DMP-11,DMR-11, M8207 STATIC DIAG#2 AH-E229C-MC OCT 1981
M8207 CZDMQC0 FICHE 1 OF 1

```
                        .REM @

                                    IDENTIFICATION
                                    --------------

                        PRODUCT CODE:   AC-E228C-MC

                        PRODUCT NAME:   CZDMQC0 M8207 STATIC DIAG #2

                        PRODUCT DATE:   JULY 1981

                        MAINTAINER:     DIAGNOSTICS MERRIMACK

                        AUTHOR:         ED BADGER
```

TABLE OF CONTENTS

1.0 INTRODUCTION
1.1 PROGRAM ABSTRACT
1.2 HARDWARE INTRODUCTION

2.0 HARDWARE REQUIREMENTS

3.0 PRELIMINARY PROGRAM REQUIREMENTS

4.0 GENERAL PROGRAM CONSIDERATIONS
4.1 DIAGNOSTIC SUPERVISOR
4.2 EXECUTION TIME

5.0 PROGRAM LOAD MEDIA

6.0 OPERATING INSTRUCTIONS
6.1 LOADING AND STARTING PROCEDURES
6.1.1 LOADING PROCEDURES
6.1.2 STARTING PROCEDURES
6.1.3 STEPS FOR QUICK AND SIMPLE EXECUTION

6.2 INITIAL DIALOGUE

6.3 PROGRAM OPTIONS
6.3.1 START COMMAND
6.3.2 RESTART COMMAND
6.3.3 CONTINUE COMMAND
6.3.4 PROCEED COMMAND
6.3.5 ADD COMMAND
6.3.6 DROP COMMAND
6.3.7 PRINT COMMAND
6.3.8 DISPLAY COMMAND
6.3.9 FLAGS COMMAND
6.3.10 ZFLAGS COMMAND
6.3.11 CONTROL CHARACTERS
6.3.12 HARDWARE PARAMETERS
6.3.13 SOFTWARE PARAMETERS
6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

7.0 TEST DESCRIPTIONS

8.0 ERROR INFORMATION
8.1 ERROR REPORTING

1.0 INTRODUCTION

1.1 PROGRAM ABSTRACT

THIS DIAGNOSTIC WAS DESIGNED TO TEST OUT THE M8200, M8204, OR M8207 MICROPROCESSOR. IT IS THE SECOND OF TWO DIAGNOSTICS FOR THESE OPTIONS.

THE PROGRAM WAS IMPLEMENTED USING THE DIAGNOSTIC SUPERVISOR.

THROUGH DIALOGUE WITH THE OPERATOR, THE PROGRAM WILL ALLOW MODIFICATION OF DEVICE PARAMETERS, SUCH AS UNIBUS ADDRESS, VECTOR ADDRESS, AND PROCESSOR TYPE.

1.2 HARDWARE INTRODUCTION

THE M820X MICROPROCESSOR USES AN EIGHT BIT DATA PATH WITH A SIXTEEN BIT INSTRUCTION MEMORY. THE INSTRUCTION MEMORY AND DATA MEMORY ARE TWO SEPARATE MEMORIES. THE MICROPROCESSOR IS DESIGNED FOR MOVING DATA AT HIGH RATES TO WORK AS A HIGH SPEED LINK BETWEEN PROCESSORS WHEN USED WITH A LINE UNIT. THE M8200 AND M8207 HAVE PROM INSTRUCTION MEMORIES. THE M8204 HAS WRITEABLE CONTROL STORE. THE MEMORY SIZES BETWEEN ALL THREE PROCESSORS VARY ALSO.

2.0 HARDWARE REQUIREMENTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE M8207 LOGIC TESTS:

PDP-11/04,05,10.20,30,34,35,40,45,50,60, OR 70
16K MEMORY
CONSOLE TERMINAL

3.0 PRELIMINARY PROGRAM REQUIREMENTS

THE PROCESSOR AND MEMORY SHOULD BE THOROUGHLY TESTED PRIOR TO RUNNING THIS DIAGNOSTIC.

4.0 GENERAL PROGRAM CONSIDERATIONS

4.1 DIAGNOSTIC SUPERVISOR

THIS PROGRAM IS COMPATIBLE WITH THE STANDALONE DIAGNOSTIC SUPERVISOR, AND MUST BE LOADED TO BE CO-RESIDENT WITH THE

SUPERVISOR, OR BE PREVIOUSLY COMBINED WITH THE SUPERVISOR AND LOADED AS A SINGLE FILE. IN EITHER CASE, THE COMBINED PROGRAM WILL NOT EXCEED 16K OF MEMORY.

4.2 EXECUTION TIME

THE TOTAL TIME REQUIRED TO RUN THE M8207 STATIC TESTS IS ABOUT 120 SECONDS PER PASS FOR EACH UNIT.

4.3 XXDP+

THIS PROGRAM MAY BE LOADED UNDER XXDP+, AND MAY BE RUN IN DUMP MODE OR CHAIN MODE.

4.4 ACT/SLIDE

THIS PROGRAM MAY BE LOADED UNDER ACT OR SLIDE AND MAY BE RUN IN DUMP MODE OR CHAIN MODE.

4.5 APT

THIS PROGRAM MAY BE LOADED BY THE APT SYSTEM (INCLUDING APT-RD) AND RUN IN PROGRAM MODE OR SCRIPT MODE.

4.6 MEMORY MANAGEMENT

MEMORY MANAGEMENT IS NOT UTILIZED IN THIS PROGRAM. IF IT IS INSTALLED, IT IS DISABLED BY THE PROGRAM.

4.7 MEMORY PARITY OPTION

IF PARITY MEMORY IS INSTALLED, MEMORY PARITY TRAPS ARE DISABLED BY THE PROGRAM.

4.8 ERROR LOGGING

THE NUMBER OF ERRORS WHICH HAVE OCCURRED ON EACH DEVICE UNDER TEST SINCE THE LAST START OR RESTART COMMAND IS KEPT IN AN ERROR LOG. THIS LOG MAY BE PRINTED BY USING THE "PRINT" COMMAND (SEE SECTION 6.3.8).

5.0 PROGRAM LOAD MEDIA

THIS PROGRAM CAN BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR FROM ACT, SLIDE, OR APT SYSTEMS, OR FROM ANY MEDIA SUPPORTED BY XXDP+. WHEN USING THE PAPER TAPE ABSOLUTE LOADER, THE PROGRAM SHOULD BE LOADED FIRST, FOLLOWED BY THE DIAGNOSTIC SUPERVISOR. WHEN USING XXDP+,

THE DIAGNOSTIC SUPERVISOR SHOULD BE LOADED FIRST, FOLLOWED BY THE DIAGNOSTIC PROGRAM.

6.0 OPERATING INSTRUCTIONS

6.1 LOADING AND STARTING PROCEDURES

6.1.1 LOADING PROCEDURES

THIS PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER. IT MAY ALSO BE LOADED FROM ANY XXDP+ LOAD MEDIA. WHEN LOADED UNDER XXDP+, THE DIAGNOSTIC SUPERVISOR WILL BE LOADED AUTOMATICALLY.

6.1.2 STARTING PROCEDURES

THE PROGRAM STARTS AT LOCATION 200. USE STANDARD DEC PROCEDURES TO START THE PROGRAM.

6.1.3 STEPS FOR QUICK AND SIMPLE EXECUTION

THE DIAGNOSTIC CAN BE EXECUTED STANDALONE UNDER XXDP+ WITHOUT READING THE REMAINDER OF THIS DOCUMENT, AS FOLLOWS:

A) LOAD AND START DIAGNOSTIC USING RUN COMMAND
B) RECEIVE DIAGNOSTIC SUPERVISOR PROMPT (DR>)
C) ENTER STA<CR>
D) ANSWER HARDWARE AND SOFTWARE QUESTIONS
E) GET END OF PASS MESSAGES OR ERROR MESSAGES
F) TO END EXECUTION, ENTER CONTROL/C

6.2 INITIAL DIALOGUE

AFTER THE PROGRAM AND THE SUPERVISOR ARE LOADED AND THE PROGRAM IS STARTED , THE FOLLOWING IDENTIFICATION IS TYPED:

```
DRS LOADED
DIAG.  RUN-TIME SERVICES
CZDMQ-C-0
M8207 DIAG.  #2 OF 2
UNIT IS M8200,M8204,OR M8207
DR>
```

THE OPERATOR THEN PROCEEDS BY TYPING ONE OR MORE OF THE COMMANDS DESCRIBED IN THE FOLLOWING SECTION 6.3.(FOR MORE DETAILED INFORMATION, REFER TO THE DIAGNOSTIC SUPERVISOR FUNCTIONAL SPECIFICATION).

6.3 PROGRAM OPTIONS

6.3.1 START COMMAND

```
**************************************************************
STA(RT)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:
   <FLAG-LIST>/EOP:<INCR>
**************************************************************
```

6.3.1.1 TESTS SWITCH (/TESTS:<TEST-LIST>)

<TEST-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.) THAT SPECIFY THE TESTS TO BE EXECUTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS RANGE FROM 1 TO THE LARGEST TEST NUMBER IN THE DIAGNOSTIC. THEY MAY BE SPECIFIED IN ANY ORDER. TESTS WILL BE EXECUTED IN NUMERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS. ON THIS AND ALL SWITCHES, THE ANGLE BRACKETS <> ARE PUNCTUATION USED IN THE DEFINITION ONLY, AND ARE NOT TO BE TYPED BY THE OPERATOR. SEE EXAMPLE AT END OF 6.3.1.5.

6.3.1.2 PASS SWITCH (/PASS:<PASS-CNT>)

<PASS-CNT> IS A DECIMAL NUMBER INDICATING THE DESIRED NUMBER OF PASSES. A PASS IS DEFINED AS THE EXECUTION OF THE FULL DIAGNOSTIC (ALL SELECTED TESTS) AGAINST ALL UNITS SUBMITTED. THE DEFAULT IS NON-ENDING EXECUTION. IN THIS CASE EXIT FROM THE PROGRAM IS ACCOMPLISHED EITHER BY TYPING A CONTROL/C OR BY OCCURANCE OF AN ERROR WITH THE HALT ON ERROR FLAG BEING SET. THE EXIT IS A RETURN TO COMMAND MODE. SEE EXAMPLE AT END OF 6.3.1.5.

6.3.1.3 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)

<FLAG-LIST> IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE	HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED
LOE	LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR
IER	INHIBIT ERROR REPORTING
IBE	INHIBIT BASIC ERROR REPORTS
IXE	INHIBIT EXTENDED ERROR REPORTS
PRI	DIRECT ALL MESSAGES TO A LINE PRINTER
PNT	PRINT NUMBER OF TEST BEING EXECUTED
BOE	BELL ON ERROR
UAM	RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS

```
                        ISR   INHIBIT STATISTICAL REPORTS
                        IDU   INHIBIT DROPPING OF UNITS BY DIAGNOSTIC
                        LOT   LOOP ON TEST

THE FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO  0
ARE CLEARED.  A FLAG NOT SPECIFIED IS CLEARED.  IF THE FLAGS
SWITCH IS NOT GIVEN ALL FLAGS ARE CLEARED.  SEE  EXAMPLE  AT
END OF 6.3.1.5.


6.3.1.4 END OF PASS SWITCH (/EOP:<INCR>)

<INCR> IS A DECIMAL NUMBER INDICATING HOW OFTEN (IN TERMS OF
PASSES) IT IS DESIRED  THAT  THE  END  OF  PASS  MESSAGE  BE
PRINTED.   THE  DEFAULT  IS  AT  THE END OF EVERY PASS.  SEE
EXAMPLE AT END OF 6.3.1.5.


6.3.1.5 EFFECT OF START COMMAND

THE EFFECT OF THE START COMMAND IS TO INITIATE THE  HARDWARE
PARAMETER  DIALOGUE,  THE  SOFTWARE  PARAMETER DIALOGUE, AND
THEN THE DIAGNOSTIC TESTS THEMSELVES.

THE HARDWARE PARAMETER DIALOGUE COMMENCES WITH THE  QUESTION
''#  UNITS?''  TO  WHICH  THE  OPERATOR REPLIES WITH A DECIMAL
NUMBER N FROM 1 TO 16. THE TERM 'UNIT'' REFERS TO THE  DEVICE
TO WHICH THIS SERIES OF DIAGNOSTICS IS DEDICATED.  FOLLOWING
THIS ARE THE QUESTIONS WHEREBY THE P-TABLES THEMSELVES  WILL
BE  BUILT.  EACH P-TABLE IS A CORE-RESIDENT TABLE CONTAINING
ALL THE HARDWARE INFORMATION FOR  ONE  UNIT.   THE  OPERATOR
MUST  SUPPLY  N  (NUMBER OF UNITS) VALUES FOR EACH QUESTION.
HE MAY DO THIS BY GIVING ONE ANSWER  TO  EACH  QUESTION  (IN
WHICH CASE THE SERIES OF QUESTIONS WILL BE POSED N TIMES) OR
BY GIVING N VALUES, SEPARATED BY COMMAS,  TO  EACH  QUESTION
(SERIES  WILL  BE POSED ONCE).  EACH QUESTION IS FOLLOWED BY
THE RESPONSE RADIX (D FOR  DECIMAL,  B  FOR  BINARY,  O  FOR
OCTAL,  L  FOR  YES/NO) IN PARENTHESES AND THE DEFAULT VALUE
AFTER THE PARENTHESES.

FOLLOWING THE HARDWARE QUESTIONS ARE THE SOFTWARE  QUESTIONS
TO  BUILD  THE SOFTWARE TABLES, WHICH DEFINE THE MODE (QUICK
VERIFY ETC.) THAT THE DIAGNOSTIC WILL EXECUTE IN.

WHEN THE QUESTION ''# UNITS?'' IS ANSWERED, MEMORY STORAGE  IS
ALLOCATED  FOR  THE  P-TABLES, AND IF THERE IS NOT ENOUGH TO
ACCOMMODATE THEM THE MESSAGE ''TOO MANY UNITS'' IS ISSUED.  IN
THIS  CASE THE DIAGNOSTIC MUST BE EXECUTED MORE THAN ONCE TO
TEST ALL UNITS.

EXAMPLE:

STA/TESTS:1:2-4:6:8-10/PASS:3/FLAGS:IER:HOE=1:UAM:LOE

THIS COMMAND WILL CAUSE THREE PASSES TO BE MADE,  EACH  PASS
CONSISTING  OF  TESTS 1,2,3,4,6,8,9, AND 10 EXECUTED AGAINST
```

ALL UNITS. THERE IS NO DIFFERENCE BETWEEN SAYING <FLAG> AND SAYING <FLAG=1>. THE NOTATION <FLAG=0> IS MEANINGFUL ONLY ON A COMMAND OTHER THAN START TO CLEAR A FLAG THAT WAS PREVIOUSLY SET. NOTE THAT ON ALL COMMANDS ONLY THE FIRST THREE LETTERS ARE SCANNED.

6.3.2 RESTART COMMAND

```
*****************************************************************
RES(TART)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:
   <FLAG-LIST>/UNITS:<UNIT-LIST>
*****************************************************************
```

6.3.2.1 TESTS, PASS, AND FLAGS SWITCHES

<TEST-LIST>, <PASS-CNT>, AND <FLAG-LIST> ARE AS IN THE START COMMAND.

6.3.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (0,1 ETC.) OR RANGES OF DECIMAL NUMBERS (0-5, 8-10 ETC.) THAT SPECIFY THE UNITS TO BE TESTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS MAY RANGE FROM 0 THRU N-1 (N IS THE NUMBER OF UNITS SPECIFIED IN THE PREVIOUS START COMMAND). THE NUMBER INDICATES THE POSITION OF THE P-TABLE AS THE DATA WAS ENTERED DURING THE HARDWARE DIAGLOGUE. THE UNITS WHICH ARE SELECTED MUST NOT HAVE BEEN DROPPED BY THE DROP COMMAND. SEE THE DISCUSSION OF ADD AND DROP COMMANDS BELOW. DEFAULT IS TO TEST ALL UNITS WHICH HAVE NOT BEEN DROPPED BY A DROP COMMAND.

6.3.2.3 EFFECT OF RESTART COMMAND

THE RESTART COMMAND DIFFERS FROM THE START COMMAND IN THAT THE P-TABLES FROM THE PREVIOUS START COMMAND (THERE MUST HAVE BEEN ONE) ARE USED, INSTEAD OF NEW ONES BEING BUILT. THE UNITS SWITCH GIVES THE ABILITY TO SELECT A SUBSET OF THESE. THE SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED (OPERATOR WILL BE ASKED). THE COMMAND CAN BE USED AFTER COMMAND MODE HAS BEEN REENTERED IN ANY OF THE THREE NORMAL WAYS: A) THE REQUESTED NUMBER OF PASSES HAVE BEEN MADE B) AN ERROR WAS ENCOUNTERED WITH THE HALT ON ERROR FLAG SET C) A CONTROL/C WAS ENTERED BY THE OPERATOR.

6.3.3 CONTINUE COMMAND

```
*****************************************************************
CON(TINUE)/PASS:<PASS-CNT/FLAGS:<FLAG-LIST>
*****************************************************************
```

```
2622
2623                    6.3.3.1 PASS SWITCH (/PASS:<PASS-CNT>)
2624
2625                    <PASS-CNT>  IS  SAME AS IN START COMMAND, BUT THE DEFAULT IS
2626                    THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART.
2627                    IF NONE REMAINS, THE DEFAULT IS NON-ENDING EXECUTION.
2628
2629
2630                    6.3.3.2 FLAG SWITCH (/FLAGS:<FLAG-LIST>)
2631
2632                    <FLAG-LIST>  IS  SAME  AS  IN START COMMAND, BUT UNSPECIFIED
2633                    FLAGS RETAIN THEIR CURRENT VALUE.
2634
2635
2636                    6.3.3.3 EFFECT OF CONTINUE COMMAND
2637
2638                    CONTINUE MUST FOLLOW A START OR RESTART,  AND  COMMAND  MODE
2639                    MUST  HAVE  BEEN  ENTERED  DUE  TO  A  HALT  ON  ERROR  OR A
2640                    CONTROL/C. THE EFFECT  OF  THE  COMMAND  IS  TO  GO  TO  THE
2641                    BEGINNING  OF THE TEST THAT WAS BEING EXECUTED WHEN THE HALT
2642                    OR CONTROL/C TOOK PLACE.  SOFTWARE DIALOGUE  MAY  OPTIONALLY
2643                    BE REEXECUTED.  HARDWARE PARAMETERS MAY NOT BE CHANGED.
2644
2645
2646                    6.3.4 PROCEED COMMAND
2647
2648                    ************************************************************
2649                    PRO(CEED)/FLAGS:<FLAG-LIST>
2650                    ************************************************************
2651
2652                    6.3.4.1 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)
2653
2654                    <FLAG-LIST>  IS  AS  IN  THE  START COMMAND, BUT UNSPECIFIED
2655                    FLAGS RETAIN THEIR CURRENT VALUE.
2656
2657
2658                    6.3.4.2 EFFECT OF PROCEED COMMAND
2659
2660                    PROCEED MUST FOLLOW A START, RESTART, OR CONTINUE.   COMMAND
2661                    MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR.  THE EFFECT
2662                    OF  THE  COMMAND  IS  TO  BEGIN  EXECUTION  AT  THE  LOCATION
2663                    FOLLOWING  THE  ERROR  CALL.   NEITHER HARDWARE NOR SOFTWARE
2664                    PARAMETERS MAY BE ALTERED.
2665
2666
2667                    6.3.5 ADD COMMAND
2668
2669                    ************************************************************
2670                    ADD/UNITS:<UNIT-LIST>
2671                    ************************************************************
2672
2673
2674                    6.3.5.1 UNITS SWITCH (/UNITS:<UNIT-LIST>
2675
2676                    <UNIT-LIST> IS AS IN THE RESTART COMMAND.
2677
```

6.3.5.2 EFFECT OF ADD COMMAND

THE UNITS SPECIFIED ARE ADDED TO THE TEST SEQUENCE. EACH UNIT MUST HAVE A P-TABLE IN MEMORY DUE TO AN EARLIER HARDWARE DIALOGUE. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR CONTINUE. THE UNITS SWITCH MUST BE SPECIFIED. THE ADD COMMAND IS MEANINGFUL ONLY FOR UNITS THAT WERE PREVIOUSLY DROPPED.

6.3.6 DROP COMMAND

****
DRO(P)/UNITS:<UNIT-LIST>
****

6.3.6.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

6.3.6.2 EFFECT OF DROP COMMAND

THE UNITS SPECIFIED WILL BE DROPPED FROM TESTING. THE UNITS WILL BE RESELECTED ONLY BY THE EXECUTION OF AN ADD OR START COMMAND. THE UNITS SWITCH MUST BE ENTERED. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR A CONTINUE COMMAND.

6.3.7 PRINT COMMAND

****
PRI(NT)
****

6.3.7.1 EFFECT OF PRINT COMMAND

THE TOTAL NUMBER OF ERRORS FOR EACH UNIT SINCE THE LAST START OR RESTART COMMAND ARE PRINTED. THE ISR (INHIBIT STATISTICAL REPORTING) FLAG IS CLEARED.

6.3.8 DISPLAY COMMAND

****
DIS(PLAY)/UNITS:<UNIT-LIST>
****

6.3.8.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

6.3.8.2 EFFECT OF DISPLAY COMMAND

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR ''DROP'' COMMAND ARE SO DESIGNATED.

6.3.9 FLAGS COMMAND

****
FLA(GS)
****

6.3.9.1 EFFECT OF FLAGS COMMAND

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

6.3.10 ZFLAGS COMMAND

****
ZFL(AGS)
****

6.3.10.1 EFFECT OF ZFLAGS COMMAND

ALL FLAGS ARE CLEARED.

6.3.11 CONTROL CHARACTERS

A CONTROL C (C) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES A RETURN TO COMMAND MODE.

A CONTROL Z (Z) ENTERED DURING ONE OF THE THREE OPERATOR DIALOGUES- INITIAL DIALOGUE (SEE 6.2),HARDWARE DIALOGUE (SEE 6.3.1.5), OR SOFTWARE DIALOGUE (SEE 6.3.1.5) CAUSES THE DEFAULTS TO BE TAKEN FOR THE REMAINDER OF THAT DIALOGUE.

A CONTROL O (O) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES ALL TELETYPE OUTPUT TO BE SURPRESSED FOR THE REMAINDER OF THE DIAGNOSTIC OR UNTIL ANOTHER O IS TYPED, WHICH RESTORES NORMAL TELETYPE OUTPUT.

6.3.12 HARDWARE PARAMETERS

THE FOLLOWING QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN RESPONSE.

1. WHICH MICRO-CPU? (0= M8200, 4= M8204, 7= M8207) (0) 7?

2. MICRO-CPU CSR ADDRESS: (0) 160170?

THIS IS THE ADDRESS AT WHICH THE CSR REGISTERS (SEL0) RESIDE ON THE UNIBUS. THE ALLOWABLE RANGE IS 160000-177776 (OCTAL), AND THE DEFAULT IS 160170.

3. MICRO-PROCESSOR RUN SWITCH-TYPE 1 IF ON, IF OFF: (0) 0?

THE RUN SWITCH IS E28, SWITCH 7 ON THE M8207. MORE TESTS CAN BE PERFORMED IF THE RUN SWITCH IS OFF. YOU MAY GENERATE AN ERROR IF YOU ANSWER THIS QUESTION WRONG.

6.3.13 SOFTWARE PARAMETERS

NO SOFTWARE PARAMETER QUESTIONS ARE ASKED BY PART 2 OF THE STATIC LOGIC TESTS.

6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.

AS SOON AS THE QUESTION "# UNITS?" IS ANSWERED (WITH THE NUMBER N, SAY) SPACE IN CORE IS ALLOCATED FOR N P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

ON THE FIRST TRIP THRU THE QUESTIONS, ALL OF THE SLOTS IN ALL OF THE P-TABLES ARE FILLED. IF THE OPERATOR TYPES IN LESS THAN N EXPLICIT VALUES IN RESPONSE TO A PARTICULAR QUESTION, THESE VALUES ARE PLACED IN THE P-TABLES (ONE VALUE GOING INTO THE PROPER SLOT OF EACH P-TABLE BEGINNING WITH THE FIRST P-TABLE) UNTIL THE STRING OF VALUES IS EXHAUSTED. THE LAST VALUE IN THE STRING BECOMES THE NEW DEFAULT AND IS USED TO FILL THAT SLOT IN THE REMAINING P-TABLES.

ON SUBSEQUENT TRIPS THRU THE QUESTIONS, THE SAME PROCESS IS CARRIED OUT, EXCEPT THAT THE EARLIEST P-TABLE NOT TO HAVE RECEIVED AN EXPLICIT VALUE IN ANY OF ITS SLOTS NOW ASSUMES THE ROLE THAT TABLE NUMBER ONE PLAYED IN THE FIRST TRIP.

THE SERIES OF QUESTIONS IS REISSUED UNTIL AT LEAST ONE QUESTION HAS RECEIVED N EXPLICIT VALUES FROM THE OPERATOR.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANSLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 16 UNITS, AND THAT THERE ARE THREE HARDWARE PARAMETERS FOR EACH (THREE SLOTS IN THE P-TABLE, THREE HARDWARE QUESTIONS IN THE DIALOGUE). LET THE DESIRED VALUE FOR THE FIRST PARAMETER BE THE NUMBER 75 FOR ALL 16 TABLES. LET THE DESIRED VALUE FOR THE SECOND PARAMETER BE EQUAL TO THE UNIT NUMBER (0,1,2,...,15) EXCEPT FOR UNIT 12, WHICH SHOULD RECEIVE THE VALUE 11. LET THE DESIRED VALUE FOR THE THIRD PARAMETER BE THE NUMBER 76 FOR THE FIRST 7 UNITS AND THE NUMBER 77 FOR THE LAST 9 UNITS.

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

```
# UNITS (D) ? 16

UNIT 1
<QUESTION 1> ? 75
<QUESTION 2> ? 0-6
<QUESTION 3> ? 76

UNIT 21
<QUESTION 1> ?
<QUESTION 2> ? 7-11,,13-15
<QUESTION 3> ? 77
```

THE FIRST TIME THE SERIES IS ASKED, SLOT ONE RECEIVES A 75 IN ALL 16 TABLES. SLOT TWO RECEIVES THE VALUES 0,1,2,...,6 IN TABLES 0 THRU 6 AND A CONSTANT 6 IN TABLES 7 THRU 15. SLOT THREE RECEIVES A CONSTANT 76 IN ALL 16 TABLES.

THE SECOND TIME THRU THE SERIES, TABLES 16 THRU THE END ARE GOING TO BE AFFECTED (NOTE THAT THIS PIECE OF INFORMATION IS PRINTED OUT FOR THE THE OPERATOR IN THE FORM 'UNIT XX'' AT THE BEGINNING OF EACH SERIES). QUESTION 1 IS RESPONDED TO BY A <CR>, SO SLOT ONE STAYS AT CONSTANT 75 IN TABLES 7 THRU 15, SINCE NO NEW EXLICIT VALUES ARE TYPED IN. SLOT TWO GETS THE VALUES 7,8,9,10,11 IN TABLES 7 THRU 11, AND GETS A 11 IN SLOT 12, AND GETS THE VALUES 13,14,15 IN TABLES 13 THRU 15. SLOT THREE GETS THE VALUE 77 IN TABLES 7 THRU 15.

THE DIALOGUE IS TERMINATED WHEN THE SOFTWARE RECOGNIZES THAT 16 EXPLICIT VALUES HAVE BEEN GIVEN FOR AT LEAST ONE QUESTION (NAMELY QUESTION 2).

7.0 TEST DESCRIPTIONS

•••••••••••••••••••• TEST 1 ••••••••••••••••••••

```
2902                            *VERIFY THAT REFERENCING UNIBUS DEVICE REGISTERS
2903                            *DOES NOT CAUSE A TIME OUT TRAP
2904                            ****************************************************
2905
2906
2907                            ********************** TEST 2 **********************
2908                            *TEST OF BR RIGHT SHIFT
2909                            *VERIFY THAT A DEST OF BR RSH (011) OF A MICRO-INSTRUCTION
2910                            *SHIFTS THE RESULTING BR  DATA RIGHT ONCE.
2911                            ****************************************************
2912
2913
2914                            ********************** TEST 3 **********************
2915                            *IOP CRAM WRITE/READ TEST
2916                            *FLOAT A 1 THROUGH EACH CRAM LOCATION
2917                            ****************************************************
2918
2919
2920                            ********************** TEST 4 **********************
2921                            *IOP CRAM WRITE/READ TEST
2922                            *FLOAT A 0 THROUGH EACH CRAM LOCATION
2923                            ****************************************************
2924
2925
2926                            ********************** TEST 5 **********************
2927                            *IOP CRAM DUAL ADDRESSING TEST
2928                            *WRITE EACH ADDRESS INTO ITSELF, READ EACH
2929                            *ADDRESS TO VERIFY CORRECT ADDRESSING
2930                            ****************************************************
2931
2932
2933                            ********************** TEST 6 **********************
2934                            *IOP MAIN MEMORY TEST
2935                            *FLOAT A 1 THROUGH ALL MAIN MEMORY LOCATIONS
2936                            ****************************************************
2937
2938
2939                            ********************** TEST 7 **********************
2940                            *IOP MAIN MEMORY TEST
2941                            *FLOAT A 0 THROUGH ALL MAIN MEMORY LOCATIONS
2942                            ****************************************************
2943
2944
2945                            ********************** TEST 8 **********************
2946                            *IOP MAIN MEMORY DUAL ADDRESSING TEST
2947                            *LOAD EACH MEMORY LOCATION WITH ITS OWN ADDRESS
2948                            *READ BACK EACH LOCATION TO VERIFY CORRECT ADDRESSING
2949                            ****************************************************
2950
2951
2952                            ********************** TEST 9 **********************
2953                            *IOP MAR TEST
2954                            *PERFORM DUAL ADDRESSING TEST
2955                            *USING MAR AUTO-INC FEATURE
2956                            ****************************************************
2957
```

```
2958
2959                            ********** TEST 10 **********
2960                            *IOP (CRAM) ODT BITS TEST
2961                            *LOAD MAR WITH A 0 INC MAR UNTIL IT OVERFLOWS
2962                            *VERIFY THAT IBUS* 10 BITS IS SET ONLY WHEN MAR BIT 8 IS A ONE
2963                            *AND THAT IBUS* 10 BIT6 IS SET ON MAR OVERFLOW
2964                            ********************************************..**********
2965
2966
2967                            ********** TEST 11 **********
2968                            *CRAM TEST OF JUMP(I) NEVER MICRO-PROCESSOR INSTRUCTION.
2969                            *PERFORM THE JUMP INSTRUCTION
2970                            *VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
2971                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
2972                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
2973                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
2974                            *THE CRAM PC IS CORRECT.  IF THE CRAM PC IN NOT RIGHT,
2975                            *THEN PORT4 CONTAINS A 37
2976                            ****************************************************
2977
2978
2979                            ********** TEST 12 **********
2980                            *CRAM TEST OF JUMP(I) ALWAYS MICRO-PROCESSOR INSTRUCTION.
2981                            *PERFORM THE JUMP INSTRUCTION
2982                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
2983                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
2984                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
2985                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
2986                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
2987                            *THEN PORT4 WILL CONTAIN A 37
2988                            ****************************************************
2989
2990
2991                            ********** TEST 13 **********
2992                            *CRAM TEST OF JUMP(I) ON C BIT SET MICRO-PROCESSOR INSTRUCTION.
2993                            *SET THE C BIT, PERFORM THE JUMP INSTRUCTION.
2994                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
2995                            *IN THE LOCATION IT IS AT.  THIS INSTRUCITON LOADS THE
2996                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
2997                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
2998                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
2999                            *THEN PORT4 WILL CONTAIN A 37.
3000                            ****************************************************
3001
3002
3003                            ********** TEST 14 **********
3004                            *CRAM TEST OF JUMP(I) ON Z BIT SET MICRO-PROCESSOR INSTRUCTION.
3005                            *SET THE Z BIT, PERFORM THE JUMP INSTRUCTION.
3006                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3007                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3008                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
3009                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3010                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3011                            *THEN PORT4 WILL CONTAIN A 37
3012                            ****************************************************
3013
```

```
3014
3015                    ****************** TEST 15 **********************
3016                    *CRAM TEST OF JUMP(I) ON BRO SET MICRO-PROCESSOR INSTRUCTION.
3017                    *SET THE BRO BIT, PERFORM THE JUMP INSTRUCTION.
3018                    *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3019                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3020                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3021                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3022                    *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3023                    *THEN THE PORT4 WILL CONTAIN A 37
3024                    ************************************************
3025
3026
3027                    ****************** TEST 16 **********************
3028                    *CRAM TEST OF JUMP(I) ON BR1 SET MICRO-PROCESSOR INSTRUCTION.
3029                    *SET THE BR1 BIT, PERFORM THE JUMP INSTRUCTION.
3030                    *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3031                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3032                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3033                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3034                    *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3035                    *THEN PORT4 WILL CONTAIN A 37
3036                    ************************************************
3037
3038
3039                    ****************** TEST 17 **********************
3040                    *CRAM TEST OF JUMP(I) ON BR4 SET MICRO-PROCESSOR INSTRUCTION.
3041                    *SET THE BR4 BIT, PERFORM THE JUMP INSTRUCTION.
3042                    *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3043                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3044                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3045                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3046                    *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3047                    *THEN PORT4 WILL CONTAIN A 37
3048                    ************************************************
3049
3050
3051                    ****************** TEST 18 **********************
3052                    *CRAM TEST OF JUMP(I) ON BR7 SET MICRO-PROCESSOR INSTRUCTION.
3053                    *SET THE BR7 BIT, PERFORM THE JUMP INSTRUCTION
3054                    *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3055                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3056                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3057                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3058                    *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3059                    *THEN PORT4 WILL CONTAIN A 37
3060                    ************************************************
3061
3062
3063                    ****************** TEST 19 **********************
3064                    *CRAM TEST OF JUMP(I) ON C BIT CLEAR MICRO-PROCESSOR INSTRUCTION.
3065                    *SET THE C BIT, PERFORM THE JUMP INSTRUCTION.
3066                    *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3067                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3068                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3069                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
```

```
3070                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3071                            *THEN PORT4 WILL CONTAIN A 37
3072                            ****************************************************
3073
3074
3075                            ******************** TEST 20 ************************
3076                            *CRAM TEST OF JUMP(I) ON Z BIT CLEAR MICRO-PROCESSOR INSTRUCTION.
3077                            *CLEAR THE Z BIT, PERFORM THE JUMP INSTRUCTION.
3078                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3079                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3080                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3081                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3082                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3083                            *THEN PORT4 WILL CONTAIN A 37
3084                            ****************************************************
3085
3086
3087                            ******************** TEST 21 ************************
3088                            *CRAM TEST OF JUMP(I) ON BR0 CLEAR MICRO-PROCESSOR INSTRUCTION.
3089                            *CLEAR THE BR0 BIT, PERFORM THE JUMP INSTRUCTION.
3090                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3091                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3092                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  A THIS POINT
3093                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3094                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3095                            *THEN PORT4 WILL CONTAIN A 37
3096                            ****************************************************
3097
3098
3099                            ******************** TEST 22 ************************
3100                            *CRAM TEST OF JUMP(I) ON BR1 CLEAR MICRO-PROCESSOR INSTRUCTION.
3101                            *CLEAR THE BR1 BIT, PERFORM THE JUMP INSTRUCTION.
3102                            *VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
3103                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3104                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3105                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3106                            *THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
3107                            *THEN PORT4 WILL CONTAIN A 37
3108                            ****************************************************
3109
3110
3111                            ******************** TEST 23 ************************
3112                            *CRAM TEST OF JUMP(I) ON BR4 CLEAR MICRO-PROCESSOR INSTRUCTION.
3113                            *CLEAR THE BR4 BIT, PERFORM THE JUMP INSTRUCTION.
3114                            *VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
3115                            *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3116                            *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3117                            *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3118                            *THE CRAM PC IS CORRECT, IF THE CRAM PC IS NOT RIGHT
3119                            *THEN PORT4 CONTAINS A 37
3120                            ****************************************************
3121
3122
3123                            ******************** TEST 24 ************************
3124                            *CRAM TEST OF JUMP(I) ON BR7 CLEAR MICRO-PROCESSOR INSTRUCTION.
3125                            *CLEAR THE BR7 BIT, PERFORM THE JUMP INSTRUCTION.
```

```
3126                    *VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
3127                    *IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
3128                    *BR WITH THE LOWEST 8 BITS OF THE CRAM PC.  AT THIS POINT
3129                    *THE BR DATA IS MOVED TO PORT4.  IF THIS DATA IS CORRECT
3130                    *THE CRAM PC IS CORRECT, IF THE CRAM PC IS NOT RIGHT
3131                    *THEN PORT4 CONTAINS A 37
3132                    ****************************************************
3133
3134
3135                    ****************** TEST 25 *************************
3136                    *
3137                    *MAIN MEMORY PAGE DUAL ADDRESS TEST.
3138                    *IN THIS TEST WE WILL VERIFY THAT PAGES DO
3139                    *NOT DUAL ADDRESS.  THIS TEST IS DIFFERENT FROM THE
3140                    *PREVIOUS DUAL ADDRESS TESTS IN THAT THE OTHER
3141                    *TEST REALLY DIDN'T CHECK PAGE DUAL ADDRESSING
3142                    ****************************************************
3143
3144
3145                    ****************** TEST 26 *************************
3146                    *
3147                    *JUMP FIELD,PAGE TEST
3148                    *
3149                    *IN THIS TEST WE WILL MAKE SURE A JUMP FIELD INSTRUCTION
3150                    *WORKS.  TO DO THIS, WE'LL PUT THE DESIRED PAGE, FIELD
3151                    *INFORMATION IN IBUS*<13> THEN ISSUE A JUMP FIELD
3152                    *THEN WE'LL READ PC REG. AND VERIFY.
3153                    *
3154                    ****************************************************
3155
3156
3157                    ****************** TEST 27 *************************
3158                    *
3159                    *JUMP TEST, JUMP ALWAYS, JUMP CHANGE FIELD
3160                    *
3161                    *IN THIS TEST, WE WILL CHECK THE ABILITY OF THE
3162                    *MICRO-PROCESSOR TO JUMP (BRANCH AND ALWAYS INSTRUCTION)
3163                    *TO LOCATIONS, FIELDS FROM OTHER LOCATIONS FIELDS.
3164                    *WE ALREADY KNOW THAT THE BRANCH INSTR WORKS FROM
3165                    *OTHER TEST.              PROCEDURE:
3166                    *       1.  START ADDR 0, FIELD 0
3167                    *       2.  **CALCULATE NEW ADDRS, FIELD VIA INC,
3168                    *       3.  CAUSE JUMP (BRANCH) TO NEW ADDRESS
3169                    *       4.  READ PC FROM IBUS*12 AND IBUS*13
3170                    *       5.  REPEAT STEP 2-4 256.TIMES
3171                    *
3172                    *       TO CALCULATE NEW ADDRESS:
3173                    *       1.  INC LOW BYTE OF ADDRESS FOR PC ADDRESS 0-7
3174                    *       2.  INC LOW BYTE OF N ADDRESS FOR PC ADDRESS 8-11
3175                    *           BITS REPRESENTED AS BITS 0-3.  WHEN 0-3 OVERFLOWS,
3176                    *           RESTARTS AT ZERO.
3177                    *                 NET RESULT IS JUMPS FROM:
3178                    *           FIELD,PAGE                    LOC
3179                    *                 0                       0
3180                    *                 1                       1
3181                    *                 2                       2
```

```
3182                                    *                  3                    3
3183                                    *                 10                    7
3184                                    *                 11                   11
3185                                    *                 :TO                  :
3186                                    *                 17                   377
3187                                    ****************************************************
3188
3189
3190                                    ****************** TEST 28 ********************
3191                                    *
3192                                    *JUMP TEST, JUMP ALWAYS, JUMP CHANGE FIELD
3193                                    *
3194                                    *IN THIS TEST, WE WILL CHECK THE ABILITY OF THE
3195                                    *MICRO-PROCESSOR TO JUMP (BRANCH AND ALWAYS INSTRUCTION)
3196                                    *TO LOCATIONS, FIELDS FROM OTHER LOCATIONS FIELDS.
3197                                    *WE ALREADY KNOW THAT THE BRANCH INSTR WORKS FROM
3198                                    *OTHER TESTS.              PROCEDURE:
3199                                    *       1.  START ADDR 0, FIELD 0
3200                                    *       2.  **CALCULATE NEW ADDRS, FIELD VIA DEC,
3201                                    *       3.  CAUSE JUMP (BRANCH) TO NEW ADDRESS
3202                                    *       4.  READ PC FROM IBUS*12 AND IBUS*13
3203                                    *       5.  REPEAT STEP 2-4 256.TIMES
3204                                    *
3205                                    *       TO CALCULATE NEW ADDRESS:
3206                                    *       1.  DEC LOW BYTE OF ADDRESS FOR PC ADDRESS 0-7
3207                                    *       2.  DEC LOW BYTE OF N ADDRESS FOR PC ADDRESS 8-11
3208                                    *           BITS REPRESENTED AS BITS 0-3.  WHEN 0-3 OVERFLOWS,
3209                                    *           RESTARTS AT ZERO
3210                                    *               NET RESULT IS JUMPS FROM:
3211                                    *             FIELD,PAGE                 LOC:
3212                                    *                  0                     0
3213                                    *                 17                    377
3214                                    *                 16                    376
3215                                    *                 15                    375
3216                                    *                 :TO                   :
3217                                    *                 00                    000
3218                                    ****************************************************
3219
3220
3221                                    ****************** TEST 29 ********************
3222                                    *
3223                                    *IN THIS TEST WE'LL VERIFY THAT THE Z BIT CAN BE READ FROM
3224                                    *IBUS*<13>. WE ALREADY KNOW THAT THE Z BIT WORKS PROPERLY,
3225                                    *ALL WE WANT TO KNOW HERE IS THAT IT CAN BE READ.
3226                                    ****************************************************
3227
3228
3229
3230                                    ****************** TEST 30 ********************
3231                                    *
3232                                    *IN THIS TEST WE'LL VERIFY THAT THE C BIT CAN BE READ FROM
3233                                    *IBUS*<13>. WE ALREADY KNOW THAT THE C BIT WORKS PROPERLY
3234                                    *ALL WE WANT TO KNOW HERE IS THAT IT BE READ.
3235                                    *
3236                                    ****************************************************
3237
```

```
3238
3239                    ********** TEST 31 **********
3240                    *TEST OF PROGRAM CLOCK BIT
3241                    *DO A MASTER CLEAR, VERIFY THAT PROGRAM CLOCK IS SET
3242                    *WRITE PROGRAM CLOCK BIT TO A ONE, VERIFY THAT IT CLEARS,
3243                    *AND THEN SETS SOME TIME LATER
3244                    ************************************************
3245
3246
3247                    ********** TEST 32 **********
3248                    *FORCE POWER FAIL TEST
3249                    *SET FORCE POWER FAIL BIT VERIFY THAT PROCESSOR TRAPS TO 24
3250                    *GOING DOWN AND COMING UP.  VERIFY ALSO THAT BUS INIT WAS
3251                    *BLOCKED FROM GETTING TO THE M8200,4,7 DURING THE POWER FAIL
3252                    ************************************************
3253
3254
3255                    ********** TEST 33 **********
3256                    *MICRO-PROCESSOR NOISE TEST
3257                    *WRITE ALL ZERO'S THEN ALL ONE'S THEN A DATA PATTERN
3258                    *TO THE IBUS* AND IBUS REGISTERS AND TO THE SP AND MAIN MEM
3259                    *THEN GO BACK AND READ THE DATA PATTERNS TO VERIFY THAT
3260                    *READING AND WRITING OF OTHER LOCATIONS AND REGISTERS
3261                    *DID NOT CHANGE THE DATA.
3262                    ************************************************
3263
3264
3265                    ********** TEST 34 **********
3266                    *THIS TEST IS DESIGNED TO MAKE SURE THAT A NODST INSTRUCTION
3267                    *DOES NOT WRITE INTO PORT B OF THE MULTIPORT RAM.
3268                    *TO DO THIS, WE'LL PUT A 125 INTO INDAT2, THEN WE'LL PUT A
3269                    *125 INTO BOTH SP1 AND BR. LAST WE'LL DO A NODST BR, SUBOC, SP1
3270                    *IF THERE IS A WRITE INTO PORTB, INADT2 WILL CONTAIN A 377
3271                    ************************************************
3272
3273
3274                    ********** TEST 35 **********
3275                    *
3276                    *EXTENDED CRAM TEST FOR M8206.  IN THIS TEST WE WILL LOAD DATA
3277                    *THROUGHOUT THE CRAM (TEST DATA IS JUST 4K OF DIAG. CODE) AND
3278                    *THEN READ IT BACK AND VERIFY THAT IT IS CORRECT
3279                    ************************************************
3280
3281
3282                    ********** TEST 36 **********
3283                    *
3284                    *THIS TEST LOADS MICRO-CODE INTO A M8206 MCPU THEN EXECUTES IT.
3285                    *THE MICRO-CODE IS DESIGNED TO WRITE ALL ONES INTO THE SEL REGS.
3286                    *
3287                    ************************************************
3288
3289
3290                    ********** TEST 37 **********
3291                    *
3292                    *NEGATIVE ADDRESS TEST.
3293                    *       IN THIS TEST, WE'LL MAKE SURE THAT THE M8207
```

```
3294                            *       DOES NOT RESPOND TO AN ADDRESS THAT ISN'T ASSIGNED
3295                            *        TO IT
3296                            *
3297                            ********************************************************
3298
3299
3300                            ****************** TEST 38 ************..*************
3301                            *
3302                            *BYTE ADDRESSING TEST
3303                            *       HERE, WE'RE GOING TO MAKE SURE THAT WE CAN
3304                            *        WRITE INTO ONLY A HIGH OR LOW BYTE OF THE MCPU.
3305                            *
3306                            ********************************************************
3307
3308
3309                            ****************** TEST 39 ***************************
3310                            *
3311                            *IN THIS TEST WE'RE GOING TO MAKE SURE THAT THE PC
3312                            *REG COUNTS UP PROPERLY.  THE PC REG SHOULD INCREMENT
3313                            *ONCE AFTER EACH INSTRUCTION.
3314                            *
3315                            ********************************************************
3316
3317
3318                            ****************** TEST 40 ***************************
3319                            *
3320                            *IN THIS TEST WE'LL MAKE SURE THAT 'BRANCH FIELD H'' DOESN'T
3321                            *GET STUCK HIGH.
3322                            *FIRST WE'LL CLEAR THE PC HIGH REG. THEN WE'LL DO A BRANCH INSTR
3323                            *WITH BAB BITS 11+12 SET.  IF PCR  BITS 8+9 SET THEN WE'LL KNOW
3324                            *WE WERE SUCCESSFUL IF PCR BITS 8+9 FAIL TO SET, WE,LL KNOW
3325                            *THAT THE MAX SELECTED THE WRONG INPUT TO BE CLOCKED INTO THE PCR.
3326                            ********************************************************
3327
3328
3329                            ****************** TEST 41 ***************************
3330                            *
3331                            *IN THIS TEST WE'RE GOING TO MAKE SURE THAT ONLY SP0
3332                            *IS SELECTED FOR SOURCE WHEN THE DESTINATION
3333                            *IS THE OUTBUS
3334                            *FIRST WE'LL WRITE EACH SP ADDRS INTO ITSELF THEN WE'LL
3335                            *MOV SP TO OBUS4.  THAT SHOULD SELECT
3336                            *SP ADDRESS 0.  IF ANY OTHER DATA SHOWS UP, WE'LL
3337                            *BLAME IT ON THE SELECTION OF A DIFFERENT SCRATCH PAD.
3338                            ********************************************************
3339
3340
3341                            ****************** TEST 42 ***************************
3342                            *
3343                            *IN THIS TEST WE ARE GOING TO MAKE SURE THAT THE
3344                            *SIGNAL 'MOV INST H'' (AND ITS ASSOC. TRIBS) DOESN'T GET
3345                            *STUCK HIGH.  IN ORDER TO DO THIS WE'LL CLEAR THE PC HIGH REG
3346                            *PUT KNOWN DATA IN THE BREG AND SP1 THEN WE'LL BRANCH
3347                            *WITH CROM BITS 0-3 SET AS WELL AS CROM BIT 9 WITH CROM BITS 8 AND 11 CLEAR.
3348                            *IF 'MOV INST H'' GETS STUCK HIGH, THE PC REG HIGH WILL GET LOADED
3349                            *WITH THE CONTENTS OF THE ALU
```

```
3350                    ************************************************************
3351
3352
3353                    ****************** TEST 43 ****************************
3354                    *TEST THAT MASTER CLEAR, CLEARS BITS IN THE NPR CONTROL REGISTER AND
3355                    *MICROPROCESSOR MISCELLANEOUS REGISTER-FIRST WE'LL SET THE
3356                    *PRIORITY UP SO THAT WHEN WE SET THE BUS REQUEST BIT THAT IT WON'T BUG US
3357                    *THEN WE'LL SET ALL THE BITS IN BOTH REGS EXCEPT THE
3358                    *NPR REQUEST. WE'LL LOOK TO SEE THAT ALL GOT SET, NEXT
3359                    *WE'LL DO A MASTER CLEAR AND BE SURE THAT THEY ALL CLEAR.
3360                    ************************************************************
3361
3362
3363
3364                    8.0 ERROR INFORMATION
3365
3366
3367                    8.1 ERROR REPORTING
3368
3369                    ERRORS ARE REPORTED BY THE PROGRAM AS  THEY  OCCUR  (IF  NOT
3370                    INHIBITED). THE REPORT CONFORMS TO THE DIAGNOSTIC SUPERVISOR
3371                    ERROR REPORT FORMAT, AND CONSISTS OF A  DESCRIPTION  OF  THE
3372                    ERROR,  THE  TEST  NUMBER,  SUBTEST  NUMBER, PC OF THE ERROR
3373                    CALL,  DEVICE  ADDRESS,  AND  BASIC   AND   EXTENDED   ERROR
3374                    INFORMATION.
3375
3376
3377
3378                    THE FOLLOWING EXAMPLES PROVIDE TYPICAL ERROR REPORTS:
3379
3380
3381                    CZDMQ DVC FTL ERR 00045 TST 027 SUB 000 PC:022572
3382
3383                    MASTER   CLEAR  FAILED  TO  CLEAR  PC  REG,  CONTENTS=000624
3384                    CZDMQ DVC FTL ERR 00015 TST 042 SUB 000 PC:027234
3385
3386                    UNIT=00, FAILING UNIT ADDRESS=160170
3387                    JUMP TEST ERROR
3388                    FROM ADDR      TO ADDR       BAD ADDR
3389                    000402         000000        000114
3390
3391
3392
3393                    FOR ALL OTHER ERRORS, THE REPORT MAY BE MORE  EXTENSIVE  AND
3394                    REQUIRE ADDITIONAL DATA TO BE REPORTED.
3395
3396
3397
3398                    9.0     HISTORY
3399
3400                       -    MODIFIED AUGUST 1980 FOR THE FOLLOWING REASONS:
3401
3402                            1) CANCELL DEPO CZDMQA1
3403                            2) CANCELL DEPO CZDMQA2
3404                            3) DETECT BAD TIMING ON INTERNAL CLOCK.
3405
```

```
3406
3407                                    -   MODIFIED JULY 1981 TO FIX TEST 43 MAR BITS IN IBUS* 10.
3408
3409
3410                                @
```

```
3412
3413
3414
3415
3416
```

```
                                .TITLE CZDMQC0 M8207 STATIC DIAG #2
002000                                  .=2000
                                .MCALL  SVC
002000                          SVC                             ; INITIALIZE SUPERVISOR MACROS
002000                          BGNMOD  CZDMQ
000000                  $LSTIN= 0
000000                  $LSTTAG= 0
000000                  SVCINS= 0       ; LIST INSTRUCTIONS, SHIFTED RIGHT
000000                  SVCTST= 0       ; LIST TEST TAGS, SHIFTED RIGHT
000000                  SVCSUB= 0       ; LIST SUBTEST TAGS, SHIFTED RIGHT
000000                  SVCGBL= 0       ; LIST GLOBAL TAGS, SHIFTED RIGHT
000000                  SVCTAG= 0       ; LIST OTHER TAGS, SHIFTED RIGHT
                        ;       CHANGE THE VALUES OF THE SVC... SYMBOLS TO BE ZERO IF YOU WISH
                        ;       TO ALIGN THE MACRO CALLS AND THEIR EXPANSIONS.  CHANGE THE
                        ;       SYMBOLS TO BE MINUS-ONE TO NOT LIST THE EXPANSIONS.  YOU MAY
                        ;       CHANGE THE SYMBOLS AT ANY POINT IN YOUR PROGRAM.
```

```
3458                                    .SBTTL  PROGRAM HEADER
3459                                    ;++
3460                                    ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
3461                                    ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
3462                                    ;--
3463
3464   002000                                   POINTER BGNAU,BGNDU
3465
3473
3474   002000                                   HEADER  CZDMQ,C,0,240.,0
 (4)   002000                           L$NAME::                ;DIAGNOSTIC NAME
 (4)   002000      103                          .ASCII /C/
 (4)   002001      132                          .ASCII /Z/
 (4)   002002      104                          .ASCII /D/
 (4)   002003      115                          .ASCII /M/
 (4)   002004      121                          .ASCII /Q/
 (6)   002005      000                          .BYTE   0
 (6)   002006      000                          .BYTE   0
 (5)   002007      000                          .BYTE   0
 (5)   002010                           L$REV::                 ;REVISION LEVEL
 (4)   002010      103                          .ASCII  /C/
 (5)   002011                           L$DEPO::                ;0
 (4)   002011      060                          .ASCII  /0/
 (5)   002012                           L$UNIT::                ;NUMBER OF UNITS
 (4)   002012   000000                          .WORD   0
 (5)   002014                           L$TIML::                ;LONGEST TEST TIME
 (4)   002014   000360                          .WORD   240.
 (5)   002016                           L$HPCP::                ;POINTER TO H.W. QUES.
 (4)   002016   027344                          .WORD   L$HARD
 (5)   002020                           L$SPCP::                ;POINTER TO S.W. QUES.
 (4)   002020   000000                          .WORD   0
 (5)   002022                           L$HPTP::                ;PTR. TO DEF. H.W. PTABLE
 (4)   002022   002262                          .WORD   L$HW
 (5)   002024                           L$SPTP::                ;PTR. TO S.W. PTABLE
 (4)   002024   000000                          .WORD   0
 (5)   002026                           L$LADP::                ;DIAG. END ADDRESS
 (4)   002026   030144                          .WORD   L$LAST
 (5)   002030                           L$STA::                 ;RESERVED FOR APT STATS
 (4)   002030   000000                          .WORD   0
 (5)   002032                           L$CO::
 (4)   002032   000000                          .WORD   0
 (5)   002034                           L$DTYP::                ;DIAGNOSTIC TYPE
 (4)   002034   000000                          .WORD   0
 (5)   002036                           L$APT::                 ;APT EXPANSION
 (4)   002036   000000                          .WORD   0
 (5)   002040                           L$DTP::                 ;PTR. TO DISPATCH TABLE
 (4)   002040   002132                          .WORD   L$DISPATCH
 (5)   002042                           L$PRIO::                ;DIAGNOSTIC RUN PRIORITY
 (4)   002042   000000                          .WORD   0
 (5)   002044                           L$ENVI::                ;FLAGS DESCRIBE HOW IT WAS SETUP
 (4)   002044   000000                          .WORD   0
 (5)   002046                           L$EXP1::                ;EXPANSION WORD
 (4)   002046   000000                          .WORD   0
 (5)   002050                           L$MREV::                ;SVC REV AND EDIT #
 (4)   002050      003                          .BYTE   C$REVISION
 (3)   002051      003                          .BYTE   C$EDIT
```

```
  (5)  002052                          L$EF::                  ;DIAG. EVENT FLAGS
  (4)  002052  000000                          .WORD   0
  (5)  002054  000000                          .WORD   0
  (5)  002056                          L$SPC::
  (4)  002056  000000                          .WORD   0
  (5)  002060                          L$DEVP::                ; POINTER TO DEVICE TYPE LIST
  (4)  002060  002730                          .WORD   L$DVTYP
  (5)  002062                          L$REPP::                ;PTR. TO REPORT CODE
  (4)  002062  000000                          .WORD   0
  (5)  002064                          L$EXP4::
  (4)  002064  000000                          .WORD   0
  (5)  002066                          L$EXP5::
  (4)  002066  000000                          .WORD   0
  (5)  002070                          L$AUT::                 ;PTR. TO ADD UNIT CODE
  (4)  002070  012144                          .WORD   L$AU
  (5)  002072                          L$DUT::                 ;PTR. TO DROP UNIT CODE
  (4)  002072  012140                          .WORD   L$DU
  (5)  002074                          L$LUN::                 ;LUN FOR EXERCISERS TO FILL
  (4)  002074  000000                          .WORD   0
  (5)  002076                          L$DESP::                ;POINTER TO DIAG. DESCRIPTION
  (4)  002076  002312                          .WORD   L$DESC
  (5)  002100                          L$LOAD::                ;GENERATE SPECIAL AUTOLOAD EMT
  (4)  002100  104035                          EMT     E$LOAD
  (5)  002102                          L$ETP::                 ;POINTER TO ERRTBL
  (4)  002102  000000                          .WORD   0
  (5)  002104                          L$ICP::                 ;PTR. TO INIT CODE
  (4)  002104  011340                          .WORD   L$INIT
  (5)  002106                          L$CCP::                 ;PTR. TO CLEAN-UP CODE
  (4)  002106  012134                          .WORD   L$CLEAN
  (5)  002110                          L$ACP::                 ;PTR. TO AUTO CODE
  (4)  002110  012042                          .WORD   L$AUTO
  (5)  002112                          L$PRT::                 ;PTR. TO PROTECT TABLE
  (4)  002112  002122                          .WORD   L$PROT
  (5)  002114                          L$TEST::                ;TEST NUMBER
  (4)  002114  000000                          .WORD   0
  (5)  002116                          L$DLY::                 ;DELAY COUNT
  (4)  002116  000000                          .WORD   0
  (5)  002120                          L$HIME::                ;PTR. TO HIGH MEM
  (4)  002120  000000                          .WORD   0
3475
3476
3482  002122                                  BGNPROT
  (3)  002122                          L$PROT::
3483  002122  177777                          .WORD   -1
3484  002124  177777                          .WORD   -1
3485  002126  177777                          .WORD   -1
3486  002130                                  ENDPROT
3487
```

```
3489                                    .SBTTL  DISPATCH TABLE
3490
3491                                    ;////////////////////////////////////////////////////////////////////////////////
3492                                    ;/ THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
3493                                    ;/ IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
3494                                    ;////////////////////////////////////////////////////////////////////////////////
3495
3496  002130                                    DISPATCH 43
 (4)  002130  000053                          .WORD   43
 (3)  002132                            L$DISPATCH::
 (6)  002132  012146                          .WORD   T1
 (6)  002134  012256                          .WORD   T2
 (6)  002136  012422                          .WORD   T3
 (6)  002140  012552                          .WORD   T4
 (6)  002142  012712                          .WORD   T5
 (6)  002144  013154                          .WORD   T6
 (6)  002146  013356                          .WORD   T7
 (6)  002150  013570                          .WORD   T8
 (6)  002152  014112                          .WORD   T9
 (6)  002154  014470                          .WORD   T10
 (6)  002156  014736                          .WORD   T11
 (6)  002160  015202                          .WORD   T12
 (6)  002162  015432                          .WORD   T13
 (6)  002164  015676                          .WORD   T14
 (6)  002166  016142                          .WORD   T15
 (6)  002170  016406                          .WORD   T16
 (6)  002172  016652                          .WORD   T17
 (6)  002174  017116                          .WORD   T18
 (6)  002176  017362                          .WORD   T19
 (6)  002200  017642                          .WORD   T20
 (6)  002202  020122                          .WORD   T21
 (6)  002204  020376                          .WORD   T22
 (6)  002206  020654                          .WORD   T23
 (6)  002210  021130                          .WORD   T24
 (6)  002212  021404                          .WORD   T25
 (6)  002214  021576                          .WORD   T26
 (6)  002216  021744                          .WORD   T27
 (6)  002220  022322                          .WORD   T28
 (6)  002222  022560                          .WORD   T29
 (6)  002224  022774                          .WORD   T30
 (6)  002226  023210                          .WORD   T31
 (6)  002230  023452                          .WORD   T32
 (6)  002232  024044                          .WORD   T33
 (6)  002234  025116                          .WORD   T34
 (6)  002236  025216                          .WORD   T35
 (6)  002240  025364                          .WORD   T36
 (6)  002242  026042                          .WORD   T37
 (6)  002244  026202                          .WORD   T38
 (6)  002246  026310                          .WORD   T39
 (6)  002250  026446                          .WORD   T40
 (6)  002252  026544                          .WORD   T41
 (6)  002254  026644                          .WORD   T42
 (6)  002256  026770                          .WORD   T43
3497
3504
3505
```

```
3506
3507
3508
```

```
                        .SBTTL DEFAULT HARDWARE P-TABLE

                        ;////////////////////////////////////////////////////////////////////////////
                        ;/ THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                        ;/ THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                        ;/ IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
                        ;////////////////////////////////////////////////////////////////////////////

                        .ENABL  AMA
002260                          BGNHW   DFPTBL
(3) 002260  000013              .WORD   L10001-L$HW/2
(3) 002262              L$HW::
(3) 002262              DFPTBL::
002262  000007                  .WORD   7               ;MICRO-CPU TYPE.
002264  160170                  .WORD   160170  ;M8200,4,7 CRS ADDRESS
002266  000300                  .WORD   300     ;M8200,4,7 VECTOR ADDRESS
002270  005000                  .WORD   5000    ;INTERRUPT PRIORITY LEVEL
002272  000003                  .WORD   3       ;LINE UNIT TYPE
002274  000056                  .WORD   56      ;SWITCH PACK #1 (DDCMP LINE #)
0C2276  000000                  .WORD   0       ;SWITCH PACK #2 (BM873 BOOT ADDRESS)
002300  000000                  .WORD   0       ;SWITCH PACK #3
002302  000000                  .WORD   0       ;TEST CONNECTOR INSTALLED FLAG
002304  000004                  .WORD   4       ;CONTAINS BAUD RATE 4=56K BAUD DEFAULT
                                                ;0=2.4K , 1=4.8K , 2=9.6K , 3=19.2K , 4=56K
                                                ;5=250K , 6=500K , 7=1 MEG BAUD
002306  000000                  .WORD   0       ;0=RUN SW OFF, 1=SW ON

002310                          ENDHW
(3) 002310              L10001:
```

```
                                .SBTTL  SOFTWARE P-TABLE

                                ;////////////////////////////////////////////////////////////////////////////
                                ;/ THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                                ;/ PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                                ;////////////////////////////////////////////////////////////////////////////

002310                                  BGNSW   SFPTBL
002310  000000                          .WORD   L10002-L$SW/2
002312                          L$SW::
002312                          SFPTBL::

002312                                  ENDSW
002312                          L10002:
```

```
3554
3555
3556
3557
3558
3559
3560
3561
3562
3563
3564
3565                                    .SBTTL  GLOBAL EQUATES SECTION
3566
3567
3568                                    ;////////////////////////////////////////////////////////////////////////////////
3569                                    ;/      THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
3570                                    ;/      ARE USED IN MORE THAN ONE TEST.
3571                                    ;////////////////////////////////////////////////////////////////////////////////
3572
3573  002312                                    EQUALS
 (1)                                    ;
 (1)                                    ; BIT DIFINITIONS
 (1)                                    ;
 (1)            100000                  BIT15== 100000
 (1)            040000                  BIT14== 40000
 (1)            020000                  BIT13== 20000
 (1)            010000                  BIT12== 10000
 (1)            004000                  BIT11== 4000
 (1)            002000                  BIT10== 2000
 (1)            001000                  BIT09== 1000
 (1)            000400                  BIT08== 400
 (1)            000200                  BIT07== 200
 (1)            000100                  BIT06== 100
 (1)            000040                  BIT05== 40
 (1)            000020                  BIT04== 20
 (1)            000010                  BIT03== 10
 (1)            000004                  BIT02== 4
 (1)            000002                  BIT01== 2
 (1)            000001                  BIT00== 1
 (1)                                    ;
 (1)            001000                  BIT9==  BIT09
 (1)            000400                  BIT8==  BIT08
 (1)            000200                  BIT7==  BIT07
 (1)            000100                  BIT6==  BIT06
 (1)            000040                  BIT5==  BIT05
 (1)            000020                  BIT4==  BIT04
 (1)            000010                  BIT3==  BIT03
 (1)            000004                  BIT2==  BIT02
 (1)            000002                  BIT1==  BIT01
 (1)            000001                  BIT0==  BIT00
 (1)                                    ;
 (1)                                    ; EVENT FLAG DEFINITIONS
 (1)                                    ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
 (1)                                    ;
 (1)            000040                  EF.START==      32.                     ; START COMMAND WAS ISSUED
 (1)            000037                  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
```

```
(1)  000036  EF.CONTINUE==  30.   ; CONTINUE COMMAND WAS ISSUED
(1)  000035  EF.NEW==       29.   ; A NEW PASS HAS BEEN STARTED
(1)  000034  EF.PWR==       28.   ; A POWER-FAIL/POWER-UP OCCURRED
(1)
(1)                               ;
(1)                               ; PRIORITY LEVEL DEFINITIONS
(1)                               ;
(1)  000340                       PRI07== 340
(1)  000300                       PRI06== 300
(1)  000240                       PRI05== 240
(1)  000200                       PRI04== 200
(1)  000140                       PRI03== 140
(1)  000100                       PRI02== 100
(1)  000040                       PRI01== 40
(1)  000000                       PRI00== 0
(1)                               ;
(1)                               ;OPERATOR FLAG BITS
(1)                               ;
(1)  000004                       EVL==     4
(1)  000010                       LOT==    10
(1)  000020                       ADR==    20
(1)  000040                       IDU==    40
(1)  000100                       ISR==   100
(1)  000200                       UAM==   200
(1)  000400                       BOE==   400
(1)  001000                       PNT==  1000
(1)  002000                       PRI==  2000
(1)  004000                       IXE==  4000
(1)  010000                       IBE== 10000
(1)  020000                       IER== 20000
(1)  040000                       LOE== 40000
(1)  100000                       HOE== 100000
3574
3575
3576
3577
3578                              ;;*****************************************************************************
3579                              ;* PROGRAM EVENT FLAG DEFINITIONS
3580                              ;;*****************************************************************************
3581
3582
3583
```

```
                                .SBTTL  GLOBAL DATA SECTION

                                ;////////////////////////////////////////////////////////////////////////////////
                                ;/      THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
                                ;/      IN MORE THAN ONE TEST.
                                ;////////////////////////////////////////////////////////////////////////////////

                                ;;**************************************************************************
                                ;* STORAGE FOR DEVICE REGISTERS
                                ;;**************************************************************************
002312                                  DESCRIPT        <M8207 DIAG. #2 OF 2>
002312                          L$DESC::
002312  034115  030062  020067         .ASCIZ  /M8207 DIAG. #2 OF 2/
002320  044504  043501  020056
002326  031043  047440  020106
002334  000062
                                        .EVEN

                                ;**************************************************************************
                                ;* PROGRAM CONTROL PARAMETERS
                                ;**************************************************************************
002336  000000                  NEXT:   .WORD   0               ;ADDRESS OF NEXT TEST TO BE EXECUTED
002340  000000                  LOCK:   .WORD   0               ;ADDRESS FOR LOCK CURRENT DATA

                                ;**************************************************************************
                                ;* MISCELLANEOUS STORAGE
                                ;**************************************************************************
002342  000000                  LOGDEV: .WORD   0               ;LOGICAL DEVICE NUMBER
002344  000000                  PSTACK: .WORD   0               ;BASE LEVEL PROGRAM STACK POINTER
002346  000000                  SUBRPC: .WORD   0               ;PC OF SUBR CALL FOR ERROR REPORTS
002350  000000                  ERRFLG: .WORD   0               ;SUBROUTINE ERROR FLAG
002352  000000                  RETADR: .WORD   0               ;SUBR ERROR RETURN ADDRESS
002354  000000                  STRTSW: .WORD   0               ;SWITCHES AT START OF PROGRAM
002356  000000                  STAT:   .WORD   0               ;KM STATUS WORD STORAGE
002360  000000                  CLKX:   .WORD   0               ;
002362  000000                  MASKX:  .WORD   0               ;
002364  000000                  SAVSP:  .WORD   0               ;STACK POINTER STORAGE
002366  000000                  SAVPC:  .WORD   0               ;PROGRAM COUNTER STORAGE
002370  000000                  ZERO:   .WORD   0               ;
002372  000001                  ONE:    .WORD   1               ;
002374  000000                  MEMLIM: .WORD   0               ;HIGHEST LOCATION FOR NPR'S
002376  000001                  KMACTV: .BLKW   1               ;M8200,4,7 SELECTED ACTIVE
002400  000001                  KMNUM:  .BLKW   1               ;OCTAL NUMBER OF M8200,4,7'S
002402  000001                  SAVACT: .BLKW   1               ;ORIGINAL ACTIVE DEVICES
002404  000001                  SAVNUM: .BLKW   1               ;WORKABLE NUMBER
002406  000000                  FLAG:   .WORD   0               ;SCRATCH STORAGE
002410  000000                  RUN:    .WORD   0               ;POINTER TO RUNNING DEVICES
002412  000000                  FADR:   .WORD   0
002414  000000                  WTYPE:  .WORD   0               ;M82XX NUMBER FOR TYPE OF MICO-CPU
002416  000000                  $REG5:  .WORD   0               ;STORAGE USED FOR ERROR MSG DATA
002420  000000                  $REG4:  .WORD   0
002422  000000                  $REG3:  .WORD   0
002424  000000                  $REG2:  .WORD   0
002426  000000                  $REG1:  .WORD   0
002430  000000                  $REG0:  .WORD   0
002432  000000                  TYPE:   .WORD   0               ;=0 FOR DMP,=1 FOR M8206
```

```
3635  002434  000000                MR0:    .WORD   0               ;MEMLOC USED INSTEAD OF R0.
3636  002436  003777                MEMSZ:  .WORD   3777            ;INDICATES MEMORIE SIZE, LAST ADDR.
3637  002440  000000                TEMP:   .WORD   0
3638  002442  000000                $TEMP0: .WORD   0
3639  002444  000000                $TMP0:  .WORD   0
3640  002446  000000                $GDADR: .WORD   0               ;CONTAINS ADDRESS OF 'GOOD' DATA
3641  002450  000000                $BDADR: .WORD   0               ;CONTAINS ADDRESS OF 'BAD' DATA
3642  002452  000000                $GDDAT: .WORD   0               ;CONTAINS 'GOOD' DATA
3643  002454  000000                $BDDAT: .WORD   0               ;CONTAINS 'BAD' DATA
3644  002456  000000                        .WORD   0               ;RESERVED--NOT TO BE USED
3645  002460  000000                        .WORD   0
3646  002462  000000                FTIME:  .WORD   0
3647  002464  000000                SAVE4:  .WORD   0
3648  002466  000000                SAVE6:  .WORD   0
3649  002470  000000                RUNB:   .WORD   0               ;0= RUN OFF, 1= RUN SW ON
3650  002472  000000                RUNINH: .WORD   0               ;0=RUN SW OFF, 1=RUN SW ON
3651
3652                                ;*****************************************************************************
3653                                ;* PROGRAM CONTROL FLAGS
3654                                ;*****************************************************************************
3655  002474     000                INIFLG: .BYTE   0               ;PROGRAM INITIALIZING FLAG
3656        002476                          .EVEN
3657  002476     000                LOKFLG: .BYTE   0               ;LOCK ON CURRENT TEST FLAG
3658  002477     000                QV.FLG: .BYTE   0               ;QUICK VERIFY FLAG
3659                                        .EVEN
3660
3661                                ;*****************************************************************************
3662                                ;* DEFINITION OF M8200,4,7 STATUS WORDS - STAT1,STAT2,STAT3
3663                                ;*
3664                                ;*
3665                                ;*      STAT1 - BITS 00-08 IS M8200,4,7 VECTOR ADDRESS
3666                                ;*              BIT15=1 LINE UNIT IS AN M8203
3667                                ;*              BIT14=0 NO TEST CONNECTOR(S) USED
3668                                ;*              BIT14=1 H-XXX TEST CONNECTOR WILL BE USED
3669                                ;*              BIT13=0 LINE UNIT IS AN M8201
3670                                ;*              BIT13=1 LINE UNIT IS AN M8202
3671                                ;*              BIT12=1 NO LINE UNIT
3672                                ;*              BITS 09-11 IS M8200,4,7 PRIORITY LEVEL
3673                                ;*
3674                                ;*      STAT2 - LOW BYTE IS SWITCH PACK #1 (DDCMP LINE NUMBER)
3675                                ;*              HIGH BYTE IS SWITCH PACK #2 (BM873 BOOT ADDRESS)
3676                                ;*
3677                                ;*      STAT3 - BIT0=1 DO FREE RUNNING TESTS ON M8200,4,7
3678                                ;*
3679                                ;*****************************************************************************
3680  002500  000000                STAT1:  .WORD   0
3681  002502  000000                STAT2:  .WORD   0
3682  002504  000000                STAT3:  .WORD   0
3683
3684                                ;*****************************************************************************
3685                                ;* POINTERS TO M8200,4,7 VECTORS AND REGISTERS
3686                                ;*****************************************************************************
3687  002506  000000                KMRVEC: 0       ;POINTER TO M8200,4,7 RCV INTRPT VECTOR
3688  002510  000000                KMRLVL: 0       ;POINTER TO M8200,4,7 RCV INTRPT SERVICE PS
3689  002512  000000                KMTVEC: 0       ;POINTER TO M8200,4,7 TX INTRPT VECTOR
3690  002514  000000                KMTLVL: 0       ;POINTER TO M8200,4,7 TX INTRPT SERVICE PS
```

```
3691  002516  000000                  KMCSR:  0       ;POINTER TO M8200,4,7 CONTROL STATUS REGISTER
3692  002520  000000                  KMCSRH: 0       ;POINTER TO M8200,4,7 CONTROL STATUS REGISTER HIGH BYTE
3693  002522  000000                  KMCTL:  0       ;POINTER TO M8200,4,7 CONTROL OUT REGISTER
3694  002524  000000                  KMP04:  0       ;POINTER TO M8200,4,7 PORT REGISTER - SEL4
3695  002526  000000                  KMP06:  0       ;POINTER TO M8200,4,7 PORT REGISTER - SEL6
3696
3697                                  ;;****  PRIMARY REG ADRS STORAGE FOR THIS UNIT  ******
3698                                  ;THESE LOCATIONS WILL BE LOADED FOR THE CURRENT UNIT, IN INIT CODE
3699  002530                          REGADR:
3700
3701                                  ;;****  STACK USED FOR SUBROUTINE LINKAGE  *****
3702  002530  000100                          .BLKW   100
3703  002730                          SSTACK:
3704
3705
3706
3707
3708
3709
3710
```

```
  3712                                      .SBTTL  GLOBAL TEXT SECTION
  3713
  3714                                      ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
  3715                                      ;%      THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
  3716                                      ;%      MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
  3717                                      ;%      MORE THAN ONE TEST.
  3718                                      ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
  3719
  3720                                      ;;***************************************************************************
  3721                                      ;* NAMES OF DEVICES SUPPORTED BY PROGRAM
  3722                                      ;;***************************************************************************
  3723  002730                                      DEVTYP  <M8200,M8204,OR M8207>
   (4)  002730                              L$DVTYP::
   (3)  002730  034115  030062  026060              .ASCIZ  /M8200,M8204,OR M8207/
   (3)  002736  034115  030062  026064
   (3)  002744  051117  046440  031070
   (3)  002752  033460     000
   (2)          002756                              .EVEN
  3724
  3725
  3726                                      ;
  3727                                      ; FORMAT STATEMENTS USED IN PRINT CALLS
  3728                                      ;
  3729
  3736
  3737
  3738
  3739
  3740
```

```
3742                            .SBTTL  GLOBAL SUBROUTINES
3743
3744                            ;////////////////////////////////////////////////////////////////////////////////
3745                            ;/      THE GLOBAL SUBROUTINES ARE CALLED BY MORE THAN ONE TEST
3746                            ;////////////////////////////////////////////////////////////////////////////////
3747
3748
3749
3750                            ;-------------------------------------------------------------------
3751                            ; MACRO'S NEEDED TO CALL SUBROUTINES
3752                            ;-------------------------------------------------------------------
3753
3754                            .MACRO  POPSP2
3755                                    22626
3756                            .ENDM
```

```
3758
3759
3760
3761
3762
```

```
3764
3765                    ;////////////////////////////////////////////////////////////////////////////////
3766                    ;/      THE GLOBAL SUBROUTINES ARE CALLED BY MORE THAN ONE TEST
3767                    ;////////////////////////////////////////////////////////////////////////////////
3768
3769
3770
3771                    ;-------------------------------------------------------------------
3772                    ; MACRO'S NEEDED TO CALL SUBROUTINES
3773                    ;-------------------------------------------------------------------
3774
3775                    .MACRO  K4ONLY  ?N2
3776                            CMP     MEMSZ,#2000
3777                            BNE     N2
3778                            EXIT    TST
3779                            .ENDM
3780                    .MACRO  ED$CALL XY
3781                            .LIST
3782                            ;************** TEST 'XY' ***************
3783                            .NLIST
3784                            .ENDM
3785                            .MACRO  BADHEAD
3786                            .RADIX  10
3787                            ED$CALL \T$TESTNUM+1
3788                            .RADIX  8
3789                            .ENDM
```

```
3791                            .MACRO  MYINT
3792                                    .LIST
3793                                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
3794                                    .NLIST
3795                            .ENDM
3796
3797                            .MACRO  MACEX   ?N2
3798                                    .LIST
3799                                    ;DO NOT DO TEST IF M8200
3800                                    .NLIST
3801                                    TST     TYPE
3802                                    BNE     N2
3803                                    EXIT    TST
3804                            N2:
3805                            .ENDM   MACEX
3806                            .MACRO  MACEX2  ?N2
3807                                    .LIST
3808                                    ;DO NOT DO TEST IF M8200
3809                                    .NLIST
3810                                    CMP     WTYPE,#0
3811                                    BNE     N2
3812                                    EXIT TST
3813                            N2:
3814                            .ENDM   MACEX2
3815                            .MACRO  K4ONLY  ?N2
3816                                    .LIST
3817                                    ;DO NOT DO TEST IF M8200, OR M8204
3818                                    .NLIST
3819                                    CMP     MEMSZ,#2000
3820                                    BNE     N2
3821                                    EXIT    TST
3822                            N2:
3823                                                            ;NOTE THIS TEST IS ONLY DESIGNED FOR 4K MODULE.
3824                            .ENDM
3825
3826                            .MACRO  CLRMAR
3827                                    ROMCLK
3828                                    004000
3829                            .ENDM   CLRMAR
3830                            .MACRO  ROMCLK
3831                            .LIST
3832                                    JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
3833                            .NLIST
3834                            .ENDM
3835
3836                            .MACRO  SROMCLK
3837                                    .LIST
3838                                    JSR     R5,..SROMCLK
3839                                    .NLIST
3840                            .ENDM
3841                            .MACRO  SKIP06  NNN
3842                                    .LIST
3843                                    ;GOTO 'NNN' IF M8206
3844                                    .NLIST
3845                                    CMP     WTYPE,#6                ;SEE IF M8206
3846                                    BEQ     NNN
```

```
                                        .ENDM
                                        .MACRO  SKIP07  NNN
                                                .LIST
                                                ;GOTO 'NNN' IF M8207
                                                .NLIST
                                                CMP     WTYPE,#7                ;SEE IF M8200,4,7
                                                BEQ     NNN
                                        .ENDM
                                        .MACRO  SKIP04  NNN
                                                .LIST
                                                ;GOTO 'NNN' IF M8204
                                                .NLIST
                                                CMP     WTYPE,#4                ;SEE IF M8204
                                                BEQ     NNN
                                        .ENDM
                                        .MACRO  MSTCLR
                                        JSR     R5,.MSTCLR              ;CLEAR M8200,4,7
                                        .ENDM

002756                                  .MSTCLR:
002756  112777  000100  177534                MOVB    #BIT6,@KMCSRH   ;SET INST.
002764  142777  000300  177526                BICB    #BIT6!BIT7,@KMCSRH
002772  000205                                RTS     R5

002774  000024                          PATCH:  .BLKW   20.             ;PATCH AREA.


003044                                  ENDBUG:
                                        ;       UNSAFE TO PATCH ANY OTHER AREA.
003044                                  .ROMCLK:
003044  000240                                  NOP
003046  000240                                  NOP
003050  152777  000002  177442          .REGT:  BISB    #BIT1,@KMCSRH
003056  012577  177444                          MOV     (R5)+,@KMP06
003062  152777  000003  177430                BISB    #BIT1!BIT0,@KMCSRH
003070  142777  000007  177422                BICB    #BIT2!BIT1!BIT0,@KMCSRH
003076  000205                                RTS     R5

003100                                  .SROMCLK:
003100  000240                                  NOP
003102  022737  000006  002414                CMP     #6,WTYPE
003110  001357                                  BNE     .REGT
003112  152777  000002  177400                BISB    #BIT1,@KMCSRH
003120  012577  177402                          MOV     (R5)+,@KMP06
003124  000240                                  NOP
003126  000240                                  NOP
003130  142777  000007  177362                BICB    #7,@KMCSRH
003136                                  1$:
003136  152777  000001  177354                BISB    #BIT0,@KMCSRH           ;STEP INSTR.
003144  142777  000007  177346                BICB    #BIT2!BIT1!BIT0,@KMCSRH
003152  000240                                  NOP
003154  000240                                  NOP
003156  152777  000002  177334                BISB    #2,@KMCSRH
003164                                  2$:
003164  000205                                  RTS     R5
```

```
3903  003166                          CLRALL:
3904                                          ;CLEARS C & Z BITS AND BR
3905  003166                                  ROMCLK
 (1)  003166  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3906  003172  000400                         400                       ;0 TO BR
3907  003174                                  ROMCLK
 (1)  003174  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3908  003200  063220                         63220                     ;SP(0) TO BR
3909  003202                                  ROMCLK
 (1)  003202  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3910  003206  060400                         60400                     ;BR,SP(0) + BR
3911  003210                                  SROMCLK
 (1)  003210  004537  003100                 JSR     R5,..SROMCLK
3912  003214  000000                         0
3913  003216  000207                         RTS     PC
3914
3915  003220                          SETBR0:
3916                                          ;SETS BR0 BIT
3917  003220                                  ROMCLK
 (1)  003220  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3918  003224  000401                         401                       ;1 TO BR
3919  003226  000207                         RTS     PC
3920
3921  003230                          SETBR1:
3922                                          ;THIS SUBROUTINE SETS BR1 BIT
3923
3924  003230                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION
 (1)  003230  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3925  003234  000402                         000402                    ;BR_002
3926  003236  000207                         RTS     PC
3927
3928  003240                          SETBR4:
3929                                          ;THIS SUBROUTINE SETS BR4 BIT
3930
3931  003240                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION
 (1)  003240  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3932  003244  000420                         420
3933  003246  000207                         RTS     PC
3934
3935  003250                          SETBR7:
3936                                          ;THIS SUBROUTINE SETS BR7 BIT
3937
3938  003250                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION
 (1)  003250  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3939  003254  000600                         600
3940  003256  000207                         RTS     PC
3941
3942  003260                          SETC:
3943                                          ;THIS SUBROUTINE SETS THE C BIT
3944
3945  003260                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION
 (1)  003260  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3946  003264  000777                         000777                    ;BR_377
3947  003266                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION
 (1)  003266  004537  003044                 JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
3948  003272  063220                         063220                    ;SP(0)_BR
```

```
3949  003274                                ROMCLK                  ;NEXT WORD IS INSTRUCTION
 (1)  003274  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
3950  003300  060400                        060400                  ;BR_SP(0)+BR
3951  003302                                SROMCLK                 ;NOW WE MUST CLOCK THE BITS INTO IBUS <13>
 (1)  003302  004537  003100                JSR     R5,..SROMCLK
3952  003306  000000                        0
3953  003310  000207                        RTS     PC
3954
3955  003312                          SETZ:
3956                                        ;THIS SUBROUTINE SETS THE Z BIT
3957
3958  003312                                ROMCLK                  ;NEXT WORD IS INSTRUCTION
 (1)  003312  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
3959  003316  000777                        000777                  ;BR_377
3960  003320                                SROMCLK                 ;NOW CLOCK THE BITS INTO IBUS<13>
 (1)  003320  004537  003100                JSR     R5,..SROMCLK
3961  003324  000777                        0777
3962  003326  000207                        RTS     PC
3963
3964  003330                          RAMDAT:
3965                                        ;THIS SUBROUTINE LOADS R4 WITH THE LOWEST
3966                                        ;8 BITS OF THE CRAM PC.
3967
3968  003330  005004                        CLR     R4
3969  003332  017605  000000                MOV     @(SP),R5        ;GOOD DATA
3970  003336  062716  000002                ADD     #2,(SP)         ;ADJUST STACK
3971  003342                                SKIP06  1$      ;IF M8206,WE'LL GET PC A DIFFERENT WAY.
 (1)                                        ;GOTO 1$ IF M8206
3972  003352                                SKIP07  1$      ;IF M8200,4,7 WE'LL GET PC A DIFFERENT WAY.
 (1)                                        ;GOTO 1$ IF M8207
3973  003362  005011                        CLR     (R1)            ;CLEAR BIT10
3974  003364  052711  000400                BIS     #BIT8,(R1)      ;CLOCK INSTRUCTION IN CRAM THAT
3975                                                                  ;JUMPED TO, IT LOADS BR WITH IT
3976  003370  005011                        CLR     (R1)            ;CLR BIT8
3977  003372                                ROMCLK                  ;NEXT WORD IS INSTRUCTION
 (1)  003372  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
3978  003376  061225                        061225                  ;MOV BR TO PORT 5
3979  003400  116104  000005                MOVB    5(R1),R4        ;PUT "FOUND" IN R4
3980  003404  000207                        RTS     PC              ;RETURN
3981
3982  003406                          1$:   ROMCLK                  ;READ PC LOW REG DIRECTLY.
 (1)  003406  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
3983  003412  121244                        121244                  ;IBUS*<12> TO PORT 4
3984  003414  116104  000004                MOVB    4(R1),R4        ;PUT INTO R4
3985  003420  000207                        RTS PC                  ;EXIT
3986
3987  003422                          WROM:
3988                                        ;THIS SUBROUTINE WRITES THE ROMMAP INTO THE CRAM
3989
3990                                  ;     BIT     #BIT15,STAT1    ;BE SURE M8200,4,7 HAS CRAM
3991                                  ;     BEQ     2$              ;SKIP IF NO CRAM
3992  003422                                SKIP07  2$
 (1)                                        ;GOTO 2$ IF M8207
3993  003432  005000                        CLR     R0              ;R0=CRAM ADDRESS
3994  003434  012702  012146                MOV     #ROMMAP,R2      ;R2 POINTS TO ROMMAP
3995  003440  012711  002000          1$:   MOV     #BIT10,(R1)     ;SET ROM0
```

```
3996  003444  010061  000004                    MOV     R0,4(R1)        ;LOAD CRAM ADDRESS
3997  003450  012261  000006                    MOV     (R2)+,6(R1)     ;LOAD WORD TO BE WRITTEN
3998  003454  052711  020000                    BIS     #BIT13,(R1)     ;WRITE IT!
3999  003460  005200                            INC     R0              ;NEXT ADDRESS
4000  003462  023700  002436                    CMP     MEMSZ,R0        ;DONE YET?
4001  003466  001364                            BNE     1$              ;BR IF NO
4002  003470  005011                            CLR     (R1)            ;CLEAR SEL0
4003  003472  000207                    2$:     RTS     PC              ;RETURN
4004
4005  003474                            MEMSET:
4006                                            ;THIS SUBROUTINE LOADS CRAM WITH SPECIAL INSTRUCTIONS
4007                                            ;FOR THE CRAM JUMP TEST. ALL CRAM LOCATIONS ARE LOADED
4008                                            ;WITH INSTRUCTIONS THAT MOVE A 37 TO THE BR, EXCEPT THE
4009                                            ;FOLLOWING CRAM ADDRESSES: 0,1,4,7,525,1777. THESE LOCATIONS
4010                                            ;CONTAIN INSTRUCTIONS WHICH LOAD THE BR WITH THE LOWEST
4011                                            ;8 BITS OF THAT CRAM ADDRESS.
4012
4013  003474                                    SKIP07  3$      ;IF M8200,4,7 CAN'T WRITE CRAM!
 (1)                                            ;GOTO 3$ IF M8207
4014  003504  005000                            CLR     R0              ;R0 = CRAM ADDRESS
4015  003506  012711  002000            1$:     MOV     #BIT10,(R1)     ;SET ROMO
4016  003512  010061  000004                    MOV     R0,4(R1)        ;LOAD CRAM ADDRESS
4017  003516  012761  000437  000006            MOV     #437,6(R1)      ;LOAD INSTRUCTION
4018  003524  052711  020000                    BIS     #BIT13,(R1)     ;WRITE INSTRUCTION IN CRAM
4019  003530  005200                            INC     R0              ;NEXT ADDRESS
4020  003532  023700  002436                    CMP     MEMSZ,R0        ;DONE YET?
4021  003536  001363                            BNE     1$              ;BR IF NO
4022  003540  005000                            CLR     R0              ;INDEX REGISTER
4023  003542  012711  002000            2$:     MOV     #BIT10,(R1)     ;SET ROMO
4024  003546  016061  003602  000004            MOV     CRAMA(R0),4(R1) ;LOAD CRAM ADDRESS IN SEL4
4025  003554  016061  003616  000006            MOV     INSTU(R0),6(R1) ;LOAD INSTRUCTION TO BE WRITTEN
4026  003562  052711  020000                    BIS     #BIT13,(R1)     ;WRITE CRAM!
4027  003566  005720                            TST     (R0)+           ;NEXT
4028  003570  022700  000014                    CMP     #14,R0          ;DONE YET?
4029  003574  001362                            BNE     2$              ;BR IF NO
4030  003576  005011                            CLR     (R1)            ;CLEAR ALL BITS
4031  003600  000207                    3$:     RTS     PC              ;RETURN
4032
4033  003602  000000  000001  000004  CRAMA:   .WORD   0,1,4,7,1777,525
      003610  000007  001777  000525
4034
4035  003616  000400                    INSTU:  000400          ;BR_0
4036  003620  000401                            000401          ;BR_1
4037  003622  000404                            000404          ;BR_4
4038  003624  000407                            000407          ;BR_7
4039  003626  000777                            000777          ;BR_377
4040  003630  000525                            000525          ;BR_125
4041
4042
4043                                            ;ROUTINE TO SAVE GENERAL REGISTERS FOR ERROR ROUTINE.
4044                                            ; CALL = JSR    PC,SV05
4045  003632  010537  002416            SV05:   MOV     R5,$REG5
4046  003636  010437  002420                    MOV     R4,$REG4
4047  003642  010337  002422                    MOV     R3,$REG3
4048  003646  010237  002424                    MOV     R2,$REG2
4049  003652  010137  002426                    MOV     R1,$REG1
```

```
4050  003656  013737  002434  002430          MOV     MR0,$REG0
4051  003664  000207                          RTS     PC
4052
4053
```

```
4055                                    .SBTTL  GLOBAL ERROR REPORT SECTION
4056
4057                                    ;////////////////////////////////////////////////////////////////////
4058                                    ;/      THE GLOBAL ERROR REPORT SECTION CONTAINS ERROR MESSAGES
4059                                    ;/      THAT ARE USED IN MORE THAN ONE TEST.
4060                                    ;////////////////////////////////////////////////////////////////////
4061
4062
4063
4064
4065
4066  003666  047045  047445  022466  TFM1:   .ASCIZ  /%N%06%S4%06%S4%04%N/
      003674  032123  047445  022466
      003702  032123  047445  022464
      003710  000116
4067  003712  047045  047445  022463  TFM2:   .ASCIZ  /%N%03%S7%03%N/
      003720  033523  047445  022463
      003726  000116
4068  003730  047045  047445  022463  TFM3:   .ASCIZ  /%N%03%S10%03%S4%04%N/
      003736  030523  022460  031517
      003744  051445  022464  032117
      003752  047045     000
4069  003755     045  022516  031517  TFM4:   .ASCIZ  /%N%03%S7%03%N/
      003762  051445  022467  031517
      003770  047045     000
4070  003773     045  022516  033117  TFM5:   .ASCIZ  /%N%06%S5%06%S3%06%N/
      004000  051445  022465  033117
      004006  051445  022463  033117
      004014  047045     000
4071  004017     045  022516  051101  TFM36:  .ASCIZ  /%N%AREGISTER ADDRESS ERROR,ADDRESS = %06%A,UNIT = %02/
      004024  043505  051511  042524
      004032  020122  042101  051104
      004040  051505  020123  051105
      004046  047522  026122  042101
      004054  051104  051505  020123
      004062  020075  047445  022466
      004070  026101  047125  052111
      004076  036440  022440  031117
      004104     000
4072  004105     045  022516  020101  TFM41:  .ASCIZ  /%N%A CSR HIGH BYTE GOT WRITTEN INTO ON A LOW BYTE XFER/
      004112  051503  020122  044510
      004120  044107  041040  052131
      004126  020105  047507  020124
      004134  051127  052111  042524
      004142  020116  047111  047524
      004150  047440  020116  020101
      004156  047514  020127  054502
      004164  042524  054040  042506
      004172  000122
4073  004174  047045  040445  041440  TFM42:  .ASCIZ  /%N%A CSR LOW BYTE GOT WRITTEN INTO ON A HIGH BYTE XFER/
      004202  051123  046040  053517
      004210  041040  052131  020105
      004216  047507  020124  051127
      004224  052111  042524  020116
      004232  047111  047524  047440
      004240  020116  020101  044510
```

```
                004246  044107  041040  052131
                004254  020105  043130  051105
                004262     000
4074            004263     045  022516  047101  TFM40:  .ASCIZ  /%N%ANEG ADDR TEST DUAL ADDR ERROR-BAD ADDR = %06/
                004270  043505  040440  042104
                004276  020122  042524  052123
                004304  042040  040525  020114
                004312  042101  051104  042440
                004320  051122  051117  041055
                004326  042101  040440  042104
                004334  020122  020075  047445
                004342  000066
4075            004344  040445  051440  051103  TFM43:  .ASCIZ  /%A SCRATCH PAD %03%A DUAL ADDRESS ERROR WITH SP%02/
                004352  052101  044103  050040
                004360  042101  022440  031517
                004366  040445  042040  040525
                004374  020114  042101  051104
                004402  051505  020123  051105
                004410  047522  020122  044527
                004416  044124  051440  022520
                004424  031117     000
4076            004427     045  022524  052101  TFM44:  .ASCIZ  /%T%ATHE MAR REG, CONTENTS= %06/
                004434  042510  046440  051101
                004442  051040  043505  020054
                004450  047503  052116  047105
                004456  051524  020075  047445
                004464  000066
4077            004466  052045  040445  044124  TFM45:  .ASCIZ  /%T%ATHE PC REG, CONTENTS= %06/
                004474  020105  041520  051040
                004502  043505  020054  047503
                004510  052116  047105  051524
                004516  020075  047445  000066
4078            004524  047045  040445  047516  TFM45A: .ASCII  /%N%ANOTE: THIS ERROR MAY BE FALSELY GENERATED IF THE/
                004532  042524  020072  044124
                004540  051511  042440  051122
                004546  051117  046440  054501
                004554  041040  020105  040506
                004562  051514  046105  020131
                004570  042507  042516  040522
                004576  042524  020104  043111
                004604  052040  042510
4079            004610  047045  040445  052522          .ASCIZ  /%N%ARUN BIT (SW7 OF E28) IS ON/
                004616  020116  044502  020124
                004624  051450  033527  047440
                004632  020106  031105  024470
                004640  044440  020123  047117
                004646     000
4080            004647     045  047101  051120  TFM46:  .ASCIZ  '%ANPR/MISC REGS DATA FAILURE, GOOD =%06%A, BAD =%06''
                004654  046457  051511  020103
                004662  042522  051507  042040
                004670  052101  020101  040506
                004676  046111  051125  026105
                004704  043440  047517  020104
                004712  022475  033117  040445
                004720  020054  040502  020104
                004726  022475  033117     000
```

```
 4081  004733     045  050101  020103  TFM47:  .ASCIZ  '%APC INCR. INCORRECT: S/B= %06%A ; WAS = %06''
       004740  047111  051103  020056
       004746  047111  047503  051122
       004754  041505  035124  051440
       004762  041057  020075  047445
       004770  022466  020101  020073
       004776  040527  020123  020075
       005004  047445  000066
 4082  005010  040515  052123  051105  TMMC:   .ASCIZ  /MASTER CLEAR FAILED TO CLEAR /
       005016  041440  042514  051101
       005024  043040  044501  042514
       005032  020104  047524  041440
       005040  042514  051101  000040
 4083  005046  047045  052045  047045  FM1:    .ASCIZ  /%N%T%N/
       005054     000
 4084
 4085
 4086
 4087  005055     000                  EM0:    .ASCIZ  //
 4088  005056  051103  046501  042040  EM1:    .ASCIZ  /CRAM DATA ERROR/
       005064  052101  020101  051105
       005072  047522  000122
 4089  005076  051103  046501  042040  EM2:    .ASCIZ  /CRAM DUAL ADDRESSING ERROR/
       005104  040525  020114  042101
       005112  051104  051505  044523
       005120  043516  042440  051122
       005126  051117     000
 4090  005131     112  046525  020120  EM3:    .ASCIZ  /JUMP ERROR/
       005136  051105  047522  000122
 4091  005144  051103  046501  045040  EM4:    .ASCIZ  /CRAM JUMP TEST FAULT/
       005152  046525  020120  042524
       005160  052123  043040  052501
       005166  052114     000
 4092  005171     111  050117  046440  EM5:    .ASCIZ  /IOP MAIN MEMORY TEST/
       005176  044501  020116  042515
       005204  047515  054522  052040
       005212  051505  000124
 4093  005216  047511  020120  040515  EM6:    .ASCIZ  /IOP MAR TEST/
       005224  020122  042524  052123
       005232     000
 4094  005233     102  020122  044522  EM7:    .ASCIZ  /BR RIGHT SHIFT ERROR/
       005240  044107  020124  044123
       005246  043111  020124  051105
       005254  047522  000122
 4095  005260  040515  020122  052504  EM10:   .ASCIZ  /MAR DUAL ADDRESSING ERROR/
       005266  046101  040440  042104
       005274  042522  051523  047111
       005302  020107  051105  047522
       005310  000122
 4096  005312  052512  050115  043040  EM11:   .ASCIZ  /JUMP FIELD ERROR/
       005320  042511  042114  042440
       005326  051122  051117     000
 4097  005333     112  046525  020120  EM12:   .ASCIZ  /JUMP TEST ERROR/
       005340  042524  052123  042440
       005346  051122  051117     000
 4098  005353     103  047117  044504  EM16:   .ASCIZ  /CONDITION CODE TESTING,Z & C/
```

```
        005360  044524  047117  041440
        005366  042117  020105  042524
        005374  052123  047111  026107
        005402  020132  020046  000103
4099    005410  046103  041517  020113  EMB1:   .ASCIZ  /CLOCK TIME TOO FAST/
        005416  044524  042515  052040
        005424  047517  043040  051501
        005432  000124
4100    005434                          EM35:
4101    005434  047506  041522  020105  EM17:   .ASCIZ  /FORCE POWER FAIL ERROR/
        005442  047520  042527  020122
        005450  040506  046111  042440
        005456  051122  051117     000
4102    005463     111  052502  025123  EM27:   .ASCIZ  ''IBUS* WRITE/READ ERROR''
        005470  053440  044522  042524
        005476  051057  040505  020104
        005504  051105  047522  000122
4103
4104    005512  041111  051525  047457  EM29:   .ASCIZ  'IBUS/OBUS WRITE/READ ERROR'
        005520  052502  020123  051127
        005526  052111  027505  042522
        005534  042101  042440  051122
        005542  051117     000
4105
4106    005545     120  046507  041440  EMB50:  .ASCIZ  'PGM CLOCK WOULD NOT CLEAR'
        005552  047514  045503  053440
        005560  052517  042114  047040
        005566  052117  041440  042514
        005574  051101     000
4107    005577     120  046507  041440  EMB51:  .ASCIZ  'PGM CLOCK WOULD NOT SET'
        005604  047514  045503  053440
        005612  052517  042114  047040
        005620  052117  051440  052105
        005626     000
4108    005627     045  022516  025101  STM:    .ASCIZ  '%N%A************************************************************'
        005634  025052  025052  025052
        005642  025052  025052  025052
        005650  025052  025052  025052
        005656  025052  025052  025052
        005664  025052  025052  025052
        005672  025052  025052  025052
        005700  025052  025052  025052
        005706  025052  025052  025052
        005714  025052  025052  025052
        005722     000
4109    005723     000                  DH0:    .ASCIZ  //
4110
4111
4112    005724  054105  042520  052103  DH1:    .ASCIZ  /EXPECTED  FOUND  ADDRESS/
        005732  042105  020040  047506
        005740  047125  020104  040440
        005746  042104  042522  051523
        005754     000
4113    005755     105  050130  041505  DH2:    .ASCIZ  /EXPECTED  FOUND/
        005762  042524  020104  043040
        005770  052517  042116     000
```

```
 4114  005775     106  047522  020115  DH3:    .ASCIZ  /FROM ADDR  TO ADDR  BAD ADDR/
       006002  042101  051104  020040
       006010  047524  040440  042104
       006016  020122  041040  042101
       006024  040440  042104  000122
 4115
 4116
 4117                                   .EVEN
 4118
 4119
 4120
 4121                                   ;-----------------------------------------------------------------------
 4122                                   ; MACRO'S NEEDED TO REPORT ERRORS
 4123                                   ;-----------------------------------------------------------------------
 4124
 4125                                   .MACRO  MDT1
 4126                                           PRINTB  #TFM1,$REG2,$REG4,$REG0
 4127                                   .ENDM
 4128
 4129                                   .MACRO  MDT2
 4130                                           PRINTB  #TFM1,$REG5,$REG4,$REG2
 4131                                   .ENDM
 4132
 4133                                   .MACRO  MDT3
 4134                                           PRINTB  #TFM2,$REG5,$REG4
 4135                                   .ENDM
 4136
 4137                                   .MACRO  MDT4
 4138                                           PRINTB  #TFM3,$REG5,$REG4,FLAG
 4139                                   .ENDM
 4140
 4141                                   .MACRO  MDT5
 4142                                           PRINTB  #TFM3,$REG5,$REG4,$REG2
 4143                                   .ENDM
 4144
 4145                                   .MACRO  MDT0
 4146                                   .ENDM
 4147                                   .MACRO  MDT6
 4148                                           PRINTB  #TFM4,$REG2,$REG4
 4149                                   .ENDM
 4150
 4151                                   .MACRO  MDT7
 4152                                           PRINTB  #TFM4,$REG5,$REG4
```

```
4154                                    .ENDM
4155                                    .MACRO  MDT8
4156                                            PRINTB #TFM5,FADR,$REG5,$REG4
4157                                    .ENDM
```

```
 4159
 4160                            .MACRO  $MD     ERRNN   ERNB    ERHM    ERFM
 4161                                    BGNMSG  ERR'ERRNN
```

```
                                        PRINTB  #FM1,#EM'ERNB
                                        PRINTB  #FM1,#DH'ERHM
                                        MDT'ERFM
                                        PRINTB  #STM
                                        ENDMSG
                                .ENDM

                                .MACRO  ERROR   ECB
                                        JSR     PC,SV05
                                        ERRDF   'ECB',EM0,ERR'ECB'
                                .ENDM


 4177  006032                           $MD     1,1,1,1
  (4)  006032                   ERR1::
  (9)  006032  012746  005056           MOV     #EM1,-(SP)
  (8)  006036  012746  005046           MOV     #FM1,-(SP)
  (7)  006042  012746  000002           MOV     #2,-(SP)
  (4)  006046  010600                   MOV     SP,R0
  (5)  006050  104414                   TRAP    C$PNTB
  (5)  006052  062706  000006           ADD     #6,SP
  (9)  006056  012746  005724           MOV     #DH1,-(SP)
  (8)  006062  012746  005046           MOV     #FM1,-(SP)
  (7)  006066  012746  000002           MOV     #2,-(SP)
  (4)  006072  010600                   MOV     SP,R0
  (5)  006074  104414                   TRAP    C$PNTB
  (5)  006076  062706  000006           ADD     #6,SP
 (12)  006102  013746  002430           MOV     $REG0,-(SP)
 (11)  006106  013746  002420           MOV     $REG4,-(SP)
 (10)  006112  013746  002424           MOV     $REG2,-(SP)
  (9)  006116  012746  003666           MOV     #TFM1,-(SP)
  (8)  006122  012746  000004           MOV     #4,-(SP)
  (5)  006126  010600                   MOV     SP,R0
  (6)  006130  104414                   TRAP    C$PNTB
  (6)  006132  062706  000012           ADD     #12,SP
  (8)  006136  012746  005627           MOV     #STM,-(SP)
  (7)  006142  012746  000001           MOV     #1,-(SP)
  (4)  006146  010600                   MOV     SP,R0
  (5)  006150  104414                   TRAP    C$PNTB
  (5)  006152  062706  000004           ADD     #4,SP
  (4)  006156                   L10003:
  (4)  006156  104423                   TRAP    C$MSG
 4178  006160                           $MD     2,2,1,1
  (4)  006160                   ERR2::
  (9)  006160  012746  005076           MOV     #EM2,-(SP)
  (8)  006164  012746  005046           MOV     #FM1,-(SP)
  (7)  006170  012746  000002           MOV     #2,-(SP)
  (4)  006174  010600                   MOV     SP,R0
  (5)  006176  104414                   TRAP    C$PNTB
  (5)  006200  062706  000006           ADD     #6,SP
  (9)  006204  012746  005724           MOV     #DH1,-(SP)
  (8)  006210  012746  005046           MOV     #FM1,-(SP)
  (7)  006214  012746  000002           MOV     #2,-(SP)
  (4)  006220  010600                   MOV     SP,R0
  (5)  006222  104414                   TRAP    C$PNTB
```

```
   (5)  006224  062706  000006          ADD     #6,SP
   (12) 006230  013746  002430          MOV     $REG0,-(SP)
   (11) 006234  013746  002420          MOV     $REG4,-(SP)
   (10) 006240  013746  002424          MOV     $REG2,-(SP)
   (9)  006244  012746  003666          MOV     #TFM1,-(SP)
   (8)  006250  012746  000004          MOV     #4,-(SP)
   (5)  006254  010600                  MOV     SP,R0
   (6)  006256  104414                  TRAP    C$PNTB
   (6)  006260  062706  000012          ADD     #12,SP
   (8)  006264  012746  005627          MOV     #STM,-(SP)
   (7)  006270  012746  000001          MOV     #1,-(SP)
   (4)  006274  010600                  MOV     SP,R0
   (5)  006276  104414                  TRAP    C$PNTB
   (5)  006300  062706  000004          ADD     #4,SP
   (4)  006304                  L10004:
   (4)  006304  104423                  TRAP    C$MSG
  4179  006306                          $MD     3,1,1,2
   (4)  006306                  ERR3::
   (9)  006306  012746  005056          MOV     #EM1,-(SP)
   (8)  006312  012746  005046          MOV     #FM1,-(SP)
   (7)  006316  012746  000002          MOV     #2,-(SP)
   (4)  006322  010600                  MOV     SP,R0
   (5)  006324  104414                  TRAP    C$PNTB
   (5)  006326  062706  000006          ADD     #6,SP
   (9)  006332  012746  005724          MOV     #DH1,-(SP)
   (8)  006336  012746  005046          MOV     #FM1,-(SP)
   (7)  006342  012746  000002          MOV     #2,-(SP)
   (4)  006346  010600                  MOV     SP,R0
   (5)  006350  104414                  TRAP    C$PNTB
   (5)  006352  062706  000006          ADD     #6,SP
   (12) 006356  013746  002424          MOV     $REG2,-(SP)
   (11) 006362  013746  002420          MOV     $REG4,-(SP)
   (10) 006366  013746  002416          MOV     $REG5,-(SP)
   (9)  006372  012746  003666          MOV     #TFM1,-(SP)
   (8)  006376  012746  000004          MOV     #4,-(SP)
   (5)  006402  010600                  MOV     SP,R0
   (6)  006404  104414                  TRAP    C$PNTB
   (6)  006406  062706  000012          ADD     #12,SP
   (8)  006412  012746  005627          MOV     #STM,-(SP)
   (7)  006416  012746  000001          MOV     #1,-(SP)
   (4)  006422  010600                  MOV     SP,R0
   (5)  006424  104414                  TRAP    C$PNTB
   (5)  006426  062706  000004          ADD     #4,SP
   (4)  006432                  L10005:
   (4)  006432  104423                  TRAP    C$MSG
  4180  006434                          $MD     4,3,2,3
   (4)  006434                  ERR4::
   (9)  006434  012746  005131          MOV     #EM3,-(SP)
   (8)  006440  012746  005046          MOV     #FM1,-(SP)
   (7)  006444  012746  000002          MOV     #2,-(SP)
   (4)  006450  010600                  MOV     SP,R0
   (5)  006452  104414                  TRAP    C$PNTB
   (5)  006454  062706  000006          ADD     #6,SP
   (9)  006460  012746  005755          MOV     #DH2,-(SP)
   (8)  006464  012746  005046          MOV     #FM1,-(SP)
   (7)  006470  012746  000002          MOV     #2,-(SP)
```

```
(4)  006474  010600                    MOV     SP,R0
(5)  006476  104414                    TRAP    C$PNTB
(5)  006500  062706  000006            ADD     #6,SP
(11) 006504  013746  002420            MOV     $REG4,-(SP)
(10) 006510  013746  002416            MOV     $REG5,-(SP)
(9)  006514  012746  003712            MOV     #TFM2,-(SP)
(8)  006520  012746  000003            MOV     #3,-(SP)
(5)  006524  010600                    MOV     SP,R0
(6)  006526  104414                    TRAP    C$PNTB
(6)  006530  062706  000010            ADD     #10,SP
(8)  006534  012746  005627            MOV     #STM,-(SP)
(7)  006540  012746  000001            MOV     #1,-(SP)
(4)  006544  010600                    MOV     SP,R0
(5)  006546  104414                    TRAP    C$PNTB
(5)  006550  062706  000004            ADD     #4,SP
(4)  006554                     L10006:
(4)  006554  104423                    TRAP    C$MSG
```

```
 4182  006556                                  $MD     5,4,2,3
  (4)  006556                        ERR5::
  (9)  006556  012746  005144                  MOV     #EM4,-(SP)
  (8)  006562  012746  005046                  MOV     #FM1,-(SP)
  (7)  006566  012746  000002                  MOV     #2,-(SP)
  (4)  006572  010600                          MOV     SP,R0
  (5)  006574  104414                          TRAP    C$PNTB
  (5)  006576  062706  000006                  ADD     #6,SP
  (9)  006602  012746  005755                  MOV     #DH2,-(SP)
  (8)  006606  012746  005046                  MOV     #FM1,-(SP)
  (7)  006612  012746  000002                  MOV     #2,-(SP)
  (4)  006616  010600                          MOV     SP,R0
  (5)  006620  104414                          TRAP    C$PNTB
  (5)  006622  062706  000006                  ADD     #6,SP
 (11)  006626  013746  002420                  MOV     $REG4,-(SP)
 (10)  006632  013746  002416                  MOV     $REG5,-(SP)
  (9)  006636  012746  003712                  MOV     #TFM2,-(SP)
  (8)  006642  012746  000003                  MOV     #3,-(SP)
  (5)  006646  010600                          MOV     SP,R0
  (6)  006650  104414                          TRAP    C$PNTB
  (6)  006652  062706  000010                  ADD     #10,SP
  (8)  006656  012746  005627                  MOV     #STM,-(SP)
  (7)  006662  012746  000001                  MOV     #1,-(SP)
  (4)  006666  010600                          MOV     SP,R0
  (5)  006670  104414                          TRAP    C$PNTB
  (5)  006672  062706  000004                  ADD     #4,SP
  (4)  006676                        L10007:
  (4)  006676  104423                          TRAP    C$MSG
```

```
4184  006700                                 $MD     6,5,1,4
 (4)  006700                         ERR6::
 (9)  006700  012746  005171                 MOV     #EM5,-(SP)
 (8)  006704  012746  005046                 MOV     #FM1,-(SP)
 (7)  006710  012746  000002                 MOV     #2,-(SP)
 (4)  006714  010600                         MOV     SP,R0
 (5)  006716  104414                         TRAP    C$PNTB
 (5)  006720  062706  000006                 ADD     #6,SP
 (9)  006724  012746  005724                 MOV     #DH1,-(SP)
 (8)  006730  012746  005046                 MOV     #FM1,-(SP)
 (7)  006734  012746  000002                 MOV     #2,-(SP)
 (4)  006740  010600                         MOV     SP,R0
 (5)  006742  104414                         TRAP    C$PNTB
 (5)  006744  062706  000006                 ADD     #6,SP
(12)  006750  013746  002406                 MOV     FLAG,-(SP)
(11)  006754  013746  002420                 MOV     $REG4,-(SP)
(10)  006760  013746  002416                 MOV     $REG5,-(SP)
 (9)  006764  012746  003730                 MOV     #TFM3,-(SP)
 (8)  006770  012746  000004                 MOV     #4,-(SP)
 (5)  006774  010600                         MOV     SP,R0
 (6)  006776  104414                         TRAP    C$PNTB
 (6)  007000  062706  000012                 ADD     #12,SP
 (8)  007004  012746  005627                 MOV     #STM,-(SP)
 (7)  007010  012746  000001                 MOV     #1,-(SP)
 (4)  007014  010600                         MOV     SP,R0
 (5)  007016  104414                         TRAP    C$PNTB
 (5)  007020  062706  000004                 ADD     #4,SP
 (4)  007024                         L10010:
 (4)  007024  104423                         TRAP    C$MSG
4185  007026                                 $MD     7,6,1,5
 (4)  007026                         ERR7::
 (9)  007026  012746  005216                 MOV     #EM6,-(SP)
 (8)  007032  012746  005046                 MOV     #FM1,-(SP)
 (7)  007036  012746  000002                 MOV     #2,-(SP)
 (4)  007042  010600                         MOV     SP,R0
 (5)  007044  104414                         TRAP    C$PNTB
 (5)  007046  062706  000006                 ADD     #6,SP
 (9)  007052  012746  005724                 MOV     #DH1,-(SP)
 (8)  007056  012746  005046                 MOV     #FM1,-(SP)
 (7)  007062  012746  000002                 MOV     #2,-(SP)
 (4)  007066  010600                         MOV     SP,R0
 (5)  007070  104414                         TRAP    C$PNTB
 (5)  007072  062706  000006                 ADD     #6,SP
(12)  007076  013746  002424                 MOV     $REG2,-(SP)
(11)  007102  013746  002420                 MOV     $REG4,-(SP)
(10)  007106  013746  002416                 MOV     $REG5,-(SP)
 (9)  007112  012746  003730                 MOV     #TFM3,-(SP)
 (8)  007116  012746  000004                 MOV     #4,-(SP)
 (5)  007122  010600                         MOV     SP,R0
 (6)  007124  104414                         TRAP    C$PNTB
 (6)  007126  062706  000012                 ADD     #12,SP
 (8)  007132  012746  005627                 MOV     #STM,-(SP)
 (7)  007136  012746  000001                 MOV     #1,-(SP)
 (4)  007142  010600                         MOV     SP,R0
 (5)  007144  104414                         TRAP    C$PNTB
 (5)  007146  062706  000004                 ADD     #4,SP
```

```
   (4)  007152                                  L10011:
   (4)  007152  104423                                  TRAP    C$MSG
 4186   007154                                         $MD     10,7,2,3
   (4)  007154                                  ERR10::
   (9)  007154  012746  005233                          MOV     #EM7,-(SP)
   (8)  007160  012746  005046                          MOV     #FM1,-(SP)
   (7)  007164  012746  000002                          MOV     #2,-(SP)
   (4)  007170  010600                                  MOV     SP,R0
   (5)  007172  104414                                  TRAP    C$PNTB
   (5)  007174  062706  000006                          ADD     #6,SP
   (9)  007200  012746  005755                          MOV     #DH2,-(SP)
   (8)  007204  012746  005046                          MOV     #FM1,-(SP)
   (7)  007210  012746  000002                          MOV     #2,-(SP)
   (4)  007214  010600                                  MOV     SP,R0
   (5)  007216  104414                                  TRAP    C$PNTB
   (5)  007220  062706  000006                          ADD     #6,SP
  (11)  007224  013746  002420                          MOV     $REG4,-(SP)
  (10)  007230  013746  002416                          MOV     $REG5,-(SP)
   (9)  007234  012746  003712                          MOV     #TFM2,-(SP)
   (8)  007240  012746  000003                          MOV     #3,-(SP)
   (5)  007244  010600                                  MOV     SP,R0
   (6)  007246  104414                                  TRAP    C$PNTB
   (6)  007250  062706  000010                          ADD     #10,SP
   (8)  007254  012746  005627                          MOV     #STM,-(SP)
   (7)  007260  012746  000001                          MOV     #1,-(SP)
   (4)  007264  010600                                  MOV     SP,R0
   (5)  007266  104414                                  TRAP    C$PNTB
   (5)  007270  062706  000004                          ADD     #4,SP
   (4)  007274                                  L10012:
   (4)  007274  104423                                  TRAP    C$MSG
 4187   007276                                         $MD     11,10,2,6
   (4)  007276                                  ERR11::
   (9)  007276  012746  005260                          MOV     #EM10,-(SP)
   (8)  007302  012746  005046                          MOV     #FM1,-(SP)
   (7)  007306  012746  000002                          MOV     #2,-(SP)
   (4)  007312  010600                                  MOV     SP,R0
   (5)  007314  104414                                  TRAP    C$PNTB
   (5)  007316  062706  000006                          ADD     #6,SP
   (9)  007322  012746  005755                          MOV     #DH2,-(SP)
   (8)  007326  012746  005046                          MOV     #FM1,-(SP)
   (7)  007332  012746  000002                          MOV     #2,-(SP)
   (4)  007336  010600                                  MOV     SP,R0
   (5)  007340  104414                                  TRAP    C$PNTB
   (5)  007342  062706  000006                          ADD     #6,SP
  (11)  007346  013746  002420                          MOV     $REG4,-(SP)
  (10)  007352  013746  002424                          MOV     $REG2,-(SP)
   (9)  007356  012746  003755                          MOV     #TFM4,-(SP)
   (8)  007362  012746  000003                          MOV     #3,-(SP)
   (5)  007366  010600                                  MOV     SP,R0
   (6)  007370  104414                                  TRAP    C$PNTB
   (6)  007372  062706  000010                          ADD     #10,SP
   (8)  007376  012746  005627                          MOV     #STM,-(SP)
   (7)  007402  012746  000001                          MOV     #1,-(SP)
   (4)  007406  010600                                  MOV     SP,R0
   (5)  007410  104414                                  TRAP    C$PNTB
   (5)  007412  062706  000004                          ADD     #4,SP
```

```
   (4)  007416
   (4)  007416  104423
 4188   007420
   (4)  007420
   (9)  007420  012746  005233
   (8)  007424  012746  005046
   (7)  007430  012746  000002
   (4)  007434  010600
   (5)  007436  104414
   (5)  007440  062706  000006
   (9)  007444  012746  005755
   (8)  007450  012746  005046
   (7)  007454  012746  000002
   (4)  007460  010600
   (5)  007462  104414
   (5)  007464  062706  000006
  (11)  007470  013746  002420
  (10)  007474  013746  002416
   (9)  007500  012746  003755
   (8)  007504  012746  000003
   (5)  007510  010600
   (6)  007512  104414
   (6)  007514  062706  000010
   (8)  007520  012746  005627
   (7)  007524  012746  000001
   (4)  007530  010600
   (5)  007532  104414
   (5)  007534  062706  000004
   (4)  007540
   (4)  007540  104423
 4189   007542
   (4)  007542
   (9)  007542  012746  005260
   (8)  007546  012746  005046
   (7)  007552  012746  000002
   (4)  007556  010600
   (5)  007560  104414
   (5)  007562  062706  000006
   (9)  007566  012746  005755
   (8)  007572  012746  005046
   (7)  007576  012746  000002
   (4)  007602  010600
   (5)  007604  104414
   (5)  007606  062706  000006
  (11)  007612  013746  002420
  (10)  007616  013746  002416
   (9)  007622  012746  003712
   (8)  007626  012746  000003
   (5)  007632  010600
   (6)  007634  104414
   (6)  007636  062706  000010
   (8)  007642  012746  005627
   (7)  007646  012746  000001
   (4)  007652  010600
   (5)  007654  104414
   (5)  007656  062706  000004
```

```
L10013:
        TRAP    C$MSG
        $MD     12,7,2,7
ERR12::
        MOV     #EM7,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     #DH2,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     $REG4,-(SP)
        MOV     $REG5,-(SP)
        MOV     #TFM4,-(SP)
        MOV     #3,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #10,SP
        MOV     #STM,-(SP)
        MOV     #1,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #4,SP
L10014:
        TRAP    C$MSG
        $MD     13,10,2,3
ERR13::
        MOV     #EM10,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     #DH2,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     $REG4,-(SP)
        MOV     $REG5,-(SP)
        MOV     #TFM2,-(SP)
        MOV     #3,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #10,SP
        MOV     #STM,-(SP)
        MOV     #1,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #4,SP
```

```
  (4)  007662
  (4)  007662  104423
4190   007664
  (4)  007664
  (9)  007664  012746  005312
  (8)  007670  012746  005046
  (7)  007674  012746  000002
  (4)  007700  010600
  (5)  007702  104414
  (5)  007704  062706  000006
  (9)  007710  012746  005755
  (8)  007714  012746  005046
  (7)  007720  012746  000002
  (4)  007724  010600
  (5)  007726  104414
  (5)  007730  062706  000006
 (11)  007734  013746  002420
 (10)  007740  013746  002424
  (9)  007744  012746  003755
  (8)  007750  012746  000003
  (5)  007754  010600
  (6)  007756  104414
  (6)  007760  062706  000010
  (8)  007764  012746  005627
  (7)  007770  012746  000001
  (4)  007774  010600
  (5)  007776  104414
  (5)  010000  062706  000004
  (4)  010004
  (4)  010004  104423
```

```
L10015:
        TRAP    C$MSG
        $MD     14,11,2,6
ERR14::
        MOV     #EM11,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     #DH2,-(SP)
        MOV     #FM1,-(SP)
        MOV     #2,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #6,SP
        MOV     $REG4,-(SP)
        MOV     $REG2,-(SP)
        MOV     #TFM4,-(SP)
        MOV     #3,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #10,SP
        MOV     #STM,-(SP)
        MOV     #1,-(SP)
        MOV     SP,R0
        TRAP    C$PNTB
        ADD     #4,SP
L10016:
        TRAP    C$MSG
```

```
 4192  010006                                        $MD     15,12,3,8
  (4)  010006                                ERR15::
  (9)  010006  012746  005333                        MOV     #EM12,-(SP)
  (8)  010012  012746  005046                        MOV     #FM1,-(SP)
  (7)  010016  012746  000002                        MOV     #2,-(SP)
  (4)  010022  010600                                MOV     SP,R0
  (5)  010024  104414                                TRAP    C$PNTB
  (5)  010026  062706  000006                        ADD     #6,SP
  (9)  010032  012746  005775                        MOV     #DH3,-(SP)
  (8)  010036  012746  005046                        MOV     #FM1,-(SP)
  (7)  010042  012746  000002                        MOV     #2,-(SP)
  (4)  010046  010600                                MOV     SP,R0
  (5)  010050  104414                                TRAP    C$PNTB
  (5)  010052  062706  000006                        ADD     #6,SP
 (12)  010056  013746  002420                        MOV     $REG4,-(SP)
 (11)  010062  013746  002416                        MOV     $REG5,-(SP)
 (10)  010066  013746  002412                        MOV     FADR,-(SP)
  (9)  010072  012746  003773                        MOV     #TFM5,-(SP)
  (8)  010076  012746  000004                        MOV     #4,-(SP)
  (5)  010102  010600                                MOV     SP,R0
  (6)  010104  104414                                TRAP    C$PNTB
  (6)  010106  062706  000012                        ADD     #12,SP
  (8)  010112  012746  005627                        MOV     #STM,-(SP)
  (7)  010116  012746  000001                        MOV     #1,-(SP)
  (4)  010122  010600                                MOV     SP,R0
  (5)  010124  104414                                TRAP    C$PNTB
  (5)  010126  062706  000004                        ADD     #4,SP
  (4)  010132                               L10017:
  (4)  010132  104423                                TRAP    C$MSG
 4193  010134                                        $MD     16,16,2,7
  (4)  010134                                ERR16::
  (9)  010134  012746  005353                        MOV     #EM16,-(SP)
  (8)  010140  012746  005046                        MOV     #FM1,-(SP)
  (7)  010144  012746  000002                        MOV     #2,-(SP)
  (4)  010150  010600                                MOV     SP,R0
  (5)  010152  104414                                TRAP    C$PNTB
  (5)  010154  062706  000006                        ADD     #6,SP
  (9)  010160  012746  005755                        MOV     #DH2,-(SP)
  (8)  010164  012746  005046                        MOV     #FM1,-(SP)
  (7)  010170  012746  000002                        MOV     #2,-(SP)
  (4)  010174  010600                                MOV     SP,R0
  (5)  010176  104414                                TRAP    C$PNTB
  (5)  010200  062706  000006                        ADD     #6,SP
 (11)  010204  013746  002420                        MOV     $REG4,-(SP)
 (10)  010210  013746  002416                        MOV     $REG5,-(SP)
  (9)  010214  012746  003755                        MOV     #TFM4,-(SP)
  (8)  010220  012746  000003                        MOV     #3,-(SP)
  (5)  010224  010600                                MOV     SP,R0
  (6)  010226  104414                                TRAP    C$PNTB
  (6)  010230  062706  000010                        ADD     #10,SP
  (8)  010234  012746  005627                        MOV     #STM,-(SP)
  (7)  010240  012746  000001                        MOV     #1,-(SP)
  (4)  010244  010600                                MOV     SP,R0
  (5)  010246  104414                                TRAP    C$PNTB
  (5)  010250  062706  000004                        ADD     #4,SP
  (4)  010254                               L10020:
```

(4) 010254 104423 TRAP C$MSG
4194

```
 4196
 4197  010256                                    $MD     17,17,0,0
  (4)  010256                        ERR17::
  (9)  010256  012746  005434                    MOV     #EM17,-(SP)
  (8)  010262  012746  005046                    MOV     #FM1,-(SP)
  (7)  010266  012746  000002                    MOV     #2,-(SP)
  (4)  010272  010600                            MOV     SP,R0
  (5)  010274  104414                            TRAP    C$PNTB
  (5)  010276  062706  000006                    ADD     #6,SP
  (9)  010302  012746  005723                    MOV     #DH0,-(SP)
  (8)  010306  012746  005046                    MOV     #FM1,-(SP)
  (7)  010312  012746  000002                    MOV     #2,-(SP)
  (4)  010316  010600                            MOV     SP,R0
  (5)  010320  104414                            TRAP    C$PNTB
  (5)  010322  062706  000006                    ADD     #6,SP
  (8)  010326  012746  005627                    MOV     #STM,-(SP)
  (7)  010332  012746  000001                    MOV     #1,-(SP)
  (4)  010336  010600                            MOV     SP,R0
  (5)  010340  104414                            TRAP    C$PNTB
  (5)  010342  062706  000004                    ADD     #4,SP
  (4)  010346                        L10021:
  (4)  010346  104423                            TRAP    C$MSG
 4198  010350                                    $MD     29,29,2,3
  (4)  010350                        ERR29::
  (9)  010350  012746  005512                    MOV     #EM29,-(SP)
  (8)  010354  012746  005046                    MOV     #FM1,-(SP)
  (7)  010360  012746  000002                    MOV     #2,-(SP)
  (4)  010364  010600                            MOV     SP,R0
  (5)  010366  104414                            TRAP    C$PNTB
  (5)  010370  062706  000006                    ADD     #6,SP
  (9)  010374  012746  005755                    MOV     #DH2,-(SP)
  (8)  010400  012746  005046                    MOV     #FM1,-(SP)
  (7)  010404  012746  000002                    MOV     #2,-(SP)
  (4)  010410  010600                            MOV     SP,R0
  (5)  010412  104414                            TRAP    C$PNTB
  (5)  010414  062706  000006                    ADD     #6,SP
 (11)  010420  013746  002420                    MOV     $REG4,-(SP)
 (10)  010424  013746  002416                    MOV     $REG5,-(SP)
  (9)  010430  012746  003712                    MOV     #TFM2,-(SP)
  (8)  010434  012746  000003                    MOV     #3,-(SP)
  (5)  010440  010600                            MOV     SP,R0
  (6)  010442  104414                            TRAP    C$PNTB
  (6)  010444  062706  000010                    ADD     #10,SP
  (8)  010450  012746  005627                    MOV     #STM,-(SP)
  (7)  010454  012746  000001                    MOV     #1,-(SP)
  (4)  010460  010600                            MOV     SP,R0
  (5)  010462  104414                            TRAP    C$PNTB
  (5)  010464  062706  000004                    ADD     #4,SP
  (4)  010470                        L10022:
  (4)  010470  104423                            TRAP    C$MSG
 4199  010472                                    $MD     35,35,2,3
  (4)  010472                        ERR35::
  (9)  010472  012746  005434                    MOV     #EM35,-(SP)
  (8)  010476  012746  005046                    MOV     #FM1,-(SP)
  (7)  010502  012746  000002                    MOV     #2,-(SP)
  (4)  010506  010600                            MOV     SP,R0
```

```
   (5)  010510  104414                          TRAP    C$PNTB
   (5)  010512  062706  000006                  ADD     #6,SP
   (9)  010516  012746  005755                  MOV     #DH2,-(SP)
   (8)  010522  012746  005046                  MOV     #FM1,-(SP)
   (7)  010526  012746  000002                  MOV     #2,-(SP)
   (4)  010532  010600                          MOV     SP,R0
   (5)  010534  104414                          TRAP    C$PNTB
   (5)  010536  062706  000006                  ADD     #6,SP
  (11)  010542  013746  002420                  MOV     $REG4,-(SP)
  (10)  010546  013746  002416                  MOV     $REG5,-(SP)
   (9)  010552  012746  003712                  MOV     #TFM2,-(SP)
   (8)  010556  012746  000003                  MOV     #3,-(SP)
   (5)  010562  010600                          MOV     SP,R0
   (6)  010564  104414                          TRAP    C$PNTB
   (6)  010566  062706  000010                  ADD     #10,SP
   (8)  010572  012746  005627                  MOV     #STM,-(SP)
   (7)  010576  012746  000001                  MOV     #1,-(SP)
   (4)  010602  010600                          MOV     SP,R0
   (5)  010604  104414                          TRAP    C$PNTB
   (5)  010606  062706  000004                  ADD     #4,SP
   (4)  010612                          L10023:
   (4)  010612  104423                          TRAP    C$MSG
 4200
 4201  010614                          BGNMSG  ERR36
   (3)  010614                          ERR36::
 4202  010614                          PRINTB  #STM
   (7)  010614  012746  005627                  MOV     #STM,-(SP)
   (6)  010620  012746  000001                  MOV     #1,-(SP)
   (3)  010624  010600                          MOV     SP,R0
   (4)  010626  104414                          TRAP    C$PNTB
   (4)  010630  062706  000004                  ADD     #4,SP
 4203  010634                          ENDMSG
   (3)  010634                          L10024:
   (3)  010634  104423                          TRAP    C$MSG
 4204
 4205  010636                          BGNMSG  ERR40
   (3)  010636                          ERR40::
 4206  010636                          PRINTF  #TFM40,R2
   (8)  010636  010246                          MOV     R2,-(SP)
   (7)  010640  012746  004263                  MOV     #TFM40,-(SP)
   (6)  010644  012746  000002                  MOV     #2,-(SP)
   (3)  010650  010600                          MOV     SP,R0
   (4)  010652  104417                          TRAP    C$PNTF
   (4)  010654  062706  000006                  ADD     #6,SP
 4207  010660                          PRINTB  #STM
   (7)  010660  012746  005627                  MOV     #STM,-(SP)
   (6)  010664  012746  000001                  MOV     #1,-(SP)
   (3)  010670  010600                          MOV     SP,R0
   (4)  010672  104414                          TRAP    C$PNTB
   (4)  010674  062706  000004                  ADD     #4,SP
 4208  010700                          ENDMSG
   (3)  010700                          L10025:
   (3)  010700  104423                          TRAP    C$MSG
 4209  010702                          BGNMSG  ERR41
   (3)  010702                          ERR41::
 4210  010702                          PRINTF  #TFM41
```

```
  (7)  010702  012746  004105                    MOV     #TFM41,-(SP)
  (6)  010706  012746  000001                    MOV     #1,-(SP)
  (3)  010712  010600                            MOV     SP,R0
  (4)  010714  104417                            TRAP    C$PNTF
  (4)  010716  062706  000004                    ADD     #4,SP
 4211  010722                              PRINTB  #STM
  (7)  010722  012746  005627                    MOV     #STM,-(SP)
  (6)  010726  012746  000001                    MOV     #1,-(SP)
  (3)  010732  010600                            MOV     SP,R0
  (4)  010734  104414                            TRAP    C$PNTB
  (4)  010736  062706  000004                    ADD     #4,SP
 4212  010742                              ENDMSG
  (3)  010742                              L10026:
  (3)  010742  104423                            TRAP    C$MSG
 4213  010744                              BGNMSG  ERR42
  (3)  010744                              ERR42::
 4214  010744                              PRINTF  #TFM42
  (7)  010744  012746  004174                    MOV     #TFM42,-(SP)
  (6)  010750  012746  000001                    MOV     #1,-(SP)
  (3)  010754  010600                            MOV     SP,R0
  (4)  010756  104417                            TRAP    C$PNTF
  (4)  010760  062706  000004                    ADD     #4,SP
 4215  010764                              PRINTB  #STM
  (7)  010764  012746  005627                    MOV     #STM,-(SP)
  (6)  010770  012746  000001                    MOV     #1,-(SP)
  (3)  010774  010600                            MOV     SP,R0
  (4)  010776  104414                            TRAP    C$PNTB
  (4)  011000  062706  000004                    ADD     #4,SP
 4216  011004                              ENDMSG
  (3)  011004                              L10027:
  (3)  011004  104423                            TRAP    C$MSG
 4217
 4218  011006                              BGNMSG  ERR43
  (3)  011006                              ERR43::
 4219  011006                              PRINTF  #TFM43,R5,R4
  (9)  011006  010446                            MOV     R4,-(SP)
  (8)  011010  010546                            MOV     R5,-(SP)
  (7)  011012  012746  004344                    MOV     #TFM43,-(SP)
  (6)  011016  012746  000003                    MOV     #3,-(SP)
  (3)  011022  010600                            MOV     SP,R0
  (4)  011024  104417                            TRAP    C$PNTF
  (4)  011026  062706  000010                    ADD     #10,SP
 4220  011032                              PRINTB  #STM
  (7)  011032  012746  005627                    MOV     #STM,-(SP)
  (6)  011036  012746  000001                    MOV     #1,-(SP)
  (3)  011042  010600                            MOV     SP,R0
  (4)  011044  104414                            TRAP    C$PNTB
  (4)  011046  062706  000004                    ADD     #4,SP
 4221  011052                              ENDMSG
  (3)  011052                              L10030:
  (3)  011052  104423                            TRAP    C$MSG
 4222  011054                              BGNMSG  ERR44
  (3)  011054                              ERR44::
 4223  011054                              PRINTF  #TFM44,#TMMC,R4
  (9)  011054  010446                            MOV     R4,-(SP)
  (8)  011056  012746  005010                    MOV     #TMMC,-(SP)
```

```
  (7)  011062  012746  004427                    MOV     #TFM44,-(SP)
  (6)  011066  012746  000003                    MOV     #3,-(SP)
  (3)  011072  010600                            MOV     SP,R0
  (4)  011074  104417                            TRAP    C$PNTF
  (4)  011076  062706  000010                    ADD     #10,SP
4224   011102                              PRINTB  #STM
  (7)  011102  012746  005627                    MOV     #STM,-(SP)
  (6)  011106  012746  000001                    MOV     #1,-(SP)
  (3)  011112  010600                            MOV     SP,R0
  (4)  011114  104414                            TRAP    C$PNTB
  (4)  011116  062706  000004                    ADD     #4,SP
4225   011122                              ENDMSG
  (3)  011122                              L10031:
  (3)  011122  104423                            TRAP    C$MSG
4226   011124                              BGNMSG  ERR45
  (3)  011124                              ERR45::
4227   011124                              PRINTF  #TFM45,#TMMC,R4
  (9)  011124  010446                            MOV     R4,-(SP)
  (8)  011126  012746  005010                    MOV     #TMMC,-(SP)
  (7)  011132  012746  004466                    MOV     #TFM45,-(SP)
  (6)  011136  012746  000003                    MOV     #3,-(SP)
  (3)  011142  010600                            MOV     SP,R0
  (4)  011144  104417                            TRAP    C$PNTF
  (4)  011146  062706  000010                    ADD     #10,SP
4228   011152                              PRINTB  #TFM45A
  (7)  011152  012746  004524                    MOV     #TFM45A,-(SP)
  (6)  011156  012746  000001                    MOV     #1,-(SP)
  (3)  011162  010600                            MOV     SP,R0
  (4)  011164  104414                            TRAP    C$PNTB
  (4)  011166  062706  000004                    ADD     #4,SP
4229   011172                              PRINTB  #STM
  (7)  011172  012746  005627                    MOV     #STM,-(SP)
  (6)  011176  012746  000001                    MOV     #1,-(SP)
  (3)  011202  010600                            MOV     SP,R0
  (4)  011204  104414                            TRAP    C$PNTB
  (4)  011206  062706  000004                    ADD     #4,SP
4230   011212                              ENDMSG
  (3)  011212                              L10032:
  (3)  011212  104423                            TRAP    C$MSG
4231   011214                              BGNMSG  ERR46
  (3)  011214                              ERR46::
4232   011214                              PRINTF  #TFM46,$GDDAT,R4
  (9)  011214  010446                            MOV     R4,-(SP)
  (8)  011216  013746  002452                    MOV     $GDDAT,-(SP)
  (7)  011222  012746  004647                    MOV     #TFM46,-(SP)
  (6)  011226  012746  000003                    MOV     #3,-(SP)
  (3)  011232  010600                            MOV     SP,R0
  (4)  011234  104417                            TRAP    C$PNTF
  (4)  011236  062706  000010                    ADD     #10,SP
4233   011242                              PRINTB  #STM
  (7)  011242  012746  005627                    MOV     #STM,-(SP)
  (6)  011246  012746  000001                    MOV     #1,-(SP)
  (3)  011252  010600                            MOV     SP,R0
  (4)  011254  104414                            TRAP    C$PNTB
  (4)  011256  062706  000004                    ADD     #4,SP
4234   011262                              ENDMSG
```

```
  (3)  011262                          L10033:
  (3)  011262  104423                          TRAP    C$MSG
4235
4236  011264                         BGNMSG  ERR47
  (3)  011264                         ERR47::
4237  011264                         PRINTF  #TFM47,R5,R4
  (9)  011264  010446                         MOV     R4,-(SP)
  (8)  011266  010546                         MOV     R5,-(SP)
  (7)  011270  012746  004733                 MOV     #TFM47,-(SP)
  (6)  011274  012746  000003                 MOV     #3,-(SP)
  (3)  011300  010600                         MOV     SP,R0
  (4)  011302  104417                         TRAP    C$PNTF
  (4)  011304  062706  000010                 ADD     #10,SP
4238  011310                         PRINTB  #STM
  (7)  011310  012746  005627                 MOV     #STM,-(SP)
  (6)  011314  012746  000001                 MOV     #1,-(SP)
  (3)  011320  010600                         MOV     SP,R0
  (4)  011322  104414                         TRAP    C$PNTB
  (4)  011324  062706  000004                 ADD     #4,SP
4239  011330                         ENDMSG
  (3)  011330                         L10034:
  (3)  011330  104423                          TRAP    C$MSG
4240
```

```
4242                            .SBTTL  REPORT CODING SECTION
4243
4244
```

```
4246                                    ;**
```

```
 4248                                   ; THE REPORT CODING SECTION CONTAINS THE
 4249                                   ; 'PRINTS'' CALLS THAT GENERATE STATISTICAL REPORTS.
 4250                                   ;--
 4251
 4252  011332                                   BGNRPT
  (3)  011332                           L$RPT::
 4253
 4259
 4260  011332                                   EXIT    RPT
  (4)  011332  000167                           .WORD   J$JMP
  (3)  011334  000000                           .WORD   L10035-2-.
 4261
```

```
 4269
 4270  011336                          ENDRPT
  (3)  011336                  L10035:
  (3)  011336  104425                 TRAP    C$RPT
 4271
```

```
4273
4274
```

```
4276
4277
```

