

TEXT LISTING

068-000439-01

PROGRAM

ECLIPSE MMPU1 DIAGNOSTIC,
PART B

TEXT TAPE

097-000439-01

ABSTRACT

THIS IS THE SECOND OF 2 PROGRAMS (EMMPU1A,
EMMPU1B) DESIGNED TO VERIFY THE OPERATION OF THE
MEMORY ALLOCATION AND PROTECTION (MAP) FEATURE.

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? NAME: EMMPUIB.TX          PART NUMBER: 097-000439
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? DESCRIPTION: ECLIPSE MMPUI DIAGNOSTIC, PART B
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? REVISION HISTORY:
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? REV.      DATE
? 00      12/31/76
? 01      01/15/80
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? THIS DIAGNOSTIC IS DESIGNED TO RUN IN AN
? AUTO-LOAD AUTO-RUN ENVIRONMENT.
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? 1.0 ABSTRACT
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? THIS IS THE SECOND OF 2 PROGRAMS (EMMPUIA,
? EMMPUIB) DESIGNED TO VERIFY THE OPERATION OF THE
? MEMORY ALLOCATION AND PROTECTION (MAP) FEATURE.
? THE FIRST PROGRAM IS A PREREQUISITE TO THE
? SECOND AND THEY ARE BOTH PREREQUISITES TO THE
? MULTIPROGRAMMING RELIABILITY TEST PROGRAM.
?
? MACHINE REQUIREMENTS
? 2.0 ECLIPSE PROCESSOR WITH MMPUI OPTION.
? 2.1 8K OF READ/WRITE MEMORY.
? 2.2 TTY
? 2.3 RTC (OPTIONAL)
? 2.4 I/O TESTER (OPTIONAL)
? 2.5 FPU (OPTIONAL)
?
? PLEASE NOTE THAT FOR A COMPLETE TEST,
? THE FOLLOWING MUST BE PRESENT:
? FPU, I/O TESTER, TTY OR CRT.
?
? OPERATING PROCEDURE
? 3.0
? 3.1 LOADING
? 3.2 START ADDRESS
? SET SWITCHES TO 200 OCTAL.
? PRESS START.
? THE PROGRAM STARTS BY PRINTING THE
? PROGRAM NAME AND REVISION NUMBER.
? IF A NON-AUTO DTOS TYPE COMMAND WAS USED ,
? THE PROGRAM PROCEEDS ASSUMING THAT THE
? SYSTEM MAP TYPE IS MMPUI. IF A DTOS AUTO TYPE
? COMMAND WAS USED THE MAP IS IDENTIFIED AND
? IF A MMPUI IS NOT FOUND, A MESSAGE
? "NOT MMPUI" IS PRINTED AND AN EXIT TO DTOS
? IS PERFORMED. WITH A MMPUI, THE PROGRAM
? INFORMS THE OPERATOR OF THE EXISTENCE
? OF ANY OF THE OPTIONS EXCLUDING THE RTC.
? THIS IS FOLLOWED BY THE NUMBER OF 1K
? MEMORY BLOCKS IN THE SYSTEM. THE MEMORY
? SIZING IS DONE USING THE LAST BLOCK FEATURE.
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? 3.3 SWITCH SETTINGS

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0003 .MAIN
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SWITCH 0 (0) = USE CONTENTS OF "SWREG"
SWITCH 0 (1) = USE DATA SWITCHES
SWITCH 1 (1) = PROCEED FROM ERROR
SWITCH 1 (0) = LOOP ON ERROR

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SWITCH 2 (1) = INHIBIT PRINTOUT TO TTY
SWITCH 3 (1) = PRINT FAILURE RATE
SWITCH 4 (1) = INHIBIT PRINTING OF PASS COUNT
SWITCH 5 (1) = ENABLE PRINTOUT TO LPT

PLEASE NOTE THAT THE SELECTION TO USE THE
DATA SWITCHES OR THE CONTENTS OF
"SWREG" MAY BE MADE ONLY AT THE BEGINNING OF
THE PROGRAM OR FOLLOWING AN ERROR.

3.4
NORMAL OPERATION
PROGRAM WILL EXECUTE ALL TESTS IN SEQUENCE
AND AUTOMATICALLY LOOP. IF SWITCH 4 IS CLEAR,
A MESSAGE "PASS" WILL BE PRINTED AT THE
END OF EACH PASS ALONG WITH THE
PASS COUNT IN DECIMAL. IF SWITCH 4 IS SET,
THE PASS COUNT WILL BE ACCUMULATED, BUT NOT
PRINTED

IF AN I/O TESTER OR AN RTC IS NOT IN THE SYSTEM,
THE TTY WILL ECHO RUBOUT CODES AT VARIOUS TIMES
IN THE PROGRAM. THIS IS NECESSARY TO PRODUCE
INTERRUPTS.

