .WORD   0
030752  000000                  HIAFL2: .WORD   0
030754  000000                  MMRFL2: .WORD   0
030756  000000                  CONFL2: .WORD   0
030760  000000                  MANFL2: .WORD   0
030762  000000                  HIMFL2: .WORD   0

                                ;THIS ROUTINE IS CALLED TO DETERMINE THE PARITY OF
```

```
                                        ;A DATA PATTERN. THE PATTERN WHICH IS TAKEN BY THIS
                                        ;ROUTINE AS ITS ARGUMENT SHOULD BE PUT IN R0. THEN
                                        ;TRANSFER CONTROL HERE BY EXECUTING:
                                        ;       JSR     PC,PARENT
                                        ;WHEN THIS ROUTINE RETURNS THE NUMBER OF ON,,1) BITS
                                        ;IN R0 IS LEFT IN R2. THIS WOULD BE A NUMBER BETWEEN
                                        ;0 AND 15.
030764  012701  000001          PARENT: MOV     #1,R1
030770  005002                          CLR     R2
030772  030100                  1$:     BIT     R1,R0
030774  001401                          BEQ     2$
030776  005202                          INC     R2
031000  006301                  2$:     ASL     R1
031002  103373                          BCC     1$
031004  000207                          RTS     PC

                                        ;THIS ROUTINE IS CALLED TO RESTORE THE TOP 1500 (DEC) WORDS IN THE
                                        ;FIRST 28K OF MEMORY. THIS SHOULD EFFECTIVELY RESTORE ANY MONITOR
                                        ;OR LOADER THAT WAS PRESENT BEFORE THIS PROGRAM BEGAN EXECUTION.
                                        ;CONTROL IS PASSED TO THIS ROUTINE BY AN INTERRUPT FROM THE TTY KEYBOARD
                                        ;WHEN ANY CHARACTER IS TYPED ON THE KEYBOARD. IF THE CHARACTER
                                        ;TURNS OUT TO BE A ↑C (CONTROL-C) THEN MEMORY IS RESTORED. IF THE
                                        ;CHARACTER IS NOT ↑C THEN A RETURN IS MADE TO THE TEST FOLLOWING
                                        ;THE ONE WHOSE EXECUTION WAS INTERRUPTED BY THE KEYBOARD INTERRUPT.
031006  017700  150126          RESMON: MOV     @#TKB,R0
031012  104416                          RSET
031014  005003                          CLR     R3
031016  042700  000200                  BIC     #BIT7,R0        ;GET THE CHARACTER, INITIALIZE THE REGISTERS
031022  022700  000003                  CMP     #3,R0           ;AND SEE IF THE CHARACTER WAS ↑C.
031026  001027                          BNE     NOCNC           ;BRANCH AND GO TO NEXT TEST IF NOT.
031030  104400                          TYPE                    ;ECHOE THE CONTROL-C AS '↑C'
031032  031742                          .WORD   CONCMS
031034  012704  002734          CHAINQ: MOV     #↑D1500,R4              ;AND RESTORE THE MONITOR.
031040  012701  051166                  MOV     #BOTTOM+4,R1
031044  012702  160000                  MOV     #160000,R2
031050  012142                  1$:     MOV     (R1)+,-(R2)
031052  077402                          SOB     R4,1$
031054  012737  177777  031130        MOV     #-1,MONF        ;RESET THE MONITOR RESTORED FLAG.
031062  020327  125252                  CMP     R3,#125252      ;SEE IF THE MONITOR IS BEING RESTORED
                                                                ;BY THE .$EOP ROUTINE.
031066  001001                          BNE     STOP            ;IF NOT GO HALT, OTHERWISE RETURN TO .$EOP
031070  000207                          RTS     PC
031072  104400                  STOP:   TYPE                    ;TYPE THE MONITOR RESTORED MESSAGE.
031074  031746                          .WORD   MMESRS
031076  013737  031126  000060        MOV     MONTTY,@#TKVEC
031104  000000                          HALT                    ;AND HALT!!
031106  005077  150026          NOCNC:  CLR     @#TKB           ;NOT CONTROL C SO RETURN TO NEXT TEST.
031112  152777  000100  150016        BISB    #BIT6,@#TKS
031120  104416                          RSET
031122  000177  177376                JMP     @#KAD           ;RETURN.
031126  000000                  MONTTY: .WORD   0               ;TEMPORARY STORAGE FOR THE INITIAL
                                                                ;CONTENTS OF THE TTY KEYBOARD INTERRUPT VECTOR.
031130  177777                  MONF:   .WORD   177777          ;FLAG. IF NOT -1 THE MONITOR IS SAVED!!


                                        ;THIS ROUTINE IS CALLED BY THE TRAP CALL MMSKIP. IT LOOKS
```

```
                                        ;AT THE SWITCH REGISTER AND DETERMINES WHETHER OR NOT
                                        ;SWITCH #7 IS ON. IF SO THE CURRENT TEST IS SKIPPED
                                        ;AND THE NEXT TEST IS ENTERED. A SSKAD MUST BE ISSUED
                                        ;BEFORE THE MMSKIP.
                                        ;THE PURPOSE OF SWITCH #7 IS TO CAUSE THE DELETION OF THE
                                        ;EXECUTION OF ANY TEST WHICH RELIES ON MEMORY MANAGEMENT
                                        ;FOR ITS OPERATION.

031132  032737  000200  177570  MMDES:  BIT     #SW7.@#SWR
031140  001001                          BNE     1$              ;IS THE SWITCH ON?
031142  000002                          RTI                     ;NO. SO RETURN.
031144  022626                  1$:     CMP     (SP)+,(SP)+
031146  104416                          RSET
031150  000177  177350                  JMP     @SKAD           ;YES. GO TO THE NEXT TEST.
                                        ;THIS ROUTINE IS CALLED TO DETERMINE THE HIGHEST POSSIBLE
                                        ;ADDRESS IN MEMORY. IT IS CALLED THUS, BY TRAP CALL SIZE:
                                        ;               SIZE
                                        ;       LOORDA: .WORD   0
                                        ;       HIORDA: .WORD   0
                                        ;       NXTINST:
                                        ;THE LOW ORDER 16-BITS OF THE ADDRESS ARE LEFT IN THE
                                        ;WORD DIRECTLY FOLLOWING THE CALL. THE HIGH ORDER 6-BITS
                                        ;ARE LEFT IN THE NEXT WORD AND CONTROL IS RETURNED
                                        ;TO THE THIRD WORD FOLLOWING THE CALL.
031154  010046                  MSIZER: MOV     R0,-(SP)        ;SAVE THE CONTENTS OF R0 AND R1
031156  010146                          MOV     R1,-(SP)        ;GET THE ADDRESS OF
031160  016600  000004                  MOV     4(SP),R0        ;THE CALL OF THE STACK.
031164  013710  177760                  MOV     @#SIZELO,(R0)
031170  005060  000002                  CLR     2(R0)
031174  012701  000006                  MOV     #6,R1           ;ROTATE THE 16-BIT 'BLOCK'
                                                                ;NUMBER 6-BITS TO THE
031200  006310                  1$:     ASL     (R0)            ;LEFT AND TURN ON LOW ORDER
031202  006160  000002                  ROL     2(R0)           ;BITS 1-5 LEAVING BIT-0
031206  077104                          SOB     R1,1$           ;OFF SO AS TO CREATE
031210  052710  000076                  BIS     #76,(R0)        ;THE 22-BIT PHYSICAL ADDRESS OF
                                                                ;THE HIGHEST WORD IN
                                                                ;MEMORY.
031214  022020                          CMP     (R0)+,(R0)+     ;DETERMINE THE RETURN ADDRESS
031216  010066  000004                  MOV     R0,4(SP)        ;AND LEAVE ON THE STACK FOR
                                                                ;AN RTI.
031222  012601                          MOV     (SP)+,R1        ;RESTORE R1 AND R0.
031224  012600                          MOV     (SP)+,R0
031226  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
031230  104400                  ERTYPE: TYPE
031232  001305                          .WORD   $CRLF
031234  010046                          MOV     R0,-(SP)        ;SAVE R0
031236  005000                          CLR     R0
031240  113700  001114                  MOVB    $ITEMB,R0       ;GET THE ITEM NUMBER
031244  001005                          BNE     1$              ;ZERO?
031246  013746  001116                  MOV     $ERRPC,-(SP)    ;YES, TYPE JUST THE PC
031252  104402                          TYPOC                   ;OF THE ERROR CALL.
```

```
 7277  031254  000137  031572                    JMP     ERT5
 7278
 7279
 7280  031260  005300                      1$:   DEC     R0              ;MAKE R0 AN INDEX FOR THE
 7281  031262  006200  000003                    ASH     #3,R0           ;ERROR TABLE
 7282  031266  062700  021310                    ADD     #$ERRTB,R0
 7283  031272  012037  031302                    MOV     @R0)+,2$        ;TYPE EM, ERROR MESSAGE.
 7284  031276  001404                            BEQ     3$
 7285  031300  104400                            TYPE
 7286  031302  000000                      2$:   .WORD   0
 7287  031304  104400                            TYPE
 7288  031306  001305                            .WORD   $CRLF
 7289  031310  012037  031320              3$:   MOV     (R0)+,4$        ;TYPE DH, DATA HEADER
 7290  031314  001404                            BEQ     5$
 7291  031316  104400                            TYPE
 7292  031320  000000                      4$:   .WORD   0
 7293  031322  104400                            TYPE
 7294  031324  001305                            .WORD   $CRLF
 7295  031326  010146                      5$:   MOV     R1,-(SP)        ;SAVE R1
 7296  031330  012001                            MOV     (R0)+,R1        ;GET DT, DATA TABLE ADDRESS
 7297  031332  001002                            BNE     6$
 7298  031334  000137  031570                    JMP     ERT4            ;JMP IF NO ERROR TABLE.
 7299  031340  012000                      6$:   MOV     (R0)+,R0        ;GET DF, DATA FORMAT ADDRESS
 7300  031342  105710                      ERT1: TSTB    (R0)            ;DATA FORMAT ENTRY EQUALS
 7301  031344  001003                            BNE     7$              ;ZERO?
 7302  031346  013146                            MOV     @(R1)+,-(SP)    ;YES, SO TYPE A 16-BIT
 7303  031350  104402                            TYPOC                   ;OCTAL NUMBER
 7304  031352  000500                            BR      ERT2
 7305  031354  122710  000001              7$:   CMPB    #1,(R0)         ;FORMAT EQUALS 1?
 7306  031360  001003                            BNE     9$
 7307  031362  013146                            MOV     @(R1)+,-(SP)    ;YES, TYPE A DECIMAL NUMBER
 7308  031364  104410                            TYPDS
 7309  031366  000472                            BR      ERT2
 7310
 7311  031370  122710  000002              9$:   CMPB    #2,(R0)         ;FORMAT 2?
 7312  031374  001012                            BNE     9$
 7313  031376  012146                      85$:  MOV     (R1)+,-(SP)     ;YES, TYPE A 22-BIT NUMBR
 7314  031400  004737  030232                    JSR     PC,$DB2O        ;CALL $DB2O TO CONVERT THE
 7315  031404  062716  000003                    ADD     #3,(SP)         ;BINARY TO ASCII
 7316  031410  012637  031416                    MOV     (SP)+,29$       ;TYPE THE STRING
 7317  031414  104400                            TYPE
 7318  031416  000000                      29$:  .WORD   0
 7319  031420  000455                            BR      ERT2
 7320
 7321  031422  122710  000004              9$:   CMPB    #4,(R0)         ;FORMAT 4?
 7322  031426  001004                            BNE     10$
 7323  031430  013146                            MOV     @(R1)+,-(SP)    ;YES, TYPE A 16-BIT
 7324  031432  104404                            TYPOS                   ;OCTAL NUMBER SUPRESSING
 7325  031434     016                            .BYTE   16              ;LEADING ZEROES
 7326  031435     000                            .BYTE   0
 7327  031436  000446                            BR      ERT2
 7328  031440  122710  000003              10$:  CMPB    #3,(R0)         ;FORMAT 3?
 7329  031444  001007                            BNE     11$
 7330  031446  013146                            MOV     @(R1)+,-(SP)    ;YES CONVERT 16-BIT
 7331  031450  012737  177777  031576            MOV     #-1,TVADFL      ;VIRTUAL ADDRESS TO 32-BIT
 7332  031456  004737  031604                    JSR     PC,TYPVAD       ;PHYSICAL ADDRESS AND TYPE
 7333  031462  000434                            BR      ERT2            ;RELOCATE ONLY IF SEG. IS ON!
```

```
 7333  031464  122710  000005          11$:    CMPB    #5,(R0)         ;FORMAT 5?
 7334  031470  001005                          BNE     12$
 7335  031472  012137  031500                  MOV     (R1)+,20$       ;PRINT ASCIZ STRING
 7336  031476  104400                          TYPE
 7337  031500  000000          20$:    .WORD   0
 7338  031502  000426                          BR      ERT3
 7339
 7340  031504  122710  000006          12$:    CMPB    #6,(R0)         ;FORMAT 6
 7341  031510  001005                          BNE     13$
 7342  031512  005037  031576                  CLR     TVADFL
 7343  031516  004737  031604                  JSR     PC,TYPVAD
 7344  031522  000414                          BR      ERT2
 7345
 7346  031524  122710  000007          13$:    CMPB    #7,(R0)         ;FORMAT 7?
 7347  031530  001010                          BNE     14$
 7348  031532  012146                          MOV     (R1)+,-(SP)
 7349  031534  004737  030232                  JSR     PC,$DB2O
 7350  031540  012637  031546                  MOV     (SP)+,45$
 7351  031544  104400                          TYPE
 7352  031546  000000          45$:    .WORD   0
 7353  031550  000401                          BR      ERT2
 7354
 7355  031552  000000          14$:    HALT                            ;?????
 7356
 7357  031554  104400          ERT2:   TYPE                            ;PRINT A TAB AFTER TYPING AN
 7358  031556  032052                  .WORD   $TAB                    ;ERROR TABLE ENTRY OF ALL MODES
 7359                                                                  ;EXCEPT ASCIZ
 7360  031560  005200          ERT3:   INC     R0                      ;POINT TO THE NEXT FORMAT BYTE
 7361  031562  005711                  TST     (R1)                    ;IS THERE ANOTHER ENTRY?
 7362  031564  001401                  BEQ     ERT4
 7363  031566  000665                  BR      ERT1                    ;YES, PROCESS IT
 7364                                                                  ;OTHERWISE:
 7365  031570  012601          ERT4:   MOV     (SP)+,R1                ;RESTORE R1
 7366  031572  012600          ERT5:   MOV     (SP)+,R0                ;RESTORE R0
 7367  031574  000207                  RTS     PC                      ;AND RETURN
 7368
 7369  031576  000000          TVADFL: .WORD   0                       ;FLAG USED TO TELL TYVAD
 7370                                                                  ;WHETHER TO CONDITIONALLY
 7371                                                                  ;OR UNCONDITIONALLY RELOCATE
 7372                                                                  ;WHEN TYPING AN ADDRESS.
 7373                                                                  ;-1 OR 0 RESPECTIVELY
 7374
 7375  031600  000000          TVADLO: .WORD   0                       ;REGISTERS FOR THE 22-BIT
 7376  031602  000000          TVADHI: .WORD   0                       ;ADDRESS COMPUTED BY TYVAD.
 7377
 7378                          ;ROUTINE WHICH CONVERTS A 16-BIT ADDRESS TO A 22-BIT
 7379                          ;ADDRESS. IF TVADFL IS -1, THEN CONVERT TO THE 22-BIT
 7380                          ;REAL ADDRESS DEPENDENT ON SEG BEING ON OR OFF FOR RELOCATION.
 7381                          ;IF TVADFL IS ZERO THEN UNCONDITIONAL USE THE KERNAL
 7382                          ;PAR WHICH IS APPROPIATE TO DO RELOCATION.
 7383  031604  104412          TYPVAD: SAVREG
 7384  031606  016601  000002          MOV     2(SP),R1                ;GET THE VIRTUAL
 7385  031612  010137  031600          MOV     R1,TVADLO               ;ADDRESS
 7386  031616  005037  031602          CLR     TVADHI
 7387  031622  005737  031576          TST     TVADFL                  ;CONDITIONALLY RELOCATE?
 7388  031626  001404                  BEQ     1$
```

```
7389  031630  032737  000001  177572          BIT     #1,@#MMR0       ;YES, SEE IF MEMORY
7390  031636  001424                          BEQ     2$              ;MANAGEMENT IS ON
7391  031640  005000                  1$:     CLR     R0              ;RELOCATE
7392  031642  073027  000003                  ASHC    #3,R0           ;LEFT SHIFT R0 AND R1
7393  031646  006300                          ASL     R0              ;THREE PLACES. R0 ONE
7394                                          ;MORE SO THAT IT CONTAINS
7395                                          ;2 X THE UPPER 3-BITS OF
7396  031650  000241                          CLC                     ;THE VIRTUAL ADDRESS
7397  031652  006001                          ROR     R1              ;RESTORE R1 TO THE OFFSET
7398  031654  006001                          ROR     R1              ;OF THE VIRTUAL ADDRESS
7399  031656  006001                          ROR     R1              ;TO THE PAR
7400  031660  062700  172340                  ADD     #KIPAR0,R0      ;DETERMINE THE CORRECT PAR'S
7401                                          ;ADDRESS
7402  031664  011003                          MOV     (R0),R3         ;GET ITS CONTENTS
7403  031666  005002                          CLR     R2
7404  031670  073227  000006                  ASHC    #6.R2           ;MAKE THE BLOCK COUNT
7405                                          ;A 22-BIT ADDRESS.
7406  031674  060103                          ADD     R1,R3           ;ADD THE OFFSET TO THE
7407  031676  005502                          ADC     R2              ;BASE ADDRESS
7408
7409  031700  010237  031602                  MOV     R2,TVADHI
7410  031704  010337  031600                  MOV     R3,TVADLO
7411  031710  012746  031600          2$:     MOV     #TVADLO,-(SP)   ;CALL $DB2O TO CONVERT THE
7412  031714  004737  030232                  JSR     PC,$DB2O        ;22-BIT
7413  031720  062716  000003                  ADD     #3,(SP)         ;TYPE ONLY 9 DIGITS.
7414  031724  012637  031732                  MOV     (SP)+,3$
7415  031730  104400                          TYPE
7416  031732  000000                  3$:     .WORD   0
7417  031734  104414                          RESREG                  ;RESTORE THE REGISTERS
7418  031736  012616                          MOV     (SP)+,(SP)      ;LEAVE ONLY THE RETURN
7419                                          ;ADDRESS ON THE STACK.
7420  031740  000207                          RTS     PC              ;RETURN
7421
7422                                  ;SPECIAL MESSAGES:
7423
7424  031742  041536  000200          CONCMS: .ASCIZ  '^C'<CRLF>
7425
7426  031746  047515  044516  047524  MMESRS: .ASCIZ  'MONITOR (OR LOADER) RESTORED!'<CRLF>
7427  031754  020122  047450  020122
7428  031762  047514  042101  051105
7429  031770  020051  042522  052123
7430  031776  051117  042105  100041
7431  032004     000
7432
7433  032005     200  047520  042527  POWERM: .ASCIZ  <CRLF>'POWER FAILURE, PROGRAM RESTARTING'<CRLF><CRLF>
7434  032012  020122  040506  046111
7435  032020  051125  026105  050040
7436  032026  047522  051107  046501
7437  032034  051040  051505  040524
7438  032042  052122  047111  100107
7439  032050  000200
7440
7441  032052  000011          $TAB:   .ASCIZ  <TAB>
7442
7443  032054  042600  050130  041505  MTAS:   .ASCII  <CRLF>'EXPECTED DATA:'<CRLF>
7444  032062  042524  020104  040504
```

```
7445  032070  040524  100072
7446  032074  051107  052517  020120          .ASCIZ  'GROUP 0.GROUP 1.MEM EV.'<TAB>'MEM ODD.'<CRLF>
7447  032102  027060  051107  052517
7448  032110  020120  027061  042515
7449  032116  020115  053105  004456
7450  032124  042515  020115  042117
7451  032132  027104  000200
7452
7453  032136  042200  052101  020101  MTA11:  .ASCII  <CRLF>'DATA WRITTEN.'<TAB>'TEST ADDR.'<TAB>'ERROR REG.'<CRLF>
7454  032144  051127  052111  042524
7455  032152  027116  052011  051505
7456  032160  020124  042101  051104
7457  032166  004456  051105  047522
7458  032174  020122  042522  027107
7459  032202     200
7460
7461  032203     040  047111  000040  MTA17:  .ASCIZ  ' IN '
7462
7463  032210  054105  042520  052103  MTB17:  .ASCIZ  'EXPECTED DATA:'<CRLF>
7464  032216  042105  042040  052101
7465  032224  035101  000200
7466
7467  032230  054502  042524  004456  MTC17:  .ASCIZ  'BYTE.'<TAB>
7468  032236     000
7469
7470  032237     127  051117  027104  MTA20:  .ASCIZ  'WORD.'<TAB>
7471  032244  000011
7472
7473  032246  054105  042520  052103  MTA21:  .ASCII  'EXPECTED DATA:'<CRLF>
7474  032254  042105  042040  052101
7475  032262  035101     200
7476  032265     110  052111  020123          .ASCIZ  'HITS IN GROUP 0.'<TAB>'/'<TAB>'HITS IN GROUP 1. '<CRLF>
7477  032272  047111  043440  047522
7478  032300  050125  030040  004456
7479  032306  004457  044510  051524
7480  032314  044440  020116  051107
7481  032322  052517  020120  027061
7482  032330  100040     000
7483
7484          032203                  MTB21=MTA17
7485
7486  032333     200  042524  052123  MTA43:  .ASCII  <CRLF>'TEST ADDRESS.'<TAB>'ERROR ADRS REG.'<TAB>
7487  032340  040440  042104  042522
7488  032346  051523  004456  051105
7489  032354  047522  020122  042101
7490  032362  051522  051040  043505
7491  032370  004456
7492  032372  051105  047522  020122          .ASCIZ  'ERROR REG.'<CRLF>
7493  032400  042522  027107  000200
7494
7495  032406  053600  047522  042524  MTA45:  .ASCIZ  <CRLF>'WROTE. 377'<TAB>'IN BYTE. '
7496  032414  020056  033463  004467
7497  032422  047111  041040  052131
7498  032430  027105  000040
7499
7500  032434  051200  040505  020104  MTB45:  .ASCIZ  <CRLF>'READ DATA. '
```