K 6

```
4279                                    .SBTTL  INITIALIZE SECTION
```

```
4281
4282                                    ;////////////////////////////////////////////////////////////////////////
4283                                    ;/ THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
4284                                    ;/ AT THE BEGINNING OF EACH PASS.
4285                                    ;////////////////////////////////////////////////////////////////////////
4286
4287  011340                                    BGNINIT
 (3)  011340                            L$INIT::
4288
4289                                    ;INITIALIZE SUBROUTINE STACK
4290  011340  012705  002730                    MOV     #SSTACK,R5
4291                                    ;STORE BASE LEVEL PROGRAM STACK POINTER
4292  011344  010637  002344                    MOV     SP,PSTACK
4293  011350  005737  002462                    TST     FTIME
4294  011354  001011                            BNE     1$
4295  011356  013737  000004  002464           MOV     @#4,SAVE4
4296  011364  013737  000006  002466           MOV     @#6,SAVE6
4297  011372  012737  000001  002462           MOV     #1,FTIME
4298  011400  013737  002464  000004  1$:      MOV     SAVE4,@#4
4299  011406  013737  002466  000006           MOV     SAVE6,@#6
4300
4301                                    ;SEE IF PROGRAM JUST STARTED, BR IF YES
4302  011414                                    READEF  #EF.START
 (3)  011414  012700  000040                    MOV     #EF.START,R0
 (3)  011420  104447                            TRAP    C$REFG
4303  011422                                    BCOMPLETE       NEWST
 (2)  011422  103414                            BCS     NEWST
4304                                    ;SEE IF THIS IS A NEW PASS, BR IF YES
4305  011424                                    READEF  #EF.NEW
 (3)  011424  012700  000035                    MOV     #EF.NEW,R0
 (3)  011430  104447                            TRAP    C$REFG
4306  011432                                    BCOMPLETE       NEWST
 (2)  011432  103410                            BCS     NEWST
4307                                    ;SEE IF PROGRAM WAS JUST CONTINUED
4308  011434                                    READEF  #EF.CONTINUE
 (3)  011434  012700  000036                    MOV     #EF.CONTINUE,R0
 (3)  011440  104447                            TRAP    C$REFG
4309  011442                                    BCOMPLETE       ENDIT
 (2)  011442  103576                            BCS     ENDIT
4310                                    ;SEE IF PROGRAM JUST RESTARTED, BR IF NOT
4311  011444                                    READEF  #EF.RESTART
 (3)  011444  012700  000037                    MOV     #EF.RESTART,R0
 (3)  011450  104447                            TRAP    C$REFG
4312  011452                                    BNCOMPLETE      GETPRM
 (2)  011452  103003                            BCC     GETPRM
4313
4314  011454                            NEWST:
4315                                    ;RESET LOGICAL DEVICE TO -1
4316  011454  012737  177777  002342            MOV     #-1,LOGDEV
4317
4318                                    ;GET UNIBUS ADRS, VECTOR, PRIORITY LEVEL, LINE UNIT,SWITCH
4319                                    ;    PACKS, TEST CONNECTOR INFO. FOR THIS M8200,4,7 (CURRENT LOGICAL
4320                                    ;    DEVICE).
4321  011462                            GETPRM:
4322  011462  005237  002342                   INC     LOGDEV
4323  011466  023737  002342  002012           CMP     LOGDEV,L$UNIT
```

```
 4324  011474  002367                          BGE     NEWST
 4325  011476                                  GPHARD  LOGDEV,R1
  (3)  011476  013700  002342                  MOV     LOGDEV,R0
  (3)  011502  104442                          TRAP    C$GPHRD
  (3)  011504  010001                          MOV     R0,R1
 4326  011506                                  BNCOMPLETE      GETPRM
  (2)  011506  103365                          BCC     GETPRM
 4327  011510  012137  002414                  MOV     (R1)+,WTYPE
 4328                                  ;GET ADDRESS OF M8200,4,7
 4329  011514  011137  002516                  MOV     (R1),KMCSR
 4330                                  ;GET POINTER TO M8200,4,7 CSR HI BYTE
 4331  011520  011137  002520                  MOV     (R1),KMCSRH
 4332  011524  005237  002520                  INC     KMCSRH
 4333                                  ;GET POINTER TO M8200,4,7 CTL OUT REG
 4334  011530  011137  002522                  MOV     (R1),KMCTL
 4335  011534  062737  000002  002522          ADD     #2,KMCTL
 4336                                  ;GET POINTER TO M8200,4,7 PORT REG - SEL 4
 4337  011542  011137  002524                  MOV     (R1),KMP04
 4338  011546  062737  000004  002524          ADD     #4,KMP04
 4339                                  ;GET POINTER TO M8200,4,7 PORT REG - SEL 6
 4340  011554  012137  002526                  MOV     (R1)+,KMP06
 4341  011560  062737  000006  002526          ADD     #6,KMP06
 4342                                  ;GET POINTER TO RCV VECTOR
 4343  011566  011137  002506                  MOV     (R1),KMRVEC
 4344                                  ;GET POINTER TO RCV PRIORITY LEVEL
 4345  011572  011137  002510                  MOV     (R1),KMRLVL
 4346  011576  062737  000002  002510          ADD     #2,KMRLVL
 4347                                  ;GET POINTER TO TX VECTOR
 4348  011604  011137  002512                  MOV     (R1),KMTVEC
 4349  011610  062737  000004  002512          ADD     #4,KMTVEC
 4350                                  ;GET POINTER TO TX PRIORITY LEVEL
 4351  011616  011137  002514                  MOV     (R1),KMTLVL
 4352  011622  062737  000006  002514          ADD     #6,KMTLVL
 4353                                  ;PUT VECTOR INTO STAT1
 4354  011630  016137  000020  002472          MOV     20(R1),RUNINH
 4355  011636  012137  002500                  MOV     (R1)+,STAT1
 4356                                  ;PUT PRIORITY INTO STAT1
 4357  011642  052137  002500                  BIS     (R1)+,STAT1
 4358                                  ;SEE IF NO LINE UNIT, SET BIT IF YES
 4359  011646  005711                          TST     (R1)
 4360  011650  001004                          BNE     50000$
 4361  011652  052737  010000  002500          BIS     #BIT12,STAT1
 4362  011660  000416                          BR      4$
 4363  011662                                  50000$:
 4364                                  ;SEE IF M8201 LINE UNIT, SET BIT IF YES
 4365  011662  021127  000001                  CMP     (R1),#1
 4366  011666  001001                          BNE     50001$
 4367  011670  000412                          BR      4$
 4368  011672                                  50001$:
 4369                                  ;SEE IF M8202 LINE UNIT, SET BIT IF YES
 4370  011672  021127  000002                  CMP     (R1),#2
 4371  011676  001004                          BNE     50002$
 4372  011700  052737  020000  002500          BIS     #BIT13,STAT1
 4373  011706  000403                          BR      4$
 4374  011710                                  50002$:
 4375                                  ;SET BIT FOR M8203 LINE UNIT
```

```
 4376  011710  052737  100000  002500          BIS     #BIT15,STAT1
 4377  011716                              4$:
 4378                                      ;SET BIT IN STAT1 FOR TEST CONNECTOR
 4379  011716  056137  000006  002500          BIS     6(R1),STAT1
 4380  011724  062701  000002                  ADD     #2,R1
 4381                                      ;SET SWITCH PACK #1 IN STAT2 LOW BYTE
 4382  011730  012137  002502                  MOV     (R1)+,STAT2
 4383                                      ;SET SWITCH PACK #2 IN STAT2 HIGH BYTE
 4384  011734  111137  002503                  MOVB    (R1),STAT2+1
 4385
 4386                                      ;INCREMENT LOGICAL UNIT (DEVICE) NUMBER
 4387                                      ;       INC     LOGDEV
 4388  011740  000240                          NOP
 4389  011742  000240                          NOP
 4390
 4391  011744  012737  002000  002436          MOV     #2000,MEMSZ
 4392  011752  005037  002432                  CLR     TYPE
 4393  011756  123727  002414  000000          CMPB    WTYPE,#0
 4394  011764  001425                          BEQ     ENDIT
 4395  011766  123727  002414  000004          CMPB    WTYPE,#4        ;KMC?
 4396  011774  001004                          BNE     5$
 4397  011776  012737  000001  002432          MOV     #1,TYPE
 4398  012004  000415                          BR      ENDIT
 4399  012006  012737  007777  002436  5$:     MOV     #7777,MEMSZ
 4400  012014  123727  002414  000006          CMPB    WTYPE,#6
 4401  012022  001003                          BNE     7$
 4402  012024  012737  000001  002432          MOV     #1,TYPE
 4403  012032  013737  002472  002470  7$:     MOV     RUNINH,RUNB
 4404  012040                              6$:
 4405  012040                              ENDIT:
 4406  012040                                  ENDINIT
  (3)  012040                              L10036:
  (3)  012040  104411                          TRAP    C$INIT
 4407
 4408                                      .EVEN
 4409  012042                                  BGNAUTO
  (3)  012042                              L$AUTO::
 4410                                      ;DEVICE DOES NOT HAVE A 'READY'
 4411  012042  013701  002516                  MOV     KMCSR,R1        ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4412  012046  012705  000004                  MOV     #4,R5           ;4 REGISTERS TO BE TESTED
 4413  012052  012737  012104  000004          MOV     #2$,4           ;SET OUT TIMEOUT TRAP
 4414  012060  012737  000240  000006          MOV     #240,6          ;LEVEL 7
 4415  012066  005711                  1$:     TST     (R1)            ;REFERENCE DEVICE REGISTERS
 4416  012070  000240                          NOP
 4417  012072  062701  000002                  ADD     #2,R1           ;NEXT REGISTER
 4418  012076  005305                          DEC     R5              ;DEC REGISTER COUNT
 4419  012100  001372                          BNE     1$              ;BR IF NOT LAST REGISTER
 4420  012102  000405                          BR      3$
 4421
 4422  012104  062706  000004          2$:     ADD     #4,SP
 4423  012110                                  DODU    LOGDEV
  (3)  012110  013700  002342                  MOV     LOGDEV,R0
  (3)  012114  104451                          TRAP    C$DODU
 4424
 4425  012116  013737  002464  000004  3$:     MOV     SAVE4,4
 4426  012124  013737  002466  000006          MOV     SAVE6,6
```

```
 4427  012132                          ENDAUTO
  (3)  012132                 L10037:
  (3)  012132  104461                 TRAP    C$AUTO
 4428
```

```
                                .SBTTL  CLEANUP CODING SECTION

                                ;////////////////////////////////////////////////////////////////////////
                                ;/ THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ;/ AT THE END OF EACH PASS.
                                ;////////////////////////////////////////////////////////////////////////

                                        BGNCLN
                                L$CLEAN::
                                        BRESET
                                        TRAP    C$RESET

                                        ENDCLN
                                L10040:
                                        TRAP    C$CLEAN
```

```
4447                                    .SBTTL  DROP UNIT SECTION
4448
4449                                    ;////////////////////////////////////////////////////////////////////////////////
4450                                    ;/ THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
4451                                    ;/ TO NO LONGER BE TESTED.
4452                                    ;////////////////////////////////////////////////////////////////////////////////
4453
4454  012140                                    BGNDU
 (3)  012140                            L$DU::
4455                                    ;ISSUE UNIBUS RESET TO CLEAN UP
4456  012140                                    BRESET
 (3)  012140  104433                        TRAP    C$RESET
4457  012142                                    ENDDU
 (3)  012142                            L10041:
 (3)  012142  104453                        TRAP    C$DU
4458
4459
4460
4461
4462
```

```
4464                                    .SBTTL  ADD UNIT SECTION
4465
4466                                    ;////////////////////////////////////////////////////////////////////
4467                                    ;/ THE ADD-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
4468                                    ;/  TO BE (A) TESTED FOR THE FIRST TIME, OR (B) RESUMED IN TESTING.  IF
4469                                    ;/  'EF.AUNIT' IS SET, THE UNIT WILL BE TESTED AS A NEW UNIT.
4470                                    ;////////////////////////////////////////////////////////////////////
4471
4472  012144                                    BGNAU
 (3)  012144                            L$AU::
4473  012144                                    ENDAU
 (3)  012144                            L10042:
 (3)  012144  104452                            TRAP    C$AU
4474
4475
4476
4477
4478
4479
```

```
                                        .SBTTL  HARDWARE TESTS


                                        ;START OF CODE BLOCK WHICH IS USED AS DATA
012146                                  ROMMAP:

012146                                          BADHEAD
 (2)                                            ;************** TEST 1 ***************
                                                ;*VERIFY THAT REFERENCING UNIBUS DEVICE REGISTERS
                                                ;*DOES NOT CAUSE A TIME OUT TRAP
012146                                          BADHEAD
 (2)                                            ;************** TEST 1 ***************

012146                                  BGNTST
 (3)    012146                          T1::
012146  013701  002516                          MOV     KMCSR,R1        ;R1 CONTAINS BASE M8200,4,7 ADDRESS
012152  012705  000004                          MOV     #4,R5           ;4 REGISTERS TO BE TESTED
012156  012737  012214  000004                  MOV     #2$,4           ;SET OUT TIMEOUT TRAP
012164  012737  000240  000006                  MOV     #240,6          ;LEVEL 7
012172  005711                          1$:     TST     (R1)            ;REFERENCE DEVICE REGISTERS
012174  000240                                  NOP
012176                                          ESCAPE  TST
 (3)    012176  104410                          TRAP    C$ESCAPE
 (3)    012200  000054                          .WORD   L10043-.
012202  062701  000002                          ADD     #2,R1           ;NEXT REGISTER
012206  005305                                  DEC     R5              ;DEC REGISTER COUNT
012210  001370                                  BNE     1$              ;BR IF NOT LAST REGISTER
012212  000410                                  BR      3$

012214  062706  000004                  2$:     ADD     #4,SP
012220                                          ERROR   36              ;TIME OUT ERROR
 (5)    012224  104455                          TRAP    C$ERDF
 (6)    012226  000044                          .WORD   36
 (6)    012230  005055                          .WORD   EMO
 (6)    012232  010614                          .WORD   ERR36

012234  013737  002464  000004          3$:     MOV     SAVE4,4
012242  013737  002466  000006                  MOV     SAVE6,6
012250                                          ESCAPE  TST
 (3)    012250  104410                          TRAP    C$ESCAPE
 (3)    012252  000002                          .WORD   L10043-.

012254                                  ENDTST
 (3)    012254                          L10043:
 (3)    012254  104401                          TRAP    C$ETST
                                        .EVEN


012256                                          BADHEAD
 (2)                                            ;************** TEST 2 ***************
                                                ;*TEST OF BR RIGHT SHIFT
                                                ;*VERIFY THAT A DEST OF BR RSH (011) OF A MICRO-INSTRUCTION
                                                ;*SHIFTS THE RESULTING BR DATA RIGHT ONCE.
012256                                          BADHEAD
 (2)                                            ;************** TEST 2 ***************
```

```
4522
4523  012256                                BGNTST
 (3)  012256                                T2::
4524
4525  012256                                      MSTCLR                  ;R1 CONTAINS BASE M8200,4,7 ADDRESS
4526  012262  013701  002516                      MOV     KMCSR,R1        ;MASTER CLEAR M8200,4,7
4527  012266  005011                              CLR     (R1)            ;R1 = M8200,4,7 BASE ADDRESS
4528  012270  012705  052525                      MOV     #52525,R5       ;CLEAR SEL0
4529  012274  010561  000004                      MOV     R5,4(R1)        ;START WITH 125
4530  012300                                      ROMCLK                  ;PORT4 125
 (1)  012300  004537  003044                      JSR     R5,..ROMCLK     ;NEXT WORD IS INSTRUCTION
4531  012304  120500                              120500                  ;CLOCK INSTRUCTION
4532  012306                                      ROMCLK                  ;PORT4 TO BR-REG
 (1)  012306  004537  003044                      JSR     R5,..ROMCLK     ;NEXT WORD IS INSTRUCTION
4533  012312  061620                              061620                  ;CLOCK INSTRUCTION
4534  012314                                      ROMCLK                  ;BR RSH BR, SHIFT BR RIGHT
 (1)  012314  004537  003044                      JSR     R5,..ROMCLK     ;NEXT WORD IS INSTRUCTION
4535  012320  061225                              061225                  ;CLOCK INSTRUCTION
4536  012322  006005                              ROR     R5              ;PORT5 BR
4537  012324  005004                              CLR     R4              ;R5 = "EXPECTED"
4538  012326  116104  000005                      MOVB    5(R1),R4        ;R4 = "FOUND"
4539  012332  120504                              CMPB    R5,R4           ;DID BR SHIFT RIGHT ONCE?
4540  012334  001410                              BEQ     1$              ;BR IF YES
4541  012336                                      ERROR   12              ;BR RIGHT SHIFT ERROR
 (5)  012342  104455                              TRAP    C$ERDF
 (6)  012344  000014                              .WORD   12
 (6)  012346  005055                              .WORD   EM0
 (6)  012350  007420                              .WORD   ERR12
4542
4543  012352                                      ESCAPE TST              ;SHOULD BE 52
 (3)  012352  104410                              TRAP    C$ESCAPE
 (3)  012354  000044                              .WORD   L10044-.
4544  012356                                1$:
4545  012356                                      ROMCLK                  ;NEXT WORD IS INSTRUCTION
 (1)  012356  004537  003044                      JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4546  012362  061620                              061620                  ;BR RSH BR, SHFT BR RIGHT AGAIN
4547  012364                                      ROMCLK                  ;NE4XT WORD IS INSTRUCTION
 (1)  012364  004537  003044                      JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4548  012370  061225                              061225                  ;PORT5 BR
4549  012372  006005                              ROR     R5              ;R5 = "EXPECTED"
4550  012374  116104  000005                      MOVB    5(R1),R4        ;R4 = "FOUND"
4551  012400  120504                              CMPB    R5,R4           ;DID BR SHIFT RIGHT?
4552  012402  001406                              BEQ     2$              ;BR IF YES
4553  012404                                      ERROR   12              ;BR RIGHT SHIFT ERROR
 (5)  012410  104455                              TRAP    C$ERDF
 (6)  012412  000014                              .WORD   12
 (6)  012414  005055                              .WORD   EM0
 (6)  012416  007420                              .WORD   ERR12
4554
4555  012420                                      ;S/B 25
4556  012420                                2$:
 (3)  012420                                ENDTST
 (3)  012420  104401                        L10044:
4557                                              TRAP    C$ETST
4558  012422                                      BADHEAD
 (2)                                              ;************** TEST 3 **************
```

```
                                        ;*IOP CRAM WRITE/READ TEST
                                        ;*FLOAT A 1 THROUGH EACH CRAM LOCATION
                                        BADHEAD
                                        ;************** TEST 3 **************

                                BGNTST
                                T3::
                                        MACEX
                                        ;DO NOT DO TEST IF M8200
012430 104432                           TRAP    C$EXIT
012432 000116                           .WORD   L10045-.
                                        MYINT
012434 013701 002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
                                                                        ;R1 CONTAINS BASE M8200,4,7 ADDRESS
012440 005037 002434                    CLR     MR0                     ;MR0 = CRAM ADDRESS
012444 012702 000001            ADR4:   MOV     #1,R2                   ;R2 = WRITE DATA
                                ADR5:
                                        BGNSEG
012450 104404                           TRAP    C$BSEG
012452 012711 002000            3$:     MOV     #BIT10,(R1)             ;SET ROM0
012456 013761 002434 000004             MOV     MR0,4(R1)               ;WRITE ADDRESS TO SEL4
012464 010261 000006                    MOV     R2,6(R1)                ;LOAD SEL6 WITH WRITE DATA
012470 052711 020000                    BIS     #BIT13,(R1)             ;WRITE SEL6 INTO CRAM
012474 016104 000006                    MOV     6(R1),R4                ;READ CRAM INTO "FOUND"
012500 020204                           CMP     R2,R4                   ;IS DATA CORRECT?
012502 001410                           BEQ     4$                      ;BR IF OK
012504                                  ERROR   1                       ;ERROR
012510 104455                           TRAP    C$ERDF
012512 000001                           .WORD   1
012514 005055                           .WORD   EM0
012516 006032                           .WORD   ERR1
                                        ESCAPE SEG
012520 104410                           TRAP    C$ESCAPE
012522 000002                           .WORD   10000$-.
012524                          4$:     ENDSEG
                                10000$:
012524 104405                           TRAP    C$ESEG
012526 000241                           CLC                             ;CLEAR CARRY
012530 006102                           ROL     R2                      ;SHIFT WRITE DATA
012532 001346                           BNE     ADR5                    ;BSR IF NOT DONE THIS ADDRESS
012534 005237 002434                    INC     MR0                     ;BUMP TO NEXT CRAM ADDRESS
012540 023737 002436 002434             CMP     MEMSZ,MR0               ;DONE YET?
012546 001336                           BNE     ADR4                    ;BR IF NO
012550                          5$:
                                ENDTST
                                L10045:
012550 104401                           TRAP    C$ETST

                                        BADHEAD
                                        ;************** TEST 4 **************
                                        ;*IOP CRAM WRITE/READ TEST
                                        ;*FLOAT A 0 THROUGH EACH CRAM LOCATION
012552                                  BADHEAD
                                        ;************** TEST 4 **************

012552                          BGNTST
```

```
  (3)  012552                                   T4::
 4596  012552                                   MACEX
  (1)
  (4)  012560  104432                                   ;DO NOT DO TEST IF M8200
                                                TRAP    C$EXIT
  (4)  012562  000126                           .WORD   L10046-.
 4597  012564                                   MYINT
  (1)  012564  013701  002516                   MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
 4598  012570                                   MSTCLR                          ;MASTER CLEAR M8200,4,7
 4599  012574  005037  002434                   CLR     MR0                     ;MR0 = CRAM ADDRESS
 4600  012600  012702  000001           ADR1:   MOV     #1,R2                   ;R2 = WRITE DATA
 4601  012604                           ADR2:
 4602  012604                                   BGNSEG
  (3)  012604  104404                           TRAP    C$BSEG
 4603  012606  005102                           COM     R2                      ;MAKE IT A FLOATING ZERO
 4604  012610  012711  002000           3$:     MOV     #BIT10,(R1)             ;SET ROM0
 4605  012614  013761  002434  000004           MOV     MR0,4(R1)               ;WRITE ADDRESS TO SEL4
 4606  012622  010261  000006                   MOV     R2,6(R1)                ;LOAD SEL6 WITH WRITE DATA
 4607  012626  052711  020000                   BIS     #BIT13,(R1)             ;WRITE SEL6 INTO CRAM
 4608  012632  016104  000006                   MOV     6(R1),R4                ;READ CRAM INTO ''FOUND''
 4609  012636  020204                           CMP     R2,R4                   ;IS DATA CORRECT?
 4610  012640  001410                           BEQ     4$                      ;BR IF OK
 4611  012642                                   ERROR   1                       ;ERROR
  (5)  012646  104455                           TRAP    C$ERDF
  (6)  012650  000001                           .WORD   1
  (6)  012652  005055                           .WORD   EM0
  (6)  012654  006032                           .WORD   ERR1
 4612  012656                                   ESCAPE SEG
  (3)  012656  104410                           TRAP    C$ESCAPE
  (3)  012660  000002                           .WORD   10000$-.
 4613  012662                           4$:     ENDSEG
  (3)  012662                           10000$:
  (3)  012662  104405                           TRAP    C$ESEG
 4614  012664  005102                           COM     R2                      ;BACK TO FLOATING ONE
 4615  012666  000241                           CLC                             ;CLEAR CARRY
 4616  012670  006102                           ROL     R2                      ;SHIFT WRITE DATA
 4617  012672  001344                           BNE     ADR2                    ;BR IF NOT DONE THIS ADDRESS
 4618  012674  005237  002434                   INC     MR0                     ;BUMP TO NEXT CRAM ADDRESS
 4619  012700  023737  002436  002434           CMP     MEMSZ,MR0               ;DONE YET?
 4620  012706  001334                           BNE     ADR1                    ;BR IF NO
 4621  012710                           5$:
 4622  012710                           ENDTST
  (3)  012710                           L10046:
  (3)  012710  104401                           TRAP    C$ETST
 4623
 4624  012712                                   BADHEAD
  (2)                                           ;*************** TEST 5 ***************
 4625                                           ;*IOP CRAM DUAL ADDRESSING TEST
 4626                                           ;*WRITE EACH ADDRESS INTO ITSELF, READ EACH
 4627                                           ;*ADDRESS TO VERIFY CORRECT ADDRESSING
 4628  012712                                   BADHEAD
  (2)                                           ;*************** TEST 5 ***************
 4629
 4630  012712                           BGNTST
  (3)  012712                           T5::
 4631  012712                           MACEX
  (1)                                           ;DO NOT DO TEST IF M8200
```

```
  (4)  012720  104432                    TRAP    C$EXIT
  (4)  012722  000230                    .WORD   L10047-.
4632   012724                           MYINT
  (1)  012724  013701  002516            MOV     KMCSR,R1            ;RECORD DEVICE ADDR.
4633                                                                ;R1 CONTAINS BASE M8200,4,7 ADDRESS
4634   012730                           MSTCLR                      ;MASTER CLEAR M8200,4,7
4635   012734  005037  002434            CLR     MR0                 ;MR0 =CRAM ADDRESS
4636   012740                           BGNSEG
  (3)  012740  104404                    TRAP    C$BSEG
4637   012742  013702  002434        1$: MOV     MR0,R2              ;SAVE R2 FOR TYPEOUT
4638   012746  012711  002000            MOV     #BIT10,(R1)         ;SET ROM0
4639   012752  013761  002434  000004      MOV     MR0,4(R1)         ;WRITE ADDRESS TO SEL4
4640   012760  013761  002434  000006      MOV     MR0,6(R1)         ;LOAD SEL6 WITH WRITE DATA
4641   012766  052711  020000            BIS     #BIT13,(R1)         ;WRITE CRAM
4642   012772                           SKIP06  15$                 ;IF M8206,SKIP NEXT INSTR.
  (1)                                   ;GOTO 15$ IF M8206
4643   013002  005061  000006            CLR     6(R1)               ;CLEAR SEL 6
4644   013006                       15$:
4645   013006  016104  000006            MOV     6(R1),R4            ;SHOULD READ BACK OWN ADDRESS
4646   013012  023704  002434            CMP     MR0,R4              ;IS DATA CORRECT?
4647   013016  001410                    BEQ     2$                  ;BR IF YES
4648   013020                           ERROR   1                   ;DATA ERROR
  (5)  013024  104455                    TRAP    C$ERDF
  (6)  013026  000001                    .WORD   1
  (6)  013030  005055                    .WORD   EM0
  (6)  013032  006032                    .WORD   ERR1
4649   013034                           ESCAPE SEG
  (3)  013034  104410                    TRAP    C$ESCAPE
  (3)  013036  000002                    .WORD   10000$-.
4650   013040                       2$: ENDSEG
  (3)  013040                      10000$:
  (3)  013040  104405                    TRAP    C$ESEG
4651   013042                           BGNSEG
  (3)  013042  104404                    TRAP    C$BSEG
4652   013044  005237  002434            INC     MR0                 ;BUMP TO NEXT ADDRESS
4653   013050  023737  002436  002434    CMP     MEMSZ,MR0           ;DONE WRITING YET?
4654   013056  001331                    BNE     1$                  ;BR IF NO
4655   013060  005037  002434            CLR     MR0                 ;RESTART AT ADDRESS 0
4656   013064  013702  002434        3$: MOV     MR0,R2              ;SAVE R2 FOR TYPEOUT
4657   013070  012711  002000            MOV     #BIT10,(R1)         ;SET ROM0
4658   013074  013761  002434  000004      MOV     MR0,4(R1)         ;SEL4 = CRAM ADDRESS
4659   013102  016104  000006            MOV     6(R1),R4            ;READ CRAM INTO ''FOUND''
4660   013106  023704  002434            CMP     MR0,R4              ;IS DATA CORRECT?
4661   013112  001411                    BEQ     4$                  ;BR IF YES
4662   013114                           ERROR   2                   ;DUAL ADDRESSING ERROR
  (5)  013120  104455                    TRAP    C$ERDF
  (6)  013122  000002                    .WORD   2
  (6)  013124  005055                    .WORD   EM0
  (6)  013126  006160                    .WORD   ERR2
4663   013130                           ESCAPE SEG
  (3)  013130  104410                    TRAP    C$ESCAPE
  (3)  013132  000002                    .WORD   10001$-.
4664   013134                           ENDSEG
  (3)  013134                      10001$:
  (3)  013134  104405                    TRAP    C$ESEG
4665   013136                       4$:                             ;LOOP TO 3$ IF SW09=1
```

```
 4666  013136  005237  002434                 INC     MR0             ;BUMP TO NEXT ADDRESS
 4667  013142  023737  002436  002434         CMP     MEMSZ,MR0       ;DONE WRITING YET?
 4668  013150  001345                         BNE     3$              ;BR IF NO
 4669  013152                               5$:
 4670  013152                               ENDTST
  (3)  013152                               L10047:
  (3)  013152  104401                       TRAP    C$ETST
 4671
 4672
 4673  013154                               BADHEAD
  (2)                                       ;*************** TEST 6 ***************
 4674                                       ;*IOP MAIN MEMORY TEST
 4675                                       ;*FLOAT A 1 THROUGH ALL MAIN MEMORY LOCATIONS
 4676  013154                               BADHEAD
  (2)                                       ;*************** TEST 6 ***************
 4677
```

```
 4679  013154                          BGNTST
  (3)  013154                          T6::
 4680  013154                                MYINT
  (1)  013154  013701  002516                 MOV     KMCSR,R1            ;RECORD DEVICE ADDR.
 4681                                                                     ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4682  013160                                MSTCLR                       ;MASTER CLEAR M8200,4,7
 4683  013164  005037  002406                CLR     FLAG                ;START WITH ADDRESS 0
 4684  013170  012737  000001  002434  1$:    MOV     #1,MR0              ;START WITH BIT 0
 4685  013176  042737  003777  013232  65$:   BIC     #3777,66$           ;CLEAR ADDRESS FIELD OF INSTRUCTION
```

```
 4687  013204  042737  000037  013240          BIC     #37,68$         ;CLEAR ADDRESS FIELD OF INSTRUCTION
```

```
 4689  013212  153737  002406  013232          BISB    FLAG,66$        ;ADD ADDRESS TO INSTRUCTION7
 4690  013220  153737  002407  013240          BISB    FLAG+1,68$      ;ADD ADDRESS TO INSTRUCTION
 4691  013226                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  013226  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
 4692  013232  010000                  66$:    010000
 4693  013234                                  ROMCLK
  (1)  013234  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
 4694  013240  004000                  68$:    004000                  ;LOAD MAR HI
 4695  013242  013761  002434  000004          MOV     MR0,4(R1)       ;WRITE PATTERN IN PORT4
 4696  013250                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  013250  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
 4697  013254  122500                          122500                  ;MOVE PORT4 TO MEMORY
 4698  013256                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  013256  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
 4699  013262  040620                          040620                  ;MOVE MEMORY TO BR
 4700  013264                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  013264  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
 4701  013270  061225                          61225                   ;MOVE BR TO PORT5
 4702  013272  013705  002434                  MOV     MR0,R5          ;PUT ''EXPECTED'' IN R5
 4703  013276  116104  000005                  MOVB    5(R1),R4        ;PUT ''FOUND'' IN R4
 4704  013302  120504                          CMPB    R5,R4           ;DATA CORRECT?
 4705  013304  001410                          BEQ     67$             ;BR IF YES
 4706  013306                                  ERROR   6               ;DATA ERROR
  (5)  013312  104455                          TRAP    C$ERDF
  (6)  013314  000006                          .WORD   6
  (6)  013316  005055                          .WORD   EM0
  (6)  013320  006700                          .WORD   ERR6
 4707  013322                                  ESCAPE  TST
  (3)  013322  104410                          TRAP    C$ESCAPE
  (3)  013324  000030                          .WORD   L10050-.
 4708  013326                          67$:                            ;SW09=1?
 4709  013326  000241                          CLC                     ;CLEAR CARRY
 4710  013330  106137  002434                  ROLB    MR0             ;SHIFT BIT IN MR0
 4711  013334  001320                          BNE     65$             ;DONE IF MR0=0
 4712  013336                                  BREAK
  (3)  013336  104422                          TRAP    C$BRK
 4713  013340  005237  002406                  INC     FLAG            ;NEXT ADDRESS
 4714  013344  023737  002436  002406          CMP     MEMSZ,FLAG      ;LAST ADDRESS?
 4715  013352  001306                          BNE     1$              ;BR IF NO
 4716  013354                          2$:
 4717  013354                          ENDTST
  (3)  013354                          L10050:
  (3)  013354  104401                          TRAP    C$ETST
 4718
 4719  013356                                  BADHEAD
  (2)                                         ;*************** TEST 7 ****************
 4720                                         ;*IOP MAIN MEMORY TEST
 4721                                         ;*FLOAT A 0 THROUGH ALL MAIN MEMORY LOCATIONS
 4722  013356                                  BADHEAD
  (2)                                         ;*************** TEST 7 ****************
 4723
 4724  013356                          BGNTST
  (3)  013356                          T7::
 4725  013356                                  MYINT
  (1)  013356  013701  002516                  MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
 4726                                                                  ;R1 CONTAINS BASE M8200,4,7 ADDRESS
```

```
4727  013362                                        MSTCLR                  ;MASTER CLEAR M8200,4,7
4728  013366  005037  002406                       CLR     FLAG            ;START WITH ADDRESS 0
4729  013372  012737  000001  002434  1$:          MOV     #1,MR0          ;START WITH BIT 0
4730  013400  005137  002434          64$:         COM     MR0             ;CHANGE TO FLOATING 0
4731  013404  042737  003777  013440  65$:         BIC     #3777,66$       ;CLEAR ADDRESS FIELD OF INSTRUCTION
4732  013412  042737  000037  013446               BIC     #37,68$         ;CLEAR ADDRESS FIELD OF INSTRUCTION
4733  013420  153737  002406  013440               BISB    FLAG,66$        ;ADD ADDRESS TO INSTRUCTION
4734  013426  153737  002407  013446               BISB    FLAG+1,68$      ;ADD ADDRESS TO INSTRUCTION
4735  013434                                        ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  013434  004537  003044                       JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4736  013440  010000                    66$:       010000                  ;LOAD MAR LO WITH ADDRESS IN FLAG
4737  013442                                        ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  013442  004537  003044                       JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4738  013446  004000                    68$:       004000                  ;LOAD MAR HI
4739  013450  013761  002434  000004               MOV     MR0,4(R1)       ;WRITE PATTERN IN PORT4
4740  013456                                        ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  013456  004537  003044                       JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4741  013462  122500                               122500                  ;MOVE PORT4 TO MEMORY
4742  013464                                        ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  013464  004537  003044                       JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4743  013470  040620                               040620                  ;MOVE MEMORY TO BR
4744  013472                                        ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  013472  004537  003044                       JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4745  013476  061225                               61225                   ;MOVE BR TO PORT5
4746  013500  013705  002434                       MOV     MR0,R5          ;PUT 'EXPECTED" IN R5
4747  013504  116104  000005                       MOVB    5(R1),R4        ;PUT 'FOUND" IN R4
4748  013510  120504                               CMPB    R5,R4           ;DATA CORRECT?
4749  013512  001406                               BEQ     67$             ;BR IF YES
4750  013514                                        ERROR   6               ;DATA ERROR
 (5)  013520  104455                               TRAP    C$ERDF
 (6)  013522  000006                               .WORD   6
 (6)  013524  005055                               .WORD   EM0
 (6)  013526  006700                               .WORD   ERR6
4751  013530                          67$:          ESCAPE  TST
 (3)  013530  104410                               TRAP    C$ESCAPE
 (3)  013532  000034                               .WORD   L10051-.
4752  013534  005137  002434                       COM     MR0             ;CHANGE TO FLOATING 1
4753  013540  000241                               CLC                     ;CLEAR CARRY
4754  013542  106137  002434                       ROLB    MR0             ;SHIFT BIT IN MR0
4755  013546  001314                               BNE     64$             ;DONE IF MR0=0
4756  013550                                        BREAK
 (3)  013550  104422                               TRAP    C$BRK
4757  013552  005237  002406                       INC     FLAG            ;NEXT ADDRESS
4758  013556  023737  002436  002406               CMP     MEMSZ,FLAG      ;LAST ADDRESS?
4759  013564  001302                               BNE     1$              ;BR IF NO
4760  013566                          2$:
4761  013566                          ENDTST
 (3)  013566                          L10051:
 (3)  013566  104401                               TRAP    C$ETST
4762
4763  013570                                        BADHEAD
 (2)                                              ;*************** TEST 8 ****************
4764                                              ;*IOP MAIN MEMORY DUAL ADDRESSING TEST
4765                                              ;*LOAD EACH MEMORY LOCATION WITH ITS OWN ADDRESS
4766                                              ;*READ BACK EACH LOCATION TO VERIFY CORRECT ADDRESSING
4767  013570                                        BADHEAD
```

```
  (2)                                          ;*************** TEST 8 ***************
 4768
 4769  013570                                BGNTST
  (3)  013570                                T8::
 4770  013570                                      MYINT
  (1)  013570  013701  002516                      MOV     KMCSR,R1            ;RECORD DEVICE ADDR.
                                                                               ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4771
 4772  013574                                      MSTCLR                      ;MASTER CLEAR M8200,4,7
 4773  013600  005037  002406                      CLR     FLAG                ;START WITH ADDRESS 0
 4774  013604  013702  002406                1$:   MOV     FLAG,R2             ;PUT DATA IN R2
 4775  013610  042737  003777  013644              BIC     #3777,2$            ;CLEAR ADDRESS FIELD OF INSTRUCTION
 4776  013616  042737  000037  013652              BIC     #37,7$              ;CLEAR ADDRESS FIELD OF INSTRUCTION
 4777  013624  153737  002406  013644              BISB    FLAG,2$             ;ADD ADDRESS TO INSTRUCTION
 4778  013632  153737  002407  013652              BISB    FLAG+1,7$           ;ADD ADDRESS TO INSTRUCTION
 4779  013640                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  013640  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4780  013644  010000                        2$:   010000                      ;LOAD MAR LO
 4781  013646                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  013646  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4782  013652  004000                        7$:   004000                      ;LOAD MAR HI
 4783  013654  010261  000004                      MOV     R2,4(R1)
 4784  013660                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  013660  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4785  013664  122500                              122500                      ;MOVE PORT4 TO MEMORY
 4786  013666                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  013666  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4787  013672  040620                              040620                      ;MOVE MEMORY TO THE BR
 4788  013674                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  013674  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4789  013700  061225                              61225                       ;MOVE BR TO PORT5
 4790  013702  010205                              MOV     R2,R5               ;PUT "EXPECTED" IN R5
 4791  013704  116104  000005                      MOVB    5(R1),R4            ;PUT "FOUND" IN R4
 4792  013710  120504                              CMPB    R5,R4               ;DATA CORRECT?
 4793  013712  001406                              BEQ     3$                  ;BR IF YES
 4794  013714                                      ERROR   6                   ;DATA ERROR
  (5)  013720  104455                              TRAP    C$ERDF
  (6)  013722  000006                              .WORD   6
  (6)  013724  005055                              .WORD   EM0
  (6)  013726  006700                              .WORD   ERR6
 4795  013730                                3$:   ESCAPE  TST
  (3)  013730  104410                              TRAP    C$ESCAPE
  (3)  013732  000156                              .WORD   L10052-.
 4796  013734  005237  002406                      INC     FLAG                ;NEXT ADDRESS
 4797  013740  023737  002436  002406              CMP     MEMSZ,FLAG          ;LAST ADDRESS?
 4798  013746  001316                              BNE     1$                  ;BR IF NO
 4799  013750  012737  013762  002340              MOV     #4$,LOCK            ;NEW SCOPE 1
 4800  013756  005037  002406                      CLR     FLAG                ;RESTART AT ADDRESS 0
 4801  013762  013702  002406                4$:   MOV     FLAG,R2             ;PUT DATA IN R2
 4802  013766  042737  003777  014014              BIC     #3777,5$                    ;CLEAR ADDRESS FIELD OF INSTRUCTION
 4803  013774  042737  000037  014022              BIC     #37,8$              ;CLEAR ADDRESS FIELD OF INSTRUCTION
 4804  014002  153737  002406  014014              BISB    FLAG,5$             ;ADD ADDRESS TO INSTRUCTION
 4805  014010                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION, ROMCLK PC+5304
  (1)  014010  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4806  014014  010000                        5$:   010000                      ;LOAD THE MAR LO
 4807  014016                                      ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014016  004537  003044                      JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
```

```
 4808  014022  004000                    8$:     004000                  ;LOAD MAR HI
 4809  014024                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  014024  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 4810  014030  040620                            040620                  ;MOVE MEMORY TO THE BR
 4811  014032                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  014032  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 4812  014036  061225                            61225                   ;MOV BR TO PORT5
 4813  014040  010205                            MOV     R2,R5           ;PUT ''EXPECTED'' IN R5
 4814  014042  116104  000005                    MOVB    5(R1),R4        ;PUT ''FOUND'' IN R4
 4815  014046  120504                            CMPB    R5,R4           ;DATA CORRECT?
 4816  014050  001406                            BEQ     6$              ;BR IF YES
 4817  014052                                    ERROR   6               ;ADDRESSING ERROR
  (5)  014056  104455                            TRAP    C$ERDF
  (6)  014060  000006                            .WORD   6
  (6)  014062  005055                            .WORD   EM0
  (6)  014064  006700                            .WORD   ERR6
 4818  014066                            6$:     ESCAPE  TST
  (3)  014066  104410                            TRAP    C$ESCAPE
  (3)  014070  000020                            .WORD   L10052-.
 4819  014072                                    BREAK
  (3)  014072  104422                            TRAP    C$BRK
 4820  014074  005237  002406                    INC     FLAG            ;NEXT ADDRESS
 4821  014100  023737  002436  002406            CMP     MEMSZ,FLAG      ;IS IT THE LAST
 4822  014106  001325                            BNE     4$              ;BR IF NO
 4823  014110                            9$:
 4824  014110                            ENDTST
  (3)  014110                            L10052:
  (3)  014110  104401                            TRAP    C$ETST
 4825
 4826  014112                                    BADHEAD
  (2)                                            ;*************** TEST 9 ***************
 4827                                            ;*IOP MAR TEST
 4828                                            ;*PERFORM DUAL ADDRESSING TEST
 4829                                            ;*USING MAR AUTO-INC FEATURE
 4830  014112                                    BADHEAD
  (2)                                            ;*************** TEST 9 ***************
 4831
 4832  014112                            BGNTST
  (3)  014112                            T9::
 4833  014112                                    K4ONLY                  ;FOR 4K CPUS ONLY.
  (1)                                            ;DO NOT DO TEST IF M8200, OR M8204
  (4)  014122  104432                            TRAP    C$EXIT
  (4)  014124  000342                            .WORD   L10053-.
 4834  014126                                    MYINT
  (1)  014126  013701  002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
 4835                                                                    ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4836  014132                                    MSTCLR                  ;MASTER CLEAR M8200,4,7
 4837  014136  005002                            CLR     R2              ;START WITH A ZERO
 4838  014140  013703  002436                    MOV     MEMSZ,R3        ;GET MEMORY SIZE
 4839  014144  005203                            INC     R3              ;STOP ADDR=MEMSZ+1
 4840  014146                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1)  014146  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 4841  014152  010000                            010000                  ;LOAD MAR WITH A ZERO
 4842  014154                                    CLRMAR
  (2)  014154  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 4843  014162  010261  000004            1$:     MOV     R2,4(R1)        ;WRITE DATA TO PORT4
```

```
4844  014166                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  014166  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
4845  014172  136500                        136500                          ;MEM_PORT4, AUTO-INC MAR
4846  014174  005202                        INC     R2                      ;INCREMENT DATA
4847  014176  020302                        CMP     R3,R2   ;DONE YET?
4848  014200  001370                        BNE     1$                      ;BR IF NO
4849  014202  005002                        CLR     R2                      ;RESTART WITH A ZERO
4850  014204                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  014204  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
4851  014210  010000                        010000                          ;LOAD MAR WITH A ZERO
4852  014212                                CLRMAR
 (2)  014212  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
4853  014220                          2$:
4854  014220                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
 (1)  014220  004537  003100                JSR     R5,..SROMCLK
4855  014224  055224                        055224                          ;MOVE MEM TO PORT4
4856  014226  010205                        MOV     R2,R5                   ;PUT "EXPECTED" IN R5
4857  014230  116104  000004                MOVB    4(R1),R4                ;PUT "FOUND" IN R4
4858  014234  120504                        CMPB    R5,R4                   ;DATA CORRECT?
4859  014236  001406                        BEQ     3$                      ;BR IF YES
4860  014240                                ERROR   11                      ;MAR ERROR
 (5)  014244  104455                        TRAP    C$ERDF
 (6)  014246  000013                        .WORD   11
 (6)  014250  005055                        .WORD   EM0
 (6)  014252  007276                        .WORD   ERR11
4861  014254                          3$:   SROMCLK
 (1)  014254  004537  003100                JSR     R5,..SROMCLK
4862  014260  000000                        0                               ;DUMP NOP INSTR. TO CLK AUTO INC IN MAR.
4863  014262  005004                        CLR     R4
4864  014264                                ROMCLK          ;READ IBUS* <15> (MAR HIGH)
 (1)  014264  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
4865  014270  121325                        121325          ;MAR HIGH _POT 5
4866
4867  014272                                ROMCLK          ;READ IBUS* <14> (MAR LOW)
 (1)  014272  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
4868  014276  121304                        121304
4869  014300  016104  000004                MOV     4(R1),R4                ;ADD TO MAR HIGH.
4870  014304  042704  160000                BIC     #160000,R4
4871  014310  005202                        INC     R2
4872  014312  020237  002436                CMP     R2,MEMSZ
4873  014316  001002                        BNE     35$
4874  014320  052702  010000                BIS     #10000,R2               ;IF AT HIGH LIMIT,ADD IN OVERFLOW BIT.
4875  014324                          35$:
4876  014324  020204                        CMP     R2,R4   ;ADDR. OK?
4877  014326  001406                        BEQ     4$
4878  014330                                ERROR   11                      ;ERROR MAR ADDR. BAD IN IBUS <14>AND <15>
 (5)  014334  104455                        TRAP    C$ERDF
 (6)  014336  000013                        .WORD   11
 (6)  014340  005055                        .WORD   EM0
 (6)  014342  007276                        .WORD   ERR11
4879                                                                    ;EXPECTED (R4) IS COMBINATION OF
4880                                                                    ;IBUS* <14> AND <15>
4881  014344                          4$:
4882  014344                                ESCAPE  TST
 (3)  014344  104410                        TRAP    C$ESCAPE
 (3)  014346  000120                        .WORD   L10053-.
```

```
4883  014350                                BREAK
 (3)  014350  104422                       TRAP    C$BRK
4884  014352  032702  010000                BIT     #10000,R2       ;DONE YET?
4885  014356  001720                       BEQ     2$
4886                                        ;*
4887                                        ;*THIS SECTION OF CODE ADDED TO MAKE SURE
4888                                        ;*THAT MASTER CLEAR, CLEARS THE MAR
4889                                        ;*
4890
4891  014360                                SKIP06  40$
 (1)                                        ;GOTO 40$ IF M8206
4892  014370  005737  002470                TST     RUNB
4893  014374  001034                       BNE     40$
4894  014376  005737  002472                TST     RUNINH
4895  014402  001031                       BNE     40$
4896  014404  052711  040000                BIS     #40000,(R1)     ;SET MASTER CLEAR
4897  014410  005011                       CLR     (R1)            ;CLEAR MASTER CLEAR
4898  014412                                ROMCLK                  ;WE MUST FIRST CLOCK
 (1)  014412  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4899  014416  121325                       121325                  ;THE MAR LATCH REGS
4900  014420                                ROMCLK                  ;BEFORE WE CAN READ THEM
 (1)  014420  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4901  014424  121304                       121304
4902  014426                                ROMCLK                  ;READ IBUS* <15> PUT IN PORT5
 (1)  014426  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4903  014432  121325                       121325                  ;MAR HIGH
4904  014434                                ROMCLK                  ;READ IBUS* <14>, PUT IN PORT4
 (1)  014434  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
4905  014440  121304                       121304                  ;MAR LOW
4906  014442  005002                       CLR     R2              ;EXPECT MAR CLEAR
4907  014444  016104  000004                MOV     4(R1),R4        ;READ PORTS 4&5. THEY CONTAIN
4908                                                                ;THE CONTENTS OF THE MAR
4909                                                                ;MASTER CLEAR SHOULD HAVE
4910                                                                ;CLEARED THE MAR
4911                                                                ;BRANCH END TST IF CLEAR
4912  014450  001406                       BEQ     40$
4913  014452                                ERROR   44
 (5)  014456  104455                       TRAP    C$ERDF
 (6)  014460  000054                       .WORD   44
 (6)  014462  005055                       .WORD   EMO
 (6)  014464  011054                       .WORD   ERR44
4914  014466                          40$:
4915  014466                          ENDTST
 (3)  014466                          L10053:
 (3)  014466  104401                       TRAP    C$ETST
4916
4917  014470                                BADHEAD
 (2)                                        ;************** TEST 10 ***************
4918                                        ;*IOP (CRAM) ODT BITS TEST
4919                                        ;*LOAD MAR WITH A 0 INC MAR UNTIL IT OVERFLOWS
4920                                        ;*VERIFY THAT IBUS* 10 BITS IS SET ONLY WHEN MAR BIT 8 IS A ONE
4921                                        ;*AND THAT IBUS* 10 BIT6 IS SET ON MAR OVERFLOW
4922  014470                                BADHEAD
 (2)                                        ;************** TEST 10 ***************
4923
4924  014470                          BGNTST
```

```
  (3)  014470                                T10::
 4925  014470                                       MACEX
  (1)                                               ;DO NOT DO TEST IF M8200
  (4)  014476  104432                               TRAP    C$EXIT
  (4)  014500  000234                               .WORD   L10054-.
 4926  014502                                       MYINT
  (1)  014502  013701  002516                       MOV     KMCSR,R1            ;RECORD DEVICE ADDR.
 4927                                                                           ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4928  014506                                       MSTCLR                      ;MASTER CLEAR M8200,4,7
 4929  014512  005002                               CLR     R2                  ;R2=SAME AS MAR CONTENTS
 4930  014514                                       ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014514  004537  003044                       JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4931  014520  010000                               010000                      ;MAR_0
 4932  014522                                T1$:
 4933  014522                                       ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014522  004537  003044                       JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4934  014526  121204                               121204                      ;PORT4=IBUS*10
 4935  014530  005005                               CLR     R5                  ;R5='EXPECTED'
 4936  014532  032702  000400                       BIT     #BIT8,R2            ;IS BIT8 SET IN MAR?
 4937  014536  001402                               BEQ     .+6                 ;BR IF NO
 4938  014540  012705  000040                       MOV     #BIT5,R5            ;IF YES THEN SET BIT5
 4939  014544  016104  000004                       MOV     4(R1),R4            ;R4='FOUND'
 4940  014550  042704  177637                       BIC     #177637,R4          ;CLEAR UNWANTED BITS
 4941  014554  020504                               CMP     R5,R4               ;BITS 5&6 SHOULD BE CLEAR
 4942  014556  001410                               BEQ     15$                 ;BR IF OK
 4943  014560                                       ERROR   7                   ;ERROR BITS 5&6 NOT CLEAR
  (5)  014564  104455                               TRAP    C$ERDF
  (6)  014566  000007                               .WORD   7
  (6)  014570  005055                               .WORD   EM0
  (6)  014572  007026                               .WORD   ERR7
 4944  014574                                       ESCAPE  TST
  (3)  014574  104410                               TRAP    C$ESCAPE
  (3)  014576  000136                               .WORD   L10054-.
 4945  014600                                15$:
 4946  014600                                       ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014600  004537  003044                       JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4947  014604  014000                               014000                      ;INC MAR
 4948  014606  005202                               INC     R2                  ;BUMP MEM ADDRESS
 4949  014610  022702  002000                       CMP     #2000,R2            ;OVERFLOWED YET?(OVFL PAGE BITS).
 4950  014614  001342                               BNE     1$                  ;BR IF NO
 4951  014616                                       ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014616  004537  003044                       JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4952  014622  121204                               121204                      ;PART4 IBUS* 10
 4953  014624  012705  000100                       MOV     #BIT6,R5            ;R5='EXPECTED'
 4954  014630  016104  000004                       MOV     4(R1),R4            ;R4='FOUND'
 4955  014634  042704  177627                       BIC     #177627,R4          ;CLEAR UNWANTED BITS
 4956  014640  020504                               CMP     R5,R4               ;BIT6 SHOULD BE SET
 4957  014642  001406                               BEQ     17$                 ;BR IF OK
 4958  014644                                       ERROR   7                   ;ERROR, BIT6 NOT SET
  (5)  014650  104455                               TRAP    C$ERDF
  (6)  014652  000007                               .WORD   7
  (6)  014654  005055                               .WORD   EM0
  (6)  014656  007026                               .WORD   ERR7
 4959  014660                                17$:   ROMCLK                      ;NEXT WORD IS INSTRUCTION,
  (1)  014660  004537  003044                       JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
 4960  014664  010000                               010000                      ;MAR_0
```

```
 4961  014666
  (1)  014666  004537  003044                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
                                              JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
 4962  014672  004000                        004000                          ;MAR HI 0
 4963  014674                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
  (1)  014674  004537  003044                JSR     R5,..ROMCLK             ;CLOCK INSTRUCTION
 4964  014700  121204                        121204                          ;PORT4 IBUS* 10
 4965  014702  005005                        CLR     R5                      ;R5='EXPECTED'
 4966  014704  016104  000004                MOV     4(R1),R4                ;R4='FOUND'
 4967  014710  042704  177637                BIC     #177637,R4              ;CLEAR UNWANTED BITS
 4968  014714  020504                        CMP     R5,R4                   ;BITS 5&6 SHOULD BE CLEAR
 4969  014716  001406                        BEQ     2$                      ;BR IF OK
 4970  014720                                ERROR   7                       ;ERROR 5&6 NOT BOTH CLEAR
  (5)  014724  104455                        TRAP    C$ERDF
  (6)  014726  000007                        .WORD   7
  (6)  014730  005055                        .WORD   EM0
  (6)  014732  007026                        .WORD   ERR7
 4971  014734                          2$:
 4972  014734                          ENDTST
  (3)  014734                          L10054:
  (3)  014734  104401                        TRAP    C$ETST
 4973
 4974  014736                                BADHEAD
  (2)                                         ;************** TEST 11 ***************
 4975                                         ;*CRAM TEST OF JUMP(I) NEVER MICRO-PROCESSOR INSTRUCTION.
 4976                                         ;*PERFORM THE JUMP INSTRUCTION
 4977                                         ;*VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
 4978                                         ;*IN THE LOCATION IT IS AT.  THIS INSTRUCTION LOADS THE
 4979                                         ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
 4980                                         ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
 4981                                         ;*THE CRAM PC IS CORRECT, IF THE CRAM PC IS NOT RIGHT,
 4982                                         ;*THEN PORT4 CONTAINS A 37
 4983  014736                                BADHEAD
  (2)                                         ;************** TEST 11 ***************
 4984
 4985  014736                          BGNTST
  (3)  014736                          T11::
 4986  014736                                SKIP04  10$
  (1)                                         ;GOTO 10$ IF M8204
 4987  014746                                EXIT    TST                             ;CAN'T DO IF ROM,4K
  (3)  014746  104432                        TRAP    C$EXIT
  (3)  014750  000230                        .WORD   L10055-.
 4988  014752                          10$:
 4989  014752                                MYINT
  (1)  014752  013701  002516                MOV     KMCSR,R1                        ;RECORD DEVICE ADDR.
 4990                                                                       ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 4991  014756                                MSTCLR                          ;MASTER CLEAR M8200,4,7
 4992  014762                                BGNSEG
  (3)  014762  104404                        TRAP    C$BSEG
 4993  014764  004737  003474                JSR     PC,MEMSET               ;SET MEM AND RAM
 4994  014770                          1$:
 4995  014770  004737  003166                JSR     PC,CLRALL               ;CLEAR ALL CONDITIONS
 4996  014774                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  014774  004537  003100                JSR     R5,..SROMCLK
 4997  015000  100400                        100400                          ;START AT ROM PC=0
 4998  015002                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  015002  004537  003100                JSR     R5,..SROMCLK
```

```
 4999  015006  114377                          114377!<400*0>          ;JUMP TO ROM PC OF 1777
 5000  015010  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
 5001  015014  000001                          1                       ;EXPECTED DATA
 5002  015016  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
 5003  015020  001406                          BEQ     2$              ;BR IF NO
 5004  015022                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
   (5) 015026  104455                          TRAP    C$ERDF
   (6) 015030  000005                          .WORD   5
   (6) 015032  005055                          .WORD   EM0
   (6) 015034  006556                          .WORD   ERR5
 5005  015036                          2$:     ESCAPE  SEG
   (3) 015036  104410                          TRAP    C$ESCAPE
   (3) 015040  000002                          .WORD   10000$-.
 5006  015042                                  ENDSEG
   (3) 015042                          10000$:
   (3) 015042  104405                          TRAP    C$ESEG
 5007  015044                                  BGNSEG
   (3) 015044  104404                          TRAP    C$BSEG
 5008  015046  004737  003166                  JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
 5009  015052                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
   (1) 015052  004537  003100                  JSR     R5,..SROMCLK
 5010  015056  100403                          100403                  ;START AT ROM PC=3
 5011  015060                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
   (1) 015060  004537  003100                  JSR     R5,..SROMCLK
 5012  015064  100000                          100000!<400*0>  ;JUMP TO ROM PC OF 0
 5013  015066  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
 5014  015072  000004                          4                       ;EXPECTED DATA
 5015  015074  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
 5016  015076  001406                          BEQ     4$              ;BR IF YES
 5017  015100                                  ERROR   5               ;ERROR, CROM PC IS WRONG
   (5) 015104  104455                          TRAP    C$ERDF
   (6) 015106  000005                          .WORD   5
   (6) 015110  005055                          .WORD   EM0
   (6) 015112  006556                          .WORD   ERR5
 5018  015114                          4$:     ESCAPE  SEG
   (3) 015114  104410                          TRAP    C$ESCAPE
   (3) 015116  000002                          .WORD   10001$-.
 5019  015120                                  ENDSEG
   (3) 015120                          10001$:
   (3) 015120  104405                          TRAP    C$ESEG
 5020  015122                                  BGNSEG
   (3) 015122  104404                          TRAP    C$BSEG
 5021  015124  004737  003166                  JSR     PC,CLRALL       ;CLEAR ALL CONDITINS
 5022  015130                                  SROMCLK                 ;NEXT WORD IS INSTRUCION,
   (1) 015130  004537  003100                  JSR     R5,..SROMCLK
 5023  015134  100406                          100406                  ;START AT ROM PC=6
 5024  015136                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
   (1) 015136  004537  003100                  JSR     R5,..SROMCLK
 5025  015142  104125                          104125!<400*0>          ;JUMP TO ROM PC OF 525
 5026  015144  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
 5027  015150  000007                          7                       ;EXPECTED DATA
 5028  015152  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
 5029  015154  001406                          BEQ     6$              ;BR IF YES
 5030  015156                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
   (5) 015162  104455                          TRAP    C$ERDF
   (6) 015164  000005                          .WORD   5
```

```
 (6)  015166  005055                        .WORD   EM0
 (6)  015170  006556                        .WORD   ERR5
5031  015172                        6$:     ESCAPE SEG
 (3)  015172  104410                        TRAP    C$ESCAPE
 (3)  015174  000002                        .WORD   10002$-.
5032  015176                              ENDSEG
 (3)  015176                        10002$:
 (3)  015176  104405                        TRAP    C$ESEG
5033  015200                        ENDTST
 (3)  015200                        L10055:
 (3)  015200  104401                        TRAP    C$ETST
5034
5035  015202                              BADHEAD
 (2)                                        ;************** TEST 12 ***************
5036                                        ;*CRAM TEST OF JUMP(I) ALWAYS MICRO-PROCESSOR INSTRUCTION.
5037                                        ;*PERFORM THE JUMP INSTRUCTION
5038                                        ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5039                                        ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5040                                        ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5041                                        ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5042                                        ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5043                                        ;*THEN PORT4 WILL CONTAIN A 37
5044  015202                              BADHEAD
 (2)                                        ;************** TEST 12 ***************
5045
5046  015202                        BGNTST
 (3)  015202                        T12::
5047  015202                              MACEX2                  ;DON'T DO IF M8200
 (1)                                        ;DO NOT DO TEST IF M8200
 (4)  015212  104432                        TRAP    C$EXIT
 (4)  015214  000214                        .WORD   L10056-.
5048  015216                              MYINT
 (1)  015216  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5049                                                                    ;R1 CONTAINS BASE M8200,4,7 ADDRESS
5050  015222                              MSTCLR                            ;MASTER CLEAR M8200,4,7
5051  015226  004737  003474                JSR     PC,MEMSET               ;SET MEM AND RAM
5052  015232                        1$:     BGNSEG
 (3)  015232  104404                        TRAP    C$BSEG
5053  015234                              SROMCLK                           ;NEXT WORD IS INSTRUCTION,
 (1)  015234  004537  003100                JSR     R5,..SROMCLK
5054  015240  100400                        100400                          ;START AT ROM PC=0
5055  015242                              SROMCLK                           ;NEXT WORD IS INSTRUCION,
 (1)  015242  004537  003100                JSR     R5,..SROMCLK
5056  015246  114777                        114377!<400*1>                  ;JUMP TO ROM PC OF 1777
5057  015250  004737  003330                JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
5058  015254  000377                        377                             ;EXPECTED DATA
5059  015256  120504                        CMPB    R5,R4                   ;IS ROM PC CORRECT?
5060  015260  001406                        BEQ     2$                      ;BR IF YES
5061  015262                              ERROR   5                         ;ERROR, CRAM PC IS WRONG
 (5)  015266  104455                        TRAP    C$ERDF
 (6)  015270  000005                        .WORD   5
 (6)  015272  005055                        .WORD   EM0
 (6)  015274  006556                        .WORD   ERR5
5062  015276                        2$:     ESCAPE SEG
 (3)  015276  104410                        TRAP    C$ESCAPE
 (3)  015300  000002                        .WORD   10000$-.
```

```
015302                                  ENDSEG
015302                          10000$:
015302  104405                          TRAP    C$ESEG
015304                                  BGNSEG
015304  104404                          TRAP    C$BSEG
015306                                  SROMCLK                         ;NEXT WORD IS INSTRUCTION.
015306  004537  003100                  JSR     R5,.SROMCLK
015312  100403                          100403                          ;START AT ROM PC=3
015314                                  SROMCLK                         ;NEXT WORD IS INSTRUCTION.
015314  004537  003100                  JSR     R5,.SROMCLK
015320  100400                          100000!<400*1>  ;JUMP TO ROM PC OF 0
015322  004737  003330                  JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
015326  000000                          0                               ;EXPECTED DATA
015330  120504                          CMPB    R5,R4                   ;IS ROM PC CORRECT?
015332  001406                          BEQ     4$                      ;BR IF YES
015334                                  ERROR   5       ;ERROR, CRAM PC IS WRONG
015340  104455                          TRAP    C$ERDF
015342  000005                          .WORD   5
015344  005055                          .WORD   EMO
015346  006556                          .WORD   ERR5
015350                          4$:     ESCAPE SEG
015350  104410                          TRAP    C$ESCAPE
015352  000002                          .WORD   10001$-.
015354                                  ENDSEG
015354                          10001$:
015354  104405                          TRAP    C$ESEG
015356                                  BGNSEG
015356  104404                          TRAP    C$BSEG
015360                                  SROMCLK                         ;NEXT WORD IS INSTRUCTION.
015360  004537  003100                  JSR     R5,.SROMCLK
015364  100406                          100406                          ;START AT ROM PC=6
015366                                  SROMCLK                         ;NEXT WORD IS INSTRUCTION.
015366  004537  003100                  JSR     R5,.SROMCLK
015372  104525                          104125!<400*1>                  ;JUMP TO ROM PC OF 525
015374  004737  003330                  JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
015400  000125                          125                             ;EXPECTED DATA
015402  120504                          CMPB    R5,R4                   ;IS ROM PC CORRECT?
015404  001406                          BEQ     6$                      ;BR IF YES
015406                                  ERROR   5                       ;ERROR, CRAM PC IS WRONG
015412  104455                          TRAP    C$ERDF
015414  000005                          .WORD   5
015416  005055                          .WORD   EMO
015420  006556                          .WORD   ERR5
015422                          6$:     ESCAPE SEG
015422  104410                          TRAP    C$ESCAPE
015424  000002                          .WORD   10002$-.
015426                                  ENDSEG
015426                          10002$:
015426  104405                          TRAP    C$ESEG
015430                          ENDTST
015430                          L10056:
015430  104401                          TRAP    C$ETST

015432                                  BADHEAD
                                        ;*************** TEST 13 ***************
                                        ;*CRAM TEST OF JUMP(I) ON C BIT SET MICRO-PROCESSOR INSTRUCTION.
```

```
                                        ;*SET THE C BIT, PERFORM THE JUMP INSTRUCTION.
                                        ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
                                        ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
                                        ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
                                        ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
                                        ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
                                        ;*THEN PORT4 WILL CONTAIN A 37
5099  015432                            BADHEAD
 (2)                                    ;*************** TEST 13 ***************
5100
5101  015432                      BGNTST
 (3)  015432                      T13::
5102  015432                      MACEX2                          ;DON'T DO IF M8200
 (1)                                    ;DO NOT DO TEST IF M8200
 (4)  015442  104432                    TRAP    C$EXIT
 (4)  015444  000230                    .WORD   L10057-.
5103  015446                            MYINT
 (1)  015446  013701  002516            MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5104                                                                    ;R1 CONTAINS BASE M8200,4,7 ADDRESS
5105  015452                            MSTCLR                          ;MASTER CLEAR M8200,4,7
5106  015456  004737  003474            JSR     PC,MEMSET               ;SET MEM AND RAM
5107  015462                      1$:   BGNSEG
 (3)  015462  104404                    TRAP    C$BSEG
5108  015464  004737  003260            JSR     PC,SETC                 ;SET THE C BIT'
5109  015470                            SROMCLK                         ;NEXT WORD IS INSTRUCTION,
 (1)  015470  004537  003100            JSR     R5,..SROMCLK
5110  015474  100400                    100400                          ;START AT ROM PC=0
5111  015476                            SROMCLK                         ;NEXT WORD IS INSTRUCION,
 (1)  015476  004537  003100            JSR     R5,..SROMCLK
5112  015502  115377                    114377!<400*2>                  ;JUMP TO ROM PC OF 1777
5113  015504  004737  003330            JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
5114  015510  000377                    377                             ;EXPECTED DATA
5115  015512  120504                    CMPB    R5,R4                   ;IS ROM PC CORRECT?
5116  015514  001406                    BEQ     2$                      ;BR IF YES
5117  015516                            ERROR   5                       ;ERROR, CRAM PC IS WRONG
 (5)  015522  104455                    TRAP    C$ERDF
 (6)  015524  000005                    .WORD   5
 (6)  015526  005055                    .WORD   EM0
 (6)  015530  006556                    .WORD   ERR5
5118  015532                      2$:                             ;LOOP TO 1$ IF SW09=1
5119  015532                            ESCAPE SEG
 (3)  015532  104410                    TRAP    C$ESCAPE
 (3)  015534  000002                    .WORD   10000$-.
5120  015536                            ENDSEG
 (3)  015536                      10000$:
 (3)  015536  104405                    TRAP    C$ESEG
5121  015540                            BGNSEG
 (3)  015540  104404                    TRAP    C$BSEG
5122  015542  004737  003260            JSR     PC,SETC                 ;SET THE C BIT'
5123  015546                            SROMCLK                         ;NEXT WORD IS INSTRUCTION,
 (1)  015546  004537  003100            JSR     R5,..SROMCLK
5124  015552  100403                    100403                          ;START AT ROM PC=3
5125  015554                            SROMCLK                         ;NEXT WORD IS INSTRUCTION,
 (1)  015554  004537  003100            JSR     R5,..SROMCLK
5126  015560  101000                    100000!<400*2>                  ;JUMP TO ROM PC OF 0
5127  015562  004737  003330            JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
```

```
 5128  015566  000000                        0                       ;EXPECTED DATA
 5129  015570  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
 5130  015572  001406                        BEQ     4$              ;BR IF YES
 5131  015574                                ERROR   5               ;ERROR, CRAM PC IS WRONG
   (5) 015600  104455                        TRAP    C$ERDF
   (6) 015602  000005                        .WORD   5
   (6) 015604  005055                        .WORD   EM0
   (6) 015606  006556                        .WORD   ERR5
 5132  015610                          4$:
 5133  015610                                ESCAPE SEG              ;LOOP TO 3$ IF SW09=1
   (3) 015610  104410                        TRAP    C$ESCAPE
   (3) 015612  000002                        .WORD   10001$-.
 5134  015614                                ENDSEG
   (3) 015614                          10001$:
   (3) 015614  104405                        TRAP    C$ESEG
 5135  015616                                BGNSEG
   (3) 015616  104404                        TRAP    C$BSEG
 5136  015620  004737  003260                JSR     PC,SETC         ;SET THE C BIT'
 5137  015624                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
   (1) 015624  004537  003100                JSR     R5,..SROMCLK
 5138  015630  100406                        100406                  ;START AT ROM PC=6
 5139  015632                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
   (1) 015632  004537  003100                JSR     R5,..SROMCLK
 5140  015636  105125                        104125!<400*2>          ;JUMP TO ROM PC OF 525
 5141  015640  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
 5142  015644  000125                        125                     ;EXPECTED DATA
 5143  015646  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
 5144  015650  001406                        BEQ     6$              ;BR IF YES
 5145  015652                                ERROR   5               ;ERROR, CRAM PC IS WRONG
   (5) 015656  104455                        TRAP    C$ERDF
   (6) 015660  000005                        .WORD   5
   (6) 015662  005055                        .WORD   EM0
   (6) 015664  006556                        .WORD   ERR5
 5146  015666                          6$:   ESCAPE SEG
   (3) 015666  104410                        TRAP    C$ESCAPE
   (3) 015670  000002                        .WORD   10002$-.
 5147  015672                                ENDSEG
   (3) 015672                          10002$:
   (3) 015672  104405                        TRAP    C$ESEG
 5148  015674                          ENDTST
   (3) 015674                          L10057:
   (3) 015674  104401                        TRAP    C$ETST
 5149
 5150  015676                                BADHEAD
   (2)                                       ;************** TEST 14 ***************
 5151                                        ;*CRAM TEST OF JUMP(I) ON Z BIT SET MICRO-PROCESSOR INSTRUCTION.
 5152                                        ;*SET THE Z BIT, PERFORM THE JUMP INSTRUCTION.
 5153                                        ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
 5154                                        ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
 5155                                        ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
 5156                                        ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
 5157                                        ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
 5158                                        ;*THEN PORT4 WILL CONTAIN A 37
 5159  015676                                BADHEAD
   (2)                                       ;************** TEST 14 ***************
 5160
```

```
 5161  015676                          BGNTST
  (3)  015676                          T14::
 5162  015676                                MACEX2                    ;DON'T DO IF M8200.
  (1)                                         ;DO NOT DO TEST IF M8200
  (4)  015706  104432                         TRAP    C$EXIT
  (4)  015710  000230                         .WORD   L10060-.
 5163  015712                                MYINT
  (1)  015712  013701  002516                 MOV     KMCSR,R1                  ;RECORD DEVICE ADDR.
 5164                                                                  ;R1 CONTAINS BASE M8200,4,7 ADDRESS
 5165  015716                                MSTCLR                    ;MASTER CLEAR M8200,4,7
 5166  015722  004737  003474                JSR     PC,MEMSET         ;SET MEM AND RAM
 5167  015726                          1$:   BGNSEG
  (3)  015726  104404                         TRAP    C$BSEG
 5168  015730  004737  003312                JSR     PC,SETZ           ;SET THE Z BIT'
 5169  015734                                SROMCLK                   ;NEXT WORD IS INSTRUCTION,
  (1)  015734  004537  003100                JSR     R5,..SROMCLK
 5170  015740  100400                       100400                    ;START AT ROM PC=0
 5171  015742                                SROMCLK                   ;NEXT WORD IS INSTRUCION,
  (1)  015742  004537  003100                JSR     R5,..SROMCLK
 5172  015746  115777                       114377!<400*3>            ;JUMP TO ROM PC OF 1777
 5173  015750  004737  003330                JSR     PC,RAMDAT         ;R4=CRAM PC (LSB 8 BITS)
 5174  015754  000377                       377                       ;EXPECTED DATA
 5175  015756  120504                       CMPB    R5,R4             ;IS ROM PC CORRECT?
 5176  015760  001406                       BEQ     2$                ;BR IF YES
 5177  015762                                ERROR   5                 ;ERROR, CRAM PC IS WRONG
  (5)  015766  104455                         TRAP    C$ERDF
  (6)  015770  000005                         .WORD   5
  (6)  015772  005055                         .WORD   EM0
  (6)  015774  006556                         .WORD   ERR5
 5178  015776                          2$:   ESCAPE SEG
  (3)  015776  104410                         TRAP    C$ESCAPE
  (3)  016000  000002                         .WORD   10000$-.
 5179  016002                                ENDSEG
  (3)  016002                          10000$:
  (3)  016002  104405                         TRAP    C$ESEG
 5180  016004                                BGNSEG
  (3)  016004  104404                         TRAP    C$BSEG
 5181  016006  004737  003312                JSR     PC,SETZ           ;SET THE Z BIT'
 5182  016012                                SROMCLK                   ;NEXT WORD IS INSTRUCTION,
  (1)  016012  004537  003100                JSR     R5,..SROMCLK
 5183  016016  100403                       100403                    ;START AT ROM PC=3
 5184  016020                                SROMCLK                   ;NEXT WORD IS INSTRUCTION,
  (1)  016020  004537  003100                JSR     R5,..SROMCLK
 5185  016024  101400                       100000!<400*3>            ;JUMP TO ROM PC OF 0
 5186  016026  004737  003330                JSR     PC,RAMDAT         ;R4=CRAM PC (LSB 8 BITS)
 5187  016032  000000                       0                         ;EXPECTED DATA
 5188  016034  120504                       CMPB    R5,R4             ;IS ROM PC CORRECT?
 5189  016036  001406                       BEQ     4$                ;BR IF YES
 5190  016040                                ERROR   5                 ;ERROR, CRAM PC IS WRONG
  (5)  016044  104455                         TRAP    C$ERDF
  (6)  016046  000005                         .WORD   5
  (6)  016050  005055                         .WORD   EM0
  (6)  016052  006556                         .WORD   ERR5
 5191  016054                          4$:   ESCAPE SEG
  (3)  016054  104410                         TRAP    C$ESCAPE
  (3)  016056  000002                         .WORD   10001$-.
```

```
                        ENDSEG
                10001$:
                        TRAP    C$ESEG
                        BGNSEG
                        TRAP    C$BSEG
5194  016064  004737  003312    JSR     PC,SETZ         ;SET THE Z BIT'
5195  016070                    SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016070  004537  003100    JSR     R5,..SROMCLK
5196  016074  100406            100406                  ;START AT ROM PC=6
5197  016076                    SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016076  004537  003100    JSR     R5,..SROMCLK
5198  016102  105525            104125!<400*3>          ;JUMP TO ROM PC OF 525
5199  016104  004737  003330    JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5200  016110  000125            125                     ;EXPECTED DATA
5201  016112  120504            CMPB    R5,R4           ;IS ROM PC CORRECT?
5202  016114  001406            BEQ     6$              ;BR IF YES
5203  016116                    ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  016122  104455            TRAP    C$ERDF
 (6)  016124  000005            .WORD   5
 (6)  016126  005055            .WORD   EM0
 (6)  016130  006556            .WORD   ERR5
5204  016132                6$: ESCAPE SEG
 (3)  016132  104410            TRAP    C$ESCAPE
 (3)  016134  000002            .WORD   10002$-.
5205  016136                    ENDSEG
 (3)  016136                10002$:
 (3)  016136  104405            TRAP    C$ESEG
5206  016140                ENDTST
 (3)  016140                L10060:
 (3)  016140  104401            TRAP    C$ETST
5207
5208  016142                    BADHEAD
 (2)                            ;*************** TEST 15 ***************
5209                            ;*CRAM TEST OF JUMP(I) ON BR0 SET MICRO-PROCESSOR INSTRUCTION.
5210                            ;*SET THE BR0 BIT, PERFORM THE JUMP INSTRUCTION.
5211                            ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5212                            ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5213                            ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5214                            ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5215                            ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5216                            ;*THEN PORT4 WILL CONTAIN A 37
5217  016142                    BADHEAD
 (2)                            ;*************** TEST 15 ***************
5218
5219  016142                BGNTST
 (3)  016142                T15::
5220  016142                    MACEX2                  ;DON'T DO IF M8200.
 (1)                            ;DO NOT DO TEST IF M8200
 (4)  016152  104432            TRAP    C$EXIT
 (4)  016154  000230            .WORD   L10061-.
5221  016156                    MYINT
 (1)  016156  013701  002516    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5222                                                    ;R1 CONTAINS BASE M8200,4,7 ADDRESS
5223  016162                    MSTCLR                  ;MASTER CLEAR M8200,4,7
5224  016166  004737  003474    JSR     PC,MEMSET       ;SET MEM AND RAM
5225  016172                1$:
```

```
5226  016172                                  BGNSEG
 (3)  016172  104404                          TRAP    C$BSEG
5227  016174  004737  003220                 JSR     PC,SETBR0       ;SET THE BR0 BIT'
5228  016200                                 SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016200  004537  003100                 JSR     R5,..SROMCLK
5229  016204  100400                         100400                  ;START AT ROM PC=0
5230  016206                                 SROMCLK                 ;NEXT WORD IS INSTRUCION,
 (1)  016206  004537  003100                 JSR     R5,..SROMCLK
5231  016212  116377                         114377!<400*4>          ;JUMP TO ROM PC OF 1777
5232  016214  004737  003330                 JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5233  016220  000377                         377                     ;EXPECTED DATA
5234  016222  120504                         CMPB    R5,R4           ;IS ROM PC CORRECT?
5235  016224  001406                         BEQ     2$              ;BR IF YES
5236  016226                                 ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  016232  104455                         TRAP    C$ERDF
 (6)  016234  000005                         .WORD   5
 (6)  016236  005055                         .WORD   EM0
 (6)  016240  006556                         .WORD   ERR5
5237  016242                           2$:   ESCAPE SEG
 (3)  016242  104410                         TRAP    C$ESCAPE
 (3)  016244  000002                         .WORD   10000$-.
5238  016246                                 ENDSEG
 (3)  016246                      10000$:
 (3)  016246  104405                         TRAP    C$ESEG
5239  016250                                 BGNSEG
 (3)  016250  104404                         TRAP    C$BSEG
5240  016252  004737  003220                 JSR     PC,SETBR0               ;SET THE BR0 BIT'
5241  016256                                 SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016256  004537  003100                 JSR     R5,..SROMCLK
5242  016262  100403                         100403                  ;START AT ROM PC=3
5243  016264                                 SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016264  004537  003100                 JSR     R5,..SROMCLK
5244  016270  102000                         100000!<400*4>          ;JUMP TO ROM PC OF 0
5245  016272  004737  003330                 JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5246  016276  000000                         0                       ;EXPECTED DATA
5247  016300  120504                         CMPB    R5,R4           ;IS ROM PC CORRECT?
5248  016302  001406                         BEQ     4$              ;BR IF YES
5249  016304                                 ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  016310  104455                         TRAP    C$ERDF
 (6)  016312  000005                         .WORD   5
 (6)  016314  005055                         .WORD   EM0
 (6)  016316  006556                         .WORD   ERR5
5250  016320                           4$:   ESCAPE SEG
 (3)  016320  104410                         TRAP    C$ESCAPE
 (3)  016322  000002                         .WORD   10001$-.
5251  016324                                 ENDSEG
 (3)  016324                      10001$:
 (3)  016324  104405                         TRAP    C$ESEG
5252  016326                                 BGNSEG
 (3)  016326  104404                         TRAP    C$BSEG
5253  016330  004737  003220                 JSR     PC,SETBR0               ;SET THE BR0 BIT'
5254  016334                                 SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016334  004537  003100                 JSR     R5,..SROMCLK
5255  016340  100406                         100406                  ;START AT ROM PC=6
5256  016342                                 SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016342  004537  003100                 JSR     R5,..SROMCLK
```

```
5257  016346  106125                  104125!<400*4>          ;JUMP TO ROM PC OF 525
5258  016350  004737  003330          JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5259  016354  000125                  125                     ;EXPECTED DATA
5260  016356  120504                  CMPB    R5,R4           ;IS ROM PC CORRECT?
5261  016360  001406                  BEQ     6$              ;BR IF YES
5262  016362                          ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  016366  104455                  TRAP    C$ERDF
 (6)  016370  000005                  .WORD   5
 (6)  016372  005055                  .WORD   EM0
 (6)  016374  006556                  .WORD   ERR5
5263  016376                  6$:     ESCAPE SEG
 (3)  016376  104410                  TRAP    C$ESCAPE
 (3)  016400  000002                  .WORD   10002$-.
5264  016402                          ENDSEG
 (3)  016402                  10002$:
 (3)  016402  104405                  TRAP    C$ESEG
5265  016404                  ENDTST
 (3)  016404                  L10061:
 (3)  016404  104401                  TRAP    C$ETST
5266
5267  016406                          BADHEAD
 (2)                                  ;*************** TEST 16 ***************
5268                                  ;*CRAM TEST OF JUMP(I) ON BR1 SET MICRO-PROCESSOR INSTRUCTION.
5269                                  ;*SET THE BR1 BIT, PERFORM THE JUMP INSTRUCTION.
5270                                  ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5271                                  ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5272                                  ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5273                                  ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5274                                  ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5275                                  ;*THEN PORT4 WILL CONTAIN A 37
5276  016406                          BADHEAD
 (2)                                  ;*************** TEST 16 ***************
5277
5278  016406                  BGNTST
 (3)  016406                  T16::
5279  016406                          MACEX2                  ;DON'T DO IF M8200.
 (1)                                  ;DO NOT DO TEST IF M8200
 (4)  016416  104432                  TRAP    C$EXIT
 (4)  016420  000230                  .WORD   L10062-.
5280  016422                          MYINT
 (1)  016422  013701  002516          MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5281                                                                  ;R1 CONTAINS BASE M8200,4,7 ADDRESS
5282  016426                          MSTCLR                          ;MASTER CLEAR M8200,4,7
5283  016432  004737  003474          JSR     PC,MEMSET               ;SET MEM AND RAM
5284  016436                  1$:
5285  016436                          BGNSEG
 (3)  016436  104404                  TRAP    C$BSEG
5286  016440  004737  003230          JSR     PC,SETBR1               ;SET THE BR1 BIT'
5287  016444                          SROMCLK                         ;NEXT WORD IS INSTRUCTION,
 (1)  016444  004537  003100          JSR     R5,.SROMCLK
5288  016450  100400                  100400                  ;START AT ROM PC=0
5289  016452                          SROMCLK                 ;NEXT WORD IS INSTRUCION,
 (1)  016452  004537  003100          JSR     R5,.SROMCLK
5290  016456  116777                  114377!<400*5>          ;JUMP TO ROM PC OF 1777
5291  016460  004737  003330          JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5292  016464  000377                  377                     ;EXPECTED DATA
```

```
5293  016466  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5294  016470  001406                        BEQ     2$              ;BR IF YES
5295  016472                                ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5) 016476  104455                        TRAP    C$ERDF
  (6) 016500  000005                        .WORD   5
  (6) 016502  005055                        .WORD   EM0
  (6) 016504  006556                        .WORD   ERR5
5296  016506                          2$:   ESCAPE  SEG
  (3) 016506  104410                        TRAP    C$ESCAPE
  (3) 016510  000002                        .WORD   10000$-.
5297  016512                                ENDSEG
  (3) 016512                          10000$:
  (3) 016512  104405                        TRAP    C$ESEG
5298  016514                                BGNSEG
  (3) 016514  104404                        TRAP    C$BSEG
5299  016516  004737  003230                JSR     PC,SETBR1               ;SET THE BR1 BIT'
5300  016522                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1) 016522  004537  003100                JSR     R5,..SROMCLK
5301  016526  100403                        100403                  ;START AT ROM PC=3
5302  016530                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1) 016530  004537  003100                JSR     R5,..SROMCLK
5303  016534  102400                        100000!<400*5>          ;JUMP TO ROM PC OF 0
5304  016536  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5305  016542  000000                        0                       ;EXPECTED DATA
5306  016544  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5307  016546  001406                        BEQ     4$              ;BR IF YES
5308  016550                                ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5) 016554  104455                        TRAP    C$ERDF
  (6) 016556  000005                        .WORD   5
  (6) 016560  005055                        .WORD   EM0
  (6) 016562  006556                        .WORD   ERR5
5309  016564                          4$:   ESCAPE  SEG
  (3) 016564  104410                        TRAP    C$ESCAPE
  (3) 016566  000002                        .WORD   10001$-.
5310  016570                                ENDSEG
  (3) 016570                          10001$:
  (3) 016570  104405                        TRAP    C$ESEG
5311  016572                                BGNSEG
  (3) 016572  104404                        TRAP    C$BSEG
5312  016574  004737  003230                JSR     PC,SETBR1               ;SET THE BR1 BIT'
5313  016600                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1) 016600  004537  003100                JSR     R5,..SROMCLK
5314  016604  100406                        100406                  ;START AT ROM PC=6
5315  016606                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1) 016606  004537  003100                JSR     R5,..SROMCLK
5316  016612  106525                        104125!<400*5>          ;JUMP TO ROM PC OF 525
5317  016614  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5318  016620  000125                        125                     ;EXPECTED DATA
5319  016622  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5320  016624  001406                        BEQ     6$              ;BR IF YES
5321  016626                                ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5) 016632  104455                        TRAP    C$ERDF
  (6) 016634  000005                        .WORD   5
  (6) 016636  005055                        .WORD   EM0
  (6) 016640  006556                        .WORD   ERR5
5322  016642                          6$:   ESCAPE  SEG
```

```
  (3)  016642  10441C                    TRAP    C$ESCAPE
  (3)  016644  000002                    .WORD   10002$-.
5323   016646                           ENDSEG
  (3)  016646                         10002$:
  (3)  016646  104405                    TRAP    C$ESEG
5324   016650                           ENDTST
  (3)  016650                         L10062:
  (3)  016650  104401                    TRAP    C$ETST
5325
5326   016652                           BADHEAD
  (2)                                   ;*************** TEST 17 ***************
5327                                    ;*CRAM TEST OF JUMP(I) ON BR4 SET MICRO-PROCESSOR INSTRUCTION.
5328                                    ;*SET THE BR4 BIT, PERFORM THE JUMP INSTRUCTION.
5329                                    ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5330                                    ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5331                                    ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5332                                    ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5333                                    ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5334                                    ;*THEN PORT4 WILL CONTAIN A 37
5335   016652                           BADHEAD
  (2)                                   ;*************** TEST 17 ***************
5336
5337   016652                         BGNTST
  (3)  016652                         117::
5338   016652                           MACEX2                         ;DON'T DO IF M8200.
  (1)                                   ;DO NOT DO TEST IF M8200
  (4)  016662  104432                    TRAP    C$EXIT
  (4)  016664  000230                    .WORD   L10063-.
5339   016666                           MYINT
  (1)  016666  013701  002516            MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5340   016672                           MSTCLR                  ;MASTER CLEAR M8200,4,7
5341   016676  004737  003474           JSR     PC,MEMSET       ;SET MEM AND RAM
5342   016702                         1$:
5343   016702                           BGNSEG
  (3)  016702  104404                    TRAP    C$BSEG
```

```
5345  016704  004737  003240                  JSR     PC,SETBR4       ;SET THE BR4 BIT'
5346  016710                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1) 016710  004537  003100                  JSR     R5,,SROMCLK
5347  016714  100400                          100400                  ;START AT ROM PC=0
5348  016716                                  SROMCLK                 ;NEXT WORD IS INSTRUCION,
  (1) 016716  004537  003100                  JSR     R5,,SROMCLK
```

```
 5350  016722  117377                    114377:<400*6>          ;JUMP TO ROM PC OF 1777
 5351  016724  004737  003330            JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
```

```
 5353  016730  000377                    377                 ;EXPECTED DATA
 5354  016732  120504                    CMPB    R5,R4       ;IS ROM PC CORRECT?
```

```
 5356  016734  001406                    BEQ     2$              ;BR IF YES
```

```
 5358  016736                          ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  016742  104455                  TRAP    C$ERDF
  (6)  016744  000005                  .WORD   5
  (6)  016746  005055                  .WORD   EM0
  (6)  016750  006556                  .WORD   ERR5
```

```
5360  016752                          2$:     ESCAPE SEG
.(3)  016752  104410                          TRAP    C$ESCAPE
 (3)  016754  000002                          .WORD   10000$-.
5361  016756                                  ENDSEG
 (3)  016756                          10000$:
 (3)  016756  104405                          TRAP    C$ESEG
5362  016760                                  BGNSEG
 (3)  016760  104404                          TRAP    C$BSEG
5363  016762  004737  003240                  JSR     PC,SETBR4               ;SET THE BR4 BIT'
5364  016766                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016766  004537  003100                  JSR     R5,.SROMCLK
5365  016772  100403                          100403                  ;START AT ROM PC=3
5366  016774                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  016774  004537  003100                  JSR     R5,.SROMCLK
5367  017000  103000                          100000!<400*6>          ;JUMP TO ROM PC OF 0
5368  017002  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5369  017006  000000                          0                       ;EXPECTED DATA
5370  017010  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
5371  017012  001406                          BEQ     4$              ;BR IF YES
5372  017014                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017020  104455                          TRAP    C$ERDF
 (6)  017022  000005                          .WORD   5
 (6)  017024  005055                          .WORD   EM0
 (6)  017026  006556                          .WORD   ERR5
5373  017030                          4$:     ESCAPE SEG
 (3)  017030  104410                          TRAP    C$ESCAPE
 (3)  017032  000002                          .WORD   10001$-.
5374  017034                                  ENDSEG
 (3)  017034                          10001$:
 (3)  017034  104405                          TRAP    C$ESEG
5375  017036                                  BGNSEG
 (3)  017036  104404                          TRAP    C$BSEG
5376  017040  004737  003240                  JSR     PC,SETBR4               ;SET THE BR4 BIT'
5377  017044                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017044  004537  003100                  JSR     R5,.SROMCLK
5378  017050  100406                          100406                  ;START AT ROM PC=6
5379  017052                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017052  004537  003100                  JSR     R5,.SROMCLK
5380  017056  107125                          104125!<400*6>          ;JUMP TO ROM PC OF 525
5381  017060  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5382  017064  000125                          125                     ;EXPECTED DATA
5383  017066  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
5384  017070  001406                          BEQ     6$              ;BR IF YES
5385  017072                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017076  104455                          TRAP    C$ERDF
 (6)  017100  000005                          .WORD   5
 (6)  017102  005055                          .WORD   EM0
 (6)  017104  006556                          .WORD   ERR5
5386  017106                          6$:     ESCAPE SEG
 (3)  017106  104410                          TRAP    C$ESCAPE
 (3)  017110  000002                          .WORD   10002$-.
5387  017112                                  ENDSEG
 (3)  017112                          10002$:
 (3)  017112  104405                          TRAP    C$ESEG
5388  017114                          ENDTST
 (3)  017114                          L10063:
```

```
  (3)  017114  104401                    TRAP    C$ETST
5389
5390  017116                            BADHEAD
  (2)                                   ;************** TEST 18 ***************
5391                                    ;*CRAM TEST OF JUMP(I) ON BR7 SET MICRO-PROCESSOR INSTRUCTION.
5392                                    ;*SET THE BR7 BIT, PERFORM THE JUMP INSTRUCTION.
5393                                    ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5394                                    ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5395                                    ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5396                                    ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5397                                    ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5398                                    ;*THEN PORT4 WILL CONTAIN A 37
5399  017116                            BADHEAD
  (2)                                   ;************** TEST 18 ***************
5400
5401  017116                    BGNTST
  (3)  017116                     T18::
5402  017116                            MACEX2                  ;DON'T DO IF M8200.
  (1)                                   ;DO NOT DO TEST IF M8200
  (4)  017126  104432                   TRAP    C$EXIT
  (4)  017130  000230                   .WORD   L10064-.
5403  017132                            MYINT
  (1)  017132  013701  002516           MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5404                                                              ;R1 CONTAINS BASE M8200,4,7 ADDRESS
5405  017136                            MSTCLR                  ;MASTER CLEAR M8200,4,7
5406  017142  004737  003474           JSR     PC,MEMSET       ;SET MEM AND RAM
5407  017146                    1$:     BGNSEG
  (3)  017146  104404                   TRAP    C$BSEG
5408  017150  004737  003250           JSR     PC,SETBR7       ;SET THE BR7 BIT'
5409  017154                            SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  017154  004537  003100           JSR     R5,..SROMCLK
5410  017160  100400                   100400                  ;START AT ROM PC=0
5411  017162                            SROMCLK                 ;NEXT WORD IS INSTRUCION,
  (1)  017162  004537  003100           JSR     R5,..SROMCLK
5412  017166  117777                   114377!<400*7>          ;JUMP TO ROM PC OF 1777
5413  017170  004737  003330           JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5414  017174  000377                   377                     ;EXPECTED DATA
5415  017176  120504                   CMPB    R5,R4           ;IS ROM PC CORRECT?
5416  017200  001406                   BEQ     2$              ;BR IF YES
5417  017202                            ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  017206  104455                   TRAP    C$ERDF
  (6)  017210  000005                   .WORD   5
  (6)  017212  005055                   .WORD   EM0
  (6)  017214  006556                   .WORD   ERR5
5418  017216                    2$:     ESCAPE SEG
  (3)  017216  104410                   TRAP    C$ESCAPE
  (3)  017220  000002                   .WORD   10000$-.
5419  017222                            ENDSEG
  (3)  017222                   10000$:
  (3)  017222  104405                   TRAP    C$ESEG
5420  017224                            BGNSEG
  (3)  017224  104404                   TRAP    C$BSEG
5421  017226  004737  003250           JSR     PC,SETBR7               ;SET THE BR7 BIT'
5422  017232                            SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  017232  004537  003100           JSR     R5,..SROMCLK
5423  017236  100403                   100403                  ;START AT ROM PC=3
```

```
5424  017240                        SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017240  004537  003100        JSR     R5,..SROMCLK
5425  017244  103400                100000!<400*7>          ;JUMP TO ROM PC OF 0
5426  017246  004737  003330        JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5427  017252  000000                0                       ;EXPECTED DATA
5428  017254  120504                CMPB    R5,R4           ;IS ROM PC CORRECT?
5429  017256  001406                BEQ     4$              ;BR IF YES
5430  017260                        ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017264  104455                TRAP    C$ERDF
 (6)  017266  000005                .WORD   5
 (6)  017270  005055                .WORD   EM0
 (6)  017272  006556                .WORD   ERR5
5431  017274                4$:     ESCAPE SEG
 (3)  017274  104410                TRAP    C$ESCAPE
 (3)  017276  000002                .WORD   10001$-.
5432  017300                        ENDSEG
 (3)  017300                10001$:
 (3)  017300  104405                TRAP    C$ESEG
5433  017302                        BGNSEG
 (3)  017302  104404                TRAP    C$BSEG
5434  017304  004737  003250        JSR     PC,SETBR7               ;SET THE BR7 BIT'
5435  017310                        SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017310  004537  003100        JSR     R5,..SROMCLK
5436  017314  100406                100406                  ;START AT ROM PC=6
5437  017316                        SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017316  004537  003100        JSR     R5,..SROMCLK
5438  017322  107525                104125!<400*7>          ;JUMP TO ROM PC OF 525
5439  017324  004737  003330        JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5440  017330  000125                125                     ;EXPECTED DATA
5441  017332  120504                CMPB    R5,R4           ;IS ROM PC CORRECT?
5442  017334  001406                BEQ     6$              ;BR IF YES
5443  017336                        ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017342  104455                TRAP    C$ERDF
 (6)  017344  000005                .WORD   5
 (6)  017346  005055                .WORD   EM0
 (6)  017350  006556                .WORD   ERR5
5444  017352                6$:     ESCAPE SEG
 (3)  017352  104410                TRAP    C$ESCAPE
 (3)  017354  000002                .WORD   10002$-.
5445  017356                        ENDSEG
 (3)  017356                10002$:
 (3)  017356  104405                TRAP    C$ESEG
5446  017360                ENDTST
 (3)  017360                L10064:
 (3)  017360  104401                TRAP    C$ETST
5447
5448  017362                        BADHEAD
 (2)                                ;*************** TEST 19 ***************
5449                                ;*CRAM TEST OF JUMP(I) ON C BIT CLEAR MICRO-PROCESSOR INSTRUCTION.
5450                                ;*SET THE C BIT, PERFORM THE JUMP INSTRUCTION.
5451                                ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5452                                ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5453                                ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5454                                ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5455                                ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5456                                ;*THEN PORT4 WILL CONTAIN A 37
```

```
5457  017362                                  BADHEAD
 (2)                                          ;************** TEST 19 **************
5458
5459  017362                            BGNTST
 (3)  017362                            T19::
5460  017362                                  MACEX2                  ;DON'T DO IF M8200.
 (1)                                          ;DO NOT DO TEST IF M8200
 (4)  017372  104432                          TRAP    C$EXIT
 (4)  017374  000244                          .WORD   L10065-.
5461  017376                                  MYINT
 (1)  017376  013701  002516                  MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5462  017402                                  MSTCLR                  ;MASTER CLEAR M8200,4,7
5463  017406  004737  003474                  JSR     PC,MEMSET       ;SET MEM AND RAM
5464  017412                            1$:   BGNSEG
 (3)  017412  104404                          TRAP    C$BSEG
5465  017414  004737  003260                  JSR     PC,SETC
5466  017420  004737  003166                  JSR     PC,CLRALL
5467  017424                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  017424  004537  003100                  JSR     R5,,SROMCLK
5468  017430  100400                          100400                  ;START AT ROM PC=0
5469  017432                                  SROMCLK                 ;NEXT WORD IS INSTRUCION,
 (1)  017432  004537  003100                  JSR     R5,,SROMCLK
5470  017436  115377                          114377!<400*2>          ;JUMP TO ROM PC OF 1777
5471  017440  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5472  017444  000001                          1                       ;EXPECTED DATA
5473  017446  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
5474  017450  001406                          BEQ     2$              ;BR IF YES
5475  017452                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017456  104455                          TRAP    C$ERDF
 (6)  017460  000005                          .WORD   5
 (6)  017462  005055                          .WORD   EM0
 (6)  017464  006556                          .WORD   ERR5
5476  017466                            2$:   ESCAPE SEG
 (3)  017466  104410                          TRAP    C$ESCAPE
 (3)  017470  000002                          .WORD   10000$-.
5477  017472                                  ENDSEG
 (3)  017472                            10000$:
 (3)  017472  104405                          TRAP    C$ESEG
5478  017474                                  BGNSEG
 (3)  017474  104404                          TRAP    C$BSEG
5479  017476                                  SKIP06  6$
 (1)                                          ;GOTO 6$ IF M8206
5480  017506  004737  003166                  JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5481  017512                                  SROMCLK                 ;NEXT WORD OF INSTRUCTION
 (1)  017512  004537  003100                  JSR     R5,,SROMCLK
5482  017516  100403                          100403                  ;START AT ROM PC=3
5483  017520                                  SROMCLK                 ;NEXT WORD OF INSTRUCTION
 (1)  017520  004537  003100                  JSR     R5,,SROMCLK
5484  017524  101000                          100000!<400*2>          ;JUMP TO ROM PC OF 0
5485  017526  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC(LSB 8 BITS)
5486  017532  000004                          4                       ;EXPECTED DATA
5487  017534  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
5488  017536  001406                          BEQ     4$              ;BR IF YES
5489  017540                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  017544  104455                          TRAP    C$ERDF
 (6)  017546  000005                          .WORD   5
```

```
  (6)  017550  005055                        .WORD   EMO
  (6)  017552  006556                        .WORD   ERR5
5490   017554                        4$:     ESCAPE SEG
  (3)  017554  104410                        TRAP    C$ESCAPE
  (3)  017556  000002                        .WORD   10001$-.
5491   017560                                ENDSEG
  (3)  017560                        10001$:
  (3)  017560  104405                        TRAP    C$ESEG
5492   017562                                BGNSEG
  (3)  017562  104404                        TRAP    C$BSEG
5493   017564  004737  003166                JSR     PC,CLRALL               ;CLEAR ALL CONDITIONS
5494   017570                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  017570  004537  003100                JSR     R5,.SROMCLK
5495   017574  100406                        100406                          ;START AT ROM PC=6
5496   017576                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  017576  004537  003100                JSR     R5,.SROMCLK
5497   017602  105125                        104125!<400*2>                  ;JUMP TO ROM PC OF 525
5498   017604  004737  003330                JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
5499   017610  000007                        7                               ;EXPECTED DATA
5500   017612  120504                        CMPB    R5,R4                   ;IS ROM PC CORRECT?
5501   017614  001406                        BEQ     6$                      ;BR IF YES
5502   017616                                ERROR   5                       ;ERROR, CRAM PC IS WRONG
  (5)  017622  104455                        TRAP    C$ERDF
  (6)  017624  000005                        .WORD   5
  (6)  017626  005055                        .WORD   EMO
  (6)  017630  006556                        .WORD   ERR5
5503   017632                        6$:     ESCAPE SEG
  (3)  017632  104410                        TRAP    C$ESCAPE
  (3)  017634  000002                        .WORD   10002$-.
5504   017636                                ENDSEG
  (3)  017636                        10002$:
  (3)  017636  104405                        TRAP    C$ESEG
5505   017640                        ENDTST
  (3)  017640                        L10065:
  (3)  017640  104401                        TRAP    C$ETST
5506
5507   017642                                BADHEAD
  (2)                                         ;*************** TEST 20 ***************
5508                                          ;*CRAM TEST OF JUMP(I) ON Z BIT CLEAR MICRO-PROCESSOR INSTRUCTION.
5509                                          ;*CLEAR THE Z BIT, PERFORM THE JUMP INSTRUCTION.
5510                                          ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5511                                          ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5512                                          ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5513                                          ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5514                                          ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5515                                          ;*THEN PORT4 WILL CONTAIN A 37
5516   017642                                BADHEAD
  (2)                                         ;*************** TEST 20 ***************
5517
5518   017642                        BGNTST
  (3)  017642                        T20::
5519   017642                                MACEX2                          ;DON'T DO IF M8200.
  (1)                                       ;DO NOT DO TEST IF M8200
  (4)  017652  104432                        TRAP    C$EXIT
  (4)  017654  000244                        .WORD   L10066-.
5520   017656                                MYINT
```

```
  (1)  017656  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5521   017662                                MSTCLR                          ;MASTER CLEAR M8200,4,7
5522   017666  004737  003474                JSR     PC,MEMSET               ;SET MEM AND RAM
5523   017672                        1$:     BGNSEG
  (3)  017672  104404                        TRAP    C$BSEG
5524   017674  004737  003312                JSR     PC,SETZ
5525   017700  004737  003166                JSR     PC,CLRALL               ; CLEAR CONDITION CODES ;*** B0
5526   017704                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  017704  004537  003100                JSR     R5,,SROMCLK
5527   017710  100400                        100400                          ;START AT ROM PC=0
5528   017712                                SROMCLK                         ;NEXT WORD IS INSTRUCION,
  (1)  017712  004537  003100                JSR     R5,,SROMCLK
5529   017716  115777                        114377!<400*3>                  ;JUMP TO ROM PC OF 1777
5530   017720  004737  003330                JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
5531   017724  000001                        1                               ;EXPECTED DATA
5532   017726  120504                        CMPB    R5,R4                   ;IS ROM PC CORRECT?
5533   017730  001406                        BEQ     2$                      ;BR IF YES
5534   017732                                ERROR   5                       ;ERROR, CRAM PC IS WRONG
  (5)  017736  104455                        TRAP    C$ERDF
  (6)  017740  000005                        .WORD   5
  (6)  017742  005055                        .WORD   EM0
  (6)  017744  006556                        .WORD   ERR5
5535   017746                        2$:     ESCAPE SEG
  (3)  017746  104410                        TRAP    C$ESCAPE
  (3)  017750  000002                        .WORD   10000$-.
5536   017752                                ENDSEG
  (3)  017752                   10000$:
  (3)  017752  104405                        TRAP    C$ESEG
5537   017754                                BGNSEG
  (3)  017754  104404                        TRAP    C$BSEG
5538   017756                                SKIP06  6$
  (1)                                         ;GOTO 6$ IF M8206
5539   017766  004737  003166                JSR     PC,CLRALL               ;CLEAR ALL CONDITIONS
5540   017772                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  017772  004537  003100                JSR     R5,,SROMCLK
5541   017776  100403                        100403                          ;START AT ROM PC=3
5542   020000                                SROMCLK                         ;NEXT WORD IS INSTRUCTION,
  (1)  020000  004537  003100                JSR     R5,,SROMCLK
5543   020004  101400                        100000!<400*3>                  ;JUMP TO ROM PC OF 0
5544   020006  004737  003330                JSR     PC,RAMDAT               ;R4=CRAM PC (LSB 8 BITS)
5545   020012  000004                        4                               ;EXPECTED DATA
5546   020014  120504                        CMPB    R5,R4                   ;IS ROM PC CORRECT?
5547   020016  001406                        BEQ     4$                      ;BR IF YES
5548   020020                                ERROR   5                       ;ERROR, CRAM PC IS WRONG
  (5)  020024  104455                        TRAP    C$ERDF
  (6)  020026  000005                        .WORD   5