4.0
ERROR DESCRIPTION
4.1
NORMAL
UPON THE DETECTION OF AN ERROR, THE PROGRAM
WILL PRINT THE C/PC AND AC'S AND THEN LOOP.
ALSO PRINTED WILL BE THE PASS COUNT AND
"OIA" INFORMATION FROM THE MAP.
CONSULT THE LISTING FOR A TEST DESCRIPTION.
4.2
ABNORMAL
THERE ARE SEVERAL TYPES OF UNEXPECTED FAILURES
WHICH WILL CAUSE A PROGRAM HALT. THEY ARE AS
FOLLOWS:
UNEXPECTED INTERRUPT
STACK OVERFLOW OR UNDERFLOW
THE CAUSE OF ANY OF THESE FAILURES SHOULD BE
CORRECTED BEFORE RESUMING TESTING.
4.3
MAP DATA
THE CONTENTS OF THE USER AND DCH MAPS MAY
BE PRINTED FOR VISUAL ANALYSIS BY SETTING
THE SWITCHES TO 220 OCTAL AND PRESSED START.
4.4
ILLEGAL TRAP
AN ILLEGAL TRAP WITH MMPUI TESTS IS
GENERATED WHENEVER AN UNEXPECTED PROT. FAULT
HAS OCCURRED. LOC. 3 HAS THE ADDRESS
OF THE FAULT ROUTINE. A RETURN BLOCK WILL BE
PUSHED ONTO THE STACK. THE PC WILL POINT
TO THE INSTRUCTION WHICH CAUSED THE FAULT.

15.0
PROGRAM DESCRIPTION

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COMMON SUBROUTINE CALLS
THE DIAGNOSTIC IS COMPRISED OF A SERIES OF
SHORT TESTS. BASICALLY, EACH TEST CONSISTS
OF A SETUP PROCEDURE, ONE OR MORE EVALUATING
CASES WITH ERROR CALLS, AND A LOOP CAPABILITY.
EACH PARTICULAR TEST CASE IS DESCRIBED IN THE
LISTING. THE COMMON ROUTINES FOR SETUP (SETUP),
ERROR CALLS (EHALT), AND LOOP (LOOP) ARE
DESCRIBED HERE, ALONG WITH OTHER COMMONLY
CALLED ROUTINES.

SETUP
EACH TEST BEGINS WITH A CALL TO
SETUP. THIS ROUTINE ISSUES AN
TORST, SETS UP THE LOOP ADDRESS, RESETS
CERTAIN ERROR SWITCHES AND ITERATION
COUNTS AND INITIALIZES THE USER AND
VECTOR STACKS.

LOC'S 0,2, AND 3 ARE SET TO THE
ADDRESS OF SETUP +1.

EHALT
THIS ROUTINE IS CALLED WHEN AN ERROR IS
DETECTED. SOMETIMES AN ERROR MIGHT OCCUR
WITH USER MODE ENABLED. FOR THIS REASON,
UPON ENTRY INTO EHALT, AN SCL IS EXECUTED
TO REMOVE USER MODE. THIS ROUTINE WILL ALSO
INTERROGATE ERROR SWITCHES AND PRINT ERROR DATA.

LOOP
THIS ROUTINE IS CALLED AT THE END OF EACH TEST
SEQUENCE. IT IS USED TO ITERATE THE SEQUENCE
IF NO ERROR HAS BEEN DETECTED.
IF AN ERROR HAS BEEN DETECTED, IT IS USED TO
MAINTAIN THE SCOPE LOOP AND INTERROGATE THE
SWITCHES, ETC. THE USER STACK AND VECTOR STACK
ARE ALSO INITIALIZED. THE TEST WILL BE
ITERATED USING THE COUNT PROVIDED BY
THE SETUP PROCEDURE.

LEPAB
MAP ALL OF MEMORY TO
LOGICAL = PHYSICAL

EUSRA
ENABLE USER A.

EUSRB
ENABLE USER B.

SLMP
EXECUTE A 1 WORD LMP WITH THE
DATA FOLLOWING THE CALL.

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S.1
SET UP THE AC'S FOR A LMP INSTRUCTION
AS PER THE WORDS FOLLOWING THE CALL.
WORD 1 = AC0 WORD 2 = AC1
WORD 3 = AC2 WORD 4 = AC3

SETDONE
THE DONE FLOP IS SET IN ONE OF
THE FOLLOWING DEVICES:
RTC, I/O TESTER OR ITY/CRT.