```
 7501  032442  040504  040524  020056
 7502  032450     000
 7503
 7504  032451     011  047111  053440  MTC45:  .ASCIZ  <TAB>'IN WORD. '
 7505  032456  051117  027104  000040
 7506
 7507  032464  053600  047522  042524  MTA50:  .ASCIZ  <CRLF>'WROTE. 000'<TAB>'IN BYTE. '
 7508  032472  020056  030060  004460
 7509  032500  047111  041040  052131
 7510  032506  027105  000040
 7511
 7512  032512  042600  052116  051105  PDMSG1: .ASCII  <CRLF>'ENTERING CACHE ADDRESS MEMORY POWER UP '
 7513  032520  047111  020107  040503
 7514  032526  044103  020105  042101
 7515  032534  051104  051505  020123
 7516  032542  042515  047515  054522
 7517  032550  050040  053517  051105
 7518  032556  052440  020120
 7519  032562  047111  040526  044514          .ASCII  'INVALIDATOR TEST.'<CRLF>
 7520  032570  040504  047524  020122
 7521  032576  042524  052123  100056
 7522  032604  046120  040505  042523          .ASCII  'PLEASE GO THROUGH A POWER DOWN, POWER UP '
 7523  032612  043440  020117  044124
 7524  032620  047522  043525  020110
 7525  032626  020101  047520  042527
 7526  032634  020122  047504  047127
 7527  032642  020054  047520  042527
 7528  032650  020122  050125     040
 7529  032655     123  050505  042525          .ASCIZ  'SEQUENCE.'<CRLF>
 7530  032662  041516  027105  000200
 7531
 7532  032670  041600  041501  042510  PDMSG2: .ASCII  <CRLF>'CACHE ADDRESS MEMORY POWER UP INVALIDATOR'
 7533  032676  040440  042104  042522
 7534  032704  051523  046440  046505
 7535  032712  051117  020131  047520
 7536  032720  042527  020122  050125
 7537  032726  044440  053116  046101
 7538  032734  042111  052101  051117
 7539  032742  052040  051505  020124          .ASCIZ  ' TEST DID NOT FAIL.'<CRLF>
 7540  032750  044504  020104  047516
 7541  032756  020124  040506  046111
 7542  032764  100056     000
 7543
 7544  032767     105  051122  051117  ADRNG:  .ASCII  'ERROR ADDRESS REGISTER NEEDED FOR TEST.'<CRLF>'BUT IT HAS BEEN '
 7545  032774  040440  042104  042522
 7546  033002  051523  051040  043505
 7547  033010  051511  042524  020122
 7548  033016  042516  042105  042105
 7549  033024  043040  051117  052040
 7550  033032  051505  026124  041200
 7551  033040  052125  044440  020124
 7552  033046  040510  020123  042502
 7553  033054  047105     040
 7554  033057     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
 7555  033064  042105  040440  020123
 7556  033072  040502  020504     000
```

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7557
7558  033077     105  051122  051117  ERRNG:  .ASCII  'ERROR REGISTER NEEDED FOR TEST,'<CRLF>'BUT IT HAS BEEN '
7559  033104  051040  043505  051511
7560  033112  042524  020122  042516
7561  033120  042105  042105  043040
7562  033126  051117  052040  051505
7563  033134  026124  041200  052125
7564  033142  044440  020124  040510
7565  033150  020123  042502  047105
7566  033156     040
7567  033157     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
7568  033164  042105  040440  020123
7569  033172  040502  020504     000
7570
7571  033177     103  047117  051124  CNRNG:  .ASCII  'CONTROL REGISTER NEEDED FOR TEST,'<CRLF>'BUT IT HAS BEEN '
7572  033204  046117  051040  043505
7573  033212  051511  042524  020122
7574  033220  042516  042105  042105
7575  033226  043040  051117  052040
7576  033234  051505  026124  041200
7577  033242  052125  044440  020124
7578  033250  040510  020123  042502
7579  033256  047105     040
7580  033261     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
7581  033266  042105  040440  020123
7582  033274  040502  020504     000
7583  033301     115  044501  052116  MNRNG:  .ASCII  'MAINTENANCE REGISTER NEEDED FOR TEST,'<CRLF>'BUT IT HAS BEEN '
7584  033306  047105  047101  042503
7585  033314  051040  043505  051511
7586  033322  042524  020122  042516
7587  033330  042105  042105  043040
7588  033336  051117  052040  051505
7589  033344  026124  041200  052125
7590  033352  044440  020124  040510
7591  033360  020123  042502  047105
7592  033366     040
7593  033367     106  040514  043507          .ASCIZ  'FLAGGED AS BAD!'
7594  033374  042105  040440  020123
7595  033402  040502  020504     000
7596
7597  033407     110  052111  046457  HMRNG:  .ASCII  'HIT/MISS REGISTER NEEDED FOR TEST,'<CRLF>'BUT IT HAS BEEN '
7598  033414  051511  020123  042522
7599  033422  044507  052123  051105
7600  033430  047040  042505  042504
7601  033436  020104  047506  020122
7602  033444  042524  052123  100054
7603  033452  052502  020124  052111
7604  033460  044040  051501  041040
7605  033466  042505  020116
7606  033472  046106  043501  042507          .ASCIZ  'FLAGGED AS BAD!'
7607  033500  020104  051501  041040
7608  033506  042101  000041
7609
7610  033512  040600  042104  042522  MTA77:  .ASCIZ  <CRLF>'ADDRESS:  '
7611  033520  051523  020072  000040
7612
```

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 7613  033526  051440  047510  046125  MTB77:  .ASCIZ  ' SHOULD HAVE BEEN A HIT IN GROUP '
 7614  033534  020104  040510  042526
 7615  033542  041040  042505  020116
 7616  033550  020101  044510  020124
 7617  033556  047111  043440  047522
 7618  033564  050125  000040
 7619
 7620  033570  043101  042524  020122  MTC77:  .ASCIZ  'AFTER REFERENCING'<CRLF>'ADDRESS:  '
 7621  033576  042522  042506  042522
 7622  033604  041516  047111  100107
 7623  033612  042101  051104  051505
 7624  033620  035123  020040     000
 7625
 7626  033625     040  044127  046111  MTD77:  .ASCIZ  ' WHILE FORCING SELECTION OF GROUP '
 7627  033632  020105  047506  041522
 7628  033640  047111  020107  042523
 7629  033646  042514  052103  047511
 7630  033654  020116  043117  043440
 7631  033662  047522  050125  000040
 7632
 7633  033670  040600  051122  051117  MTA101: .ASCII  <CRLF>'ARROR ADRS REG.'<TAB>'ERRCR REG.'<TAB>
 7634  033676  040440  051104  020123
 7635  033704  042522  027107  042411
 7636  033712  051122  051117  051040
 7637  033720  043505  004456
 7638  033724  054105  042520  052103          .ASCIZ  'EXPECTED ERR.'<TAB>'PATTERN PUT IN MAINT REG.'<CRLF>
 7639  033732  042105  042440  051122
 7640  033740  004456  040520  052124
 7641  033746  051105  020116  052520
 7642  033754  020124  047111  046440
 7643  033762  044501  052116  051040
 7644  033770  043505  100056     000
 7645
 7646  033775     200  043101  042524  MTA120: .ASCIZ  <CRLF>'AFTER 2ND CYCLE READ  '
 7647  034002  020122  047062  020104
 7648  034010  054503  046103  020105
 7649  034016  042522  042101  020040
 7650  034024     000
 7651
 7652  034025     200  043101  042524  MTB120: .ASCIZ  <CRLF>'AFTER 4TH CYCLE READ  '
 7653  034032  020122  052064  020110
 7654  034040  054503  046103  020105
 7655  034046  042522  042101  020040
 7656  034054     000
 7657
 7658  034055     200  043101  042524  MTC120: .ASCIZ  <CRLF>'AFTER 6TH CYCLE READ  '
 7659  034062  020122  052066  020110
 7660  034070  054503  046103  020105
 7661  034076  042522  042101  020040
 7662  034104     000
 7663  034105     200  043101  042524  MTD120: .ASCIZ  <CRLF>'AFTER 8TH CYCLE READ  '
 7664  034112  020122  052070  020110
 7665  034120  054503  046103  020105
 7666  034126  042522  042101  020040
 7667  034134     000
 7668
```

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 7669  034135     200  043101  042524  MTE120: .ASCIZ  <CRLF>'AFTER 10TH CYCLE READ '
 7670  034142  020122  030061  044124
 7671  034150  041440  041531  042514
 7672  034156  051040  040505  020104
 7673  034164     000
 7674
 7675  034165     200  043101  042524  MTF120: .ASCIZ  <CRLF>'AFTER 12TH CYCLE READ '
 7676  034172  020122  031061  044124
 7677  034200  041440  041531  042514
 7678  034206  051040  040505  020104
 7679  034214     000
 7680
 7681  034215     106  047522  020115  MTG120: .ASCIZ  'FROM THE HIT/MISS REG. EXPECTED '
 7682  034222  044124  020105  044510
 7683  034230  027524  044515  051523
 7684  034236  051040  043505  020056
 7685  034244  054105  042520  052103
 7686  034252  042105  000040
 7687
 7688  034256  052200  042510  050040  MTA124: .ASCII  <CRLF>'THE PATTERN BEING USED IN THE MAINTENANCE '
 7689  034264  052101  042524  047122
 7690  034272  041040  044505  043516
 7691  034300  052440  042523  020104
 7692  034306  047111  052040  042510
 7693  034314  046440  044501  052116
 7694  034322  047105  047101  042503
 7695  034330     040
 7696  034331     122  043505  051511          .ASCIZ  'REGISTER WAS: '
 7697  034336  042524  020122  040527
 7698  034344  035123  000040
 7699
 7700  034350  051200  043105  051105  MTA126: .ASCIZ  <CRLF>'REFERENCED ADDRESS:'<TAB>
 7701  034356  047105  042503  020104
 7702  034364  042101  051104  051505
 7703  034372  035123  000011
 7704
 7705  034376  040600  051122  051117  MTB126: .ASCIZ  <CRLF>'ARROR ADDRESS REGISTER:'<TAB>
 7706  034404  040440  042104  042522
 7707  034412  051523  051040  043505
 7708  034420  051511  042524  035122
 7709  034426  000011
 7710
 7711  034430  050200  052101  042524  MTA131: .ASCIZ  <CRLF>'PATTERN BEING USED IN THE MAINTENANCE REGISTER:'<TAB>
 7712  034436  047122  041040  044505
 7713  034444  043516  052440  042523
 7714  034452  020104  047111  052040
 7715  034460  042510  046440  044501
 7716  034466  052116  047105  047101
 7717  034474  042503  051040  043505
 7718  034502  051511  042524  035122
 7719  034510  000011
 7720
 7721  034512  042600  050130  041505  MTB131: .ASCIZ  <CRLF>'EXPECTED ERROR REGISTER:'<TAB>
 7722  034520  042524  020104  051105
 7723  034526  047522  020122  042522
 7724  034534  044507  052123  051105
```

```
                034542  004472      000

                034545      200  047507  020124  MTC131: .ASCIZ   CRLF)'GOT ERROR REGISTER:'(TAB)
                034552  051105  047522  020122
                034560  042522  044507  052123
                034566  051105  004472      000

                034573      200  051105  047522  MTA134: .ASCIZ  (CRLF 'ERROR ADR REG.'(TAB)'ERROR REG.' CRLF)
                034600  020122  042101  020122
                034606  042522  027107  042411
                034614  051122  051117  051040
                034622  043505  100056      000

                034627      200  054105  042520  MTA135. .ASCIZ  (CRLF)'EXPECTED ERROR REG.:  '
                034634  052103  042105  042440
                034642  051122  051117  051040
                034650  043505  035056  020040
                034656      000

                034657      107  052117  042440  MTB135: .ASCIZ  'GOT ERROR REG.:  '
                034664  051122  051117  051040
                034672  043505  035056  020040
                034700      000

                034701      200  054105  042520  MTC135: .ASCIZ  (CRLF)'EXPECTED ERROR ADR REG.:  '
                034706  052103  042105  042440
                034714  051122  051117  040440
                034722  051104  051040  043505
                034730  035056  020040      000

                034735      107  052117  042440  MTD135: .ASCIZ  'GOT ERROR ADR REG.:  '
                034742  051122  051117  040440
                034750  051104  051040  043505
                034756  035056  020040      000


                                                ;THESE ARE THE ERROR MESSAGES:

                034763      101  051040  043105  EM1:    .ASCIZ  'A REFERENCE WHICH SHOULD HAVE BEEN A HIT WAS A MISS.'
                034770  051105  047105  042503
                034776  053440  044510  044103
                035004  051440  047510  046125
                035012  020104  040510  042526
                035020  041040  042505  020116
                035026  020101  044510  020124
                035034  040527  020123  020101
                035042  044515  051523  000056


                035050  052600  042516  050130  EM14:   .ASCIZ  (CRLF)'UNEXPECTED PARITY ERROR TRAP.'
                035056  041505  042524  020104
                035064  040520  044522  054524
                035072  042440  051122  051117
                035100  052040  040522  027120
                035106      000
```

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 7781  035107     052  035052  042524  EM15:   .ASCIZ  '***TEST ABORTED! GOING TO NEXT TEST.***'
 7782  035114  052123  040440  047502
 7783  035122  052122  042105  020041
 7784  035130  047507  047111  020107
 7785  035136  047524  047040  054105
 7786  035144  020124  042524  052123
 7787  035152  025056  025052     000
 7788  035157     103  041501  042510  EM55:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
 7789  035164  051040  043505  051511
 7790  035172  042524  020122  042522
 7791  035200  050123  047117  042523
 7792  035206  052040  051505  020124
 7793  035214  040506  046111  042105
 7794  035222  100056
 7795  035224  020101  042522  042506          .ASCII  'A REFERENCE TO THE LOW ORDER ERROR ADDRESS REGISTER '
 7796  035232  042522  041516  020105
 7797  035240  047524  052040  042510
 7798  035246  046040  053517  047440
 7799  035254  042122  051105  042440
 7800  035262  051122  051117  040440
 7801  035270  042104  042522  051523
 7802  035276  051040  043505  051511
 7803  035304  042524  020122
 7804  035310  044524  042515  020104          .ASCIZ  'TIMED OUT.'
 7805  035316  052517  027124     000
 7806
 7807  035323     103  041501  042510  EM56:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
 7808  035330  051040  043505  051511
 7809  035336  042524  020122  042522
 7810  035344  050123  047117  042523
 7811  035352  052040  051505  020124
 7812  035360  040506  046111  042105
 7813  035366  100056
 7814  035370  020101  042522  042506          .ASCII  'A REFERENCE TO THE HIGH ORDER ERROR ADDRESS REGISTER '
 7815  035376  042522  041516  020105
 7816  035404  047524  052040  042510
 7817  035412  044040  043511  020110
 7818  035420  051117  042504  020122
 7819  035426  051105  047522  020122
 7820  035434  042101  051104  051505
 7821  035442  020123  042522  044507
 7822  035450  052123  051105     040
 7823  035456     124  046511  042105          .ASCIZ  'TIMED OUT.'
 7824  035462  047440  052125  000056
 7825
 7826  035470  040503  044103  020105  EM57:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
 7827  035476  042522  044507  052123
 7828  035504  051105  051040  051505
 7829  035512  047520  051516  020105
 7830  035520  042524  052123  043040
 7831  035526  044501  042514  027104
 7832  035534     200
 7833  035535     101  051040  043105          .ASCIZ  'A REFERENCE TO THE ERROR REGISTER TIMED OUT.'
 7834  035542  051105  047105  042503
 7835  035550  052040  020117  044124
 7836  035556  020103  051105  047522
```

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 7937  035564  020122  042522  044507
 7938  035572  052123  051105  052040
 7939  035600  046511  042105  047440
 7940  035606  052125  000056
 7941
 7942  035612  040503  044103  020105  EM60:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.' CRLF
 7943  035620  042522  044507  052123
 7944  035626  051105  051040  051505
 7945  035634  047520  051516  020105
 7946  035642  042524  052123  043040
 7947  035650  044501  042514  027104
 7948  035656     200
 7949  035657     101  051040  043105          .ASCIZ  'A REFERENCE TO THE CONTROL REGISTER TIMED OUT.'
 7950  035664  051105  047105  042503
 7951  035672  052040  020117  044124
 7952  035700  020105  047503  052116
 7953  035706  047522  020114  042522
 7954  035714  044507  052123  051105
 7955  035722  052040  046511  042105
 7956  035730  047440  052125  000056
 7957
 7958  035736  040503  044103  020105  EM61:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.'<CRLF>
 7959  035744  042522  044507  052123
 7960  035752  051105  051040  051505
 7961  035760  047520  051516  020105
 7962  035766  042524  052123  043040
 7963  035774  044501  042514  027104
 7964  036002     200
 7965  036003     101  051040  043105          .ASCIZ  'A REFERENCE TO THE MAINTENANCE REGISTER TIMED OUT.'
 7966  036010  051105  047105  042503
 7967  036016  052040  020117  044124
 7968  036024  020105  040515  047111
 7969  036032  042524  040516  041516
 7970  036040  020105  042522  044507
 7971  036046  052123  051105  052040
 7972  036054  046511  042105  047440
 7973  036062  052125  000056
 7974
 7975  036066  040503  044103  020105  EM62:   .ASCII  'CACHE REGISTER RESPONSE TEST FAILED.' CRLF
 7976  036074  042522  044507  052123
 7977  036102  051105  051040  051505
 7978  036110  047520  051516  020105
 7979  036116  042524  052123  043040
 7980  036124  044501  042514  027104
 7981  036132     200
 7982  036133     101  051040  043105          .ASCIZ  'A REFERENCE TO THE HIT/MISS REGISTER TIMED OUT.'<CRLF>
 7983  036140  051105  047105  042503
 7984  036146  052040  020117  044124
 7985  036154  020105  044510  027524
 7986  036162  044515  051523  051040
 7987  036170  043505  051511  042524
 7988  036176  020122  044524  042515
 7989  036204  020104  052517  027124
 7990  036212  000200
 7991
 7992  036214  040503  044103  020105  EM63:   .ASCII  'CACHE REGISTER DATA PATHS, READ ZEROES, TEST FAILED.'
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7893  036222  042522  042537  052123
7894  036230  051105  042040  052101
7895  036236  020101  040520  044124
7896  036244  026123  051040  040505
7897  036252  020104  042532  047522
7898  036260  051505  020054  042524
7899  036266  052123  043040  044501
7900  036274  042514  027104
7901  036300  053600  047522  042524          .ASCII  <CRLF>'WROTE ZEROES BUT READ BACK NON-ZERO DATA '
7902  036306  055040  051105  042517
7903  036314  020123  052502  020124
7904  036322  042522  042101  041040
7905  036330  041501  020113  047516
7906  036336  026516  042532  047522
7907  036344  042040  052101  020101
7908  036352  051106  046517  041040          .ASCII  'FROM BOTH'<CRLF>'THE CONTROL AND MAINTENANCE REGISTERS.'
7909  036360  052117  100110  044124
7910  036366  020105  047503  052116
7911  036374  047522  020114  047101
7912  036402  020104  040515  047111
7913  036410  042524  040516  041516
7914  036416  020105  042522  044507
7915  036424  052123  051105  027123
7916  036432     000
7917
7918  036433     103  041501  042510  EM64:   .ASCII  'CACHE REGISTER DATA PATH, READ ZEROES, TEST FAILED.'
7919  036440  051040  043505  051511
7920  036446  042524  020122  040504
7921  036454  040524  050040  052101
7922  036462  026110  051040  040505
7923  036470  020104  042532  047522
7924  036476  051505  020054  042524
7925  036504  052123  043040  044501
7926  036512  042514  027104
7927  036516  053600  047522  042524          .ASCII  <CRLF>'WROTE ZEROES BUT READ BACK NON-ZERO DATA FROM '
7928  036524  055040  051105  042517
7929  036532  020123  052502  020124
7930  036540  042522  042101  041040
7931  036546  041501  020113  047516
7932  036554  026516  042532  047522
7933  036562  042040  052101  020101
7934  036570  051106  046517     040
7935  036575     200  044124  020105          .ASCIZ  <CRLF>'THE MAINTENANCE REGISTER.'
7936  036602  040515  047111  042524
7937  036610  040516  041516  020105
7938  036616  042522  044507  052123
7939  036624  051105  000056
7940
7941  036630  040503  044103  020105  EM65:   .ASCII  'CACHE REGISTER DATA PATHS, READ ONES, TEST FAILED.'<CRLF>
7942  036636  042522  044507  052123
7943  036644  051105  042040  052101
7944  036652  020101  040520  044124
7945  036660  026123  051040  040505
7946  036666  020104  047117  051505
7947  036674  020054  042522  052123
7948  036702  043040  044501  042514
```

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 7949  036710  327104     200
 7950  036713     106  044501  042514          .ASCII  'FAILED TO READ CORRECT DATA FROM THE ADDRESS REGISTER'
 7951  036720  020104  047524  051040
 7952  036726  040505  020104  047503
 7953  036734  051122  041505  020124
 7954  036742  040504  040524  043040
 7955  036750  047522  020115  044124
 7956  036756  020105  042101  051104
 7957  036764  051505  020123  042522
 7958  036772  044507  052123  051105
 7959  037000  044440  020116  044124          .ASCII  ' IN THE CLEAR STATE.'<CRLF>'THE LOW ORDER ADDRESS '
 7960  037006  020105  046103  040505
 7961  037014  020122  052123  052101
 7962  037022  027105  052200  042510
 7963  037030  046040  053517  047440
 7964  037036  042122  051105  040440
 7965  037044  042104  042522  051523
 7966  037052     040
 7967  037053     123  047510  046125          .ASCII  'SHOULD HAVE BEEN SET TO: 17774C'<CRLF>
 7968  037060  020104  040510  042526
 7969  037066  041040  042505  020116
 7970  037074  042523  020124  047524
 7971  037102  020072  033461  033467
 7972  037110  030064     200
 7973  037113     124  042515  044040          .ASCII  'THE HIGH ORDER ADDRESS REGISTER SHOULD HAVE BEEN '
 7974  037120  043511  020110  051117
 7975  037126  042504  020122  042101
 7976  037134  051104  051505  020123
 7977  037142  042522  044507  052123
 7978  037150  051105  051440  047510
 7979  037156  046125  020104  040510
 7980  037164  042526  041040  042505
 7981  037172  020116
 7982  037174  042523  020124  047524          .ASCIZ  'SET TO: 000003'
 7983  037202  020072  030060  030060
 7984  037210  031460     000
 7985
 7986  037213     103  041501  042510  EM66:   .ASCIZ  'CACHE CONTROL REGISTER COUNT PATTERN TEST FAILED.'
 7987  037220  041440  047117  051124
 7988  037226  046117  051040  043505
 7989  037234  051511  042524  020122
 7990  037242  047503  047125  020124
 7991  037250  040520  052124  051105
 7992  037256  020116  042524  052123
 7993  037264  043040  044501  042514
 7994  037272  027104     000
 7995
 7996  037275     103  041501  042510  EM67:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 7997  037302  044040  052111  046457
 7998  037310  051511  020123  047101
 7999  037316  020104  047503  052116
 8000  037324  047522  020114  042522
 8001  037332  044507  052123  051105
 8002  037340  052040  051505  020124
 8003  037346  040506  046111  042105
 8004  037354     056
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 9005  037355     200  044527  044124          .ASCII  <CRLF>'WITH THE CONTROL REGISTER CLEAR, THE HIT/MISS '
 9006  037362  052040  042510  041440
 9007  037370  047117  051124  046117
 9008  037376  051040  043505  051511
 9009  037404  042524  020122  046103
 9010  037412  040505  026122  052040
 9011  037420  042510  044040  052111
 9012  037426  046457  051511  020123
 9013  037434  042522  044507  052123          .ASCIZ  'REGISTER SHOULD'<CRLF>'HAVE SHOWN SIX HITS (000077)'.'
 9014  037442  051105  051440  047510
 9015  037450  046125  100104  040510
 9016  037456  042526  051440  047510
 9017  037464  047127  051440  054111
 9018  037472  044040  052111  020123
 9019  037500  030050  030060  033460
 9020  037506  024467  000056
 9021
 9022  037512  040503  044103  020105  EM70:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 9023  037520  044510  027524  044515
 9024  037526  051523  040440  042116
 9025  037534  041440  047117  051124
 9026  037542  046117  051040  043505
 9027  037550  051511  042524  020122
 9028  037556  042524  052123  043040
 9029  037564  044501  042514  027104
 9030  037572  053600  044510  042514          .ASCII  <CRLF>'WHILE FORCING SELECTION OF GROUP 1 AND FORCING '
 9031  037600  043040  051117  044503
 9032  037606  043516  051440  046105
 9033  037614  041505  044524  047117
 9034  037622  047440  020106  051107
 9035  037630  052517  020120  020061
 9036  037636  047101  020104  047506
 9037  037644  041522  047111  020107
 9038  037652  044515  051523  051505          .ASCII  'MISSES TO GROUP 3,'<CRLF>'THE HIT/MISS REGISTER '
 9039  037660  052040  020117  051107
 9040  037666  052517  020120  026060
 9041  037674  052200  042510  044040
 9042  037702  052111  046457  051511
 9043  037710  020123  042522  044507
 9044  037716  052123  051105     040
 9045  037723     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX HITS (000077)'.'
 9046  037730  020104  040510  042526
 9047  037736  051440  047510  047127
 9048  037744  051440  054111  044040
 9049  037752  052111  020123  030065
 9050  037760  030060  033460  024467
 9051  037766  000056
 9052
 9053  037770  040503  044103  020105  EM71:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 9054  037776  044510  027524  044515
 9055  040004  051523  040440  042116
 9056  040012  041440  047117  051124
 9057  040020  046117  051040  043505
 9058  040026  051511  042524  020122
 9059  040034  042524  052123  043040
 9060  040042  044501  042514  027104
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 8061  040050  053600  044513  042514          .ASCII  <CRLF>'WHILE FORCING SELECTION OF GROUP 0 AND FORCING '
 8062  040056  043040  051111  044503
 8063  040064  043516  051440  046105
 8064  040072  041505  044524  047111
 8065  040100  047440  020106  051107
 8066  040106  052517  020120  020060
 8067  040114  047101  020104  047506
 8068  040122  041522  047111  020107
 8069  040130  044515  051523  051505          .ASCII  'MISSES TO GROUP 1.'<CRLF 'THE HIT/MISS REGISTER '
 8070  040136  052040  020117  051107
 8071  040144  052517  020120  026061
 8072  040152  052200  042510  044040
 8073  040160  052111  046457  051511
 8074  040166  020123  042522  044507
 8075  040174  052123  051105     040
 8076  040201     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX HITS (000077).'
 8077  040206  020104  040510  042526
 8078  040214  051440  047510  047127
 8079  040222  051440  054111  044040
 8080  040230  052111  020123  030050
 8081  040236  030060  033460  024467
 8082  040244  000056
 8083
 8084  040246  040503  044103  020105  EM72:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 8085  040254  044510  027524  044515
 8086  040262  051523  040440  042116
 8087  040270  041440  047117  051124
 8088  040276  046117  051040  043505
 8089  040304  051511  042524  020122
 8090  040312  042524  052123  043040
 8091  040320  044501  042514  027104
 8092  040326  044127  046111  020105          .ASCII  'WHILE FORCING MISSES TO BOTH GROUPS. THE HIT MISS '
 8093  040334  047506  041522  047111
 8094  040342  020107  044515  051523
 8095  040350  051505  052040  020117
 8096  040356  047502  044124  043440
 8097  040364  047522  050125  026123
 8098  040372  052040  042510  044040
 8099  040400  052111  046457  051511
 8100  040406  020123
 8101  040410  042522  044507  052123          .ASCIZ  'REGISTER'<CRLF 'SHOULD HAVE SHOWN SIX MISSES (000000).'
 8102  040416  051105  051600  047510
 8103  040424  046125  020104  040510
 8104  040432  042526  051440  047510
 8105  040440  047127  051440  054111
 8106  040446  046440  051511  042523
 8107  040454  020123  030050  030060
 8108  040462  030060  024460  000056
 8109
 8110  040470  040503  044103  020105  EM73:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 8111  040476  044510  027524  044515
 8112  040504  051523  040440  042116
 8113  040512  041440  047117  051124
 8114  040520  046117  051040  043505
 8115  040526  051511  042524  020122
 8116  040534  042524  052123  043040
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 8117  040542  044501  042514  027104
 8118  040550  053600  044510  042514          .ASCII  <CRLF>'WHILE FORCING MISSES TO BOTH GROUPS AND FORCING '
 8119  040556  043040  051117  044503
 8120  040564  043516  046440  051511
 8121  040572  042523  020123  047524
 8122  040600  041040  052117  020110
 8123  040606  051107  052517  051520
 8124  040614  040440  042116  043040
 8125  040622  051117  044503  043516
 8126  040630     040
 8127  040631     123  046105  041505          .ASCII  'SELECTION OF GROUP 1.' <CRLF>'THE HIT/MISS REGISTER '
 8128  040636  044524  047117  047440
 8129  040644  020106  051107  052517
 8130  040652  020120  026061  052200
 8131  040660  042510  044040  052111
 8132  040666  046457  051511  020123
 8133  040674  042522  044507  052123
 8134  040702  051105     040
 8135  040705     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX MISSES  (000000).'
 8136  040712  020104  040510  042526
 8137  040720  051440  047510  047127
 8138  040726  051440  054111  046440
 8139  040734  051511  042523  020123
 8140  040742  030050  030060  030060
 8141  040750  024460  000056
 8142
 8143  040754  040503  044103  020105  EM74:   .ASCII  'CACHE HIT/MISS AND CONTROL REGISTER TEST FAILED.'
 8144  040762  044510  027524  044515
 8145  040770  051523  040440  042116
 8146  040776  041440  047117  051124
 8147  041004  046117  051040  043505
 8148  041012  051511  042524  020122
 8149  041020  042524  052123  043040
 8150  041026  044501  042514  027104
 8151  041034  053600  044510  042514          .ASCII  <CRLF>'WHILE FORCING MISSES TO BOTH GROUPS AND FORCING '
 8152  041042  043040  051117  044503
 8153  041050  043516  046440  051511
 8154  041056  042523  020123  047524
 8155  041064  041040  052117  020110
 8156  041072  051107  052517  051520
 8157  041100  040440  042116  043040
 8158  041106  051117  044503  043516
 8159  041114     040
 8160  041115     123  046105  041505          .ASCII  'SELECTION OF GROUP 0.' <CRLF>'THE HIT/MISS REGISTER '
 8161  041122  044524  047117  047440
 8162  041130  020106  051107  052517
 8163  041136  020120  026060  052200
 8164  041144  042510  044040  052111
 8165  041152  046457  051511  020123
 8166  041160  042522  044507  052123
 8167  041166  051105     040
 8168  041171     123  047510  046125          .ASCIZ  'SHOULD HAVE SHOWN SIX MISSES (000000).'
 8169  041176  020104  040510  042526
 8170  041204  051440  047510  047127
 8171  041212  051440  054111  046440
 8172  041220  051511  042523  020123
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 8173  041226  030050  030060  030060
 8174  041234  024460  000056
 8175
 8176  041240  047503  052116  047522  EM75:   .ASCII  'CONTROL REGISTER TEST FAILED.'<CRLF>'FAILED TO GET '
 8177  041246  020114  042522  044507
 8178  041254  052123  051105  052040
 8179  041262  051505  020124  040506
 8180  041270  046111  042105  100056
 8181  041276  040506  046111  042105
 8182  041304  052040  020117  042507
 8183  041312  020124
 8184  041314  020101  044510  020124          .ASCIZ  'A HIT ON A REFERENCE WHICH SHOULD HAVE BEEN A HIT.'
 8185  041322  047117  040440  051040
 8186  041330  043105  051105  047105
 8187  041336  042503  053440  044510
 8188  041344  044103  051440  047510
 8189  041352  046125  020104  040510
 8190  041360  042526  041040  042505
 8191  041366  020116  020101  044510
 8192  041374  027124     000
 8193
 8194          041240                  EM76=EM75
 8195
 8196  041377     103  047117  051124  EM77:   .ASCII  'CONTROL REGISTER TEST FAILED.'<CRLF>'THE WRONG '
 8197  041404  046117  051040  043505
 8198  041412  051511  042524  020122
 8199  041420  042524  052123  043040
 8200  041426  044501  042514  027104
 8201  041434  052200  042510  053440
 8202  041442  047522  043516     040
 8203  041447     107  047522  050125          .ASCIZ  'GROUP WAS WRITTEN WHILE FORCING SELECTION OF A GROUP.'
 8204  041454  053440  051501  053440
 8205  041462  044522  052124  047105
 8206  041470  053440  044510  042514
 8207  041476  043040  051117  044503
 8208  041504  043516  051440  046105
 8209  041512  041505  044524  047117
 8210  041520  047440  020106  020101
 8211  041526  051107  052517  027120
 8212  041534     000
 8213
 8214  041535     103  047117  051124  EM117:  .ASCII  'CONTROL REGISTER TEST FAILED.'<CRLF>
 8215  041542  046117  051040  043505
 8216  041550  051511  042524  020122
 8217  041556  042524  052123  043040
 8218  041564  044501  042514  027104
 8219  041572     200
 8220  041573     107  052117  040440          .ASCIZ  'GOT A HIT IN THE GROUP TO WHICH MISSES ARE BEING FORCED.'
 8221  041600  044040  052111  044440
 8222  041606  020116  044124  020105
 8223  041614  051107  052517  020120
 8224  041622  047524  053440  044510
 8225  041630  044103  046440  051511
 8226  041636  042523  020123  051101
 8227  041644  020105  042502  047111
 8228  041652  020107  047506  041522
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 8229  041660  042105  000056
 8230
 8231  041664  044510  027524  044515  EM120:  .ASCII  'HIT/MISS REGISTER PATTERNS TEST FAILED.'
 8232  041672  051523  051040  043505
 8233  041700  051511  042524  020122
 8234  041706  040520  052124  051105
 8235  041714  051516  052040  051505
 8236  041722  020124  040506  046111
 8237  041730  042105     056
 8238  041733     200  042522  042101          .ASCII  <CRLF>'READ WRONG DATA FROM THE HIT/MISS REGISTER'<CRLF>
 8239  041740  053440  047522  043516
 8240  041746  042040  052101  020101
 8241  041754  051106  046517  052040
 8242  041762  042510  044040  052111
 8243  041770  046457  051511  020123
 8244  041776  042522  044507  052123
 8245  042004  051105     200
 8246  042007     127  044510  042514          .ASCIZ  'WHILE FLOATING A PATTERN OF HITS AND MISSES THROUGH IT.'
 8247  042014  043040  047514  052101
 8248  042022  047111  020107  020101
 8249  042030  040520  052124  051105
 8250  042036  020116  043117  044040
 8251  042044  052111  020123  047101
 8252  042052  020104  044515  051523
 8253  042060  051505  052040  051110
 8254  042066  052517  044107  044440
 8255  042074  027124     000
 8256
 8257  042077     103  041501  042510  EM121:  .ASCII  /CACHE CONTROL SIGNAL, THE 'RANDOM' SIGNAL, TEST FAILED./
 8258  042104  041440  047117  051124
 8259  042112  046117  051440  043511
 8260  042120  040516  026114  052040
 8261  042126  042510  023440  040522
 8262  042134  042116  046517  020047
 8263  042142  044523  047107  046101
 8264  042150  020054  042524  052123
 8265  042156  043040  044501  042514
 8266  042164  027104
 8267  042166  043200  044501  042514          .ASCII  <CRLF>'FAILED TO GET BOTH HITS AT THE TWO TEST ADDRESSES '
 8268  042174  020104  047524  043440
 8269  042202  052105  041040  052117
 8270  042210  020110  044510  051524
 8271  042216  040440  020124  044124
 8272  042224  020105  053524  020117
 8273  042232  042524  052123  040440
 8274  042240  042104  042522  051523
 8275  042246  051505     040
 8276  042251     127  044510  044103          .ASCIZ  'WHICH WERE REFERENCED.'
 8277  042256  053440  051105  020105
 8278  042264  042522  042506  042522
 8279  042272  041516  042105  000056
 8280
 8281  042300  040515  047111  042524  EM122:  .ASCII  'MAINTENANCE REGISTER COUNT PATTERN TEST FAILED.'
 8282  042306  040516  041516  020105
 8283  042314  042522  044507  052123
 8284  042322  051105  041440  052517
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 8285  042330  052116  050040  052101
 8286  042336  042524  047122  052040
 8287  042344  051505  020124  040506
 8288  042352  046111  042105     056
 8289  042357     200  044124  020105          .ASCII   <CRLF>'THE MAINTENANCE REGISTER WILL NOT CLEAR.'
 8290  042364  040515  047111  042524
 8291  042372  040516  041516  020105
 8292  042400  042522  044507  052123
 8293  042406  051105  053440  046111
 8294  042414  020114  047516  020124
 8295  042422  046103  040505  027122
 8296
 8297  042430  040503  044103  020105  EM123:  .ASCII  'CACHE MAINTENANCE REGISTER COUNT PATTERN TEST FAILED.'
 8298  042436  040515  047111  042524
 8299  042444  040516  041516  020105
 8300  042452  042522  044507  052123
 8301  042460  051105  041440  052517
 8302  042466  052116  050040  052101
 8303  042474  042524  047122  052040
 8304  042502  051505  020124  040506
 8305  042510  046111  042105     056
 8306  042515     200  043101  042524          .ASCII  <CRLF>'AFTER WRITING A PATTERN IN THIS REGISTER '
 8307  042522  020122  051127  052111
 8308  042530  047111  020107  020101
 8309  042536  040520  052124  051105
 8310  042544  020116  047111  052040
 8311  042552  044510  020123  042522
 8312  042560  044507  052123  051105
 8313  042566     040
 8314  042567     106  044501  042514          .ASCIZ  'FAILED TO READ THAT PATTERN BACK.'
 8315  042574  020104  047524  051040
 8316  042602  040505  020104  044124
 8317  042610  052101  050040  052101
 8318  042616  042524  047122  041040
 8319  042624  041501  027113     000
 8320
 8321  042631     101  020116  047125  EM124:  .ASCII  'AN UNEXPECTED ERROR OCCURRED WHILE RUNNING THE '
 8322  042636  054105  042520  052103
 8323  042644  042105  042440  051122
 8324  042652  051117  047440  041503
 8325  042660  051125  042522  020104
 8326  042666  044127  046111  020105
 8327  042674  052522  047116  047111
 8328  042702  020107  044124  020105
 8329  042710  040515  047111  042524          .ASCII  'MAINTENANCE REGISTER'<CRLF>'COUNT PATTERN '
 8330  042716  040516  041516  020105
 8331  042724  042522  044507  052123
 8332  042732  051105  041600  052517
 8333  042740  052116  050040  052101
 8334  042746  042524  047122     040
 8335  042753     124  051505  027124          .ASCIZ  'TEST. NOTE MISSES WERE BEING FORCED TO BOTH GROUPS.'
 8336  042760  047040  052117  020105
 8337  042766  044515  051523  051505
 8338  042774  053440  051105  020105
 8339  043002  042502  047111  020107
 8340  043010  047506  041522  042105
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8341  043016  052040  020117  047502
8342  043024  044124  043440  047522
8343  043032  050125  027123     000
8344
8345  043037     115  044501  052116  EM127:  .ASCII  'MAINTENANCE REGISTER TEST FAILED.'<CRLF>
8346  043044  047105  047101  042503
8347  043052  051040  043505  051511
8348  043060  042524  020122  042524
8349  043066  052123  043040  044501
8350  043074  042514  027104     200
8351  043101     116  020117  051124          .ASCII  'NO TRAP OR ABORT OCCURRED WHEN THE PATTERN WAS PUT '
8352  043106  050101  047440  020122
8353  043114  041101  051117  020124
8354  043122  041517  052503  051122
8355  043130  042105  053440  042510
8356  043136  020116  044124  020105
8357  043144  040520  052124  051105
8358  043152  020116  040527  020123
8359  043160  052520  020124
8360  043164  047111  052040  042510          .ASCIZ  'IN THE MAINTENANCE REGISTER.'
8361  043172  046440  044501  052116
8362  043200  047105  047101  042503
8363  043206  051040  043505  051511
8364  043214  042524  027122     000
8365
8366  043221     105  051122  051117  EM130:  .ASCIZ  'ERROR REGISTER WILL NOT UNLOCK, OR CLEAR.'
8367  043226  051040  043505  051511
8368  043234  042524  020122  044527
8369  043242  046114  047040  052117
8370  043250  052440  046116  041517
8371  043256  026113  047440  020122
8372  043264  046103  040505  027122
8373  043272     000
8374
8375  043273     105  051122  051117  EM131:  .ASCII  'ERROR REGISTER AND MAINTENANCE REGISTER TEST FAILED.'
8376  043300  051040  043505  051511
8377  043306  042524  020122  047101
8378  043314  020104  040515  047111
8379  043322  042524  040516  041516
8380  043330  020105  042522  044507
8381  043336  052123  051105  052040
8382  043344  051505  020124  040506
8383  043352  046111  042105     056
8384  043357     200  051105  047522          .ASCII  <CRLF>'ERROR REGISTER IS INCORRECTLY SET'
8385  043364  020122  042522  044507
8386  043372  052123  051105  044440
8387  043400  020123  047111  047503
8388  043406  051122  041505  046124
8389  043414  020131  042523     124
8390  043421     200  047506  020122          .ASCIZ  <CRLF>'FOR THE ERROR THAT WAS FORCED USING THE MAINTENANCE REGISTER.'
8391  043426  044124  020105  051105
8392  043434  047522  020122  044124
8393  043442  052101  053440  051501
8394  043450  043040  051117  042503
8395  043456  020104  051525  047111
8396  043464  020107  044124  020105
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 8397  043472  040515  047111  042524
 8398  043500  040516  041516  020105
 8399  043506  042522  044507  052123
 8400  043514  051105  000056
 8401
 8402  043520                          EM140:
 8403  043520  040515  047111  046440          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 8404  043526  046505  051117  020131
 8405  043534  040504  040524  050040
 8406  043542  051101  052111  020131
 8407  043550  044103  041505  042513
 8408  043556  051522  052040  051505
 8409  043564  020124  040506  046111
 8410  043572  042105     056
 8411  043575     200  047125  041101          .ASCII  <CRLF> 'UNABLE TO FORCE A PARITY ERROR, USING '.
 8412  043602  042514  052040  020117
 8413  043610  047506  041522  020105
 8414  043616  020101  040520  044522
 8415  043624  054520  042440  051122
 8416  043632  051117  020054  051525
 8417  043640  047111  020107
 8418  043644  044124  020105  040515          .ASCII  'THE MAINTENANCE REGISTER.'<CRLF>
 8419  043652  047111  042524  040516
 8420  043660  041516  020105  042522
 8421  043666  044507  052123  051105
 8422  043674  100054
 8423  043676  052101  052040  042510          .ASCII  'AT THE MAIN MEMORY EVEN WORD, LOW BYTE, PARITY '
 8424  043704  046440  044501  020116
 8425  043712  042515  047515  054522
 8426  043720  042440  042526  020116
 8427  043726  047527  042122  020054
 8428  043734  047514  020127  054502
 8429  043742  042524  020054  040520
 8430  043750  044522  054524     040
 8431  043755     103  042510  045503          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
 8432  043762  051105  100054  051040
 8433  043770  040505  044504  043516
 8434  043776  040440  042040  052101
 8435  044004  020101  040520  052124
 8436  044012  051105  020116  044127
 8437  044020  041511  020110
 8438  044024  044123  052517  042114          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
 8439  044032  044040  053101  020105
 8440  044040  040503  051525  042105
 8441  044046  040440  020116  051105
 8442  044054  047522  027122     000
 8443
 8444  044061                          EM141:
 8445  044061     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 8446  044066  042515  047515  054522
 8447  044074  042040  052101  020101
 8448  044102  042520  044522  054524
 8449  044110  041440  042510  045503
 8450  044116  051105  020123  042524
 8451  044124  052123  043040  044501
 8452  044132  042514  027104
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9453  044136  052600  040516  046102          .ASCII  <CRLF>'UNABLE TO FORCE A PARITY ERROR, USING '
9454  044144  020105  047524  043040
9455  044152  051117  042503  040440
9456  044160  050040  051101  052111
9457  044166  020131  051105  047522
9458  044174  026122  052440  044523
9459  044202  043516     040
9460  044205     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER.'<CRLF>
9461  044213  044501  052116  047105
9462  044220  047101  042503  051040
9463  044226  043505  051511  042524
9464  044234  026122     200
9465  044237     101  020124  044124          .ASCII  'AT THE MAIN MEMORY ODD WORD, LOW BYTE, PARITY '
9466  044244  020105  040515  047111
9467  044253  046440  046505  051117
9468  044260  020131  042117  020104
9469  044266  047523  042122  020054
9470  044274  047514  020127  054502
9471  044302  042524  020054  040520
9472  044310  044522  054524     040
9473  044315     103  042510  045503          .ASCII  'CHECKER.'<CRLF>' READING A DATA PATTERN WHICH '
9474  044322  051105  100054  051040
9475  044330  040505  044504  043516
9476  044336  040440  042040  052101
9477  044344  020101  040520  052124
9478  044352  051105  020116  044127
9479  044360  041511  020110
9480  044364  044123  052517  042114          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
9481  044372  044040  053101  020105
9482  044400  040503  051525  042105
9483  044406  040440  020116  051105
9484  044414  047522  027122     000
9485
9486  044421                          EM142:
9487  044421     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
9488  044426  042515  047515  054522
9489  044434  042040  052101  020101
9490  044442  040520  044522  054524
9491  044450  041440  042510  045503
9492  044456  051105  020123  042524
9493  044464  052123  043040  044501
9494  044472  042514  027104
9495  044476  052600  040516  046102          .ASCII  <CRLF>'UNABLE TO FORCE A PARITY ERROR, USING '
9496  044504  020105  047524  043040
9497  044512  051117  042503  040440
9498  044520  050040  051101  052111
9499  044526  020131  051105  047522
9500  044534  026122  052440  044523
9501  044542  043516     040
9502  044545     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER.'<CRLF>
9503  044552  044501  052116  047105
9504  044560  047101  042503  051040
9505  044566  043505  051511  042524
9506  044574  026122     200
9507  044577     101  020124  044124          .ASCII  'AT THE MAIN MEMORY EVEN WORD, HIGH BYTE, PARITY '
9508  044604  020105  040515  047111
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 9503  044612  046440  046505  051117
 9510  044620  020131  053105  047105
 9511  044626  053440  051117  026104
 9512  044634  040040  043511  020110
 9513  044642  054502  042524  020054
 9514  044650  040520  044522  054524
 9515  044656     040
 9516  044657     103  042510  045503          .ASCII  'CHECKER,'<CRLF>' READING A DATA PATTERN WHICH '
 9517  044664  051105  100054  051040
 9520  044672  042505  044504  043516
 9521  044700  040440  042040  052101
 9522  044706  020101  040520  052124
 9523  044714  051105  020116  044127
 9524  044722  041511  020110
 9525  044725  044123  052517  042114          .ASCII  'SHOULD HAVE CAUSED AN ERROR.'
 9526  044734  044040  053101  020105
 9527  044742  040503  051525  042105
 9530  044750  040440  020116  051105
 9531  044756  047522  027122     000
 9532
 9533  044763                          EM143:
 9534  044763     115  044501  020116          .ASCII  'MAIN MEMORY DATA PARITY CHECKERS TEST FAILED.'
 9535  044770  042515  047515  054522
 9536  044776  042040  052101  020101
 9537  045004  040520  044522  054524
 9540  045012  041440  042510  045503
 9541  045020  051105  020123  042524
 9542  045026  052123  043040  044501
 9543  045034  042514  027104
 9544  045040  052600  040516  046102          .ASCII   <CRLF>'UNABLE TO FORCE A PARITY ERROR, USING '
 9545  045046  020105  047524  043040
 9546  045054  051117  042503  040440
 9547  045062  050040  051101  052111
 9550  045070  020131  051105  047522
 9551  045076  026122  052440  044523
 9552  045104  043516     040
 9553  045107     124  042510  046440          .ASCII  'THE MAINTENANCE REGISTER,'<CRLF>
 9554  045114  044501  052116  047105
 9555  045122  047101  042503  051040
 9556  045130  043505  051511  042524
 9557  045136  026122     200
 9560  045141     101  020124  044124          .ASCII  'AT THE MAIN MEMORY ODD WORD, HIGH BYTE, PARITY '
 9561  045146  020105  040515  047111
 9562  045154  046440  046505  051117
 9563  045162  020131  042117  020104
 9564  045170  047527  042122  020054
 9565  045176  044510  044107  041040
 9566  045204  052131  026105  050040
 9567  045212  051101  052111  020131
 9570  045220  044103  041505  042513          .ASCII  'CHECKER,' <CRLF>'' READING A DATA PATTERN WHICH '
 9571  045226  026122  020200  042522
 9572  045234  042101  047111  020107
 9573  045242  020101  040504  040524
 9574  045250  050040  052101  042524
 9575  045256  047122  053440  044510
 9576  045264  044103     040
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                045267  000123  047510  046125          .ASCIZ  'SHOULD HAVE CAUSED AN ERROR.'
                045274  020104  040510  042526
                045302  041440  052501  042523
                045310  020104  047101  042440
                045316  051122  051117  000056

045324  020040  042524  052123  DH140:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'DATA.'<TAB>'ADDRESS.'
045332  004456  040503  046114
045340  040440  020124  041520
045346  004456  040504  040524
045354  004456  042101  051104
045362  051505  027123  000

                045324                  DH141=DH140

                045324                  DH142=DH140

                045324                  DH143=DH140

045367  004     003     000     DF140:  .BYTE   4.3.0.2
045372  002

                045367                  DF141=DF140

                045367                  DF142=DF140

                045367                  DF143=DF140

                045374                  .EVEN
045374  001224  001116  001230  DT140:  .WORD   $TMPC,$ERRPC,$TMP2,$TMP3,0
045402  001232  000000

                045374                  DT141=DT140

                045374                  DT142=DT140

                045374                  DT143=DT140

045406  051105  047522  020122  EM132:  .ASCII  'ERROR REGISTER TEST WAS UNABLE TO CAUSE A TIME OUT.'
045414  042523  044537  052123
045422  051105  052040  051505
045430  020124  040527  020123
045436  047125  041101  042514
045444  052040  020117  040503
045452  051525  020105  020101
045460  044524  042515  047440
045466  052125  000054
045471  000200  052101  040440          .ASCII  <CRLF><CRLF>'AT AN ADDRESS WHICH SHOULD HAVE TIMED OUT.'
045476  020116  042101  051104
045504  051505  020123  044127
045512  041511  020110  044123
045520  052517  042114  040440
045526  053101  020105  044524
045534  042516  020104  052517
045542  027124  000000
```

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 9621
 9622  045545     105  051122  051117  EM133:  .ASCII  'ERROR REGISTER TEST FAILED.'
 9623  045552  051040  043505  051511
 9624  045560  042524  020122  042524
 9625  045566  052123  043040  044501
 9626  045574  042514  027104
 9627  045600  040600  052106  051105          .ASCII  <CRLF>'AFTER CAUSING A TIME OUT THE ERROR REGISTER SHOULD '
 9628  045606  041440  052501  044523
 9629  045614  043516  040440  052040
 9630  045622  046511  020105  052517
 9631  045630  020124  044124  020105
 9632  045636  051105  047522  020122
 9633  045644  042522  044507  052123
 9634  045652  051105  051440  047513
 9635  045660  046125  020104
 9636  045664  040510  042526  041040          .ASCII  'HAVE BEEN SET TO : CC0000.'
 9637  045672  042505  020116  042523
 9638  045700  020124  047524  035040
 9639  045706  030040  030060  030060
 9640  045714  027060     000
 9641
 9642  045717     103  047117  051124  EM134:  .ASCII  'CONTROL REGISTER, DISABLE TRAPS, TEST FAILED.'
 9643  045724  046117  051040  043505
 9644  045732  051511  042524  026122
 9645  045740  042040  051511  041101
 9646  045746  042514  052040  040522
 9647  045754  051520  020054  042524
 9648  045762  052123  043040  044501
 9649  045770  042514  027104
 9650  045774  040600  052040  040522          .ASCII  <CRLF>'A TRAP OCCURRED WITH BIT 3 SET IN THE CONTROL REGISTER.'
 9651  046002  020120  041517  052503
 9652  046010  051122  042105  053440
 9653  046016  052111  020110  044502
 9654  046024  020124  020060  042523
 9655  046032  020124  047111  052040
 9656  046040  042510  041440  047117
 9657  046046  051124  046117  051040
 9658  046054  043505  051511  042524
 9659  046062  027122     000
 9660
 9661  046065     105  051122  051117  EM135:  .ASCII  'ERROR REGISTER, LOCK UP, TEST FAILED.'
 9662  046072  051040  043505  051511
 9663  046100  042524  026122  046040
 9664  046106  041517  020113  050125
 9665  046114  020054  042524  052123
 9666  046122  043040  044501  042514
 8667  046130  027104
 9668  046132  040600  052106  051105          .ASCII  <CRLF>'AFTER FORCING MULTIPLE ERRORS, TWO, THE ERROR '
 9669  046140  043040  051117  044503
 9670  046146  043516  046440  046125
 9671  046154  044524  046120  020105
 9672  046162  051105  047522  051522
 9673  046170  020054  053524  026117
 9674  046176  052040  042510  042440
 9675  046204  051122  051117     040
 9676  046211     122  043505  051511          .ASCII  'REGISTERS WAS INSORRECTLY SET.'
```

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 8677  046216  042524  051522  053440
 8678  046224  051501  044440  051516
 8679  046232  051117  042522  052103
 8680  046240  054514  051440  052105
 8681  046246  000056
 8682
 8683  046250  052600  042516  050130  EM150:  .ASCIZ  <CRLF>"UNEXPECTED CPU ERROR TRAPPED TO VECTOR ERRVEC (4,)"
 8684  046256  041505  042524  020104
 8685  046264  050103  020125  051105
 8686  046272  047522  020122  051124
 8687  046300  050101  042520  020104
 8688  046306  047524  053040  041505
 8689  046314  047524  020122  051105
 8690  046322  053122  041505  024040
 8691  046330  024464  000041
 8692
 8693                                  ;THESE ARE DATA HEADERS:
 8694
 8695  046334  020040  042524  052123  DH1:    .ASCIZ  '  TEST.'<TAB>' GROUP.'<TAB>'PHYSICAL ADDR.'<TAB>'CALL AT PC.'
 8696  046342  004456  043440  047522
 8697  046350  050125  004456  044120
 8698  046356  051531  041511  046101
 8699  046364  040440  042104  027122
 8700  046372  041411  046101  020114
 8701  046400  052101  050040  027103
 8702  046406     000
 8703  046407     040  052040  051505  DH14:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'ERROR ADDR REG.'
 8704  046414  027124  041411  046101
 8705  046422  020114  052101  050040
 8706  046430  027103  042411  051122
 8707  046436  051117  040440  042104
 8708  046444  020122  042522  027107
 8709  046452  052011  040522  020120          .ASCII  <TAB>"TRAP AT PC."<TAB>
 8710  046460  052101  050040  027103
 8711  046466     011
 8712  046467     105  051122  051117          .ASCIZ  'ERROR REG.'
 8713  046474  051040  043505  000056
 8714
 8715  046502  020040  042524  052123  DH15:   .ASCIZ  '  TEST.' TAB'CALL AT PC.'
 8716  046510  004456  040503  046114
 8717  046516  040440  020124  041520
 8718  046524  000056
 8719
 8720  046526  020040  042524  052123  DH55:   .ASCIZ  '  TEST.'<TAB>'TRAP AT PC.'<TAB>'CALL AT PC.'<TAB>'REG ADDRESS.'
 8721  046534  004456  051124  050101
 8722  046542  040440  020124  041520
 8723  046550  004456  040503  046114
 8724  046556  040440  020124  041520
 8725  046564  004456  042522  020107
 8726  046572  042101  051104  051505
 8727  046600  027123     000
 8728
 8729          046526                  DH56=DH55
 8730
 8731          046526                  DH57=DH55
 8732
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                        046526                  DH60=DH55
                        046526                  DH61=DH55
                        046526                  DH62=DH55

046603    040   052040  051505  DH63:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'CONTROL.'
046610  027124  041411  046101
046616  020114  052101  050040
046624  027103  041411  047117
046632  051124  046117     056
046637    115   044501  052116          .ASCIZ  'MAINT.'<TAB>'(DATA READ FROM EACH REGISTER)'
046644  004456  042050  052101
046652  020101  042522  042101
046660  043040  047522  020115
046666  040505  044103  051040
046674  043505  051511  042524
046702  024522     000

046705    040   052040  051505  DH64:   .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'CONTROL REGISTER DATA.'
046712  027124  041411  046101
046720  020114  052101  050040
046726  027103  041411  047117
046734  051124  046117  051040
046742  043505  051511  042524
046750  020122  040504  040524
046756  000056

046760  020040  042524  052123  DH65:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'LOW ORD.'<TAB>'HIGH ORD.'
046766  004456  040503  046114
046774  040440  020124  041520
047002  004456  047514  020127
047010  051117  027104  044011
047016  043511  020110  051117
047024  027104
047026  024011  040504  040524          .ASCIZ  <TAB>'(DATA READ FROM ADR. REG.)'
047034  051040  040505  020104
047042  051106  046517  040440
047050  051104  020056  042522
047056  027107  000051

047062  020040  042524  052123  DH66:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'WROTE.' TAB>'READ.'
047070  004456  040503  046114
047076  040440  020124  041520
047104  004456  051127  052117
047112  027105  051011  040505
047120  027104
047122  042411  050130  041505          .ASCIZ  <TAB>'EXPECTED.'
047130  042524  027104     000

047135    040   052040  051505  DH67:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN READ FROM THE '
047142  027124  041411  046101
047150  020114  052101  050040
047156  027103  050011  052101
047164  042524  047122  051040
047172  040505  020104  051106
```

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 8798  047200  046517  052040  042510
 8799  047206     040
 8800  047207     110  052111  046457  .       .ASCIZ  'HIT MISS REGISTER.'
 8801  047314  051511  052123  042523
 8802  047322  044507  052123  051105
 8803  047330  000056
 8804
 8805                  047135                  DH70=DH67
 8806
 8807                  047135                  DH71=DH67
 8808
 8809                  047135                  DH72=DH67
 8810
 8811                  047135                  DH73=DH67
 8812
 8813                  047135                  DH74=DH67
 8814
 8815  047232  020040  042524  052123  DH75:   .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>' GROUP.'<TAB>
 8816  047240  004456  040503  046114
 8817  047246  040440  020124  041520
 8818  047254  004456  043440  047522
 8819  047262  050125  004456
 8820  047266  042101  051104  051505          .ASCIZ  'ADDRESS.'<TAB>'PATTERN IN CONTROL REG.'
 8821  047274  027123  050011  052101
 8822  047302  042524  047122  044440
 8823  047310  020116  047503  052116
 8824  047316  047522  020114  042522
 8825  047324  027107     000
 8826
 8827                  047232                  DH76=DH75
 8828
 8829  047327     040  052040  051505  DH77:   .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'
 8830  047334  027124  041411  046101
 8831  047342  020114  052101  050040
 8832  047350  027103     000
 8833
 8834
 8835                  047232                  DH117=DH75
 8836
 8837  047353     040  052040  051505  DH120:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN IN CONTROL REG.'
 8838  047360  027124  041411  046101
 8839  047366  020114  052101  050040
 8840  047374  027103  050011  052101
 8841  047402  042524  047122  044440
 8842  047410  020116  047503  052116
 8843  047416  047522  020114  042522
 8844  047424  027107     000
 8845
 8846  047427     040  052040  051505  DH121:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TEST ADDRESS.'
 8847  047434  027124  041411  046101
 8848  047442  020114  052101  050040
 8849  047450  027103  052011  051505
 8850  047456  020124  042101  051104
 8851  047464  051505  027123     000
 8852
 8853  047471     040  052040  051505  DH122:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'WROTE.'<TAB>
```

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 8845  047476  027124  041411  046101
 8846  047504  020114  052101  050040
 8847  047512  027103  053411  047522
 8848  047520  042524  004456
 8849  047524  044124  047105  041440          .ASCIZ  'THEN CLEARED AND READ.'
 8850  047532  042514  051101  042105
 8851  047540  040440  042116  051040
 8852  047546  040505  027104     000
 8853
 8854  047553     040  042524  052123  DH123:  .ASCIZ  ' TEST.'<TAB>'CALL AT PC.'<TAB>'WROTE.'<TAB>'READ.'
 8855  047560  004456  040503  046114
 8856  047566  040440  020124  041520
 8857  047574  004456  051127  052117
 8858  047602  027105  051011  040505
 8859  047610  027104     000
 8860
 8861          046407                  DH124=DH14
 8862
 8863  047613     040  052040  051505  DH125:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'ADDRESS.'
 8864  047620  027124  041411  046101
 8865  047626  020114  052101  050040
 8866  047634  027103  040411  042104
 8867  047642  042522  051523  000056
 8868
 8869  047650  020040  042524  052123  DH126:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'
 8870  047656  004456  040503  046114
 8871  047664  040440  020124  041520
 8872  047672  004456  051124  050101
 8873  047700  040440  020124  041520
 8874  047706     056
 8875  047707     011  051105  047522          .ASCIZ  <TAB>'ERROR REG.'
 8876  047714  020122  042522  027107
 8877  047722     000
 8878
 8879  047723     040  052040  051505  DH127:  .ASCIZ  '  TEST.'<TAB>'CALL AT PC.'<TAB>'PATTERN USED.'
 8880  047730  027124  041411  046101
 8881  047736  020114  052101  050040
 8882  047744  027103  050011  052101
 8883  047752  042524  047122  052440
 8884  047760  042523  027104     000
 8885
 8886  047765     040  052040  051505  DH130:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'ERROR ADR REG.'
 8887  047772  027124  041411  046101
 8888  050000  020114  052101  050040
 8889  050006  027103  042411  051122
 8890  050014  051117  040440  051104
 8891  050022  051040  043505     056
 8892  050027     011  051105  047522          .ASCIZ  <TAB>'ERROR REG.'
 8893  050034  020122  042522  027107
 8894  050042     000
 8895
 8896  050043     040  052040  051505  DH131:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'<TAB>
 8897  050050  027124  041411  046101
 8898  050056  020114  052101  050040
 8899  050064  027103  052011  040522
 8900  050072  020120  052101  050040
```

```
8901  050100  027103     011
8902  050103     105  051122  051117          .ASCIZ  'ERROR ADR REG.'
8903  050110  040440  051124  051040
8904  050116  043505  000056
8905
8906            047613                  DH132=DH125
8907
8908            047650                  DH133=DH126
8909
8910  050122  020040  042524  052123  DH134:  .ASCII  '  TEST.'<TAB>'CALL AT PC.'<TAB>'TRAP AT PC.'<TAB>
8911  050130  004456  040503  046114
8912  050136  040440  020124  041520
8913  050144  004456  051124  050101
8914  050152  040440  020124  041520
8915  050160  004456
8916  050162  047503  052116  047522          .ASCIZ  'CONTROL REG.'
8917  050170  020114  042522  027107
8918  050176     000
8919
8920            047327                  DH135=DH77
8921
8922  050177     040  052040  051505  DH150:  .ASCIZ  '  TEST.'<TAB>'TRAP AT PC.'<TAB>'CALL AT PC.'<TAB>'CPU ERROR REGISTER.'
8923  050204  027124  052011  040522
8924  050212  020120  052101  050040
8925  050220  027103  041411  046101
8926  050226  020114  052101  050040
8927  050234  027103  041411  052520
8928  050242  042440  051122  051117
8929  050250  051040  043505  051511
8930  050256  042524  027122     000
8931                                  ;THESE ARE DATA FORMAT DESIGNATORS FOR THE DATA TABLE:
8932
8933  050263     004     004     003  DF1:    .BYTE   4,4,3,3
8934  050266     003
8935
8936  050267     004     003     007  DF14:   .BYTE   4,3,7,3,0
8937  050272     003     000
8938
8939  050274     004     003          DF15:   .BYTE   4,3
8940
8941  050276     004     003     003  DF55:   .BYTE   4,3,3,2
8942  050301     002
8943
8944            050276                  DF56=DF55
8945
8946            050276                  DF57=DF55
8947
8948            050276                  DF60=DF55
8949
8950            050276                  DF61=DF55
8951
8952            050276                  DF62=DF55
8953
8954  050302     004     003     000  DF63:   .BYTE   4,3,0,0,0
8955  050305     000     000
8956
```

```
                        050302                  DF64=DF63
                        050302                  DF65=DF63
                        050302                  DF66=DF63
                        050302                  DF67=DF63
                        050302                  DF70=DF63
                        050302                  DF71=DF63
                        050302                  DF72=DF63
                        050302                  DF73=DF63
                        050302                  DF74=DF63
050307    004     003     004   DF75:   .BYTE   4,3,4,2,0
050312    002     000
                        050307                  DF76=DF75
050314    004     003     005   DF77:   .BYTE   4,3,5,2,5,0,5,2,5,0
050317    002     005     000
050322    005     002     005
050325    000
                        050307                  DF117=DF75
050326    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
050331    005     000     005
050334    000     005     000
050337    005     000     005
050342    000     005     000
050345    005     000     005
050350    000     005     000
050353    005     000     005
050356    000     005     000
050361    004     003     002   DF121:  .BYTE   4,3,2,2
050364    002
050365    004     003     000   DF122:  .BYTE   4,3,0,0
050370    000
                        050365                  DF123=DF122
050371    004     003     007   DF124:  .BYTE   4,3,7,3,0,5,0,
050374    003     000     005
050377    000     000
050401    004     003     002   DF125:  .BYTE   4,3,2,0
050404    000
```

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 9013  050405      004     003     003  DF126:  .BYTE   4,3,3,0,5,2,5,2
 9014  050410      000     005     002
 9015  050413      005     002
 9016
 9017  050415      004     003     000  DF127:  .BYTE   4,3,0
 9018
 9019              050401                DF130=DF125
 9020
 9021  050420      004     003     003  DF131:  .BYTE   4,3,3,2,5,0,5,0,5,0
 9022  050423      002     005     000
 9023  050426      005     000     005
 9024  050431      000
 9025
 9026              050401                DF132=DF125
 9027
 9028              050405                DF133=DF126
 9029
 9030  050432      004     003     003  DF134:  .BYTE   4,3,3,0,5,2,0
 9031  050435      000     005     002
 9032  050440      000
 9033
 9034  050441      004     003     005  DF135:  .BYTE   4,3,5,0,5,0,5,2,5,2
 9035  050444      000     005     000
 9036  050447      005     002     005
 9037  050452      002
 9038
 9039  050453      004     003     003  DF150:  .BYTE   4,3,3,0
 9040  050456      000
 9041
 9042              050460                .EVEN
 9043
 9044                                    ;THESE ARE DATA TABLES:
 9045
 9046  050460  001224  001226  001230  DT1:    .WORD   $TMP0,$TMP1,$TMP2,$ERRPC,0
 9047  050466  001116  000000
 9048
 9049  050472  001224  001116  001226  DT14:   .WORD   $TMP0,$ERRPC,$TMP1,$TMP3,$TMP4,0
 9050  050500  001232  001234  000000
 9051
 9052  050506  001224  001226  000000  DT15:   .WORD   $TMP0,$TMP1,0
 9053
 9054
 9055  050514  001224  001226  001116  DT55:   .WORD   $TMP0,$TMP1,$ERRPC,$TMP3,0
 9056  050522  001232  000000
 9057
 9058              050514                DT56=DT55
 9059
 9060              050514                DT57=DT55
 9061
 9062              050514                DT60=DT55
 9063
 9064              050514                DT61=DT55
 9065
 9066              050514                DT62=DT55
 9067
 9068  050526  001224  001116  001230  DT63:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
```

```
 9069  050534  001232  000000
 9070
 9071  050540  001224  001116  001230  DT64:   .WORD   $TMP0,$ERRPC,$TMP2,0
 9072  050546  000000
 9073
 9074  050550  001224  001116  001230  DT65:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
 9075  050556  001232  000000
 9076
 9077  050562  001224  001116  001230  DT66:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,$TMP4,0
 9078  050570  001232  001234  000000
 9079
 9080          050540                  DT67=DT64
 9081
 9082          050540                  DT70=DT64
 9083
 9084          050540                  DT71=DT64
 9085
 9086          050540                  DT72=DT64
 9087
 9088          050540                  DT73=DT64
 9089
 9090          050540                  DT74=DT64
 9091
 9092  050576  001224  001116  001230  DT75:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP10,$TMP3,0
 9093  050604  001244  001232  000000
 9094
 9095  050612  001224  001116  001230  DT76:   .WORD   $TMP0,$ERRPC,$TMP2,$TMP12,$TMP3,0
 9096  050620  001250  001232  000000
 9097
 9098  050626  001224  001116  033512  DT77:   .WORD   $TMP0,$ERRPC,MTA77,$TMP10,MTB77,$TMP2,MTC77
 9099  050634  001244  033526  001230
 9100  050642  033570
 9101  050644  001250  033625  001232          .WORD   $TMP12,MTD77,$TMP3,0
 9102  050652  000000
 9103
 9104          050612                  DT117=DT76
 9105
 9106  050654  001224  001116  001230  DT120:  .WORD   $TMP0,$ERRPC,$TMP2,MTA120,KCR0,MTG120,KCE0
 9107  050662  033775  006700  034215
 9108  050670  006714
 9109  050672  034025  006702  034215          .WORD   MTB120,KCR1,MTG120,KCE1
 9110  050700  006716
 9111  050702  034055  006704  034215          .WORD   MTC120,KCR2,MTG120,KCE2
 9112  050710  006720
 9113  050712  034105  006706  034215          .WORD   MTD120,KCR3,MTG120,KCE3
 9114  050720  006722
 9115  050722  034135  006710  034215          .WORD   MTE120,KCR4,MTG120,KCE4
 9116  050730  006724
 9117  050732  034165  006712  034215          .WORD   MTF120,KCR5,MTG120,KCE5,0
 9118  050740  006726  000000
 9119
 9120  050744  001224  001116  001230  DT121:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP4,0
 9121  050752  001234  000000
 9122
 9123  050756  001224  001116  001230  DT122:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,0
 9124  050764  001232  000000
```

```
9125
9126            050756                          DT123=DT122
9127
9128  050770    001224  001116  001225  DT124:  .WORD   $TMP0,$ERRPC,$TMP1,$TMP3,$TMP4,MTA124,$TMP5,0
9129  050776    001232  001234  034256
9130  051004    001240  000000
9131
9132  051010    001224  001116  001230  DT125:  .WORD   $TMP0,$ERRPC,$TMP2,0
9133  051016    000000
9134
9135  051020    001224  001116  001230  DT126:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP7,MTA126,$TMP5,MTB126,$TMP3,0
9136  051026    001242  034350  001236
9137  051034    034376  001232  000000
9138
9139            051010                          DT127=DT125
9140
9141  051042    001224  001116  001230  DT130:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP4,0
9142  051050    001234  000000
9143
9144  051054    001224  001116  001230  DT131:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,MTA131,$TMP5
9145  051062    001232  034430  001236
9146  051070    034512  001240  034545          .WORD   MTB131,$TMP6,MTC131,$TMP7,0
9147  051076    001242  000000
9148
9149            051010                          DT132=DT125
9150
9151            051020                          DT133=DT126
9152
9153  051102    001224  001116  001230  DT134:  .WORD   $TMP0,$ERRPC,$TMP2,$TMP3,MTA134,$TMP4,$TMP6,0
9154  051110    001232  034573  001234
9155  051116    001240  000000
9156
9157  051122    001224  001116  034627  DT135:  .WORD   $TMP0,$ERRPC,MTA135,$TMP2,MTB135,$TMP3
9158  051130    001230  034657  001232
9159  051136    034701  001234  034735          .WORD   MTC135,$TMP4,MTD135,$TMP6,0
9160  051144    001240  000000
9161
9162  051150    001224  001226  001230  DT150:  .WORD   $TMP0,$TMP1,$TMP2,$TMP3,0
9163  051156    001232  000000
9164
9165  051162    000000  000000  000000  BOTTOM: .WORD   0,0,0
9166            057170                          .=.+6000
9167  057170                                    BOTPRG:
9168            000001                          .END
```

```
ABORTT  030476          6951    7072#
ADRNG   033176          7118    7544#
BADCAD  030614          7098*   7097    7098#
BIT0    = 000001        1368#   2485    2583    5532    5606    5671    6277    6393
BIT1    = 000002        1367#   1369
BIT10   = 002000        1358#   1368
BIT11   = 004000        1357#   1367
BIT12   = 010000        1356#   1366
BIT13   = 020000        1355#   1365
BIT14   = 040000        1354#   1364
BIT15   = 100000        1353#   1363
BIT2    = 000004        1352#   1362
BIT3    = 000010        1351#   1361
BIT4    = 000020        1350#   1360    6561
BIT5    = 000040        1349#   1359    6571    6637
BIT6    = 000100        1367#   2490    2588
BIT7    = 000200        1348#   6620
BIT8    = 000400        1347#   6578
BIT9    = 001000        1346#
BITPRG  057170          9167#
BITTOM  051162          2173    7198    9165#
BPTVEC= 000014          1375#
CACHVE= 000114          1382#   2186*   2203*   2295*   2627*   2720*   2811*   3022*   3133*   3221*   3315*   3242*   3318*
                        3403*   3487*   3574*   3655*   3750*   3838*   3937*   4036*   4135*   4234*   4333*   4432*   4531*
                        4634*   4758*   4889*   5001*   5112*   5223*   5334*   5419*   5533*   5607*   5672*   5732*   5736*
                        5870*   5896*   6012*   6037*   6153*   6179*   6272*   6281*   6303*   6391*   6402*   6424*   6332*
                        7058*   7086*
CHAINJ  031234          6516    7197#
CLEAN   030526          6950    7084#
CNRNG   033177          7132    7571#
CONCMS  031742          7196    7424#
CONFL0  030742          2259*   2314*   2321*   2413*   2996*   7128    7154#
CONFL2  030756          2506*   2602*   2665*   2688*   2758*   2781*   2969*   2934    7160#
CONTRL= 177746          1392#   2256    2300*   2302    2395    2438*   2453*   2466*   2497*   2535*   2551*   2564*   2594*
                        2643*   2656*   2667*   2680*   2690*   2736*   2749*   2760*   2773*   2793*   2826*   2839*   2835*
                        2973*   3036*   3054*   3070*   3141*   3214*   3246*   3321*   3406*   3430*   3577*   3639*   3711*
                        3841*   3940*   4039*   4138*   4237*   4336*   4435*   4534*   4667*   4793*   4890*   5002*   5113*
                        5224*   5335*   5531*   5532*   5559    5591*   5606*   5624    5656*   5671*   5699    5729*   5867*
                        6007*   6148*   6272*   6393*   7093*
CPSP_R  030352          2185    4635    5469    7044#   7087
CRLERR= 177766          1405#   2228    2276*   2279*   5467    6645*   7046    7035*
CR      = 000015        1280#   6758    6768
CRLF    = 000200        1281#   2158    6731    6768    7424    7426    7433    7443    7446    7453    7463    7473    7475
                        7486    7492    7495    7500    7507    7512    7519    7529    7532    7539    7544    7558    7571
                        7583    7597    7610    7620    7633    7639    7646    7652    7659    7663    7663    7675    7680
                        7700    7705    7711    7721    7727    7732    7738    7749    7774    7789    7807    7828    5423
```

```
                              7868    7875    7892    7901    7909    7927    7935    7941    7959    7967    8005    8013    8030
                              8039    8061    8069    8101    8118    8127    8151    8160    8175    8196    8214    8239    8267
                              8289    8306    8329    8345    8394    8390    8411    8418    8431    8453    8460    8473    8495
                              8502    8516    8539    8545    8559    8613    8627    8650    8668    8633
DF1         050263            1811    9933#
DF117     = 050307            2049    9986#
DF120       050326            2052    8959#
DF121       050351            2055    9998#
DF122       050365            2058    9001#   9004
DF123     = 050365            2061    9004#
DF124       050371            2064    9006#
DF125       050401            9010#   9019    9026
DF126       050405            9013#   9028
DF127       050415            2073    9017#
DF130     = 050401            2076    9019#
DF131       050420            2080    9021#
DF132     = 050401            2083    9026#
DF133     = 050405            2086    9028#
DF134       050432            2089    9030#
DF135       050441            2092    9034#
DF14        050267            1844    8936#
DF140       045367            2101    9584#   9587    9589    9591
DF141     = 045367            2104    9587#
DF142     = 045367            2107    9589#
DF143     = 045367            2110    9591#
DF15        050274            1947    8939#
DF150       050453            2125    9039#
DF55        050276            1945    8941#   8944    8946    8948    8950    8952
DF56      = 050276            1948    8944#
DF57      = 050276            1951    8946#
DF60      = 050276            1954    8948#
DF61      = 050276            1957    8950#
DF62      = 050276            1960    8952#
DF63        050302            1963    8954#   8957    8959    8961    8963    8965    8967    8969    8971    8973
DF64      = 050302            1966    8957#
DF65      = 050302            1969    8959#
DF66      = 050302            1972    8961#
DF67      = 050302            1975    8963#
DF70      = 050302            1978    8965#
DF71      = 050302            1981    8967#
DF72      = 050302            1984    8969#
DF73      = 050302            1987    8971#
DF74      = 050302            1990    8973#
DF75        050307            1994    8975#   8978    8986
DF76      = 050307            1997    8978#
DF77        050314            2000    8980#
DH1         046334            1811    8695#
DH117     = 047232            2049    8826#
DH120       047353            2052    8829#
DH121       047427            2055    8837#
DH122       047471            2058    8844#
DH123       047553            2061    8854#
DH124     = 046407            2064    8861#
DH125       047613            8863#   8906
DH126       047650            8869#   8908
DH127       047723            2073    8879#
```

```
                    2076    8886#
                    2080    8896#
                    2083    8906#
                    2086    8909#
                    2089    8910#
                    2092    8920#
                    1844    8703#  8861
                    2101    8571#  8579    8580    8582
                    2104    8579#
                    2107    8580#
                    2110    8582#
                    1847    8715#
                    2125    8922#
                    1945    8720#  8729    8731    8733    8735    8737
                    1946    8729#
                    1951    8731#
                    1954    8733#
                    1957    8735#
                    1960    8737#
                    1963    8739#
                    1966    8752#
                    1969    8761#
                    1972    8774#
                    1975    8793#  8798    8799    8800    8802    8804
                    1978    8796#
                    1981    8798#
                    1984    8800#
                    1987    8802#
                    1990    8804#
                    1994    8806#  8818    8825
                    1997    8818#
                    2000    8820#  8920
SPLA=               1775    6592*  6615*
                    1811    9046#
                    2049    9104#
                    2052    9106#
                    2055    9120#
                    2058    9123#  9126
                    2061    9126#
                    2064    9128#
                    9132#   9139    9149
                    9135#   9151
                    2073    9139#
                    2076    9141#
                    2080    9144#
                    2083    9149#
                    2086    9151#
                    2089    9153#
                    2092    9157#
                    1844    9049#
                    2101    8594#  8597    8599    8601
                    2104    8597#
                    2107    8599#
                    2110    8601#
                    1847    9052#
                    2125    9162#
```

```
DT55      050514        1945    9055#   9058    9060    9062    9064    9066
DT56    = 050514        1948    9058#
DT57    = 050514        1951    9060#
DT60    = 050514        1954    9062#
DT61    = 050514        1957    9064#
DT62    = 050514        1960    9066#
DT63      050526        1963    9068#
DT64      050540        1966    9071#   9080    9082    9084    9086    9088    9090
DT65      050550        1969    9074#
DT66      050562        1972    9077#
DT67    = 050540        1975    9080#
DT70    = 050540        1978    9082#
DT71    = 050540        1981    9084#
DT72    = 050540        1984    9096#
DT73    = 050540        1987    9088#
DT74    = 050540        1990    9090#
DT75      050576        1994    9092#
DT76      050612        1997    9095#   9104
DT77      050626        2000    9098#
EMTVEC= 000030        1378#   2139+   2140+
EM1       034763        1811    7763#
EM117     041535        2049    8214#
EM120     041664        2052    8231#
EM121     042077        2055    8257#
EM122     042300        2058    8281#
EM123     042430        2061    8297#
EM124     042631        2064    8321#
EM127     043037        2073    8345#
EM130     043221        2076    8356#
EM131     043273        2080    8375#
EM132     045406        2083    8604#
EM133     045545        2086    8622#
EM134     045717        2089    8642#
EM135     046065        2092    8661#
EM14      035050        1844    7774#
EM140     043520        2101    8402#
EM141     044061        2104    8444#
EM142     044421        2107    8486#
EM143     044763        2110    8529#
EM15      035107        1847    7791#
EM150     046250        2125    8683#
EM55      035157        1945    7788#
EM56      035323        1948    7807#
EM57      035470        1951    7826#
EM60      035612        1954    7842#
EM61      035736        1957    7858#
EM62      036066        1960    7875#
EM63      036214        1963    7892#
EM64      036432        1966    7918#
EM65      036630        1969    7941#
EM66      037213        1972    7986#
EM67      037275        1975    7996#
EM70      037512        1978    8022#
EM71      037770        1981    8053#
EM72      040246        1984    8084#
EM73      040470        1987    8110#
```

```
EM74    040754          1950    8143#
EM75    041240          1994    8176#  9194
EM76  = 041340          1997    8194#
EM77    041310          2000    8196#
ERRNG   033077          7125    7558#
ERRVEC= 000004          1371#   2185*   2208    2209*   2222*   2230*   2231    4635*   5446*   6552    6553*   6555*   6559*
                        7087*
ERTYPE  031230          6629    7075    7269#
ERR11   031342          7299#   7363
ERR12   031554          7303    7308    7318    7326    7332    7344    7353    7357#
ERR13   031560          7336    7360#
ERR14   031570          7292    7362    7365#
ERR15   031572          7277    7366#
ESC   = ******  U       1675    2157    6942    6943    6944    6945    6946    6947    6948    6950    6951    6952    6953
                        6954    6955    6956    6957    6958
HIADRS= 000042          1390#   2244    2354    3206    3270    3279    3286    3355    3364    3372    3439    3448    3456
                        3526    3535    3543    3613    3621    3629    3700    3709    3717    3786    3795    3803    3886
                        3894    3902    3984    3993    4001    4083    4092    4100    4182    4131    4199    4281    4230
                        4298    4380    4389    4397    4479    4488    4496    4578    4587    4595    4703    4721    4729
                        4815    4824    4832    4927    4936    4944    5039    5047    5055    5149    5158    5156    5253
                        5269    5277    5371    5380    5388    5478    5496    5504    5561    5626    5691    5732    5804
                        5813    5932    5944    5953    6073    6085    6094    6215    6227    6236    7061
HIMF10  030736          2246*   2369*   7114    7152#
HIMF20  030752          7158#
HIMF30  030746          2270*   2597*   2939*   7142    7156#
HIMF40  030762          2600*   2970*   2997    7162#
HITMDS= 000052          1394#   2219    2268    2449    2462    2475    2546    2560    2573    2646    2659    2670    2692
                        2739    2752    2763    2775    2847    3044    3060    3090    3949    3948    4047    4146    4245
                        4344    4443    4542    5537    5662
HMPNG   033407          7146    7597#
HT    = 000011          1278#   6729    6768
IOTVEC= 000020          1376#   2137*   2138*
IA    = 000001          2198#
IADONE  003752          2223    2279#
IAERR   003530          2209    2228#
IAERR0  003540          2230#   2233
IAERR1  003552          2229    2232#
IAERR2  003620          2239    2244#
IAERR3  003640          2245    2250#
IAERR4  003660          2251    2256#
IAERR5  003700          2257    2262#
IAERR6  003720          2263    2268#
IAERR7  003740          2269    2274#
IAERR9  003742          2242    2248    2254    2260    2266    2272    2276#
IATMP   003526          2208*   2222    2225#   2230
IA1     003476          2212    2214#   2220
IA2     003502          2218#   2232    2277
IA3     003514          2222#
IB    = 000002          2290#
IBDONE  004112          2304    2316    2323#
IBERR1  004046          2310#
IBERR2  004076          2308    2318#
IB1     004014          2299    2300#
IB2     004032          2305#
IC    = 000003          2340#
ICDONE  004254          2358    2368    2371#
```

```
JCERR1  004204          2356    2360#
JC1     004156          2350    2352#
JC2     004176          2357#
JD    = 000004          2327    2386#
JDDONE  004272          2407    2415#
JDERR1  004344          2404    2408#
JD1     004316          2397    2398#   2405
JD2     004336          2405#   2414
KA    = 000006          2525#
KADONE  005232          2576    2594#
KAD2    005256          2596    2600#
KAD3    005274          2598    2601    2603#
KAERR1  005162          2548    2580#
KAERR2  005200          2562    2595#
KAERR3  005216          2575    2590#
KAFLG   005160          2534*   2578#   2583*   2588*   2593*   2595    2600
KA1     004760          2535#   2536
KA2     005002          2537    2540#   2541
KA3     005030          2550#   2584
KA4     005054          2552    2554#   2555
KA5     005102          2563#   2589
KA6     005126          2565    2567#   2568
KB    = 000005          2428#   2977
KBDONE  004666          2477    2497#
KBD2    004710          2499    2504#
KBD3    004724          2505    2508#
KBERR1  004616          2450    2482#
KBERR2  004634          2463    2497#
KBERR3  004652          2476    2492#
KBFLG   004614          2437*   2480#   2485*   2490*   2495*   2498    2504
KB1     004426          2438#   2439
KB2     004452          2441    2443#   2444
KB3     004474          2452#   2486
KB4     004520          2454    2456#   2457
KB5     004542          2465#   2491
KB6     004566          2467    2469#   2470
KC    = 000011          2806#
KCCON   006646          2815*   2835    2925*   2928*   2934#   2967
KCDONE  006760          2922    2973#
KCERR   006730          2912    2966#
KCE0    006714          2901    2908    2959#   9106
KCE1    006716          2960#   9109
KCE2    006720          2961#   9111
KCE3    006722          2962#   9113
KCE4    006724          2963#   9115
KCE5    006726          2964#   9117
KCFLG1  006650          2816*   2920*   2936#
KCPTR   006652          2818*   2832    2898    2915*   2916    2938#
KCR0    006700          2890*   2907    2952#   9106
KCR1    006702          2892*   2953#   9109
KCR2    006704          2893*   2954#   9111
KCR3    006706          2894*   2955#   9113
KCR4    006710          2895*   2956#   9115
KCR5    006712          2896*   2957#   9117
KC[illegible]   006654  2818    2941#
KCTBLB  006676          2916    2950#
```

```
KCC     006224          2817*   2926    2931
KCI     006240          2817    2923*   2918
KCI0    006444          2889*
KCI1    006504          2898*
KCI2    006522          2902*   2905
KCI3    006552          2910*   2913
KCI4    006562          2911    2913*
KCI5    006564          2915*   2971
KCI6    006620          2921    2924*
KCI7    006634          2924    2928*
KCO     006322          2837*   2845
KCO.5   006330          2836    2839    2843*
KCO3    006352          2833    2848    2862*
KCO4    006372          2963    2866*
KCO5    006402          2967    2870*
KCO6    006410          2871    2874*
KCO7    006426          2875    2878*
KCO8    006432          2879    2882*
KCO9    006442          2883    2885*
KD      = 000007        2622*
KDPAR0= 172360          1548*
KDPAR1= 172362          1549*
KDPAR2= 172364          1550*
KDPAR3= 172366          1551*
KDPAR4= 172370          1552*
KDPAR5= 172372          1553*
KDPAR6= 172374          1554*
KDPAR7= 172376          1555*
KDPDR0= 172320          1526*
KDPDR1= 172322          1527*
KDPDR2= 172324          1528*
KDPDR3= 172326          1529*
KDPDR4= 172330          1530*
KDPDR5= 172332          1531*
KDPDR6= 172334          1532*
KDPDR7= 172336          1533*
KE      = 000010        2715*   2977
KERSTK= 001100          1265*
KF      = 000013        3017*
KFTMP1  007246          3103*
KFTMP2  007250          3026    3104*
KF1     007054          3026*
KF2     007136          3045    3054*
KF3     007174          3061    3070*
KF4     007244          3093    3101*
KF5     007252          3101    3106*
KIPAR0= 172340          1537*   4645    4760    4868    4980    5091    5202    5313    5427    5948    5939    6139    7400
KIPAR1= 172342          1538*
KIPAR2= 172344          1539*
KIPAR3= 172346          1540*
KIPAR4= 172350          1541*
KIPAR5= 172352          1542*
KIPAR6= 172354          1543*   5444*
KIPAR7= 172356          1544*
KIPDR0= 172300          1515*   4647    4762    4870    4982    5093    5204    5315    5429    5950    5990    6131
KIPDR1= 172302          1516*
```

DEKBCB.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
KIPDR2= 172304          1517#
KIPDR3= 172306          1519#
KIPDR4= 172310          1519#
KIPDR5= 172312          1520#
KIPDR6= 172314          1521#
KIPDR7= 172316          1522#
KSP    =%000006         1289#
KTMP1D  005620          2693#
KTMP1E  006150          2786#
KTMP2D  005622          2632    2694#
KTMP2E  006152          2725    2787#
KV     = 000044         5521#
KVDONE  022416          5554    5565#
KVERR   022356          5533    5556#
KV1     022340          5536    5543#
KV2     022346          5546#
KX     = 000046         5581#
KXDONE  022616          5615    5631#
KXERR   022556          5607    5621#
KX1     022520          5598    5606#
KX2     022550          5592    5613#
KY     = 000012         2993#
KY1     007002          2995    2997#
KY2     007016          2998    3000#
KZ     = 000046         5646#
KZDONE  023016          5680    5696#
KZERR   022756          5672    5686#
KZ1     022720          5663    5671#
KZ2     022750          5657    5678#
K1D     005332          2632#
K1E     005662          2725#
K2D     005376          2643#
K2E     005726          2736#
K3D     005436          2647    2654#
K3E     005766          2740    2747#
K4D     005502          2660    2667#
K4E     006032          2753    2760#
K5D     005542          2671    2678#
K5E     006072          2764    2771#
K6D     005612          2677    2683    2690#
K6E     006142          2770    2776    2793#
K7D     005624          2691    2696#
K7E     006154          2784    2789#
LF     = 000012         1279#   6762    6762
LOADRS= 177740          1389#   2211    2238    2353    3205    3269    3276    3295    3354    3362    3371    3439    3446
                        3455    3525    3533    3542    3611    3619    3628    3699    3707    3716    3795    3793    3902
                        3884    3892    3901    3983    3991    4000    4082    4090    4099    4191    4189    4198    4290
                        4288    4297    4379    4387    4396    4478    4496    4495    4577    4595    4594    4702    4720
                        4727    4814    4822    4831    4926    4934    4943    5037    5045    5054    5149    5156    5165
                        5259    5267    5276    5370    5378    5387    5477    5495    5502    5560    5625    5630    5793
                        5791    5803    5811    5923    5931    5943    5951    6064    6072    6094    6092    6205    6214
                        6226    6234    6339    6350    6460    6471    7056    7060
LOAFLG  030734          2204    2240*   2366*   7112    7151#
LOAFL2  030750          7157#
LOC    = 026110         2856#   2857#   2858#   2859    3324#   3325#   3326#   3327    3409#   3410#   3411#   3412    3493#
                        3494#   3495#   3496    3590#   3581#   3582#   3583    3669#   3669#   3670#   3671    3754#   3755#
```

```
                    3756*  3757   4786*  4787*  4788*  4789   4895*  4896*  4897*  4898   5007*  5008*  5009*
                    5010   5118*  5119*  5120*  5121   5229*  5230*  5231*  5232   5340*  5341*  5342*  5343
                    5538*  5539*  5540*  5541   5737*  5738*  5739*  5740   5761*  5762*  5763*  5764   5875*
                    5876*  5877*  5879   5901*  5902*  5903*  5904   6017*  6018*  6019*  6020   6042*  6043*
                    6044*  6045   6158*  6159*  6160*  6161   6184*  6185*  6186*  6187   6327*  6328*  6329*
                    6330   6448*  6449*  6450*  6451
LOOP    003276      2167*  6525
MA    = 000014      3125*
MAB   = 000015      3232*
MABDON  010030      3258   3274   3280   3295*
MABRR0  007640      3242   3260*
MABRR1  007650      3263*
MABRR2  007666      3268*  3277   3279
MABRR3  007722      3266   3276*
MABRR4  007744      3261   3282*
MABR15  007652      3264*  3293
MAB2    007622      3254*
MADONE  007522      3192   3214*
MAERR   007436      3133   3194*
MAERR1  007460      3199   3204*
MAINT = 177750      1393*  2262   2305*  2306   3143   3245   3320   3405   3489   3576   3657   3749   3840
                    3939   4038   4137   4236   4335   4434   4533   4668   4782   4893   5004   5115   5236
                    5337   5535   5610   5675   5734   5758   5872   5898   6014   6039   6155   6181   6293
                    6306   6404   6427   7090*
MANFLG  030744      2264*  2315*  3179*  5914*  6030*  6171*  6197*  7135   7155*
MANFL2  030760      3188*  3210*  3257*  3291*  3340*  3378*  3424*  3462*  3511*  3549*  3597*  3635*  3685*
                    3723*  3771*  3809*  3870*  3908*  3969*  4007*  4069*  4106*  4167*  4205*  4266*  4304*
                    4365*  4403*  4464*  4502*  4563*  4601*  4687*  4708*  4800*  4838*  4912*  4950*  5023*
                    5061*  5134*  5172*  5245*  5283*  5356*  5394*  5750*  5774*  5898*  6355*  7161*
MAPHO = 170202      1632*
MAPH00= 170202      1568*  1632   5449*
MAPH01= 170206      1570*  1634
MAPH02= 170212      1572*  1636
MAPH03= 170216      1574*  1638
MAPH04= 170222      1576*  1640
MAPH05= 170226      1578*  1642
MAPH06= 170232      1580*  1644
MAPH07= 170236      1582*  1646
MAPH1 = 170206      1634*
MAPH10= 170242      1584*
MAPH11= 170246      1586*
MAPH12= 170252      1588*
MAPH13= 170256      1590*
MAPH14= 170262      1592*
MAPH15= 170266      1594*
MAPH16= 170272      1596*
MAPH17= 170276      1598*
MAPH2 = 170212      1636*
MAPH20= 170302      1600*
MAPH21= 170306      1602*
MAPH22= 170312      1604*
MAPH23= 170316      1606*
MAPH24= 170320      1608*
MAPH25= 170326      1610*
MAPH26= 170332      1612*
MAPH27= 170336      1614*
```

```
MAPH3 = 170216           1638#
MAPH30= 170342           1616#
MAPH31= 170346           1618#
MAPH32= 170352           1620#
MAPH33= 170356           1622#
MAPH34= 170362           1624#
MAPH35= 170366           1626#
MAPH36= 170372           1628#
MAPH37= 170376           1630#
MAPH4 = 170222           1640#
MAPH5 = 170226           1642#
MAPH6 = 170232           1644#
MAPH7 = 170236           1646#
MAPL0 = 170200           1631#
MAPL00= 170200           1567#   1631    4650    4765    4873    4985    5096    5207    5318    5448#   5853    5993    6134
MAPL01= 170204           1569#   1633
MAPL02= 170210           1571#   1635
MAPL03= 170214           1573#   1637
MAPL04= 170220           1575#   1639
MAPL05= 170224           1577#   1641
MAPL06= 170230           1579#   1643
MAPL07= 170234           1581#   1645
MAPL1 = 170204           1633#
MAPL10= 170240           1583#
MAPL11= 170244           1585#
MAPL12= 170250           1587#
MAPL13= 170254           1589#
MAPL14= 170260           1591#
MAPL15= 170264           1593#
MAPL16= 170270           1595#
MAPL17= 170274           1597#
MAPL2 = 170210           1635#
MAPL20= 170300           1599#
MAPL21= 170304           1601#
MAPL22= 170310           1603#
MAPL23= 170314           1605#
MAPL24= 170320           1607#
MAPL25= 170324           1609#
MAPL26= 170330           1611#
MAPL27= 170334           1613#
MAPL3 = 170214           1637#
MAPL30= 170340           1615#
MAPL31= 170344           1617#
MAPL32= 170350           1619#
MAPL33= 170354           1621#
MAPL34= 170360           1623#
MAPL35= 170364           1625#
MAPL36= 170370           1627#
MAPL37= 170374           1629#
MAPL4 = 170220           1639#
MAPL5 = 170224           1641#
MAPL6 = 170230           1643#
MAPL7 = 170234           1645#
MA1     007336           3145    3148#   3191
MA2     007354           3170#
MA2     007402           3173    3181#
```

```
MA4     007426          3182    3190*   3212
MB    = 000016          3308*
MBDONE  010346          3341    3360    3366    3381*
MBERRO  010146          3318    3343*
MB1     010120          3322    3329*
MB2     010124          3331*
MB3     010130          3336*
MC    = 000017          3393*
MCDONE  010662          3425    3444    3450    3465*
MCERRO  010462          3403    3427*
MC1     010434          3407    3414*
MC2     010440          3416*
MC3     010444          3420*
MD    = 000020          3477*
MDDONE  011202          3512    3531    3537    3552*
MDERRO  011002          3487    3514*
MD1     010752          3491    3499*
MD2     010756          3501*
MD3     010764          3507*
ME    = 000021          3564*
MEDONE  011522          3598    3617    3623    3638*
MEERRO  011322          3574    3600*
MEMERR= 177744          1391*   2250    2349*   3198    3204    3260    3264*   3265    3271    3289    3343    3349*   3350
                        3356    3375    3427    3433*   3434    3440    3459    3514    3520*   3521    3527    3546    3600
                        3606*   3607    3613    3632    3698    3694*   3695    3701    3720    3774    3780*   3781    3787
                        3806    3873    3879*   3880    3886    3905    3972    3978*   3979    3985    4004    4071    4077*
                        4078    4084    4103    4170    4176*   4177    4183    4202    4269    4275*   4276    4282    4301
                        4368    4374*   4375    4381    4400    4467    4473*   4474    4480    4499    4566    4572*   4573
                        4579    4598    4695    4706    4715*   4716    4722    4803    4809*   4810    4816    4835    4915
                        4921*   4922    4928    4947    5026    5032*   5033    5039    5058    5137    5143*   5144    5150
                        5169    5248    5254*   5255    5261    5280    5359    5365*   5366    5372    5391    5471    5481
                        5490*   5491    5497    5562    5627    5692    5781    5788    5798*   5799    5805    5921    5928
                        5938*   5939    5945    6062    6069    6079*   6080    6086    6204    6211    6221*   6222    6228
                        6336    6343*   6347    6354*   6457    6464*   6468    6475*   6644*   7053    7059    7094*
ME1     011272          3578    3586*
ME2     011276          3588*
ME3     011304          3593*
MF    = 000022          3650*
MFDONE  012036          3686    3705    3711    3726*
MFERRO  011636          3655    3688*
MF1     011604          3666    3673*
MF2     011616          3659    3679*
MF3     011620          3681*
MG    = 000023          3738*
MGDONE  012356          3772    3791    3797    3812*
MGERRO  012156          3750    3774*
MG1     012124          3752    3759*
MG2     012132          3762*
MG3     012140          3767*
MH    = 000024          3828*
MHDONE  012722          3871    3890    3896    3911*
MHERRO  012522          3838    3873*
MH1     012502          3844    3860*
MH2     012504          3866*
MI    = 000025          3927*
MIDONE  013266          3970    3989    3995    4010*
```

```
MIERRO  013066          3937    3972*
MI1     013046          3943    3959*
MI2     013050          3965*
MJ    = 000026          4026*
MJDONE  013532          4069    4088    4094    4109*
MJERRO  013432          4036    4071*
MJ1     013412          4042    4058*
MJ2     013414          4064*
MK    = 000027          4125*
MKDONE  014176          4168    4187    4193    4208*
MKERRO  013776          4135    4170*
MK1     013756          4141    4157*
MK2     013760          4163*
ML    = 000030          4224*
MLDONE  014542          4267    4286    4292    4307*
MLERRO  014342          4234    4269*
ML1     014322          4240    4256*
ML2     014324          4262*
MMDES   031132          6952    7229*
MMESRS  031746          7208    7426*
MMRFLG  030740          2252*   3273*   3359*   3443*   3530*   3616*   3704*   3790*   3889*   3988*   4087*   4186*   4285*
                        4384*   4483*   4582*   4724*   4819*   4931*   5042*   5153*   5264*   5375*   5499*   5808*   5948*
                        6089*   6231*   7121    7153*
MMRFL2  030754          3292*   3379*   3463*   3550*   3636*   3724*   3810*   3909*   4008*   4107*   4206*   4305*   4404*
                        4503*   4602*   4839*   4951*   5062*   5173*   5294*   5395*   5483*   7159*
MMRO  = 177572          1416*   1420    3347*   3431*   3518*   3604*   3692*   3778*   3877*   3976*   4075*   4174*   4273*
                        4372*   4471*   4570*   4665*   4713*   4780*   4807*   4888*   4919*   5000*   5030*   5111*   5141*
                        5222*   5252*   5333*   5363*   5443*   5488*   5796*   5895*   5936*   6011*   6034*   6077*   6152*
                        6178*   6219*   7091*   7389
MMR1  = 177574          1417*   1421
MMR2  = 177576          1418*   1422
MMR3  = 172516          1419*   1423    3348*   3432*   3519*   3605*   3693*   3779*   3878*   3977*   4076*   4175*   4274*
                        4373*   4472*   4571*   4664*   4714*   4779*   4808*   4887*   4920*   4999*   5031*   5110*   5142*
                        5221*   5253*   5332*   5364*   5442*   5489*   5797*   5894*   5937*   6010*   6035*   6078*   6151*
                        6177*   6220*   7092*
MMSKIP= 104422          4633    4757    4866    4978    5083    5200    5311    5425    5846    5986    6127    6952*
MMVEC = 000250          1384*
MN    = 000031          4323*
MNRNG   033301          7139    7583*
MO    = 000032          4422*
MODONE  015452          4465    4484    4490    4505*
MOERRO  015252          4432    4467*
MONF    031130          2167*   7202*   7217*
MONTTY  031126          2170*   7209    7215*
MO1     015232          4438    4454*
MO2     015234          4460*
MP    = 000033          4521*
MPDONE  016016          4564    4583    4589    4604*
MPERRO  015616          4531    4566*
MP1     015576          4537    4553*
MP2     015600          4559*
MQ    = 000043          5414*
MQDONE  022242          5465    5500    5507*
MQERR   022036          5446    5467*
MQ1     022016          5461*
MQ2     022052          5468    5471*
```

```
MQ3     022140          5472    5486*
MQ4     022142          5484    5488*
MQ5     022166          5494*   5503    5505
MQ6     022222          5492    5502*
MR    = 000034          4623*
MRDONE  016446          4688    4725    4732*
MRERRO  016240          4634    4690*
MR1     016220          4684*
MR2     016252          4692    4695*
MR3     016342          4696    4711*
MR4     016346          4709    4713*
MR5     016372          4719*   4729    4730
MR6     016426          4717    4727*
MS    = 000035          4747*
MSDONE  017066          4801    4820    4826    4841*
MSERRO  016666          4758    4803*
MSIZER  031154          6953    7245*
MS1     016640          4784    4791*
MS2     016644          4793*
MS3     016650          4796*
MT    = 000036          4856*
MTA1C1  033670          7633*
MTA11   032136          7453*
MTA120  033775          7646*   9106
MTA124  034256          7688*   9128
MTA126  034350          7700*   9135
MTA131  034430          7711*   9144
MTA134  034573          7732*   9153
MTA135  034627          7738*   9157
MTA17   032203          7461*   7484
MTA20   032237          7470*
MTA21   032246          7473*
MTA43   032333          7486*
MTA45   032406          7495*
MTA5    032054          7443*
MTA50   032464          7507*
MTA77   033512          7610*   9098
MTB120  034025          7652*   9109
MTB126  034376          7705*   9135
MTB131  034512          7721*   9146
MTB135  034657          7744*   9157
MTB17   032210          7463*
MTB21 = 032203          7484*
MTB45   032434          7500*
MTB77   033526          7613*   9098
MTC120  034055          7658*   9111
MTC131  034545          7727*   9146
MTC135  034701          7749*   9159
MTC17   032230          7467*
MTC45   032451          7504*
MTC77   033570          7620*   9098
MTDONE  017512          4913    4932    4938    4953*
MTD120  034105          7663*   9113
MTD135  034735          7755*   9159
MTD77   033625          7626*   9101
MTERRC  017312          4889    4915*
```

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MTE120   034135      7669#   9115
MTF120   034165      7675#   9117
MTG120   034215      7691#   9106    9109    9111    9113    9115    9117
MT1      017362      4893    4901#
MT2      017374      4909#
MU     = 000037      4968#
MUDONE   020132      5024    5043    5049    5064#
MUERRO   017732      5001    5026#
MU1      017706      5005    5013#
MU2      017714      5019#
MV     = 000040      5079#
MVDONE   020552      5135    5154    5160    5175#
MVERRO   020352      5112    5137#
MV1      020326      5116    5124#
MV2      020334      5130#
MW     = 000041      5190#
MWDONE   021172      5246    5265    5271    5296#
MWERRO   020772      5223    5249#
MW1      020746      5227    5235#
MW2      020754      5241#
MY     = 000042      5301#
MYDONE   021612      5357    5376    5382    5397#
MYERRO   021412      5334    5359#
MY1      021366      5338    5346#
MY2      021374      5352#
NCM1   = 000014      1664#   2439    3141    3246    3321    3406    3490    3577    3652    3751    4667    4890    5531
                     5729    5867    6007    6148    6272    6393
NIMC   = 000014      1663#   1664    4793
NA     = 000047      5719#
NADONE   023402      5751    5775    5809    5816#
NA1      023104      5735    5742#
NA10     023362      5800    5811#
NA2      [illegible] 5744#   5783    5799
NA3      [illegible] 5732    5754#
NA4      [illegible] 5759    5766#
NA5      [illegible] 5768#
NA6      023212      5756    5778#
NA7      023236      5782    5786#
NA8      023302      5794    5796#
NA9      023326      5802#   5812    5814
NB     = [illegible] 5835#
NBDONE   024072      5889    5915    5949    5956#
NB01     023750      5873    5880#
NB010    024052      5940    5951#
NB02     023564      5882#   5923    5929
NB03     023612      5870    5892#
NB04     023650      5899    5906#
NB05     023654      5908#
NB06     023702      5896    5919#
NB07     023726      5922    5926#
NB08     023772      5924    5936#
NB09     024016      5942#   5952    5954
NC     = 000051      5976#
NCDONE   024572      6031    6056    6090    6097#
NC1      024264      6015    6022#
NC10     024552      6081    6092#
```

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N02         024270       6024#   6064    6070
N03         024316       6012    6034#
N04         024350       6043    6047#
N05         024354       6049#
N06         024402       6037    6059#
N07         024436       6063    6067#
N08         024472       6065    6077#
N09         024516       6083#   6093    6095
[illegible] =[illegible] 6117#
[illegible]NE [illegible] 6172  6198    6232    6239#
[illegible] 024764       6156    6163#
[illegible] 025256       6223    6234#
[illegible] 0247[illegible] 6165# 6206  6212
[illegible] 025016       6153    6175#
[illegible] 025054       6192    6189#
[illegible] 025060       6191#
[illegible] 025106       6179    6201#
[illegible] 025132       6205    6209#
[illegible] 025176       6207    6219#
[illegible] 025222       6225#   6235    6237
NMDONE      015106       4366    4385    4391    4406#
NMERRO      014706       4333    4368#
NM1         014666       4339    4355#
NM2         014670       4361#
NOCNO       031106       7194    7211#
PARCNT      030764       6276    6397    7172#
PC        =%000007       1302#   6276*   6397*   6503*   6506*   6516*   6520*   6529*   6736*   6743*   6750*   6754*   6755*
                         6993    7029*   7075*   7179*   7206*   7313*   7331*   7343*   7349*   [illegible] [illegible] [illegible]
PCMSG1      032512       7512#
PCMSG2      032670       7532#
PIRQ      = 177772       1273#
PIROVE    = 000240       1383#
POWERM      032005       6992    7433#
PR0       = 000000       1305#
PR1       = 000040       1306#
PR2       = 000100       1307#
PR3       = 000140       1308#
PR4       = 000200       1309#
PR5       = 000240       1310#
PR6       = 000300       1311#
PR7       = 000340       1312#
PS        = 177776       1270#   1271    2131*
PSW       = 177776       1271#   7096*
PWFVEC    = 000024       1377#   2143*   2144*   6965*   6966*   6974*   6989*   6990*
RESMON      031006       2160    7189#
RESREG    = 104414       6948#   7027    7417
RESVEC    = 000010       1372#
RSET      = 104416       3295    3381    3465    3552    3639    3726    3812    3911    4010    4103    4209    4307    4406
                         4505    4604    4732    4841    4953    5064    5175    5296    5397    5507    5555    5631    5696
                         5816    5956    6097    6239    6361    6482    6950#   7076    7190    7213    7233
R0        =%000000       1284#   1292    2172*   2176*   2205*   2207*   2211*   2215    2219*   2219    2236    2239    [illegible]
                         2250    2256    2262    2269    2302*   2303    2311    2319    2353*   2355    2361    2364    [illegible]
                         2395*   2399*   2400    2406*   2441*   2443    2454*   2456    2467*   2469    [illegible] [illegible] [illegible]
                         2554    2565*   2567    2632*   2633*   2634    2638    2725*   2726*   [illegible] [illegible] [illegible] [illegible]
                         2833*   2839    2840*   2843    2844*   2866*   2889*   2890    2899*   2902*   2903*   2904    [illegible]
                         2910    3026*   3030*   3031    3033    3037    3041    3047    3055    3057    3062    3146*   [illegible]
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                        4645*  4657*  4658*  4661*  4760*  4772*  4773*  4776*  4868*  4880*  4881*  4884*  4990*
                        4992*  4993*  4996*  5091*  5103*  5104*  5107*  5202*  5214*  5215*  5219*  5313*  5325*
                        5326*  5329*  5427*  5433*  5434*  5435*  5436*  5437*  5438*  5439*  5440*  5450*  5459
                        5592*  5593   5594   5600   5657*  5658   5659   5665   5848*  5850*  5861*  5864*  5998*
                        6000*  6001*  6004*  6129*  6141*  6142*  6145*  6273*  6288   6298   6309   6319   6356
                        6359*  6394*  6409   6419   6430   6440   6477   6479*  6513*  6517*  6520   6667   6692*
                        6721   6722*  6723   6726*  6962   6872*  6876   6892   6893   6906*  6926   6927*  6928
                        6929*  6930*  6931*  6967   6989*  7017*  7021   7031*  7033*  7035*  7053*  7054   7056*
                        7057   7174   7189*  7192*  7193   7245   7247*  7248*  7249*  7252*  7253*  7255*  7258
                        7259   7262*  7271   7272*  7273*  7279*  7280*  7281*  7292   7288   7295   7298*  7299
                        7304   7310   7320   7327   7333   7340   7346   7360*  7366*  7391*  7392*  7393*  7400*
                        7402
R1        =%000001      1285#  1293   2173*  2175*  2204*  2206*  2306*  2307   2312   2354*  2357   2362   2400*
                        2403   2410   2442*  2444*  2455*  2457*  2469*  2470*  2539*  2541*  2553*  2555*  2566*
                        2568*  2634*  2635*  2636   2644   2645   2669   2727*  2728*  2729   2737   2738   2762
                        2823*  2827   2834*  2845*  2870*  2891*  2892   2898*  2908*  2910   3031*  3032*  3086
                        3098   3095   3143*  3149*  3150   3151*  3156   3172   3331   3416   3501   3598   3679
                        3762   4653*  4654*  4655   4768*  4769*  4770   4793   4876*  4877*  4879   4903   4988*
                        4989*  4990   5099*  5100*  5101   5210*  5211*  5212   5321*  5322*  5323   5428*  5431
                        5546   5744   5769   5856*  5857*  5858   5892   5908   5996*  5997*  5998   6024   6049
                        6137*  6138*  6139   6165   6191   6287*  6288*  6290   6308*  6309*  6312   6408*  6409*
                        6411   6429*  6430*  6433   6658   6691*  6863   6876*  6877   6891   6905*  6968   6987*
                        7013*  7017   7018*  7030*  7032*  7034*  7172*  7174   7177*  7198*  7200   7246   7250*
                        7254*  7261*  7294   7295*  7301   7305   7312   7322   7329   7335   7348   7361   7365*
                        7384*  7395   7397*  7398*  7399*  7406
R10       =%000000      1292#
R11       =%000001      1293#
R12       =%000002      1294#
R13       =%000003      1295#
R14       =%000004      1296#
R15       =%000005      1297#
R2        =%000002      1286#  1294   2174*  2175   2396*  2399   2401   2405*  2409   2449*  2462*  2475*  2483
                        2488   2493   2546*  2547   2560*  2561   2573*  2574   2581   2586   2591   2638*  2639*
                        2640   2657   2659   2691   2731*  2732*  2733   2750   2751   2774   2824*  2829   2832*
                        2837*  2841*  2874*  2893   2900*  2905*  2909*  2913*  3033*  3034*  3096   3098   3097
                        3150*  3181   3186   3245*  3249*  3250*  3320*  3330*  3334*  3405*  3415*  3418*  3499*
                        3500*  3504*  3576*  3587*  3590*  3657*  3674*  3675   3676*  3750*  3764*  3840*  3859*
                        3860*  3939*  3958*  3959*  4038*  4057*  4058*  4137*  4156*  4157*  4236*  4255*  4256*
                        4335*  4354*  4355*  4434*  4453*  4454*  4533*  4552*  4553*  4647*  4652*  4662*  4668*
                        4670*  4672*  4762*  4767*  4777*  4782*  4792*  4794*  4970*  4975*  4985*  4992*  4902*
                        4904*  4982*  4987*  4997*  5004*  5014*  5015*  5093*  5098*  5109*  5115*  5125*  5126*
                        5204*  5209*  5219*  5226*  5236*  5237*  5315*  5320*  5330*  5337*  5347*  5348*  5409*
                        5431*  5535*  5544*  5552*  5610*  5612*  5613*  5675*  5677*  5679*  5734*  5743*  5745*
                        5759*  5767*  5769*  5850*  5855*  5965*  5872*  5891*  5893*  5899*  5907*  5909*  5990*
                        5995*  6005*  6014*  6023*  6025*  6039*  6049*  6050*  6131*  6136*  6146*  6155*  6164*
                        6166*  6181*  6190*  6192*  6277   6283*  6289*  6293*  6294*  6306*  6311*  6314*  6315*
                        6398   6404*  6410*  6414*  6415*  6427*  6432*  6435*  6436*  6669   6690*  6864   6875*
                        6879*  6892   6889*  6890*  6891   6896*  6904*  6969   6986*  7019*  7020   7021*  7036*
                        7037*  7173*  7176*  7199*  7200*  7403*  7404*  7407*  7409
R3        =%000003      1287#  1295   2401*  2402*  2403   2411   2654*  2655*  2656   2663   2678*  2679*  2680
                        2686   2747*  2748*  2749   2756   2771*  2772*  2773   2779   2879*  2894   2901*  2904*
                        4648*  4660*  4763*  4775*  4871*  4983*  4983*  4995*  5094*  5106*  5205*  5217*  5316*
                        5328*  5430*  5432*  5851*  5863*  5991*  6003*  6132*  6144*  6515*  6670   6699*  6803
                        6812*  6818*  6819*  6822*  6827*  6828*  6929   6929*  6965   6873*  6874*  6888*  6891*
                        6900*  6901*  6903*  6970   6985*  7016*  7029*  7036   7191*  7203   7402*  7405*  7410
R4        =%000004      1288#  1296   2882*  2895   3144*  3149   3176   3181   3185   3190*  3244*  3249   3255
```

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                        3319*  3330   3337   3404*  3415   3421   3498*  3500   3508   3575*  3587   3594   3656*
                        3674   3692   3748*  3749*  3760   3769   3839*  3959   3967   3938*  3958   3966   4037*
                        4057   4065   4136*  4156   4164   4235*  4255   4263   4334*  4354   4362   4433*  4453
                        4461   4532*  4552   4560   4649*  4653   4657   4659*  4764*  4768   4772   4774*  4791*
                        4792   4797   4872*  4876   4980   4982*  4891*  4902   4909   4984*  4988   4992   4994*
                        5003*  5014   5020   5095*  5099   5103   5105*  5114*  5125   5131   5206*  5210   5214
                        5216*  5225*  5236   5242   5317*  5321   5325   5327*  5336*  5347   5353   5534*  5544
                        5609*  5612   5674*  5677   5733*  5743   5757*  5767   5852*  5856   5860   5962*  5871*
                        5981   5897*  5907   5992*  5996   6000   6002*  6013*  6023   6033*  6049   6133*  6137
                        6141   6143*  6154*  6164   6180*  6190   6292*  6299   6305*  6311   6403*  6410   6426*
                        6432   6671   6698*  6804   6806*  6807*  6808*  6809   6810*  6824   6826*  6834*  6837*
                        6971   6984*  7015*  7022*  7197*  7201*
R5     =%000005         1289#  1297   2947*  2966   2970   2974   2979   2982   2986*  2996   3090*  3091*  3092
                        3172*  3177   3659*  3675   3844*  3845   3946   3852   3943*  3944   3945   3951   4042*
                        4043   4044   4050   4141*  4142   4143   4149   4240*  4241   4242   4248   4339*  4340
                        4341   4347   4438*  4439   4440   4446   4537*  4538   4539   4545   4650*  4655*  4656*
                        4765*  4770*  4771*  4973*  4978*  4979*  4985*  4990*  4991*  5096*  5101*  5102*  5207*
                        5212*  5213*  5318*  5323*  5324*  5953*  5958*  5959*  5993*  5998*  5999*  6134*  6139*
                        6140*  6672   6687*  6805   6811*  6813*  6915*  6916*  6817*  6919   6836*  6966   6963*
                        6870*  6877*  6891*  6896   6902*  6972   6983*  7014*  7020*  7025*  7026
R6     =%000006         1290#  1298   2132*  2133*  2134
R7     =%000007         1291#  1302
SAVREG= 104412          6947#  7012   7383
SDPAR0= 172260          1504#
SDPAR1= 172262          1505#
SDPAR2= 172264          1506#
SDPAR3= 172266          1507#
SDPAR4= 172270          1508#
SDPAR5= 172272          1509#
SDPAR6= 172274          1510#
SDPAR7= 172276          1511#
SDPDR0= 172220          1482#
SDPDR1= 172222          1483#
SDPDR2= 172224          1484#
SDPDR3= 172226          1485#
SDPDR4= 172230          1486#
SDPDR5= 172232          1487#
SDPDR6= 172234          1488#
SDPDR7= 172236          1489#
SIPAR0= 172240          1493#
SIPAR1= 172242          1494#
SIPAR2= 172244          1495#
SIPAR3= 172246          1496#
SIPAR4= 172250          1497#
SIPAR5= 172252          1498#
SIPAR6= 172254          1499#
SIPAR7= 172256          1500#
SIPDR0= 172200          1471#
SIPDR1= 172202          1472#
SIPDR2= 172204          1473#
SIPDR3= 172206          1474#
SIPDR4= 172210          1475#
SIPDR5= 172212          1476#
SIPDR6= 172214          1477#
SIPDR7= 172216          1478#
SIZE  = 104424          6953#
```

```
SIZEHI= 177762      1402#
SIZELO= 177760      1400#   7248
SKAD    030524      2200#   2292*   2342*   2388*   2430*   2527*   3624*   2717*   2808*   3019*   3127*   3234*   3310*
                    3395*   3479*   3566*   3652*   3740*   3830*   3929*   4028*   4127*   4226*   4325*   4424*   4523*
                    4625*   4749*   4858*   4970*   5081*   5192*   5303*   5416*   5523*   5593*   5648*   5721*   5832*
                    5979*   6119*   6267*   6399*   7077    7079#   7214    7234
SKBADR  030616      6954    7112#
SKBCNR  030660      6956    7128#
SKBERR  030642      6955    7121#
SKBHMR  030714      6958    7142#
SKBMNR  030676      6957    7135#
SKIPT = 104420      3856    3955    4054    4153    4252    4351    4450    4549    5604    5669    6351#   7049    7065
                    7149
SKPBAD= 104426      2347    6954#
SKPBCN= 104432      2297    2393    2435    2532    2629    2722    2813    3024    3131    3239    3315    3400    3494
                    3571    3745    3935    3934    4033    4132    4231    4330    4429    4528    4630    4754    4863
                    4975    5096    5197    5308    5422    5528    5589    5653    5726    5843    5983    6124    6956#
SKPBER= 104430      2348    3239    3314    3399    3483    3570    3744    3334    3933    4032    4131    4230    4329
                    4428    4527    4629    4753    4862    4974    5085    5196    5307    5421    5527    5587    5652
                    5725    5842    5982    6123    6955#
SKPBHM= 104436      2436    2533    2630    2723    2814    3025    3241    3317    3402    3486    3573    3747    3837
                    3936    4035    4134    4233    4332    4431    4530    4632    4756    4865    4977    5098    5199
                    5310    5424    5530    5590    5655    5728    5845    5985    6126    6959#
SKPBMN= 104434      2298    3132    3240    3316    3401    3485    3572    3745    3836    3935    4034    4133    4232
                    4331    4430    4529    4631    4755    4964    4976    5097    5199    5309    5423    5529    5599
                    5654    5727    5844    5984    6125    6957#
SKPNG   030730      7119    7126    7133    7140    7148#
SP    =%000006      1298#   1299    1300    1301    2136*   2232    2234    2235    3207    3209    3263    3283    3294
                    3346    3369    3370    3430    3453    3454    3517    3540    3541    3603    3626    3627    3691
                    3714    3715    3777    3800    3801    3876    3899    3900    3975    3998    3999    4074    4097
                    4098    4173    4196    4197    4272    4295    4296    4371    4394    4395    4470    4493    4494
                    4569    4592    4593    4643*   4690    4699    4700    4701    4711*   4806    4829    4830    4918
                    4941    4942    5029    5052    5053    5140    5163    5164    5251    5274    5275    5362    5395
                    5385    5475    5476    5495    5557    5558    5622    5623    5697    5698    5780*   5920*   6051*
                    6203*   6342    6353    6463    6474    6510*   6552*   6555    6557    6558    6563*   6564*   6565
                    6588    6589    6593*   6624    6639*   6642*   6667*   6669*   6669*   6670*   6671*   6672*   6673*
                    6674*   6675*   6676*   6683*   6684*   6685*   6686*   6687    6698    6689    6690    6691    6692
                    6721*   6722    6723*   6725    6726    6727*   6729    6731    6733    6737    6739*   6741*   6749*
                    6753    6757    6758    6762    6795*   6796    6797    6798*   6803*   6804*   6805*   6811    6835
                    6837    6838    6839*   6840*   6862*   6863*   6864*   6965*   6966*   6867*   6968    6871*   6984
                    6866*   6888    6898    6900    6902    6903    6904    6905    6906    6909*   6909*   6926*   6927
                    6967*   6968*   6969*   6970*   6971*   6972*   6973    6979*   6993    6994    6995    6996    6997
                    6998    6993*   7013    7026*   7044    7047    7062    7063    7066    7072    7074    7099    7099*
                    7148    7232    7245*   7246*   7247    7259*   7261    7262    7271*   7275*   7294*   7301*   7306*
                    7312*   7314*   7315    7322*   7329*   7348*   7350    7365    7366    7394    7411*   7413*   7414
                    7418*
SPUR    030400      2186    2203    2295    2627    2720    2811    3022    3201    3202    3215    5419    6270    6339
                    6349    6391    6459    6470    7052#   7059    7096
SR0   = 177572      1420#
SR1   = 177574      1421#
SR2   = 177576      1422#
SR3   = 172516      1423#
SSP   =%000006      1300#
STACK = 001100      1264#   1265    1266    1267    2136    7099
START   003000      1679    2130#   6994
STKLMT= 177774      1272#
```

```
STOP    031072          7205    7207#
SUBSTK= 000700          1266#
SWR     = 177570        1274#   1275    6547#   6561    6563    6571    6578    6617    6620    6627    6631    6637    7229
SW0     = 000001        1340#
SW00    = 000001        1339#   1340
SW01    = 000002        1329#   1339
SW02    = 000004        1328#   1338
SW03    = 000010        1327#   1337
SW04    = 000020        1326#   1336
SW05    = 000040        1325#   1335
SW06    = 000100        1324#   1334
SW07    = 000200        1323#   1333
SW08    = 000400        1322#   1332
SW09    = 001000        1321#   1331
SW1     = 000002        1339#
SW10    = 002000        1320#
SW11    = 004000        1319#
SW12    = 010000        1318#
SW13    = 020000        1317#
SW14    = 040000        1316#
SW15    = 100000        1315#
SW2     = 000004        1338#
SW3     = 000010        1337#
SW4     = 000020        1336#
SW5     = 000040        1335#
SW6     = 000100        1334#
SW7     = 000200        1333#   7229
SW8     = 000400        1332#
SW9     = 001000        1331#
SYSTID= 177764          1404#
SCMCM1= 000034          1662#   2466
SCM1    = 000030        1660#   2564    2654    2736    2744    2771    2926    2928    3054    3841    3940    4237    4336
                        5002    5224    5591    5656
SIMO    = 000044        1659#   2551    2643    2651    2678    2747    2828    2925    3036    4039    4138    4435    4534
                        5113    5335
SIMCM1= 000054          1661#   2453
TAB     = 000011        1658#   7441    7446    7453    7467    7470    7476    7486    7495    7504    7507    7633    7639
                        7700    7705    7711    7721    7727    7732    8571    8695    8703    8709    8715    8720    8739
                        8744    8752    8761    8769    8774    8790    8793    8806    8911    8920    8926    8937    8944
                        8854    8863    8869    8875    8879    8886    8892    8996    8910    8922
TBITVE= 000014          1373#
TESTR1= 140000          1665#   2635    2728    2823    3032
TESTR2= 142000          1666#   2639    2732    2824    3034
TESTR3= 144000          1667#
TKVEC   = 000060        1380#   2170    2180*   2181*   7209*
TOP     003332          2168    2177#
TPVEC   = 000064        1381#
TRAPVE= 000034          1379#   2141*   2142*
TRTVEC= 000014          1374#
TST1    003402          2196#
TST10   005624          2624    2713#
TST11   006154          2717    2904#
TST12   006764          2808    2952#
TST13   007016          3015#
TST14   007262          3019    3123#
TST15   007534          3127    3230#
```

TST16	010032	3234	3306#									
TST17	010350	3310	3391#									
TST2	003756	2200	2299#									
TST20	010664	3395	3475#									
TST21	011204	3479	3562#									
TST22	011524	3566	3648#									
TST23	012040	3652	3736#									
TST24	012360	3740	3826#									
TST25	012724	3830	3925#									
TST26	013270	3929	4024#									
TST27	013634	4028	4123#									
TST3	004112	2292	2339#									
TST30	014203	4127	4222#									
TST31	014544	4226	4321#									
TST32	015110	4325	4420#									
TST33	015454	4424	4519#									
TST34	016020	4523	4621#									
TST35	016450	4626	4745#									
TST36	017070	4749	4854#									
TST37	017514	4858	4966#									
TST4	004254	2342	2383#									
TST40	020134	4970	5077#									
TST41	020554	5081	5188#									
TST42	021174	5192	5299#									
TST43	021614	5303	5412#									
TST44	022244	5416	5519#									
TST45	022420	5523	5579#									
TST46	022620	5583	5644#									
TST47	023020	5648	5717#									
TST5	004372	2388	2426#									
TST50	023404	5721	5834#									
TST51	024074	5838	5974#									
TST52	024574	5978	6115#									
TST53	025300	6119	6263#									
TST54	025654	6267	6384#									
TST55	026230	6388	6484#									
TST6	004724	2430	2523#									
TST7	005274	2527	2620#									
TVADF	031576	7330*	7342*	7369*	7387							
TVADHI	031602	7376*	7385*	7409*								
TVADLO	031600	7375*	7385*	7410*	7411							
TYPBS =	104410	6511	6946*	7307								
TYPE =	104400	2155	6509	6512	6622	6630	6734	6830	6907	6942*	6991	7117	7124	7131
		7138	7145	7195	7207	7269	7294	7296	7290	7292	7316	7336	7351	7357
		7415												
TYPOC =	104402	6943*	7276	7302										
TYPON =	104406	6945*												
TYPOS =	104404	6944*	7323											
TYPVAD	031604	7331	7343	7383*										
UA =	000054	6265*												
UAER1	025540	6281	6335*											
UAER2	025600	6303	6346*											
UATMP1	025534	6287	6299	6332*	6339									
UATMP2	025536	6309	6320	6333*	6350									
UA1	025542	6275*	6359											
UA2	025566	6279	6281*											

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CB3     025422          6296#
CB4     025442          6303#   6304    6344
CB5     025506          6317#
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CB7     025634          6279    6324    6356#
CB9     025552          6357    6361#
CB      = 000055        6386#
CBER1   026114          6402    6456#
CBER2   026154          6424    6467#
CBTMP1  026110          6408    6420    6453#   6460
CBTMP2  026112          6429    6441    6454#   6471
CC1     025716          6396#   6480
CC3     025742          6399    6402#
CC5     025776          6417#
CC4     026016          6424#   6425    6465
CC6     026062          6438#
CC8     026102          6445#
CC7     026210          6400    6445    6477#
CC9     026226          6478    6482#
UDPAR0= 177660          1460#
UDPAR1= 177662          1461#
UDPAR2= 177664          1462#
UDPAR3= 177666          1463#
UDPAR4= 177670          1464#
UDPAR5= 177672          1465#
UDPAR6= 177674          1466#
UDPAR7= 177676          1467#
UDPDR0= 177620          1438#
UDPDR1= 177622          1439#
UDPDR2= 177624          1440#
UDPDR3= 177626          1441#
UDPDR4= 177630          1442#
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UDPDR6= 177634          1444#
UDPDR7= 177636          1445#
UIPAR0= 177640          1449#
UIPAR1= 177642          1450#
UIPAR2= 177644          1451#
UIPAR3= 177646          1452#
UIPAR4= 177650          1453#
UIPAR5= 177652          1454#
UIPAR6= 177654          1455#
UIPAR7= 177656          1456#
UIPDR0= 177600          1427#
UIPDR1= 177602          1428#
UIPDR2= 177604          1429#
UIPDR3= 177606          1430#
UIPDR4= 177610          1431#
UIPDR5= 177612          1432#
UIPDR6= 177614          1433#
UIPDR7= 177616          1434#
USESTK= 000600          1267#
USP     =%000006        1301#
$BDADR  001122          1729#
$BDDAT  001126          1731#
$BELL   001300          1785#   6622    6647
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$CM1  = 000024          1743*  1744*  1745*  1746*  1747*  1748*  1749*  1750*  1751*  1752*  1753*  1754*  1755*
                        1756*  1757*  1758*  1759*  1760*  1761*  1762*  1763*
$CM2  = 000050          1743*  1744*  1745*  1746*  1747*  1748*  1749*  1750*  1751*  1752*  1753*  1754*  1755*
                        1756*  1757*  1758*  1759*  1760*  1761*  1762*  1763*
$CM3  = 000024          1741*  1743
$CM4  = 000024          1763*  1764*  1765*  1766*  1767*  1768*  1769*  1770*  1771*  1772*  1773*  1774*  1775*
                        1776*  1777*  1778*  1779*  1780*  1781*  1782*  1783*
$CRLF   001305          1787*  6630   6647   6734   6768   7270   7287   7293
$DBLK   030006          6873   6907   6915*
$DB22   030232          7012*  7313   7349   7412
$DDAGN  026344          6505   6514   6518   6524*
$DTB_   027776          6976   6911*
$ENDAD  026334          1703   2153   6520*  6634
$ENDCT  026264          2145   6507*
$ENDMG  026350          6509   6526*
$ENULL  026365          6512   6529*
$EOP    026230          6497*
$EOPCT  026256          2145*  6504*  6508
$ERFLG  001103          1720*  6537   6567   6569   6575*  6596   6614*  6647
$ERMAX  001115          1726*  2148*  6569   6591*  6596
$ERROR  026644          2139   6613*
$ERRPC  001116          1727*  6624*  6625*  6626   6647   7275   8594   9046   9049   9055   9068   9071   9074
                        9077   9092   9095   9098   9106   9120   9123   9128   9132   9135   9141   9144   9153
                        9157
$ERRTB  001310          1805*  7281
$ERTTL  001112          1724*  6623*  6647
$ESCAP  001276          1784*  2147*  6590*  6640   6642   6647
$FILLC  001150          1739*  6737   6768
$FILLS  001147          1738*  6768
$GDADR  001120          1728*
$GDDAT  001124          1730*
$GET42  026306          6513*
$HD   = 000003          1241   1242
$ICNT   001104          1721*  6582*  6583   6585*  6595
$ILLUP  030224          6965   6996*
$ITEMB  001114          1725*  6626*  6647   7073*  7273
$LF     001306          1788*  6647   6768
$LPADR  001106          1722*  2149*  6573*  6588*  6593   6595
$LPERR  001110          1723*  2150*  2212*  2299*  2350*  2397*  2439*  2452*  2465*  2536*  2550*  2563*  2817*
                        3145*  6275*  6304*  6396*  6425*  6573   6589*  6595   6639
$MXCNT  026642          6586   6595*
$NULL   001146          1737*  6739   6768
$NWTST= 000001          2189*  2191   2281*  2293   2325*  2327   2374*  2376   2418*  2420   2510*  2512   2606*
                        2608   2699*  2701   2792*  2794   2975*  2977   3002*  3004   3108*  3110   3220*  3222
                        3298*  3300   3383*  3385   3467*  3469   3554*  3556   3640*  3642   3728*  3730   3815*
                        3817   3914*  3916   4013*  4015   4112*  4114   4211*  4213   4310*  4312   4409*  4411
                        4508*  4510   4610*  4612   4734*  4736   4843*  4845   4955*  4957   5066*  5068   5177*
                        5179   5288*  5290   5399*  5401   5509*  5511   5569*  5571   5634*  5636   5702*  5704
                        5819*  5821   5959*  5961   6100*  6102   6242*  6244   6363*  6365
$OCNT   027566          6802*  6831*  6844*
$OCTVL  030334          7014   7039*
$OMODE  027570          6797*  6801*  6806   6809*  6820*  6946*
$OVER   026626          6548   6566   6574   6584   6592*
$PASS   001100          1718*  6501*  6502*  6510   6526   6580   6596
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$PWRDN  030076            2143    6965#   6989
$PWRMG  030214            6992#
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$QUES   001204            1796#   5647
$RDCHR= ****** U          6947
$RDDEC= ****** U          6947
$RDLIN= ****** U          6947
$RDOCT= ****** U          6947
$REGAD  001152            1741#
$REG0   001154            1743#
$REG1   001156            1744#
$REG10  001174            1751#
$REG11  001176            1752#
$REG12  001200            1753#
$REG13  001202            1754#
$REG14  001204            1755#
$REG15  001206            1756#
$REG16  001210            1757#
$REG17  001212            1758#
$REG2   001160            1745#
$REG20  001214            1759#
$REG21  001216            1760#
$REG22  001220            1761#
$REG23  001222            1762#
$REG3   001162            1746#
$REG4   001164            1747#
$REG5   001166            1748#
$REG6   001170            1749#
$REG7   001172            1750#
$RESRE  027072            6682#   6948
$SAVRE  027034            6666#   6947
$SAVR6  030230            6973*   6979    6980*   6981*   6998#
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$STUP = 177777            1652#
$SVLAD  026600            6556    6587#
$SVPC = 000204            1701#   1706
$SWR  = 167400            1241    1242#   1243#   1251    1252    1253    1254    1255    1256    1257    1783    1794    1795
                          2146    2147    2149    2150    2197    2290    2339    2384    2427    2524    2621    2714    2805
                          2993    3016    3124    3231    3307    3392    3476    3563    3649    3737    3827    3926    4025
                          4124    4223    4322    4421    4520    4622    4746    4855    4967    5078    5189    5300    5413
                          5520    5580    5645    5718    5835    5975    6116    6264    6385    6494    6500    6515    6525
                          5526    6538    6539    6540    6541    6542    6547    6559    6561    6562    6567    6569    6569
                          6576    6577    6578    6589    6592    6595    6604    6605    6606    6607    6638    6609    6617
                          6620    6627    6631    6637    6647
$SWRMK= 000200            1244#   1257    1258    6542    6543    6563    6564
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$TIMES  001274            1783#   2146*   2197*   2339*   2384*   2427*   2524*   2621*   2714*   2805*   3016*   3124*   3231*
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                          4520*   4622*   4746*   4855*   4967*   5078*   5189*   5300*   5413*   5520*   5580*   5645*   5718*
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$TKB    001140            1734#   2182*   7189    7211*
$TKS    001136            1733#   2134    2183*   7212*
$TMPO   001224            1763#   2202*   2294*   2344*   2390*   2432*   2529*   2626*   2719*   2810*   3021*   3129*   3236*
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                    4525*  4627*  4751*  4860*  4972*  5083*  5194*  5305*  5418*  5525*  5585*  5650*  5723*
                    5840*  5980*  6121*  6269*  6390*  8594   9046   9049   9052   9055   9068   9071   9074
                    9077   9092   9095   9098   9106   9120   9123   9128   9132   9135   9141   9144   9153
                    9157   9162
$TMP1   001226      1764*  2234*  2360*  3048*  3064*  3205*  3853*  3952*  4051*  4150*  4249*  4348*  4447*
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$TMP10  001244      1771*  2636*  2729*  9092   9098
$TMP11  001246      1772*  2637*  2730*
$TMP12  001250      1773*  2640*  2733*  3095   9101
$TMP13  001252      1774*  2641*  2734*
$TMP14  001254      1775*
$TMP15  001256      1776*
$TMP16  001260      1777*
$TMP17  001262      1778*
$TMP2   001230      1765*  2311*  2319*  2361*  2409*  2483*  2488*  2493*  2581*  2586*  2591*  2650*  2674*
                    2685*  2743*  2767*  2778*  2967*  3047*  3063*  3095*  3176*  3185*  3206*  3255*  3269*
                    3283*  3337*  3354*  3369*  3421*  3438*  3453*  3508*  3525*  3540*  3594*  3611*  3626*
                    3682*  3699*  3714*  3768*  3785*  3800*  3852*  3867*  3894*  3899*  3951*  3966*  3983*
                    3998*  4050*  4065*  4082*  4097*  4149*  4164*  4181*  4196*  4248*  4263*  4280*  4295*
                    4347*  4362*  4379*  4394*  4446*  4461*  4478*  4493*  4545*  4560*  4577*  4592*  4685*
                    4700*  4720*  4797*  4814*  4829*  4909*  4926*  4941*  5020*  5037*  5052*  5131*  5148*
                    5163*  5242*  5259*  5274*  5353*  5370*  5385*  5462*  5475*  5495*  5557*  5600*  5622*
                    5665*  5687*  5748*  5772*  5787*  5803*  5886*  5912*  5927*  5943*  6028*  6053*  6069*
                    6084*  6169*  6195*  6210*  6226*  6298*  6319*  6419*  6440*  7045*  7061*  8594   9046
                    9068   9071   9074   9077   9092   9095   9098   9106   9120   9123   9132   9135   9141
                    9144   9153   9157   9162
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$TMP21  001266      1780*
$TMP22  001270      1781*
$TMP23  001272      1782*
$TMP3   001232      1766*  2236*  2312*  2362*  2410*  2651*  2663*  2675*  2686*  2744*  2756*  2768*  2773*
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                    3628*  3700*  3716*  3786*  3802*  3885*  3901*  3984*  4000*  4083*  4099*  4182*  4198*
                    4281*  4297*  4380*  4396*  4479*  4495*  4578*  4594*  4702*  4721*  4815*  4831*  4927*
                    4943*  5038*  5054*  5149*  5165*  5260*  5276*  5371*  5387*  5463*  5477*  5496*  5559*
                    5624*  5689*  5788*  5804*  5928*  5944*  6069*  6085*  6211*  6227*  6299*  6320*  6420*
                    6441*  7046*  7062*  8594   9049   9055   9068   9074   9077   9092   9095   9101   9123
                    9128   9135   9144   9153   9157   9162
$TMP4   001234      1767*  2237*  2411*  3097*  3204*  3271*  3286*  3356*  3372*  3440*  3456*  3527*  3543*
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                    4928*  4944*  5039*  5055*  5150*  5166*  5261*  5277*  5372*  5388*  5479*  5497*  5560*
                    5625*  5690*  5789*  5805*  5929*  5945*  6070*  6086*  6212*  6228*  6300*  6321*  6421*
                    6442*  7059*  9049   9077   9120   9128   9141   9153   9159
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$TN   = 003055      1241*  2199   2197*  2198   2199   2281   2290*  2291   2325   2339*  2340   2341   2374
                    2384*  2386   2387   2418   2427*  2428   2429   2510   2524*  2525   2526   2606   2621*
                    2622   2623   2699   2714*  2715   2716   2792   2805*  2906   2807   2975   2993*  3002
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                    3016*  3017   3018   3108   3124*  3125   3126   3220   3231*  3232   3233   3298   3307*
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                    3914   3926*  3927   3928   4013   4025*  4026   4027   4112   4124*  4125   4126   4211
                    4223*  4224   4225   4310   4322*  4323   4324   4409   4421*  4422   4423   4508   4520*
                    4521   4522   4610   4622*  4623   4624   4734   4746*  4747   4748   4843   4855*  4856
                    4857   4955   4967*  4968   4969   5066   5078*  5079   5080   5177   5189*  5190   5191
                    5288   5300*  5301   5302   5399   5413*  5414   5415   5509   5520*  5521   5522   5569
                    5580*  5581   5582   5634   5645*  5646   5647   5702   5718*  5719   5720   5219   5835*
                    5836   5837   5959   5975*  5976   5977   6100   6116*  6117   6118   6242   6264*  6265
                    6266   6363   6385*  6386   6387
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$TPFLG  001151      1740*  6717   6768
$TPS    001142      1735*  6755   6768
$TRAP   030016      2141   6926*
$TRP  = 000040      6933*  6943*  6944*  6945*  6946*  6947*  6948*  6949*  6950   6951*  6952*  6953*  6954*
                    6955*  6956*  6957*  6958*  6959*
$TRPAD  030036      6930   6941*
$TSTNM  001102      1719*  2130*  2202   2294   2344   2390   2432   2529   2626   2719   2810   3021   3129
                    3236   3312   3397   3481   3566   3654   3742   3832   3931   4030   4129   4238   4327
                    4426   4525   4627   4751   4860   4972   5083   5194   5305   5418   5525   5585   5650
                    5723   5840   5980   6121   6269   6390   6499*  6537   6565   6587*  6572   6596   6616
                    6647
$TYPBN= ****** U    6947
$TYPDS  027572      6861*  6946
$TYPE   027130      6717*  6933   6942
$TYPEC  027274      6736   6743   6750   6755*  6756
$TYPEX  027342      6761   6763   6766*
$TYPOC  027370      6800*  6943
$TYPON  027404      6799   6802*  6945
$TYPOS  027344      6795*  6944
$XTSTR  026376      6550*
$$GET4= 000001      6515*  6517*
$$TRP = 000002      6932*  6943   6944   6945   6946   6947   6948   6949   6951   6952   6953   6954   6955
                    6956   6957   6958   6959
$CFILL  027567      6796*  6800*  6810   6845*
.     = 057170      1671*  1675   1677*  1701   1702*  1704*  1706*  1715*  1799   2135   2149   2150   2956
                    2859*  3161   3324   3327*  3409   3412*  3493   3496*  3590   3583*  3668   3671*  3754
                    3757*  4786   4789*  4895   4898*  5007   5010*  5118   5121*  5229   5232*  5340   5343*
                    5538   5541*  5737   5740*  5761   5764*  5875   5878*  5901   5904*  6017   6020*  6042
                    6045*  6158   6161*  6184   6187*  6327   6330*  6448   6451*  6526   6530   6595   6596
                    6647   6768   6915*  6976   6997   7039*  8593*  9042*  9166*
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B01

CROSS REFERENCE TABLE -- MACRO NAMES

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3492	3579	3667	3753	4785	4994	5006	5117	5228	5339	5537
		[illegible]	[illegible]	[illegible]	6016	6041	6157	6183	6326	6447					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2265	2271	2313	2320	2363	2412	2494	2499	2494	2532
							2745	2757	2769	2790	2969	3049	3065	3100	3178
							3358	3377	3423	3442	3461	3510	3529	3548	3596
							3789	3809	3854	3969	3899	3907	3953	3968	3997
							4166	4195	4204	4250	4265	4294	4303	4349	4364
							454?	4562	4591	4600	4686	4693	[illegible]	4723	4799
							5041	5060	5133	5152	5171	5244	5263	5282	5355
					5498	5563	5602	5629	5667	5694	5749	5773	5794	5807	5897
					6054	6075	6089	6170	6196	6217	6230	6301	6322	6422	6443
[illegible]	[illegible]	[illegible]	2699												
		3342	3426	3513	3599	3687	3773	3872	3971	4070	4169	4268	4367	4466	4565
		[illegible]	[illegible]	5126	5247	5359									
		[illegible]	[illegible]	3506	3592	3690	3766	3865	3964	4063	4162	4261	4360	4459	4558
		[illegible]	[illegible]	5129	5240	5351									
[illegible]	[illegible]	3829	3928	4027	4126	4225	4324	4423	4522						
[illegible]	[illegible]	4959	5080	5191	5302										
[illegible]	[illegible]	4857													
[illegible]	2188#	2191	2281#	2283	2373#	2376	2417#	2420	2510#	2512	2606#	2608	2699#	2701	2792#
	2794	3002#	3004	3108#	3110	3219#	3222	3298#	3300	3383#	3385	3467#	3469	3554#	3556
	3640#	3642	3728#	3730	3815#	3917	3914#	3916	4013#	4015	4112#	4114	4211#	4213	4310#
	4312	4409#	4411	4509#	4510	4610#	4612	4734#	4736	4843#	4845	4955#	4957	5066#	5068
	5177#	5179	5288#	5290	5399#	5401	5509#	5511	5569#	5571	5634#	5636	5702#	5704	5819#
	5821	5959#	5961	6100#	6102	6242#	6244	6363#	6365						
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[illegible]	5701#	5831	5969	6110	6112										
[illegible]	2605#	2608	2701												
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[illegible]	2975#	2977													
[illegible]	6402#	8444	6486	8529											
[illegible]	4607#	4612	4736	4845	4957	5068	5179	5290							

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MSG33    4609#   4957    5068    5179    5290
MSG66    2325#   2327
MSG88    5557#   5571    5636
MSG99    5699#   5714    5821    5961    6102
NULL        1#   1650#
NEWTST      1#   1650#   2189    2291    2325    2374    2418    2510    2606    2699    2792    2975    3002    3108    3220
         3298    3383    3467    3554    3640    3728    3815    3914    4013    4112    4211    4310    4409    4508    4610
         4734    4943    4955    5066    5177    5288    5399    5509    5569    5634    5702    5819    5959    6100    6242
         6363
NMAC1    1200#   5731    5754    5869    6036
NMAC2    1201#   5892    6009    6150    6175
NMAC3    1202#   5778    5918    6059    6201
POP         1#   1650#   6697    6902    6983
PUSH        1#   1650#   6667    6861    6967
[illegible] 1224#
SCOPE    1269#   2196    2289    2338    2383    2426    2523    2620    2713    2804    2992    3015    3123    3230    3306
         3391    3475    3562    3649    3736    3826    3925    4024    4123    4222    4321    4420    4519    4621    4745
         4854    4966    5077    5188    5299    5412    5519    5579    5644    5717    5834    5974    6115    6263    6384
         6499
SETMAP   1211#   4644    4759    4967    4975    5090    5201    5312    5847    5987    6129
SETMM    1214#   5426
SETTRA   6933#   6943    6944    6945    6946    6947    6948    6950    6951    6952    6953    6954    6955    6956    6957
         6958
SETUP       1#   1650#   2131
SKBREX   1204#   2296    2346    2392    2434    2531    2628    2721    2912    3023    3130    3237    3313    3392    3482
         3569    3743    3833    3932    4031    4130    4229    4328    4427    4525    4629    4752    4851    4973    5094
         5195    5306    5420    5526    5596    5651    5724    5941    5991    6122    6271    6392
SKIP        1#   1650#
SLASH       1#   1650#
SPACE    1650#
SSLAD    1219#   2199    2291    2341    2387    2429    2526    2623    2716    2807    3019    3126    3233    3309    3394
         3478    3565    3651    3739    3829    3928    4027    4126    4225    4324    4423    4522    4624    4748    4857
         4969    5080    5191    5302    5415    5522    5582    5647    5720    5837    5977    6118    6256    6397
STARS       1#   1650#   1681    1708    1789    2189    2195    2291    2298    2325    2337    2374    2392    2418    2425
         2510    2522    2606    2619    2699    2712    2792    2903    2975    2991    3002    3014    3109    3122    3220
         3229    3298    3305    3383    3390    3467    3474    3554    3561    3640    3647    3729    3735    3815    3925
         3914    3924    4013    4023    4112    4122    4211    4221    4310    4320    4409    4419    4508    4519    4610
         4620    4734    4744    4943    4853    4955    4965    5065    5076    5177    5197    5299    5298    5399    5411
         5509    5518    5569    5579    5634    5643    5702    5716    5819    5933    5959    5973    6100    6114    6242
         6262    6363    6383    6487    6531    6597    6649    6695    6759    6949    6917    6960    7000
THIT     1220#   3042    3058    3847    3946    4045    4144    4243    4342    4441    4540    5595    5560
TCMAPO   1209#
TCPARO   1213#
TRMTRP   6933#
TSTHIT   1221#   3040    3056
TYPBIN      1#   1650#
TYPDEC      1#   1650#   6510
TYPNAM      1#   1650#   2151
TYPNUM      1#   1650#
TYPOCS      1#   1650#
TYPOCT      1#   1650#
TYPTXT      1#   1650#
UMAC1    1189#   6242    6363
UMAC2    1190#   6335    6346    6456    6467
UMAC3    1192#   6296    6317    6417    6438
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$$CMRE   1708#   1743    1744    1745    1746    1747    1748    1749    1750    1751    1752    1753    1754    1755    1756
         1757    1758    1759    1760    1761    1762
$$CMTM   1709#   1763    1764    1765    1766    1767    1768    1769    1770    1771    1772    1773    1774    1775    1776
         1777    1778    1779    1780    1781    1782
$$ESCA      1#   1650#
$$NEWT      1#   1650#   2189    2291    2325    2374    2418    2510    2606    2699    2792    2575    3002    3108    3220
         3299    3393    3467    3554    3640    3728    3815    3914    4013    4112    4211    4310    4409    4508    4610
         4734    4843    4955    5066    5177    5288    5399    5509    5569    5634    5702    5819    5959    6100    6242
         6363
$$SET    6933#   6943    6944    6945    6946    6947    6948    6950    6951    6952    6953    6954    6955    6956    6957
         6958
$$SKIP      1#   1650#
.EQUAT      1#
.HEADE      1#   1228#   1231
.KT11       1#
.SETUP      1#   1228#   1652
.SWRHI      1#   1228#   1246
.SWRLO   1258#
.$ACT1      1#   1228#   1681
.$CATC      1#   1228#   1668
.$CMTA      1#   1229#   1709
.$DB2D      1#
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.$ERRO      1#   1229#   6597
.$ERRT      1#
.$MULT      1#
.$POWE      1#   1230#   6960
.$RAND      1#
.$RCDE      1#
.$RDOC      1#
.$READ      1#
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.$SB2D      1#
.$SB2O      1#
.$SCOP      1#   1229#   6531
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.$SUPR      1#
.$TPHF      1#   1230#   6917
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ADC	7407														
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	4774	4981	4882	4993	4994	5104	5105	5215	5216	5326	5327	5790	5861	5862	5920
	6001	6002	6061	6142	6143	6203	6358	6479	5727	6798	6808	6931	7037	7281	7314
	7400	7406	7413												
ASH	4654	4769	4977	4989	5100	5211	5322	5857	5997	6138	7280				
ASHC	2902	7392	7404												
ASL	2937	2841	7177	7252	7393										
ASLB	6886														
ASR	7029														
BCC	2939	2842	6897	7179											
BEQ	2154	2304	2308	2359	2365	2368	2505	2601	2683	2776	2911	2917	2924	2995	2998
	3093	3161	3173	3182	3266	3351	3435	3522	3608	3696	3782	3891	3980	4079	4179
	4277	4376	4475	4574	4692	4696	4717	4811	4923	5034	5145	5256	5357	5472	5492
	5794	5800	5924	5940	6065	6381	6207	6223	6337	6348	6357	6458	6469	6478	6514
	6519	6562	6566	6569	6572	6581	6615	6621	6638	6641	6730	6763	6825	7024	7055
	7175	7283	7289	7352	7389	7390									
BGE	6594														
BGT	6505	6832	6895	7023											
BHI	6570														
BHIS	2432	2633	2655	2679	2726	2748	2772	2889	2891	2903	3030	6502	6564	6822	7036
	7192														
BIS	2485	2490	2495	2583	2588	2593	5532	5606	5671	6827	6828	6889	6890	7255	
BISB	2183	7212													
BIT	2228	2600	2646	2659	2670	2682	2739	2752	2763	2775	3044	3060	3092	3156	3199
	3849	3948	4047	4146	4245	4344	4443	4542	5467	5597	5662	6277	6399	6561	6571
	6578	6620	6627	6637	7054	7174	7229	7389							
BITB	6751														
BLOS	2220														
BLT	6742	6833	6878	6894											
BMI	6548	6825													
BNE	2135	2152	2168	2229	2233	2239	2245	2251	2257	2263	2269	2356	2404	2450	2463
	2476	2499	2548	2562	2575	2596	2647	2660	2671	2740	2753	2764	3045	3061	3191
	3199	3261	3277	3279	3344	3363	3365	3429	3447	3449	3515	3534	3536	3601	3620
	3622	3699	3708	3710	3775	3794	3796	3950	3974	3993	3995	3949	3973	3992	3994
	4048	4072	4091	4093	4147	4171	4190	4192	4246	4270	4289	4291	4345	4369	4389
	4390	4444	4468	4487	4489	4543	4567	4586	4599	4728	4730	4904	4923	4825	4916
	4935	4937	5027	5046	5048	5138	5157	5159	5249	5268	5270	5360	5379	5391	5468
	5503	5505	5598	5663	5782	5812	5814	5922	5952	5954	6063	6093	6095	6205	6235
	6237	6278	6340	6351	6399	6461	6472	6579	6628	6635	6724	6732	6738	6752	6759
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	7305	7311	7321	7328	7334	7341	7347								
BPL	2921	6618	6632	6718	6756	6821	6869	6899							
BR	2156	2242	2248	2254	2260	2266	2272	2316	2407	2414	2496	2491	2594	2589	2598
	2677	2691	2770	2784	2836	2848	2863	2867	2871	2875	2879	2993	3101	3192	3212
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	3512	3531	3537	3551	3578	3598	3617	3623	3637	3666	3696	3705	3711	3725	3752
	3772	3791	3797	3811	3871	3890	3896	3910	3970	3989	3995	4009	4069	4089	4094
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	4913	4932	4938	4952	5005	5024	5043	5049	5063	5116	5135	5154	5160	5174	5227
	5246	5265	5271	5285	5338	5357	5376	5382	5396	5465	5494	5500	5536	5554	5615
	5680	5735	5751	5759	5775	5809	5873	5889	5899	5915	5949	6015	6031	6040	6056
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	7303	7308	7318	7326	7332	7338	7344	7353	7363						

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        6812  6822  6875  6980  7019  7090  7091  7092  7093  7095  7096  7173  7191  7211  7249
        7252  7342  7386  7391  7403
CLRB    6555  5760  6901
CMP     2134  2153  2219  2232  2238  2244  2250  2256  2262  2268  2355  2357  2364  2367  2403
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        3991  3933  4071  4074  4090  4092  4170  4173  4189  4191  4269  4272  4288  4290  4363
        4371  4387  4389  4467  4470  4486  4488  4566  4569  4585  4587  4690  4695  4699  4701
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        5140  5156  5158  5248  5251  5267  5269  5359  5362  5378  5380  5471  5486  5502  5504
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        6236  6290  6312  6336  6339  6342  6347  6350  6353  6356  6411  6433  6457  6460  6463
        6468  6471  6474  6477  6557  6583  6634  6893  7047  7063  7066  7074  7148  7193  7203
        7232  7258
CMPB    6556  5569  6729  6731  6737  6758  6762  7304  7310  7320  7327  7333  7340  7346
COM     3091
DEC     2920  6503  7022  7279
DECB    6741  6744  6820  6831
EMT     1268
HALT    1675  2274  2861  2864  2865  2868  2869  2872  2873  2876  2977  2980  2981  2894  2895
        3162  6619  6633  6636  6719  6975  6996  7210  7355
INC     2151  2167  6501  6582  6623  6826  6834  6879  6981  7025  7176  7360
INCB    6587  6614  6764
IOT     1269
JMP     1679  2223  2231  2277  2477  2576  2912  2918  2922  2926  2931  2971  3202  5469  6279
        6328  6344  6349  6359  6400  6459  6465  6470  6490  6525  7067  7077  7097  7214  7234
        7277  7297
JSR     6276  6397  6516  6520  6629  6736  6743  6750  7075  7313  7331  7343  7349  7412
MOV     2131  2132  2136  2137  2138  2139  2140  2141  2142  2143  2144  2145  2149  2150  2170
        2172  2173  2174  2175  2177  2180  2181  2185  2186  2197  2200  2203  2204  2205  2209
        2209  2211  2212  2222  2230  2234  2236  2237  2240  2246  2252  2259  2264  2270  2292
        2295  2299  2302  2306  2311  2312  2314  2315  2319  2321  2339  2342  2349  2350  2353
        2354  2360  2361  2362  2366  2369  2384  2388  2395  2397  2399  2400  2401  2409  2410
        2411  2413  2427  2430  2438  2439  2441  2442  2449  2452  2453  2454  2455  2462  2465
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        2866  2870  2874  2878  2882  2886  2890  2892  2893  2994  2895  2996  2998  2900  2901
        2904  2907  2908  2909  2925  2928  2967  2969  2970  2996  2999  3016  3019  3022  3026
        3031  3033  3036  3047  3048  3054  3063  3064  3090  3095  3097  3124  3127  3133  3141
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3143	3145	3146	3149	3150	3172	3176	3177	3179	3185	3186	3198	3201	3204	3205
3206	3207	3210	3215	3231	3234	3242	3244	3245	3246	3249	3255	3257	3264	3269
3270	3271	3273	3283	3285	3286	3287	3288	3289	3291	3292	3307	3310	3318	3319
3320	3321	3330	3337	3340	3349	3354	3355	3356	3359	3369	3371	3372	3373	3374
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ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

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RUN-TIME RATIO: 208/176=1.1
CORE USED:  36K  (71 PAGES)
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Spooler runtime 30 Seconds, 126 KCS, 882 disk reads, 6 disk writes, 218 pages