  (6)  020030  005055                        .WORD   EM0
  (6)  020032  006556                        .WORD   ERR5
5549   020034                        4$:     ESCAPE SEG
  (3)  020034  104410                        TRAP    C$ESCAPE
  (3)  020036  000002                        .WORD   10001$-.
5550   020040                                ENDSEG
  (3)  020040                   10001$:
  (3)  020040  104405                        TRAP    C$ESEG
5551   020042                                BGNSEG
  (3)  020042  104404                        TRAP    C$BSEG
```

```
5552  020044  004737  003166          JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5553  020050                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  020050  004537  003100          JSR     R5,..SROMCLK
5554  020054  100406                  100406                  ;START AT ROM PC=6
5555  020056                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  020056  004537  003100          JSR     R5,..SROMCLK
5556  020062  105525                  104125!<400*3>          ;JUMP TO ROM PC OF 525
5557  020064  004737  003330          JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5558  020070  000007                  7                       ;EXPECTED DATA
5559  020072  120504                  CMPB    R5,R4           ;IS ROM PC CORRECT?
5560  020074  001406                  BEQ     6$              ;BR IF YES
5561  020076                          ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  020102  104455                  TRAP    C$ERDF
 (6)  020104  000005                  .WORD   5
 (6)  020106  005055                  .WORD   EM0
 (6)  020110  006556                  .WORD   ERR5
5562  020112                  6$:     ESCAPE  SEG
 (3)  020112  104410                  TRAP    C$ESCAPE
 (3)  020114  000002                  .WORD   10002$-.
5563  020116                          ENDSEG
 (3)  020116                  10002$:
 (3)  020116  104405                  TRAP    C$ESEG
5564  020120                  ENDTST
 (3)  020120                  L10066:
 (3)  020120  104401                  TRAP    C$ETST
5565
5566  020122                          BADHEAD
 (2)                                  ;************** TEST 21 ***************
5567                                  ;*CRAM TEST OF JUMP(I) ON BRO CLEAR MICRO-PROCESSOR INSTRUCTION.
5568                                  ;*CLEAR THE BRO BIT, PERFORM THE JUMP INSTRUCTION.
5569                                  ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5570                                  ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5571                                  ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5572                                  ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5573                                  ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5574                                  ;*THEN PORT4 WILL CONTAIN A 37
5575  020122                          BADHEAD
 (2)                                  ;************** TEST 21 ***************
5576
5577  020122                  BGNTST
 (3)  020122                  T21::
5578  020122                          MACEX2                  ;DON'T DO IF M8200.
 (1)                                  ;DO NOT DO TEST IF M8200
 (4)  020132  104432                  TRAP    C$EXIT
 (4)  020134  000240                  .WORD   L10067-.
5579  020136                          MVINT
 (1)  020136  013701  002516          MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5580  020142                          MSTCLR                  ;MASTER CLEAR M8200,4,7
5581  020146  004737  003474          JSR     PC,MEMSET       ;SET MEM AND RAM
5582  020152                  1$:     BGNSEG
 (3)  020152  104404                  TRAP    C$BSEG
5583  020154  004737  003166          JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5584  020160                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  020160  004537  003100          JSR     R5,..SROMCLK
5585  020164  100400                  100400                  ;START AT ROM PC=0
5586  020166                          SROMCLK                 ;NEXT WORD IS INSTRUCION,
```

```
  (1)  020166  004537  003100                    JSR     R5,.SROMCLK
5587   020172  116377                             114377!<400*4>          ;JUMP TO ROM PC OF 1777
5588   020174  004737  003330                     JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5589   020200  000001                             1                       ;EXPECTED DATA
5590   020202  120504                             CMPB    R5,R4           ;IS ROM PC CORRECT?
5591   020204  001406                             BEQ     2$              ;BR IF YES
5592   020206                                     ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  020212  104455                             TRAP    C$ERDF
  (6)  020214  000005                             .WORD   5
  (6)  020216  005055                             .WORD   EMO
  (6)  020220  006556                             .WORD   ERR5
5593   020222                              2$:    ESCAPE  SEG
  (3)  020222  104410                             TRAP    C$ESCAPE
  (3)  020224  000002                             .WORD   10000$-.
5594   020226                                     ENDSEG
  (3)  020226                              10000$:
  (3)  020226  104405                             TRAP    C$ESEG
5595   020230                                     BGNSEG
  (3)  020230  104404                             TRAP    C$BSEG
5596   020232                                     SKIP06  6$
  (1)                                              ;GOTO 6$ IF M8206
5597   020242  004737  003166                     JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5598   020246                                     SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  020246  004537  003100                     JSR     R5,.SROMCLK
5599   020252  100403                             100403                  ;START AT ROM PC=3
5600   020254                                     SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  020254  004537  003100                     JSR     R5,.SROMCLK
5601   020260  102000                             100000!<400*4>          ;JUMP TO ROM PC OF 0
5602   020262  004737  003330                     JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5603   020266  000004                             4                       ;EXPECTED DATA
5604   020270  120504                             CMPB    R5,R4           ;IS ROM PC CORRECT?
5605   020272  001406                             BEQ     4$              ;BR IF YES
5606   020274                                     ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  020300  104455                             TRAP    C$ERDF
  (6)  020302  000005                             .WORD   5
  (6)  020304  005055                             .WORD   EMO
  (6)  020306  006556                             .WORD   ERR5
5607   020310                              4$:    ESCAPE  SEG
  (3)  020310  104410                             TRAP    C$ESCAPE
  (3)  020312  000002                             .WORD   10001$-.
5608   020314                                     ENDSEG
  (3)  020314                              10001$:
  (3)  020314  104405                             TRAP    C$ESEG
5609   020316                                     BGNSEG
  (3)  020316  104404                             TRAP    C$BSEG
5610   020320  004737  003166                     JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5611   020324                                     SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  020324  004537  003100                     JSR     R5,.SROMCLK
5612   020330  100406                             100406                  ;START AT ROM PC=6
5613   020332                                     SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  020332  004537  003100                     JSR     R5,.SROMCLK
5614   020336  106125                             104125!<400*4>          ;JUMP TO ROM PC OF 525
5615   020340  004737  003330                     JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5616   020344  000007                             7                       ;EXPECTED DATA
5617   020346  120504                             CMPB    R5,R4           ;IS ROM PC CORRECT?
5618   020350  001406                             BEQ     6$              ;BR IF YES
```

```
5619  020352                                    ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  020356  104455                            TRAP    C$ERDF
 (6)  020360  000005                            .WORD   5
 (6)  020362  005055                            .WORD   EM0
 (6)  020364  006556                            .WORD   ERR5
5620  020366                              6$:     ESCAPE SEG
 (3)  020366  104410                            TRAP    C$ESCAPE
 (3)  020370  000002                            .WORD   10002$-.
5621  020372                                    ENDSEG
 (3)  020372                              10002$:
 (3)  020372  104405                            TRAP    C$ESEG
5622  020374                              ENDTST
 (3)  020374                              L10067:
 (3)  020374  104401                            TRAP    C$ETST
5623
5624  020376                                    BADHEAD
 (2)                                            ;************** TEST 22 ***************
5625                                            ;*CRAM TEST OF JUMP(I) ON BR1 CLEAR MICRO-PROCESSOR INSTRUCTION.
5626                                            ;*CLEAR THE BR1 BIT, PERFORM THE JUMP INSTRUCTION.
5627                                            ;*VERIFY THE JUMP DID OCCUR BY CLOCKING THE INSTRUCTION
5628                                            ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5629                                            ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5630                                            ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5631                                            ;*THE JUMP WAS SUCCESSFUL, IF THE JUMP WAS UNSUCCESSFUL
5632                                            ;*THEN PORT4 WILL CONTAIN A 37
5633  020376                                    BADHEAD
 (2)                                            ;************** TEST 22 ***************
5634
5635  020376                              BGNTST
 (3)  020376                              T22::
5636  020376                                    MACEX2                  ;DON'T DO IF M8200.
 (1)                                            ;DO NOT DO TEST IF M8200
 (4)  020606  104432                            TRAP    C$EXIT
 (4)  020610  000240                            .WORD   L10070-.
5637  020612                                    MYINT
 (1)  020612  013701  002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5638  020616                                    MSTCLR                  ;MASTER CLEAR M8200,4,7
5639  020622  004737  003474                    JSR     PC,MEMSET       ;SET MEM AND RAM
5640  020626                              1$:     BGNSEG
 (3)  020626  104404                            TRAP    C$BSEG
5641  020630  004737  003166                    JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5642  020634                                    SROMCLK                 ;NEXT WORD IS INSTRUCTION.
 (1)  020634  004537  003100                    JSR     R5,.SROMCLK
5643  020640  100400                            100400                  ;START AT ROM PC=0
5644  020642                                    SROMCLK                 ;NEXT WORD IS INSTRUCION.
 (1)  020642  004537  003100                    JSR     R5,.SROMCLK
5645  020646  116777                            114377!<400*5>          ;JUMP TO ROM PC OF 1777
5646  020650  004737  003330                    JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5647  020654  000001                            1                       ;EXPECTED DATA
5648  020656  120504                            CMPB    R5,R4           ;IS ROM PC CORRECT?
5649  020660  001406                            BEQ     2$              ;BR IF YES
5650  020662                                    ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  020666  104455                            TRAP    C$ERDF
 (6)  020670  000005                            .WORD   5
 (6)  020672  005055                            .WORD   EM0
 (6)  020674  006556                            .WORD   ERR5
```

```
5651  020476                          2$:     ESCAPE SEG
  (3) 020476  104410                        TRAP    C$ESCAPE
  (3) 020500  000002                        .WORD   10000$-.
5652  020502                                ENDSEG
  (3) 020502                        10000$:
  (3) 020502  104405                        TRAP    C$ESEG
5653  020504                                BGNSEG
  (3) 020504  104404                        TRAP    C$BSEG
5654  020506                                SKIP06  6$
  (1)                                       ;GOTO 6$ IF M8206
5655  020516  004737  003166                JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5656  020522                                SROMCLK                 ;NEXT WORD IS INSTRUCTION.
  (1) 020522  004537  003100                JSR     R5,..SROMCLK
5657  020526  100403                        100403                  ;START AT ROM PC=3
5658  020530                                SROMCLK                 ;NEXT WORD IS INSTRUCTION.
  (1) 020530  004537  003100                JSR     R5,..SROMCLK
5659  020534  102400                        100000!<400*5>          ;JUMP TO ROM PC OF 0
5660  020536  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5661  020542  000004                        4                       ;EXPECTED DATA
5662  020544  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5663  020546  001406                        BEQ     4$              ;BR IF YES
5664  020550                                ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5) 020554  104455                        TRAP    C$ERDF
  (6) 020556  000005                        .WORD   5
  (6) 020560  005055                        .WORD   EM0
  (6) 020562  006556                        .WORD   ERR5
5665  020564                          4$:     ESCAPE SEG
  (3) 020564  104410                        TRAP    C$ESCAPE
  (3) 020566  000002                        .WORD   10001$-.
5666  020570                                ENDSEG
  (3) 020570                        10001$:
  (3) 020570  104405                        TRAP    C$ESEG
5667  020572                                BGNSEG
  (3) 020572  104404                        TRAP    C$BSEG
5668  020574  004737  003166                JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5669  020600                                SROMCLK                 ;NEXT WORD IS INSTRUCTION.
  (1) 020600  004537  003100                JSR     R5,..SROMCLK
5670  020604  100406                        100406                  ;START AT ROM PC=6
5671  020606                                SROMCLK                 ;NEXT WORD IS INSTRUCTION.
  (1) 020606  004537  003100                JSR     R5,..SROMCLK
5672  020612  106525                        104125!<400*5>          ;JUMP TO ROM PC OF 525
5673  020614  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5674  020620  000007                        7                       ;EXPECTED DATA
5675  020622  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5676  020624  001406                        BEQ     6$              ;BR IF YES
5677  020626                                ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5) 020632  104455                        TRAP    C$ERDF
  (6) 020634  000005                        .WORD   5
  (6) 020636  005055                        .WORD   EM0
  (6) 020640  006556                        .WORD   ERR5
5678  020642                          6$:     ESCAPE SEG
  (3) 020642  104410                        TRAP    C$ESCAPE
  (3) 020644  000002                        .WORD   10002$-.
5679  020646                                ENDSEG
  (3) 020646                        10002$:
  (3) 020646  104405                        TRAP    C$ESEG
```

```
5680  020650                          ENDTST
 (3)  020650                          L10070:
 (3)  020650  104401                          TRAP    C$ETST
5681
5682  020652                                 BADHEAD
 (2)                                         ;************** TEST 23 **************
5683                                         ;*CRAM TEST OF JUMP(I) ON BR4 CLEAR MICRO-PROCESSOR INSTRUCTION.
5684                                         ;*CLEAR THE BR4 BIT, PERFORM THE JUMP INSTRUCTION.
5685                                         ;*VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
5686                                         ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5687                                         ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5688                                         ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5689  020652  020652                         ;*THE CRAM PC IS CORRECT, IF THE CRAM PC IS NOT RIGHT.
5690                                         ;*THEN PORT4 CONTAINS A 37
5691
5692  020654                                 BADHEAD
 (2)                                         ;************** TEST 23 **************
5693
```

```
5695  020654                                BGNTST
 (3)  020654                                T23::
5696  020654                                      MACEX2                    ;DON'T DO IF M8200.
 (1)                                              ;DO NOT DO TEST IF M8200
 (4)  020664  104432                              TRAP    C$EXIT
 (4)  020666  000240                              .WORD   L10071-.
5697  020670                                      MYINT
 (1)  020670  013701  002516                      MOV     KMCSR,R1                  ;RECORD DEVICE ADDR.
5698  020674                                      MSTCLR                    ;MASTER CLEAR M8200,4,7
5699  020700  004737  003474                      JSR     PC,MEMSET         ;SET MEM AND RAM
5700  020704                                1$:   BGNSEG
 (3)  020704  104404                              TRAP    C$BSEG
5701  020706  004737  003166                      JSR     PC,CLRALL         ;CLEAR ALL CONDITIONS
5702  020712                                      SROMCLK                   ;NEXT WORD IS INSTRUCTION,
 (1)  020712  004537  003100                      JSR     R5,..SROMCLK
5703  020716  100400                              100400                    ;START AT ROM PC=0
5704  020720                                      SROMCLK                   ;NEXT WORD IS INSTRUCTION,
 (1)  020720  004537  003100                      JSR     R5,..SROMCLK
5705  020724  117377                              114377!<400*6>            ;JUMP TO ROM PC OF 1777
5706  020726  004737  003330                      JSR     PC,RAMDAT         ;R4=CRAM PC (LSB 8 BITS)
```

```
5708  020732  000001                        1                       ;EXPECTED DATA
5709  020734  120504                        CMPB    R5,R4           ;IS ROM PC CORRECT?
5710  020736  001406                        BEQ     2$              ;BR IF YES
5711  020740                                ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  020744  104455                        TRAP    C$ERDF
 (6)  020746  000005                        .WORD   5
 (6)  020750  005055                        .WORD   EM0
 (6)  020752  006556                        .WORD   ERR5
5712  020754                          2$:   ESCAPE SEG
 (3)  020754  104410                        TRAP    C$ESCAPE
 (3)  020756  000002                        .WORD   10000$-.
5713  020760                                ENDSEG
 (3)  020760                          10000$:
 (3)  020760  104405                        TRAP    C$ESEG
5714  020762                                BGNSEG
 (3)  020762  104404                        TRAP    C$BSEG
5715  020764                                SKIP06  6$
 (1)                                        ;GOTO 6$ IF M8206
5716  020774  004737  003166                JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5717  021000                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  021000  004537  003100                JSR     R5,..SROMCLK
5718  021004  100403                        100403                  ;START AT ROM PC=3
5719  021006                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  021006  004537  003100                JSR     R5,..SROMCLK
5720  021012  103000                        100000!<400*6>  ;JUMP TO ROM PC OF 0
5721  021014  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5722  021020  000004                        4                       ;EXPECTED DATA
```

```
 5724  021022  120504                    CMPB    R5,R4           ;IS ROM PC CORRECT?
 5725  021024  001406                    BEQ     4$              ;BSR IF YES
```

```
 5727  021026                          ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  021032  104455                  TRAP    C$ERDF
  (6)  021034  000005                  .WORD   5
  (6)  021036  005055                  .WORD   EM0
  (6)  021040  006556                  .WORD   ERR5
```

```
5729  021042                          4$:     ESCAPE SEG
 (3)  021042  104410                         TRAP    C$ESCAPE
 (3)  021044  000002                         .WORD   10001$-.
5730  021046                                ENDSEG
 (3)  021046                          10001$:
 (3)  021046  104405                         TRAP    C$ESEG
5731  021050                                BGNSEG
 (3)  021050  104404                         TRAP    C$BSEG
5732  021052  004737  003166                JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
5733  021056                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  021056  004537  003100                JSR     R5,..SROMCLK
5734  021062  100406                       100406                  ;START AT ROM PC=6
5735  021064                                SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  021064  004537  003100                JSR     R5,..SROMCLK
5736  021070  107125                       104125!<400*6>  ;JUMP TO ROM PC OF 525
5737  021072  004737  003330                JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5738  021076  000007                       7                       ;EXPECTED DATA
5739  021100  120504                       CMPB    R5,R4           ;IS ROM PC CORRECT?
5740  021102  001406                       BEQ     6$              ;BR IF YES
5741  021104                                ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  021110  104455                         TRAP    C$ERDF
 (6)  021112  000005                         .WORD   5
 (6)  021114  005055                         .WORD   EM0
 (6)  021116  006556                         .WORD   ERR5
5742  021120                          6$:     ESCAPE SEG
 (3)  021120  104410                         TRAP    C$ESCAPE
 (3)  021122  000002                         .WORD   10002$-.
5743  021124                                ENDSEG
 (3)  021124                          10002$:
 (3)  021124  104405                         TRAP    C$ESEG
5744  021126                                ENDTST
 (3)  021126                          L10071:
 (3)  021126  104401                         TRAP    C$ETST
5745
5746  021130                                BADHEAD
 (2)                                        ;*************** TEST 24 ***************
5747                                        ;*CRAM TEST OF JUMP(I) ON BR7 CLEAR MICRO-PROCESSOR INSTRUCTION.
5748                                        ;*CLEAR THE BR7 BIT, PERFORM THE JUMP INSTRUCTION.
5749                                        ;*VERIFY THE JUMP DID NOT OCCUR BY CLOCKING THE INSTRUCTION
5750                                        ;*IN THE LOCATION IT IS AT. THIS INSTRUCTION LOADS THE
5751                                        ;*BR WITH THE LOWEST 8 BITS OF THE CRAM PC. AT THIS POINT
5752                                        ;*THE BR DATA IS MOVED TO PORT4. IF THIS DATA IS CORRECT
5753                                        ;*THE CRAM PC IS CORRECT, IF THE CRAM PC IS NOT RIGHT.
5754                                        ;*THEN PORT4 CONTAINS A 37
5755  021130                                BADHEAD
 (2)                                        ;*************** TEST 24 ***************
5756
5757  021130                          BGNTST
 (3)  021130                          T24::
5758  021130                                MACEX2                  ;DON'T DO IF M8200.
 (1)                                        ;DO NOT DO TEST IF M8200
 (4)  021140  104432                        TRAP    C$EXIT
 (4)  021142  000240                        .WORD   L10072-.
5759  021144                                MYINT
 (1)  021144  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5760  021150                                MSTCLR                  ;MASTER CLEAR M8200,4,7
```

```
 5761  021154  004737  003474          JSR     PC,MEMSET       ;SET MEM AND RAM
 5762  021160                  1$:     BGNSEG
  (3)  021160  104404                  TRAP    C$BSEG
 5763  021162  004737  003166          JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
 5764  021166                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  021166  004537  003100          JSR     R5,..SROMCLK
 5765  021172  100400                  100400          ;START AT ROM PC=0
 5766  021174                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  021174  004537  003100          JSR     R5,..SROMCLK
 5767  021200  117777                  114377!<400*7>          ;JUMP TO ROM PC OF 1777
 5768  021202  004737  003330          JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
 5769  021206  000001                  1                       ;EXPECTED DATA
 5770  021210  120504                  CMPB    R5,R4           ;IS ROM PC CORRECT?
 5771  021212  001406                  BEQ     2$              ;BR IF YES
 5772  021214                          ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  021220  104455                  TRAP    C$ERDF
  (6)  021222  000005                  .WORD   5
  (6)  021224  005055                  .WORD   EM0
  (6)  021226  006556                  .WORD   ERR5
 5773  021230                  2$:     ESCAPE SEG
  (3)  021230  104410                  TRAP    C$ESCAPE
  (3)  021232  000002                  .WORD   10000$-.
 5774  021234                          ENDSEG
  (3)  021234                  10000$:
  (3)  021234  104405                  TRAP    C$ESEG
 5775  021236                          BGNSEG
  (3)  021236  104404                  TRAP    C$BSEG
 5776  021240                          SKIP06  6$
  (1)                                 ;GOTO 6$ IF M8206
 5777  021250  004737  003166          JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
 5778  021254                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  021254  004537  003100          JSR     R5,..SROMCLK
 5779  021260  100403                  100403                  ;START AT ROM PC=3
 5780  021262                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  021262  004537  003100          JSR     R5,..SROMCLK
 5781  021266  103400                  100000!<400*7>  ;JUMP TO ROM PC OF 0
 5782  021270  004737  003330          JSR     PC,RAMDAT       ;;R4=CRAM PC (LCB 8 BITS)
 5783  021274  000004                  4                       ;EXPECTED DATA
 5784  021276  120504                  CMPB    R5,R4           ;IS ROM PC CORRECT?
 5785  021300  001406                  BEQ     4$              ;BR IF YES
 5786  021302                          ERROR   5               ;ERROR, CRAM PC IS WRONG
  (5)  021306  104455                  TRAP    C$ERDF
  (6)  021310  000005                  .WORD   5
  (6)  021312  005055                  .WORD   EM0
  (6)  021314  006556                  .WORD   ERR5
 5787  021316                  4$:     ESCAPE SEG
  (3)  021316  104410                  TRAP    C$ESCAPE
  (3)  021320  000002                  .WORD   10001$-.
 5788  021322                          ENDSEG
  (3)  021322                  10001$:
  (3)  021322  104405                  TRAP    C$ESEG
 5789  021324                          BGNSEG
  (3)  021324  104404                  TRAP    C$BSEG
 5790  021326  004737  003166          JSR     PC,CLRALL       ;CLEAR ALL CONDITIONS
 5791  021332                          SROMCLK                 ;NEXT WORD IS INSTRUCTION,
  (1)  021332  004537  003100          JSR     R5,..SROMCLK
```

```
5792  021336  100406                          100406                  ;START AT ROM PC=6
5793  021340                                  SROMCLK                 ;NEXT WORD IS INSTRUCTION,
 (1)  021340  004537  003100                  JSR     R5,.SROMCLK
5794  021344  107525                          104125!<400*7>          ;JUMP TO ROM PC OF 525
5795  021346  004737  003330                  JSR     PC,RAMDAT       ;R4=CRAM PC (LSB 8 BITS)
5796  021352  000007                          7                       ;EXPECTED DATA
5797  021354  120504                          CMPB    R5,R4           ;IS ROM PC CORRECT?
5798  021356  001406                          BEQ     6$              ;BR IF YES
5799  021360                                  ERROR   5               ;ERROR, CRAM PC IS WRONG
 (5)  021364  104455                          TRAP    C$ERDF
 (6)  021366  000005                          .WORD   5
 (6)  021370  005055                          .WORD   EM0
 (6)  021372  006556                          .WORD   ERR5
5800  021374                          6$:     ESCAPE SEG
 (3)  021374  104410                          TRAP    C$ESCAPE
 (3)  021376  000002                          .WORD   10002$-.
5801  021400                                  ENDSEG
 (3)  021400                          10002$:
 (3)  021400  104405                          TRAP    C$ESEG
5802  021402                          ENDTST
 (3)  021402                          L10072:
 (3)  021402  104401                          TRAP    C$ETST
5803
5804  021404                                  BADHEAD
 (2)                                          ;************** TEST 25 ***************
5805                                          ;*
5806                                          ;*MAIN MEMORY PAGE DUAL ADDRESS TEST.
5807                                          ;*IN THIS TEST WE WILL VERIFY THAT PAGES DO
5808                                          ;*NOT DUAL ADDRESS.  THIS TEST IS DIFFERENT FROM THE
5809                                          ;*PREVIOUS DUAL ADDRESS TESTS IN THAT THE OTHER
5810                                          ;*TEST REALLY DIDN'T CHECK PAGE DUAL ADDRESSING
5811  021404                                  BADHEAD
 (2)                                          ;************** TEST 25 ***************
5812
5813  021404                          BGNTST
 (3)  021404                          T25::
5814  021404                                  K4ONLY                  ;FOR 4K CPUS ONLY.
 (1)                                          ;DO NOT DO TEST IF M8200, OR M8204
 (4)  021414  104432                          TRAP    C$EXIT
 (4)  021416  000156                          .WORD   L10073-.
5815  021420                                  MYINT
 (1)  021420  013701  002516                  MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
5816  021424                                  MSTCLR
5817  021430  005002                          CLR R2                  ;R2 WILL BE PAGE #
5818  021432  042737  000037  021456  1$:     BIC #37,2$              ;CLEAR UNUSED BITS
5819  021440  050237  021456                  BIS R2,2$               ;ADD CURRENT PAGE MARKER.
5820  021444                                  ROMCLK                  ;SET ADDR D
 (1)  021444  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
5821  021450  010000                          10000
5822  021452                                  ROMCLK                  ;OF PAGE X
 (1)  021452  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
5823  021456  004000                  2$:     4000                    ;THIS LOCATION MODIFIED BY LOST
5824                                                                  ;FEW INSTRUCTIONS
5825  021460  010261  000004                  MOV R2,4(R1)            ;PUT PAGE # INTO PART 4
5826  021464                                  ROMCLK                  ;CLOCK PART 4 INTO MEMORY
 (1)  021464  004537  003044                  JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
```

```
5827  021470  122500                          122500                  ;WHOSE PAGE # IS IN R2
5828  021472  005202                          INC R2                  ;UPDATE PAGE #
5829  021474  032702  000020                  BIT #20,R2              ;DONE ALL PAGES?
5830  021500  001754                          BEQ 1$                  ;NO-DO NEXT ONE
5831
5832                                                                  ;OK, ALL LOADS OF ALL PAGES
5833                                                                  ;CONTAIN THIER PAGE NUMBER, NOW
5834                                                                  ;WE'LL GO BACK THROUGH
5835                                                                  ;THEM CHECKING THEM OUT.
5836
5837  021502  005002                          CLR R2                  ;R2 STILL HAS PAGE NUMBER
5838
5839  021504  042737  000037  021522  3$:     BIC #37,4$
5840  021512  050237  021522                  BIS R2,4$
5841  021516                                  ROMCLK                  ;LOAD PAGE NUMBER
 (1)  021516  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5842  021522  004000                  4$:     4000
5843  021524                                  ROMCLK                  ;MOVE MEM TO PART 4
 (1)  021524  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5844  021530  041224                          041224
5845  021532  116104  000004                  MOVB 4(R1),R4           ;''FOUND''
5846  021536  110205                          MOVB R2,R5              ;''EXPECTED''
5847  021540  120504                          CMPB R5,R4              ;ADDRESS PROBLEM?
5848  021542  001406                          BEQ 5$
5849
5850  021544                                  ERROR 13                ;PAGE ADDRESSING ERROR IN MAIN
 (5)  021550  104455                          TRAP    C$ERDF
 (6)  021552  000015                          .WORD   13
 (6)  021554  005055                          .WORD   EM0
 (6)  021556  007542                          .WORD   ERR13
5851                                                                  ;MEMORY.
5852                                                                  ;MAR BITS 8 THROUGH 12 ARE REPRESENTED
5853                                                                  ;BY R2 (''EXP'ED'')BITS 0-4)
5854
5855  021560                          5$:     ESCAPE TST
 (3)  021560  104410                          TRAP    C$ESCAPE
 (3)  021562  000012                          .WORD   L10073-.
5856  021564  005202                          INC R2                  ;UPDATE PAGE ADDRESS
5857  021566  032702  000020                  BIT #20,R2              ;ALL DONE?
5858  021572  001744                          BEQ 3$                  ;NO-CHECK NEXT PAGE.
5859                                                                  ;YES-EXIT.
5860  021574                          ENDTST
 (3)  021574                          L10073:
 (3)  021574  104401                          TRAP    C$ETST
5861
5862
5863  021576                                  BADHEAD
 (2)                                          ;************** TEST 26 ***************
5864                                          ;*
5865                                          ;*JUMP FIELD,PAGE TEST
5866                                          ;*
5867                                          ;*IN THIS TEST WILL MAKE SURE A JUMP FIELD INSTRUCTION
5868                                          ;*WORKS.  TO DO THIS, WE'LL PUT THE DESIRED PAGE,FIELD
5869                                          ;*INORMATION IN !BUS*<13> THEN ISSUE A JUMP FIELD
5870                                          ;*THEN WE'LL READ PC REG. AND VERIFY.
5871  021576                                  BADHEAD
```

```
 (2)                                        ;************** TEST 26 ***************
5872
5873  021576                               BGNTST
 (3)  021576                               T26::
5874  021576                                     K4ONLY                    ;FOR 4K CPUS ONLY
 (1)                                       ;DO NOT DO TEST IF M8200, OR M8204
 (4)  021606  104432                       TRAP    C$EXIT
 (4)  021610  000132                       .WORD   L10074-.
5875  021612                               MYINT
 (1)  021612  013701  002516                MOV     KMCSR,R1                 ;RECORD DEVICE ADDR.
5876  021616                                     MSTCLR
5877
5878  021622  005002                             CLR R2                    ;R2 TO CONTAIN FIELD #
5879
5880  021624  042737  000017  021642  1$:      BIC #17,2$                ;CLEAR ANY JUNK
5881  021632  050237  021642                   BIS R2,2$                 ;SET FIELD # INTO INSTR.
5882
5883  021636                                     ROMCLK                    ;CLOCK FIELD BITS INTO BREG.
 (1)  021636  004537  003044                   JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
5884  021642  000400                    2$:     000400                    ;CONTAINS FIELD,PAGE BITS
5885  021644                                     ROMCLK                    ;XFERR BREG INTO IBUS*<13>
 (1)  021644  004537  003044                   JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
5886  021650  061233                           061233
5887  021652                                     SROMCLK                   ;GET INSTRUCTION CLOCKED.
 (1)  021652  004537  003100                   JSR     R5,..SROMCLK
5888  021656  100000                           100000                    ;BAS FORM FOR JUM FIELD INSTR.
5889
5890
5891  021660  142761  000002  000001           BICB #BIT1,1(R1)                ;CLEAR ROMI
5892  021666                                     ROMCLK                    ;CLOCK NEXT INSTR.
 (1)  021666  004537  003044                   JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
5893  021672  121264                           121264                    ;MOVE IBUS*TO PORT 4
5894  021674  116104  000004                   MOVB 4(R1),R4             ;GET IT.
5895  021700  042704  177760                   BIC     #^C<17>,R4
5896  021704  120402                           CMPB R4,R2                ;FIELD OK?
5897  021706  001407                           BEQ 3$                    ;IF OK GO AHEAD
5898  021710  010205                           MOV     R2,R5
5899  021712                                     ERROR 14                  ;CHANGE FIELD INSTRUCTION   ;*** BO
 (5)  021716  104455                       TRAP    C$ERDF
 (6)  021720  000016                       .WORD   14
 (6)  021722  005055                       .WORD   EMO
 (6)  021724  007664                       .WORD   ERR14
5900                                                                       ;FAILED.  FOR FIELD,PAGE INDICATES
5901                                                                       ;BY 'EXPECTED'' BITS 0,1,2,3 OF
5902                                                                       ;EXPECTED REPRESENT FIELD BITS.
5903  021726                               3$:     ESCAPE TST
 (3)  021726  104410                       TRAP    C$ESCAPE
 (3)  021730  000012                       .WORD   L10074-.
5904
5905
5906  021732  005202                             INC R2                    ;UPDATE TO NEXT FIELD
5907  021734  032702  000020                   BIT #20,R2                ;DONE ALL FIELDS?
5908  021740  001731                           BEQ     1$
5909
5910  021742                               ENDTST
 (3)  021742                               L10074:
```

```
  (3)  021742  104401                          TRAP    C$ETST
 5911
 5912  021744                                 BADHEAD
  (2)                                         ;************** TEST 27 ***************
 5913                                         ;*
 5914                                         ;*JUMP TEST, JUMP ALWAYS, JUMP CHANGE FIELD
 5915                                         ;*
 5916                                         ;*IN THIS TEST, WE WILL CHECK THE ABILITY OF THE
 5917                                         ;*MICRO PROCESSOR TO JUMP (BRANCH & ALWAYS INSTRUCTION)
 5918                                         ;*TO LOCATIONS, FIELDS FROM OTHER LOCATIONS FIELDS.
 5919                                         ;*WE ALREADY KNOW THAT THE BRANCH INSTR WORKS FROM
 5920                                         ;*OTHER TEST.                PROCEDURE:
 5921                                         ;*       1. START ADDR 0, FIELD 0
 5922                                         ;*       2. **CALCULATE NEW ADDRS, FIELD  VIA INC,
 5923                                         ;*       3. CAUSE JUMP (BRANCH) TO NEW ADDRESS
 5924                                         ;*       4. READ PC FROM IBUS*12 AND IBUS*13
 5925                                         ;*       5. REPEAT STEP 2-4 256.TIMES
 5926                                         ;*
 5927                                         ;*       TO CALCULATE NEW ADDRESS:
 5928                                         ;*       1. INC LOW BYTE OF ADDRESS FOR PC ADDRES 0-7
 5929                                         ;*       2. INC LOW BYTE OF NADDRESS FOR PC ADDRESS 8-11
 5930                                         ;*          BITS REPRESENTED AS BITS 0-3. WHEN  0-3 OVERFLOWS,
 5931                                         ;*          RESTARTS AT ZERO.
 5932                                         ;*          NET RESULT IS JUMPS FROM:
 5933                                         ;*               FIELD,PAGE                LOC
 5934                                         ;*                     0                   0
 5935                                         ;*                     1                   1
 5936                                         ;*                     2                   2
 5937                                         ;*                     3                   3
 5938                                         ;*                    10                   7
 5939                                         ;*                    11                  11
 5940                                         ;*                    :TO                 :
 5941                                         ;*                    17                 377
 5942                                         ;*
 5943  021744                                 BADHEAD
  (2)                                         ;************** TEST 27 ***************
 5944
 5945  021744                                 BGNTST
  (3)  021744                          T27::
 5946  021744                                 MYINT
  (1)  021744  013701  002516                 MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
 5947  021750                                 K4ONLY                          ;4K CPUS ONLY.
  (1)                                        ;DO NOT DO TEST IF M8200, OR M8204
  (4)  021760  104432                        TRAP    C$EXIT
  (4)  021762  000336                        .WORD   L10075-.
 5948  021764                                 MSTCLR
 5949
 5950  021770  012737  000000  002406         MOV     #0, FLAG        ;FLAG TO REPRESENT
 5951                                                                  ;FIELD,PAGE
 5952                                                                  ;TO VARIE STARTING PAGE,FIELD,
 5953                                                                  ;CHANGE #0 PORTION OF INSTR.
 5954  021776  012702  000000                 MOV     #0, R2          ;R2 TO CONTAIN JUMPED
 5955                                                                  ;TO CHANGE STARTING IMM ADDR.,
 5956                                                                  ;VARIE #0 PORTIONS OF INSTR.
 5957  022002  012737  000000  002412         MOV     #0, FADR        ;ADDRESS
 5958                                         ;LOOP HERE
```

```
5959  022010                          1$:
5960  022010  042737  000017  022050        BIC #17,2$              ;CLEAR JUNK FROM FIELD
5961                                        ;PORTION OF CHANGE FIELD INSTR
5962  022016  013700  002406              MOV FLAG,R0             ;INORDER TO INC, DEC FIELD,PAGE
5963  022022  042700  177760              BIC #^C<17>,R0
5964  022026  050037  022050              BIS R0,2$               ;NOW POSITION IN INSTR.
5965  022032  042737  077777  022064      BIC #077777,3$                  ;NOW FOR IMMED. BR INSTR.
5966  022040  050237  022064              BIS R2,3$               ;NOW ADD IMMEDIATE ADDR
5967
5968
5969
5970  022044                              ROMCLK
 (1)  022044  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5971  022050  000400                2$:   000400                  ;MOVE PAGE,FIELD # TO BREG.
5972  022052                              ROMCLK
 (1)  022052  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5973  022056  061233                      61233                   ;MOV    BREG TO PC HIGH REG.
5974  022060                              SROMCLK
 (1)  022060  004537  003100              JSR     R5,..SROMCLK
5975  022064  100000                3$:   100000                  ;NOW CLOCK IT IN BY JMP FIELD INSTR.
5976
5977  022066                              ROMCLK                  ;READ PC REG HI
 (1)  022066  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5978  022072  121265                      121265
5979  022074                              ROMCLK                  ;READ PC REG LOW
 (1)  022074  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
5980  022100  121244                      121244
5981
5982  022102  016104  000004              MOV 4(R1),R4            ;READ PC REG (NOW IN SEL 4)
5983  022106  042704  170000              BIC     #170000,R4      ;STRIP FOR ONLY PAGE,FIELD BITS.
5984
5985  022112  013705  022050              MOV 2$,R5               ;NOW FROM ADDR WE WANTED TO
5986  022116  000305                      SWAB R5                 ;JUMP TO
5987  022120  042705  170377              BIC #170377,R5          ;CLEAR JUNK
5988  022124  050205                      BIS R2,R5               ;ADD IMMED ADDR
5989  022126                              SKIP06  5$
 (1)                                        ;GOTO 5$ IF M8206
5990  022136  105205                      INCB    R5              ;UPDATE ADDR. EXPECTED SENCE THE READ
5991  022140                        5$:
5992                                        ;OF THE IBUS <13> INC THE PC.
5993
5994  022140  020504                      CMP R5,R4               ;JUMP GO OK?
5995  022142  001406                      BEQ 4$                  ;YEA, CONTINUES
5996  022144                              ERROR 15                ;FAILED TO JUMP PROPERLY.
 (5)  022150  104455                      TRAP    C$ERDF
 (6)  022152  000017                      .WORD   15
 (6)  022154  005055                      .WORD   EM0
 (6)  022156  010006                      .WORD   ERR15
5997                                        ;"FROM ADDR" REPRESENTS
5998                                        ;THE ADDRESS WE STARTED AT
5999                                        ;"TO ADDR" REPRESENTS WHERE
6000                                        ;WE EXPECTED TO JUMP TO.
6001                                        ;"BAD ADDR" REPRESENTS WHERE
6002                                        ;WE WENT TO.
6003
6004                                .REM %
```

```
                                                15      12      11      10      9 8 7          0
                                                ---------------------------------------------------
                                                !UNUSED !  FIELD          ! PAGE    !IMMED. ADDR  !
                                                !       !   BITS          ! BITS    !             !
                                                ---------------------------------------------------

                                        ;THIS IS A PICTURE OF THE P.C. REG.
                                         BITS 0-7 ARE IN IBUS*<12>
                                         BITS 8-11 ARE IN IBUS*<13>
                                         THEY GOT CLOCK IN THERE VIA JUMPS TAKEN
                                         THE FIELD BITS
                                         ARE IN BIT POSITION 0,1 OF THE INSTRUCTION AT 2$.

                                         3$ WAS THE JUMP ALWAYS INSTRUCTION. THE IMMED. ADDR.
                                         WAS IN 0-7 OF THE JUMP INSTR.  THE PAGE BITS,
                                         PC REG BITS 8,9, WERE IN BITS 11,12 OF THE INSTR.
                                         JUMP INSTRUCTIONS HAVE BEEN CHECKED OUT
                                         BEFORE, SO THE IMPORTANT THING TO REMEMBER TO
                                         WATCH IS THE ''FROM ADDR'',''TO ADDR''

                                %

     022160                     4$:     ESCAPE TST
(3)  022160  104410                     TRAP    C$ESCAPE
(3)  022162  000136                     .WORD   L10075-.
     022164  010437  002412             MOV R4,FADR
     022170  005237  002406             INC FLAG                        ;UPDATE PAGE,FIELD
     022174  105202                     INCB R2                         ;UPDATE JMMED. ADDR
     022176  001304                     BNE 1$                          ;LOOP IF NOT DONE.

                                        ;*
                                        ;*CHECK HERE TO SEE IF MASTER CLEAR CLEARS P.C. REG
                                        ;*

     022200                             SKIP06  40$
(1)                                     ;GOTO 40$ IF M8206
     022210  005737  002470             TST     RUNB
     022214  001041                     BNE     40$
     022216  005737  002472             TST     RUNINH
     022222  001036                     BNE     40$
     022224  052711  040000             BIS     #40000,(R1)     ;SET MASTER CLEAR
     022230  105761  000001             TSTB    1(R1)
     022234  042711  040000             BIC     #40000,(R1)

                                        ;TO RUN THIS SECTION OF CODE YOU MUST TURN SW7 OF SWITCH PACK #E28
                                        ;OFF SO THAT M8207 NOT SELFSTARTING.

     022240                             ROMCLK                  ;WE MUST FIRST CLOCK
(1)  022240  004537  003044             JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
     022244  121265                     121265                  ;THE PC LATCH REGS
     022246                             ROMCLK                  ;BEFORE WE CAN READ THEM
(1)  022246  004537  003044             JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
     022252  121244                     121244
     022254                             ROMCLK                  ;REG PC REG HI, PUT IN PORTS
(1)  022254  004537  003044             JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
     022260  121265                     121265
```

```
6055
6056  022262                                    ROMCLK                  ;REG PC REG LOW, PUT IN PORT4
 (1)  022262  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6057  022266  121244                            121244
6058  022270  005005                            CLR     R5              ;EXPECT ZERO
6059  022272  016104  000004                    MOV     4(R1),R4        ;READ PC REG FROM PORT 485
6060  022276  042704  170003                    BIC     #170003,R4
6061  022302  001406                            BEQ     40$             ;IF CLEARED, EXIT
6062                                                                    ;NOTE WE ALSO CLEARED BIT 1 OF THE
6063                                                                    ;PC REG, BECAUSE AFTER THE MASTER
6064                                                                    ;CLEAR, WE DID TWO INSTRUCTIONS TO
6065                                                                    ;READ IT, THUS CAUSING THE PC REG
6066                                                                    ;TO GET BUMPED.
6067
6068  022304                                    ERROR   45              ;MASTER CLEAR FAILED TO CLEAR
 (5)  022310  104455                            TRAP    C$ERDF
 (6)  022312  000055                            .WORD   45
 (6)  022314  005055                            .WORD   EM0
 (6)  022316  011124                            .WORD   ERR45
6069                                                                    ;PC REG
6070  022320                              40$:
6071  022320                              ENDTST
 (3)  022320                              L10075:
 (3)  022320  104401                            TRAP    C$ETST
6072  022322                                    BADHEAD
 (2)                                            ;************** TEST 28 **************
6073                                            ;*
6074                                            ;*JUMP TEST, JUMP ALWAYS, JUMP CHANGE FIELD
6075                                            ;*
6076                                            ;*IN THIS TEST, WE WILL CHECK THE ABILITY OF THE
6077                                            ;*MICRO PROCESSOR TO JUMP (BRANCH & ALWAYS INSTRUCTION)
6078                                            ;*TO LOCATIONS, FIELDS FROM OTHER LOCATIONS FIELDS.
6079                                            ;*WE ALREADY KNOW THAT THE BRANCH INSTR WORKS FROM
6080                                            ;*OTHER TEST.                PROCEDURE:
6081                                            ;*      1. START ADDR 0, FIELD 0
6082                                            ;*      2. **CALCULATE NEW ADDRS, FIELD  VIA DEC,
6083                                            ;*      3. CAUSE JUMP (BRANCH) TO NEW ADDRESS
6084                                            ;*      4. READ PC FROM IBUS*12 AND IBUS*13
6085                                            ;*      5. REPEAT STEP 2-4 256.TIMES
6086                                            ;*
6087                                            ;*      TO CALCULATE NEW ADDRESS:
6088                                            ;*      1. DEC LOW BYTE OF ADDRESS FOR PC ADDRES 0-7
6089                                            ;*      2. DEC LOW BYTE OF NADDRESS FOR PC ADDRESS 8-11
6090                                            ;*         BITS REPRESENTED AS BITS 0-3. WHEN  0-3 OVERFLOWS,
6091                                            ;*         RESTARTS AT ZERO.
6092                                            ;*         NET RESULT IS JUMPS FROM:
6093                                            ;*              FIELD,PAGE              LOC
6094                                            ;*                   0                  0
6095                                            ;*                  17                  377
```

```
                                        ;*                      16              376
                                        ;*                      15              375
                                        ;*                      :TO             :
                                        ;*                      00              000
                                        ;*
022322                                  BADHEAD
 (2)                                    ;*************** TEST 28 ****** ********

                                        BGNTST
022322                          T28::
                                        MYINT
022322  013701  002516                  MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
022326                                  K4ONLY                  ;4K CPUS ONLY.
 (1)                                    ;DO NOT DO TEST IF M8200, OR M8204
 (4)    022336  104432                  TRAP    C$EXIT
 (4)    022340  000216                  .WORD   L10076-.
022342                                  MSTCLR

022346  012737  000000  002406          MOV     #0, FLAG        ;FLAG TO REPRESENT
                                                                ;FIELD,PAGE
                                                                ;TO VARIE STARTING PAGE,FIELD,
                                                                ;CHANGE #0 PORTION OF INSTR.
022354  012702  000000                  MOV     #0, R2          ;R2 TO CONTAIN JUMPED
                                                                ;TO CHANGE STARTING IMM ADDR.,
                                                                ;VARIE #0 PORTIONS OF INSTR.
022360  012737  000000  002412          MOV     #0, FADR        ;ADDRESS
                                        ;LOOP HERE
022366                          1$:
022366  042737  000017  022426          BIC #17,2$              ;CLEAR JUNK FROM FIELD
                                                                ;PORTION OF CHANGE FIELD INSTR
022374  013700  002406                  MOV FLAG,R0             ;INORDER TO INC, DEC FIELD,PAGE
022400  042700  177760                  BIC #^C<17>,R0
022404  050037  022426                  BIS R0,2$               ;NOW POSITION IN INSTR.
022410  042737  077777  022442          BIC #077777,3$                  ;NOW FOR IMMED. BR INSTR.
022416  050237  022442                  BIS R2,3$               ;NOW ADD IMMEDIATE ADDR


022422                                  ROMCLK
022422  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
022426  000400                  2$:     000400                  ;MOVE PAGE,FIELD # TO BREG.
022430                                  ROMCLK
022430  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
022434  061233                          61233                   ;MOV    BREG TO PC HIGH REG.
022436                                  SROMCLK
022436  004537  003100                  JSR     R5,..SROMCLK
022442  100000                  3$:     100000                  ;NOW CLOCK IT IN BY JMP FIELD INSTR.

022444                                  ROMCLK                  ;READ PC REG HI
022444  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
022450  121265                          121265
022452                                  ROMCLK                  ;READ PC REG LOW
022452  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
022456  121244                          121244

022460  016104  000004                  MOV 4(R1),R4            ;READ PC REG (NOW IN SEL 4)
```

```
6142  022464  042704  170000                  BIC     #170000,R4      ;STRIP FOR ONLY PAGE,FIELD BITS.
6143
6144  022470  013705  022426                  MOV 2$,R5               ;NOW FROM ADDR WE WANTED TO
6145  022474  000305                          SWAB R5                 ;JUMP TO
6146  022476  042705  170377                  BIC #170377,R5          ;CLEAR JUNK
6147  022502  050205                          BIS R2,R5               ;ADD IMMED ADDR
6148  022504                                  SKIP06  5$
  (1)                                         ;GOTO 5$ IF M8206
6149  022514  105205                          INCB    R5              ;UPDATE ADDR. EXPECTED SENCE THE READ
6150  022516                          5$:
6151                                                                  ;OF THE IBUS <13> INC THE PC.
6152
6153  022516  020504                          CMP R5,R4               ;JUMP GO OK?
6154  022520  001406                          BEQ 4$                  ;YEA, CONTINUES
6155  022522                                  ERROR 15                ;FAILED TO JUMP PROPERLY.
  (5)  022526  104455                         TRAP    C$ERDF
  (6)  022530  000017                         .WORD   15
  (6)  022532  005055                         .WORD   EM0
  (6)  022534  010006                         .WORD   ERR15
6156                                                                  ;''FROM ADDR'' REPRESENTS
6157                                                                  ;THE ADDRESS WE STARTED AT
6158                                                                  ;''TO ADDR'' REPRESENTS WHERE
6159                                                                  ;WE EXPECTED TO JUMP TO,
6160                                                                  ;''BAD ADDR'' REPRESENTS WHERE
6161                                                                  ;WE WENT TO.
6162
6163                            .REM %
6164                                                  15      12      11      10      9 8 7           0
6165                                                  ----------------------------------------------
6166                                                  !UNUSED !  FIELD        ! PAGE    !IMMED. ADDR  !
6167                                                  !       !  BITS         ! BITS    !             !
6168                                                  ----------------------------------------------
6169
6170                                                ;THIS IS A PICTURE OF THE P.C. REG.
6171                                                 BITS 0-7 ARE IN IBUS*<12>
6172                                                 BITS 8-11 ARE IN IBUS*<13>
6173                                                 THEY GOT CLOCK IN THERE VIA JUMPS TAKEN
6174                                                 THE FIELD BITS
6175                                                 ARE IN BIT POSITION 0,1 OF THE INSTRUCTION AT 2$.
6176
6177                                                 3$ WAS THE JUMP ALWAYS INSTRUCTION. THE IMMED. ADDR.
6178                                                 WAS IN 0-7 OF THE JUMP INSTR.  THE PAGE BITS,
6179                                                 PC REG BITS 8,9, WERE IN BITS 11,12 OF THE INSTR.
6180                                                 JUMP INSTRUCTIONS HAVE BEEN CHECKED OUT
6181                                                 BEFORE, SO THE IMPORTANT THING TO REMEMBER TO
6182                                                 WATCH IS THE ''FROM ADDR'',''TO ADDR''
6183
6184                            %
6185
6186  022536                          4$:     ESCAPE TST
  (3)  022536  104410                         TRAP    C$ESCAPE
  (3)  022540  000016                         .WORD   L10076-.
6187  022542  010437  002412                  MOV R4,FADR
6188  022546  005337  002406                  DEC FLAG                ;UPDATE PAGE,FIELD
6189  022552  105302                          DECB R2                 ;UPDATE JMMED. ADDR
6190  022554  001304                          BNE 1$                  ;LOOP IF NOT DONE.
```

```
 6191
 6192
 6193  022556                          ENDTST
  (3)  022556                          L10076:
  (3)  022556  104401                          TRAP    C$ETST
 6194  022560                                  BADHEAD
  (2)                                         ;************** TEST 29 ******..********
 6195                                         ;*
 6196                                         ;* IN THIS TEST WE'LL VERIFY THAT THE Z BIT CAN BE READ FROM
 6197                                         ;* IBUS*<13>. WE ALLREADY KNOW THAT THE Z BIT WORKS PROPERLY,
 6198                                         ;* ALL WE WANT TO KNOW HERE IS THAT IT CAN BE READ.
 6199                                         ;*
 6200  022560                                  BADHEAD
  (2)                                         ;************** TEST 29 ***************
 6201
 6202  022560                                  BGNTST
  (3)  022560                          T29::
 6203  022560                                  K4ONLY                          ;M8206 &M8207 ONLY!
  (1)                                         ;DO NOT DO TEST IF M8200, OR M8204
  (4)  022570  104432                         TRAP    C$EXIT
  (4)  022572  000200                         .WORD   L10077-.
 6204  022574                                  MSTCLR
 6205  022600                                  MYINT
  (1)  022600  013701  002516                 MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
 6206  022604  004737  003166                 JSR     PC,CLRALL               ;CLR CONDITION CODES.
 6207  022610                                  ROMCLK                          ;NOW READ IBUS*<15>PUT IN PORT 4
  (1)  022610  004537  003044                 JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 6208  022614  121264                         121264
 6209  022616  116104  000004                 MOVB    4(R1),R4                ;READ IT FROM PORT 4
 6210  022622  042704  177477                 BIC     #177477,R4              ;STRIP ANY JUNK,C&Z BITS 6,7
 6211  022626  012705  000000                 MOV     #0,R5                   ;EXPECT IT CLEAR
 6212  022632  120405                         CMPB    R4,R5                   ;OK?
 6213  022634  001410                         BEQ     1$
 6214  022636                                  ERROR   16                      ;FAILURE OF Z&C TO BE CLEAR.
  (5)  022642  104455                         TRAP    C$ERDF
  (6)  022644  000020                         .WORD   16
  (6)  022646  005055                         .WORD   EM0
  (6)  022650  010134                         .WORD   ERR16
 6215
 6216  022652                                  ESCAPE TST
  (3)  022652  104410                         TRAP    C$ESCAPE
  (3)  022654  000116                         .WORD   L10077-.
 6217  022656  004737  003312          1$:    JSR     PC,SETZ                 ;SET Z BIT.
 6218  022662                                  ROMCLK                          ;NOW GO BACK AND CHECK Z BIT SET.
  (1)  022662  004537  003044                 JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
 6219  022666  121264                         121264
 6220
 6221  022670  016104  000004                 MOV     4(R1),R4                ;GET INFO.
 6222  022674  042704  177477                 BIC     #^C<300>,R4             ;STRIP FOR C&Z BITS.
 6223  022700  012705  000200.                MOV     #200,R5                 ;EXPECT ONLY Z BIT SET.
 6224  022704  120405                         CMPB    R4,R5                   ;SET OK?
 6225  022706  001410                         BEQ     2$
 6226  022710                                  ERROR   16                      ;Z BIT FAILED TO SET PROPERLY.
  (5)  022714  104455                         TRAP    C$ERDF
  (6)  022716  000020                         .WORD   16
  (6)  022720  005055                         .WORD   EM0
```

```
  (6)  022722  010134                        .WORD   ERR16
6227
6228  022724                                ESCAPE  TST
  (3)  022724  104410                        TRAP    C$ESCAPE
  (3)  022726  000044                        .WORD   L10077-.
6229  022730  004737  003166          2$:     JSR     PC,CLRALL               ;NOW TRY TO CLEAR Z BIT.
6230  022734                                ROMCLK
  (1)  022734  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6231  022740  121264                        121264
6232  022742  016104  000004                MOV     4(R1),R4
6233  022746  042704  177477                BIC     #^C<300>,R4             ;STRIP FOR C&Z BITS
6234  022752  001407                        BEQ     3$                      ;IF ZERO,WE'RE OK
6235  022754  005005                        CLR     R5                      ;ELSE REPORT ERROR
6236  022756                                ERROR   16                      ;Z BIT FAILED TO CLEAR PROPERLY.
  (5)  022762  104455                        TRAP    C$ERDF
  (6)  022764  000020                        .WORD   16
  (6)  022766  005055                        .WORD   EM0
  (6)  022770  010134                        .WORD   ERR16
6237  022772                          3$:
6238  022772                                ENDTST
  (3)  022772                         L10077:
  (3)  022772  104401                        TRAP    C$ETST
6239                                  ;FINDFAST
6240  022774                                BADHEAD
  (2)                                         ;************** TEST 30 ***************
6241                                          ;*
6242                                          ;* IN THIS TEST WE'LL VERIFY THAT THE C BIT CAN BE READ FROM
6243                                          ;* IBUS*<13>. WE ALLREADY KNOW THAT THE C BIT WORKS PROPERLY,
6244                                          ;* ALL WE WANT TO KNOW HERE IS THAT IT CAN BE READ.
6245                                          ;*
6246  022774                                BADHEAD
  (2)                                         ;************** TEST 30 ***************
6247
6248  022774                                BGNTST
  (3)  022774                         T30::
6249  022774                                K4ONLY                                  ;M8206 &M8207 ONLY!
  (1)                                         ;DO NOT DO TEST IF M8200, OR M8204
  (4)  023004  104432                        TRAP    C$EXIT
  (4)  023006  000200                        .WORD   L10100-.
6250  023010                                MSTCLR
6251  023014                                MYINT
  (1)  023014  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6252  023020  004737  003166                JSR     PC,CLRALL               ;CLR CONDITION CODES.
6253  023024                                ROMCLK                          ;NOW READ IBUS*<13>PUT IN PORT 4
  (1)  023024  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6254  023030  121264                        121264
6255  023032  116104  000004                MOVB    4(R1),R4                ;READ IT FROM PORT 4
6256  023036  042704  177477                BIC     #177477,R4              ;STRIP ANY JUNK,C&Z BITS 6,7
6257  023042  012705  000000                MOV     #0,R5                   ;EXPECT IT CLEAR
6258  023046  120405                        CMPB    R4,R5                   ;OK?
6259  023050  001410                        BEQ     1$
6260  023052                                ERROR   16                      ;FAILURE OF Z&C TO BE CLEAR.
  (5)  023056  104455                        TRAP    C$ERDF
  (6)  023060  000020                        .WORD   16
  (6)  023062  005055                        .WORD   EM0
  (6)  023064  010134                        .WORD   ERR16
```

```
6261
6262  023066                                    ESCAPE TST
 (3)  023066  104410                            TRAP    C$ESCAPE
 (3)  023070  000116                            .WORD   L10100-.
6263  023072  004737  003260          1$:       JSR     PC,SETC                 ;SET C BIT.
6264  023076                                    ROMCLK                          ;NOW GO BACK AND CHECK C BIT SET.
 (1)  023076  004537  003044                    JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
6265  023102  121264                            121264
6266  023104  016104  000004                    MOV     4(R1),R4                ;GET INFO.
6267  023110  042704  177477                    BIC     #^C<300>,R4             ;STRIP FOR C&Z BITS.
6268  023114  012705  000100                    MOV     #100,R5                 ;EXPECT ONLY C BIT SET.
6269  023120  120405                            CMPB    R4,R5                   ;SET OK?
6270  023122  001410                            BEQ     2$
6271  023124                                    ERROR   16                      ;C BIT FAILED TO SET PROPERLY.
 (5)  023130  104455                            TRAP    C$ERDF
 (6)  023132  000020                            .WORD   16
 (6)  023134  005055                            .WORD   EM0
 (6)  023136  010134                            .WORD   ERR16
6272
6273  023140                                    ESCAPE  TST
 (3)  023140  104410                            TRAP    C$ESCAPE
 (3)  023142  000044                            .WORD   L10100-.
6274  023144  004737  003166          2$:       JSR     PC,CLRALL               ;NOW TRY TO CLEAR C BIT.
6275  023150                                    ROMCLK
 (1)  023150  004537  003044                    JSR     R5,.ROMCLK      ;CLOCK INSTRUCTION
6276  023154  121264                            121264
6277  023156  016104  000004                    MOV     4(R1),R4
6278  023162  042704  177477                    BIC     #^C<300>,R4             ;STRIP FOR C&Z BITS
6279  023166  001407                            BEQ     3$                      ;IF ZERO,WE'RE OK
6280  023170  005005                            CLR     R5                      ;ELSE REPORT ERROR
6281  023172                                    ERROR   16                      ;C BIT FAILED TO CLEAR PROPERLY.
 (5)  023176  104455                            TRAP    C$ERDF
 (6)  023200  000020                            .WORD   16
 (6)  023202  005055                            .WORD   EM0
 (6)  023204  010134                            .WORD   ERR16
6282  023206                              3$:
6283  023206                                    ENDTST
 (3)  023206                              L10100:
 (3)  023206  104401                            TRAP    C$ETST
6284  023210                                    BADHEAD
 (2)                                            ;*************** TEST 31 ***************
6285                                            ;*TEST OF PROGRAM CLOCK BIT
6286                                            ;*DO A MASTER CLEAR, VERIFY THAT PROGRAM CLOCK IS SET
6287                                            ;*WRITE PROGRAM CLOCK BIT TO A ONE, VERIFY THAT IT CLEARS,
6288                                            ;*AND THEN SETS SOME TIME LATER
6289  023210                                    BADHEAD
 (2)                                            ;*************** TEST 31 ***************
6290
6291  023210                              BGNTST
 (3)  023210                              T31::
6292  023210                                    MYINT
 (1)  023210  013701  002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6293  023214                                    MSTCLR                  ;MASTER CLEAR M8200,4,7
6294  023220  005037  002440                    CLR     TEMP            ;PREPARE FOR
6295  023224  005037  002444                    CLR     $TMP0           ;DELAY
6296  023230  012761  000020  000004    1$:     MOV     #20,4(R1)       ;LOAD PORT 4
```

```
6297  023236  152761  000002  000001          BISB    #BIT1,1(R1)       ;SET ROMI
6298  023244  012761  121111  000006          MOV     #121111,6(R1)     ;SEL6 _ INSTRUCTION
6299  023252  152761  000003  000001          BISB    #BIT1!BIT0,1(R1);SET CLOCK BIT
6300  023260  012761  121224  000006          MOV     #121224,6(R1)     ;LOAD NEXT INSTRUCTION
6301  023266  152761  000003  000001          BISB    #BIT1!BIT0,1(R1);READ CLOCK BIT
6302  023274  142761  030001  000001          BICB    #BIT!BIT0,1(R1);CLEAR MAINT BITS
6303  023302  016104  000004                  MOV     4(R1),R4          ;PUT "FOUND" IN R4
6304  023306  005037  002452                  CLR     $GDDAT            ;PUT "EXPECTED" IN $GDDAT
6305  023312  123704  002452                  CMPB    $GDDAT,R4                 ;IS PGM CLOCK CLEAR?
6306  023316  001406                          BEQ     2$
6307  023320  013702  002452                  MOV     $GDDAT,R2
6308  023324                                  ERRDF   50,EMB50                  ;ERROR, PGM CLOCK IS NOT CLEAR
  (4) 023324  104455                          TRAP    C$ERDF
  (5) 023326  000062                          .WORD   50
  (5) 023330  005545                          .WORD   EMB50
  (5) 023332  000000                          .WORD   0
6309  023334                        2$:
6310  023334                                  ROMCLK                    ;NEXT WORD IS INSTRUCTION,
  (1) 023334  004537  003044                  JSR     R5,..ROMCLK       ;CLOCK INSTRUCTION
6311  023340  121224                          121224                    ;PORT4 LU11
6312  023342  122761  000020  000004          CMPB    #20,4(R1)         ;IS PGM CLOCK SET?
6313  023350  001420                          BEQ     3$                ;BR IF YES
6314  023352  005237  002440                  INC     TEMP              ;INCREMENT DELAY
6315  023356  005537  002444                  ADC     $TMP0             ;INCREMENT DELAY
6316  023362  022737  000006  002444          CMP     #6,$TMP0          ;IS DELAY DONE
6317  023370  001361                          BNE     2$                ;BR IF NO
6318  023372  012702  000006                  MOV     #6,R2
6319  023376  013704  002444                  MOV     $TMP0,R4
6320  023402                                  ERRDF   51,EMB51                  ;ERROR PGM CLOCK NOT SET
  (4) 023402  104455                          TRAP    C$ERDF
  (5) 023404  000063                          .WORD   51
  (5) 023406  005577                          .WORD   EMB51
  (5) 023410  000000                          .WORD   0
6321  023412                        3$:
6322
6323  023412  122737  000007  002414          CMPB    #7,WTYPE          ; ONLY DO NEXT TEST IF M8207
6324  023420  001013                          BNE     4$                ; EXIT IF NOT.
6325
6326  023422  005737  002444                  TST     $TMP0             ; IF ANY LARGE COUNT, WE'RE OK
6327  023426  001010                          BNE     4$                ; THEN EXIT
6328
6329  023430  042737  000007  002440          BIC     #7,TEMP           ; CLEAR OUT ANY SMALL COUNT
6330  023436  001004                          BNE     4$                ; IF LARGE COUNT LEFT OVER, WE'RE OK.
6331
6332  023440                                  ERRDF   100,EMB1          ; ERROR
  (4) 023440  104455                          TRAP    C$ERDF
  (5) 023442  000144                          .WORD   100
  (5) 023444  005410                          .WORD   EMB1
  (5) 023446  000000                          .WORD   0
6333                                                                      ; TIME TTOOO SHORT FOR CLOCK.  MUST BE
6334                                                                      ; DEFECTIVE CAPACITOR IN TIMEING CIRCUIT.
6335  023450                        4$:
6336
6337  023450                        ENDTST
  (3) 023450                      L10101:
  (3) 023450  104401                          TRAP    C$ETST
```

```
                                                BADHEAD
                                                ;************** TEST 32 ***************
                                                ;*FORCE POWER FAIL TEST
                                                ;*SET FORCE POWER FAIL BIT VERIFY THAT PROCESSOR TRAPS TO 24
                                                ;*GOING DOWN AND COMING UP. VERIFY ALSO THAT BUS INIT WAS
                                                ;*BLOCKED FROM GETTING TO THE M8200,4,7 DURING THE POWER FAIL
                                                ;*THIS TEST WILL TAKE LONGER THAN 2 SECONDS TO RUN. THIS TEST
                                                ;*SHOULD NOT BE RUN IF YOU HAVE VOLATILABLE MEMORY IN YOUR SYSTEM.
                                                BADHEAD
                                                ;************** TEST 32 ***************

                                        BGNTST
                                        T32::
                                                BRESET                  ;STALL FOR TIME
                                                TRAP    C$RESET
                                                MYINT
                                                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
                                                                        ;R1 CONTAINS BASE M8200,4,7 ADDRESS
                                                MSTCLR                  ;MASTER CLEAR M8200,4,7
                                                CLR     TEMP            ;PREPARE FOR DELAY
                                                MOV     @#24,$TMP0      ;SAVE POWER FAIL ADDRESS
                                                MOV     @#24,-(SP)      ;STORE POWER FAIL ADDRESS
                                                MOV     #1$,@#24        ;SET U FOPR FORCE POWER FAIL
                                                MOV     #2,4(R1)        ;LOAD PORT4
                                                MOV     #BIT9,(R1)      ;SET ROMI
                                                MOV     #121111,6(R1)   ;LOAD INSTRUCTION
                                                MOV     #BIT9!BIT8!BIT11,(R1)   ;CLOCK INSTRUCTION
                                        5$:     INC     TEMP            ;WAIT FOR POWER FAIL
                                                BNE     5$              ;BR IF DELAY NOT DONE
                                                MSTCLR
                                                ERROR   17      ;ERROR, NO POWER FAIL
                                                TRAP    C$ERDF
                                                .WORD   17
                                                .WORD   EM0
                                                .WORD   ERR17
                                                BR      4$
                                        1$:     MOV     #3$,@#24        ;POWER UP ADDRESS
                                                MOV     SP,2$           ;STORE STACK
                                                HALT                    ;WAIT FOR POWER UP SEQUENCE
                                        2$:     0
                                        3$:     MOV     2$,SP           ;RESTORE STACK
                                                MOV     #10$,@#24       ;PUT IN CASE OF FALSE POWER-UP.
                                                CLR     11$
                                        12$:    INC     11$     ;STALL ON POWER UP.
                                                BNE     12$             ;WAIT HERE IF BAD,WILL POWER OUT OF HERE.
                                                                        ;ELSE PROCEED.

                                                POPSP2                  ;POP STACK TWICE2
                                                MOV     KMCSR,R1        ;
                                                MOV     (SP)+,@#24      ;RESTORE TRUE POWER FAIL ADDRESS
                                                CMP     $TMP0,@#24      ;IS IT CORRECT?
                                                BEQ     4$              ;BR IF YES
                                                ERROR   17              ;ERROR, STACK IS INCORRECT
                                                TRAP    C$ERDF
                                                .WORD   17
```

```
  (6)  023660  005055                        .WORD   EM0
  (6)  023662  010256                        .WORD   ERR17
6383   023664  013737  002444  000024        MOV     $TMP0,@#24      ;RESTORE TRUE POWER FAIL ADDRESS
6384   023672  013706  002344                MOV     PSTACK,SP       ;RESTORE STACK
6385   023676  032711  004000          4$:   BIT     #BIT11,(R1)     ;BIT11 STILL SET?
6386   023702  001016                        BNE     7$
6387   023704  005737  002470                TST     RUNB
6388   023710  001013                        BNE     7$
6389   023712  011104                        MOV     (R1),R4
6390   023714  012705  004000                MOV     #BIT11,R5
6391   023720                                ERROR   35              ;OAC FAILED
  (5)  023724  104455                        TRAP    C$ERDF
  (6)  023726  000043                        .WORD   35
  (6)  023730  005055                        .WORD   EM0
  (6)  023732  010472                        .WORD   ERR35
6392                                                                ;TO PREVENT
6393                                                                ;INIT FROM
6394                                                                ;CLEARING CSR
6395   023734                         EXIT:  TST
  (3)  023734  104432                        TRAP    C$EXIT
  (3)  023736  000104                        .WORD   L10102-.
6396   023740  012711  003000          7$:   MOV     #BIT9!BIT10,(R1) ;SEL6 = MAINT IR
6397   023744  012705  121111                MOV     #121111,R5      ;R5 = EXPECTED
6398   023750  016104  000006                MOV     6(R1),R4        ;R4 = FOUND
6399   023754  020504                        CMP     R5,R4           ;MAINT IR SHOULD = 12111
6400   023756  001431                        BEQ     6$              ;BR IF OK
6401   023760                                MSTCLR
6402   023764                                ERROR   35              ;IF = 0 THEN BUS INIT WAS
  (5)  023770  104455                        TRAP    C$ERDF
  (6)  023772  000043                        .WORD   35
  (6)  023774  005055                        .WORD   EM0
  (6)  023776  010472                        .WORD   ERR35
6403                                                                ;NOT BLOCKED FROM CLEARING
6404                                                                ;THE M8200,4,7
6405
6406   024000  000000          11$:  .WORD   0                       ;TEMP COUNT FOR STALL ON POWER UP.
6407
6408   024002  052711  040000          10$:  BIS     #BIT14,(R1)     ;CLR THE THING SO IT CAN'T ASSIRT AC LOW
6409                                                                ;AGAIN!
6410   024006                                MSTCLR
6411   024012                                ERROR   17              ;ERROR  GLIP GAVE US SECOUND UNEXPECTED
  (5)  024016  104455                        TRAP    C$ERDF
  (6)  024C20  000021                        .WORD   17
  (6)  024022  005055                        .WORD   EM0
  (6)  024024  010256                        .WORD   ERR17
6412                                                                ;ASSERTION OF AC LOW ON UNIBUS.
6413                                                                ;FATEL TYPE OF ERROR.
6414   024026  062706  000004                ADD     #4,SP           ;RESTORE STACK.
6415   024032  012637  000024                MOV     (SP)+,@#24
6416   024036                                MSTCLR
6417   024042                          6$:
6418   024042                         ENDTST
  (3)  024042                         L10102:
  (3)  024042  104401                        TRAP    C$ETST
6419
6420   024044                                BADHEAD
```

```
 (2)                                        ;************** TEST 33 ***************
6421                                        ;*MICRO-PROCESSOR NOISE TEST
6422                                        ;*WRITE ALL ZERO'S THEN ALL ONE'S THEN A DATA PATTTERN
6423                                        ;*TO THE IBUS* AND IBUS REGISTERS AND TO THE SP AND MAIN MEM
6424                                        ;*THEN GO BACK AND READ THE DATA PATERNS TO VERIFY THAT
6425                                        ;*READING AND WRITING OF OTHER LOCATIONS AND REGISTERS
6426                                        ;*DID NOT CHANGE THE DATA.
6427  024044                                BADHEAD
 (2)                                        ;************** TEST 33 ***************
6428
6429  024044                          BGNTST
 (3)  024044                          T33::
6430  024044                                MYINT
 (1)  024044  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6431  024050                                MSTCLR                          ;MASTER CLEAR M8200,4,7
6432  024054  005002                       CLR     R2                      ;R2 IS INDEX REGISTER
6433  024056  042737  000017  024104  1$:   BIC     #17,2$                  ;CLEAR ADDRESS FIELD
6434  024064  156237  025100  024104        BISB    30$(R2),2$              ;ADD IBUS* REG ADDRESS TO INSTRUCTION
6435  024072  116261  025106  000004        MOVB    31$(R2),4(R1)           ;LOAD PORT4
6436  024100                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  024100  004537  003044                JSR     R5,.ROMCLK              ;CLOCK INSTRUCTION
6437  024104  121100                 2$:   121100                          ;WRITE IBUS* REGISTER
6438  024106  005202                       INC     R2                      ;INC INDEX REGISTER
6439  024110  022702  000005                CMP     #5,R2                   ;DONE YET?
6440  024114  001360                       BNE     1$                      ;BR IF NO
6441  024116  005002                       CLR     R2                      ;R2 IS IBUS REGISTER ADDRESS
6442  024120  042737  000017  024166  3$:   BIC     #17,4$                  ;CLEAR ADDRESS FIELD OF INSTRUCTIONS
6443  024126  042737  000017  024202        BIC     #17,5$
6444  024134  042737  000017  024214        BIC     #17,6$
6445  024142  050237  024166                BIS     R2,4$                   ;ADD IBUS REG ADDRESS TO INSTRUCTION
6446  024146  050237  024202                BIS     R2,5$
6447  024152  050237  024214                BIS     R2,6$
6448  024156  105061  000004                CLRB    4(R1)                   ;CLEAR PORT4
6449  024162                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  024162  004537  003044                JSR     R5,.ROMCLK              ;CLOCK INSTRUCTION
6450  024166  122100                 4$:   122100                          ;WRITE 0 TO IBUS REG
6451  024170  112761  000377  000004        MOVB    #377,4(R1)              ;LOAD PORT4
6452  024176                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  024176  004537  003044                JSR     R5,.ROMCLK              ;CLOCK INSTRUCTION
6453  024202  122100                 5$:   122100                          ;WRITE ALL ONES TO  IBUS REG
6454  024204  110261  000004                MOVB    R2,4(R1)                ;LOAD PORT4
6455  024210                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
 (1)  024210  004537  003044                JSR     R5,.ROMCLK              ;CLOCK INSTRUCTION
6456  024214  122100                 6$:   122100                          ;WRITE ITS OWN ADDRESS TO IBUS REG
6457  024216  005202                       INC     R2                      ;NEXT ADDRESS
6458  024220  022702  000010                CMP     #10,R2                  ;DONE YET?
6459  024224  001335                       BNE     3$                      ;BR IF NO
6460  024226  005002                       CLR     R2                      ;START AT SP ADDRESS 0
6461  024230  042737  000017  024276  7$:   BIC     #17,8$                  ;CLEAR ADDRESS FIELD
6462  024236  042737  000017  024312        BIC     #17,9$
6463  024244  042737  000017  024324        BIC     #17,10$
6464  024252  050237  024276                BIS     R2,8$                   ;ADD ADDRESS TO INSTRUCTION
6465  024256  050237  024312                BIS     R2,9$
6466  024262  050237  024324                BIS     R2,10$
6467  024266  105061  000004                CLRB    4(R1)                   ;CLEAR PORT4
6468  024272                                ROMCLK                          ;NEXT WORD IS INSTRUCTION,
```

```
 (1)  024272  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6469  024276  123100                    8$:     123100                  ;WRITE ZERO TO SP
6470  024300  112761  000377  000004            MOVB    #377,4(R1)      ;LOAD PORT4
6471  024306                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024306  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6472  024312  123100                    9$:     123100                  ;WRITE ALL ONES TO SP
6473  024314  110261  000004                    MOVB    R2,4(R1)        ;LOAD PORT4
6474  024320                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024320  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6475  024324  123100                    10$:    123100                  ;WRITE SP ADDRESS TO ITSELF
6476  024326  005202                            INC     R2              ;NEXT SP ADDRESS
6477  024330  022702  000020                    CMP     #20,R2          ;DONE YET?
6478  024334  001335                            BNE     7$              ;BR IF NO
6479  024336  005002                            CLR     R2              ;R2 = ,AOM ,E, ADDRESS
6480  024340                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024340  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6481  024344  010000                            010000                  ;MAR _ 0
6482  024346                                    ROMCLK
 (1)  024346  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6483  024352  004000                            4000
6484  024354  105061  000004            11$:    CLRB    4(R1)           ;CLEAR PORT4
6485  024360                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024360  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6486  024364  122500                            122500                  ;WRITE ZEROS TO MEM
6487  024366  112761  000377  000004            MOVB    #377,4(R1)      ;LOAD PORT4
6488  024374                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024374  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6489  024400  122500                            122500                  ;WRITE ONES TO MEM
6490  024402  110261  000004                    MOVB    R2,4(R1)        ;LOAD PORT4
6491  024406                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024406  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6492  024412  136500                            136500                  ;WRITE TO MEM IT OWN ADDRESS
6493  024414  005202                            INC     R2              ;NEXT MEM ADDRESS
6494  024416  022702  001000                    CMP     #1000,R2        ;DONE YET?
6495  024422  001354                            BNE     11$             ;BR IF NO
6496
6497                                            ;NOW GO BACK AND READ EVERYTHIN
6498
6499  024424                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024424  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6500  024430  010000                            010000                  ;MAR 0
6501  024432                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
 (1)  024432  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6502  024436  004000                            4000                    ;MAR HI _ 0 (M8200,4,7 ONLY)
6503                                            ;WOULD BE CRAM CODE
6504  024440  005737  002432                    TST     TYPE
6505  024444  001452                            BEQ     40$
6506  024446  005005                            CLR     R5              ;R5 IS INDEX REGISTER
6507  024450  042737  000360  024512  12$:     BIC     #360,13$        ;CLEAR ADDRESS FIELD
6508  024456  116502  025100                    MOVB    30$(R5),R2      ;R2 = IBUS* ADDRESS
6509  024462  010203                            MOV     R2,R3           ;PUT IBUS* ADDRESS IN R3
6510  024464  006303                            ASL     R3              ;SHIFT ADDRESS TO BITS 4-7
6511  024466  006303                            ASL     R3
6512  024470  006303                            ASL     R3
6513  024472  006303                            ASL     R3
6514  024474  050337  024512                    BIS     R3,13$          ;ADD ADDRESS TO INSTRUCTION
```

```
6515  024500  116537  025106  002452          MOVB    31$(R5),$GDDAT  ;$GDDAT = 'EXPECTED'
6516  024506                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 024506  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6517  024512  121004                  13$:    121004                  ;PORT4 - IBUS* REGISTER
6518  024514  016104  000004                  MOV     4(R1),R4        ;R4 = 'FOUND'
6519  024520  123704  002452                  CMPB    $GDDAT,R4               ;IBUS* CONTENTS OK?
6520  024524  001416                          BEQ     20$             ;BR IF YES
6521  024526  010237  002434                  MOV     R2,MR0
6522  024532  105037  002453                  CLRB    $GDDAT+1
6523  024536  013705  002452                  MOV     $GDDAT,R5
6524  024542                                  ERROR   29              ;IBUS* DATA ERROR
  (5) 024546  104455                          TRAP    C$ERDF
  (6) 024550  000035                          .WORD   29
  (6) 024552  005055                          .WORD   EM0
  (6) 024554  010350                          .WORD   ERR29
6525  024556                                  ESCAPE  TST
  (3) 024556  104410                          TRAP    C$ESCAPE
  (3) 024560  000334                          .WORD   L10103-.
6526  024562  005205                  20$:    INC     R5              ;INC COUNTER
6527  024564  022705  000005                  CMP     #5,R5           ;DONE YET?
6528  024570  001327                          BNE     12$             ;BR IF NO
6529
6530  024572                          40$:
6531                                  ;END CRAM,GENERAL TESTS
6532
6533  024572  005002                          CLR     R2              ;R2 = IBUS REG ADDRESS
6534  024574  042737  000360  024630  14$:    BIC     #360,15$        ;CLEAR ADDRESS FIELD OF INSTRUCTION
6535  024602  010203                          MOV     R2,R3           ;R3 = IBUS ADDRESS
6536  024604  006303                          ASL     R3              ;SHIFT ADDRESS TO BITS 4-7
6537  024606  006303                          ASL     R3
6538  024610  006303                          ASL     R3
6539  024612  006303                          ASL     R3
6540  024614  050337  024630                  BIS     R3,15$          ;ADD ADDRESS TO INSTRUCTION
6541  024620  010237  002452                  MOV     R2,$GDDAT               ;$GDDAT = 'EXPECTED'
6542  024624                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 024624  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6543  024630  021004                  15$:    021004                  ;PORT4 - IBUS REG
6544  024632  016104  000004                  MOV     4(R1),R4        ;IBUS = 'FOUND'
6545  024636  123704  002452                  CMPB    $GDDAT,R4               ;IBUS CONTENTS OK?
6546  024642  001410                          BEQ     21$             ;BR IF YES
6547  024644  013705  002452                  MOV     $GDDAT,R5
6548  024650                                  ERROR   29              ;IBUS DATA ERROR
  (5) 024654  104455                          TRAP    C$ERDF
  (6) 024656  000035                          .WORD   29
  (6) 024660  005055                          .WORD   EM0
  (6) 024662  010350                          .WORD   ERR29
6549  024664  005202                  21$:    INC     R2              ;NEXT IBUS REGISTER
6550  024666  022702  000010                  CMP     #10,R2          ;DONE YET?
6551  024672  001340                          BNE     14$             ;BR IF NO
6552  024674  005002                          CLR     R2              ;R2 = SP ADDRESS
6553  024676  042737  000017  024714  16$:    BIC     #17,17$         ;CLEAR ADDRESS FIELD OF INSTRUCTION
6554  024704  050237  024714                  BIS     R2,17$          ;ADD ADDRESS TO INSTRUCTION
6555  024710                                  ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 024710  004537  003044                  JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6556  024714  040600                  17$:    040600                  ;BR - SP
6557  024716  010237  002452                  MOV     R2,$GDDAT               ;$GDDAT = 'EXPECTED'
```

```
6558  024722                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION, ROMCLK PC-5304
  (1) 024722  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6559  024726  061224                            061224                  ;PORT4   BR
6560  024730  016104  000004                    MOV     4(R1),R4        ;R4 = 'FOUND'
6561  024734  123704  002452                    CMPB    $GDDAT,R4               ;SP CONTENTS OK?
6562  024740  001412                            BEQ     22$             ;BR IF YES
6563  024742  013705  002452                    MOV     $GDDAT,R5
6564  024746                                    ERROR   7               ;SP DATA ERROR
  (5) 024752  104455                            TRAP    C$ERDF
  (6) 024754  000007                            .WORD   7
  (6) 024756  005055                            .WORD   EM0
  (6) 024760  007026                            .WORD   ERR7
6565  024762                                    ESCAPE  TST
  (3) 024762  104410                            TRAP    C$ESCAPE
  (3) 024764  000130                            .WORD   L10103-.
6566  024766  005202                    22$:    INC     R2              ;NEXT SP LOCATION
6567  024770  022702  000020                    CMP     #20,R2          ;DONE YET?
6568  024774  001340                            BNE     16$             ;BR IF NO
6569  024776  005002                            CLR     R2              ;R2 = MEMORY ADDRESS
6570  025000                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 025000  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6571  025004  010000                            010000                  ;MAR   0
6572  025006                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 025006  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6573  025012  004000                            4000                    ;MAR HI   0 (M8200,4,7 OR FAMILY ONLY)
6574  025014  010237  002452           18$:    MOV     R2,$GDDAT               ;$GDDAT = 'EXPECTED'
6575  025020                                    ROMCLK                  ;NEXT WORD IS INSTRUCTION,
  (1) 025020  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6576  025024  055224                            055224                  ;PORT4   MAIN MEM
6577  025026  016104  000004                    MOV     4(R1),R4        ;R4 = 'FOUND'
6578  025032  123704  002452                    CMPB    $GDDAT,R4               ;MAIN MEM CONTENTS OK?
6579  025036  001412                            BEQ     23$             ;BR IF YES
6580  025040  013705  002452                    MOV     $GDDAT,R5
6581  025044                                    ERROR   6               ;MAIN MEM DATA ERROR
  (5) 025050  104455                            TRAP    C$ERDF
  (6) 025052  000006                            .WORD   6
  (6) 025054  005055                            .WORD   EM0
  (6) 025056  006700                            .WORD   ERR6
6582  025060                                    ESCAPE  TST
  (3) 025060  104410                            TRAP    C$ESCAPE
  (3) 025062  000032                            .WORD   L10103-.
6583  025064  005202                    23$:    INC     R2              ;NEXT MEM ADDRESS
6584  025066  022702  001000                    CMP     #1000,R2                ;DONE YET?
6585  025072  001350                            BNE     18$             ;BR IF NO
6586  025074                                    EXIT    TST
  (3) 025074  104432                            TRAP    C$EXIT
  (3) 025076  000016                            .WORD   L10103-.
6587  025100    000     002     003     30$:    .BYTE   0,2,3,5,10
      025103    005     010
6588
6589              025106                        .EVEN
6590  025106    001     003     004     31$:    .BYTE   1,3,4,6,10
      025111    006     010
```

```
6592
6593            025114                  .EVEN
6594
6595  025114                            ENDTST
 (3)  025114                            L10103:
 (3)  025114  104401                            TRAP    C$ETST
6596
6597  025116                                    BADHEAD
 (2)                                            ;************** TEST 34 **************
6598                                            ;* THIS TEST IS DESIGNED TO MAKE SURE THAT A NODST INSTRUCTION
6599                                            ;* DOES NOT WRITE INTO PORT B OF THE MULTIPORT RAM.
6600                                            ;* TO DO THIS,WE'LL PUT A 125 INTO INDAT2,THEN WE'LL PUT A
6601                                            ;* 125 INTO BOTH SP1 AND BR. LAST WE'LL DO A NODST BR,SUBOC,SP1
6602                                            ;* IF THERE IS A WRITE INTO PORTB,INDAT2 WILL CONTAIN A 377.
6603  025116                                    BADHEAD
 (2)                                            ;************** TEST 34 **************
6604
6605  025116                            BGNTST
 (3)  025116                            T34::
6606  025116                                    MYINT
 (1)  025116  013701  002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6607  025122                                    ROMCLK
 (1)  025122  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6608  025126  000525                            00525                   ;PUT A 125 INTO BRG.
6609  025130                                    ROMCLK
 (1)  025130  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6610  025134  062221                            062221                  ;NOW INTO OIDAT2
6611  025136                                    ROMCLK
 (1)  025136  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6612  025142  063221                            63221                   ;NOW INTO SP1
6613  025144                                    ROMCLK
 (1)  025144  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6614  025150  060361                            060361                  ;NOW THE 'NODST  BR,SUBOC,SP1''
6615                                                                    ;THE NODST SHOULD NOT MODIFY INDAT2!
6616
6617  025152                                    ROMCLK
 (1)  025152  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6618  025156  020420                            020420                  ;PUT CONTENT OF INDAT2 IN BRG.
6619
6620  025160                                    ROMCLK
 (1)  025160  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6621  025164  061220                            061220                  ;PUT BRG INTO BSEL0
6622
6623  025166  111104                            MOVB    (R1),R4         ;SEE WHAT CAME BACK.
6624  025170  012705  000125                    MOV     #125,R5         ;SHOULD BE 125  IF 377 CAME BACK,
6625                                                                    ;YOU CAN BET THAT THE 'NODST'' WROTE
6626                                                                    ;INTO THE MULTIPORT RAM!  WATCH SIGNAL
6627                                                                    ; ''D1 WRITE OUT L''
6628
6629  025174  020405                            CMP     R4,R5           ;NOW LOOK.
6630  025176  001406                            BEQ     10$
6631
6632  025200                                    ERROR   7
 (5)  025204  104455                            TRAP    C$ERDF
 (6)  025206  000007                            .WORD   7
 (6)  025210  005055                            .WORD   EMO
```

```
  (6)  025212  007026                        .WORD   ERR7
6633
6634  025214                          10$:
6635  025214                                  ENDTST
  (3)  025214                       L10104:
  (3)  025214  104401                         TRAP    C$ETST
6636
6637  025216                                  BADHEAD
  (2)                                         ;*************** TEST 35 ***************
6638                                          ;*
6639                                          ;* EXTENDED CRAM TEST FOR M8206. IN THIS TEST WE WILL LOAD DATA
6640                                          ;* THROUGHOUT THE CRAM (TEST DATA IS JUST 4K OF DIAG. CODE) AND
6641                                          ;* THEN READ IT BACK AND VERIFY THAT IT IS CORRECT.
6642  025216                                  BADHEAD
  (2)                                         ;*************** TEST 35 ***************
6643
6644  025216                                  BGNTST
  (3)  025216                       T35::
6645  025216                                  SKIP06  10$                     ;DO TEST ONLY IF IT IS A M8206
  (1)                                         ;GOTO 10$ IF M8206
6646  025226                                  EXIT    TST                     ;OTHERWIZE,SKIP TEST.
  (3)  025226  104432                         TRAP    C$EXIT
  (3)  025230  000132                         .WORD   L10105-.
6647
6648  025232                          10$:    MYINT
  (1)  025232  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6649
6650  025236  012702  012146                MOV     #ROMMAP,R2              ;GET ADDR. OF LIST.
6651
6652  025242  012711  002000                MOV     #2000,(R1)              ;SET TO WRITE DATA.
6653  025246  005003                         CLR     R3                      ;CRAM ADDR ZERO.
6654
6655  025250  010361  000004          15$:  MOV     R3,4(R1)                ;SET ADDR.
6656  025254  012261  000006                MOV     (R2)+,6(R1)             ;WRITE DATA.
6657
6658  025260  020337  002436                CMP     R3,MEMSZ                ;DONE WHOLE CRAM?
6659  025264  001402                         BEQ     20$                     ;YES,EXIT THIS LOOP.
6660  025266  005203                         INC     R3                      ;NO,UPDAT ADDR.
6661  025270  000767                         BR      15$
6662  025272  005003                   20$:  CLR     R3                      ;NOW WE WILL READ BACK,STARTING AT
6663                                                                        ;CRAM ADDR. ZERO.
6664  025274  012705  012146                MOV     #ROMMAP,R5              ;GET ADDR. LIST OF DATA
6665
6666  025300  010361  000004          30$:  MOV     R3,4(R1)                ;SET ADDR.
6667
6668  025304  011502                         MOV     (R5),R2                 ;PUT EXPECTED INTO R2
6669  025306  016104  000006                MOV     6(R1),R4                ;READ ACCUAL
6670  025312  020204                         CMP     R2,R4                   ;EQUAL?
6671  025314  001411                         BEQ     40$                     ;YES,CONTINUE.
6672  025316  010300                         MOV     R3,R0
6673
6674  025320                                  ERROR   1                       ;ERROR CRAM DATA TEST,DATA
  (5)  025324  104455                         TRAP    C$ERDF
  (6)  025326  000001                         .WORD   1
  (6)  025330  005055                         .WORD   EM0
  (6)  025332  006032                         .WORD   ERR1
```

```
6675                                                                    ;READ NOT DATA THAT WAS WRITTEN.
6676
6677  025334                                    ESCAPE TST
 (3)  025334  104410                            TRAP    C$ESCAPE
 (3)  025336  000024                            .WORD   L10105-.
6678  025340  020337  002436          40$:      CMP     R3,MEMSZ              ;ALL DONE?
6679  025344  001002                            BNE     50$
6680
6681  025346                                    EXIT    TST
 (3)  025346  104432                            TRAP    C$EXIT
 (3)  025350  000012                            .WORD   L10105-.
6682
6683  025352  005203                    50$:    INC     R3                    ;UPDATE ADDR.
6684  025354  062705  000002                    ADD     #2,R5
6685  025360  000747                            BR      30$
6686
6687  025362                            ENDTST
 (3)  025362                            L10105:
 (3)  025362  104401                            TRAP    C$ETST
6688
6689
6690  025364                                    BADHEAD
 (2)                                            ;*************** TEST 36 ***************
6691                                            ;*
6692                                            ;* THIS TEST LOADS MICRO-CODE INTO A M8206 MCPU THEN EXECTUES IT.
6693                                            ;* THE MICRO CODE IS DESIGNED TO WRITE ALL ONES INTO THE SEL REGS.
6694                                            ;* THIS TEST IS ONLY PERFORMED ON AN M8206.
6695  025364                                    BADHEAD
 (2)                                            ;*************** TEST 36 ***************
6696
6697  025364                                    BGNTST
 (3)  025364                            T36::
6698
6699  025364                                    SKIP06  1$                    ;ONLY DO THIS TEST IF M8206
 (1)                                            ;GOTO 1$ IF M8206
6700  025374                                    EXIT    TST
 (3)  025374  104432                            TRAP    C$EXIT
 (3)  025376  000442                            .WORD   L10106-.
6701
6702  025400                            1$:     MYINT
 (1)  025400  013701  002516                    MOV     KMCSR,R1              ;RECORD DEVICE ADDR.
6703
6704  025404  004537  026006                    JSR     R5,LOADER             ;LOAD THE MICRO CODE
6705
6706  025410  000777                            777                           ;MOVE #377,BRG
6707  025412  061220                            061220                        ;MOVE BRG,BSEL0
6708  025414  061222                            061222                        ;MOVE BRG,BSEL2
6709  025416  061223                            061223                        ;MOVE   BRG,BSEL3
6710  025420  061224                            061224                        ;MOVE   BRG,BSEL4
6711  025422  061225                            061225                        ;MOVE   BRG,BSEL5
6712  025424  061226                            061226                        ;MOVE BRG,BSEL6
6713  025426  061227                            061227                        ;MOVE   BRG,BSEL7
6714  025430  123000                            123000                        ;MOVE BSEL0,SP0
6715  025432  101410                            101410                        ;BRANCH BACK ONE UNTIL <>377
6716
6717  025434  000400                            400                           ;MOVE   #0,BRG
```

```
 6718  025436  061220                        61220                          ;MOVE BRG,BSEL0
 6719  025440  061222                        61222                          ;MOVE BRG,BSEL2
 6720  025442  061223                        61223                          ;MOVE BRG,BSEL3
 6721  025444  061224                        61224                          ;MOVE BRG,BSEL4
 6722  025446  061225                        61225                          ;MOVE BRG,BSEL5
 6723  025450  061226                        61226                          ;MOVE BRG,,BSEL6
 6724  025452  061227                        61227                          ;MOVE BRG,BSEL7
 6725  025454  123000                        123000                         ;MOVE BSEL0,SP0
 6726  025456  104022                        104022                         ;BRANCH BACK ONE LOCATION.
 6727  025460  177777                        177777
 6728
 6729  025462  012711  040000                MOV     #040000,(R1)           ;INITIALIZE MCPU
 6730  025466  012711  100000                MOV     #100000,(R1)           ;START CPU.
 6731
 6732  025472  012700  000062                MOV     #50.,R0                ;THE CYCLE TIME ON THE M8206 IS
 6733                                                                        ;200NS.  WE ARE ASKING THE MCPU TO
 6734                                                                        ;DO 8 INSTRUCTIONS.  WE'LL DELAY
 6735                                                                        ;100 PDP11 INSTRUCTIONS
 6736                                                                        ;THIS REALLY SHOULD BE PLENTY OF TIME.
 6737
 6738  025476  005300                20$:     DEC     R0
 6739  025500  001376                        BNE     20$
 6740
 6741  025502  005005                        CLR     R5                     ;JUST FOR TYPEOUT.
 6742  025504  012705  000377                MOV     #377,R5        ;EXPECT 377
 6743  025510  111104                        MOVB    (R1),R4        ;READ MCPU
 6744  025512  120405                        CMPB    R4,R5          ;SEE IF OK.
 6745  025514  001410                        BEQ     30$
 6746
 6747  025516                                ERROR   29                     ;ERROR! MCPU WAS TO WRITE ALL
   (5) 025522  104455                        TRAP    C$ERDF
   (6) 025524  000035                        .WORD   29
   (6) 025526  005055                        .WORD   EM0
   (6) 025530  010350                        .WORD   ERR29
 6748                                                                       ;ONES INTO BSEL0,BUT INSTEAD FAILED.
 6749  025532                                ESCAPE  TST
   (3) 025532  104410                        TRAP    C$ESCAPE
   (3) 025534  000304                        .WORD   L10106-.
 6750
 6751  025536  012705  177777        30$:    MOV     #177777,R5             ;EXPECT ALL ONES
 6752  025542  016104  000002                MOV     2(R1),R4               ;RECIEVED
 6753  025546  020405                        CMP     R4,R5                  ;RECIEVE OK?
 6754  025550  001410                        BEQ     40$
 6755
 6756  025552                                ERROR   29                     ;ERROR! MCPU WAS TO WRITE ALL ONES
   (5) 025556  104455                        TRAP    C$ERDF
   (6) 025560  000035                        .WORD   29
   (6) 025562  005055                        .WORD   EM0
   (6) 025564  010350                        .WORD   ERR29
 6757                                                                       ;INTO BSEL 2&3
 6758
 6759  025566                                ESCAPE  TST
   (3) 025566  104410                        TRAP    C$ESCAPE
   (3) 025570  000250                        .WORD   L10106-.
 6760
 6761  025572  016104  000004        40$:    MOV     4(R1),R4               ;READ BSEL 4&5
```

```
6762  025576  020405                      CMP     R4,R5                   ;READ OK?
6763  025600  001410                      BEQ     50$
6764
6765  025602                              ERROR   29                      ;ERROR! FAILED TO WRITE BSEL $&5
 (5)  025606  104455                      TRAP    C$ERDF
 (6)  025610  000035                      .WORD   29
 (6)  025612  005055                      .WORD   EM0
 (6)  025614  010350                      .WORD   ERR29
6766                                                                    ; TO ALL ONES.
6767  025616                              ESCAPE  TST
 (3)  025616  104410                      TRAP    C$ESCAPE
 (3)  025620  000220                      .WORD   L10106-.
6768
6769  025622  016104  000006        50$:  MOV     6(R1),R4                ;READ BSEL 6&7
6770  025626  020405                      CMP     R4,R5                   ;READ OK?
6771  025630  001410                      BEQ     60$
6772
6773  025632                              ERROR   29                      ;ERROR! FAILED TO WRITE BSEL 6&7
 (5)  025636  104455                      TRAP    C$ERDF
 (6)  025640  000035                      .WORD   29
 (6)  025642  005055                      .WORD   EM0
 (6)  025644  010350                      .WORD   ERR29
6774                                                                    ; TO ALL ONES.
6775  025646                              ESCAPE  TST
 (3)  025646  104410                      TRAP    C$ESCAPE
 (3)  025650  000170                      .WORD   L10106-.
6776  025652  105011                60$:  CLRB    (R1)                    ;SIGNAL MCPU TO WRITE ALL ZEROS.
6777  025654  005005                      CLR     R5                      ;EXPECT TO READ ALL ZEROS.
6778
6779  025656  005004                      CLR     R4
6780  025660  111104                      MOVB    (R1),R4                 ;READ BSEL0
6781  025662  001410                      BEQ     70$                     ;EXPECT ZERO.
6782
6783  025664                              ERROR   29                      ;MCPU FAILED TO CLEAR BSEL0
 (5)  025670  104455                      TRAP    C$ERDF
 (6)  025672  000035                      .WORD   29
 (6)  025674  005055                      .WORD   EM0
 (6)  025676  010350                      .WORD   ERR29
6784
6785  025700                              ESCAPE  TST
 (3)  025700  104410                      TRAP    C$ESCAPE
 (3)  025702  000136                      .WORD   L10106-.
6786  025704  016104  000002        70$:  MOV     2(R1),R4                ;READ BSEL 2&3
6787  025710  001410                      BEQ     80$                     ;IF ZERO,OK
6788
6789  025712                              ERROR   29                      ;MCPU FAILED TO CLEAR BSEL 2&3
 (5)  025716  104455                      TRAP    C$ERDF
 (6)  025720  000035                      .WORD   29
 (6)  025722  005055                      .WORD   EM0
 (6)  025724  010350                      .WORD   ERR29
6790  025726                              ESCAPE  TST
 (3)  025726  104410                      TRAP    C$ESCAPE
 (3)  025730  000110                      .WORD   L10106-.
6791  025732                        80$:
6792  025732  016104  000004              MOV     4(R1),R4                ;READ BSEL 4&5
6793  025736  001410                      BEQ     90$
```

```
6794
6795  025740                                ERROR   29                      ;MCPU FAILED TO CLEAR BSEL 4&5
 (5)  025744  104455                        TRAP    C$ERDF
 (6)  025746  000035                        .WORD   29
 (6)  025750  005055                        .WORD   EM0
 (6)  025752  010350                        .WORD   ERR29
6796  025754                                ESCAPE  TST
 (3)  025754  104410                        TRAP    C$ESCAPE
 (3)  025756  000062                        .WORD   L10106-.
6797  025760                          90$:
6798  025760  016104  000006                MOV     6(R1),R4                ;READ BSEL 6&7
6799  025764  001406                        BEQ     95$
6800
6801  025766                                ERROR   29                      ;MCPU FAILED TO CLEAR BSEL 6&7
 (5)  025772  104455                        TRAP    C$ERDF
 (6)  025774  000035                        .WORD   29
 (6)  025776  005055                        .WORD   EM0
 (6)  026000  010350                        .WORD   ERR29
6802
6803  026002                          95$:  EXIT    TST
 (3)  026002  104432                        TRAP    C$EXIT
 (3)  026004  000034                        .WORD   L10106-.
6804
6805
6806                                        ;
6807                                        ;LOADER   SUBROUTINE USED BY THIS TEST TO LOAD MICRO CODE INTO A M8206
6808                                        ;
6809
6810  026006  012711  002000          LOADER: MOV     #2000,(R1)
6811
6812  026012  005000                        CLR     R0
6813
6814  026014  010061  000004          10$:  MOV     R0,4(R1)          ;SET ADDR.
6815  026020  005200                        INC     R0
6816  026022  011561  000006                MOV     (R5),6(R1)        ;WRIITE MICRO CODE.
6817  026026  022527  177777                CMP     (R5)+,#177777     ;SEE IF TERM.
6818  026032  001370                        BNE     10$
6819  026034  005011                        CLR     (R1)
6820  026036  000205                        RTS     R5
6821
6822  026040                                ENDTST
 (3)  026040                          L10106:
 (3)  026040  104401                        TRAP    C$ETST
6823
6824  026042                                BADHEAD
 (2)                                        ;*************** TEST 37 ***************
6825                                        ;*
6826                                        ;*NEGATIVE ADDRESS TEST.
6827                                        ;*      IN THIS TEST, WE'LL MAKE SURE THAT THE M8207
6828                                        ;*      DOES NOT RESPOND TO AN ADDRESS THAT ISN'T ASSIGNED
6829                                        ;*      TO IT
6830                                        ;*
6831  026042                                BADHEAD
 (2)                                        ;*************** TEST 37 ***************
6832
6833  026042                                BGNTST
```

```
 (3)  026042                                T37::
6834  026042                                      MYINT
 (1)  026042  013701  002516                       MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6835
6836  026046  012711  000641                       MOV     #641,(R1)       ;PUT A DEFINITE PATTERN IN MCPU.
6837  026052  012737  026130  000004               MOV     #20$,@#4        ;SET UP FOR TRAPS FROM NON-EX.
6838  026060  005037  000006                       CLR     @#6
6839  026064  012702  160000                       MOV     #160000,R2      ;GET STARTING ADDRESS.
6840
6841  026070  022712  000641             10$:      CMP     #641,(R2)       ;SEE IF CONTENTS OF THE ADDRESS
6842                                                                        ;POINTED TO BY R2 EQUALS THE CONTENTS
6843                                                                        ;OF THE MCPU CSR
6844  026074  001420                             BEQ     40$
6845
6846  026076  062702  000002             15$:      ADD     #2,R2           ;UPDATE ADDRESS.
6847  026102  020227  177700                       CMP     R2,#177700      ;DONE?     ;BC
6848  026106  001370                             BNE     10$             ;NO-LOOP
6849
6850  026110  013737  002464  000004       17$:      MOV     SAVE4,@#4       ;RESTORE TRAP CATCHER
6851  026116  013737  002466  000006               MOV     SAVE6,@#6       ;FROM VALUES SAVED BY INIT SECTION
6852  026124                                       EXIT    TST             ;EXIT, ALL DONE
 (3)  026124  104432                               TRAP    C$EXIT
 (3)  026126  000052                               .WORD   L10107-.
6853
6854  026130  062706  000004             20$:      ADD     #4,SP           ;SAVE FROM TRAP
6855  026134  000760                             BR      15$             ;LOOP
6856
6857  026136                               40$:      ;*OH NO, WE MAY HAVE A DUAL ADDRESS PROBLEM!
6858
6859  026136  012711  000174                       MOV     #174,(R1)       ;WRITE NEW PATTERN IN MCPU CSR
6860  026142  022712  000174                       CMP     #174,(R2)       ;DID NEW PATTERN SHOW UP IN ADDR?
6861  026146  001403                             BEQ     60$
6862
6863  026150  012711  000641             50$:      MOV     #641,(R1)       ;PUT OLD PATTERN BACK IN MCPU CSR.
6864  026154  000750                             BR      15$             ;LOOP
6865
6866  026156  020102                     60$:      CMP     R1,R2           ;IS THIS THE MCPU ADDRESS?
6867  026160  001773                             BEQ     50$             ;YES-NO ERROR
6868
6869  026162                                       ERROR   40              ;DUAL ADDRESS ERROR
 (5)  026166  104455                               TRAP    C$ERDF
 (6)  026170  000050                               .WORD   40
 (6)  026172  005055                               .WORD   EM0
 (6)  026174  010636                               .WORD   ERR40
6870  026176  000744                             BR      17$
6871
6872  026200                                       ENDTST
 (3)  026200                               L10107:
 (3)  026200  104401                               TRAP    C$ETST
6873
6874  026202                                       BADHEAD
 (2)                                              ;*************** TEST 38 ****************
6875                                              ;*
6876                                              ;*BYTE ADDRESSING TEST
6877                                              ;*      HERE, WE'RE GOING TO MAKE SURE THAT WE CAN
6878                                              ;*      WRITE INTO ONLY A HIGH OR LOW BYTE OF THE MCPU.
```

```
6879                                            ;*
6880  026202                                    BADHEAD
 (2)                                            ;*************** TEST 38 ***************
6881
6882  026202                                    BGNTST
 (3)  026202                              T38::
6883  026202                                    MYINT
 (1)  026202  013701  002516                     MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6884  026206  005061  000002                     CLR     2(R1)                   ;CLEAR CSR
6885  026212  112761  177777  000002             MOVB    #-1,2(R1)               ;WRITE ALL ONES INTO LOW BYTE
6886                                                                              ;OF CSR
6887  026220  032761  177400  000002             BIT     #177400,2(R1)           ;SEE IF HIGH BYTE GOT WRITTEN
6888  026226  001410                             BEQ     10$
6889
6890  026230                                    ERROR   41                      ;HIGH BYTE GOT WRITTEN INTO ON A LOW BYTE
 (5)  026234  104455                             TRAP    C$ERDF
 (6)  026236  000051                             .WORD   41
 (6)  026240  005055                             .WORD   EM0
 (6)  026242  010702                             .WORD   ERR41
6891  026244                                    ESCAPE  TST                     ;OPERATION
 (3)  026244  104410                             TRAP    C$ESCAPE
 (3)  026246  000040                             .WORD   L10110-.
6892
6893  026250  005061  000002              10$:   CLR     2(R1)
6894  026254  112761  177777  000003             MOVB    #-1,3(R1)               ;WRITE INTO HIGH BYTE
6895  026262  032761  000377  000002             BIT     #377,2(R1)              ;SEE IF LOW BYTE GOT WRITTEN
6896  026270  001406                             BEQ     20$
6897
6898  026272                                    ERROR   42                      ;LOW BYTE GOT WRITTEN INTO ON A
 (5)  026276  104455                             TRAP    C$ERDF
 (6)  026300  000052                             .WORD   42
 (6)  026302  005055                             .WORD   EM0
 (6)  026304  010744                             .WORD   ERR42
6899                                                                            ;HIGH BYTE OPERATION.
6900
6901  026306                              20$:
6902  026306                                    ENDTST
 (3)  026306                              L10110:
 (3)  026306  104401                             TRAP    C$ETST
6903
6904  026310                                    BADHEAD
 (2)                                            ;*************** TEST 39 ***************
6905                                            ;*
6906                                            ;*IN THIS TEST WE'RE GOING TO MAKE SURE THAT THE PC
6907                                            ;*REG COUNTS UP PROPERLY. THE PC REG SHOULD INCREMENT
6908                                            ;*ONCE AFTER EACH INSTRUCTION.
6909                                            ;*
6910  026310                                    BADHEAD
 (2)                                            ;*************** TEST 39 ***************
6911
6912  026310                                    BGNTST
 (3)  026310                              T39::
6913  026310                                    SKIP07  10$                     ;ONLY DO IF M8207
 (1)                                            ;GOTO 10$ IF M8207
6914  026320                                    EXIT TST
 (3)  026320  104432                             TRAP    C$EXIT
```

```
  (3)  026322  000122                        .WORD   L10111-.
6915
6916  026324                          10$:    MYINT
  (1)  026324  013701  002516                MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6917  026330                                  MSTCLR
6918  026334                                  ROMCLK
  (1)  026334  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6919  026340  000400                          400
6920  026342                                  ROMCLK
  (1)  026342  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6921  026346  061233                          61233
6922  026350                                  SROMCLK
  (1)  026350  004537  003100                JSR     R5,..SROMCLK
6923  026354  100000                          100000
6924  026356  012705  000001                MOV     #1,R5           ;START AT ZERO
6925
6926  026362                          20$:    ROMCLK                  ;READ PC HIGH REG.
  (1)  026362  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6927  026366  121265                          121265
6928
6929  026370                                  ROMCLK                  ;READ PC LOW REG.
  (1)  026370  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6930  026374  121244                          121244
6931  026376  016104  000004                MOV     4(R1),R4        ;GET WHOLE PICTURE
6932  026402  042704  170000                BIC     #170000,R4
6933  026406  020405                         CMP     R4,R5           ;INCREMENT OK?
6934  026410  001410                         BEQ     30$
6935
6936  026412                                  ERROR   47              ;PC FAILED TO INCREMENT PROPERLY
  (5)  026416  104455                        TRAP    C$ERDF
  (6)  026420  000057                        .WORD   47
  (6)  026422  005055                        .WORD   EM0
  (6)  026424  011264                        .WORD   ERR47
6937                                                                    ;SHOULD INCREMENT BY ONE
6938                                                                    ;FOR EACH INSTRUCTION.
6939  026426                                  ESCAPE  TST
  (3)  026426  104410                        TRAP    C$ESCAPE
  (3)  026430  000014                        .WORD   L10111-.
6940
6941  026432  062705  000002          30$:    ADD     #2,R5           ;UPDATE EXPECTED ADDRESS BY 2.
6942  026436  020527  000777                CMP     R5,#777
6943  026442  001347                         BNE     20$
6944
6945  026444                                  ENDTST
  (3)  026444                     L10111:
  (3)  026444  104401                        TRAP    C$ETST
6946
6947  026446                                  BADHEAD
  (2)                                       ;*************** TEST 40 ***************
6948                                        ;*
6949                                        ;*IN THIS TEST WE'LL MAKE SURE THAT 'BRANCH FIELD H'' DOESN'T
6950                                        ;*GET SUCH HIGH.
6951                                        ;*FIRST WE'LL CLEAR THE PC HIGH REG. THEN WE'LL DO A BRANCH INSTR
6952                                        ;*WITH BAB BITS 11&12 SET. IF PCR BITS 8&9 SET THEN WE'LL KNOW
6953                                        ;*WE WERE SUCCESSFUL IF PCR BITS 8&9 FAIL TO SET, WE'LL KNOW
6954                                        ;*THAT THE MUX SELECTED THE WRONG INPUT TO BE CLOCKED INTO THE PCR.
```

```
6955
6956  026446                                    ;*
(2)                                             BADHEAD
                                                ;*************** TEST 40 ***************
6957
6958  026446                                    BGNTST
(3)   026446                              T40::
6959  026446                                    SKIP07  10$             ;ONLY DO IF M8207
(1)                                             ;GOTO 10$ IF M8207
6960  026456                                    EXIT TST
(3)   026456  104432                            TRAP    C$EXIT
(3)   026460  000062                            .WORD   L10112-.
6961
6962  026462                              10$:  MYINT                   ;INITIALIZE PARAMETERS
(1)   026462  013701  002516                    MOV     KMCSR,R1                ;RECORD DEVICE ADDR.
6963  026466                                    MSTCLR                  ;CLEAR DEVICE.
6964
6965  026472                                    ROMCLK                  ;DO A 'BRANCH ALWAYS'' WITH
(1)   026472  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6966  026476  114400                           114400                  ;BAB BITS 11&12 SET THIS SHOULD CLOCK
6967                                                                    ;THESE BITS INTO BITS 8&9 OF THE PCR.
6968  026500                                    ROMCLK                  ;NOW READ THE PCR HIGH
(1)   026500  004537  003044                    JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
6969  026504  121265                           121265                  ;AND PUT INTO PORT5.
6970                                                                    ;REG. BR NO CLK OF BAB BITS
6971  026506  116105  000005                   MOVB    5(R1),R5        ;READ THE PCR.
6972  026512  112704  000003                   MOVB    #3,R4           ;EXPECT BITS 8,9 TO BE SET.
6973  026516  042705  000374                   BIC     #374,R5         ;STRIP ANY JUNK
6974  026522  020405                           CMP     R4,R5           ;OK?
6975  026524  001406                           BEQ     20$
6976
6977  026526                                    ERROR   15              ;'BRANCH FIELD H'' STUCK HIGH OR
(5)   026532  104455                            TRAP    C$ERDF
(6)   026534  000017                            .WORD   15
(6)   026536  005055                            .WORD   EM0
(6)   026540  010006                            .WORD   ERR15
6978                                                                    ;OTHER PROBLEM IN THIS AREA.
6979
6980  026542                              20$:
6981  026542                                    ENDTST
(3)   026542                              L10112:
(3)   026542  104401                            TRAP    C$ETST
6982
6983  026544                                    BADHEAD
(2)                                             ;*************** TEST 41 ***************
6984                                            ;*
6985                                            ;*IN THIS TEST WE'RE GOING TO MAKE SURE THAT ONLY SP0
6986                                            ;*IS SELECTED FOR SOURCE WHEN THE DESTINATION
6987                                            ;*IS THE OUTBUS
6988                                            ;*FIRST WE'LL WRITE EACH SP ADDRS INTO ITSELF THEN WE'LL
6989                                            ;*MOV SP TO OBUS4. THAT SHOULD SELECT
6990                                            ;*SP ADDRESS 0. IF ANY OTHER DATA SHOWS UP, WE'LL
6991                                            ;*BLAME IT ON THE SELECTION OF A DIFFERENT SCRATCH PAD.
6992  026544                                    BADHEAD
(2)                                             ;*************** TEST 41 ***************
6993
6994  026544                                    BGNTST
```

```
 (3)  026544                          T41::
6995  026544                                MYINT
 (1)  026544  013701  002516                 MOV     KMCSR,R1            ;RECORD DEVICE ADDR.
6996  026550  005005                       CLR     R5                  ;START WITH ADDR-ZERO
6997
6998  026552  042737  000017  026574  10$:  BIC     #17,20$             ;STRIP SP ADDR FIELD FROM INSTR
6999  026560  010561  000004               MOV     R5,4(R1)            ;PUT SP ADDR INTO PORT4.
7000  026564  050537  026574               BIS     R5,20$              ;ADD SP ADDR TO INSTR.
7001  026570                               ROMCLK
 (1)  026570  004537  003044               JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
7002  026574  123100                 20$:  123100                      ;WRITE TO SP
7003  026576  005205                       INC     R5                  ;UPDATE ADDRESS
7004  026600  120527  000020               CMPB    R5,#20              ;IF NOT THROUGH, REPEAT.
7005  026604  001362                       BNE     10$
7006
7007  026606                               ROMCLK                      ;NOW MOV SP0 TO OBUS* PORT4
 (1)  026606  004537  003044               JSR     R5,..ROMCLK         ;CLOCK INSTRUCTION
7008  026612  061204                       061204                      ;
7009  026614  116104  000004               MOVB    4(R1),R4            ;READ PORT4 IT S/B ZERO
7010  026620  001410                       BEQ     30$
7011  026622  012705  000000               MOV     #0,R5
7012  026626                               ERROR   43                  ;SP0 NOT SELECTED FOR SOURCE-SEE
 (5)  026632  104455                       TRAP    C$ERDF
 (6)  026634  000053                       .WORD   43
 (6)  026636  005055                       .WORD   EM0
 (6)  026640  011006                       .WORD   ERR43
7013                                                                     ;DISCUSSION IN HEADER.
7014
7015  026642                          30$:  ENDTST
 (3)  026642                          L10113:
 (3)  026642  104401                       TRAP    C$ETST
7016
7017  026644                               BADHEAD
 (2)                                       ;*************** TEST 42 ***************
7018                                       ;*
7019                                       ;*IN THIS TEST WE ARE GOING TO MAKE SURE THAT THE
7020                                       ;*SIGNAL 'MOV INST H' (AND ITS ASSOC. TRIBS) DOESN'T GET
7021                                       ;*STUCK HIGH. IN ORDER TO DO THIS WE'LL CLEAR THE PC HIGH REG
7022                                       ;*PUT KNOWN DATA IN THE BREG AND SP1 THEN WE'LL A BRANCH
7023                                       ;*WITH CROM BITS 0-3 SET AS WELL AS CROM BIT 9 WITH CROM BITS 8 AND 11 CLEAR.
7024                                       ;*IF 'MOV INST H' GETS STUCK HIGH, THE PC REG HIGH WILL GET LOADED
7025                                       ;*WITH THE CONTENTS OF THE ALU
7026  026644                               BADHEAD
 (2)                                       ;*************** TEST 42 ***************
7027
7028  026644                               BGNTST
 (3)  026644                          T42::
7029  026644                               SKIP07  10$                 ;ONLY DO IF M8207
 (1)                                       ;GOTO 10$ IF M8207
7030  026654                               EXIT TST                    ;ELSE EXIT
 (3)  026654  104432                       TRAP    C$EXIT
 (3)  026656  000110                       .WORD   L10114-.
7031
7032  026660                          10$:  MYINT                       ;DO INITIAL TEST SET-UP.
 (1)  026660  013701  002516               MOV     KMCSR,R1                    ;RECORD DEVICE ADDR.
7033  026664                               MSTCLR                      ;DO A MASTER CLEAR.
```

```
7034  026670  005737  002470              TST     RUNB
7035  026674  001034                      BNE     20$
7036
7037                                      ;TO RUN THIS SECTION OF CODE YOU MUST TURN SW7 OF SWITCH PACK #E28
7038                                      ;OFF SO THAT M8207 NOT SELFSTARTING.
7039
7040  026676  012761  000002  000004      MOV     #2,4(R1)        ;PUT A 2 INTO SP1
7041  026704                              ROMCLK                  ;PORT4 TO SCRATCH PAD 1
 (1)  026704  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7042  026710  123101                      123101
7043  026712  012761  000004  000004      MOV     #4,4(R1)
7044  026720                              ROMCLK
 (1)  026720  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7045  026724  123100                      123100
7046  026726                              ROMCLK                  ;NOW DO A BRANCH ON C-BIT SET
 (1)  026726  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7047  026732  141201                      141201                  ;BASED ON SP CONTENTS
7048                                                              ;OK-WHAT WE ARE REALLY
7049                                                              ;INTERESTED IN IS SEEING IF THE
7050                                                              ;PC HIGH REG GETS LOADED WITH
7051                                                              ;THE CONTENTS OF THE ALU (2)
7052                                                              ;IF THIS OCCURS, WE CAN PROBABLY
7053                                                              ;SAY THAT 'MOV INSTR' REMAINED
7054                                                              ;HIGH.
7055  026734                              ROMCLK                  ;READ PC HIGH, PUT INTO PORT5
 (1)  026734  004537  003044              JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7056  026740  121265                      121265
7057  026742  116104  000005              MOVB    5(R1),R4        ;READ PC REG HIGH FROM PORT
7058  026746  001407                      BEQ     20$             ;SHOULD BE CLEAR
7059  026750  005005                      CLR     R5
7060
7061  026752                              ERROR   15              ;ERROR-PC REG HIGH S/B CLEAR-SEE HEADER
 (5)  026756  104455                      TRAP    C$ERDF
 (6)  026760  000017                      .WORD   15
 (6)  026762  005055                      .WORD   EM0
 (6)  026764  010006                      .WORD   ERR15
7062                                                            ;DISCUSSION.
7063
7064  026766                      20$:
7065  026766                              ENDTST
 (3)  026766                      L10114:
 (3)  026766  104401                      TRAP    C$ETST
7066
7067  026770                              BADHEAD
 (2)                                      ;*************** TEST 43 ***************
7068                                      ;*TEST THAT MASTER CLEAR, CLEARS BITS IN THE NPR CONTROL REGISTER AND
7069                                      ;*MICROPROCESSOR MISCELLANEOUS REGISTER-FIRST WE'LL SET THE
7070                                      ;*PRIORITY UP SO THAT WHEN WE SET THE BUS REQUEST BIT THAT IT WON'T BUG US
7071                                      ;*THEN WE'LL SET ALL THE BITS IN BOTH REGS EXCEPT THE
7072                                      ;*NPR REQUEST. WE'LL LOOK TO SEE THAT ALL GOT SET, NEXT
7073                                      ;*WE'LL DO A MASTER CLEAR AND BE SURE THAT THEY ALL
7074                                      ;*CLEAR.
7075  026770                              BADHEAD
 (2)                                      ;*************** TEST 43 ***************
7076
7077  026770                              BGNTST
```

```
(3)  026770                                T43::
     026770                                         MYINT
(1)  026770  013701  002516                         MOV     KMCSR,R1          ;RECORD DEVICE ADDR.
     026774                                         MSTCLR
     027000                                         SETPRI  #PRI07            ;DON'T ALLOW INTERRUPTS.
(3)  027000  012700  000340                         MOV     #PRI07,R0
(3)  027004  104441                                 TRAP    C$SPRI
     027006  012761  177777  000004                 MOV     #-1,4(R1)         ;DATA TO BE SET
     027014  042761  000002  000004                 BIC     #2,4(R1)          ;DON'T SET AC LOW!
     027022                                         ROMCLK
(1)  027022  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027026  121111                                 121111                    ;PUT INTO MISC REG.
     027030  042761  000400  000004                 BIC     #400,4(R1)        ;DON'T SET NPR BIT
     027036                                         ROMCLK
(1)  027036  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027042  121130                                 121130                    ;PUT INTO NPR REG
     027044                                         ROMCLK
(1)  027044  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027050  121225                                 121225                    ;MOV MISC REG (11) TO PORT5

     027052                                         ROMCLK
(1)  027052  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027056  121204                                 121204                    ;MOVE NPR REG (10) TO PORT4
     027060  012737  146636  002452                 MOV     #146636,$GDDAT    ;EXPECT ALL TO SET
     027066  016104  000004                         MOV     4(R1),R4          ;READ WHAT HAPPEN
     027072  042704  030140                         BIC     #030140,R4        ;MASK UNUSED BITS
     027076  023704  002452                         CMP     $GDDAT,R4         ;DID ALL BITS GET SET?
     027102  001410                                 BEQ     10$               ;YES CONTINUE.
     027104                                         BRESET
(3)  027104  104433                                 TRAP    C$RESET
     027106                                         ERROR   46                ;SO SORT OF PROBLEM SETTING BITS
(5)  027112  104455                                 TRAP    C$ERDF
(6)  027114  000056                                 .WORD   46
(6)  027116  005055                                 .WORD   EMO
(6)  027120  011214                                 .WORD   ERR46
                                                                              ;IN THE NPR AND/OR MISC REG.
     027122                                         CKLOOP
(3)  027122  104406                                 TRAP    C$CLP1

     027124  152761  000100  000001  10$:           BISB    #100,1(R1)        ;SET MASTER CLEAR
     027132  142761  000300  000001                 BICB    #300,1(R1)        ;CLEAR MASTER CLEAR

     027140                                         ROMCLK
(1)  027140  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027144  121225                                 121225                    ;MOV MISC REG (11) TO PORT5

     027146                                         ROMCLK
(1)  027146  004537  003044                         JSR     R5,.ROMCLK        ;CLOCK INSTRUCTION
     027152  121204                                 121204                    ;MOV NPR REG (10) TO PORT4
     027154  016104  000004                         MOV     4(R1),R4          ;READ RESULTS
     027160  005037  002452                         CLR     $GDDAT            ;EXPECT ZERO
     027164  042704  010140                         BIC     #010140,R4        ;MASK UNUSED BITS
     027170  001407                                 BEQ     20$               ;IF ALL ZERO, EVERYTHING COOL.

     027172                                         ERROR   46                ;MASTER CLEAR FAILED TO CLEAR
(5)  027176  104455                                 TRAP    C$ERDF
```

```
  (6)  027200  000056                        .WORD   46
  (6)  027202  005055                        .WORD   EMO
  (6)  027204  011214                        .WORD   ERR46
7117
7118  027206                                 CKLOOP
  (3)  027206  104406                        TRAP    C$CLP1
7119
7120  027210                           20$:
7121  027210  012761  000014  000004         MOV     #14,4(R1)       ;NOW WE ARE GOING TO TRY TO
7122  027216                                 ROMCLK                  ;SET THE EXT BITS (16&17) IN THE NPR REG.
  (1)  027216  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7123  027222  121110                         121110                  ;IF MASTER CLEAR FAILED TO CLEAR ITSELF
7124  027224                                 ROMCLK                  ;THEN WE WILL BE UNABLE TO SET
  (1)  027224  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7125  027230  121205                         121205                  ;THESE BITS
7126  027232  116104  000005                MOVB    5(R1),R4        ;READ REG
7127  027236  042704  000140                BIC     #140,R4         ;MASK UNUSED BITS
7128  027242  012737  000014  002452         MOV     #14,$GDDAT      ;STORE GOOD
7129  027250  023704  002452                CMP     $GDDAT,R4       ;DID BITS SET?
7130  027254  001407                         BEQ     30$             ;YES-CONTINUE
7131
7132  027256                                 ERROR   46              ;MASTER CLEAR FAILED TO CLEAR
  (5)  027262  104455                        TRAP    C$ERDF
  (6)  027264  000056                        .WORD   46
  (6)  027266  005055                        .WORD   EMO
  (6)  027270  011214                        .WORD   ERR46
7133                                                               ;ITSELF, THUS PROHIBITING US FROM
7134                                                               ;FURTHER SETTING BITS IN THE NPR REG.
7135  027272                                 CKLOOP
  (3)  027272  104406                        TRAP    C$CLP1
7136
7137  027274                           30$:  BRESET                  ;NOW WE'LL SEE IF A BUS RESET CLEARS
  (3)  027274  104433                        TRAP    C$RESET
7138                                                               ;THESE BITS.
7139  027276  005737  002470                TST     RUNB            ;CAN'T DO THIS
7140  027302  001016                         BNE     40$             ;TEST IF RUN SW SET.
7141  027304                                 ROMCLK
  (1)  027304  004537  003044                JSR     R5,..ROMCLK     ;CLOCK INSTRUCTION
7142  027310  121204                         121204                  ;READ MISC REG
7143  027312  116104  000004                MOVB    4(R1),R4
7144  027316  001410                         BEQ     40$             ;IF ZERO-END TST
7145
7146  027320  005037  002452                CLR     $GDDAT          ;S/B ZERO
7147
7148  027324                                 ERROR   46              ;BUS RESET FAILED TO CLEAR NPR REG
  (5)  027330  104455                        TRAP    C$ERDF
  (6)  027332  000056                        .WORD   46
  (6)  027334  005055                        .WORD   EMO
  (6)  027336  011214                        .WORD   ERR46
7149                                                               ;MASTER CLEAR WAS ABLE TO LOOK TO THE
7150                                                               ;CIRCUITRY THAT CONVERTS BUS INIT
7151                                                               ;TO "CLEAR"
7152
7153  027340                           40$:
7154  027340                                 ENDTST
  (3)  027340                           L10115:
```

```
(3)  027340  104401                    TRAP    C$ETST
```

```
                                .SBTTL HARDWARE PARAMETER CODING SECTION



                                ;////////////////////////////////////////////////////////////////////////
                                ;/ THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ;/ THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ;/ MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ;/ INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ;/ MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ;/ WITH THE OPERATOR.
                                ;////////////////////////////////////////////////////////////////////////

027342                                  BGNHRD
(3) 027342  000016                      .WORD L10116-L$HARD/2
(3) 027344                      L$HARD::

027344                                  GPRMD   WPM,0,0,7,0,7,YES
(4) 027344  000032                      .WORD   T$CODE
(4) 027346  027400                      .WORD   WPM
(4) 027350  000007                      .WORD   7
(4) 027352  000000                      .WORD   T$LOLIM
(4) 027354  000007                      .WORD   T$HILIM
027356                                  GPRMA   ADDRES,2,0,160000,177776,YES
(4) 027356  001031                      .WORD   T$CODE
(4) 027360  027452                      .WORD   ADDRES
(4) 027362  160000                      .WORD   T$LOLIM
(4) 027364  177776                      .WORD   T$HILIM
                                ;       GPRMA   VECTOR,4,0,0,674,YES
                                ;       GPRMD   PRIRTY,6,0,7000,4,7,YES
                                ;       GPRMD   LNUNIT,10,0,3,0,3,YES
                                ;       GPRMD   SWPAC1,12,0,377,0,377,YES
                                ;       GPRMD   SWPAC2,14,0,377,0,377,YES
                                ;       GPRMD   LOOPBK,16,0,40000,0,1,YES
027366                                  GPRMD   ISRUN,24,0,7,0,1,YES
(4) 027366  012032                      .WORD   T$CODE
(4) 027370  030050                      .WORD   ISRUN
(4) 027372  000007                      .WORD   7
(4) 027374  000000                      .WORD   T$LOLIM
(4) 027376  000001                      .WORD   T$HILIM
027400                                  ENDHRD
(2)                                     .EVEN
(3) 027400                      L10116:

027400  044127  041511  020110  WPM:    .ASCIZ  'WHICH MICRO-CPU? (0=M8200,4=M8204,7=M8207''
027406  044515  051103  026517
027414  050103  037525  024040
027422  036460  034115  030062
027430  026060  036464  034115
027436  030062  026064  036467
027444  034115  030062  000067
027452  044515  051103  026517  ADDRES: .ASCIZ  /MICRO-CPU  CSR ADDRESS : /
027460  050103  020125  041440
027466  051123  040440  042104
027474  042522  051523  035040
027502  000040
```

```
 7185  027504  044515  051103  026517  VECTOR: .ASCIZ  /MICRO-CPU VECTOR ADDRESS : /
       027512  050103  020125  042526
       027520  052103  051117  040440
       027526  042104  042522  051523
       027534  035040  000040
 7186  027540  044515  051103  026517  PRIRTY: .ASCIZ  /MICRO-CPU PRIORITY LEVEL : /
       027546  050103  020125  051120
       027554  047511  044522  054524
       027562  046040  053105  046105
       027570  035040  000040
 7187  027574  044127  041511  020110  LNUNIT: .ASCIZ  /WHICH LINE UNIT (0-3)? 0=NONE,1=M8201,2=M8202,3=M8203 : /
       027602  044514  042516  052440
       027610  044516  020124  030050
       027616  031455  037451  030040
       027624  047075  047117  026105
       027632  036461  034115  030062
       027640  026061  036462  034115
       027646  030062  026062  036463
       027654  034115  030062  020063
       027662  020072     000
 7188  027665     123  044527  041524  SWPAC1: .ASCIZ  /SWITCH PACK #1 (DDCMP LINE #) : /
       027672  020110  040520  045503
       027700  021440  020061  042050
       027706  041504  050115  046040
       027714  047111  020105  024443
       027722  035040  000040
 7189  027726  053523  052111  044103  SWPAC2: .ASCIZ  /SWITCH PACK #2 (BM873 BOOT ADR) : /
       027734  050040  041501  020113
       027742  031043  024040  046502
       027750  033470  020063  047502
       027756  052117  040440  051104
       027764  020051  020072     000
 7190  027771     127  046111  020114  LOOPBK: .ASCIZ  /WILL TEST CONNECTOR(S) BE USED ? 0=NO,1=YES : /
       027776  042524  052123  041440
       030004  047117  042516  052103
       030012  051117  051450  020051
       030020  042502  052440  042523
       030026  020104  020077  036460
       030034  047516  030454  054475
       030042  051505  035040  000040
 7191  030050  044515  051103  026517  ISRUN:  .ASCIZ  'MICRO-PROCESSOR RUN SWITCH  TYPE 0 IF OFF, 1 IF ON :''
       030056  051120  041517  051505
       030064  047523  020122  052522
       030072  020116  053523  052111
       030100  044103  020040  054524
       030106  042520  030040  044440
       030114  020106  043117  026106
       030122  030440  044440  020106
       030130  047117  035040     000
 7192
 7193        030136                  .EVEN
 7194
 7195
 7196
 7197
 7198
```

```
7199
```

```
7201                                    .SBTTL  SOFTWARE PARAMETER CODING SECTION
7202
7203
7204                                    ;////////////////////////////////////////////////////////////////////////
7205                                    ;/ THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
7206                                    ;/ THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
7207                                    ;/ MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
7208                                    ;/ INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
7209                                    ;/ MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
7210                                    ;/ WITH THE OPERATOR.
7211                                    ;////////////////////////////////////////////////////////////////////////
7212
7213  030136                                    BGNSFT
 (3)  030136  000000                          .WORD L10117-L$SOFT/2
 (3)  030140                          L$SOFT::
7214
7215
7216  030140                                    ENDSFT
 (2)                                          .EVEN
 (3)  030140                          L10117:
7217
7218                                    .EVEN
7219
7220
7221
7222
7223
7224
7225  030140                                        LASTAD
 (2)                                              .EVEN
 (4)  030140  000000                              .WORD   0
 (4)  030142  000000                              .WORD   0
 (3)  030144                                L$LAST::
7226
7227         000001                     .END
```

```
ADDRES  027452            7173    7184#
ADR   = 000020 G          3573#
ADR1    012600            4600#   4620
ADR2    012604            4601#   4617
ADR4    012444            4568#   4586
ADR5    012450            4569#   4583
ASSEMB= 000010            3434
BIT0  = 000001 G          3573#   3882    3883    3896    3897    6299    6301    6302
BIT00 = 000001 G          3573#
BIT01 = 000002 G          3573#
BIT02 = 000004 G          3573#
BIT03 = 000010 G          3573#
BIT04 = 000020 G          3573#
BIT05 = 000040 G          3573#
BIT06 = 000100 G          3573#
BIT07 = 000200 G          3573#
BIT08 = 000400 G          3573#
BIT09 = 001000 G          3573#
BIT1  = 000002 G          3573#   3880    3882    3883    3890    3897    5891    6297    6299    6301
BIT10 = 002000 G          3573#   3995    4015    4023    4571    4604    4638    4657    6396
BIT11 = 004000 G          3573#   6360    6385    6390
BIT12 = 010000 G          3573#   4361
BIT13 = 020000 G          3573#   3998    4018    4026    4372    4574    4607    4641
BIT14 = 040000 G          3573#   6408
BIT15 = 100000 G          3573#   4376
BIT2  = 000004 G          3573#   3883    3897
BIT3  = 000010 G          3573#
BIT4  = 000020 G          3573#
BIT5  = 000040 G          3573#   4938
BIT6  = 000100 G          3573#   3867    3868    4953
BIT7  = 000200 G          3573#   3868
BIT8  = 000400 G          3573#   3974    4936    6360
BIT9  = 001000 G          3573#   6358    6360    6396
BOE   = 000400 G          3573#
CLKX    002360            3613#
CLRALL  003166            3903#   4995    5008    5021    5466    5480    5493    5525    5539    5552    5583    5597    5610
                          5641    5655    5668    5701    5716    5732    5763    5777    5790    6206    6229    6252    6274
CRAMA   003602            4024    4033#
CZDMQ   002000 G          3440#
C$AU  = 000052            3434#   4473
C$AUTO= 000061            3434#   4427
C$BRK = 000022            3434#   4712    4756    4819    4883
C$BSEG= 000004            3434#   4570    4602    4636    4651    4992    5007    5020    5052    5064    5076    5107    5121
                          5135    5167    5180    5193    5226    5239    5252    5285    5298    5311    5343    5362    5375
                          5407    5420    5433    5464    5478    5492    5523    5537    5551    5582    5595    5609    5640
                          5653    5667    5700    5714    5731    5762    5775    5789
C$BSUB= 000002            3434#
C$CEFG= 000045            3434#
C$CLCK= 000062            3434#
C$CLEA= 000012            3434#   4440
C$CLOS= 000035            3434#
C$CLP1= 000006            3434#   7101    7118    7135
C$CVEC= 000036            3434#
C$DCLN= 000044            3434#
C$DODU= 000051            3434#   4423
C$DRPT= 000024            3434#
```

```
C$DU   = 000053  3434#  4457
C$EDIT= 000003  3434#  3474
C$ERDF= 000055  3434#  4507  4541  4553  4578  4611  4648  4662  4706  4750  4794  4817  4860
                4878  4913  4943  4958  4970  5004  5017  5030  5061  5073  5085  5117  5131
                5145  5177  5190  5203  5236  5249  5262  5295  5308  5321  5358  5372  5385
                5417  5430  5443  5475  5489  5502  5534  5548  5561  5592  5606  5619  5650
                5664  5677  5711  5727  5741  5772  5786  5799  5850  5899  5996  6068  6155
                6214  6226  6236  6260  6271  6281  6308  6320  6332  6364  6382  6391  6402
                6411  6524  6548  6564  6581  6632  6674  6747  6756  6765  6773  6783  6789
                6795  6801  6869  6890  6898  6936  6977  7012  7061  7099  7116  7132  7148
C$ERHR= 000056  3434#
C$ERRO= 000060  3434#
C$ERSF= 000054  3434#
C$ERSO= 000057  3434#
C$ESCA= 000010  3434#  4500  4511  4543  4579  4612  4649  4663  4707  4751  4795  4818  4882
                4944  5005  5018  5031  5062  5074  5086  5119  5133  5146  5178  5191  5204
                5237  5250  5263  5296  5309  5322  5360  5373  5386  5418  5431  5444  5476
                5490  5503  5535  5549  5562  5593  5607  5620  5651  5665  5678  5712  5729
                5742  5773  5787  5800  5855  5903  6027  6186  6216  6228  6262  6273  6525
                6565  6582  6677  6749  6759  6767  6775  6785  6790  6796  6891  6939
C$ESEG= 000005  3434#  4580  4613  4650  4664  5006  5019  5032  5063  5075  5087  5120  5134
                5147  5179  5192  5205  5238  5251  5264  5297  5310  5323  5361  5374  5387
                5419  5432  5445  5477  5491  5504  5536  5550  5563  5594  5608  5621  5652
                5666  5679  5713  5730  5743  5774  5788  5801
C$ESUB= 000003  3434#
C$ETST= 000001  3434#  4513  4556  4588  4622  4670  4717  4761  4824  4915  4972  5033  5088
                5148  5206  5265  5324  5388  5446  5505  5564  5622  5680  5744  5802  5860
                5910  6071  6193  6238  6283  6337  6418  6595  6635  6687  6822  6872  6902
                6945  6981  7015  7065  7154
C$EXIT= 000032  3434#  4564  4596  4631  4833  4925  4987  5047  5102  5162  5220  5279  5338
                5402  5460  5519  5578  5636  5696  5758  5814  5874  5947  6106  6203  6249
                6395  6586  6646  6681  6700  6803  6852  6914  6960  7030
C$GETB= 000026  3434#
C$GETW= 000027  3434#
C$GMAN= 000043  3434#
C$GPHR= 000042  3434#  4325
C$GPLO= 000030  3434#
C$GPRI= 000040  3434#
C$INIT= 000011  3434#  4406
C$INLP= 000020  3434#
C$MANI= 000050  3434#
C$MEM  = 000031  3434#
C$MSG  = 000023  3434#  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189  4190
                4192  4193  4197  4198  4199  4203  4208  4212  4216  4221  4225  4230  4234
                4239
C$OPEN= 000034  3434#
C$PNTB= 000014  3434#  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189  4190
                4192  4193  4197  4198  4199  4202  4207  4211  4215  4220  4224  4228  4229
                4233  4238
C$PNTF= 000017  3434#  4206  4210  4214  4219  4223  4227  4232  4237
C$PNTS= 000016  3434#
C$PNTX= 000015  3434#
C$QIO  = 000377  3434#
C$RDBU= 000007  3434#
C$REFG= 000047  3434#  4302  4305  4308  4311
C$RESE= 000033  3434#  4438  4456  6349  7098  7137
```

```
C$REVI= 000003          3434#  3474
C$RFLA= 000021          3434#
C$RPT = 000025          3434#  4270
C$SEFG= 000046          3434#
C$SPRI= 000041          3434#  7080
C$SVEC= 000037          3434#
C$TPRI= 000013          3434#
DFPTBL  002262 G        3519#
DH0     005723          4109#  4197
DH1     005724          4112#  4177  4178  4179  4184  4185
DH2     005755          4113#  4180  4182  4186  4187  4188  4189  4190  4193  4198  4199
DH3     005775          4114#  4192
DIAGMC= 000000          3434
EF.CON= 000036 G        3573#  4308
EF.NEW= 000035 G        3573#  4305
EF.PWR= 000034 G        3573#
EF.RES= 000037 G        3573#  4311
EF.STA= 000040 G        3573#  4302
EMB1    005410          4099#  6332
EMB50   005545          4106#  6308
EMB51   005577          4107#  6320
EM0     005055          4087#  4507  4541  4553  4578  4611  4648  4662  4706  4750  4794  4817  4860
                        4878   4913  4943  4958  4970  5004  5017  5030  5061  5073  5085  5117  5131
                        5145   5177  5190  5203  5236  5249  5262  5295  5308  5321  5358  5372  5385
                        5417   5430  5443  5475  5489  5502  5534  5548  5561  5592  5606  5619  5650
                        5664   5677  5711  5727  5741  5772  5786  5799  5850  5899  5996  6068  6155
                        6214   6226  6236  6260  6271  6281  6364  6382  6391  6402  6411  6524  6548
                        6564   6581  6632  6674  6747  6756  6765  6773  6783  6789  6795  6801  6869
                        6890   6898  6936  6977  7012  7061  7099  7116  7132  7148
EM1     005056          4088#  4177  4179
EM10    005260          4095#  4187  4189
EM11    005312          4096#  4190
EM12    005333          4097#  4192
EM16    005353          4098#  4193
EM17    005434          4101#  4197
EM2     005076          4089#  4178
EM27    005463          4102#
EM29    005512          4104#  4198
EM3     005131          4090#  4180
EM35    005434          4100#  4199
EM4     005144          4091#  4182
EM5     005171          4092#  4184
EM6     005216          4093#  4185
EM7     005233          4094#  4186  4188
ENDBUG  003044          3875#
ENDIT   012040          4309   4394  4398  4405#
ERRFLG  002350          3609#
ERR1    006032 G        4177#  4578  4611  4648  6674
ERR10   007154 G        4186#
ERR11   007276 G        4187#  4860  4878
ERR12   007420 G        4188#  4541  4553
ERR13   007542 G        4189#  5850
ERR14   007664 G        4190#  5899
ERR15   010006 G        4192#  5996  6155  6977  7061
ERR16   010134 G        4193#  6214  6226  6236  6260  6271  6281
ERR17   010256 G        4197#  6364  6382  6411
```

```
ERR2    006160 G  4178#  4662
ERR29   010350 G  4198#  6524  6548  6747  6756  6765  6773  6783  6789  6795  6801
ERR3    006306 G  4179#
ERR35   010472 G  4199#  6391  6402
ERR36   010614 G  4201#  4507
ERR4    006434 G  4180#
ERR40   010636 G  4205#  6869
ERR41   010702 G  4209#  6890
ERR42   010744 G  4213#  6898
ERR43   011006 G  4218#  7012
ERR44   011054 G  4222#  4913
ERR45   011124 G  4226#  6068
ERR46   011214 G  4231#  7099  7116  7132  7148
ERR47   011264 G  4236#  6936
ERR5    006556 G  4182#  5004  5017  5030  5061  5073  5085  5117  5131  5145  5177  5190  5203
                  5236  5249  5262  5295  5308  5321  5358  5372  5385  5417  5430  5443  5475
                  5489  5502  5534  5548  5561  5592  5606  5619  5650  5664  5677  5711  5727
                  5741  5772  5786  5799
ERR6    006700 G  4184#  4706  4750  4794  4817  6581
ERR7    007026 G  4185#  4943  4958  4970  6564  6632
EVL     = 000004 G  3573#
E$END   = 002100    3434#
E$LOAD= 000035      3434#  3474
FADR    002412      3626#  4192  5957*  6028*  6116*  6187*
FLAG    002406      3624#  4184  4683*  4689  4690  4713*  4714  4728*  4733  4734  4757*  4758  4773*
                    4774  4777  4778  4796*  4797  4800*  4801  4804  4820*  4821  5950*  5962  6029*
                    6109*  6121  6188*
FM1     005046      4083#  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189  4190
                    4192  4193  4197  4198  4199
FTIME   002462      3646#  4293  4297*
F$AU    = 000015    3434#  4472  4473
F$AUTO= 000020      3434#  4409  4427
F$BGN   = 000040    3434#  3440  3482  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188
                    4189  4190  4192  4193  4197  4198  4199  4201  4205  4209  4213  4218  4222
                    4226  4231  4236  4252  4260  4287  4409  4437  4454  4472  4493  4500  4511
                    4513  4523  4543  4556  4563  4564  4570  4579  4588  4595  4596  4602  4612
                    4622  4630  4631  4636  4649  4651  4663  4670  4679  4707  4717  4724  4751
                    4761  4769  4795  4818  4824  4832  4833  4882  4915  4924  4925  4944  4972
                    4985  4987  4992  5005  5007  5018  5020  5031  5033  5046  5047  5052  5062
                    5064  5074  5076  5086  5088  5101  5102  5107  5119  5121  5133  5135  5146
                    5148  5161  5162  5167  5178  5180  5191  5193  5204  5206  5219  5220  5226
                    5237  5239  5250  5252  5263  5265  5278  5279  5285  5296  5298  5309  5311
                    5322  5324  5337  5338  5343  5360  5362  5373  5375  5386  5388  5401  5402
                    5407  5418  5420  5431  5433  5444  5446  5459  5460  5464  5476  5478  5490
                    5492  5503  5505  5518  5519  5523  5535  5537  5549  5551  5562  5564  5577
                    5578  5582  5593  5595  5607  5609  5620  5622  5635  5636  5640  5651  5653
                    5665  5667  5678  5680  5695  5696  5700  5712  5714  5729  5731  5742  5744
                    5757  5758  5762  5773  5775  5787  5789  5800  5802  5813  5814  5855  5860
                    5873  5874  5903  5910  5945  5947  6027  6071  6104  6106  6186  6193  6202
                    6203  6216  6228  6238  6248  6249  6262  6273  6283  6291  6337  6348  6395
                    6418  6429  6525  6565  6582  6586  6595  6605  6635  6644  6646  6677  6681
                    6687  6697  6700  6749  6759  6767  6775  6785  6790  6796  6803  6822  6833
                    6852  6872  6882  6891  6902  6912  6914  6939  6945  6958  6960  6981  6994
                    7015  7028  7030  7065  7077  7154  7170  7213
F$CLEA= 000007      3434#  4437  4440
F$DU    = 000016    3434#  4454  4457
```

```
F$END = 000041          3434#  3440  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189
                        4190   4192  4193  4197  4198  4199  4203  4208  4212  4216  4221  4225  4230
                        4234   4239  4260  4270  4406  4427  4440  4457  4473  4493  4500  4511  4513
                        4523   4543  4556  4563  4564  4579  4580  4588  4595  4596  4612  4613  4622
                        4630   4631  4649  4650  4663  4664  4670  4679  4707  4717  4724  4751  4761
                        4769   4795  4818  4824  4832  4833  4882  4915  4924  4925  4944  4972  4985
                        4987   5005  5006  5018  5019  5031  5032  5033  5046  5047  5062  5063  5074
                        5075   5086  5087  5088  5101  5102  5119  5120  5133  5134  5146  5147  5148
                        5161   5162  5178  5179  5191  5192  5204  5205  5206  5219  5220  5237  5238
                        5250   5251  5263  5264  5265  5278  5279  5296  5297  5309  5310  5322  5323
                        5324   5337  5338  5360  5361  5373  5374  5386  5387  5388  5401  5402  5418
                        5419   5431  5432  5444  5445  5446  5459  5460  5476  5477  5490  5491  5503
                        5504   5505  5518  5519  5535  5536  5549  5550  5562  5563  5564  5577  5578
                        5593   5594  5607  5608  5620  5621  5622  5635  5636  5651  5652  5665  5666
                        5678   5679  5680  5695  5696  5712  5713  5729  5730  5742  5743  5744  5757
                        5758   5773  5774  5787  5788  5800  5801  5802  5813  5814  5855  5860  5873
                        5874   5903  5910  5945  5947  6027  6071  6104  6106  6186  6193  6202  6203
                        6216   6228  6238  6248  6249  6262  6273  6283  6291  6337  6348  6395  6418
                        6429   6525  6565  6582  6586  6595  6605  6635  6644  6646  6677  6681  6687
                        6697   6700  6749  6759  6767  6775  6785  6790  6796  6803  6822  6833  6852
                        6872   6882  6891  6902  6912  6914  6939  6945  6958  6960  6981  6994  7015
                        7028   7030  7065  7077  7154  7181  7216

F$HARD= 000004          3434#  7170  7181
F$HW  = 000013          3434#  3519  3534
F$INIT= 000006          3434#  4287  4406
F$JMP = 000050          3434#  4260  4564  4596  4631  4833  4925  4987  5047  5102  5162  5220  5279
                        5338   5402  5460  5519  5578  5636  5696  5758  5814  5874  5947  6106  6203
                        6249   6395  6586  6646  6681  6700  6803  6852  6914  6960  7030
F$MOD = 000000          3434#  3440
F$MSG = 000011          3434#  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189  4190
                        4192   4193  4197  4198  4199  4201  4203  4205  4208  4209  4212  4213  4216
                        4218   4221  4222  4225  4226  4230  4231  4234  4236  4239
F$PROT= 000021          3434#  3482  3486
F$PWR = 000017          3434#
F$RPT = 000012          3434#  4252  4270
F$SEG = 000003          3434#  4570  4580  4602  4613  4636  4650  4651  4664  4992  5006  5007  5019
                        5020   5032  5052  5063  5064  5075  5076  5087  5107  5120  5121  5134  5135
                        5147   5167  5179  5180  5192  5193  5205  5226  5238  5239  5251  5252  5264
                        5285   5297  5298  5310  5311  5323  5343  5361  5362  5374  5375  5387  5407
                        5419   5420  5432  5433  5445  5464  5477  5478  5491  5492  5504  5523  5536
                        5537   5550  5551  5563  5582  5594  5595  5608  5609  5621  5640  5652  5653
                        5666   5667  5679  5700  5713  5714  5730  5731  5743  5762  5774  5775  5788
                        5789   5801
F$SOFT= 000005          3434#  7213  7216
F$SRV = 000010          3434#
F$SUB = 000002          3434#
F$SW  = 000014          3434#  3543  3546
F$TEST= 000001          3434#  4493  4513  4523  4556  4563  4588  4595  4622  4630  4670  4679  4717
                        4724   4761  4769  4824  4832  4915  4924  4972  4985  5033  5046  5088  5101
                        5148   5161  5206  5219  5265  5278  5324  5337  5388  5401  5446  5459  5505
                        5518   5564  5577  5622  5635  5680  5695  5744  5757  5802  5813  5860  5873
                        5910   5945  6071  6104  6193  6202  6238  6248  6283  6291  6337  6348  6418
                        6429   6595  6605  6635  6644  6687  6697  6822  6833  6872  6882  6902  6912
                        6945   6958  6981  6994  7015  7028  7065  7077  7154

GETPRM  011462          4312   4321#  4326
G$CNTO= 000200          3434#
```

```
G$DELM= 000372           3434#
G$DISP= 000003           3434#
G$EXCP= 000400           3434#
G$HILI= 000002           3434#
G$LOLI= 000001           3434#
G$NO  = 000000           3434#
G$OFFS= 000400           3434#  7172  7173  7180
G$OFSI= 000376           3434#  7172  7173  7180
G$PRMA= 000001           3434#  7173
G$PRMD= 000002           3434#  7172  7180
G$PRML= 000000           3434#
G$RADA= 000140           3434#
G$RADB= 000000           3434#
G$RADD= 000040           3434#
G$RADL= 000120           3434#
G$RADO= 000020           3434#  7172  7173  7180
G$XFER= 000004           3434#
G$YES = 000010           3434#  7172  7173  7180
HELP  = 000000           3421#  3466  3477  3498  3730  4254  4262
HOE   = 100000 G         3573#
IBE   = 010000 G         3573#
IDU   = 000040 G         3573#
IER   = 020000 G         3573#
INIFLG  002474           3655#
INSTU   003616           4025  4035#
ISR   = 000100 G         3573#
ISRUN   030050           7180  7191#
IXE   = 004000 G         3573#
I$AU  = 000041           3434#  4472#  4473#
I$AUTO= 000041           3434#  4409#  4427#
I$CLN = 000041           3434#  4437#  4440#
I$DU  = 000041           3434#  4454#  4457#
I$HRD = 000041           7170#  7181#
I$INIT= 000041           3434#  4287#  4406#
I$MOD = 000040           3434#  3440#
I$MSG = 000041           3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#
                         4192#  4193#  4197#  4198#  4199#  4201#  4203#  4205#  4208#  4209#  4212#  4213#  4216#
                         4218#  4221#  4222#  4225#  4226#  4230#  4231#  4234#  4236#  4239#
I$PROT= 000040           3434#  3482#
I$PTAB= 000041           3434#
I$PWR = 000041           3434#
I$RPT = 000041           3434#  4252#  4270#
I$SEG = 000041           3434#  4493   4523   4563   4570#  4579   4580#  4595   4602#  4612   4613#  4630   4636#
                         4649   4650#  4651#  4663   4664#  4679   4724   4769   4832   4924   4985   4992#  5005
                         5006#  5007#  5018   5019#  5020#  5031   5032#  5046   5052#  5062   5063#  5064#  5074
                         5075#  5076#  5086   5087#  5101   5107#  5119   5120#  5121#  5133   5134#  5135#  5146
                         5147#  5161   5167#  5178   5179#  5180#  5191   5192#  5193#  5204   5205#  5219   5226#
                         5237   5238#  5239#  5250   5251#  5252#  5263   5264#  5278   5285#  5296   5297#  5298#
                         5309   5310#  5311#  5322   5323#  5337   5343#  5360   5361#  5362#  5373   5374#  5375#
                         5386   5387#  5401   5407#  5418   5419#  5420#  5431   5432#  5433#  5444   5445#  5459
                         5464#  5476   5477#  5478#  5490   5491#  5492#  5503   5504#  5518   5523#  5535   5536#
                         5537#  5549   5550#  5551#  5562   5563#  5577   5582#  5593   5594#  5595#  5607   5608#
                         5609#  5620   5621#  5635   5640#  5651   5652#  5653#  5665   5666#  5667#  5678   5679#
                         5695   5700#  5712   5713#  5714#  5729   5730#  5731#  5742   5743#  5757   5762#  5773
                         5774#  5775#  5787   5788#  5789#  5800   5801#  5813   5873   5945   6104   6202   6248
                         6291   6348   6429   6605   6644   6697   6833   6882   6912   6958   6994   7028   7077
```

```
I$SETU= 000041           3434#
I$SFT = 000041           7213#  7216#
I$SRV = 000041           3434#
I$SUB = 000041           3434#  4493   4523   4563   4595   4630   4679   4724   4769   4832   4924   4985   5046
                         5101   5161   5219   5278   5337   5401   5459   5518   5577   5635   5695   5757   5813
                         5873   5945   6104   6202   6248   6291   6348   6429   6605   6644   6697   6833   6882
                         6912   6958   6994   7028   7077
I$TST = 000041           3434#  4493#  4500   4511   4513#  4523#  4543   4556#  4563#  4564   4588#  4595#  4596
                         4622#  4630#  4631   4670#  4679#  4707   4717#  4724#  4751   4761#  4769#  4795   4818
                         4824#  4832#  4833   4882   4915#  4924#  4925   4944   4972#  4985#  4987   5033#  5046#
                         5047   5088#  5101#  5102   5148#  5161#  5162   5206#  5219#  5220   5265#  5278#  5279
                         5324#  5337#  5338   5388#  5401#  5402   5446#  5459#  5460   5505#  5518#  5519   5564#
                         5577#  5578   5622#  5635#  5636   5680#  5695#  5696   5744#  5757#  5758   5802#  5813#
                         5814   5855   5860#  5873#  5874   5903   5910#  5945#  5947   6027   6071#  6104#  6106
                         6186   6193#  6202#  6203   6216   6228   6238#  6248#  6249   6262   6273   6283#  6291#
                         6337#  6348#  6395   6418#  6429#  6525   6565   6582   6586   6595#  6605#  6635#  6644#
                         6646   6677   6681   6687#  6697#  6700   6749   6759   6767   6775   6785   6790   6796
                         6803   6822#  6833#  6852   6872#  6882#  6891   6902#  6912#  6914   6939   6945#  6958#
                         6960   6981#  6994#  7015#  7028#  7030   7065#  7077#  7154#
J$JMP = 000167           3434#  4260
KMACTV  002376           3620#
KMCSR   002516           3691#  4329*  4411   4494   4526   4565   4597   4632   4680   4725   4770   4834   4926
                         4989   5048   5103   5163   5221   5280   5339   5403   5461   5520   5579   5637   5697
                         5759   5815   5875   5946   6105   6205   6251   6292   6350   6378   6430   6606   6648
                         6702   6834   6883   6916   6962   6995   7032   7078
KMCSRH  002520           3692#  3867*  3868*  3880*  3882*  3883*  3890*  3894*  3896*  3897*  3900*  4331*  4332*
KMCTL   002522           3693#  4334*  4335*
KMNUM   002400           3621#
KMPO4   002524           3694#  4337*  4338*
KMPO6   002526           3695#  3881*  3891*  4340*  4341*
KMRLVL  002510           3688#  4345*  4346*
KMRVEC  002506           3687#  4343*
KMTLVL  002514           3690#  4351*  4352*
KMTVEC  002512           3689#  4348*  4349*
LNUNIT  027574           7187#
LOADER  026006           6704   6810#
LOCK    002340           3601#  4799*
LOE   = 040000 G         3573#
LOGDEV  002342           3606#  4316*  4322*  4323   4325   4423
LOKFLG  002476           3657#
LOOPBK  027771           7190#
LOT   = 000010 G         3573#
L$ACP   002110 G         3474#
L$APT   002036 G         3474#
L$AU    012144 G         3474   4472#
L$AUT   002070 G         3474#
L$AUTO  012042 G         3474   4409#
L$CCP   002106 G         3474#
L$CLEA  012134 G         3474   4437#
L$CO    002032 G         3474#
L$DEPO  002011 G         3474#
L$DESC  002312 G         3474   3595#
L$DESP  002076 G         3474#
L$DEVP  002060 G         3474#
L$DISP  002132 G         3474   3496#
L$DLY   002116 G         3474#
```

```
L$DTP   002040 G        3474#
L$DTVP  002034 G        3474#
L$DU    012140 G        3474    4454#
L$DUT   002072 G        3474#
L$DVTV  002730 G        3474    3723#
L$EF    002052 G        3474#
L$ENVI  002044 G        3474#
L$ETP   002102 G        3474#
L$EXP1  002046 G        3474#
L$EXP4  002064 G        3474#
L$EXP5  002066 G        3474#
L$HARD  027344 G        3474    7170#
L$HIME  002120 G        3474#
L$HPCP  002016 G        3474#
L$HPTP  002022 G        3474#
L$HW    002262 G        3474    3519#
L$ICP   002104 G        3474#
L$INIT  011340 G        3474    4287#
L$LADP  002026 G        3474#
L$LAST  030144 G        3474    7225#
L$LOAD  002100 G        3474#
L$LUN   002074 G        3474#
L$MREV  002050 G        3474#
L$NAME  002000 G        3474#
L$PRIO  002042 G        3474#
L$PROT  002122 G        3474    3482#
L$PRT   002112 G        3474#
L$REPP  002062 G        3474#
L$REV   002010 G        3474#
L$RPT   011332 G        4252#
L$SOFT  030140 G        7213#
L$SPC   002056 G        3474#
L$SPCP  002020 G        3474#
L$SPTP  002024 G        3474#
L$STA   002030 G        3474#
L$SW    002312 G        3543#
L$TEST  002114 G        3474#
L$TIML  002014 G        3474#
L$UNIT  002012 G        3474#   4323
L10001  002310          3519    3534#
L10002  002312          3543    3546#
L10003  006156          4177#
L10004  006304          4178#
L10005  006432          4179#
L10006  006554          4180#
L10007  006676          4182#
L10010  007024          4184#
L10011  007152          4185#
L10012  007274          4186#
L10013  007416          4187#
L10014  007540          4188#
L10015  007662          4189#
L10016  010004          4190#
L10017  010132          4192#
L10020  010254          4193#
L10021  010346          4197#
```

```
L10022  010470          4198#
L10023  010612          4199#
L10024  010634          4203#
L10025  010700          4208#
L10026  010742          4212#
L10027  011004          4216#
L10030  011052          4221#
L10031  011122          4225#
L10032  011212          4230#
L10033  011262          4234#
L10034  011330          4239#
L10035  011336          4260    4270#
L10036  012040          4406#
L10037  012132          4427#
L10040  012136          4440#
L10041  012142          4457#
L10042  012144          4473#
L10043  012254          4500    4511    4513#
L10044  012420          4543    4556#
L10045  012550          4564    4588#
L10046  012710          4596    4622#
L10047  013152          4631    4670#
L10050  013354          4707    4717#
L10051  013566          4751    4761#
L10052  014110          4795    4818    4824#
L10053  014466          4833    4882    4915#
L10054  014734          4925    4944    4972#
L10055  015200          4987    5033#
L10056  015430          5047    5088#
L10057  015674          5102    5148#
L10060  016140          5162    5206#
L10061  016404          5220    5265#
L10062  016650          5279    5324#
L10063  017114          5338    5388#
L10064  017360          5402    5446#
L10065  017640          5460    5505#
L10066  020120          5519    5564#
L10067  020374          5578    5622#
L10070  020650          5636    5680#
L10071  021126          5696    5744#
L10072  021402          5758    5802#
L10073  021574          5814    5855    5860#
L10074  021742          5874    5903    5910#
L10075  022320          5947    6027    6071#
L10076  022556          6106    6186    6193#
L10077  022772          6203    6216    6228    6238#
L10100  023206          6249    6262    6273    6283#
L10101  023450          6337#
L10102  024042          6395    6418#
L10103  025114          6525    6565    6582    6586    6595#
L10104  025214          6635#
L10105  025362          6646    6677    6681    6687#
L10106  026040          6700    6749    6759    6767    6775    6785    6790    6796    6803    6822#
L10107  026200          6852    6872#
L10110  026306          6891    6902#
L10111  026444          6914    6939    6945#
```

```
L10112  026542            6960    6981#
L10113  026642            7015#
L10114  026766            7030    7065#
L10115  027340            7154#
L10116  027400            7170    7181#
L10117  030140            7213    7216#
MASKX   002362            3614#
MEMLIM  002374            3619#
MEMSET  003474            4005#   4993    5051    5106    5166    5224    5283    5341    5406    5463    5522    5581    5639
                          5699    5761
MEMSZ   002436            3636#   4000    4020    4391*   4399*   4585    4619    4653    4667    4714    4758    4797    4821
                          4833    4838    4872    5814    5874    5947    6106    6203    6249    6658    6678
MR0     002434            3635#   4050    4567*   4572    4584*   4585    4599*   4605    4618*   4619    4635*   4637    4639
                          4640    4646    4652*   4653    4655*   4656    4658    4660    4666*   4667    4684*   4695    4702
                          4710*   4729*   4730*   4739    4746    4752*   4754*   6521*
NEWST   011454            4303    4306    4314#   4324
NEXT    002336            3600#
ONE     002372            3618#
O$APTS= 000000            3434#   3474
O$AU  = 000001            3434#   3464#   3474
O$BGNR= 000000            3434#   3474
O$BGNS= 000000            3434#   3474
O$DU  = 000001            3434#   3464#   3474
O$ERRT= 000000            3434#   3474
O$GNSW= 000000            3434#   3474
O$POIN= 000001            3434#   3464#   3474
O$SETU= 000000            3434#   3474    7225
PATCH   002774            3871#
PNT   = 001000 G          3573#
PRI   = 002000 G          3573#
PRIRTY  027540            7186#
PRI00 = 000000 G          3573#
PRI01 = 000040 G          3573#
PRI02 = 000100 G          3573#
PRI03 = 000140 G          3573#
PRI04 = 000200 G          3573#
PRI05 = 000240 G          3573#
PRI06 = 000300 G          3573#
PRI07 = 000340 G          3573#   7080
PSTACK  002344            3607#   4292*   6384
QV.FLG  002477            3658#
RAMDAT  003330            3964#   5000    5013    5026    5057    5069    5081    5113    5127    5141    5173    5186    5199
                          5232    5245    5258    5291    5304    5317    5351    5368    5381    5413    5426    5439    5471
                          5485    5498    5530    5544    5557    5588    5602    5615    5646    5660    5673    5706    5721
                          5737    5768    5782    5795
REGADR  002530            3699#
RETADR  002352            3610#
ROMMAP  012146            3994    4486#   6650    6664
RUN     002410            3625#
RUNB    002470            3649#   4403*   4892    6038    6387    7034    7139
RUNINH  002472            3650#   4354*   4403    4894    6040
SAVACT  002402            3622#
SAVE4   002464            3647#   4295*   4298    4425    4509    6850
SAVE6   002466            3648#   4296*   4299    4426    4510    6851
SAVNUM  002404            3623#
SAVPC   002366            3616#
```

```
SAVSP   002364            3615#
SETBR0  003220            3915#   5227    5240    5253
SETBR1  003230            3921#   5286    5299    5312
SETBR4  003240            3928#   5345    5363    5376
SETBR7  003250            3935#   5408    5421    5434
SETC    003260            3942#   5108    5122    5136    5465    6263
SETZ    003312            3955#   5168    5181    5194    5524    6217
SFPTBL  002312 G          3543#
SSTACK  002730            3703#   4290
STAT    002356            3612#
STAT1   002500            3680#   4355*   4357*   4361*   4372*   4376*   4379*
STAT2   002502            3681#   4382*   4384*
STAT3   002504            3682#
STM     005627            4108#   4177    4178    4179    4180    4182    4184    4185    4186    4187    4188    4189    4190
                          4192    4193    4197    4198    4199    4202    4207    4211    4215    4220    4224    4229    4233
                          4238
STRTSW  002354            3611#
SUBRPC  002346            3608#
SVCGBL= 000000            3434#   3440    3448#   3474    3482    3496    3519    3543    3595    3723    4177    4178    4179
                          4180    4182    4184    4185    4186    4187    4188    4189    4190    4192    4193    4197    4198
                          4199    4201    4205    4209    4213    4218    4222    4226    4231    4236    4252    4287    4409
                          4437    4454    4472    7170    7213    7225#
SVCINS= 000000            3434#   3445#   3474    3496    3519    3543    3595    3723    4177    4178    4179    4180    4182
                          4184    4185    4186    4187    4188    4189    4190    4192    4193    4197    4198    4199    4202
                          4203    4206    4207    4208    4210    4211    4212    4214    4215    4216    4219    4220    4221
                          4223    4224    4225    4227    4228    4229    4230    4232    4233    4234    4237    4238    4239
                          4260    4270    4302    4303    4305    4306    4308    4309    4311    4312    4325    4326    4406
                          4423    4427    4438    4440    4456    4457    4473    4500    4507    4511    4513    4541    4543
                          4553    4556    4564    4570    4578    4579    4580    4588    4596    4602    4611    4612    4613
                          4622    4631    4636    4648    4649    4650    4651    4662    4663    4664    4670    4706    4707
                          4712    4717    4750    4751    4756    4761    4794    4795    4817    4818    4819    4824    4833
                          4860    4878    4882    4883    4913    4915    4925    4943    4944    4958    4970    4972    4987
                          4992    5004    5005    5006    5007    5017    5018    5019    5020    5030    5031    5032    5033
                          5047    5052    5061    5062    5063    5064    5073    5074    5075    5076    5085    5086    5087
                          5088    5102    5107    5117    5119    5120    5121    5131    5133    5134    5135    5145    5146
                          5147    5148    5162    5167    5177    5178    5179    5180    5190    5191    5192    5193    5203
                          5204    5205    5206    5220    5226    5236    5237    5238    5239    5249    5250    5251    5252
                          5262    5263    5264    5265    5279    5285    5295    5296    5297    5298    5308    5309    5310
                          5311    5321    5322    5323    5324    5338    5343    5358    5360    5361    5362    5372    5373
                          5374    5375    5385    5386    5387    5388    5402    5407    5417    5418    5419    5420    5430
                          5431    5432    5433    5443    5444    5445    5446    5460    5464    5475    5476    5477    5478
                          5489    5490    5491    5492    5502    5503    5504    5505    5519    5523    5534    5535    5536
                          5537    5548    5549    5550    5551    5561    5562    5563    5564    5578    5582    5592    5593
                          5594    5595    5606    5607    5608    5609    5619    5620    5621    5622    5636    5640    5650
                          5651    5652    5653    5664    5665    5666    5667    5677    5678    5679    5680    5696    5700
                          5711    5712    5713    5714    5727    5729    5730    5731    5741    5742    5743    5744    5758
                          5762    5772    5773    5774    5775    5786    5787    5788    5789    5799    5800    5801    5802
                          5814    5850    5855    5860    5874    5899    5903    5910    5947    5996    6027    6068    6071
                          6106    6155    6186    6193    6203    6214    6216    6226    6228    6236    6238    6249    6260
                          6262    6271    6273    6281    6283    6308    6320    6332    6337    6349    6364    6382    6391
                          6395    6402    6411    6418    6524    6525    6548    6564    6565    6581    6582    6586    6595
                          6632    6635    6646    6674    6677    6681    6687    6700    6747    6749    6756    6759    6765
                          6767    6773    6775    6783    6785    6789    6790    6795    6796    6801    6803    6822    6852
                          6869    6872    6890    6891    6898    6902    6914    6936    6939    6945    6960    6977    6981
                          7012    7015    7030    7061    7065    7080    7098    7099    7101    7116    7118    7132    7135
                          7137    7148    7154    7170    7172    7173    7180    7181    7213    7216    7225
```

```
SVCSUB= 000000  3434# 3447#
SVCTAG= 000000  3434# 3449# 3534 3546 4177 4178 4179 4180 4182 4184 4185 4186 4187
                4188 4189 4190 4192 4193 4197 4198 4199 4203 4208 4212 4216 4221
                4225 4230 4234 4239 4270 4406 4427 4440 4457 4473 4513 4556 4580
                4588 4613 4622 4650 4664 4670 4717 4761 4824 4915 4972 5006 5019
                5032 5033 5063 5075 5087 5088 5120 5134 5147 5148 5179 5192 5205
                5206 5238 5251 5264 5265 5297 5310 5323 5324 5361 5374 5387 5388
                5419 5432 5445 5446 5477 5491 5504 5505 5536 5550 5563 5564 5594
                5608 5621 5622 5652 5666 5679 5680 5713 5730 5743 5744 5774 5788
                5801 5802 5860 5910 6071 6193 6238 6283 6337 6418 6595 6635 6687
                6822 6872 6902 6945 6981 7015 7065 7154 7181 7216
SVCTST= 000000  3434# 3446# 4493 4523 4563 4595 4630 4679 4724 4769 4832 4924 4985
                5046 5101 5161 5219 5278 5337 5401 5459 5518 5577 5635 5695 5757
                5813 5873 5945 6104 6202 6248 6291 6348 6429 6605 6644 6697 6833
                6882 6912 6958 6994 7028 7077
SV05    003632  4045# 4507 4541 4553 4578 4611 4648 4662 4706 4750 4794 4817 4860
                4878 4913 4943 4958 4970 5004 5017 5030 5061 5073 5085 5117 5131
                5145 5177 5190 5203 5236 5249 5262 5295 5308 5321 5358 5372 5385
                5417 5430 5443 5475 5489 5502 5534 5548 5561 5592 5606 5619 5650
                5664 5677 5711 5727 5741 5772 5786 5799 5850 5899 5996 6068 6155
                6214 6226 6236 6260 6271 6281 6364 6382 6391 6402 6411 6524 6548
                6564 6581 6632 6674 6747 6756 6765 6773 6783 6789 6795 6801 6869
                6890 6898 6936 6977 7012 7061 7099 7116 7132 7148
SWPAC1  027665  7188#
SWPAC2  027726  7189#
S$LSYM= 010000  3434# 3534# 3546# 4177# 4178# 4179# 4180# 4182# 4184# 4185# 4186# 4187# 4188#
                4189# 4190# 4192# 4193# 4197# 4198# 4199# 4203# 4208# 4212# 4216# 4221# 4225#
                4230# 4234# 4239# 4270# 4406# 4427# 4440# 4457# 4473# 4513# 4556# 4570# 4588#
                4602# 4622# 4636# 4651# 4670# 4717# 4761# 4824# 4915# 4972# 4992# 5007# 5020#
                5033# 5052# 5064# 5076# 5088# 5107# 5121# 5135# 5148# 5167# 5180# 5193# 5206#
                5226# 5239# 5252# 5265# 5285# 5298# 5311# 5324# 5343# 5362# 5375# 5388# 5407#
                5420# 5433# 5446# 5464# 5478# 5492# 5505# 5523# 5537# 5551# 5564# 5582# 5595#
                5609# 5622# 5640# 5653# 5667# 5680# 5700# 5714# 5731# 5744# 5762# 5775# 5789#
                5802# 5860# 5910# 6071# 6193# 6238# 6283# 6337# 6418# 6595# 6635# 6687# 6822#
                6872# 6902# 6945# 6981# 7015# 7065# 7154# 7181# 7216#
TEMP    002440  3637# 6294* 6314* 6329* 6353* 6361*
TFM1    003666  4066# 4177 4178 4179
TFM2    003712  4067# 4180 4182 4186 4189 4198 4199
TFM3    003730  4068# 4184 4185
TFM36   004017  4071#
TFM4    003755  4069# 4187 4188 4190 4193
TFM40   004263  4074# 4206
TFM41   004105  4072# 4210
TFM42   004174  4073# 4214
TFM43   004344  4075# 4219
TFM44   004427  4076# 4223
TFM45   004466  4077# 4227
TFM45A  004524  4078# 4228
TFM46   004647  4080# 4232
TFM47   004733  4081# 4237
TFM5    003773  4070# 4192
TMMC    005010  4082# 4223 4227
TYPE    002432  3634# 4392* 4397* 4402* 4564 4596 4631 4925 6504
T$ARGC= 000001  3474# 4177# 4178# 4179# 4180# 4182# 4184# 4185# 4186# 4187# 4188# 4189# 4190#
                4192# 4193# 4197# 4198# 4199# 4202# 4206# 4207# 4210# 4211# 4214# 4215# 4219#
                4220# 4223# 4224# 4227# 4228# 4229# 4232# 4233# 4237# 4238#
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
T$CODE= 012032      7172#  7173#  7180#
T$ERRN= 000056      3434#  4507#  4541#  4553#  4578#  4611#  4648#  4662#  4706#  4750#  4794#  4817#  4860#
                    4878#  4913#  4943#  4958#  4970#  5004#  5017#  5030#  5061#  5073#  5085#  5117#  5131#
                    5145#  5177#  5190#  5203#  5236#  5249#  5262#  5295#  5308#  5321#  5358#  5372#  5385#
                    5417#  5430#  5443#  5475#  5489#  5502#  5534#  5548#  5561#  5592#  5606#  5619#  5650#
                    5664#  5677#  5711#  5727#  5741#  5772#  5786#  5799#  5850#  5899#  5996#  6068#  6155#
                    6214#  6226#  6236#  6260#  6271#  6281#  6308#  6320#  6332#  6364#  6382#  6391#  6402#
                    6411#  6524#  6548#  6564#  6581#  6632#  6674#  6747#  6756#  6765#  6773#  6783#  6789#
                    6795#  6801#  6869#  6890#  6898#  6936#  6977#  7012#  7061#  7099#  7116#  7132#  7148#
T$EXCP= 000000      7172#  7173#  7180#
T$FLAG= 000040      4260#  4500#  4511#  4543#  4564#  4579#  4596#  4612#  4631#  4649#  4663#  4707#  4751#
                    4795#  4818#  4833#  4882#  4925#  4944#  4987#  5005#  5018#  5031#  5047#  5062#  5074#
                    5086#  5102#  5119#  5133#  5146#  5162#  5178#  5191#  5204#  5220#  5237#  5250#  5263#
                    5279#  5296#  5309#  5322#  5338#  5360#  5373#  5386#  5402#  5418#  5431#  5444#  5460#
                    5476#  5490#  5503#  5519#  5535#  5549#  5562#  5578#  5593#  5607#  5620#  5636#  5651#
                    5665#  5678#  5696#  5712#  5729#  5742#  5758#  5773#  5787#  5800#  5814#  5855#  5874#
                    5903#  5947#  6027#  6106#  6186#  6203#  6216#  6228#  6249#  6262#  6273#  6395#  6525#
                    6565#  6582#  6586#  6646#  6677#  6681#  6700#  6749#  6759#  6767#  6775#  6785#  6790#
                    6796#  6803#  6852#  6891#  6914#  6939#  6960#  7030#
T$GMAN= 000000      3434#
T$HILI= 000001      7172#  7173#  7180#
T$LAST= 000001      3434#  7225#
T$LOLI= 000000      7172#  7173#  7180#
T$LSYM= 010000      3434#  3534   3546   4177   4178   4179   4180   4182   4184   4185   4186   4187   4188
                    4189   4190   4192   4193   4197   4198   4199   4203   4208   4212   4216   4221   4225
                    4230   4234   4239   4270   4406   4427   4440   4457   4473   4513   4556   4588   4622
                    4670   4717   4761   4824   4915   4972   5033   5088   5148   5206   5265   5324   5388
                    5446   5505   5564   5622   5680   5744   5802   5860   5910   6071   6193   6238   6283
                    6337   6418   6595   6635   6687   6822   6872   6902   6945   6981   7015   7065   7154
                    7181   7216
T$LTNO= 000053      7225#
T$NEST= 000000      3434#  3440#  3482#  3486#  3519#  3534#  3543#  3546#  4177#  4178#  4179#  4180#  4182#
                    4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#
                    4203#  4205#  4208#  4209#  4212#  4213#  4216#  4218#  4221#  4222#  4225#  4226#  4230#
                    4231#  4234#  4236#  4239#  4252#  4270#  4287#  4406#  4409#  4427#  4437#  4440#  4454#
                    4457#  4472#  4473#  4493#  4513#  4523#  4556#  4563#  4570#  4580#  4588#  4595#  4602#
                    4613#  4622#  4630#  4636#  4650#  4651#  4664#  4670#  4679#  4717#  4724#  4761#  4769#
                    4824#  4832#  4915#  4924#  4972#  4985#  4992#  5006#  5007#  5019#  5020#  5032#  5033#
                    5046#  5052#  5063#  5064#  5075#  5076#  5087#  5088#  5101#  5107#  5120#  5121#  5134#
                    5135#  5147#  5148#  5161#  5167#  5179#  5180#  5192#  5193#  5205#  5206#  5219#  5226#
                    5238#  5239#  5251#  5252#  5264#  5265#  5278#  5285#  5297#  5298#  5310#  5311#  5323#
                    5324#  5337#  5343#  5361#  5362#  5374#  5375#  5387#  5388#  5401#  5407#  5419#  5420#
                    5432#  5433#  5445#  5446#  5459#  5464#  5477#  5478#  5491#  5492#  5504#  5505#  5518#
                    5523#  5536#  5537#  5550#  5551#  5563#  5564#  5577#  5582#  5594#  5595#  5608#  5609#
                    5621#  5622#  5635#  5640#  5652#  5653#  5666#  5667#  5679#  5680#  5695#  5700#  5713#
                    5714#  5730#  5731#  5743#  5744#  5757#  5762#  5774#  5775#  5788#  5789#  5801#  5802#
                    5813#  5860#  5873#  5910#  5945#  6071#  6104#  6193#  6202#  6238#  6248#  6283#  6291#
                    6337#  6348#  6418#  6429#  6595#  6605#  6635#  6644#  6687#  6697#  6822#  6833#  6872#
                    6882#  6902#  6912#  6945#  6958#  6981#  6994#  7015#  7028#  7065#  7077#  7154#  7170#
                    7181#  7213#  7216#
T$NS0 = 000000      3440#
T$NS1 = 000005      3482#  3486   3519#  3534   3543#  3546   4177#  4178#  4179#  4180#  4182#  4184#  4185#
                    4186#  4187#  4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#  4203   4205#
                    4208   4209#  4212   4213#  4216   4218#  4221   4222#  4225   4226#  4230   4231#  4234
                    4236#  4239   4252#  4270   4287#  4406   4409#  4427   4437#  4440   4454#  4457   4472#
                    4473   4493#  4513   4523#  4556   4563#  4588   4595#  4622   4630#  4670   4679#  4717
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
                    4724#   4761    4769#   4824    4832#   4915    4924#   4972    4985#   5033    5046#   5088    5101#
                    5148    5161#   5206    5219#   5265    5278#   5324    5337#   5388    5401#   5446    5459#   5505
                    5518#   5564    5577#   5622    5635#   5680    5695#   5744    5757#   5802    5813#   5860    5873#
                    5910    5945#   6071    6104#   6193    6202#   6238    6248#   6283    6291#   6337    6348#   6418
                    6429#   6595    6605#   6635    6644#   6687    6697#   6822    6833#   6872    6882#   6902    6912#
                    6945    6958#   6981    6994#   7015    7028#   7065    7077#   7154    7170#   7181    7213#   7216
T$NS2 = 000003      4570#   4580    4602#   4613    4636#   4650    4651#   4664    4992#   5006    5007#   5019    5020#
                    5032    5052#   5063    5064#   5075    5076#   5087    5107#   5120    5121#   5134    5135#   5147
                    5167#   5179    5180#   5192    5193#   5205    5226#   5238    5239#   5251    5252#   5264    5285#
                    5297    5298#   5310    5311#   5323    5343#   5361    5362#   5374    5375#   5387    5407#   5419
                    5420#   5432    5433#   5445    5464#   5477    5478#   5491    5492#   5504    5523#   5536    5537#
                    5550    5551#   5563    5582#   5594    5595#   5608    5609#   5621    5640#   5652    5653#   5666
                    5667#   5679    5700#   5713    5714#   5730    5731#   5743    5762#   5774    5775#   5788    5789#
                    5801
T$PTNU= 000000      3434#
T$SAVL= 177777      3434#
T$SEGL= 177777      3434#   4570#   4579    4580#   4602#   4612    4613#   4636#   4649    4650#   4651#   4663    4664#
                    4992#   5005    5006#   5007#   5018    5019#   5020#   5031    5032#   5052#   5062    5063#   5064#
                    5074    5075#   5076#   5086    5087#   5107#   5119    5120#   5121#   5133    5134#   5135#   5146
                    5147#   5167#   5178    5179#   5180#   5191    5192#   5193#   5204    5205#   5226#   5237    5238#
                    5239#   5250    5251#   5252#   5263    5264#   5285#   5296    5297#   5298#   5309    5310#   5311#
                    5322    5323#   5343#   5360    5361#   5362#   5373    5374#   5375#   5386    5387#   5407#   5418
                    5419#   5420#   5431    5432#   5433#   5444    5445#   5464#   5476    5477#   5478#   5490    5491#
                    5492#   5503    5504#   5523#   5535    5536#   5537#   5549    5550#   5551#   5562    5563#   5582#
                    5593    5594#   5595#   5607    5608#   5609#   5620    5621#   5640#   5651    5652#   5653#   5665
                    5666#   5667#   5678    5679#   5700#   5712    5713#   5714#   5729    5730#   5731#   5742    5743#
                    5762#   5773    5774#   5775#   5787    5788#   5789#   5800    5801#
T$SEK0= 010002      4570#   4579    4580    4602#   4612    4613    4636#   4649    4650    4651#   4663    4664    4992#
                    5005    5006    5007#   5018    5019    5020#   5031    5032    5052#   5062    5063    5064#   5074
                    5075    5076#   5086    5087    5107#   5119    5120    5121#   5133    5134    5135#   5146    5147
                    5167#   5178    5179    5180#   5191    5192    5193#   5204    5205    5226#   5237    5238    5239#
                    5250    5251    5252#   5263    5264    5285#   5296    5297    5298#   5309    5310    5311#   5322
                    5323    5343#   5360    5361    5362#   5373    5374    5375#   5386    5387    5407#   5418    5419
                    5420#   5431    5432    5433#   5444    5445    5464#   5476    5477    5478#   5490    5491    5492#
                    5503    5504    5523#   5535    5536    5537#   5549    5550    5551#   5562    5563    5582#   5593
                    5594    5595#   5607    5608    5609#   5620    5621    5640#   5651    5652    5653#   5665    5666
                    5667#   5678    5679    5700#   5712    5713    5714#   5729    5730    5731#   5742    5743    5762#
                    5773    5774    5775#   5787    5788    5789#   5800    5801
T$SUBN= 000000      3434#   4493#   4523#   4563#   4595#   4630#   4679#   4724#   4769#   4832#   4924#   4985#   5046#
                    5101#   5161#   5219#   5278#   5337#   5401#   5459#   5518#   5577#   5635#   5695#   5757#   5813#
                    5873#   5945#   6104#   6202#   6248#   6291#   6348#   6429#   6605#   6644#   6697#   6833#   6882#
                    6912#   6958#   6994#   7028#   7077#
T$TAGL= 177777      3434#
T$TAGN= 010120      3434#   3482#   3519#   3543#   4177#   4178#   4179#   4180#   4182#   4184#   4185#   4186#   4187#
                    4188#   4189#   4190#   4192#   4193#   4197#   4198#   4199#   4201#   4205#   4209#   4213#   4218#
                    4222#   4226#   4231#   4236#   4252#   4287#   4409#   4437#   4454#   4472#   4493#   4523#   4563#
                    4595#   4630#   4679#   4724#   4769#   4832#   4924#   4985#   5046#   5101#   5161#   5219#   5278#
                    5337#   5401#   5459#   5518#   5577#   5635#   5695#   5757#   5813#   5873#   5945#   6104#   6202#
                    6248#   6291#   6348#   6429#   6605#   6644#   6697#   6833#   6882#   6912#   6958#   6994#   7028#
                    7077#   7170#   7213#
T$TEMP= 000005      3486#   3496#   3534#   3546#   4177#   4178#   4179#   4180#   4182#   4184#   4185#   4186#   4187#
                    4188#   4189#   4190#   4192#   4193#   4197#   4198#   4199#   4203#   4208#   4212#   4216#   4221#
                    4225#   4230#   4234#   4239#   4260#   4270#   4406#   4427#   4440#   4457#   4473#   4500#   4511#
                    4513#   4543#   4556#   4564#   4579#   4580#   4588#   4596#   4612#   4613#   4622#   4631#   4649#
                    4650#   4663#   4664#   4670#   4707#   4717#   4751#   4761#   4795#   4818#   4824#   4833#   4882#
                    4915#   4925#   4944#   4972#   4987#   5005#   5006#   5018#   5019#   5031#   5032#   5033#   5047#
```

```
                5062#  5063#  5074#  5075#  5086#  5087#  5088#  5102#  5119#  5120#  5133#  5134#  5146#
                5147#  5148#  5162#  5178#  5179#  5191#  5192#  5204#  5205#  5206#  5220#  5237#  5238#
                5250#  5251#  5263#  5264#  5265#  5279#  5296#  5297#  5309#  5310#  5322#  5323#  5324#
                5338#  5360#  5361#  5373#  5374#  5386#  5387#  5388#  5402#  5418#  5419#  5431#  5432#
                5444#  5445#  5446#  5460#  5476#  5477#  5490#  5491#  5503#  5504#  5505#  5519#  5535#
                5536#  5549#  5550#  5562#  5563#  5564#  5578#  5593#  5594#  5607#  5608#  5620#  5621#
                5622#  5636#  5651#  5652#  5665#  5666#  5678#  5679#  5680#  5696#  5712#  5713#  5729#
                5730#  5742#  5743#  5744#  5758#  5773#  5774#  5787#  5788#  5800#  5801#  5802#  5814#
                5855#  5860#  5874#  5903#  5910#  5947#  6027#  6071#  6106#  6186#  6193#  6203#  6216#
                6228#  6238#  6249#  6262#  6273#  6283#  6337#  6395#  6418#  6525#  6565#  6582#  6586#
                6595#  6635#  6646#  6677#  6681#  6687#  6700#  6749#  6759#  6767#  6775#  6785#  6790#
                6796#  6803#  6822#  6852#  6872#  6891#  6902#  6914#  6939#  6945#  6960#  6981#  7015#
                7030#  7065#  7154#  7172#  7173#  7180#  7181#  7216#
T$TEST= 000053  3434#  4488   4491   4493#  4517   4521   4523#  4558   4561   4563#  4590   4593   4595#
                4624   4628   4630#  4673   4676   4679#  4719   4722   4724#  4763   4767   4769#  4826
                4830   4832#  4917   4922   4924#  4974   4983   4985#  5035   5044   5046#  5090   5099
                5101#  5150   5159   5161#  5208   5217   5219#  5267   5276   5278#  5326   5335   5337#
                5390   5399   5401#  5448   5457   5459#  5507   5516   5518#  5566   5575   5577#  5624
                5633   5635#  5682   5692   5695#  5746   5755   5757#  5804   5811   5813#  5863   5871
                5873#  5912   5943   5945#  6072   6102   6104#  6194   6200   6202#  6240   6246   6248#
                6284   6289   6291#  6339   6346   6348#  6420   6427   6429#  6597   6603   6605#  6637
                6642   6644#  6690   6695   6697#  6824   6831   6833#  6874   6880   6882#  6904   6910
                6912#  6947   6956   6958#  6983   6992   6994#  7017   7026   7028#  7067   7075   7077#
                7225
T$TSTM= 177777  3434#  4177   4178   4179   4180   4182   4184   4185   4186   4187   4188   4189   4190
                4192   4193   4197   4198   4199   4202   4203   4206   4207   4208   4210   4211   4212
                4214   4215   4216   4219   4220   4221   4223   4224   4225   4227   4228   4229   4230
                4232   4233   4234   4237   4238   4239   4270   4302   4305   4308   4311   4325   4406
                4423   4427   4438   4440   4456   4457   4473   4500   4507   4511   4513   4541   4543
                4553   4556   4564   4570   4578   4579   4580   4588   4596   4602   4611   4612   4613
                4622   4631   4636   4648   4649   4650   4651   4662   4663   4664   4670   4706   4707
                4712   4717   4750   4751   4756   4761   4794   4795   4817   4818   4819   4824   4833
                4860   4878   4882   4883   4913   4915   4925   4943   4944   4958   4970   4972   4987
                4992   5004   5005   5006   5007   5017   5018   5019   5020   5030   5031   5032   5033
                5047   5052   5061   5062   5063   5064   5073   5074   5075   5076   5085   5086   5087
                5088   5102   5107   5117   5119   5120   5121   5131   5133   5134   5135   5145   5146
                5147   5148   5162   5167   5177   5178   5179   5180   5190   5191   5192   5193   5203
                5204   5205   5206   5220   5226   5236   5237   5238   5239   5249   5250   5251   5252
                5262   5263   5264   5265   5279   5285   5295   5296   5297   5298   5308   5309   5310
                5311   5321   5322   5323   5324   5338   5343   5358   5360   5361   5362   5372   5373
                5374   5375   5385   5386   5387   5388   5402   5407   5417   5418   5419   5420   5430
                5431   5432   5433   5443   5444   5445   5446   5460   5464   5475   5476   5477   5478
                5489   5490   5491   5492   5502   5503   5504   5505   5519   5523   5534   5535   5536
                5537   5548   5549   5550   5551   5561   5562   5563   5564   5578   5582   5592   5593
                5594   5595   5606   5607   5608   5609   5619   5620   5621   5622   5636   5640   5650
                5651   5652   5653   5664   5665   5666   5667   5677   5678   5679   5680   5696   5700
                5711   5712   5713   5714   5727   5729   5730   5731   5741   5742   5743   5744   5758
                5762   5772   5773   5774   5775   5786   5787   5788   5789   5799   5800   5801   5802
                5814   5850   5855   5860   5874   5899   5903   5910   5947   5996   6027   6068   6071
                6106   6155   6186   6193   6203   6214   6216   6226   6228   6236   6238   6249   6260
                6262   6271   6273   6281   6283   6308   6320   6332   6337   6349   6364   6382   6391
                6395   6402   6411   6418   6524   6525   6548   6564   6565   6581   6582   6586   6595
                6632   6635   6646   6674   6677   6681   6687   6700   6747   6749   6756   6759   6765
                6767   6773   6775   6783   6785   6789   6790   6795   6796   6801   6803   6822   6852
                6869   6872   6890   6891   6898   6902   6914   6936   6939   6945   6960   6977   6981
                7012   7015   7030   7061   7065   7080   7098   7099   7101   7116   7118   7132   7135
```

```
                    7137    7148    7154
T$TSTS= 000001      3434#   4493#   4523#   4563#   4595#   4630#   4679#   4724#   4769#   4832#   4924#   4985#   5046#
                    5101#   5161#   5219#   5278#   5337#   5401#   5459#   5518#   5577#   5635#   5695#   5757#   5813#
                    5873#   5945#   6104#   6202#   6248#   6291#   6348#   6429#   6605#   6644#   6697#   6833#   6882#
                    6912#   6958#   6994#   7028#   7077#
T$$AU  = 010042     4472#   4473
T$$AUT= 010037      4409#   4427
T$$CLE= 010040      4437#   4440
T$$DU  = 010041     4454#   4457
T$$HAR= 010116      7170#   7181
T$$HW  = 010001     3519#   3534
T$$INI= 010036      4287#   4406
T$$MSG= 010034      4177#   4178#   4179#   4180#   4182#   4184#   4185#   4186#   4187#   4188#   4189#   4190#   4192#
                    4193#   4197#   4198#   4199#   4201#   4203    4205#   4208    4209#   4212    4213#   4216    4218#
                    4221    4222#   4225    4226#   4230    4231#   4234    4236#   4239
T$$PRO= 010000      3482#
T$$RPT= 010035      4252#   4260    4270
T$$SEG= 010002      4570#   4579    4580#   4602#   4612    4613#   4636#   4649    4650#   4651#   4663    4664#   4992#
                    5005    5006#   5007#   5018    5019#   5020#   5031    5032#   5052#   5062    5063#   5064#   5074
                    5075#   5076#   5086    5087#   5107#   5119    5120#   5121#   5133    5134#   5135#   5146    5147#
                    5167#   5178    5179#   5180#   5191    5192#   5193#   5204    5205#   5226#   5237    5238#   5239#
                    5250    5251#   5252#   5263    5264#   5285#   5296    5297#   5298#   5309    5310#   5311#   5322
                    5323#   5343#   5360    5361#   5362#   5373    5374#   5375#   5386    5387#   5407#   5418    5419#
                    5420#   5431    5432#   5433#   5444    5445#   5464#   5476    5477#   5478#   5490    5491#   5492#
                    5503    5504#   5523#   5535    5536#   5537#   5549    5550#   5551#   5562    5563#   5582#   5593
                    5594#   5595#   5607    5608#   5609#   5620    5621#   5640#   5651    5652#   5653#   5665    5666#
                    5667#   5678    5679#   5700#   5712    5713#   5714#   5729    5730#   5731#   5742    5743#   5762#
                    5773    5774#   5775#   5787    5788#   5789#   5800    5801#
T$$SOF= 010117      7213#   7216
T$$SW  = 010002     3543#   3546
T$$TES= 010115      4493#   4500    4511    4513    4523#   4543    4556    4563#   4564    4588    4595#   4596    4622
                    4630#   4631    4670    4679#   4707    4717    4724#   4751    4761    4769#   4795    4818    4824
                    4832#   4833    4882    4915    4924#   4925    4944    4972    4985#   4987    5033    5046#   5047
                    5088    5101#   5102    5148    5161#   5162    5206    5219#   5220    5265    5278#   5279    5324
                    5337#   5338    5388    5401#   5402    5446    5459#   5460    5505    5518#   5519    5564    5577#
                    5578    5622    5635#   5636    5680    5695#   5696    5744    5757#   5758    5802    5813#   5814
                    5855    5860    5873#   5874    5903    5910    5945#   5947    6027    6071    6104#   6106    6186
                    6193    6202#   6203    6216    6228    6238    6248#   6249    6262    6273    6283    6291#   6337
                    6348#   6395    6418    6429#   6525    6565    6582    6586    6595    6605#   6635    6644#   6646
                    6677    6681    6687    6697#   6700    6749    6759    6767    6775    6785    6790    6796    6803
                    6822    6833#   6852    6872    6882#   6891    6902    6912#   6914    6939    6945    6958#   6960
                    6981    6994#   7015    7028#   7030    7065    7077#   7154
T1      012146 G    3496    4493#
T10     014470 G    3496    4924#
T11     014736 G    3496    4985#
T12     015202 G    3496    5046#
T13     015432 G    3496    5101#
T14     015676 G    3496    5161#
T15     016142 G    3496    5219#
T16     016406 G    3496    5278#
T17     016652 G    3496    5337#
T18     017116 G    3496    5401#
T19     017362 G    3496    5459#
T2      012256 G    3496    4523#
T20     017642 G    3496    5518#
T21     020122 G    3496    5577#
```

```
T22      020376 G          3496    5635#
T23      020654 G          3496    5695#
T24      021130 G          3496    5757#
T25      021404 G          3496    5813#
T26      021576 G          3496    5873#
T27      021744 G          3496    5945#
T28      022322 G          3496    6104#
T29      022560 G          3496    6202#
T3       012422 G          3496    4563#
T30      022774 G          3496    6248#
T31      023210 G          3496    6291#
T32      023452 G          3496    6348#
T33      024044 G          3496    6429#
T34      025116 G          3496    6605#
T35      025216 G          3496    6644#
T36      025364 G          3496    6697#
T37      026042 G          3496    6833#
T38      026202 G          3496    6882#
T39      026310 G          3496    6912#
T4       012552 G          3496    4595#
T40      026446 G          3496    6958#
T41      026544 G          3496    6994#
T42      026644 G          3496    7028#
T43      026770 G          3496    7077#
T5       012712 G          3496    4630#
T6       013154 G          3496    4679#
T7       013356 G          3496    4724#
T8       013570 G          3496    4769#
T9       014112 G          3496    4832#
UAM    = 000200 G          3573#
VECTOR   027504            7185#
WPM      027400            7172    7183#
WROM     003422            3987#
WTYPE    002414            3627#   3888    3971    3972    3992    4013    4327*   4393    4395    4400    4642    4891    4986
                           5047    5102    5162    5220    5279    5338    5402    5460    5479    5519    5538    5578    5596
                           5636    5654    5696    5715    5758    5776    5989    6037    6148    6323    6645    6699    6913
                           6959    7029
X$ALWA=  000000            3434#
X$FALS=  000040            3434#
X$OFFS=  000400            3434#
X$TRUE=  000020            3434#
ZERO     002370            3617#
$BDADR   002450            3641#
$BDDAT   002454            3643#
$GDADR   002446            3640#
$GDDAT   002452            3642#   4232    6304*   6305    6307    6515*   6519    6522*   6523    6541*   6545    6547    6557*
                           6561    6563    6574*   6578    6580    7093*   7096    7112*   7128*   7129    7146*
$LSTIN=  000000            3443#
$LSTTA=  000000            3444#
$REG0    002430            3633#   4050*   4177    4178
$REG1    002426            3632#   4049*
$REG2    002424            3631#   4048*   4177    4178    4179    4185    4187    4190
$REG3    002422            3630#   4047*
$REG4    002420            3629#   4046*   4177    4178    4179    4180    4182    4184    4185    4186    4187    4188    4189
                           4190    4192    4193    4198    4199
$REG5    002416            3628#   4045*   4179    4180    4182    4184    4185    4186    4188    4189    4192    4193    4198
```

```
                    4199
$TEMPO  002442      3638#
$TMPO   002444      3639#  6295*  6315*  6316   6319   6326   6354*  6380   6383
.       = 030144    3426#  3620#  3621#  3622#  3623#  3656#  3702#  3723#  3871#  4260   4500   4511   4543
                    4564   4579   4596   4612   4631   4649   4663   4707   4751   4795   4818   4833   4882
                    4925   4937   4944   4987   5005   5018   5031   5047   5062   5074   5086   5102   5119
                    5133   5146   5162   5178   5191   5204   5220   5237   5250   5263   5279   5296   5309
                    5322   5338   5360   5373   5386   5402   5418   5431   5444   5460   5476   5490   5503
                    5519   5535   5549   5562   5578   5593   5607   5620   5636   5651   5665   5678   5689
                    5696   5712   5729   5742   5758   5773   5787   5800   5814   5855   5874   5903   5947
                    6027   6106   6186   6203   6216   6228   6249   6262   6273   6395   6525   6565   6582
                    6586   6589#  6593#  6646   6677   6681   6700   6749   6759   6767   6775   6785   6790
                    6796   6803   6852   6891   6914   6939   6960   7030   7193#
.MSTCL  002756      3866#  4525   4598   4634   4682   4727   4772   4836   4928   4991   5050   5105   5165
                    5223   5282   5340   5405   5462   5521   5580   5638   5698   5760   5816   5876   5948
                    6107   6204   6250   6293   6352   6363   6401   6410   6416   6431   6917   6963   7033
                    7079
.REGT   003050      3880#  3889
.ROMCL  003044      3877#  3905   3907   3909   3917   3924   3931   3938   3945   3947   3949   3958   3977
                    3982   4530   4532   4534   4545   4547   4691   4693   4696   4698   4700   4735   4737
                    4740   4742   4744   4779   4781   4784   4786   4788   4805   4807   4809   4811   4840
                    4842   4844   4850   4852   4864   4867   4898   4900   4902   4904   4930   4933   4946
                    4951   4959   4961   4963   5820   5822   5826   5841   5843   5883   5885   5892   5970
                    5972   5977   5979   6049   6051   6053   6056   6129   6131   6136   6138   6207   6218
                    6230   6253   6264   6275   6310   6436   6449   6452   6455   6468   6471   6474   6480
                    6482   6485   6488   6491   6499   6501   6516   6542   6555   6558   6570   6572   6575
                    6607   6609   6611   6613   6617   6620   6918   6920   6926   6929   6965   6968   7001
                    7007   7041   7044   7046   7055   7083   7086   7088   7091   7106   7109   7122   7124
                    7141
.SROMC  003100      3886#  3911   3951   3960   4854   4861   4996   4998   5009   5011   5022   5024   5053
                    5055   5065   5067   5077   5079   5109   5111   5123   5125   5137   5139   5169   5171
                    5182   5184   5195   5197   5228   5230   5241   5243   5254   5256   5287   5289   5300
                    5302   5313   5315   5346   5348   5364   5366   5377   5379   5409   5411   5422   5424
                    5435   5437   5467   5469   5481   5483   5494   5496   5526   5528   5540   5542   5553
                    5555   5584   5586   5598   5600   5611   5613   5642   5644   5656   5658   5669   5671
                    5702   5704   5717   5719   5733   5735   5764   5766   5778   5780   5791   5793   5887
                    5974   6133   6922
```

```
BADHEA   3785#  4488   4491   4517   4521   4558   4561   4590   4593   4624   4628   4673   4676   4719   4722
         4763   4767   4826   4830   4917   4922   4974   4983   5035   5044   5090   5099   5150   5159   5208
         5217   5267   5276   5326   5335   5390   5399   5448   5457   5507   5516   5566   5575   5624   5633
         5682   5692   5746   5755   5804   5811   5863   5871   5912   5943   6072   6102   6194   6200   6240
         6246   6284   6289   6339   6346   6420   6427   6597   6603   6637   6642   6690   6695   6824   6831
         6874   6880   6904   6910   6947   6956   6983   6992   7017   7026   7067   7075
BCOMPL     15#  3434#  4303   4306   4309
BERROR     19#  3434#
BGNAU      23#  3434#  4472
BGNAUT     31#  3434#  4409
BGNCLN     39#  3434#  4437
BGNDU      47#  3434#  4454
BGNHRD     55#  3434#  7170
BGNHW      66#  3434#  3519
BGNINI     77#  3434#  4287
BGNMOD     85#  3434#  3440
BGNMSG     98#  3434#  4177   4178   4179   4180   4182   4184   4185   4186   4187   4188   4189   4190   4192
         4193   4197   4198   4199   4201   4205   4209   4213   4218   4222   4226   4231   4236
BGNPRO    106#  3434#  3482
BGNPTA    114#  3434#
BGNRPT    144#  3434#  4252
BGNSEG    152#  3434#  4570   4602   4636   4651   4992   5007   5020   5052   5064   5076   5107   5121   5135
         5167   5180   5193   5226   5239   5252   5285   5298   5311   5343   5362   5375   5407   5420   5433
         5464   5478   5492   5523   5537   5551   5582   5595   5609   5640   5653   5667   5700   5714   5731
         5762   5775   5789
BGNSET    161#  3434#
BGNSFT    182#  3434#  7213
BGNSRV    193#  3434#
BGNSUB    201#  3434#
BGNSW     225#  3434#  3543
BGNTST    236#  3434#  4493   4523   4563   4595   4630   4679   4724   4769   4832   4924   4985   5046   5101
         5161   5219   5278   5337   5401   5459   5518   5577   5635   5695   5757   5813   5873   5945   6104
         6202   6248   6291   6348   6429   6605   6644   6697   6833   6882   6912   6958   6994   7028   7077
BNCOMP    266#  3434#  4312   4326
BNERRO    270#  3434#
BREAK     274#  3434#  4712   4756   4819   4883
BRESET    278#  3434#  4438   4456   6349   7098   7137
CKLOOP    282#  3434#  7101   7118   7135
CLOCK     286#  3434#
CLOSE     292#  3434#
CLRMAR   3826#  4842   4852
CLRVEC    296#  3434#
COMMEN    3C1#  3434#
DELAY     322#  3434#
DESCRI    317#  3434#  3595
DEVTYP    341#  3434#  3723
DISPAT    346#  3434#  3496
DISPLA    360#  3434#
DOCLN     376#  3434#
DODU      380#  3434#  4423
DORPT     385#  3434#
ED$CAL   3780#  4488   4491   4517   4521   4558   4561   4590   4593   4624   4628   4673   4676   4719   4722
         4763   4767   4826   4830   4917   4922   4974   4983   5035   5044   5090   5099   5150   5159   5208
         5217   5267   5276   5326   5335   5390   5399   5448   5457   5507   5516   5566   5575   5624   5633
         5682   5692   5746   5755   5804   5811   5863   5871   5912   5943   6072   6102   6194   6200   6240
         6246   6284   6289   6339   6346   6420   6427   6597   6603   6637   6642   6690   6695   6824   6831
```

```
        6874    6880    6904    6910    6947    6956    6983    6992    7017    7026    7067    7075
ENDAU    389#   3434#   4473
ENDAUT   401#   3434#   4427
ENDCLN   413#   3434#   4440
ENDCOM   425#   3434#
ENDDU    441#   3434#   4457
ENDHRD   453#   3434#   7181
ENDHW    465#   3434#   3534
ENDINI   475#   3434#   4406
ENDMOD   487#   3434#
ENDMSG   500#   3434#   4177    4178    4179    4180    4182    4184    4185    4186    4187    4188    4189    4190    4192
        4193    4197    4198    4199    4203    4208    4212    4216    4221    4225    4230    4234    4239
ENDPRO   512#   3434#   3486
ENDPTA   520#   3434#
ENDRPT   529#   3434#   4270
ENDSEG   541#   3434#   4580    4613    4650    4664    5006    5019    5032    5063    5075    5087    5120    5134    5147
        5179    5192    5205    5238    5251    5264    5297    5310    5323    5361    5374    5387    5419    5432    5445
        5477    5491    5504    5536    5550    5563    5594    5608    5621    5652    5666    5679    5713    5730    5743
        5774    5788    5801
ENDSET   555#   3434#
ENDSFT   568#   3434#   7216
ENDSRV   580#   3434#
ENDSUB   596#   3434#
ENDSW    614#   3434#   3546
ENDTST   624#   3434#   4513    4556    4588    4622    4670    4717    4761    4824    4915    4972    5033    5088    5148
        5206    5265    5324    5388    5446    5505    5564    5622    5680    5744    5802    5860    5910    6071    6193
        6238    6283    6337    6418    6595    6635    6687    6822    6872    6902    6945    6981    7015    7065    7154
EQUALS   642#   3434#   3573
ERRDF    714#   3434#   4507    4541    4553    4578    4611    4648    4662    4706    4750    4794    4817    4860    4878
        4913    4943    4958    4970    5004    5017    5030    5061    5073    5085    5117    5131    5145    5177    5190
        5203    5236    5249    5262    5295    5308    5321    5358    5372    5385    5417    5430    5443    5475    5489
        5502    5534    5548    5561    5592    5606    5619    5650    5664    5677    5711    5727    5741    5772    5786
        5799    5850    5899    5996    6068    6155    6214    6226    6236    6260    6271    6281    6308    6320    6332
        6364    6382    6391    6402    6411    6524    6548    6564    6581    6632    6674    6747    6756    6765    6773
        6783    6789    6795    6801    6869    6890    6898    6936    6977    7012    7061    7099    7116    7132    7148
ERRERD   718#   3434#
ERROR    722#   3434#   4170#   4507    4541    4553    4578    4611    4648    4662    4706    4750    4794    4817    4860
        4878    4913    4943    4958    4970    5004    5017    5030    5061    5073    5085    5117    5131    5145    5177
        5190    5203    5236    5249    5262    5295    5308    5321    5358    5372    5385    5417    5430    5443    5475
        5489    5502    5534    5548    5561    5592    5606    5619    5650    5664    5677    5711    5727    5741    5772
        5786    5799    5850    5899    5996    6068    6155    6214    6226    6236    6260    6271    6281    6364    6382
        6391    6402    6411    6524    6548    6564    6581    6632    6674    6747    6756    6765    6773    6783    6789
        6795    6801    6869    6890    6898    6936    6977    7012    7061    7099    7116    7132    7148
ERRSF    726#   3434#
ERRSOF   730#   3434#
ERRTBL   734#   3434#
ESCAPE   744#   3434#   4500    4511    4543    4579    4612    4649    4663    4707    4751    4795    4818    4882    4944
        5005    5018    5031    5062    5074    5086    5119    5133    5146    5178    5191    5204    5237    5250    5263
        5296    5309    5322    5360    5373    5386    5418    5431    5444    5476    5490    5503    5535    5549    5562
        5593    5607    5620    5651    5665    5678    5712    5729    5742    5773    5787    5800    5855    5903    6027
        6186    6216    6228    6262    6273    6525    6565    6582    6677    6749    6759    6767    6775    6785    6790
        6796    6891    6939
EXIT     771#   3434#   4260    4564    4596    4631    4833    4925    4987    5047    5102    5162    5220    5279    5338
        5402    5460    5519    5578    5636    5696    5758    5814    5874    5947    6106    6203    6249    6395    6586
        6646    6681    6700    6803    6852    6914    6960    7030
FEQUAL   810#   3434#
```

```
GETBYT    824#  3434#
GETPRI    834#  3434#
GETWOR    829#  3434#
GMANIA    839#  3434#
GMANID    848#  3434#
GMANIL    859#  3434#
GPHARD    868#  3434#  4325
GPRMA     874#  3434#  7173
GPRMD     903#  3434#  7172  7180
GPRML     934#  3434#
HEADER    954#  3434#  3474
INLOOP    962#  3434#
IOSETU    966#  3434#
IOSTAR    974#  3434#
KT11      982#  3434#
K4ONLY   3775#  3815#  4833  5814  5874  5947  6106  6203  6249
LASTAD   1147#  3434#  7225
MACEX    3797#  4564   4596  4631  4925
MACEX2   3806#  5047   5102  5162  5220  5279  5338  5402  5460  5519  5578  5636  5696  5758
MANUAL   1162#  3434#
MDT0     4145#  4197
MDT1     4125#  4177   4178
MDT2     4129#  4179
MDT3     4133#  4180   4182  4186  4189  4198  4199
MDT4     4137#  4184
MDT5     4141#  4185
MDT6     4147#  4187   4190
MDT7     4151#  4188   4193
MDT8     4155#  4192
MEMORY   1166#  3434#
M$TCLR   3862#  4525   4598  4634  4682  4727  4772  4836  4928  4991  5050  5105  5165  5223  5282
         5340   5405   5462  5521  5580  5638  5698  5760  5816  5876  5948  6107  6204  6250  6293
         6352   6363   6401  6410  6416  6431  6917  6963  7033  7079
MYINT    3791#  4565   4597  4632  4680  4725  4770  4834  4926  4989  5048  5103  5163  5221  5280
         5339   5403   5461  5520  5579  5637  5697  5759  5815  5875  5946  6105  6205  6251  6292
         6350   6430   6606  6648  6702  6834  6883  6916  6962  6995  7032  7078
M$BYTE   2000#  3434#  3474#
M$CHEC   2118#  3434#  4260#  4564#  4596#  4631#  4833#  4925#  4987#  5047#  5102#  5162#  5220#  5279#  5338#
         5402#  5460#  5519#  5578#  5636#  5696#  5758#  5814#  5874#  5947#  6106#  6203#  6249#  6395#  6586#
         6646#  6681#  6700#  6803#  6852#  6914#  6960#  7030#
M$CNTO   2182#  3434#  7172#  7173#  7180#
M$COUN   2066#  3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#
         4193#  4197#  4198#  4199#  4202#  4206#  4207#  4210#  4211#  4214#  4215#  4219#  4220#  4223#  4224#
         4227#  4228#  4229#  4232#  4233#  4237#  4238#
M$DATA   1867#  3434#  3474#  3595#  3723#
M$DECR   2029#  3434#  3486#  3534#  3546#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#
         4189#  4190#  4192#  4193#  4197#  4198#  4199#  4203#  4208#  4212#  4216#  4221#  4225#  4230#  4234#
         4239#  4270#  4406#  4427#  4440#  4457#  4473#  4513#  4556#  4580#  4588#  4613#  4622#  4650#  4664#
         4670#  4717#  4761#  4824#  4915#  4972#  5006#  5019#  5032#  5033#  5063#  5075#  5087#  5088#  5120#
         5134#  5147#  5148#  5179#  5192#  5205#  5206#  5238#  5251#  5264#  5265#  5297#  5310#  5323#  5324#
         5361#  5374#  5387#  5388#  5419#  5432#  5445#  5446#  5477#  5491#  5504#  5505#  5536#  5550#  5563#
         5564#  5594#  5608#  5621#  5622#  5652#  5666#  5679#  5680#  5713#  5730#  5743#  5744#  5774#  5788#
         5801#  5802#  5860#  5910#  6071#  6193#  6238#  6283#  6337#  6418#  6595#  6635#  6687#  6822#  6872#
         6902#  6945#  6981#  7015#  7065#  7154#  7181#  7216#
M$DEFA   2170#  3434#  7172#  7173#  7180#
M$ENDE   2074#  3434#  3534#  3546#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#
```

```
          4190#  4192#  4193#  4197#  4198#  4199#  4203#  4208#  4212#  4216#  4221#  4225#  4230#  4234#  4239#
          4270#  4406#  4427#  4440#  4457#  4473#  4513#  4556#  4580#  4588#  4613#  4622#  4650#  4664#  4670#
          4717#  4761#  4824#  4915#  4972#  5006#  5019#  5032#  5033#  5063#  5075#  5087#  5088#  5120#  5134#
          5147#  5148#  5179#  5192#  5205#  5206#  5238#  5251#  5264#  5265#  5297#  5310#  5323#  5324#  5361#
          5374#  5387#  5388#  5419#  5432#  5445#  5446#  5477#  5491#  5504#  5505#  5536#  5550#  5563#  5564#
          5594#  5608#  5621#  5622#  5652#  5666#  5679#  5680#  5713#  5730#  5743#  5744#  5774#  5788#  5801#
          5802#  5860#  5910#  6071#  6193#  6238#  6283#  6337#  6418#  6595#  6635#  6687#  6822#  6872#  6902#
          6945#  6981#  7015#  7065#  7154#  7181#  7216#
M$ERRI    1649#  3434#  4507#  4541#  4553#  4578#  4611#  4648#  4662#  4706#  4750#  4794#  4817#  4860#  4878#
          4913#  4943#  4958#  4970#  5004#  5017#  5030#  5061#  5073#  5085#  5117#  5131#  5145#  5177#  5190#
          5203#  5236#  5249#  5262#  5295#  5308#  5321#  5358#  5372#  5385#  5417#  5430#  5443#  5475#  5489#
          5502#  5534#  5548#  5561#  5592#  5606#  5619#  5650#  5664#  5677#  5711#  5727#  5741#  5772#  5786#
          5799#  5850#  5899#  5996#  6068#  6155#  6214#  6226#  6236#  6260#  6271#  6281#  6308#  6320#  6332#
          6364#  6382#  6391#  6402#  6411#  6524#  6548#  6564#  6581#  6632#  6674#  6747#  6756#  6765#  6773#
          6783#  6789#  6795#  6801#  6869#  6890#  6898#  6936#  6977#  7012#  7061#  7099#  7116#  7132#  7148#
M$ESCA    2006#  3434#  4500#  4511#  4543#  4579#  4612#  4649#  4663#  4707#  4751#  4795#  4818#  4882#  4944#
          5005#  5018#  5031#  5062#  5074#  5086#  5119#  5133#  5146#  5178#  5191#  5204#  5237#  5250#  5263#
          5296#  5309#  5322#  5360#  5373#  5386#  5418#  5431#  5444#  5476#  5490#  5503#  5535#  5549#  5562#
          5593#  5607#  5620#  5651#  5665#  5678#  5712#  5729#  5742#  5773#  5787#  5800#  5855#  5903#  6027#
          6186#  6216#  6228#  6262#  6273#  6525#  6565#  6582#  6677#  6749#  6759#  6767#  6775#  6785#  6790#
          6796#  6891#  6939#
M$ESCS    2010#  3434#  4500#  4511#  4543#  4579#  4612#  4649#  4663#  4707#  4751#  4795#  4818#  4882#  4944#
          5005#  5018#  5031#  5062#  5074#  5086#  5119#  5133#  5146#  5178#  5191#  5204#  5237#  5250#  5263#
          5296#  5309#  5322#  5360#  5373#  5386#  5418#  5431#  5444#  5476#  5490#  5503#  5535#  5549#  5562#
          5593#  5607#  5620#  5651#  5665#  5678#  5712#  5729#  5742#  5773#  5787#  5800#  5855#  5903#  6027#
          6186#  6216#  6228#  6262#  6273#  6525#  6565#  6582#  6677#  6749#  6759#  6767#  6775#  6785#  6790#
          6796#  6891#  6939#
M$EXCP    2101#  3434#  7172#  7173#  7180#
M$EXIT    2014#  3434#  4260#  4564#  4596#  4631#  4833#  4925#  4987#  5047#  5102#  5162#  5220#  5279#  5338#
          5402#  5460#  5519#  5578#  5636#  5696#  5758#  5814#  5874#  5947#  6106#  6203#  6249#  6395#  6586#
          6646#  6681#  6700#  6803#  6852#  6914#  6960#  7030#
M$EXSE    2022#  3434#  4260#  4564#  4596#  4631#  4833#  4925#  4987#  5047#  5102#  5162#  5220#  5279#  5338#
          5402#  5460#  5519#  5578#  5636#  5696#  5758#  5814#  5874#  5947#  6106#  6203#  6249#  6395#  6586#
          6646#  6681#  6700#  6803#  6852#  6914#  6960#  7030#
M$EXTJ    2018#  3434#  4260#  4564#  4596#  4631#  4833#  4925#  4987#  5047#  5102#  5162#  5220#  5279#  5338#
          5402#  5460#  5519#  5578#  5636#  5696#  5758#  5814#  5874#  5947#  6106#  6203#  6249#  6395#  6586#
          6646#  6681#  6700#  6803#  6852#  6914#  6960#  7030#
M$GEN     2038#  3434#  3440#  3474#  3482#  3496#  3519#  3534#  3543#  3546#  3595#  3723#  4177#  4178#  4179#
          4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#
          4203#  4205#  4208#  4209#  4212#  4213#  4216#  4218#  4221#  4222#  4225#  4226#  4230#  4231#  4234#
          4236#  4239#  4252#  4270#  4287#  4406#  4409#  4427#  4437#  4440#  4454#  4457#  4472#  4473#  4493#
          4513#  4523#  4556#  4563#  4580#  4588#  4595#  4613#  4622#  4630#  4650#  4664#  4670#  4679#  4717#
          4724#  4761#  4769#  4824#  4832#  4915#  4924#  4972#  4985#  5006#  5019#  5032#  5033#  5046#  5063#
          5075#  5087#  5088#  5101#  5120#  5134#  5147#  5148#  5161#  5179#  5192#  5205#  5206#  5219#  5238#
          5251#  5264#  5265#  5278#  5297#  5310#  5323#  5324#  5337#  5361#  5374#  5387#  5388#  5401#  5419#
          5432#  5445#  5446#  5459#  5477#  5491#  5504#  5505#  5518#  5536#  5550#  5563#  5564#  5577#  5594#
          5608#  5621#  5622#  5635#  5652#  5666#  5679#  5680#  5695#  5713#  5730#  5743#  5744#  5757#  5774#
          5788#  5801#  5802#  5813#  5860#  5873#  5910#  5945#  6071#  6104#  6193#  6202#  6238#  6248#  6283#
          6291#  6337#  6348#  6418#  6429#  6595#  6605#  6635#  6644#  6687#  6697#  6822#  6833#  6872#  6882#
          6902#  6912#  6945#  6958#  6981#  6994#  7015#  7028#  7065#  7077#  7154#  7170#  7181#  7213#  7216#
          7225#
M$GENB    1938#  3434#
M$GETS    2035#  3434#  3486#  3534#  3546#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#
          4189#  4190#  4192#  4193#  4197#  4198#  4199#  4203#  4208#  4212#  4216#  4221#  4225#  4230#  4234#
          4239#  4270#  4406#  4427#  4440#  4457#  4473#  4513#  4556#  4579#  4580#  4588#  4612#  4613#  4622#
          4649#  4650#  4663#  4664#  4670#  4717#  4761#  4824#  4915#  4972#  5005#  5006#  5018#  5019#  5031#
```

```
                5032#  5033#  5062#  5063#  5074#  5075#  5086#  5087#  5088#  5119#  5120#  5133#  5134#  5146#  5147#
                5148#  5178#  5179#  5191#  5192#  5204#  5205#  5206#  5237#  5238#  5250#  5251#  5263#  5264#  5265#
                5296#  5297#  5309#  5310#  5322#  5323#  5324#  5360#  5361#  5373#  5374#  5386#  5387#  5388#  5418#
                5419#  5431#  5432#  5444#  5445#  5446#  5476#  5477#  5490#  5491#  5503#  5504#  5505#  5535#  5536#
                5549#  5550#  5562#  5563#  5564#  5593#  5594#  5607#  5608#  5620#  5621#  5622#  5651#  5652#  5665#
                5666#  5678#  5679#  5680#  5712#  5713#  5729#  5730#  5742#  5743#  5744#  5773#  5774#  5787#  5788#
                5800#  5801#  5802#  5860#  5910#  6071#  6193#  6238#  6283#  6337#  6418#  6595#  6635#  6687#  6822#
                6872#  6902#  6945#  6981#  7015#  7065#  7154#  7181#  7216#
M$GETT          1877#  3434#  4260#  4500#  4511#  4543#  4564#  4579#  4596#  4612#  4631#  4649#  4663#  4707#  4751#
                4795#  4818#  4833#  4882#  4925#  4944#  4987#  5005#  5018#  5031#  5047#  5062#  5074#  5086#  5102#
                5119#  5133#  5146#  5162#  5178#  5191#  5204#  5220#  5237#  5250#  5263#  5279#  5296#  5309#  5322#
                5338#  5360#  5373#  5386#  5402#  5418#  5431#  5444#  5460#  5476#  5490#  5503#  5519#  5535#  5549#
                5562#  5578#  5593#  5607#  5620#  5636#  5651#  5665#  5678#  5696#  5712#  5729#  5742#  5758#  5773#
                5787#  5800#  5814#  5855#  5874#  5903#  5947#  6027#  6106#  6186#  6203#  6216#  6228#  6249#  6262#
                6273#  6395#  6525#  6565#  6582#  6586#  6646#  6677#  6681#  6700#  6749#  6759#  6767#  6775#  6785#
                6790#  6796#  6803#  6852#  6891#  6914#  6939#  6960#  7030#
M$GNGB          1902#  3434#  3440#  3474#  3482#  3496#  3519#  3543#  3595#  3723#  4177#  4178#  4179#  4180#  4182#
                4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#  4205#  4209#
                4213#  4218#  4222#  4226#  4231#  4236#  4252#  4287#  4409#  4437#  4454#  4472#  7170#  7213#  7225#
M$GNIN          2049#  3434#  3474#  3496#  3519#  3543#  3595#  3723#  4177#  4178#  4179#  4180#  4182#  4184#  4185#
                4186#  4187#  4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4202#  4203#  4206#  4207#  4208#
                4210#  4211#  4212#  4214#  4215#  4216#  4219#  4220#  4221#  4223#  4224#  4225#  4227#  4228#  4229#
                4230#  4232#  4233#  4234#  4237#  4238#  4239#  4260#  4270#  4302#  4303#  4305#  4306#  4308#  4309#
                4311#  4312#  4325#  4326#  4406#  4423#  4427#  4438#  4440#  4456#  4457#  4473#  4500#  4507#  4511#
                4513#  4541#  4543#  4553#  4556#  4564#  4570#  4578#  4579#  4580#  4588#  4596#  4602#  4611#  4612#
                4613#  4622#  4631#  4636#  4648#  4649#  4650#  4651#  4662#  4663#  4664#  4670#  4706#  4707#  4712#
                4717#  4750#  4751#  4756#  4761#  4794#  4795#  4817#  4818#  4819#  4824#  4833#  4860#  4878#  4882#
                4883#  4913#  4915#  4925#  4943#  4944#  4958#  4970#  4972#  4987#  4992#  5004#  5005#  5006#  5007#
                5017#  5018#  5019#  5020#  5030#  5031#  5032#  5033#  5047#  5052#  5061#  5062#  5063#  5064#  5073#
                5074#  5075#  5076#  5085#  5086#  5087#  5088#  5102#  5107#  5117#  5119#  5120#  5121#  5131#  5133#
                5134#  5135#  5145#  5146#  5147#  5148#  5162#  5167#  5177#  5178#  5179#  5180#  5190#  5191#  5192#
                5193#  5203#  5204#  5205#  5206#  5220#  5226#  5236#  5237#  5238#  5239#  5249#  5250#  5251#  5252#
                5262#  5263#  5264#  5265#  5279#  5285#  5295#  5296#  5297#  5298#  5308#  5309#  5310#  5311#  5321#
                5322#  5323#  5324#  5338#  5343#  5358#  5360#  5361#  5362#  5372#  5373#  5374#  5375#  5385#  5386#
                5387#  5388#  5402#  5407#  5417#  5418#  5419#  5420#  5430#  5431#  5432#  5433#  5443#  5444#  5445#
                5446#  5460#  5464#  5475#  5476#  5477#  5478#  5489#  5490#  5491#  5492#  5502#  5503#  5504#  5505#
                5519#  5523#  5534#  5535#  5536#  5537#  5548#  5549#  5550#  5551#  5561#  5562#  5563#  5564#  5578#
                5582#  5592#  5593#  5594#  5595#  5606#  5607#  5608#  5609#  5619#  5620#  5621#  5622#  5636#  5640#
                5650#  5651#  5652#  5653#  5664#  5665#  5666#  5667#  5677#  5678#  5679#  5680#  5696#  5700#  5711#
                5712#  5713#  5714#  5727#  5729#  5730#  5731#  5741#  5742#  5743#  5744#  5758#  5762#  5772#  5773#
                5774#  5775#  5786#  5787#  5788#  5789#  5799#  5800#  5801#  5802#  5814#  5850#  5855#  5860#  5874#
                5899#  5903#  5910#  5947#  5996#  6027#  6068#  6071#  6106#  6155#  6186#  6193#  6203#  6214#  6216#
                6226#  6228#  6236#  6238#  6249#  6260#  6262#  6271#  6273#  6281#  6283#  6308#  6320#  6332#  6337#
                6349#  6364#  6382#  6391#  6395#  6402#  6411#  6418#  6524#  6525#  6548#  6564#  6565#  6581#  6582#
                6586#  6595#  6632#  6635#  6646#  6674#  6677#  6681#  6687#  6700#  6747#  6749#  6756#  6759#  6765#
                6767#  6773#  6775#  6783#  6785#  6789#  6790#  6795#  6796#  6801#  6803#  6822#  6852#  6869#  6872#
                6890#  6891#  6898#  6902#  6914#  6936#  6939#  6945#  6960#  6977#  6981#  7012#  7015#  7030#  7061#
                7065#  7080#  7098#  7099#  7101#  7116#  7118#  7132#  7135#  7137#  7148#  7154#  7170#  7172#  7173#
                7180#  7181#  7213#  7216#  7225#
M$GNLS          1913#  3434#  4580#  4613#  4650#  4664#  5006#  5019#  5032#  5063#  5075#  5087#  5120#  5134#  5147#
                5179#  5192#  5205#  5238#  5251#  5264#  5297#  5310#  5323#  5361#  5374#  5387#  5419#  5432#  5445#
                5477#  5491#  5504#  5536#  5550#  5563#  5594#  5608#  5621#  5652#  5666#  5679#  5713#  5730#  5743#
                5774#  5788#  5801#
M$GNSU          1898#  3434#
M$GNTA          1890#  3434#  3534#  3546#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#
                4190#  4192#  4193#  4197#  4198#  4199#  4203#  4208#  4212#  4216#  4221#  4225#  4230#  4234#  4239#
```

```
                4270#   4406#   4427#   4440#   4457#   4473#   4513#   4556#   4588#   4622#   4670#   4717#   4761#   4824#   4915#
                4972#   5033#   5088#   5148#   5206#   5265#   5324#   5388#   5446#   5505#   5564#   5622#   5680#   5744#   5802#
                5860#   5910#   6071#   6193#   6238#   6283#   6337#   6418#   6595#   6635#   6687#   6822#   6872#   6902#   6945#
                6981#   7015#   7065#   7154#   7181#   7216#
M$GNTE          1894#   3434#   4493#   4523#   4563#   4595#   4630#   4679#   4724#   4769#   4832#   4924#   4985#   5046#   5101#
                5161#   5219#   5278#   5337#   5401#   5459#   5518#   5577#   5635#   5695#   5757#   5813#   5873#   5945#   6104#
                6202#   6248#   6291#   6348#   6429#   6605#   6644#   6697#   6833#   6882#   6912#   6958#   6994#   7028#   7077#
M$HAPT          1739#   3434#   3474#
M$HNAP          1824#   3434#   3474#
M$INCR          2026#   3434#   3440#   3482#   3519#   3543#   4177#   4178#   4179#   4180#   4182#   4184#   4185#   4186#   4187#
                4188#   4189#   4190#   4192#   4193#   4197#   4198#   4199#   4201#   4202#   4203#   4205#   4206#   4207#   4208#
                4209#   4210#   4211#   4212#   4213#   4214#   4215#   4216#   4218#   4219#   4220#   4221#   4222#   4223#   4224#
                4225#   4226#   4227#   4228#   4229#   4230#   4231#   4232#   4233#   4234#   4236#   4237#   4238#   4239#   4252#
                4270#   4287#   4302#   4305#   4308#   4311#   4325#   4406#   4409#   4423#   4427#   4437#   4438#   4440#   4454#
                4456#   4457#   4472#   4473#   4493#   4500#   4507#   4511#   4513#   4523#   4541#   4543#   4553#   4556#   4563#
                4564#   4570#   4578#   4579#   4580#   4588#   4595#   4596#   4602#   4611#   4612#   4613#   4622#   4630#   4631#
                4636#   4648#   4649#   4650#   4651#   4662#   4663#   4664#   4670#   4679#   4706#   4707#   4712#   4717#   4724#
                4750#   4751#   4756#   4761#   4769#   4794#   4795#   4817#   4818#   4819#   4824#   4832#   4833#   4860#   4878#
                4882#   4883#   4913#   4915#   4924#   4925#   4943#   4944#   4958#   4970#   4972#   4985#   4987#   4992#   5004#
                5005#   5006#   5007#   5017#   5018#   5019#   5020#   5030#   5031#   5032#   5033#   5046#   5047#   5052#   5061#
                5062#   5063#   5064#   5073#   5074#   5075#   5076#   5085#   5086#   5087#   5088#   5101#   5102#   5107#   5117#
                5119#   5120#   5121#   5131#   5133#   5134#   5135#   5145#   5146#   5147#   5148#   5161#   5162#   5167#   5177#
                5178#   5179#   5180#   5190#   5191#   5192#   5193#   5203#   5204#   5205#   5206#   5219#   5220#   5226#   5236#
                5237#   5238#   5239#   5249#   5250#   5251#   5252#   5262#   5263#   5264#   5265#   5278#   5279#   5285#   5295#
                5296#   5297#   5298#   5308#   5309#   5310#   5311#   5321#   5322#   5323#   5324#   5337#   5338#   5343#   5358#
                5360#   5361#   5362#   5372#   5373#   5374#   5375#   5385#   5386#   5387#   5388#   5401#   5402#   5407#   5417#
                5418#   5419#   5420#   5430#   5431#   5432#   5433#   5443#   5444#   5445#   5446#   5459#   5460#   5464#   5475#
                5476#   5477#   5478#   5489#   5490#   5491#   5492#   5502#   5503#   5504#   5505#   5518#   5519#   5523#   5534#
                5535#   5536#   5537#   5548#   5549#   5550#   5551#   5561#   5562#   5563#   5564#   5577#   5578#   5582#   5592#
                5593#   5594#   5595#   5606#   5607#   5608#   5609#   5619#   5620#   5621#   5622#   5635#   5636#   5640#   5650#
                5651#   5652#   5653#   5664#   5665#   5666#   5667#   5677#   5678#   5679#   5680#   5695#   5696#   5700#   5711#
                5712#   5713#   5714#   5727#   5729#   5730#   5731#   5741#   5742#   5743#   5744#   5757#   5758#   5762#   5772#
                5773#   5774#   5775#   5786#   5787#   5788#   5789#   5799#   5800#   5801#   5802#   5813#   5814#   5850#   5855#
                5860#   5873#   5874#   5899#   5903#   5910#   5945#   5947#   5996#   6027#   6068#   6071#   6104#   6106#   6155#
                6186#   6193#   6202#   6203#   6214#   6216#   6226#   6228#   6236#   6238#   6248#   6249#   6260#   6262#   6271#
                6273#   6281#   6283#   6291#   6308#   6320#   6332#   6337#   6348#   6349#   6364#   6382#   6391#   6395#   6402#
                6411#   6418#   6429#   6524#   6525#   6548#   6564#   6565#   6581#   6582#   6586#   6595#   6605#   6632#   6635#
                6644#   6646#   6674#   6677#   6681#   6687#   6697#   6700#   6747#   6749#   6756#   6759#   6765#   6767#   6773#
                6775#   6783#   6785#   6789#   6790#   6795#   6796#   6801#   6803#   6822#   6833#   6852#   6869#   6872#   6882#
                6890#   6891#   6898#   6902#   6912#   6914#   6936#   6939#   6945#   6958#   6960#   6977#   6981#   6994#   7012#
                7015#   7028#   7030#   7061#   7065#   7077#   7080#   7098#   7099#   7101#   7116#   7118#   7132#   7135#   7137#
                7148#   7154#   7170#   7213#
M$IOSE          1700#   3434#
M$LDR0          1942#   3434#   4302#   4305#   4308#   4311#   4325#   4423#   7080#
M$MASK          1671#   3434#
M$MCHI             4#   3434#
M$MCLO          1624#   3434#
M$MSK1          1677#   3434#
M$POP           1881#   3434#   3486#   3534#   3546#   4177#   4178#   4179#   4180#   4182#   4184#   4185#   4186#   4187#   4188#
                4189#   4190#   4192#   4193#   4197#   4198#   4199#   4203#   4208#   4212#   4216#   4221#   4225#   4230#   4234#
                4239#   4270#   4406#   4427#   4440#   4457#   4473#   4513#   4556#   4580#   4588#   4613#   4622#   4650#   4664#
                4670#   4717#   4761#   4824#   4915#   4972#   5006#   5019#   5032#   5033#   5063#   5075#   5087#   5088#   5120#
                5134#   5147#   5148#   5179#   5192#   5205#   5206#   5238#   5251#   5264#   5265#   5297#   5310#   5323#   5324#
                5361#   5374#   5387#   5388#   5419#   5432#   5445#   5446#   5477#   5491#   5504#   5505#   5536#   5550#   5563#
                5564#   5594#   5608#   5621#   5622#   5652#   5666#   5679#   5680#   5713#   5730#   5743#   5744#   5774#   5788#
                5801#   5802#   5860#   5910#   6071#   6193#   6238#   6283#   6337#   6418#   6595#   6635#   6687#   6822#   6872#
```

```
          6902#  6945#  6981#  7015#  7065#  7154#  7181#  7216#
M$PRIN    1636#  3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#
          4193#  4197#  4198#  4199#  4202#  4206#  4207#  4210#  4211#  4214#  4215#  4219#  4220#  4223#  4224#
          4227#  4228#  4229#  4232#  4233#  4237#  4238#
M$PUSH    1631#  3434#  3440#  3482#  3519#  3543#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#
          4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#  4205#  4209#  4213#  4218#  4222#  4226#
          4231#  4236#  4252#  4287#  4409#  4437#  4454#  4472#  4493#  4523#  4563#  4570#  4595#  4602#  4630#
          4636#  4651#  4679#  4724#  4769#  4832#  4924#  4985#  4992#  5007#  5020#  5046#  5052#  5064#  5076#
          5101#  5107#  5121#  5135#  5161#  5167#  5180#  5193#  5219#  5226#  5239#  5252#  5278#  5285#  5298#
          5311#  5337#  5343#  5362#  5375#  5401#  5407#  5420#  5433#  5459#  5464#  5478#  5492#  5518#  5523#
          5537#  5551#  5577#  5582#  5595#  5609#  5635#  5640#  5653#  5667#  5695#  5700#  5714#  5731#  5757#
          5762#  5775#  5789#  5813#  5873#  5945#  6104#  6202#  6248#  6291#  6348#  6429#  6605#  6644#  6697#
          6833#  6882#  6912#  6958#  6994#  7028#  7077#  7170#  7213#
M$PUT     1972#  3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#
          4193#  4197#  4198#  4199#  4202#  4206#  4207#  4210#  4211#  4214#  4215#  4219#  4220#  4223#  4224#
          4227#  4228#  4229#  4232#  4233#  4237#  4238#
M$PUT1    1981#  3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#
          4193#  4197#  4198#  4199#  4202#  4206#  4207#  4210#  4211#  4214#  4215#  4219#  4220#  4223#  4224#
          4227#  4228#  4229#  4232#  4233#  4237#  4238#
M$RADI    2077#  3434#  7172#  7173#  7180#
M$RBR0    1952#  3434#
M$RNR0    1962#  3434#  4325#
M$SETS    2032#  3434#  3440#  3482#  3519#  3543#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#
          4188#  4189#  4190#  4192#  4193#  4197#  4198#  4199#  4201#  4205#  4209#  4213#  4218#  4222#  4226#
          4231#  4236#  4252#  4287#  4409#  4437#  4454#  4472#  4493#  4523#  4563#  4570#  4595#  4602#  4630#
          4636#  4651#  4679#  4724#  4769#  4832#  4924#  4985#  4992#  5007#  5020#  5046#  5052#  5064#  5076#
          5101#  5107#  5121#  5135#  5161#  5167#  5180#  5193#  5219#  5226#  5239#  5252#  5278#  5285#  5298#
          5311#  5337#  5343#  5362#  5375#  5401#  5407#  5420#  5433#  5459#  5464#  5478#  5492#  5518#  5523#
          5537#  5551#  5577#  5582#  5595#  5609#  5635#  5640#  5653#  5667#  5695#  5700#  5714#  5731#  5757#
          5762#  5775#  5789#  5813#  5873#  5945#  6104#  6202#  6248#  6291#  6348#  6429#  6605#  6644#  6697#
          6833#  6882#  6912#  6958#  6994#  7028#  7077#  7170#  7213#
M$STAR    1733#  3434#
M$SVC     1933#  3434#  4177#  4178#  4179#  4180#  4182#  4184#  4185#  4186#  4187#  4188#  4189#  4190#  4192#
          4193#  4197#  4198#  4199#  4202#  4203#  4206#  4207#  4208#  4210#  4211#  4212#  4214#  4215#  4216#
          4219#  4220#  4221#  4223#  4224#  4225#  4227#  4228#  4229#  4230#  4232#  4233#  4234#  4237#  4238#
          4239#  4260#  4270#  4302#  4305#  4308#  4311#  4325#  4406#  4423#  4427#  4438#  4440#  4456#  4457#
          4473#  4500#  4507    4511#  4513#  4541    4543#  4553    4556#  4564#  4570#  4578    4579#  4580#  4588#
          4596#  4602#  4611    4612#  4613#  4622#  4631#  4636#  4648    4649#  4650#  4651#  4662    4663#  4664#
          4670#  4706    4707#  4712#  4717#  4750    4751#  4756#  4761#  4794    4795#  4817    4818#  4819#  4824#
          4833#  4860    4878    4882#  4883#  4913    4915#  4925#  4943    4944#  4958    4970    4972#  4987#  4992#
          5004    5005#  5006#  5007#  5017    5018#  5019#  5020#  5030    5031#  5032#  5033#  5047#  5052#  5061
          5062#  5063#  5064#  5073    5074#  5075#  5076#  5085    5086#  5087#  5088#  5102#  5107#  5117    5119#
          5120#  5121#  5131    5133#  5134#  5135#  5145    5146#  5147#  5148#  5162#  5167#  5177    5178#  5179#
          5180#  5190    5191#  5192#  5193#  5203    5204#  5205#  5206#  5220#  5226#  5236    5237#  5238#  5239#
          5249    5250#  5251#  5252#  5262    5263#  5264#  5265#  5279#  5285#  5295    5296#  5297#  5298#  5308
          5309#  5310#  5311#  5321    5322#  5323#  5324#  5338#  5343#  5358    5360#  5361#  5362#  5372    5373#
          5374#  5375#  5385    5386#  5387#  5388#  5402#  5407#  5417    5418#  5419#  5420#  5430    5431#  5432#
          5433#  5443    5444#  5445#  5446#  5460#  5464#  5475    5476#  5477#  5478#  5489    5490#  5491#  5492#
          5502    5503#  5504#  5505#  5519#  5523#  5534    5535#  5536#  5537#  5548    5549#  5550#  5551#  5561
          5562#  5563#  5564#  5578#  5582#  5592    5593#  5594#  5595#  5606    5607#  5608#  5609#  5619    5620#
          5621#  5622#  5636#  5640#  5650    5651#  5652#  5653#  5664    5665#  5666#  5667#  5677    5678#  5679#
          5680#  5696#  5700#  5711    5712#  5713#  5714#  5727    5729#  5730#  5731#  5741    5742#  5743#  5744#
          5758#  5762#  5772    5773#  5774#  5775#  5786    5787#  5788#  5789#  5799    5800#  5801#  5802#  5814#
          5850    5855#  5860#  5874#  5899    5903#  5910#  5947#  5996    6027#  6068    6071#  6106#  6155    6186#
          6193#  6203#  6214    6216#  6226    6228#  6236    6238#  6249#  6260    6262#  6271    6273#  6281    6283#
          6308    6320    6332    6337#  6349#  6364    6382    6391    6395#  6402    6411    6418#  6524    6525#  6548
```

6564 6565# 6581 6582# 6586# 6595# 6632 6635# 6646# 6674 6677# 6681# 6687# 6700# 6747
6749# 6756 6759# 6765 6767# 6773 6775# 6783 6785# 6789 6790# 6795 6796# 6801 6803#
6822# 6852# 6869 6872# 6890 6891# 6898 6902# 6914# 6936 6939# 6945# 6960# 6977 6981#
7012 7015# 7030# 7061 7065# 7080# 7098# 7099 7101# 7116 7118# 7132 7135# 7137# 7148
7154#

M$TLAB 1929# 3434# 4177# 4178# 4179# 4180# 4182# 4184# 4185# 4186# 4187# 4188# 4189# 4190# 4192#
4193# 4197# 4198# 4199# 4202# 4203# 4206# 4207# 4208# 4210# 4211# 4212# 4214# 4215# 4216#
4219# 4220# 4221# 4223# 4224# 4225# 4227# 4228# 4229# 4230# 4232# 4233# 4234# 4237# 4238#
4239# 4270# 4302# 4305# 4308# 4311# 4325# 4406# 4423# 4427# 4438# 4440# 4456# 4457# 4473#
4500# 4507# 4511# 4513# 4541# 4543# 4553# 4556# 4564# 4570# 4578# 4579# 4580# 4588# 4596#
4602# 4611# 4612# 4613# 4622# 4631# 4636# 4648# 4649# 4650# 4651# 4662# 4663# 4664# 4670#
4706# 4707# 4712# 4717# 4750# 4751# 4756# 4761# 4794# 4795# 4817# 4818# 4819# 4824# 4833#
4860# 4878# 4882# 4883# 4913# 4915# 4925# 4943# 4944# 4958# 4970# 4972# 4987# 4992# 5004#
5005# 5006# 5007# 5017# 5018# 5019# 5020# 5030# 5031# 5032# 5033# 5047# 5052# 5061# 5062#
5063# 5064# 5073# 5074# 5075# 5076# 5085# 5086# 5087# 5088# 5102# 5107# 5117# 5119# 5120#
5121# 5131# 5133# 5134# 5135# 5145# 5146# 5147# 5148# 5162# 5167# 5177# 5178# 5179# 5180#
5190# 5191# 5192# 5193# 5203# 5204# 5205# 5206# 5220# 5226# 5236# 5237# 5238# 5239# 5249#
5250# 5251# 5252# 5262# 5263# 5264# 5265# 5279# 5285# 5295# 5296# 5297# 5298# 5308# 5309#
5310# 5311# 5321# 5322# 5323# 5324# 5338# 5343# 5358# 5360# 5361# 5362# 5372# 5373# 5374#
5375# 5385# 5386# 5387# 5388# 5402# 5407# 5417# 5418# 5419# 5420# 5430# 5431# 5432# 5433#
5443# 5444# 5445# 5446# 5460# 5464# 5475# 5476# 5477# 5478# 5489# 5490# 5491# 5492# 5502#
5503# 5504# 5505# 5519# 5523# 5534# 5535# 5536# 5537# 5548# 5549# 5550# 5551# 5561# 5562#
5563# 5564# 5578# 5582# 5592# 5593# 5594# 5595# 5606# 5607# 5608# 5609# 5619# 5620# 5621#
5622# 5636# 5640# 5650# 5651# 5652# 5653# 5664# 5665# 5666# 5667# 5677# 5678# 5679# 5680#
5696# 5700# 5711# 5712# 5713# 5714# 5727# 5729# 5730# 5731# 5741# 5742# 5743# 5744# 5758#
5762# 5772# 5773# 5774# 5775# 5786# 5787# 5788# 5789# 5799# 5800# 5801# 5802# 5814# 5850#
5855# 5860# 5874# 5899# 5903# 5910# 5947# 5996# 6027# 6068# 6071# 6106# 6155# 6186# 6193#
6203# 6214# 6216# 6226# 6228# 6236# 6238# 6249# 6260# 6262# 6271# 6273# 6281# 6283# 6308#
6320# 6332# 6337# 6349# 6364# 6382# 6391# 6395# 6402# 6411# 6418# 6524# 6525# 6548# 6564#
6565# 6581# 6582# 6586# 6595# 6632# 6635# 6646# 6674# 6677# 6681# 6687# 6700# 6747# 6749#
6756# 6759# 6765# 6767# 6773# 6775# 6783# 6785# 6789# 6790# 6795# 6796# 6801# 6803# 6822#
6852# 6869# 6872# 6890# 6891# 6898# 6902# 6914# 6936# 6939# 6945# 6960# 6977# 6981# 7012#
7015# 7030# 7061# 7065# 7080# 7098# 7099# 7101# 7116# 7118# 7132# 7135# 7137# 7148# 7154#

M$TSTL 1921# 3434# 4177# 4178# 4179# 4180# 4182# 4184# 4185# 4186# 4187# 4188# 4189# 4190# 4192#
4193# 4197# 4198# 4199# 4202# 4203# 4206# 4207# 4208# 4210# 4211# 4212# 4214# 4215# 4216#
4219# 4220# 4221# 4223# 4224# 4225# 4227# 4228# 4229# 4230# 4232# 4233# 4234# 4237# 4238#
4239# 4270# 4302# 4305# 4308# 4311# 4325# 4406# 4423# 4427# 4438# 4440# 4456# 4457# 4473#
4500# 4507# 4511# 4513# 4541# 4543# 4553# 4556# 4564# 4570# 4578# 4579# 4580# 4588# 4596#
4602# 4611# 4612# 4613# 4622# 4631# 4636# 4648# 4649# 4650# 4651# 4662# 4663# 4664# 4670#
4706# 4707# 4712# 4717# 4750# 4751# 4756# 4761# 4794# 4795# 4817# 4818# 4819# 4824# 4833#
4860# 4878# 4882# 4883# 4913# 4915# 4925# 4943# 4944# 4958# 4970# 4972# 4987# 4992# 5004#
5005# 5006# 5007# 5017# 5018# 5019# 5020# 5030# 5031# 5032# 5033# 5047# 5052# 5061# 5062#
5063# 5064# 5073# 5074# 5075# 5076# 5085# 5086# 5087# 5088# 5102# 5107# 5117# 5119# 5120#
5121# 5131# 5133# 5134# 5135# 5145# 5146# 5147# 5148# 5162# 5167# 5177# 5178# 5179# 5180#
5190# 5191# 5192# 5193# 5203# 5204# 5205# 5206# 5220# 5226# 5236# 5237# 5238# 5239# 5249#
5250# 5251# 5252# 5262# 5263# 5264# 5265# 5279# 5285# 5295# 5296# 5297# 5298# 5308# 5309#
5310# 5311# 5321# 5322# 5323# 5324# 5338# 5343# 5358# 5360# 5361# 5362# 5372# 5373# 5374#
5375# 5385# 5386# 5387# 5388# 5402# 5407# 5417# 5418# 5419# 5420# 5430# 5431# 5432# 5433#
5443# 5444# 5445# 5446# 5460# 5464# 5475# 5476# 5477# 5478# 5489# 5490# 5491# 5492# 5502#
5503# 5504# 5505# 5519# 5523# 5534# 5535# 5536# 5537# 5548# 5549# 5550# 5551# 5561# 5562#
5563# 5564# 5578# 5582# 5592# 5593# 5594# 5595# 5606# 5607# 5608# 5609# 5619# 5620# 5621#
5622# 5636# 5640# 5650# 5651# 5652# 5653# 5664# 5665# 5666# 5667# 5677# 5678# 5679# 5680#
5696# 5700# 5711# 5712# 5713# 5714# 5727# 5729# 5730# 5731# 5741# 5742# 5743# 5744# 5758#
5762# 5772# 5773# 5774# 5775# 5786# 5787# 5788# 5789# 5799# 5800# 5801# 5802# 5814# 5850#
5855# 5860# 5874# 5899# 5903# 5910# 5947# 5996# 6027# 6068# 6071# 6106# 6155# 6186# 6193#
6203# 6214# 6216# 6226# 6228# 6236# 6238# 6249# 6260# 6262# 6271# 6273# 6281# 6283# 6308#

```
            6320#  6332#  6337#  6349#  6364#  6382#  6391#  6395#  6402#  6411#  6418#  6524#  6525#  6548#  6564#
            6565#  6581#  6582#  6586#  6595#  6632#  6635#  6646#  6674#  6677#  6681#  6687#  6700#  6747#  6749#
            6756#  6759#  6765#  6767#  6773#  6775#  6783#  6785#  6789#  6790#  6795#  6796#  6801#  6803#  6822#
            6852#  6869#  6872#  6890#  6891#  6898#  6902#  6914#  6936#  6939#  6945#  6960#  6977#  6981#  7012#
            7015#  7030#  7061#  7065#  7080#  7098#  7099#  7101#  7116#  7118#  7132#  7135#  7137#  7148#  7154#
M$WORD      1994#  3434#  3474#  3496#  4260#  4507#  4541#  4553#  4564#  4578#  4596#  4611#  4631#  4648#  4662#
            4706#  4750#  4794#  4817#  4833#  4860#  4878#  4913#  4925#  4943#  4958#  4970#  4987#  5004#  5017#
            5030#  5047#  5061#  5073#  5085#  5102#  5117#  5131#  5145#  5162#  5177#  5190#  5203#  5220#  5236#
            5249#  5262#  5279#  5295#  5308#  5321#  5338#  5358#  5372#  5385#  5402#  5417#  5430#  5443#  5460#
            5475#  5489#  5502#  5519#  5534#  5548#  5561#  5578#  5592#  5606#  5619#  5636#  5650#  5664#  5677#
            5696#  5711#  5727#  5741#  5758#  5772#  5786#  5799#  5814#  5850#  5874#  5899#  5947#  5996#  6068#
            6106#  6155#  6203#  6214#  6226#  6236#  6249#  6260#  6271#  6281#  6308#  6320#  6332#  6364#  6382#
            6391#  6395#  6402#  6411#  6524#  6548#  6564#  6581#  6586#  6632#  6646#  6674#  6681#  6700#  6747#
            6756#  6765#  6773#  6783#  6789#  6795#  6801#  6803#  6852#  6869#  6890#  6898#  6914#  6936#  6960#
            6977#  7012#  7030#  7061#  7099#  7116#  7132#  7148#  7172#  7173#  7180#  7225
M$XFER      1682#  3434#
OPEN        1171#  3434#
POINTE      1176#  3434#  3464
POPSP2      3754#  6377
PRINTB      1239#  3434#  4177   4178   4179   4180   4182   4184   4185   4186   4187   4188   4189   4190   4192
            4193   4197   4198   4199   4202   4207   4211   4215   4220   4224   4228   4229   4233   4238
PRINTF      1279#  3434#  4206   4210   4214   4219   4223   4227   4232   4237
PRINTS      1319#  3434#
PRINTX      1359#  3434#
READBU      1399#  3434#
READEF      1403#  3434#  4302   4305   4308   4311
RFLAGS      1408#  3434#
ROMCLK      3830#  3905   3907   3909   3917   3924   3931   3938   3945   3947   3949   3958   3977   3982   4530
            4532   4534   4545   4547   4691   4693   4696   4698   4700   4735   4737   4740   4742   4744   4779
            4781   4784   4786   4788   4805   4807   4809   4811   4840   4842   4844   4850   4852   4864   4867
            4898   4900   4902   4904   4930   4933   4946   4951   4959   4961   4963   5820   5822   5826   5841
            5843   5883   5885   5892   5970   5972   5977   5979   6049   6051   6053   6056   6129   6131   6136
            6138   6207   6218   6230   6253   6264   6275   6310   6436   6449   6452   6455   6468   6471   6474
            6480   6482   6485   6488   6491   6499   6501   6516   6542   6555   6558   6570   6572   6575   6607
            6609   6611   6613   6617   6620   6918   6920   6926   6929   6965   6968   7001   7007   7041   7044
            7046   7055   7083   7086   7088   7091   7106   7109   7122   7124   7141
SETPRI      1413#  3434#  7080
SETVEC      1418#  3434#
SKIP04      3855#  4986
SKIP06      3841#  3971   4642   4891   5479   5538   5596   5654   5715   5776   5989   6037   6148   6645   6699
SKIP07      3848#  3972   3992   4013   6913   6959   7029
SLASH       1424#  3434#
SROMCL      3836#  3911   3951   3960   4854   4861   4996   4998   5009   5011   5022   5024   5053   5055   5065
            5067   5077   5079   5109   5111   5123   5125   5137   5139   5169   5171   5182   5184   5195   5197
            5228   5230   5241   5243   5254   5256   5287   5289   5300   5302   5313   5315   5346   5348   5364
            5366   5377   5379   5409   5411   5422   5424   5435   5437   5467   5469   5481   5483   5494   5496
            5526   5528   5540   5542   5553   5555   5584   5586   5598   5600   5611   5613   5642   5644   5656
            5658   5669   5671   5702   5704   5717   5719   5733   5735   5764   5766   5778   5780   5791   5793
            5887   5974   6133   6922
STARS       1438#  3434#
SVC         1452#  3433#  3434
XFER        1612#  3434#  4260#  4564#  4596#  4631#  4833#  4925#  4987#  5047#  5102#  5162#  5220#  5279#  5338#
            5402#  5460#  5519#  5578#  5636#  5696#  5758#  5814#  5874#  5947#  6106#  6203#  6249#  6395#  6586#
            6646#  6681#  6700#  6803#  6852#  6914#  6960#  7030#
XFERF       1616#  3434#
XFERT       1620#  3434#
```

```
$MD      4160#  4177  4178  4179  4180  4182  4184  4185  4186  4187  4188  4189  4190  4192  4193
         4197   4198  4199

. ABS.  030144     000

 ERRORS DETECTED:  0

 CZDMQC.BIC,CZDMQC.SEQ/CRF/DOC/NL:TOC=SVC34R.MLB,CZDMQC.P11
 RUN-TIME: 40 48 4 SECONDS
 RUN-TIME RATIO: 106/93=1.1
 CORE USED:  18K  (35 PAGES)

 DOCUMENT PAGES:  197
```