SUMAP
A BLOCK OF MEMORY IS SET UP TO DO A BLOCK
LOAD OF THE MAP VIA A LMP. THE CALL
IS FOLLOWED BY 6 PAIRS OF TWO WORDS. THE
FIRST WORD IN EACH PAIR IDENTIFIES WHICH
MAP:
0=USER A, 400=USER B
1000=DCH A, 1400=DCH B
1200=EXT DCH A, 1600=EXT DCH B
THE SECOND WORD IN EACH PAIR DENOTES
HOW THAT MAP IS TO BE LOADED:
0 = 0'S, 1 = 1'S, 2 = ADDRESS

RCBLK
THIS ROUTINE IS USED FOLLOWING A BLOCK
LOAD OF THE MAP BY A LMP TO READ
BACK AND CHECK THE LOADED MAPS.
AS DESCRIBED ABOVE FOR THE "SUMAP" ROUTINE,
THE CALL IS FOLLOWED BY A USER SELECTION
WORD AND A LOAD SPECIFIER.

TRAN
IF NO ERROR EXISTS, A NEW
RANDOM # IS RETURNED IN AC0.
IF AN ERROR EXISTS, THE OLD
# IS RE-CIRCULATED.

5.2 MONITOR LOCATIONS

THE FOLLOWING LOCATIONS IN PAGE 0 MAY BE
MONITORED/EXAMINED TO PROVIDE ADDITIONAL
INFORMATION.

LOC 200 USED BY DTOS
LOC 201 CURRENT TEST ADDRESS LCCATION
LOC 202 STARTING ADDRESS FOR PROGRAM
LOC 203 PROGRAM PASS COUNT
LOC 204 TEST ITERATION COUNT

5.3 MEMORY MAP

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UNLESS OTHERWISE SPECIFIED, MEMORY
IS ALWAYS MAPPED TO ITSELF. THAT IS
LOGICAL=PHYSICAL FOR USER A AND USER B.

SEQUENCE OF TESTING

16.0 THE TESTING SEQUENCE FOR
PROGRAM EMPPIB IS AS FOLLOWS:

USER MODE IS RESET BY SPECIAL CASES
256K TESTS
LEF INSTRUCTION
INTERRUPT
MAP ENABLE VIA SPECIAL CASES
MAP ENABLE VIA @ BIT
DCH TESTS
FPU TESTS
MISCELLANEOUS TESTS

17.0 PROGRAMMING DESCRIPTION FOR MAP FEATURE

THE INSTRUCTIONS WHICH MAY BE
USED TO SETUP AND INTERROGATE
THE MAP FEATURE ARE BRIEFLY
DESCRIBED HERE.

7.1 DOA INSTRUCTION

THE DOA INSTRUCTION WITH THE FOLLOWING
FORMAT DEFINES THE PROTECTION FEATURES
THAT ARE TO BE ENABLED FOR A USER.

BIT CONTENTS
0-5 UNUSED
6-8 FORMAT BITS
9 LEF MODE
10 I/O PROTECT
11 WRITE PROTECT
12 INDIRECT PROTECT
13 USER, A=0, B=1
14 DATA CHANNEL MAP ENABLE
15 USER MAP ENABLE

7.2 DOB INSTRUCTION

THE DOB INSTRUCTION MAY BE USED
TO MAP SUPERVISOR BLOCK 31. BITS 6-15

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OF THE SPECIFIED AC DENOTE A
PHYSICAL BLOCK NUMBER TO WHICH
LOGICAL 31 WILL BE MAPPED WHEN
IN THE SUPERVISOR MODE.

7.3 DIA INSTRUCTION

THE DIA INSTRUCTION MAY BE USED
TO READ INTO THE SPECIFIED AC
THE STATUS OF THE LAST ENABLED USER.

BIT CONTENTS
0 UNUSED
1 EXTERNAL FAULT
2 I/O ERROR
3 WRITE ERROR
4 DEFER ERROR
5 SINGLE REFERENCE
6-8 FORMAT
9 LEF
10 I/O PROTECT
11 WRITE PROTECT
12 INDIRECT PROTECT
13 USER, A=0, B=1
14 DATA CHANNEL MAP ENABLE
15 USER MODE INTERRUPT

7.4 DOO INSTRUCTION

THE DOO INSTRUCTION MAY BE USED TO
TRANSLATE A LOGICAL BLOCK NUMBER TO
ITS CORRESPONDING PHYSICAL BLOCK NUMBER.
THE RESULT IS PLACED IN BITS 9-15 OF
THE MAP STATUS REGISTER.

BIT CONTENTS
0 UNUSED
1-5 LOGICAL BLOCK NUMBER TO
BE TRANSLATED
6-8 FORMAT
7.5 DIC INSTRUCTION

THE DIC INSTRUCTION MAY BE USED TO READ
THE PHYSICAL BLOCK # CORRESPONDING TO THE
LOGICAL BLOCK SPECIFIED BY THE LAST
TRANSLATE BLOCK INSTRUCTION (DOO).

BIT CONTENTS

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10009 .MAIN
01 WRITE PROTECT
02 FORMAT
03 UNUSED
04 EXTERNAL
05 EXTERNAL BLOCK #
06
07 MAP SINGLE CYCLE
08
09 AN IO PULSE ISSUED TO THE MAP
10 ALLOWS THE LAST USER MAP ENABLED
11 TO BE MAPPED FOR ONE MEMORY REFERENCE.
12 THE FIRST MEMORY REFERENCE AFTER
13 THE NEXT LOAD OR STORE INSTRUCTION
14 IS MAPPED. AFTER THE MEMORY CYCLE
15 IS MAPPED, THE USER MAP IS AGAIN
16 DISABLED.
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8.0 I/O TESTER HARDWARE DESCRIPTION
8.1 TEST BOARD COMMANDS
    TORST = CLEAR THE TESTER (IF NEW MODE)
    WIOC 0 = CLEAR THE TESTER (IF NEW MODE)
    INTA = READ THE DATA BUFFER (NOT NEW MODE)
    DATIB = READ THE PULSE DETECTORS
    DATIA = READ THE DATA BUFFER
    DATOA = READ THE DCH ADDRESS BUFFER (NEW MODE)
    DATOB = LOAD THE DATA BUFFER
    DATOC = LOAD THE FUNCTION BUFFER
    DATOC = LOAD THE DATA AND DCH ADDRESS BUFFERS
8.2 FUNCTION REGISTER BIT ASSIGNMENTS
    BIT 0 SET DCH SYNC
    BIT 1 SET DCH MODE0
    BIT 2 SET DCH MODE1
    BIT 3 SET PI SYNC
    BIT 4 BUSY (IF NOT IN NEW MODE)
    BIT 5 DONE (IF NOT IN NEW MODE)
    BIT 6 NEW MODE
    BITS 7-9 AN OCTAL # WHICH SPECIFIES THE
    # OF RGENB PULSES BETWEEN
    SUCCESSIVE DCH CYCLES. (NEW MODE ONLY)
    NOTE THAT 0 SPECIFIES 1 RGENB PULSE.
    BITS 10-15 # OF DCH CYCLES TO BE RUN.
    (NEW MODE ONLY)
    NOTE THAT 0 SPECIFIES 1 DCH CYCLE.
8.3 PULSE DETECTOR BIT ASSIGNMENTS
    BIT 0 IOPLS
    BIT 1 INTA (INTA AND DCHP)
    BIT 2 MSKO
    BIT 3 DCHI
    BIT 4 OVFL0
    BIT 5 UCHO
    BIT 6 DCHA
    BIT 7 RGENB (COMPLEMENTS WITH EACH PULSE)
    BIT 8 DATOA
    BIT 9 DATOB
    BIT 10 DATOC
    BIT 11 DATIA
    BIT 12 DATIB
    BIT 13 DATIC (NOT SET IF DEV CODE = 0)
    BIT 14 STWT
    BIT 15 CLR
8.4 TEST BOARD LOGIC
    THE TEST BOARD CONTAINS 16 PULSE
    DETECTOR FLIP FLOPS. THESE FF'S MAY
    BE READ BY A "DIC" WITH A DEVICE

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CODE OF 0. THEY MAY BE CLEARED BY
IORST OR NI0C 0 (IF IN NEW MODE).
A PARTICULAR FF SETS WHENEVER
A PULSE OCCURS ON THE LINE TO
WHICH IT IS CONNECTED.

THE TEST BOARD ALSO CONTAINS
A 16 BIT DATA BUFFER. THIS
BUFFER MAY BE LOADED/READ ETC.
UNDER PROGRAM CONTROL. THIS
BUFFER IS ALSO USED FOR DCH
OPERATIONS. IT SHOULD BE NOTED THAT
IN NEW MODE, ANY LOAD DATA BUFFER
PROCEDURE, ACTUALLY LOADS THE
EXCLUSIVE OR OF THE OUTPUT DATA
AND THE DATA PREVIOUSLY STORED IN THE BUFFER.

A 16 BIT DCH ADDRESS BUFFER
IS USED TO DIRECT DCH REQUESTS
TO ANY LOCATION IN/OUT OF MEMORY.

.EOT

0012 .MAIN

**00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS