

Micro Fiche Scan

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DEUNA

Test description:

REPAIR DIAG

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IDENTIFICATION

PRODUCT CODE: AC-T363B-MC
PRODUCT NAME: CZLAABO REPAIR DIAG
PRODUCT DATE: JANUARY 1983
MAINTAINER: DISTRIBUTED SYSTEMS DIAGNOSTIC ENGINEERING
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TABLE OF CONTENTS

1.0	GENERAL INFORMATION
1.1	PROGRAM ABSTRACT
1.2	SYSTEM REQUIREMENTS
1.3	RELATED DOCUMENTS AND STANDARDS
1.4	DIAGNOSTIC HIERARCHY PREREQUISITES
1.5	ASSUMPTIONS
2.0	OPERATING INSTRUCTIONS
2.1	COMMANDS
2.2	SWITCHES
2.3	FLAGS
2.4	HARDWARE QUESTIONS
2.5	SOFTWARE QUESTIONS
2.6	EXTENDED P-TABLE DIALOGUE
2.7	QUICK STARTUP PROCEDURE
3.0	ERROR INFORMATION
4.0	PERFORMANCE AND PROGRESS REPORTS
5.0	DEVICE INFORMATION TABLES
6.0	TEST SUMMARIES

67USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 4
 CZUAAB.MAC 07-APR-83 17:03

.PAGE
 8
 .REM 8

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

THIS PRODUCT IS THE PDP-11 REPAIR LEVEL DIAGNOSTIC FOR THE UNIBUS TO NI ADAPTER (DEUNA). THIS DIAGNOSTIC WAS DESIGNED TO DETECT STATIC AND DYNAMIC HARDWARE FAILURES IN THE DEUNA BOARDSET. THE DEUNA BOARDSET IS THE TWO MODULES WHICH PLUG INTO THE PDP-11 UNIBUS. THE TWO MODULES ARE THE M7792 PORT MODULE AND THE M7793 LINK MODULE. THIS DIAGNOSTIC IS CAPABLE OF TESTING EIGHT SUCH BOARDSETS ON A SINGLE PDP-11 UNIBUS.

THIS DIAGNOSTIC WILL ONLY RUN IN A STANDALONE, OFFLINE ENVIRONMENT. THE DEUNA IS LOGICALLY REMOVED FROM THE 'WIRE' BY THE DIAGNOSTIC, SO NO MESSAGES FROM OTHER NODES ON THE NETWORK, TO THE DEUNA UNDER TEST, WILL DISRUPT THE TESTING PROCESS. HOWEVER, BECAUSE THIS DIAGNOSTIC RUNS THE DEUNA SELF-TEST IN TEST 9, AND THE SELF-TEST PERFORMS AN EXTERNAL LOOPBACK AS PART OF ITS TESTING PROCEDURE, IT IS RECOMMENDED THAT THE DEUNA TRANSCEIVER CABLE BE REMOVED FROM THE H4000 TRANSCEIVER AND PLUGGED INTO A FIELD SERVICE EXTERNAL LOOPBACK CONNECTOR.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT. THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

THE FOLLOWING LIST OF HARDWARE IS REQUIRED TO RUN THIS DIAGNOSTIC:

PDP-11 CPU
 28K WORDS OF MEMORY
 CONSOLE TERMINAL
 DEUNA BOARDSET (M7792, M7793)
 PLUS, ONE OF THE FOLLOWING:
 -LINK BOARD TO BULKHEAD CABLE CONNECTED AND BULKHEAD TO
 TRANSCEIVER TAP CABLE CONNECTED (NORMAL ONLINE CONFIGURATION)
 OR
 -LINK BOARD TO BULKHEAD CABLE CONNECTED AND BULKHEAD TO FIELD
 SERVICE EXTERNAL LOOPBACK CONNECTOR INSTALLED (OFFLINE CONFIGURATION)

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP+ USERS MANUAL CHOUS
 XXDP+ PROGRAMMERS MANUAL
 DEUNA LINK BOARD FUNCTIONAL SPECIFICATION
 DEUNA PORT BOARD FUNCTIONAL SPECIFICATION
 DEUNA PROGRAMMING SPECIFICATION

67USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 5
 CZUAB.MAC 07-APR-83 17:03

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THIS DIAGNOSTIC ASSUMES THAT THE PDP-11 PROCESSOR AND MEMORY ARE IN WORKING CONDITION AND IS CAPABLE OF EXECUTING PDP-11 INSTRUCTIONS NORMALLY. THE UNIBUS IS EXPECTED TO BE FULLY OPERATIONAL I.E. ANY PROBLEMS REPORTED BY THIS DIAGNOSTIC, ABOUT THE INTEGRITY OF THE UNIBUS, ARE ASSUMED TO BE THE RESULT OF A FAILURE ON THE DEUNA AND NOT THE FAULT OF OTHER DEVICES CONNECTED TO THE UNIBUS.

THIS DIAGNOSTIC DOES NOT REQUIRE ANY PRELIMINARY TESTS BE EXECUTED ON THE DEUNA, NOR DOES RUNNING OF ANY OTHER TESTS PRIOR TO RUNNING THIS DIAGNOSTIC, AFFECT THE OPERATION OF THE TESTS IN THIS DIAGNOSTIC.

FOR A COMPLETE TEST OF THE DEUNA, ALL THE AVAILABLE DIAGNOSTIC SOFTWARE SHOULD BE RUN. THIS WOULD INCLUDE RUNNING THE DEUNA FUNCTIONAL DIAGNOSTIC AND THE DEUX-11 SYSTEM EXERCISOR WITH THE DEUNA MODULE SELECTED.

1.5 ASSUMPTIONS

THIS DIAGNOSTIC ASSUMES THAT THE DEUNA WILL NOT HANG THE UNIBUS WHEN AN ACCESS IS MADE TO ANY ONE OF THE PCSR REGISTERS. THE DEUNA IS CAPABLE OF ASSERTING ACLO ON THE UNIBUS, THIS FEATURE COULD, IF BROKEN, CAUSE THE UNIBUS TO HANG. THIS TYPE OF FAILURE IS NOT DETECTED BY THE DIAGNOSTIC.

PORTIONS OF THIS DIAGNOSTIC USE SPECIAL DIAGNOSTIC MICROCODE THAT IS LOADED INTO THE DEUNA WRITEABLE CONTROL STORE. THIS MICROCODE ALLOWS THE DIAGNOSTIC MORE VISIBILITY INTO THE INTERNALS OF THE DEUNA HARDWARE AS WELL AS NOT RELYING AS HEAVILY ON THE COMPLEX OPERATIONAL MICROCODE IN ROM, HOWEVER, THIS INCREASES THE DIAGNOSTIC'S COMPLEXITY SOMEWHAT. THEREFORE, IT IS ASSUMED THAT THE USER OF THIS DIAGNOSTIC IS FAMILIAR WITH THE DEUNA ENOUGH TO READ DEUNA MICROCODE SHOULD AN ERROR OCCUR.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT BTEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME)
DROP	DEACTIVATE A UNIT

DISPLAY TYPE A LIST OF ALL DEVICE INFORMATION
 FLAGS TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
 ZFLAGS CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE "STA" INSTEAD OF "START".

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY "DDDD".

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDD	EXECUTE DDDDD PASSES (DDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDD = 1 TO 64000)
/UNITS:LIST	TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

START/TESTS:1-5/PASS:1000/EOP:100

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS, NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBE*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXE*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	'BELL' ON ERROR
UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
IDR	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST

*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1

SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE, TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS AND TYPE A 'BELL' ON ERROR, YOU MAY USE THE FOLLOWING STRING:

```
/FLAGS:LOE:IER:BOE
```

2.4 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING QUESTIONS FOR EACH UNIT.

WHAT IS THE PCSRO ADDRESS?

67USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 8
 CZUAAB.MAC 07-APR-83 17:03

THIS IS THE ADDRESS AT WHICH PCSRO RESIDES ON THE UNIBUS.
 THIS ADDRESS IS SWITCH SELECTABLE ON THE PORT MODULE.
 THE ALLOWABLE RANGE IS 160000-177776.

WHAT IS THE VECTOR ADDRESS?
 THIS IS THE INTERRUPT VECTOR ADDRESS. THIS ADDRESS IS ALSO
 SWITCH SELECTABLE ON THE PORT MODULE. THE ALLOWABLE RANGE
 IS 000-776.

SAMPLE DIALOGUE:

DR>START

CHANGE HW (L) ? Y

UNITS (D) ? 2

UNIT 0

WHAT IS THE PCSRO ADDRESS? (0) ? 170000
 WHAT IS THE VECTOR ADDRESS? (0) ? 700

UNIT 1

WHAT IS THE PCSRO ADDRESS? (0) ? 170010
 WHAT IS THE VECTOR ADDRESS? (0) ? 710

2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE AND ANSWER ANY QUESTIONS THE MONITOR ASKS
3. TYPE 'R NAME', WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
6. ANSWER ALL THE HARDWARE QUESTIONS

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE
 DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS
 ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY
 A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES
 ARE ALWAYS PRINTED UNLESS THE "IER" FLAG IS SET (SECTION 2.3).
 THE GENERAL ERROR MESSAGE IS OF THE FORM:

67USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 9
 CZUAAB.MAC 07-APR-83 17:03

NAME TYPE NUMBER ON UNIT NUMBER TST NUMBER PC:XXXXXX
 ERROR MESSAGE

.WHERE: NAME = DIAGNOSTIC NAME
 TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
 NUMBER = ERROR NUMBER
 UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
 TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
 PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE "IER" OR "IBR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE "IER", "IBE" OR "IXE" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE "EOP" SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

5.0 DEVICE INFORMATION TABLES

AT THE COMPLETION OF THE FIRST PASS OF EACH DEUNA BEING TESTED, INFORMATION FOR THAT DEUNA IS PRINTED. THIS PRINTOUT CONTAINS THE ETHERNET DEFAULT ADDRESS (OBTAINED BY READING THE PHYSICAL ADDRESS ROM), THE OPERATIONAL MICROCODE ROM VERSION NUMBER, AND THE SWITCH PACK SETTINGS FOR SELF TEST LOOPING AND REMOTE BOOTING.

EXAMPLE PRINTOUT:

ETHERNET DEFAULT ADDRESS (HEX): AA-00-03-00-00-02

ROM MICROCODE VERSION (DECIMAL): 1

SWITCH PACK SET FOR :

SELF TEST LOOP DISABLED

REMOTE BOOT ENABLED

6.0 TEST SUMMARIES

TEST 1: PCSRO READ ACCESS TEST

THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 0 CAN BE READ FROM THE UNIBUS AND THAT THE PREDETERMINED BITS APPEAR IN THE EXPECTED BIT POSITIONS.

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 10
CZUAAB.MAC 07-APR-83 17:03

TEST 2: PCSR1 READ ACCESS TEST

THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER CAN BE READ FROM THE UNIBUS AND THAT THE PREDETERMINED BITS APPEAR IN THE EXPECTED BIT POSITIONS.

TEST 3: PCSR2 READ ACCESS TEST

THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 2 CAN BE READ FROM THE UNIBUS

TEST 4: PCSR3 READ ACCESS TEST

THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 3 CAN BE READ FROM THE UNIBUS

TEST 5: RESET TEST

THIS TEST WILL VERIFY THE RESET STATE FOR ALL DEUNA UNIBUS REGISTERS

TEST 6: PCSR2 REGISTER READ/WRITE TEST

THIS TEST WILL CHECK THE REGISTER FOR ALL SA0 AND SA1 ERRORS (STUCK AT 0 AND STUCK AT 1 ERRORS). THE HOST WILL WRITE PATTERNS TO THE REGISTER AND READ THEM BACK TO VERIFY. THE PATTERNS TO BE USED ARE AT THE LABEL PATERN:: IN THE GLOBAL DATA SECTION OF THIS PROGRAM.

NOTE: SINCE PCSR2 BIT 00 IS ALWAYS PRESET TO LOGIC 0, THE LOWEST ORDER BIT OF THE PATTERN WILL BE MASKED BEFORE DOING THE COMPARISON.

TEST 7: REGISTER PCSR3 READ/WRITE TEST

THIS TEST WILL WRITE PATTERNS TO THE WRITEABLE FIELD OF PCSR3 AND WILL READ THESE BACK FOR VERIFICATION.

TEST 8: NOP TEST

THIS TEST WILL VERIFY THAT THE DEUNA PROCESSOR IS ALIVE AND CAN RESPOND TO A PORT COMMAND ISSUED. THE NOP PORT COMMAND WILL BE ISSUED TO THE DEUNA IN PCSR0 BITS 3:0 AND WILL WAIT FOR THE 'DNI' BIT TO SET IN PCSR0.

THE NOP PORT COMMAND USES A MINIMUM OF HARDWARE BUT FORCES THE T11 TO EXECUTE THE PORT COMMAND SEQUENCE.

TEST 9: SELF TEST

THIS TEST VERIFIES THAT THE ROM BASED SELF TEST
CAN BE RUN SUCCESSFULLY WHEN INVOKED VIA
THE SELF TEST PORT COMMAND.

TEST 10: DEUNA ROM DUMP TEST

THIS TEST WILL VERIFY THAT THE DATA PATH FROM THE T11 PROCESSOR
TO THE UNIBUS INTERFACE IS INTACT AND ABLE TO TRANSFER DATA RELIABLY.
THIS DATA PATH IS CRUCIAL FOR FURTHER TESTING BECAUSE IT IS NECESSARY
FOR LOADING REPAIR-LEVEL DIAGNOSTICS INTO THE WCS.

THE TEST STRATEGY IS TO TRANSFER KNOWN DATA OVER THE DATA PATH AND TO
VERIFY THE TRANSFERRED DATA.

THE DATA SOURCE FOR THE DUMP TEST IS THE ROM MICROCODE RESIDENT ON THE
DEUNA PORT BOARD. A DUMP OF THE ROM WILL EXERCISE THE DATA PATH NEEDED
FOR LOADING WCS AND THE ROM CONTENTS CAN BE VERIFIED. THE ROM MICROCODE
WILL BE CHECKED BY VERIFYING THE CRC BYTES. THE CRC BYTES CHARACTERIZE
THE DATA CONTENTS OF THE ROM AND ARE BURNED INTO THE ROM AT THE TIME OF
MANUFACTURE. A FAILURE TO VERIFY THE CRC CALCULATION ON THE DUMPED ROM
DATA DUMP WILL BE INTERPRETED AS AN ERROR IN THE DATA PATH.

TEST 11: WCS LOAD/DUMP TEST

THIS TEST WILL USE THE LOAD/DUMP PORT COMMAND TO VERIFY THE DATA
PATHWAY TO/FROM THE WCS. PATTERNS WILL BE USED TO CHECK THE DATA PATHWAY
FOR ALL SA0 AND SA1 ERRORS.

BECAUSE THE OPERATIONAL MICROCODE NEEDS THE LOWER 2K OF WCS ONLY THE TOP HALF
OF WCS WILL BE LOADED WITH A DATA PATTERN THEN DUMPED BACK
TO MEMORY FOR VERIFICATION. THIS PROCEDURE WILL BE REPEATED FOR ALL PATTERNS.

TEST 12: LOAD AND START FUNCTION TEST

THIS TEST WILL VERIFY THAT THE LOAD AND START MICROADDRESS PORT COMMAND
IS OPERATIONAL.

THE PROCESS IS TO LOAD WCS WITH MICROCODE THAT WHEN STARTED WILL WRITE
A PATTERN OF DATA TO THE LITE-BYTE FIELD OF PCSR1 REGISTER WHICH CAN BE READ
FROM THE UNIBUS AND BE VERIFIED.

NOTE: THIS TEST USES MICROCODE MODULE 'A'

TEST 13: COMPREHENSIVE WCS MEMORY TEST

THIS TEST WILL EXHAUSTIVELY TEST THE WCS MEMORY.
CUSTOM MICROCODE MODULE B, MICROTEST #1 IS USED TO DO THE ACTUAL TESTING.
MICROTEST #1 RUNS A SERIES OF MICROSUBTESTS TESTS ON THE WCS MEMORY CHECKING
FOR BOTH ADDRESS AND DATA ERRORS. IF AN ERROR DOES OCCUR THE PORT CONTROL
BLOCK WILL CONTAIN THE INFORMATION ABOUT THE ERROR.

PCBB+0: CONTAINS THE MICROSUBTEST THAT FAILED

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 12
CZUAAB.MAC 07-APR-83 17:03

PCBB+1: 0 = DATA ERROR, 1 = ADDRESS ERROR
PCBB+2: CONTAINS THE ADDRESS OF THE LOCATION
PCBB+4: CONTAINS THE DATA THAT WAS WRITTEN
PCBB+6: CONTAINS THE DATA THAT WAS READ

TEST 14: INTERRUPT VECTOR TEST

THIS TEST WILL VERIFY THAT THE INTERRUPT INTERFACE LOGIC OF THE DEUNA IS CAPABLE OF GENERATING AN INTERRUPT VECTOR AND ARBITRATING FOR CONTROL OF THE UNIBUS.
THE DEUNA INTERRUPT ENABLE BIT WILL BE SET AND AN INTERRUPT WILL BE CAUSED BY ISSUING A NOP PORT COMMAND. AN INTERRUPT IS EXPECTED AT THE CORRECT VECTOR AND AT THE CORRECT PRIORITY.

TEST 15: PCSRO INTERRUPT BIT TEST

THIS TEST WILL VERIFY THAT EACH OF THE INTERRUPT BITS IN REGISTER PCSRO CAN CAUSE AN INTERRUPT.

EACH OF THE INTERRUPTS OF REGISTER PCSRO IS SET UNDER THE CONTROL OF THE T11 AND NOT DIRECTLY BY HARDWARE. THE T11 THEREFORE CAN INITIATE UNIBUS INTERRUPTS BY SETTING BITS IN REGISTER PCSRO.

THIS TEST USES MICROMODULE C, MICROTEST #1.
MICROCODE MODULE C IS LOADED IF NOT ALREADY DONE SO BY A PREVIOUS TEST.

THE DEUNA INTERRUPT VECTOR IS SETUP TO STORE THE CONTENTS OF PCSRO WHEN THE INTERRUPT OCCURS. PCBB+0 IS LOADED WITH THE INTERRUPT BIT THAT IS TO BE TESTED THEN PCSRO COMMAND BITS ARE LOADED WITH A 1 TO TELL THE T11 TO EXECUTE MICROTEST #1. WE WAIT FOR THE INTERRUPT TO OCCUR THEN SEE IF THE CONTENTS OF PCSRO AT THE TIME OF THE INTERRUPT CONTAINED THE CORRECT INTERRUPT BIT. THE TEST IS REPEATED FOR ALL THE INTERRUPT BITS.

TEST 16: TIMER TEST

THIS TEST WILL USE THE CUSTOM MICROCODE MODULE 'C' TO CHECK THE OPERATION OF THE TIMER.

THE TIMER IS ACCESSIBLE ONLY TO THE T11 PROCESSOR. THE HOST PROCESSOR CAN START THE TIMER ONLY WITH THE ASSISTANCE OF THE T11 PROCESSOR.

FOR THIS TEST THE MICROCODE WILL BE LOADED ONLY IF IT HAS NOT ALREADY BEEN DONE BY A PREVIOUS TEST.

WHEN THE MICROCODE IS STARTED THE T11 WILL START THE TIMER AND WILL SET 'DNI' WHEN THE TIMING INTERVAL HAS EXPIRED. THE INTERVAL IS 10 SECONDS.

ANY TIME FROM 8 TO 12 SECONDS IS AN ACCEPTABLE RANGE.

TEST 17: LINK MEMORY TEST

THIS TEST WILL EXHAUSTIVELY TEST THE LINK MEMORY.

THE LINK MEMORY OCCUPIES THE 16-32K ADDRESS SPACE OF THE T-11. CUSTOM MICROCODE MODULE C MICROTEST #3 IS USED TO DO THE ACTUAL TESTING. MICROTEST #3 RUNS A SERIES OF MICROSUBTESTS TESTS ON THE LINK MEMORY CHECKING FOR BOTH ADDRESS AND DATA ERRORS. IF AN ERROR DOES OCCUR THE PORT CONTROL BLOCK WILL CONTAIN THE INFORMATION ABOUT THE ERROR.

PCBB+0: CONTAINS THE MICROSUBTEST THAT FAILED
 PCBB+1: 0 = DATA ERROR, 1 = ADDRESS ERROR,
 PCBB+2: CONTAINS THE ADDRESS OF THE LOCATION
 PCBB+4: CONTAINS THE DATA THAT WAS WRITTEN
 PCBB+6: CONTAINS THE DATA THAT WAS READ

MICROSUBTEST #	DESCRIPTION
1	ACCESS TEST
2	ADDRESS SHIFT TEST
3	DATA LATCH TEST
4	ADDRESS BIT SHIFT #1
5	ADDRESS BIT SHIFT #2
6	MARCH TEST

TEST 18: DMA 'TO' ADDRESS TEST

THIS TEST WILL VERIFY THAT THE INTERNAL REGISTER 'DMATO' CAN BE READ AND WRITTEN. THE T11 WILL BE USED TO WRITE AND READ THIS REGISTER. THIS TEST REQUIRES THE USE OF CUSTOM MICROCODE MODULE C MICROTEST #4. PCBB+0 WILL BE WRITTEN WITH THE DATA PATTERN TO TEST, THE T11 WILL WRITE THIS PATTERN TO THE 'DMATO' REGISTER AND READ IT BACK AND PUT THE DATA READ INTO PCBB+2. THE DATA AT PCBB+2 WILL BE VERIFIED.

TEST 19: DMA 'FROM' ADDRESS REGISTER TEST

THIS TEST CHECKS THE OPERATION OF THE REGISTER/COUNTER THAT CONTAINS THE ADDRESS OF THE LINK MEMORY WORD TO BE MOVED TO THE HOST DURING DMA OPERATIONS. THE REGISTER CAN BE WRITTEN BY THE T11 BUT IT CAN NOT BE READ BACK FOR VERIFICATION, THEREFORE IT MUST BE CHECKED INDIRECTLY.

THE METHOD USED IS TO LOAD MICROCODE MODULE C IF IT HAS NOT ALREADY BEEN DONE. THE MICROTEST #5 LOADS EACH LOCATION OF LINK MEMORY WITH ITS ADDRESS THEN IT TAKES THE CONTENTS OF PCBB+0 AND LOADS IT INTO THE DMA 'FROM' ADDRESS REGISTER, THE 'TO' REGISTER IS LOADED WITH THE ADDRESS OF PCBB+2, THE WORD COUNT IS LOADED FOR A ONE WORD TRANSFER AND THE DMA ENGINE IS STARTED. THE HOST VERIFIES PCBB+2 = PCBB+0

TEST 20: DMA BLOCK TRANSFER TEST

THIS TEST WILL VERIFY THAT THE DMA ENGINE CAN TRANSFER A MAXIMUM SIZE DATA BLOCK TO HOST MEMORY.

THIS TEST USES CUSTOM MICROCODE MODULE C, MICROTEST #6. THE MICROTEST FILLS EACH LOCATION OF LINK MEMORY WITH ITS ADDRESS AND THEN SETS UP A TRANSFER FROM LINK MEMORY TO THE ADDRESS POINTED TO BY PCBB+0. THE TRANSFER SIZE IS 1776 WORDS. AFTER THE MICROTEST FINISHES THE BUFFER IS CHECKED TO SEE IF IT CONTAINS THE INCREMENTING ADDRESS PATTERN.

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 14
 CZUAAB.MAC 07-APR-83 17:03

TEST 21: TRANSMIT DONE TEST

THE TRANSMIT STATE MACHINE INFORMS THE PORT MODULE PROCESSOR OF A 'TRANSMIT DONE' CONDITION. IT DOES THIS BY GENERATING AN INTERRUPT WHENEVER IT FINISHES TRANSMITTING A DATAGRAM. SINCE THE 'TRANSMIT DONE' INTERRUPT IS A NECESSARY CONDITION OF EVERY DATAGRAM TRANSMISSION, THIS TEST WILL USE THE INTERRUPT TO INDICATE THAT THE TRANSMIT STATE MACHINE IS FUNCTIONING.

MICROCODE MODULE D MICROTEST #1 WILL BE USED FOR THIS TEST. IT SETS UP THE T-11 FOR AN INTERRUPT, STARTS A DATAGRAM LOOPBACK AND WAITS FOR A TRANSMIT INTERRUPT. THE T-11 WILL BE RELEASED FROM THE LOOP IF THE XMIT DONE INTERRUPT OCCURS. UPON RELEASE THE DNI BIT WILL BE SET IN PCSRO SIGNALING THAT THE TEST IS COMPLETE.

TEST 22: RECEIVER DONE TEST

THE LINK HARDWARE INCLUDES LOGIC TO TELL THE DEUNA PROCESSOR WHEN A LINK MEMORY BUFFER HAS BEEN FILLED AND DATA IS AVAILABLE FOR PROCESSING. THE HARDWARE INTERRUPTS THE DEUNA PROCESSOR. BECAUSE THE INTERRUPT HAPPENS WHEN A LINK MEMORY BUFFER IS FULL AND THE LINK MEMORY IS FILLED BY THE OPERATION OF THE RECEIVE STATE MACHINE, THE INTERRUPT CAN BE USED TO CHECK IF THE STATE MACHINE WORKS.

MICROCODE MODULE D MICROTEST #2 WILL BE USED FOR THIS TEST. IT SETS UP THE T-11 FOR AN INTERRUPT, STARTS A DATAGRAM LOOPBACK AND WAITS FOR A RECEIVER INTERRUPT. THE T-11 WILL BE RELEASED FROM THE LOOP IF THE INTERRUPT OCCURS. UPON RELEASE THE DNI BIT WILL BE SET IN PCSRO SIGNALING THAT THE TEST IS COMPLETE.

TEST 23: DATA BYTE FRAMING TEST

THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR BYTE DATA BOUNDARY CONDITIONS.

THE T-11 PROCESSOR WILL TRANSMIT DATA IN LOOPBACK MODE. THE DATA WILL BE ORGANIZED SUCH THAT DATA BOUNDARIES ARE CREATED BETWEEN ADJACENT BYTES IN THE DATA STREAM (I.E. 11111111000000011...) THE T-11 PROCESSOR WILL VERIFY THE CONDITION OF THE DATA AFTER IT IS LOOPED BACK TO THE RECEIVER DATA BUFFER.

THIS TEST WILL USE MICROCODE MODULE 'D' MICROTEST #3. TESTING OF THE DATA FRAMING WILL BE DONE BY THE T-11 PROCESSOR. THE HOST PROCESSOR, MEANWHILE, WILL WAIT FOR A 'DNI' IN REGISTER PCSRO. IF 'DNI' APPEARS, THE HOST PROCESSOR WILL CHECK PCSR1 FOR AN ERROR CONDITION. IF AN ERROR CONDITION IS SET, ADDITIONAL ERROR INFORMATION WILL BE FOUND IN THE PCBB AS FOLLOWS:

PCBB+0: RECEIVER STATUS WORD
 PCBB+2: DATA TRANSMITTED
 PCBB+4: DATA RECEIVED
 PCBB+6: WORD OFFSET INTO RECEIVER BUFFER OF BAD DATA

TEST 24: DATA WORD FRAMING TEST

THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR WORD DATA BOUNDARY CONDITIONS.

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 15
 CZUAAB.MAC 07-APR-83 17:03

THE T-11 PROCESSOR WILL TRANSMIT DATA IN LOOPBACK MODE. THE DATA WILL BE ORGANIZED SUCH THAT DATA BOUNDARIES ARE CREATED BETWEEN ADJACENT WORDS IN THE DATA STREAM (I.E. 11111111111111110000000000000011...) THE T-11 PROCESSOR WILL VERIFY THE CONDITION OF THE DATA AFTER IT IS LOOPED BACK TO THE RECEIVER DATA BUFFER.

THIS TEST WILL USE MICROCODE MODULE 'D' MICROTEST #4. TESTING OF THE DATA FRAMING WILL BE DONE BY THE T-11 PROCESSOR. THE HOST PROCESSOR, MEANWHILE, WILL WAIT FOR A 'DNI' IN REGISTER PCSRO. IF 'DNI' APPEARS, THE HOST PROCESSOR WILL CHECK PCSR1 FOR AN ERROR CONDITION. IF AN ERROR CONDITION IS SET, ADDITIONAL ERROR INFORMATION WILL BE FOUND IN THE PCBB AS FOLLOWS:

PCBB+0: RECEIVER STATUS WORD
 PCBB+2: DATA TRANSMITTED
 PCBB+4: DATA RECEIVED
 PCBB+6: WORD OFFSET INTO RECEIVER BUFFER OF BAD DATA

TEST 25: DATA PATH PATTERN TEST

THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR ALL 'STUCK AT 0' AND 'STUCK AT 1' ERRORS.

THE T-11 PROCESSOR WILL TRANSMIT DATAGRAMS OF MAXIMUM LENGTH IN LOOPBACK MODE. THIS PATTERN LOOPBACK PROCEDURE WILL BE USED FOR ALL PATTERNS OF UP TO WORD WIDTH.

THIS TEST USES MICROMODULE 'D' MICROTEST #5 TO DO THE TESTING. THE HOST PROCESSOR WILL PASS A DATA PATTERN TO THE T-11 PROCESSOR THROUGH THE PCBB. THE T-11 WILL FILL A XMIT BUFFER WITH THE DATA PATTERN AND TRANSMIT THE DATAGRAM OVER THE LOOPBACK. THE T-11 PROCESSOR WILL VERIFY THE PATTERN IN THE RECEIVER BUFFER. IF THE T-11 FINDS AN ERROR, IT WILL WRITE THE FAILING PATTERN TO THE PCBB ALONG WITH THE OFFSET INTO THE RECEIVER BUFFER AT WHICH THE PATTERN WAS FOUND. IT WILL INFORM THE HOST OF THE ERROR BY SETTING PCSR1 TO AN ERROR CONDITION. THE PCBB IS FORMATTED AS FOLLOWS:

PCBB+0: DATA PATTERN
 PCBB+2: RECEIVER STATUS WORD
 PCBB+4: BAD DATA PATTERN
 PCBB+6: OFFSET INTO RECEIVER BUFFER WHERE BAD DATA WAS FOUND

TEST 26: STATUS MUX VERIFICATION TEST

THE LINK WRITES STATUS IN LINK MEMORY AFTER EACH TRANSMIT ATTEMPT. THE STATUS GIVES INFORMATION ABOUT THE ATTEMPTED OPERATION. THE STATUS INFORMATION IS WRITTEN INTO THE FIRST TWO LOCATIONS OF THE TRANSMIT BUFFER. THIS INFORMATION IS ACCESSIBLE TO THE T-11 BY SIMPLY READING IT FROM LINK MEMORY.

THIS TEST WILL VERIFY THAT THE STATUS INFORMATION IS WRITTEN INTO THE FIRST LOCATION OF THE TRANSMIT BUFFER. THE TEST WILL ALSO CHECK THE SECOND WORD OF THE TRANSMIT BUFFER.

THIS TEST WILL USE MICROMODULE 'D' MICROTEST #6. WHEN THE TEST IS STARTED, THE T-11 PROCESSOR WILL SET UP THE LINK FOR LOOPBACK OF A DATA PATTERN. A BACKGROUND PATTERN WILL BE WRITTEN INTO THE FIRST WORD OF THE TRANSMIT BUFFER. THIS WORD SHOULD BE OVER-WRITTEN BY THE STATUS WHEN

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 16
 CZUAAS.MAC 07-APR-83 17:03

THE BUFFER IS TRANSMITTED. THE SECOND WORD OF THE TRANSMIT BUFFER CAN NOT BE WRITTEN WITH A BACKGROUND BECAUSE IT MUST DESIGNATE THE TRANSMIT BYTE COUNT.

WHEN THE DATAGRAM HAS BEEN LOOPED BACK, THE T-11 PROCESSOR WILL PASS THE FIRST TWO WORDS OF THE TRANSMIT BUFFER TO THE HOS1 THRU THE PCBB+0 AND PCBB+2.

PCBB+0: FIRST WORD OF TRANSMIT BUFFER
 PCBB+2: SECOND WORD OF TRANSMIT BUFFER

THE CORRECT STATUS SHOULD BE:

TRANSMIT STATUS WORD 0 BITS 15:09:00 SHOULD BE ALL 0 AND
 BIT 13 SHOULD BE A 1

TRANSMIT STATUS WORD 1 BITS 15:13 SHOULD ALL BE 0

TEST 27: LINK BYTE COUNTER TEST

BYTE COUNTERS ARE INVOLVED BOTH WITH THE LINK TRANSMIT FUNCTION AND THE LINK RECEIVE FUNCTION. WHEN THE T-11 PREPARES A TRANSMIT BUFFER FOR TRANSMISSION OF A DATAGRAM, IT WRITES THE INTENDED BYTE COUNT IN THE SECOND WORD OF THE TRANSMIT BUFFER. WHEN TRANSMISSION OF THE TRANSMIT BUFFER BEGINS, THE BYTE COUNT VALUE IS USED TO LOAD THE TRANSMIT BYTE COUNTER. THIS COUNTER IS DECREMENTED BY THE TRANSMIT STATE MACHINE AS THE DATAGRAM IS TRANSMITTED. THE DATAGRAM TRANSMISSION WILL CONTINUE UNTIL THE BYTE COUNTER IS DECREMENTED TO ZERO.

THE RECEIVER ALSO HAS A BYTE COUNTER. THIS COUNTER IS CLEARED AT THE START OF A DATAGRAM RECEPTION AND IS INCREMENTED BY THE RECEIVE STATE MACHINE AS THE DATAGRAM IS RECEIVED. THE VALUE IN THIS COUNTER IS WRITTEN INTO WORD TWO OF THE RECEIVE BUFFER AT THE END OF RECEPTION.

THIS TEST WILL USE MICROMODULE 'D' MICROTTEST #7.
 THIS TEST WILL VERIFY THE BYTE COUNT LOGIC BY LOOPING MESSAGES AND VERIFYING THAT THE BYTE COUNT APPEARING IN THE RECEIVE BUFFER CORRESPONDS TO THE BYTE COUNT THAT WAS WRITTEN TO THE TRANSMIT BYTE COUNTER. THE TEST WILL ALSO VERIFY THAT THE ACTUAL NUMBER OF BYTES TRANSFERRED TO THE RECEIVE BUFFER CORRESPONDS TO THE INTENDED BYTE COUNT.

THE TRANSMIT BYTE COUNT IS PASSED TO THE T-11 VIA THE PCBB+0. AFTER THE DATAGRAM LOOPBACK THE RECEIVE BYTE COUNT IS PLACED INTO PCBB+2 BY THE T-11 PROCESSOR. PCBB+4 IS LOADED BY THE T-11 PROCESSOR WITH THE ACTUAL NUMBER OF BYTES THAT WERE TRANSFERRED TO THE RECEIVER BUFFER.

PCBB+0: TRANSMIT BYTE COUNT
 PCBB+2: RECEIVE BYTE COUNT
 PCBB+4: ACTUAL NUMBER OF BYTES RECEIVED

TEST 28: ODD BYTE TEST

THIS TEST WILL VERIFY THAT THE LINK CAN TRANSMIT AND RECEIVE DATAGRAMS HAVING ONLY ODD BYTE COUNTS.

THIS TEST IS IDENTICAL TO THE PREVIOUS BYTE COUNTER TEST WITH THE ONLY

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 17
 CZUAAB.MAC 07-APR-83 17:03

EXCEPTION THAT IT PASSES ONLY ODD BYTE COUNTS TO THE MICROCODE. IT ALSO USES MICROMODULE 'D' MICROTEST #7

TEST 29: LINK MAXIMUM BYTE COUNTER TEST

THE RECEIVE BYTE COUNTER IS A 12 BIT BINARY COUNTER THAT COUNTS THE NUMBER OF BYTES THAT WERE RECEIVED DURING A DATAGRAM TRANSMISSION. THE BYTE COUNTER IS INCREMENTED AS EACH BYTE IS RECEIVED. THE RECEIVE BYTE COUNTER HAS LOGIC THAT DISABLES THE COUNTER IF THE MAXIMUM VALUE IS REACHED AND PREVENTS THE COUNTER FROM ROLLING OVER TO ZERO.

THIS TEST WILL CHECK THAT THE COUNTER 'TOPS OUT' AT THE MAXIMUM COUNTER VALUE. IT DO THIS MICROMODULE 'D' MICROTEST #9 IS USED. IT WILL TRANSMIT A DATAGRAM OF MAXIMUM COUNTER LENGTH OVER THE LOOPBACK. THE LINK CRC HARDWARE WILL BE ALLOCATED TO THE TRANSMIT SIDE SO THAT CRC BYTES WILL APPENDED TO THE DATAGRAM. THE LENGTH OF THE DATAGRAM WILL THEREFORE EXCEED THE LENGTH OF THE RECEIVE BYTE COUNTER. THE RECEIVE COUNTER WILL BE CHECKED TO INSURE THAT THE COUNTER HAS REMAINED AT THE MAXIMUM VALUE, IF NOT AN ERROR IS PASSED TO THE HOST.

TEST 30: FIFO TEST

THERE ARE TWO FIFO'S USED IN THE DEUNA TO KEEP TRACK OF RECEIVER BUFFERS. THE FIRST IS CALLED THE 'RECEIVER BUFFER AVAILABLE FIFO' AND THE SECOND IS CALLED THE 'RECEIVER BUFFER DONE FIFO'.

THE T11 LOADS THE RECEIVER BUFFER AVAILABLE FIFO WITH A LIST OF UNUSED 1K BUFFERS IN LINK MEMORY. WHEN THE DEUNA SENSES THAT A PACKET IS COMING IN IT PULLS AN AVAILABLE BUFFER ADDRESS FROM THE OUTPUT OF THE RECEIVER BUFFER AVAILABLE FIFO AND USES IT TO ADDRESS LINK MEMORY FOR THE STORAGE OF THE RECEIVED DATA. AFTER THE DATA HAS BEEN LOADED THE RECEIVER STATE MACHINE PUTS THE USED BUFFER ADDRESS INTO THE RECEIVER BUFFER DONE FIFO WHERE AN INTERRUPT IS GENERATED TO THE T11 WHEN IT BUBBLES TO THE TOP OF THE FIFO.

THESE FIFO'S ARE 64 DEEP BY 4 BITS WIDE. THE OPERATIONAL MICROCODE ONLY FILLS THE FIFO TO A MAXIMUM OF 16. THE 4 BIT WIDTH REPRESENTS BITS 14-11 OF THE LINK MEMORY ADDRESS. THESE BITS ALLOW THE ADDRESSING OF A 1K BUFFER IN LINK MEMORY.

THIS TEST WILL VERIFY THAT THE RECEIVE BUFFER AVAILABLE FIFO AND THE RECEIVER BUFFER DONE FIFO OPERATE CORRECTLY. THIS WILL BE DONE BY LOADING THE RECEIVER BUFFER AVAILABLE FIFO WITH A 1K BUFFER ADDRESS THEN A PACKET WILL BE TRANSMITTED IN LOOPBACK MODE. AFTER THE RECEIVER INTERRUPT OCCURS THE RECEIVER BUFFER DONE FIFO IS READ AND THE ADDRESS IS COMPARED WITH WHAT WAS GIVEN THE RECEIVER BUFFER AVAILABLE FIFO. THEY SHOULD BE THE SAME IF EVERYTHING IS WORKING CORRECTLY. THE OPERATION IS PERFORMED WITH THE TRANSMITTER BUFFER SET TO 0 AND WILL BE REPEATED WITH RECEIVER BUFFERS 1-15. THIS TEST WILL USE MICROMODULE 'D' MICROTEST #10.

PARAMETERS PASSED TO THE MICROCODE WILL BE FORMATTED IN THE PCBB AS FOLLOWS:

PCBB+0: RECEIVE BUFFER ADDRESS
 PCBB+2: RECEIVE BUFFER COMPLETED ADDRESS

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 18
 CZUAAB.MAC 07-APR-83 17:03

TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

THIS TEST WILL VERIFY THAT BUFFERS 1-15 OF LINK MEMORY CAN BE ADDRESSED CORRECTLY BY THE RECEIVER. THIS WILL BE DONE BY DIRECTING THE MICROCODE TO TRANSMIT A DATA PATTERN FROM BUFFER 0 AND TO RECEIVE THE DATA IN BUFFER X WHERE X = 1-15. THEN A CHECK WILL BE MADE TO SEE IF THE PATTERN NOT ONLY ARRIVED IN THE CORRECT RECEIVER BUFFER BUT THAT THE PATTERN DOES NOT SHOW UP ANYWHERE ELSE IN LINK MEMORY EXCEPT WHERE IT WAS SUPPOSE TO.

THIS TEST WILL USE MICROMODULE 'D' MICROTEST #11. THIS MICROTEST ACCEPTS 2 PARAMETERS: THE TRANSMIT BUFFER AND THE RECEIVER BUFFER. IT WILL SET UP A DATA PATTERN IN THE TRANSMIT BUFFER AND TELL THE LINK TO TRANSMIT, IN LOOPBACK MODE, FROM THE TRANSMIT BUFFER GIVEN TO THE RECEIVER BUFFER GIVEN. AFTER THE RECEIVER INTERRUPT, THE DATA IS CHECKED IN THE EXPECTED RECEIVER BUFFER FOR THE CORRECT DATA PATTERN. THEN ALL OF LINK MEMORY (EXCEPT FOR THE TRANSMIT BUFFER) IS CHECKED TO SEE IF THE PATTERN ENDS UP ELSEWHERE. IF AN ERROR IS FOUND THE MICROCODE PASSES THE ADDRESS OF LINK MEMORY WHERE THE ERROR WAS FOUND, THE DATA THAT WAS FOUND THERE ALONG WITH THE DATA THAT SHOULD HAVE BEEN THERE.

THE PARAMETERS FOR THE MICROCODE ARE FORMATED IN THE PCBB AS FOLLOWS:

PCBB+0: RECEIVER BUFFER ADDRESS
 PCBB+2: TRANSMIT BUFFER ADDRESS
 PCBB+4: LINK MEMORY ADDRESS (IF ERROR)
 PCBB+6: GOOD DATA PATTERN (IF ERROR)
 PCBB+10: BAD DATA PATTERN (IF ERROR)

TEST 32: TRANSMITTER LINK MEMORY ADDRESS TEST

THIS TEST WILL VERIFY THAT BUFFERS 1-15 CAN BE CORRECTLY ADDRESSED BY THE TRANSMITTER. THIS TEST IS IDENTICAL TO THE RECEIVER ADDRESS TEST IN THAT IT USES THE SAME MICROCODE (MICROMODULE 'D' MICROTEST #11) EXCEPT IT FIXES THE RECEIVER BUFFER AT 0 AND VARIES THE TRANSMIT BUFFER FROM 1-15.

TEST 33: LINK MEMORY ARBITRATION TEST

THE LINK MEMORY CAN BE ACCESSED BY FOUR PROCESSES; THE T-11 PROCESSOR, THE DMA ENGINE, THE RECEIVE STATE MACHINE AND THE TRANSMIT STATE MACHINE. THE PORT MODULE HAS ARBITRATION CIRCUITRY TO MANAGE LINK MEMORY ACCESSES. THIS CIRCUITRY PREVENTS CONFLICTS BETWEEN PROCESSES AND ASSURES THAT HIGHER PRIORITY PROCESSES GET PRECEDENCE.

THIS TEST WILL VERIFY THE ABILITY OF THE LINK MEMORY ARBITRATOR TO HANDLE SIMULTANEOUS REQUESTS BY FOUR PROCESSES. EACH OF THESE PROCESSES WILL INVOLVE TASKS THAT REQUIRE HEAVY ACCESSES OF LINK MEMORY. DATA WILL BE MOVED INTO OR OUT OF LINK MEMORY BY EACH. WHEN THAT TASKS ARE FINISHED THE DATA WILL BE VERIFIED.

THE FOUR PROCESSES ARE:

1-TRANSMIT STATE MACHINE

WILL TRANSMIT A DATAGRAM OF MAXIMUM DATA LENGTH IN LOOPBACK

MODE. THE DATA FIELD WILL CONTAIN A BIT PATTERN STRING OF TWO 1'S FOLLOWED BY TWO 0'S I.E. 31463 (OCTAL).

2-RECEIVE STATE MACHINE

WILL RECEIVE A DATAGRAM OF MAXIMUM DATA LENGTH OVER THE LOOPBACK. THE RECEIVE DATA BUFFER WILL BE FILLED WITH 0'S PRIOR TO THE RECEPTION.

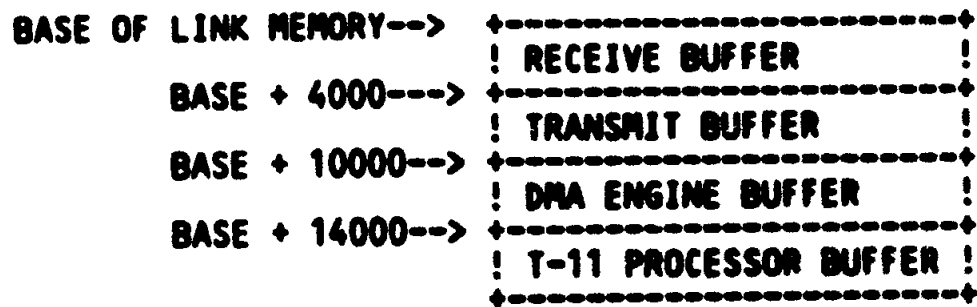
3-T-11 MICROPROCESSOR DMA

A 1K BUFFER IN LINK MEMORY WILL BE FILLED WITH AN ALL 1'S DATA PATTERN PRIOR TO THE OPERATION THEN ALTERNATING 1'S AND 0'S DATA PATTERN WILL BE WRITTEN.

4-DMA ENGINE

WILL TRANSFER A 1K BLOCK OF DATA FROM LINK MEMORY TO UNIBUS MEMORY. THE DATA IN LINK MEMORY WILL A BIT PATTERN STRING OF FOUR 1'S FOLLOWED BY A STRING OF FOUR 0'S. THE BUFFER IN UNIBUS MEMORY WILL BE CLEARED PRIOR TO THE OPERATION.

THE FOUR PROCESSES WILL WORK OUT OF FOUR SEPARATE AREAS OF LINK MEMORY.



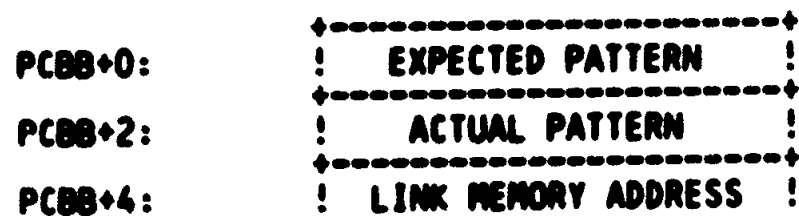
THIS WILL ALLOW THE ARITRITION CIRCUITRY TO BE TESTED AND YET ALLOWS THE DATA TO BE VERIFIED EASILY AND ASSOCIATED WITH A SINGLE PROCESS.

A DATAGRAM WILL BE LOOPED BACK FROM THE TRANSMIT BUFFER TO THE RECEIVE BUFFER. AS THE DATAGRAM IS BEING TRANSFERRED, THE T-11 PROCESSOR WILL FILL IT'S BUFFER AND THE DMA ENGINE WILL TRANSFER IT'S BUFFER FROM LINK MEMORY TO UNIBUS MEMORY.

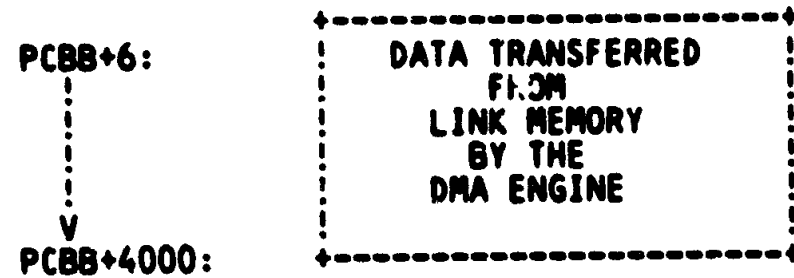
WHEN THE RECEIVE STATE MACHINE IS DONE, THE T-11 WILL VERIFY THE DATA IN THE RECEIVE BUFFER. IF AN ERROR IS FOUND PCSR1 WILL BE SET TO INDICATE AN ERROR.

THE HOST WILL WAIT FOR THE MICROCODE TO FINISH AND WHEN DONE, IT WILL VERIFY THE DATA TRANSFERRED BY THE DMA ENGINE TO UNIBUS MEMORY.

THE FIRST 3 WORDS OF THE PCBB ARE USED FOR ERROR INFORMATION, THE REST WILL BE THE UNIBUS ADDRESS THAT THE DMA ENGINE WILL TRANSFER TO.



68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 20
 CZUAAB.MAC 07-APR-83 17:03



TEST 34: STATION ADDRESS PATTERN TEST

WITHOUT EITHER THE PROMISCUIOUS MODE OR THE MULTICAST MODE ENABLED, THE LINK LOGIC WILL RECOGNIZE DATAGRAM ADDRESSES ONLY IF THE ADDRESS IS CONTAINED IN THE STATION ADDRESS RAM.

WHEN A DATAGRAM ARRIVES, THE LINK LOGIC COMPARES THE DATAGRAM DESTINATION ADDRESS FIELD TO THE 12 ADDRESSES WRITTEN IN THE STATION ADDRESS RAM. IF THE INCOMING ADDRESS MATCHES ONE OF THESE, THEN THE DATAGRAM WILL BE ACCEPTED BY THE LINK. THE 'MATCH' BIT IS SET IN THE TRANSMIT BUFFER AND THE RECEIVING PROCESS BEGINS.

THIS TEST WILL VERIFY THAT THE LINK CAN RECOGNIZE A DATAGRAM WHEN THE DESTINATION ADDRESS OF THE DATAGRAM MATCHES ONE OF THE ADDRESSES STORED IN THE STATION ADDRESS RAM.

THIS TEST WILL USE MICROMODULE 'E' MICROTEST #1. PATTERNS WILL BE USED FOR ADDRESSES IN CHECKING THE STATION ADDRESS LOGIC. THE PATTERNS WILL BE SUPPLIED TO THE T-11 THROUGH THE PCBB. THE MICROCODE WILL BE RESTARTED FOR EACH DIFFERENT PATTERN TO BE TESTED. UPON START-UP, THE T-11 PROCESSOR WILL PICK UP THE CURRENT PATTERN/ADDRESS, LOAD THE SAME PATTERN INTO ALL 12 LOCATIONS OF THE STATION ADDRESS RAM, FORMAT THE TRANSMIT BUFFER AND LOGIC FOR A LOOPBACK, PRESET PCSR1 TO AN ERROR CONDITION, START THE LINK AND WAIT FOR THE MATCH BIT IN THE TRANSMIT BUFFER. IF THE MATCH BIT SETS THE PCSR1 ERROR CONDITION IS CLEARED AND THE T-11 WAITS FOR BOTH THE TRANSMITTER AND RECEIVER INTERRUPTS BEFORE IT SETS 'DNI' TO INDICATE THE TEST WAS SUCCESSFUL

THE PCBB WILL BE USED TO PASS THE 48 BIT STATION ADDRESS PATTERN:



THE FOLLOWING PATTERNS WILL BE USED:

- ALTERNATING 1'S AND 0'S
- ALTERNATING 0'S AND 1'S
- PAIR OF 0'S FOLLOWED BY PAIR OF 1'S
- FOUR 0'S FOLLOWED BY FOUR 1'S
- EIGHT 0'S FOLLOWED BY EIGHT 1'S
- SIXTEEN 1'S FOLLOWED BY SIXTEEN 0'S FOLLOWED BY 16 1'S

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 21
 CZUAAB.MAC 07-APR-83 17:03

-TWENTYFOUR 1'S FOLLOWED BY TWENTYFOUR 0'S

TEST 35: STATION ADDRESS REJECTION TEST

THIS TEST WILL VERIFY THAT THE STATION ADDRESS DETECTION LOGIC DOES NOT RECOGNIZE A DATAGRAM WHEN THE DATAGRAM ADDRESS IS NOT CONTAINED IN THE STATION ADDRESS RAM.

THE MICROCODE WILL FILL THE STATION ADDRESS RAM WITH 0'S. THE DESTINATION FIELD OF THE TRANSMIT BUFFER IS FILLED WITH 1'S. A TRANSMISSION IS STARTED IN LOOPBACK MODE AND THE T-11 WILL WAIT FOR A RECEIVER INTERRUPT. OF COURSE, THE RECEIVER INTERRUPT SHOULD NEVER HAPPEN BECAUSE THE STATION ADDRESS LOGIC SHOULD NOT GET A SUCCESSFUL COMPARISON BETWEEN 0'S IN THE DESTINATION ADDRESS OF THE INCOMING DATAGRAM AND THE 1'S IN THE STATION ADDRESS RAM. THE T-11 WILL BE PUT INTO A LOOP WAITING FOR A RECEIVER INTERRUPT AND THE DEUNA TIMER IS STARTED. IF THE LOOP IS BROKEN BY THE RECEIVER INTERRUPT AN ERROR WILL BE PRESENTED IN PCSR1 BY THE MICROCODE. IF THE LOOP IS BROKEN BY THE TIMER THEN THE TEST WAS SUCCESSFUL.

TEST 36: STATION ADDRESS RAM POSITION TEST

THE STATION ADDRESS RAM CAN HOLD UP TO 12 STATION ADDRESSES. WHEN A DATAGRAM IS RECEIVED THE STATION ADDRESS COMPARISON LOGIC DOES A BIT-WISE COMPARISON OF ALL 12 RAM STATION ADDRESS WITH THE INCOMING DATAGRAM STATION ADDRESS.

THIS TEST WILL VERIFY THAT THE DEUNA CAN RECOGNIZE A STATION ADDRESS REGARDLESS OF THE LOCATION OF THE ADDRESS IN THE STATION ADDRESS RAM.

THIS TEST WILL USE MICROMODULE 'E' MICROTEST #4. THE MICROCODE WILL WRITE A STATION ADDRESSES OF ALL 1'S INTO A SINGLE LOCATION OF THE STATION ADDRESS RAM. THE OTHER ELEVEN LOCATION WILL BE LOADED WITH 0'S. A DATAGRAM WITH AN ALL 1'S DESTINATION ADDRESS WILL BE TRANSMITTED IN LOOPBACK MODE. THE TEST WILL VERIFY THAT THE DATAGRAM IS RECEIVED. THE TEST WILL BE REPEATED FOR ALL TWELVE LOCATIONS OF THE STATION ADDRESS RAM.

THE MICROTEST WILL BE REPEATED FOR EACH OF THE 12 TEST ITERATIONS. THE PCBB WILL BE USED TO PASS TO THE MICROCODE WHICH POSITION IS TO BE LOADED WITH 1'S. WHEN THE STATION ADDRESS IS LOADED, THE STATION ADDRESSES MUST BE ROTATED ORTHOGONALLY, I.E. BIT 0 OF ALL STATION ADDRESSES LOADED TOGETHER, THEN BIT 1, THEN BIT 2 ETC. THIS MAKES IT DIFFICULT TO DESCRIBE THE POSITION OF ANY SINGLE STATION ADDRESS IN TERMS OF AN OFFSET FROM THE RAM BASE ADDRESS.

THE PCBB IS FORMATTED AS FOLLOWS:

```
PCBB+0:      +-----+
              !  RAM ADDRESS POSTION  !
              +-----+
```

TEST 37: MULTICAST ADDRESS TEST

MULTICAST ADDRESSING PERMITS THE DEUNA TO RESPOND TO MESSAGES AIMED AT LOGICALLY RELATED DEVICES ON THE NETWORK. THE MSB OF THE DESTINATION ADDRESS

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 22
 CZUAAB.MAC 07-APR-83 17:03

OF THESE MESSAGES IS A 1. THIS BIT IS DETECTED BY THE ADDRESS RECOGNITION LOGIC.

THIS TEST WILL VERIFY THAT THE DEUNA CAN RECOGNIZE AND ACCEPT MESSAGES WITH THE MULTICAST BIT DESIGNATION.

THIS TEST WILL USE MICROMODULE 'E' MICROTEST #4. THE MICROCODE WILL PREPARE A DATAGRAM WITH THE DESTINATION ADDRESS HAVING THE MULTICAST BIT SET. THE DEUNA WILL BE SETUP IN LOOPBACK MODE WITH 'ENABLE ALL MULTICAST'. THE DATAGRAM WILL BE TRANSMITTED AND THE T-11 WILL BE PUT IN A LOOP WAITING FOR A RECEIVER INTERRUPT. THE TIMER WILL INTERRUPT THE LOOP IF THE RECEIVER INTERRUPT DOES NOT OCCUR. IF THIS HAPPENS, PCSR1 WILL INDICATE AN ERROR. OTHERWISE WHEN THE RECEIVER INTERRUPT OCCURS IT WILL BREAK THE LOOP AND PCSR1 WILL INDICATE A SUCCESSFULL COMPLETION OF THE TEST.

TEST 38: CRC DATA PATTERN TEST

THE LINK MODULE HAS HARDWARE TO GUARANTEE THAT DATAGRAMS HAVE NOT BEEN CORRUPTED DURING TRANSMISSION AND RECEPTION. THE HARDWARE GENERATES A CRC FOR DATAGRAMS TRANSMITTED AND VERIFIES THE CRC FOR DATAGRAMS RECEIVED. THE CRC IS A 32 BIT NUMBER GENERATED BY DIVIDING THE DATAGRAM BIT STREAM BY A CRC POLYNOMIAL. THE DIVISION RESULTS IN A UNIQUE NUMBER THAT CAN ONLY BE REPRODUCED IN CRC CALCULATIONS IF THE BIT STREAM EXACTLY MATCHES THE ORIGINAL. THE CRC IS CALCULATED DURING DATAGRAM TRANSMISSION AND IS APPENDED TO THE PACKET. THE CRC IS TRANSMITTED AS PART OF THE PACKET. THE CRC IS AGAIN CALCULATED WHEN THE DATAGRAM IS RECEIVED AND THE CALCULATED IS COMPARED TO THE CRC TRANSMITTED. IF THE DATAGRAM HAS BEEN FAITHFULLY TRANSMITTED, THE CRC'S SHOULD MATCH EXACTLY.

THE DEUNA CALCULATES THE CRC WITH DEDICATED CRC LOGIC. THE LOGIC IS EITHER DEDICATED TO THE CALCULATION OF THE OUTGOING DATAGRAM OR THE CALCULATION OF THE INCOMING DATAGRAM, BUT NOT BOTH.

THIS TEST WILL VERIFY THE OPERATION OF THE CRC CALCULATION CIRCUITRY. MICROMODULE 'F' MICROTEST #1 WILL BE USED. THE MICROCODE WILL TRANSMIT DATAGRAMS IN LOOPBACK MODE. THE CRC HARDWARE WILL BE DEDICATED TO THE TRANSMITTER. WHEN THE DATAGRAM IS RECEIVED THE T-11 WILL CALCULATE A CRC ON THE DATA RECEIVED (INCLUDING THE TRANSMITTED CRC). THE RESULT OF THIS CALCULATION WILL BE A 32 BIT CONSTANT. THIS CONSTANT IS THEN COMPARED TO WHAT WAS EXPECTED AND IF THEY DO NOT MATCH. AN ERROR IS PLACED IN PCSR1.

PATTERNS WILL BE PASSED TO THE MICROCODE THROUGH THE PCBB. THE MICROCODE WILL FILL THE TRANSMIT BUFFER WITH THIS PATTERN BEFORE EACH TRANSMISSION TAKES PLACE.

THE PCBB WILL BE FORMATTED AS FOLLOWS:

```
PCBB+0:      +-----+
              ! DATA PATTERN !
              +-----+
```

TEST 39: CRC ERROR TEST

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 23
 CZUAAB.MAC 07-APR-83 17:03

THIS TEST WILL VERIFY THAT THE LINK CRC CIRCUITRY CAN DETECT A BAD CRC.

MICROMODULE 'F' MICROTEST #2 WILL BE USED. THE MICROCODE WILL TRANSMIT DATAGRAMS IN LOOPBACK MODE. EACH DATAGRAM WILL HAVE AN ERRONEOUS CRC APPENDED TO THE DATA FIELD. THE DEUNA CRC LOGIC WILL BE SETUP SUCH THAT THE CRC LOGIC WILL BE DEDICATED TO THE RECEIVER. THIS IS EXPECTED TO CAUSE A CRC ERROR.

THE DATA FIELDS OF EACH DATAGRAM WILL CONSIST OF PATTERNS. THE PATTERNS WILL BE PASSED TO THE MICROCODE VIA THE PCBB.

AFTER THE RECEIVER INTERRUPT THE MICROCODE WILL PASS THE RECEIVER STATUS WORD 0 BACK VIA PCBB+2. THE CRC BIT IN THIS WORD IS CHECKED TO SEE IF IT IS SET.

THE PCBB IS FORMATTED AS FOLLOWS:

```

PCBB+0:      +-----+
              !   DATA PATTERN   !
              +-----+
PCBB+2:      ! RECEIVER STATUS WORD !
              +-----+
  
```

TEST 40: CRC PATTERN LENGTH TEST

THIS TEST WILL VERIFY THAT THE RECEIVE CRC HARDWARE CAN CALCULATE CRC FOR DATAGRAMS OF VARYING LENGTHS.

DATAGRAMS WILL BE TRANSMITTED FOR THE TRANSMIT BUFFER TO THE RECEIVE BUFFER IN LOOPBACK MODE. THE TRANSMIT CRC WILL BE DISABLED WHICH WILL ASSIGN THE CRC LOGIC TO CALCULATION OF INCOMING DATAGRAMS. THE CRC FOR TRANSMIT DATAGRAMS WILL BE CALCULATED BY THE MICROCODE. IT IS EXPECTED THAT THE CRC LOGIC WILL VERIFY THE CRC APPENDED TO THE DATAGRAM AS IT IS BEING RECEIVED.

PATTERNS WILL BE USED TO FILL THE DATAGRAM DATA FIELD. THE PATTERNS WILL BE PASSED TO THE MICROCODE THROUGH THE PCBB ALONG WITH THE BYTE COUNT TO BE USED.

AFTER THE RECEPTION OF THE DATAGRAM THE RECEIVER STATUS WORD WILL BE PASSED BACK VIA THE PCBB SO IT CAN BE CHECKED

THE PCBB IS FORMATTED AS FOLLOWS:

```

PCBB+0:      +-----+
              !   DATA PATTERN   !
              +-----+
PCBB+2:      !   BYTE COUNT   !
              +-----+
PCBB+4:      ! RECEIVE STATUS WORD !
              +-----+
  
```

TEST 41: RECEIVER BUFFER RECOVERY - RUNT TEST

THIS TEST WILL CHECK THE ABILITY OF THE RECEIVE STATE MACHINE TO REJECT A DATAGRAM OF LESS THAN 64 BYTES AND TO RECOVER THE RECEIVER BUFFER.

USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 24
 CZUAAB.MAC 07-APR-83 17:03

THIS TEST WILL USE MICROMODULE 'F' MICROTEST #4.
 EACH TRIAL WILL CONSIST OF TWO DATAGRAM TRANSMISSIONS IN LOOPBACK MODE. EACH TRANSMISSION WILL LOOPBACK A DATAGRAM FILLED WITH UNIQUE DATA. THE FIRST DATAGRAM WILL BE A RUNT OF LESS THAN 64 BYTES. THE SECOND WILL BE A DATAGRAM OF LEGAL SIZE.

EACH TRIAL WILL START WITH THE LINK BUFFER POINTER RESET TO THE FIRST LINK BUFFER. THE RUNT WILL BE TRANSMITTED, THEN THE VALID DATAGRAM. IF THE BUFFER RECOVERY IS WORKING CORRECTLY, THE SECOND DATAGRAM IS EXPECTED TO BE WRITTEN INTO THE SAME LINK MEMORY BUFFER AS WAS THE RUNT.

THIS TEST WILL BE REPEATED WITH VARIOUS RUNT PACKET SIZES.

THE BYTE COUNT FOR THE RUNT PACKET TRANSMISSION WILL BE PASSED VIA THE PCBB. AFTER THE TWO TRANSMISSIONS, THE MICROCODE WILL PASS BACK THE CONTENTS OF THE BUFFER DONE FIFO, AND THE CONTENTS OF THE FIRST DATA WORD OF THE RECEIVER BUFFER.

THE PCBB WILL BE FORMATTED AS FOLLOWS:

```

PCBB+0:      +-----+
              !          RUNT BYTE COUNT          !
              +-----+
PCBB+2:      !  BUFFER DONE FIFO CONTENTS  !
              +-----+
PCBB+4:      !  FIRST DATA WORD OF BUFFER  !
              +-----+

```

TEST 42: HALF-DUPLEX TEST

THE LINK INCLUDES A 'HALF DUPLEX' MODE OF OPERATION. THIS MODE CAN BE ENABLED OR DISABLED THROUGH THE LINK MODE REGISTER. THE OPERATIONAL MICROCODE NORMALLY USES HALF-DUPLEX MODE.

IN THE HALF-DUPLEX MODE, THE LINK WILL NOT RECEIVE MESSAGES ADDRESSED TO ITSELF. INCOMING MESSAGES LOOPED BACK WILL BE IGNORED BY THE RECEIVE STATE MACHINE. THE STATE MACHINE WILL NOT ISSUE A 'RECEIVER DONE' INTERRUPT AND THE BUFFER CAN BE RECOVERED FOR RECEIVING A LATER DATAGRAM.

THIS TEST USES MICROMODULE 'F' MICROTEST #5.
 THIS TEST WILL VERIFY THE OPERATION OF HALF-DUPLEX MODE. A DATAGRAM WILL BE TRANSMITTED IN LOOPBACK MODE WITH THE HALF-DUPLEX BIT SET. THE MICROCODE WILL VERIFY THAT THE RECEIVER INTERRUPT DOES NOT OCCUR. THE MICROCODE WILL THEN CLEAR THE HALF-DUPLEX BIT AND LOOP A DATAGRAM AND VERIFY THAT THE ORIGINAL BUFFER WAS RECOVERED.

THIS TEST WILL USE THE PCBB TO PASS INFORMATION. PCBB+0 WILL BE USED TO PASS THE CONTENTS OF THE BUFFER DONE FIFO AFTER THE SECOND DATAGRAM IS RECEIVED. PCBB+4 WILL BE USED TO PASS THE FIRST WORD OF DATA FROM THE RECEIVER BUFFER AFTER THE SECOND DATAGRAM IS TRANSMITTED.

```

PCBB+0:      +-----+
              ! CONTENTS OF BUFFER DONE FIFO !
              +-----+
PCBB+2:      ! FIRST DATA WORD OF BUFFER DONE!

```


----->

THE CONTENTS OF THE BUFFER DONE FIFO SHOULD BE 0 AND THE FIRST DATA WORD SHOULD BE AN ALTERNATING 1'S AND 0'S PATTERN.

TEST 43: COLLISION TEST

THE RECEIVE STATE MACHINE REACTS TO COLLISIONS ON THE WIRE BY ACTIVATING THE RETRY LOGIC. THE RETRY LOGIC WAITS AN INTERVAL OF TIME BEFORE ATTEMPTING TO RETRANSMIT THE DATAGRAM. THE INTERVALS ARE NOT UNIFORM BUT ARE OF GENERALLY INCREASING PSEUDO-RANDOM DURATION. THE RETRY LOGIC WILL ATTEMPT TO RETRANSMIT UP TO 15 ADDITIONAL TIMES BEFORE GIVING UP.

THIS TEST WILL VERIFY THAT THE RECEIVE STATE MACHINE RESPONDS TO A COLLISION AND THAT THE RETRY SEQUENCE IS REPORTED CORRECTLY IN THE TRANSMIT STATUS WORD.

THIS TEST WILL USE MICROMODULE 'G' MICROTEST #1. THE LINK BOARD CONTAINS DIAGNOSTIC LOGIC THAT ALLOWS COLLISIONS TO BE SIMULATED. WITH THE FORCE COLLISIONS LOGIC ACTIVATED, THE RETRY HARDWARE CAN BE STEPPED THROUGH THE RETRY SEQUENCE. THAT IS, EVERY DATAGRAM LOOPED BACK WILL STEP THE RETRY LOGIC THROUGH ONE STEP OF THE RETRY SEQUENCE. THE RETRY SEQUENCE CAN BE VERIFIED BY CHECKING THE TRANSMIT BUFFER STATUS WORDS AFTER EACH RETRY STEP.

THE PCBB WILL BE USED TO PASS PARAMETERS BETWEEN THE MICROCODE AND THE HOST PROCESSOR. PCBB+0 WILL BE USED TO PASS THE DATA TO BE LOADED INTO THE LINK MODE WORD. PCBB+2 WILL BE PASSED BACK BY THE MICROCODE, IT IS THE FIRST WORD OF THE TRANSMIT BUFFER (TRANSMIT STATUS WORD 0). PCBB+4 WILL ALSO BE PASSED BACK, IT IS TRANSMIT STATUS WORD 1.

THE TRANSMIT STATUS WORDS SHOULD SHOW THE FOLLOWING STATUS:

LOOPBACK STEP #	STATUS BITS			
	WORD 0	WORD 0	WORD 0	WORD 1
	ERRS (14)	MORE (12)	ONE (11)	RETRY (10)
1	0	0	1	0
2-15	0	1	0	0
16	1	0	0	1

THE PCBB IS FORMATTED AS FOLLOWS:

PCBB+0: ↑-----↑
 ! LINK MODE WORD !
 ↑-----↑

68USER DOCUMENTATION MACY11 30A(1052) 07-APR-83 17:13 PAGE 26
 CZUAAB.MAC 07-APR-83 17:03

```
PCBB+2:      ! TRANSMIT STATUS WORD 0!
             +-----+
PCBB+4:      ! TRANSMIT STATUS WORD 1!
             +-----+
```

TEST 44: TDR COUNTER TEST

THE DEUNA HAS A COUNTER DESIGNED TO HELP LOCATE FAULTS IN THE COAXIAL CABLE. THE COUNTER IS INITIALIZED WHEN A MESSAGE IS TRANSMITTED AND INCREMENTS AS THE DATAGRAM IS TRANSMITTED. COUNTING WILL STOP IF A COLLISION OCCURS OR THE CARRIER IS LOST. COUNTING ALSO STOPS IF THE 10 BIT COUNTER REACHES ITS MODULUS.

THIS TEST WILL DETERMINE THAT THE TDR COUNTER VALUE WILL CHANGE AND THAT THE COUNTER IS NOT STUCK.

BECAUSE THE COUNTER COUNTS DURING TRANSMISSION OF A DATAGRAM AND WILL CONTINUE TO COUNT DURING THE TIME THAT THE TRANSMIT STATE MACHINE OPERATES, THE COUNT ACCUMULATED IN THE COUNTER DURING TRANSMISSION IS PROPORTIONAL TO THE LENGTH OF THE DATAGRAM. THIS TEST WILL USE THIS RELATION TO VERIFY THAT THE COUNTER IS NOT STUCK.

THIS TEST USES MICROMODULE 'G' MICROTEST #2. THE TEST WILL SEND DATAGRAMS OVER THE LOOPBACK. THE LENGTH OF THE DATAGRAM WILL BE VARIED BY USING AN INCREASING BYTE COUNT IN THE TRANSMIT BUFFER. AFTER EACH DATAGRAM HAS BEEN LOOPED BACK, THE TRANSMIT BUFFER WORD 1 WILL BE PASSED BACK TO THE HOST TO VERIFY THAT IT IS CORRECT. THE CRITERIA FOR CORRECTNESS WILL BE: INCREASING BYTE COUNTS SHOULD RESULT IN INCREASING TDR VALUES IN TRANSMIT STATUS WORD 1.

THE PCBB WILL BE FORMATED AS FOLLOWS:

```
PCBB+0:      +-----+
             !   BYTE COUNT   !
             +-----+
PCBB+2:      ! TRANSMIT STATUS WORD 1!
             +-----+
```

TEST 45: RETRY LOGIC TEST

THE RETRY LOGIC IS ACTIVATED WHENEVER A COLLISION IS ENCOUNTERED DURING A TRANSMISSION ATTEMPT. THE LINK STOPS TRANSMISSION AND WAITS FOR A PERIOD OF TIME BEFORE ATTEMPTING TO RETRANSMIT.

THE WAIT TIME IS AN INTEGRAL NUMBER OF 'SLOT TIMES'. THE NUMBER COMES FROM A RANDOM NUMBER GENERATOR. THE NUMBER OF SLOT TIMES IS NOT EXACTLY RANDOM SINCE THE RETRY LOGIC WAITS A GENERALLY INCREASING NUMBER OF SLOT TIMES BEFORE TRYING TO RETRANSMIT. THIS TEST WILL VERIFY THAT THE RETRY LOGIC IS CAPABLE OF GENERATING VARIABILITY IN THE DURATION OF THE RETRY WAIT TIMES.

THIS TEST WILL USE MICROMODULE 'G' MICROTEST #3. THE LINK MODULE HAS A DIAGNOSTIC MAINTENANCE FACILITY MAKING IT POSSIBLE TO SINGLE STEP THE RETRY LOGIC THROUGH THE MAXIMUM SIXTEEN RETRY STEPS. THIS FEATURE WILL ALSO MAKE IT POSSIBLE TO MEASURE THE RETRY WAIT INTERVAL.

THE MICROCODE WILL SET THE COLLISION BIT IN THE LINK MODE REGISTER AND AND TRANSMIT A DATAGRAM IN LOOPBACK MODE. THE T-11 WILL COUNT WHILE WAITING FOR THE TRANSMIT STATE MACHINE TO INTERRUPT. THE ACCUMULATED COUNT SHOULD PROVIDE A MEASURE OF TIME TAKEN FOR THE TRANSMISSION ATTEMPT TO OCCUR. SINCE THE COLLISION BIT IS SET, THIS INTERVAL WILL INCLUDE THE RETRY WAIT INTERVAL. THE ACCUMULATED COUNT WILL BE WRITTEN BY THE MICROCODE TO THE PCBB.

THE MICROTEST WILL BE EXECUTED 16 TIMES. AFTER EACH EXECUTION, THE COUNT WILL BE READ FROM THE PCBB AND STORED IN A TABLE. THE TABLE WILL BE SCANNED TO VERIFY THAT THEY ARE NOT ALL THE SAME.

THE PCBB IS FORMATTED AS FOLLOWS:

PCBB+0:	↑-----↑
	! BYTE COUNT !
	↑-----↑
PCBB+2:	! TRANSMIT WAIT COUNT !
	↑-----↑

TEST 46: PRINT DEVICE PARAMETERS TEST

THIS TEST PRINTS THE DEFAULT PHYSICAL ADDRESS, THE MICROCODE REVISION AND THE SWITCH PACK SETTINGS.

74PROGRAM REVISION HISTORY
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 29

.TITLE PROGRAM REVISION HISTORY

1391
1392
1393
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1405
1406
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1408
1409
1410
1411
1412

: DATE AUTHOR DESCRIPTION OF CHANGE

:3-FEB-83 (MAC001)

ADD THIS SECTION.
REMOVE REDUNDANT .MCALL STATEMENTS TO SVC.
CHANGE INIT CODE TO DELAY A PERIOD OF TIME AFTER A
POWER FAILURE OCCURS TO ALLOW SELF TEST TO FINISH.
INCREASE AMOUNT OF TIME TO WAIT FOR DNI AFTER ISSUING
A RESET TO PCSRO.
ADD PRINTING OF PCSR'S IF ERROR OCCURS.
UPDATE SELF TEST ERROR CODES AND DESCRIPTIONS.
CHANGE TEST 9 TO DECODE PCSR1 IF DNI NEVER HAPPENS.
CHANGE TEST 5 TO NOT CHECK PORT COMMAND FIELD OF PCSRO.
UPDATE 'HEADER' STATEMENT TO REV A-2.

:24-MAR-83 (RSJ001)

CHANGE ALL WORD ACCESS TO THE UPPER BYTE OF PCSRO TO
BYTE ACCESS. INTRODUCED NEW VARIABLES TO DESCRIBE THE
UPPER BYTE, SAME NAMES WITH B ADDED I.E. DNI -> DNIB.
ADDED ADDRESS STORAGE VARIABLE PCSROUB AS THE ADDRESS OF
THE UPPER BYTE OF PCSRO.
CHANGED HEADER TO REV B-0.

74PROGRAM REVISION HISTORY
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 30

1413
1414
1415
1416
1417
1418
1419 000000'
1420
1421
1422
1423
1424
1425
1426 000000'
1427
1428 000000'
1429 000000'
1430 000000' 103
1431 000001' 132
1432 000002' 125
1433 000003' 101
1434 000004' 101
1435 000005' 000
1436 000006' 000
1437 000007' 000
1438 000010'
1439 000010' 102
1440 000011'
1441 000011' 060
1442 000012'
1443 000012' 000000
1444 000014'
1445 000014' 000000
1446 000016'
1447 000016' 053256'
1448 000020'
1449 000020' 000000
1450 000022'
1451 000022' 000262'
1452 000024'
1453 000024' 000000
1454 000026'
1455 000026' 000000G
1456 000030'
1457 000030' 000000
1458 000032'
1459 000032' 000000
1460 000034'
1461 000034' 000000
1462 000036'
1463 000036' 000000
1464 000040'
1465 000040' 000124'
1466 000042'
1467 000042' 000340
1468 000044'

.TITLE PROGRAM HEADER AND TABLES
.SBTTL PROGRAM HEADER

.ENABL AMA

BGNMOD

:+
: THE PROGRAM HEADER IS THE INTERFACE BETWEEN
: THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
:--

POINTER BGNRPT,BGNAU,BGNDU

HEADER CZUAA,B,0,0,0,340

:MAC001
LSNAME::
 .ASCII /C/
 .ASCII /Z/
 .ASCII /U/
 .ASCII /A/
 .ASCII /A/
 .BYTE 0
 .BYTE 0
 .BYTE 0
LSREV::
 .ASCII /B/
LSDEPO::
 .ASCII /O/
LSUNIT::
 .WORD 0
LSTIML::
 .WORD 0
LSHPCP::
 .WORD LSHARD
LSSPCP::
 .WORD 0
LSHPTP::
 .WORD LSHW
LSSPTP::
 .WORD 0
LSLADP::
 .WORD LSLAST
LSSTA::
 .WORD 0
LSCO::
 .WORD 0
LSDTYP::
 .WORD 0
LSAPT::
 .WORD 0
LSDTP::
 .WORD LSDISPATCH
LSPRIO::
 .WORD 340
LSENV1::

75PROGRAM HEADER AND TABLES
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 31
PROGRAM HEADER

1469	000044'	000000
1470	000046'	
1471	000046'	000000
1472	000050'	
1473	000050'	003
1474	000051'	003
1475	000052'	
1476	000052'	000000
1477	000054'	000000
1478	000056'	
1479	000056'	000000
1480	000060'	
1481	000060'	000700'
1482	000062'	
1483	000062'	021176'
1484	000064'	
1485	000064'	000000
1486	000066'	
1487	000066'	000000
1488	000070'	
1489	000070'	022026'
1490	000072'	
1491	000072'	022020'
1492	000074'	
1493	000074'	000000
1494	000076'	
1495	000076'	000706'
1496	000100'	
1497	000100'	104035
1498	000102'	
1499	000102'	000000
1500	000104'	
1501	000104'	021212'
1502	000106'	
1503	000106'	021654'
1504	000110'	
1505	000110'	021652'
1506	000112'	
1507	000112'	021204'
1508	000114'	
1509	000114'	000000
1510	000116'	
1511	000116'	000000
1512	000120'	
1513	000120'	000000
1514		

LSEXP1::	.WORD	0
LSMREV::	.WORD	0
LSEF::	.BYTE	CSREVISION
	.BYTE	CSREDIT
	.WORD	0
	.WORD	0
LSSPC::	.WORD	0
LSDEVP::	.WORD	0
LSREPP::	.WORD	LSDVTYP
LSEXP4::	.WORD	LSRPT
LSEXP5::	.WORD	0
LSAUT::	.WORD	0
LSDUT::	.WORD	LSAU
LSLUN::	.WORD	LSDU
LSDESP::	.WORD	0
LSLOAD::	.WORD	LSDESC
LSETP::	EMT	ESLOAD
LSICP::	.WORD	0
LSCCP::	.WORD	LSINIT
LSACP::	.WORD	LSCLEAN
LSPRT::	.WORD	LSAUTO
LSTEST::	.WORD	LSPRCT
LSPLY::	.WORD	0
LSHIRE::	.WORD	0
	.WORD	0
		;RSJ001

75PROGRAM HEADER AND TABLES
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 32
DISPATCH TABLE

.SBTTL DISPATCH TABLE

..++
: THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
: IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
:--

DISPATCH 46

1515		
1516		
1517		
1518		
1519		
1520		
1521		
1522	000122'	
1523	000122'	000056
1524	000124'	
1525	000124'	022076'
1526	000126'	022310'
1527	000130'	022642'
1528	000132'	022754'
1529	000134'	023072'
1530	000136'	023560'
1531	000140'	023642'
1532	000142'	023740'
1533	000144'	024162'
1534	000146'	027124'
1535	000150'	027540'
1536	000152'	030326'
1537	000154'	031006'
1538	000156'	031424'
1539	000160'	031714'
1540	000162'	032422'
1541	000164'	032740'
1542	000166'	033406'
1543	000170'	033764'
1544	000172'	034344'
1545	000174'	034672'
1546	000176'	035202'
1547	000200'	035512'
1548	000202'	036072'
1549	000204'	036452'
1550	000206'	037046'
1551	000210'	037610'
1552	000212'	040206'
1553	000214'	040610'
1554	000216'	041130'
1555	000220'	041520'
1556	000222'	042104'
1557	000224'	042470'
1558	000226'	043130'
1559	000230'	043460'
1560	000232'	044070'
1561	000234'	044350'
1562	000236'	044670'
1563	000240'	045230'
1564	000242'	045620'
1565	000244'	046202'
1566	000246'	046634'
1567	000250'	047240'
1568	000252'	050330'
1569	000254'	051052'
1570	000256'	051466'
1571		

	.WORD	46
LSDISPATCH::		
	.WORD	T1
	.WORD	T2
	.WORD	T3
	.WORD	T4
	.WORD	T5
	.WORD	T6
	.WORD	T7
	.WORD	T8
	.WORD	T9
	.WORD	T10
	.WORD	T11
	.WORD	T12
	.WORD	T13
	.WORD	T14
	.WORD	T15
	.WORD	T16
	.WORD	T17
	.WORD	T18
	.WORD	T19
	.WORD	T20
	.WORD	T21
	.WORD	T22
	.WORD	T23
	.WORD	T24
	.WORD	T25
	.WORD	T26
	.WORD	T27
	.WORD	T28
	.WORD	T29
	.WORD	T30
	.WORD	T31
	.WORD	T32
	.WORD	T33
	.WORD	T34
	.WORD	T35
	.WORD	T36
	.WORD	T37
	.WORD	T38
	.WORD	T39
	.WORD	T40
	.WORD	T41
	.WORD	T42
	.WORD	T43
	.WORD	T44
	.WORD	T45
	.WORD	T46

75PROGRAM HEADER AND TABLES
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 34
DEFAULT HARDWARE P-TABLE

.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 HARDWARE P-TABLES,
: AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
:--

1572						
1573						
1574						
1575						
1576						
1577						
1578						
1579						
1580						
1581	000260'		BGNHW	DFPTBL		
1582	000260'	000002				.WORD L10000-LSHW/2
1583	000262'					LSHW::
1584	000262'					DFPTBL::
1585						
1586	000262'	000000	.WORD	0	:CSR	
1587	000264'	000000	.WORD	0	:VECTOR	
1588						
1589	000266'		ENDHW			L10000:
1590	000266'					

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 36
 CZUAAB.MAC 07-APR-83 17:03 DEFAULT HARDWARE P-TABLE

```

1592          .TITLE GLOBAL AREAS
1593          .SBTTL GLOBAL EQUATES SECTION
1594
1595
1596
1597          :++
1598          : THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
1599          : ARE USED IN MORE THAN ONE TEST.
1600          :--
1601
1602          000266'          EQUALS
1603          :
1604          : BIT DIFINITIONS
1605          :
1606          100000          BIT15== 100000
1607          040000          BIT14== 40000
1608          020000          BIT13== 20000
1609          010000          BIT12== 10000
1610          004000          BIT11== 4000
1611          002000          BIT10== 2000
1612          001000          BIT09== 1000
1613          000400          BIT08== 400
1614          000200          BIT07== 200
1615          000100          BIT06== 100
1616          000040          BIT05== 40
1617          000020          BIT04== 20
1618          000010          BIT03== 10
1619          000004          BIT02== 4
1620          000002          BIT01== 2
1621          000001          BIT00== 1
1622          :
1623          001000          BIT9== BIT09
1624          000400          BIT8== BIT08
1625          000200          BIT7== BIT07
1626          000100          BIT6== BIT06
1627          000040          BIT5== BIT05
1628          000020          BIT4== BIT04
1629          000010          BIT3== BIT03
1630          000004          BIT2== BIT02
1631          000002          BIT1== BIT01
1632          000001          BIT0== BIT00
1633          :
1634          : EVENT FLAG DEFINITIONS
1635          : EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
1636          :
1637          000040          EF.START== 32.          : START COMMAND WAS ISSUED
1638          000037          EF.RESTART== 31.         : RESTART COMMAND WAS ISSUED
1639          000036          EF.CONTINUE== 30.        : CONTINUE COMMAND WAS ISSUED
1640          000035          EF.NEW== 29.            : A NEW PASS HAS BEEN STARTED
1641          000034          EF.PWR== 28.            : A FOWER-FAIL/POWER-UP OCCURRED
1642          :
1643          : PRIORITY LEVEL DEFINITIONS
1644          :
1645          :
1646          000340          PRI07== 340
1647          000300          PRI06== 300

```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 37
CZUAAB.MAC 07-APR-83 17:03 GLOBAL EQUATES SECTION

1648	000240	PRI05== 240	
1649	000200	PRI04== 200	
1650	000140	PRI03== 140	
1651	000100	PRI02== 100	
1652	000040	PRI01== 40	
1653	000000	PRI00== 0	
1654		:	
1655		:OPERATOR FLAG BITS	
1656		:	
1657	000004	EVL== 4	
1658	000010	LOT== 10	
1659	000020	ADR== 20	
1660	000040	IDU== 40	
1661	000100	ISR== 100	
1662	000200	UAM== 200	
1663	000400	BOE== 400	
1664	001000	PNT== 1000	
1665	002000	PRI== 2000	
1666	004000	IXE== 4000	
1667	010000	IBE== 10000	
1668	020000	IER== 20000	
1669	040000	LOE== 40000	
1670	100000	HOE== 100000	
1671			
1672	000077	SECOND==63.	:63 LINE CLOCK TICKS = APROX. 1 SECOND
1673	000001	SET== 1	
1674	000000	CLEAR== 0	
1675	004000	SIZ1K== 4000	:1K WORDS
1676	010000	SIZ2K== SIZ1K*2	:2K WORDS
1677	020000	SIZ4K== SIZ2K*2	:4K WORDS
1678	040000	SIZ8K== SIZ4K*2	:8K WORDS
1679	020000	WCSSIZ==SIZ4K	:SIZE OF THE DEUMA WRITEABLE CONTROL STORE
1680	020000	IOSIZ==SIZ4K	:SIZE OF THE DEUMA I/O PAGE
1681	040000	ROMSIZ==SIZ8K	:SIZE OF THE DEUMA ROM IN WORDS
1682	077774	LINSIZ==SIZ8K*2-4	:SIZE OF THE DEUMA LINK MEMORY
1683	000000	WCSADR==0	:INTERNAL BASE ADDRESS OF WCS
1684	020000	IQADR==WCSADR+WCSSIZ	:INTERNAL BASE ADDRESS OF THE I/O PAGE FOR THE T11
1685	040000	ROMADR==IQADR+IOSIZ	:INTERNAL BASE ADDRESS OF THE DEUMA ROM
1686	100000	LINADR==ROMADR+ROMSIZ	:INTERNAL BASE ADDRESS OF THE DEUMA LINK MEMORY
1687	000100	IE== BIT6	:INTERRUPT ENABLE
1688	177777	INITH== -1	:INITIAL HIGH WORD FOR 32 BIT CRC CALCULATOR
1689	177777	INITL== -1	:INITIAL LOW WORD FOR 32 BIT CRC CALCULATOR
1690	166670	POLYH== 166670	:FUNCTION POLYNOMIAL HIGH WORD FOR 32 BIT CRC
1691	101440	POLYL== 101440	:FUNCTION POLYNOMIAL LOW WORD FOR 32 BIT CRC
1692	120001	POLY16== 120001	:FUNCTION POLYNOMIAL FOR 16 BIT CRC
1693	000000	DATERR==0	:DATA ERROR INDICATER FOR LINK MEMORY TESTS
1694	000001	ADRERR==1	:ADDRESS ERROR INDICATOR FOR LINK MEMORY TESTS
1695	002756	MAXBYT==1518.	:MAXIMUM NUMBER OF BYTES RECEIVER CAN HANDLE
1696	000100	MINBYT==64.	:MINIMUM NUMBER OF BYTES RECEIVER CAN HANDLE
1697	000004	CRCSIZ==4.	:SIZE OF CRC
1698	000001	IMPON=1	:IN MICROMONITOR STATE *** REMOVE COMMENT MARKS AND
1699	000002	INTST=2	:IN A TEST STATE *** USE THESE THREE VARIABLES
1700	000003	INERR=3	:IN ERROR STATE *** FOR ASSEMBLY WITH MACY11
1701			

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 38
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL EQUATES SECTION

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1702
1703 ; PCSRO - PORT CONTROL AND STATUS REGISTER 0 (OPERATIONAL MICROCODE DEFINITIONS)
1704
1705 100000 SERI == BIT15 ; STATUS ERROR INTERRUPT
1706 000200 SERIB == BIT07 ; STATUS ERROR INTERRUPT BYTE REFERENCE ;RSJ001
1707 040000 PCEI == BIT14 ; PORT COMMAND ERROR INTERRUPT
1708 000100 PCEIB == BIT06 ; PORT COMMAND ERROR INTERRUPT BYTE REFERENCE ;RSJ001
1709 020000 RXI == BIT13 ; RECEIVE RING INTERRUPT
1710 000040 RXIB == BIT05 ; RECEIVE RING INTERRUPT BYTE REFERENCE ;RSJ001
1711 010000 TXI == BIT12 ; TRANSMIT RING INTERRUPT
1712 000020 TXIB == BIT04 ; TRANSMIT RING INTERRUPT BYTE REFERENCE ;RSJ001
1713 004000 DNI == BIT11 ; DONE INTERRUPT
1714 000010 DNIB == BIT03 ; DONE INTERRUPT BYTE REFERENCE ;RSJ001
1715 002000 RCEI == BIT10 ; RECEIVE BUFFER UNAVAILABLE
1716 000004 RCEIB == BIT02 ; RECEIVE BUFFER UNAVAILABLE BYTE REFERENCE ;RSJ001
1717
1718 000400 FATI == BIT08 ; FATAL ERROR INTERRUPT
1719 000001 FATIB == BIT00 ; FATAL ERROR INTERRUPT BYTE REFERENCE ;RSJ001
1720 000200 INTR == BIT07 ; INTERRUPT SUMMARY <15:08>
1721 000100 INTE == BIT06 ; INTERRUPT ENABLE
1722 000040 RSET == BIT05 ; UNA RESET
1723
1724 ; PCSRO - PORT CONTROL AND STATUS REGISTER 0 (DIAGNOSTIC MICROCODE DEFINITIONS)
1725
1726
1727 100000 NPRERR == BIT15 ;T11 NPR TIMEOUT INTERRUPT OCCURRED
1728 040000 NXMERR == BIT14 ;T11 NON-EXISTANT MEMORY TIMEOUT OCCURRED
1729 020000 UNJERR == BIT13 ;T11 UNEXPECTED INTERRUPT OCCURRED
1730 010000 PARERR == BIT12 ;T11 LINK MEMORY PARITY ERROR OCCURRED
1731
1732 ;PORT COMMANDS <03:00>
1733 000001 GETPCB == BIT00
1734 000002 GETCMD == BIT01
1735 000006 PNOP == BIT01!BIT02
1736 000003 SLFT == BIT00!BIT01
1737
1738 ;PCSR1 - PORT CONTROL AND STATUS REGISTER 1
1739 100000 XPWR == BIT15 ; TRANSCEIVER POWER BAD
1740 040000 ICAB == BIT14 ; PORT/LINK CABLING OK
1741
1742 ;SELF TEST ERROR CODE <13:08>
1743
1744 000200 PCTO == BIT07 ; PORT COMMAND TIMEOUT
1745
1746 000010 RRTC == BIT03 ; REMOTE CONSOLE RESERVED
1747 000400 SFTB0 == BIT8 ;FIRST BIT OF SELF TEST FIELD
1748 001000 SFTB1 == BIT9 ;SECOND
1749 002000 SFTB2 == BIT10 ;THIRD
1750 004000 SFTB3 == BIT11 ;FOURTH
1751 010000 SFTB4 == BIT12 ;FIFTH
1752 020000 SFTB5 == BIT13 ;SIXTH
1753 037400 SFT == BIT8!BIT9!BIT10!BIT11!BIT12!BIT13 ;SELF TEST FIELD
1754
1755 ;PORT STATE <02:00>
1756
1757 000007 PSTATE == BIT00!BIT01!BIT02 ;PORT STATE BITS OF PCSR1
    
```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 39
 CZUAA8.MAC 07-APR-83 17:03 GLOBAL EQUATES SECTION

1758	000000	RESET	==	0	:RESET STATE (NOT REALLY A STATE)
1759	000001	PRILD	==	BIT00	: PRIMARY LOAD STATE
1760	000002	READY	==	BIT01	:READY STATE
1761	000003	RUN	==	BIT00!BIT01	:RUNNING STATE
1762	000005	UNIHLT	==	BIT00!BIT02	:UNIBUS HALTED STATE
1763	000006	NIHLT	==	BIT01!BIT02	:NI HALTED STATE
1764	000007	NIUNI	==	BIT00!BIT01!BIT02	:UNIBUS AND NI HALTED STATE
1765		:			
1766		:			:DESCRIPTOR RING DEFINITIONS
1767	100000	OWN	==	BIT15	
1768	040000	ERRS	==	BIT14	
1769	001000	STP	==	BIT09	
1770	000400	ENP	==	BIT08	
1771		:			
1772		:			:PORT FUNCTION CODES
1773		:			
1774		:			
1775	000000	PFNOP1	==	0	:NOP PORT FUNCTION #1
1776	000001	LASM	==	1	:LOAD AND START MICROADDRESS
1777	000002	RDPA	==	2	:READ DEFAULT PHYSICAL ADDRESS
1778	000003	PFNOP2	==	3	:NOP PORT FUNCTION #2
1779	000004	RPA	==	4	:READ PHYSICAL ADDRESS
1780	000005	WPA	==	5	:WRITE PHYSICAL ADDRESS
1781	000006	RNAL	==	6	:READ MULTICAST ADDRESS LIST
1782	000007	WML	==	7	:WRITE MULTICAST ADDRESS LIST
1783	000010	RRF	==	10	:READ RING FORMAT
1784	000011	WRF	==	11	:WRITE RING FORMAT
1785	000012	RC	==	12	:READ COUNTERS
1786	000013	RACC	==	13	:READ AND CLEAR COUNTERS
1787	000014	RTM	==	14	:READ THE NODE
1788	000015	WTM	==	15	:WRITE THE NODE
1789	000016	RPS	==	16	:READ PORT STATUS
1790	000017	RACPS	==	17	:READ AND CLEAR PORT STATUS
1791	000020	DIM	==	20	:DUMP INTERNAL MEMORY
1792	000021	LIM	==	21	:LOAD INTERNAL MEMORY
1793	000022	RSIDP	==	22	:READ SYSTEM ID PARAMETERS
1794	000023	WSIDP	==	23	:WRITE SYSTEM ID PARAMETERS
1795	000024	RLSA	==	24	:READ LOAD SERVER ADDRESS
1796	000025	WLSA	==	25	:WRITE LOAD SERVER ADDRESS
1797					

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 40
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL EQUATES SECTION

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1798
1799
1800      .SBTTL  GLOBAL DATA SECTION
1801
1802      :++
1803      : THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
1804      : IN MORE THAN ONE TEST.
1805      :--
1806
1807 000266' 000000  UNACSR::WORD 0      :CSR
1808 000270' 000000  UNAVEC::WORD 0      :VECTOR
1809 000272' 000000  UNAPRI::WORD 0      :PRIORITY
1810
1811 000274'          CLKTAB::
1812 000274' 000000  CLKCSR::WORD 0      :LINE CLOCK STATUS REGISTER
1813 000276' 000000  CLKBR::WORD 0      :LINE CLOCK PRIORITY
1814 000300' 000000  CLKVEC::WORD 0      :LINE CLOCK VECTOR
1815 000302' 000000  CLKFRE::WORD 0      :LINE CLOCK FREQUENCY
1816
1817 000304' 000000  CSRNUM::WORD 0      :PCSR NUMBER
1818 000306' 000000  BITNUM::WORD 0      :BIT NUMBER
1819 000310' 000000  BITNAM::WORD 0      :POINTER TO BIT NAME ASCII STRING
1820 000312' 000000  BITSTA::WORD 0      :POINTER TO BIT STATUS ASCII STRING
1821 000314' 000000  PWHEN::WORD 0      :POINTER TO 'BEFORE' OR 'AFTER' ASCII STRING
1822 000316' 000000  PCOMND::WORD 0      :POINTER TO PORT COMMAND ASCII STRING
1823 000320' 000000  MICMOD::WORD 0      :POINTER TO MICROCODE MODULE # LOADED
1824
1825 000322' 000000  FRESIZ::WORD 0      :POINTER TO WORD CONTAINING SIZE OF FREE MEMORY
1826 000324' 000000  FREMEM::WORD 0      :POINTER TO FREE MEMORY SPACE
1827
1828 000326' 000000  MICRO::WORD 0      :CURRENT MICROCODE MODULE LOADED
1829 000330' 000000  UNIT::WORD 0      :CURRENT UNIT NUMBER BEING TESTED
1830 000332' 000000  METER::WORD 0      :CLOCK TICKS
1831 000334' 021040  SWADDR::WORD 21040 :INTERNAL ADDRESS OF SWITCH PACK
1832
1833 000336' 000000  PCSR0::WORD 0      :PORT CONTROL AND STATUS REGISTER 0
1834 000340' 000000  PCSR1::WORD 0      :PORT CONTROL AND STATUS REGISTER 1
1835 000342' 000000  PCSR2::WORD 0      :PORT CONTROL AND STATUS REGISTER 2
1836 000344' 000000  PCSR3::WORD 0      :PORT CONTROL AND STATUS REGISTER 3
1837 000346' 000000  PCSROUB::WORD 0      :PORT CONTROL AND STATUS REGISTER 0 UPPER BYTE ;RSJ001
1838
1839 000350' 000000  PCSROC::WORD 0      :PCSR0 CONTENTS
1840 000352' 000000  PCSRIC::WORD 0      :PCSR1 CONTENTS
1841 000354' 000000  PCSR2C::WORD 0      :PCSR2 CONTENTS
1842 000356' 000000  PCSR3C::WORD 0      :PCSR3 CONTENTS
1843
1844 000360'          BNAMTO::          :TABLE OF POINTERS TO BIT NAME MNEMONICS FOR PCSRO
1845 000360' 001271'          $BIT0
1846 000362' 001263'          $BIT1
1847 000364' 001255'          $BIT2
1848 000366' 001247'          $BIT3
1849 000370' 001241'          $BIT4
1850 000372' 001054'          $RSET
1851 000374' 001043'          $INTE
1852 000376' 001032'          $INTR
1853 000400' 001021'          $FAT1

```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 41
CZUAAB.MAC 07-APR-83 17:03 GLOBAL DATA SECTION

1854 000402' 001203'
 1855 000404' 001010'
 1856 000406' 001000'
 1857 000410' 000770'
 1858 000412' 000760'
 1859 000414' 000747'
 1860 000416' 000736'
 1861 000420'
 1862 000420' 000000
 1863 000422' 000000
 1864 000424' 000000
 1865 000426' 001120'
 1866 000430' 001241'
 1867 000432' 001233'
 1868 000434' 001225'
 1869 000436' 001107'
 1870 000440' 000000
 1871 000442' 000000
 1872 000444' 000000
 1873 000446' 000000
 1874 000450' 000000
 1875 000452' 000000
 1876 000454' 001076'
 1877 000456' 001065'

SBIT9
 SRCEI
 SDNI
 STXI
 SRXI
 SPCEI
 SSERI

BNAMT1::

:TABLE OF POINTERS TO BIT NAME MNEMONICS FOR PCSR1

.WORD 0
 .WORD 0
 .WORD 0
 SRMTC
 SBIT4
 SBIT5
 SBIT6
 SPCTO
 .WORD 0
 .WORD 0
 .WORD 0
 .WORD 0
 .WORD 0
 SICAB
 SXPWR

1878
 1879 000460'
 1880 000460' 001271'
 1881 000462' 001263'
 1882 000464' 001255'
 1883 000466' 001247'
 1884 000470' 001241'
 1885 000472' 001233'
 1886 000474' 001225'
 1887 000476' 001217'
 1888 000500' 001211'
 1889 000502' 001203'
 1890 000504' 001174'
 1891 000506' 001165'
 1892 000510' 001156'
 1893 000512' 001147'
 1894 000514' 001140'
 1895 000516' 001131'

BNAMT2::

:TABLE OF GENERIC BIT NAME MNEMONICS

SBIT0
 SBIT1
 SBIT2
 SBIT3
 SBIT4
 SBIT5
 SBIT6
 SBIT7
 SBIT8
 SBIT9
 SBIT10
 SBIT11
 SBIT12
 SBIT13
 SBIT14
 SBIT15

1896
 1897 000520'
 1898 000520' 125252
 1899 000522' 052525
 1900 000524' 031463
 1901 000526' 007417
 1902 000530' 000377
 1903 000532' 177777
 1904
 1905 000534' 125252
 1906 000536' 125252
 1907 000540' 125252
 1908 000542' 052525
 1909 000544' 052525

PATERN::

PAT1:: .WORD ^B1010101010101010
 PAT2:: .WORD ^B0101010101010101
 PAT3:: .WORD ^B0011001100110011
 PAT4:: .WORD ^B0000111100001111
 PAT5:: .WORD ^B0000000011111111
 PAT6:: .WORD ^B1111111111111111

SPAT1::

.WORD ^B1010101010101010
 .WORD ^B1010101010101010
 .WORD ^B1010101010101010
 SPAT2:: .WORD ^B0101010101010101
 .WORD ^B0101010101010101

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 44
CZUAAB.MAC 07-APR-83 17:03 GLOBAL DATA SECTION

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.SBTTL GLOBAL TEXT SECTION

:++
: THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
: MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
: MORE THAN ONE TEST.
:--

:
: NAMES OF DEVICES SUPPORTED BY PROGRAM

:
: DEVTYP <DEUNA>

000700'
000700'
000700' 042504 047125 000101

LSDVTYP::
.ASCIZ /DEUNA/
.EVEN

:
: TEST DESCRIPTION

:
: DESCRIPT <DEUNA REPAIR DIAGNOSTIC>

000706'
000706'
000706' 042504 047125 020101
000714' 042522 040520 051111
000722' 042040 040511 047107
000730' 051517 044524 000103

L\$DESC::
.ASCIZ /DEUNA REPAIR DI

.EVEN

000736' 042523 044522 041040 \$SERI:: .ASCIZ /SERI BIT/
000744' 052111 000
000747' 120 042503 020111 \$PCEI:: .ASCIZ /PCEI BIT/
000754' 044502 000124
000760' 054122 020111 044502 \$RXI:: .ASCIZ /RXI BIT/
000766' 000124
000770' 054124 020111 044502 \$IXI:: .ASCIZ /IXI BIT/
000776' 000124
001000' 047104 020111 044502 \$DNI:: .ASCIZ /DNI BIT/
001006' 000124
001010' 041522 044505 041040 \$RCEI:: .ASCIZ /RCEI BIT/
001016' 052111 000
001021' 106 052101 020111 \$FATI:: .ASCIZ /FATI BIT/
001026' 044502 000124
001032' 047111 051124 041040 \$INTR:: .ASCIZ /INTR BIT/
001040' 052111 000
001043' 111 052116 020105 \$INTE:: .ASCIZ /INTE BIT/
001050' 044502 000124
001054' 051522 052105 041040 \$RSET:: .ASCIZ /RSET BIT/
001062' 052111 000
001065' 130 053520 020122 \$XPWR:: .ASCIZ /XPWR BIT/
001072' 044502 000124
001076' 041511 041101 041040 \$ICAB:: .ASCIZ /ICAB BIT/
001104' 052111 000
001107' 120 052103 020117 \$PCTO:: .ASCIZ /PCTO BIT/

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 45
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2002	001114'	044502	000124				
2003	001120'	046522	041524	041040	\$RMTC::	.ASCIZ	/RMTC BIT/
2004	001126'	052111	000				
2005	001131'	102	052111	030440	\$BIT15::	.ASCIZ	/BIT 15/
2006	001136'	000065					
2007	001140'	044502	020124	032061	\$BIT14::	.ASCIZ	/BIT 14/
2008	001146'	000					
2009	001147'	102	052111	030440	\$BIT13::	.ASCIZ	/BIT 13/
2010	001154'	000063					
2011	001156'	044502	020124	031061	\$BIT12::	.ASCIZ	/BIT 12/
2012	001164'	000					
2013	001165'	102	052111	030440	\$BIT11::	.ASCIZ	/BIT 11/
2014	001172'	000061					
2015	001174'	044502	020124	030061	\$BIT10::	.ASCIZ	/BIT 10/
2016	001202'	000					
2017	001203'	102	052111	034440	\$BIT9::	.ASCIZ	/BIT 9/
2018	001210'	000					
2019	001211'	102	052111	034040	\$BIT8::	.ASCIZ	/BIT 8/
2020	001216'	000					
2021	001217'	102	052111	033440	\$BIT7::	.ASCIZ	/BIT 7/
2022	001224'	000					
2023	001225'	102	052111	033040	\$BIT6::	.ASCIZ	/BIT 6/
2024	001232'	000					
2025	001233'	102	052111	032440	\$BIT5::	.ASCIZ	/BIT 5/
2026	001240'	000					
2027	001241'	102	052111	032040	\$BIT4::	.ASCIZ	/BIT 4/
2028	001246'	000					
2029	001247'	102	052111	031440	\$BIT3::	.ASCIZ	/BIT 3/
2030	001254'	000					
2031	001255'	102	052111	031040	\$BIT2::	.ASCIZ	/BIT 2/
2032	001262'	000					
2033	001263'	102	052111	030440	\$BIT1::	.ASCIZ	/BIT 1/
2034	001270'	000					
2035	001271'	102	052111	030040	\$BIT0::	.ASCIZ	/BIT 0/
2036	001276'	000					
2037	001277'	116	052117	051440	\$NSET::	.ASCIZ	/NOT SET/
2038	001304'	052105	000				
2039	001307'	123	052105	000	\$SET::	.ASCIZ	/SET/
2040	001313'	116	052117	041440	\$NCLR::	.ASCIZ	/NOT CLEAR/
2041	001320'	042514	051101	000			
2042	001325'	103	042514	051101	\$CLR::	.ASCIZ	/CLEAR/
2043	001332'	000					
2044	001333'	102	043105	051117	\$BEFOR::	.ASCIZ	/BEFORE/
2045	001340'	000105					
2046	001342'	043101	042524	000122	\$AFTER::	.ASCIZ	/AFTER/
2047	001350'	042507	050124	041103	\$GTPCB::	.ASCIZ	/GETPCB/
2048	001356'	000					
2049	001357'	107	052105	041440	\$GTCMD::	.ASCIZ	/GET COMMAND/
2050	001364'	046517	040515	042116			
2051	001372'	000					
2052	001373'	123	046105	020106	\$SLFT::	.ASCIZ	/SELF TEST/
2053	001400'	042524	052123	000			
2054	001405'	116	050117	000	\$NOP::	.ASCIZ	/NOP/
2055	001411'	123	040524	052122	\$SSTR::	.ASCIZ	/START/
2056	001416'	000					
2057	001417'	104	046505	047101	\$PDNDM::	.ASCIZ	/DEMAND POLL/

GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 46
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2058	001424'	020104	047520	046114	
2059	001432'	000			
2060	001433'	123	047524	000120	ESTOP::.ASCIZ /STOP/
2061	001440'	042522	042523	000124	SRESET::.ASCIZ /RESET/
2062	001446'	040504	040524	042440	SDATER::.ASCIZ /DATA ERROR/
2063	001454'	051122	051117	000	
2064	001461'	101	042104	042522	SADRER::.ASCIZ /ADDRESSING ERROR/
2065	001466'	051523	047111	020107	
2066	001474'	051105	047522	000122	
2067	001502'	040520	044522	054524	SPARER::.ASCIZ /PARITY ERROR/
2068	001510'	042440	051122	051117	
2069	001516'	000			
2070					
2071					: : FORMAT STATEMENTS USED IN PRINT CALLS :
2072					
2073					
2074					
2075	001517'	045	022516	052501	UNLOD::.ASCIZ /XN%AUNABLE TO LOAD MICROCODE MODULE XTXN/
2076	001524'	040516	046102	020105	
2077	001532'	047524	046040	040517	
2078	001540'	020104	044515	051103	
2079	001546'	041517	042117	020105	
2080	001554'	047515	052504	042514	
2081	001562'	022440	022524	000116	
2082	001570'	042522	044507	052123	RACERR::.ASCIZ /REGISTER ACCESS TEST FAILED/
2083	001576'	051105	040440	041503	
2084	001604'	051505	020123	042524	
2085	001612'	052123	043040	044501	
2086	001620'	042514	000104		
2087	001624'	042522	042523	020124	RSETER::.ASCIZ /RESET TEST FAILED/
2088	001632'	042524	052123	043040	
2089	001640'	044501	042514	000104	
2090	001646'	042522	044507	052123	RRWER::.ASCIZ 'REGISTER READ/WRITE TEST FAILED'
2091	001654'	051105	051040	040505	
2092	001662'	027504	051127	052111	
2093	001670'	020105	042524	052123	
2094	001676'	043040	044501	042514	
2095	001704'	006104			
2096	001706'	047516	020120	042524	NOPERR::.ASCIZ /NOP TEST FAILED/
2097	001714'	052123	043040	044501	
2098	001722'	042514	000104		
2099	001726'	042523	043114	052040	SLFTST::.ASCIZ /SELF TEST FAILED/
2100	001734'	051505	020124	040506	
2101	001742'	046111	042105	000	
2102	001747'	122	046517	042040	ROMDMP::.ASCIZ /ROM DUMP TEST FAILED/
2103	001754'	046525	020120	042524	
2104	001762'	052123	043040	044501	
2105	001770'	042514	000104		
2106	001774'	041527	020123	047514	DATALD::.ASCIZ 'WCS LOAD/DUMP TEST FAILED'
2107	002002'	042101	042057	046525	
2108	002010'	020120	042524	052123	
2109	002016'	043040	044501	042514	
2110	002024'	000104			
2111	002026'	047514	042101	040440	LASFT::.ASCIZ /LOAD AND START FUNCTION TEST FAILED/
2112	002034'	042116	051440	040524	
2113	002042'	052122	043040	047125	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 47
 CZUAA3.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2114	002050'	052103	047511	020116	
2115	002056'	042524	052123	043040	
2116	002064'	044501	042514	000104	
2117	002072'	041527	020123	042515	WCSMEM::.ASCIZ /WCS MEMORY TEST FAILED/
2118	002100'	047515	054522	052040	
2119	002106'	051505	020124	040506	
2120	002114'	046111	042105	000	
2121	002121'	111	052116	051105	INTVEC::.ASCIZ /INTERRUPT VECTOR TEST FAILED/
2122	002126'	052522	052120	053040	
2123	002134'	041505	047524	020122	
2124	002142'	042524	052123	043040	
2125	002150'	044501	042514	000104	
2126	002156'	041520	051123	020060	INTBIT::.ASCIZ /PCSR0 INTERRUPT BIT TEST FAILED/
2127	002164'	047111	042524	051122	
2128	002172'	050125	020124	044502	
2129	002200'	020124	042524	052123	
2130	002206'	043040	044501	042514	
2131	002214'	000104			
2132	002216'	044524	042515	020122	TIMTST::.ASCIZ /TIMER TEST FAILED/
2133	002224'	042524	052123	043040	
2134	002232'	044501	042514	000104	
2135	002240'	044514	045516	046440	LNKMEM::.ASCIZ /LINK MEMORY TEST FAILED/
2136	002246'	046505	051117	020131	
2137	002254'	042524	052123	043040	
2138	002262'	044501	042514	000104	
2139	002270'	046504	020101	052047	DMATO::.ASCIZ /DMA 'TO' ADDRESS REGISTER TEST FAILED/
2140	002276'	023517	040440	042104	
2141	002304'	042522	051523	051040	
2142	002312'	043505	051511	042524	
2143	002320'	020122	042524	052123	
2144	002326'	043040	044501	042514	
2145	002334'	000104			
2146	002336'	046504	020101	043047	DMAFRM::.ASCIZ /DMA 'FROM' ADDRESS REGISTER TEST FAILED/
2147	002344'	047522	023515	040440	
2148	002352'	042104	042522	051523	
2149	002360'	051040	043505	051511	
2150	002366'	042524	020122	042524	
2151	002374'	052123	043040	044501	
2152	002402'	042514	000104		
2153	002406'	046504	020101	046102	DMABLK::.ASCIZ /DMA BLOCK TRANSFER TEST FAILED/
2154	002414'	041517	020113	051124	
2155	002422'	047101	043123	051105	
2156	002430'	052040	051505	020124	
2157	002436'	040506	046111	042105	
2158	002444'	000			
2159	002445'	124	040522	051516	TRNDON::.ASCIZ /TRANSMIT DONE TEST FAILED/
2160	002452'	044515	020124	047504	
2161	002460'	042516	052040	051505	
2162	002466'	020124	040506	046111	
2163	002474'	042105	000		
2164	002477'	122	041505	044505	RCVDON::.ASCIZ /RECEIVER DONE TEST FAILED/
2165	002504'	042526	020122	047504	
2166	002512'	042516	052040	051505	
2167	002520'	020124	040506	046111	
2168	002526'	042105	000		
2169	002531'	104	052101	020101	DBFRAM::.ASCIZ /DATA BYTE FRAMING TEST FAILED/

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 48
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2170	002536	054502	042524	043040	
2171	002544	040522	044515	043516	
2172	002552	052040	051505	020124	
2173	002560	040506	046111	042105	
2174	002566	000			
2175	002567	104	052101	020101	DWFRAM::.ASCIZ /DATA WORD FRAMING TEST FAILED/
2176	002574	047527	042122	043040	
2177	002602	040522	044515	043516	
2178	002610	052040	051505	020124	
2179	002616	040506	046111	042105	
2180	002624	000			
2181	002625	104	052101	020101	DPPAT::.ASCIZ /DATA PATH PATTERN TEST FAILED/
2182	002632	040520	044124	050040	
2183	002640	052101	042524	047122	
2184	002646	052040	051505	020124	
2185	002654	040506	046111	042105	
2186	002662	000			
2187	002663	123	040524	052524	STAMUX::.ASCIZ /STATUS MUX VERIFICATION TEST FAILED/
2188	002670	020123	052515	020130	
2189	002676	042524	044522	044506	
2190	002704	040503	044524	047117	
2191	002712	052040	051505	020124	
2192	002720	040506	046111	042105	
2193	002726	000			
2194	002727	114	047111	020113	LNKBYT::.ASCIZ /LINK BYTE COUNTER TEST FAILED/
2195	002734	054502	042524	041440	
2196	002742	052517	052116	051105	
2197	002750	052040	051505	020124	
2198	002756	040506	046111	042105	
2199	002764	000			
2200	002765	114	047111	020113	ODDBYT::.ASCIZ /LINK ODD BYTE COUNTER TEST FAILED/
2201	002772	042117	020104	054502	
2202	003000	042524	041440	052517	
2203	003006	052116	051105	052040	
2204	003014	051505	020124	040506	
2205	003022	046111	042105	000	
2206	003027	114	047111	020113	MAXCNT::.ASCIZ /LINK MAXIMUM BYTE COUNT TEST FAILED/
2207	003034	040515	044530	052515	
2208	003042	020115	054502	042524	
2209	003050	041440	052517	052116	
2210	003056	052040	051505	020124	
2211	003064	040506	046111	042105	
2212	003072	000			
2213	003073	106	043111	020117	FIFTST::.ASCIZ /FIFO TEST FAILED/
2214	003100	042524	052123	043040	
2215	003106	044501	042514	000104	
2216	003114	042522	042503	053111	RLNKAD::.ASCIZ /RECEIVER LINK MEMORY ADDRESS TEST FAILED/
2217	003122	051105	046040	047111	
2218	003130	020113	042515	047515	
2219	003136	054522	040440	042104	
2220	003144	042522	051523	052040	
2221	003152	051505	020124	040506	
2222	003160	046111	042105	000	
2223	003165	124	040522	051516	TLNKAD::.ASCIZ /TRANSMITTER LINK MEMORY ADDRESS TEST FAILED/
2224	003172	044515	052124	051105	
2225	003200	046040	047111	020113	

GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 49
 CZUAAB.MAL 07-APR-83 17:03 GLOBAL TEXT SECTION

2226	003206'	042515	047515	054522	
2227	003214'	040440	042104	042522	
2228	003222'	051523	052040	051505	
2229	003230'	020124	040506	046111	
2230	003236'	042105	000		
2231	003241'	114	047111	020113	LNKARB::ASCIZ /LINK MEMORY ARBITRATION TEST FAILED/
2232	003246'	042515	047515	054522	
2233	003254'	040440	041122	052111	
2234	003262'	040522	044524	047117	
2235	003270'	052040	051505	020124	
2236	003276'	040506	046111	042105	
2237	003304'	000			
2238	003305'	123	040524	044524	STAPAT::ASCIZ /STATION ADDRESS PATTERN TEST FAILED/
2239	003312'	047117	040440	042104	
2240	003320'	042522	051523	050040	
2241	003326'	052101	042524	047122	
2242	003334'	052040	051505	020124	
2243	003342'	040506	046111	042105	
2244	003350'	000			
2245	003351'	123	040524	044524	STAREJ::ASCIZ /STATION ADDRESS REJECTION TEST FAILED/
2246	003356'	047117	040440	042104	
2247	003364'	042522	051523	051040	
2248	003372'	045105	041505	044524	
2249	003400'	047117	052040	051505	
2250	003406'	020124	040506	046111	
2251	003414'	042105	000		
2252	003417'	123	040524	044524	STAPOS::ASCIZ /STATION ADDRESS RAM POSITION TEST FAILED/
2253	003424'	047117	040440	042104	
2254	003432'	042522	051523	051040	
2255	003440'	046501	050040	051517	
2256	003446'	052111	047511	020116	
2257	003454'	042524	052123	043040	
2258	003462'	044501	042514	000104	
2259	003470'	052515	052114	041511	MUCAST::ASCIZ /MULTICAST ADDRESS TEST FAILED/
2260	003476'	051501	020124	042101	
2261	003504'	051104	051505	020123	
2262	003512'	042524	052123	043040	
2263	003520'	044501	042514	000104	
2264	003526'	051103	020103	040504	CRCDAT::ASCIZ /CRC DATA PATTERN TEST FAILED/
2265	003534'	040524	050040	052101	
2266	003542'	042524	047122	052040	
2267	003550'	051505	020124	040506	
2268	003556'	046111	042105	000	
2269	003563'	103	041522	042440	CRCERR::ASCIZ /CRC ERROR TEST FAILED/
2270	003570'	051122	051117	052040	
2271	003576'	051505	020124	040506	
2272	003604'	046111	042105	000	
2273	003611'	103	041522	050040	CRCPAT::ASCIZ /CRC PATTERN LENGTH TEST FAILED/
2274	003616'	052101	042524	047122	
2275	003624'	046040	047105	052107	
2276	003632'	020110	042524	052123	
2277	003640'	043040	044501	042514	
2278	003646'	000104			
2279	003650'	042522	042503	053111	RBRUN::ASCIZ /RECEIVE BUFFER RECOVERY - RUNT TEST FAILED/
2280	003656'	020105	052502	043106	
2281	003664'	051105	051040	041505	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 50
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2282	003672	053117	051105	020131	
2283	003700	020055	052522	052116	
2284	003706	052040	051505	020124	
2285	003714	040506	046111	042105	
2286	003722	000			
2287	003723	110	046101	026506	HAFDUP::.ASCIZ /HALF-DUPLEX TEST FAILED/
2288	003730	052504	046120	054105	
2289	003736	052040	051505	020124	
2290	003744	040506	046111	042105	
2291	003752	000			
2292	003753	103	046117	044514	COLTST::.ASCIZ /COLLISION TEST FAILED/
2293	003760	044523	047117	052040	
2294	003766	051505	020124	040506	
2295	003774	046111	042105	000	
2296	004001	124	051104	041440	TDRCNT::.ASCIZ /TDR COUNTER TEST FAILED/
2297	004006	052517	052116	051105	
2298	004014	052040	051505	020124	
2299	004022	040506	046111	042105	
2300	004030	000			
2301	004031	122	052105	054522	RETLOG::.ASCIZ /RETRY LOGIC TEST FAILED/
2302	004036	046040	043517	041511	
2303	004044	052040	051505	020124	
2304	004052	040506	046111	042105	
2305	004060	000			
2306	004061	125	040516	046102	PRTPAR::.ASCIZ /UNABLE TO PRINT DEVICE PARAMETERS FOR THIS UNIT/
2307	004066	020105	047524	050040	
2308	004074	044522	052116	042040	
2309	004102	053105	041511	020105	
2310	004110	040520	040522	042515	
2311	004116	042524	051522	043040	
2312	004124	051117	052040	044510	
2313	004132	020123	047125	052111	
2314	004140	000			
2315	004141	045	050101	051503	FORM1::.ASCIZ /ZAPCSRXD1XA DOES NOT EXISTXN/
2316	004146	022522	030504	040445	
2317	004154	042040	042517	020123	
2318	004162	047516	020124	054105	
2319	004170	051511	022524	000116	
2320	004176	040445	041520	051123	FORM2::.ASCIZ /ZAPCSRXD1XA BIT X22XA IS XTEN/
2321	004204	042045	022461	020101	
2322	004212	044502	020124	055045	
2323	004220	022462	020101	051511	
2324	004226	022440	022524	000116	
2325	004234	040445	041520	051123	FORM3::.ASCIZ /ZAPCSRXD1XA FAILED DATA PATTERN TESTXN/
2326	004242	042045	022461	020101	
2327	004250	040506	046111	042105	
2328	004256	042040	052101	020101	
2329	004264	040520	052124	051105	
2330	004272	020116	042524	052123	
2331	004300	047045	000		
2332	004303	045	042101	052101	FORM4::.ASCIZ /ZADATA WRITTEN: X06XA DATA READ: X06XN/
2333	004310	020101	051127	052111	
2334	004316	042524	035116	022440	
2335	004324	033117	040445	042040	
2336	004332	052101	020101	042522	
2337	004340	042101	020072	047445	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 51
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

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2338 004346' 022466 000116
2339 004352' 040445 040503 047116 FORM5:: .ASCIZ /%ACANNOT CLEAR INTE BIT IN PCSRO%N/
2340 004360' 052117 041440 042514
2341 004366' 051101 044440 052116
2342 004374' 020105 044502 020124
2343 004402' 047111 050040 051503
2344 004410' 030122 047045 000
2345 004415' 045 022524 030523 FORM6:: .ASCIZ /%T%S1%T%S1%T%S1%T%A PORT COMMAND WAS ISSUED%N/
2346 004422' 052045 051445 022461
2347 004430' 022524 030523 052045
2348 004436' 040445 050040 051117
2349 004444' 020124 047503 046515
2350 004452' 047101 020104 040527
2351 004460' 020123 051511 052523
2352 004466' 042105 047045 000
2353 004473' 045 041501 041522 FORM7:: .ASCIZ /%ACRC CHECK ERROR ON DATA DUMPED FROM DEUNA ROM%N/
2354 004500' 041440 042510 045503
2355 004506' 042440 051122 051117
2356 004514' 047440 020116 040504
2357 004522' 040524 042040 046525
2358 004530' 042520 020104 051106
2359 004536' 046517 042040 052505
2360 004544' 040516 051040 046517
2361 004552' 047045 000
2362 004555' 045 042101 044516 FORM8:: .ASCIZ /%ADNI BIT DID NOT CLEAR A TER WRITING A 1 TO IT%N/
2363 004562' 041040 052111 042040
2364 004570' 042111 047040 052117
2365 004576' 041440 042514 051101
2366 004604' 040440 052106 051105
2367 004612' 053440 044522 044524
2368 004620' 043516 040440 030440
2369 004626' 052040 020117 052111
2370 004634' 047045 000
2371 004637' 045 050101 051503 FORM9:: .ASCIZ /%APCSRXD1%S1%T%S1%T%A RESET WAS ISSUED%N/
2372 004644' 022522 030504 051445
2373 004652' 022461 022524 030523
2374 004660' 052045 051445 022461
2375 004666' 022524 020101 042522
2376 004674' 042523 020124 040527
2377 004702' 020123 051511 052523
2378 004710' 042105 047045 000
2379 004715' 045 042101 052505 FORM10:: .ASCIZ /%ADEUNA %JT IN READY STATE AFTER RESET WAS ISSUED%N/
2380 004722' 040516 047040 052117
2381 004730' 044440 020116 042522
2382 004736' 042101 020131 052123
2383 004744' 052101 020105 043101
2384 004752' 042524 020122 042522
2385 004760' 042523 020124 040527
2386 004766' 020123 051511 052523
2387 004774' 042105 047045 000
2388 005001' 045 042101 052101 FORM11:: .ASCIZ /%ADATA COMPARE ERROR%N/
2389 005006' 020101 047503 050115
2390 005014' 051101 020105 051105
2391 005022' 047522 022522 000116
2392 005030' 040445 052502 043106 FORM12:: .ASCIZ /%ABUFFER ADDRESS: %06%S1%ADATA SB: %06%S1%ADATA WAS: %06%N/
2393 005036' 051105 040440 042104
  
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62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 52
CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2394	005044'	042522	051523	020072
2395	005052'	047445	022466	030523
2396	005060'	040445	040504	040524
2397	005066'	051440	035102	022440
2398	005074'	033117	051445	022461
2399	005102'	042101	052101	020101
2400	005110'	040527	035123	022440
2401	005116'	033117	047045	000
2402	005123'	045	030501	020066
2403	005130'	044502	020124	051103
2404	005136'	020103	044123	052517
2405	005144'	042114	041040	035105
2406	005152'	030040	051445	022462
2407	005160'	053501	051501	020072
2408	005166'	047445	022466	000116
2409	005174'	040445	040504	040524
2410	005202'	053440	044522	052124
2411	005210'	047105	052040	020117
2412	005216'	041520	051123	020061
2413	005224'	051106	046517	052040
2414	005232'	030461	053440	051501
2415	005240'	020072	047445	022466
2416	005246'	000116		
2417	005250'	040445	040504	040524
2418	005256'	051040	040505	020104
2419	005264'	051106	046517	050040
2420	005272'	051503	030522	043040
2421	005300'	047522	020115	047125
2422	005306'	041111	051525	053440
2423	005314'	051501	020072	047445
2424	005322'	022466	000116	
2425	005326'	040445	047516	044440
2426	005334'	052116	051105	052522
2427	005342'	052120	040440	052106
2428	005350'	051105	047040	050117
2429	005356'	050040	051117	020124
2430	005364'	047503	046515	047101
2431	005372'	020104	040527	020123
2432	005400'	051511	052523	042105
2433	005406'	047045	000	
2434	005411'	045	052501	040516
2435	005416'	042040	042111	047040
2436	005424'	052117	044440	052116
2437	005432'	051105	052522	052120
2438	005440'	040440	020124	047503
2439	005446'	051122	041505	020124
2440	005454'	051120	047511	044522
2441	005462'	054524	047045	000
2442	005467'	045	047101	020117
2443	005474'	047111	042524	051122
2444	005502'	050125	020124	043101
2445	005510'	042524	020122	030524
2446	005516'	020061	042523	020124
2447	005524'	052045	040445	044440
2448	005532'	020116	041520	051123
2449	005540'	022460	000116	

FORM13:::ASCIZ /XA16 BIT CRC SHOULD BE: 0XS2XAWAS: X06XN/

FORM15:::ASCIZ /XADATA WRITTEN TO PCSR1 FROM T11 WAS: X06XN/

FORM16:::ASCIZ /XADATA READ FROM PCSR1 FROM UNIBUS WAS: X06XN/

FORM17:::ASCIZ /XAND INTERRUPT AFTER NOP PORT COMMAND WAS ISSUEDXN/

FORM18:::ASCIZ /XAUNA DID NOT INTERRUPT AT CORRECT PRIORITYXN/

FORM19:::ASCIZ /XAND INTERRUPT AFTER T11 SET XTXA IN PCSROXN/

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 53
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2450	005544°	040445	044524	042515	FORM20:::ASCIZ /%TIMER DID NOT INTERRUPT T11%N/
2451	005552°	020122	044504	020104	
2452	005560°	047516	020124	047111	
2453	005566°	042524	051122	050125	
2454	005574°	020124	030524	022461	
2455	005602°	000116			
2456	005604°	040445	044524	042515	FORM21:::ASCIZ /%TIMER DID NOT INTERRUPT WHEN EXPECTED%N/
2457	005612°	020122	044504	020104	
2458	005620°	047516	020124	047111	
2459	005626°	042524	051122	050125	
2460	005634°	020124	044127	047105	
2461	005642°	042440	050130	041505	
2462	005650°	042524	022504	000116	
2463	005656°	040445	054105	042520	FORM22:::ASCIZ /%EXPECTED INTERRUPT BETWEEN 8 AND 12 SECONDS%N/
2464	005664°	052103	052105	044440	
2465	005672°	052116	051105	052522	
2466	005700°	052120	041040	052105	
2467	005706°	042527	047105	034040	
2468	005714°	040440	042116	030440	
2469	005722°	020062	042523	047503	
2470	005730°	042116	022523	000116	
2471	005736°	040445	042522	044503	FORM23:::ASCIZ /%RECEIVED INTERRUPT AT %D1% SECONDS%N/
2472	005744°	053105	042105	044440	
2473	005752°	052116	051105	052522	
2474	005760°	052120	040440	020124	
2475	005766°	042045	022461	020101	
2476	005774°	042523	047503	042116	
2477	006002°	022523	000116		
2478	006006°	040445	044515	051103	FORM24:::ASCIZ /%MICRO TEST %D2% HUNG%N/
2479	006014°	020117	042524	052123	
2480	006022°	022440	031104	040445	
2481	006030°	044040	047125	022507	
2482	006036°	000116			
2483	006040°	040445	040504	040524	FORM25:::ASCIZ /%ADATA WRITTEN TO 'DMATO' REGISTER = %D6%N/
2484	006046°	053440	044522	052124	
2485	006054°	047105	052040	020117	
2486	006062°	042047	040515	047524	
2487	006070°	020047	042522	044507	
2488	006076°	052123	051105	036440	
2489	006104°	022440	033117	047045	
2490	006112°	000			
2491	006113°	045	042101	052101	FORM26:::ASCIZ /%ADATA READ FROM 'DMATO' REGISTER = %D6%N/
2492	006120°	020101	042522	042101	
2493	006126°	043040	047522	020115	
2494	006134°	042047	040515	047524	
2495	006142°	020047	042522	044507	
2496	006150°	052123	051105	020040	
2497	006156°	020075	047445	022466	
2498	006164°	000116			
2499	006166°	040445	040504	040524	FORM27:::ASCIZ /%ADATA SHOULD BE: %D6% DATA WAS: %D6%N/
2500	006174°	051440	047510	046125	
2501	006202°	020104	042502	020072	
2502	006210°	047445	022466	020101	
2503	006216°	040504	040524	053440	
2504	006224°	051501	020072	047445	
2505	006232°	022466	000116		

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 54
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2506	006236'	052045	047045	000	FORM28::ASCIZ	/XTXN/			
2507	006243'	045	040501	042104	FORM29::ASCIZ	/XAADDRESS = X06XS2/			
2508	006250'	042522	051523	036440					
2509	006256'	022440	033117	051445					
2510	006264'	G00062							
2511	006266'	040445	042522	042503	FORM30::ASCIZ	/XARECEIVER STATUS:X06XN/			
2512	006274'	053111	051105	051440					
2513	006302'	040524	052524	035123					
2514	006310'	047445	022466	000116					
2515	006316'	040445	052502	043106	FORM31::ASCIZ	/XABUFFER OFFSET:X06XN/			
2516	006324'	051105	047440	043106					
2517	006332'	042523	035124	047445					
2518	006340'	022466	000116						
2519	006344'	040445	051124	047101	FORM32::ASCIZ	/XATRANSMIT STATUS WORD XD1XS1XTXA NOT CLEAR AFTER TRANSMITXN/			
2520	006352'	046523	052111	051440					
2521	006360'	040524	052524	020123					
2522	006366'	047527	042122	022440					
2523	006374'	030504	051445	022461					
2524	006402'	022524	020101	047516					
2525	006410'	020124	046103	040505					
2526	006416'	020122	043101	042524					
2527	006424'	020122	051124	047101					
2528	006432'	046523	052111	047045					
2529	006440'	000							
2530	006441'	045	052101	040522	FORM33::ASCIZ	/XATRANSMIT BYTE COUNT = XD4XN/			
2531	006446'	051516	044515	020124					
2532	006454'	054502	042524	041440					
2533	006462'	052517	052116	036440					
2534	006470'	022440	032104	047045					
2535	006476'	000							
2536	006477'	045	051101	041505	FORM34::ASCIZ	/XARECEIVE BYTE COUNT SHOULD BE: XD4XS3XAWAS: XD4XN/			
2537	006504'	044505	042526	041040					
2538	006512'	052131	020105	047503					
2539	006520'	047125	020124	044123					
2540	006526'	052517	042114	041040					
2541	006534'	035105	022440	032104					
2542	006542'	051445	022463	053501					
2543	006550'	051501	020072	042045					
2544	006556'	022464	000116						
2545	006562'	040445	041501	052524	FORM35::ASCIZ	/XAActual NUMBER OF BYTES RECEIVED SHOULD BE: XD4XA WAS: XD4XN/			
2546	006570'	046101	047040	046525					
2547	006576'	042502	020122	043117					
2548	006604'	041040	052131	051505					
2549	006612'	051040	041505	044505					
2550	006620'	042526	020104	044123					
2551	006626'	052517	042114	041040					
2552	006634'	035105	022440	032104					
2553	006642'	040445	020040	053440					
2554	006650'	051501	020072	042045					
2555	006656'	022464	000116						
2556	006662'	040445	044514	045516	FORM36::ASCIZ	/XALINK MEMORY ADDRESS = X06XN/			
2557	006670'	046440	046505	051117					
2558	006676'	020131	042101	051104					
2559	006704'	051505	020123	020075					
2560	006712'	047445	022466	000116					
2561	006720'	040445	051124	047101	FORM37::ASCII	/XATRANSMIT STATUS INFORMATION INCORRECT AFTER LOOPBACK STEP /			

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 55
CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2562	006726	046523	052111	051440
2563	006734	040524	052524	020123
2564	006742	047111	047506	046522
2565	006750	052101	047511	020116
2566	006756	047111	047503	051122
2567	006764	041505	020124	043101
2568	006772	042524	020122	047514
2569	007000	050117	040502	045503
2570	007006	051440	042524	020120
2571	007014	052516	041115	051105
2572	007022	022440	031104	047045
2573	007030	000		
2574	007031	045	052101	040522
2575	007036	051516	044515	020124
2576	007044	052123	052101	051525
2577	007052	053440	051117	020104
2578	007060	042045	022461	020101
2579	007066	044123	052517	042114
2580	007074	041040	035105	022440
2581	007102	033117	040445	053440
2582	007110	051501	020072	047445
2583	007116	022466	000116	
2584	C 7122	040445	042124	020122
2585	007130	047503	047125	042524
2586	007136	020122	047516	020124
2587	007144	047111	051103	046505
2588	007152	047105	044524	043516
2589	007160	047045	000	
2590	007163	045	051101	052105
2591	007170	054522	041040	041501
2592	007176	047513	043106	053440
2593	007204	044501	020124	044524
2594	007212	042515	044440	052116
2595	007220	051105	040526	020114
2596	007226	047516	020124	040526
2597	007234	054522	047111	022507
2598	007242	022516	000116	
2599	007246	040445	042522	051124
2600	007254	020131	022443	032123
2601	007262	040445	040527	052111
2602	007270	044440	052116	051105
2603	007276	040526	020114	047503
2604	007304	047125	022524	022516
2605	007312	000116		
2606	007314	042045	022465	033523
2607	007322	000		
2608	007323	045	032504	047045
2609	007330	000		
2610	007331	045	052101	042510
2611	007336	032040	020070	044502
2612	007344	020124	042504	052123
2613	007352	047111	052101	047511
2614	007360	020116	042101	051104
2615	007366	051505	020123	040520
2616	007374	052124	051105	020116
2617	007402	051511	022472	000116

.ASCIZ /NUMBER XD2XN/

FORM38::.ASCIZ /XATRANSMIT STATUS WORD XD1XA SHOULD BE: X06XA WAS: X06XN/

FORM39::.ASCIZ /XATDR COUNTER NOT INCREMENTINGXN/

FORM40::.ASCIZ /XARETRY BACKOFF WAIT TIME INTERVAL NOT VARYINGXNZN/

FORM41::.ASCIZ /XARETRY #XS4XAWAIT INTERVAL COUNTXNZN/

FORM42::.ASCIZ /XD5XS7/

FORM43::.ASCIZ /XD5XN/

FORM44::.ASCIZ /XATHE 48 BIT DESTINATION ADDRESS PATTERN IS:XN/

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 56
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2618	007410'	040445	047514	042527	FORM45::ASCIZ	/XLOWER ORDER = %06%N/
2619	007416'	020122	051117	042504		
2620	007424'	020122	020075	047445		
2621	007432'	022466	000116			
2622	007436'	040445	044515	042104	FORM46::ASCIZ	/XAMIDDLE ORDER = %06%N/
2623	007444'	042514	047440	042122		
2624	007452'	051105	036440	022440		
2625	007460'	033117	047045	000		
2626	007465'	045	052501	050120	FORM47::ASCIZ	/XAUPPER ORDER = %06%N/
2627	007472'	051105	047440	042122		
2628	007500'	051105	020040	020075		
2629	007506'	047445	022466	000116		
2630	007514'	040445	042504	047125	FORM48::ASCIZ	/XADEUNA FAILED TO RECOGNIZE A STATION ADDRESS THAT MATCHES%N/
2631	007522'	020101	040506	046111		
2632	007530'	042105	052040	020117		
2633	007536'	042522	047503	047107		
2634	007544'	055111	020105	020101		
2635	007552'	052123	052101	04751'		
2636	007560'	020116	042101	051104		
2637	007566'	051505	020123	044124		
2638	007574'	052101	046440	052101		
2639	007602'	044103	051505	047045		
2640	007610'	000				
2641	007611'	045	052101	042510	FORM49::ASCIZ	/XATHE STATION ADDRESS IN RAM POSITION %D2%N/
2642	007616'	051440	040524	044524		
2643	007624'	047117	040440	042104		
2644	007632'	042522	051523	044440		
2645	007640'	020116	040522	020115		
2646	007646'	047520	044523	044524		
2647	007654'	047117	022440	031104		
2648	007662'	047045	000			
2649	007665'	045	051101	041505	FORM50::ASCIZ	/XARECEIVER STATUS WORD 0 SHOULD BE: %06%S3%AWAS: %06%N/
2650	007672'	044505	042526	020122		
2651	007700'	052123	052101	051525		
2652	007706'	053440	051117	020104		
2653	007714'	020060	044123	052517		
2654	007722'	042114	041040	035105		
2655	007730'	022440	033117	051445		
2656	007736'	022463	053501	051501		
2657	007744'	020072	047445	022466		
2658	007752'	000116				
2659	007754'	040445	051103	020103	FORM51::ASCIZ	/XACRC ERROR BIT NOT SET%N/
2660	007762'	051105	047522	020122		
2661	007770'	044502	020124	047516		
2662	007776'	020124	042523	022524		
2663	010004'	000116				
2664	010006'	040445	051105	047522	FORM52::ASCIZ	/XAERROR SUMMARY BIT NOT SET%N/
2665	010014'	020122	052523	046515		
2666	010022'	051101	020131	044502		
2667	010030'	020124	047516	020124		
2668	010036'	042523	022524	000116		
2669	010044'	040445	052516	041115	FORM53::ASCIZ	/XANUMBER OF DATA BYTES TRANSMITTED: %D4%N/
2670	010052'	051105	047440	020106		
2671	010060'	040504	040524	041040		
2672	010066'	052131	051505	052040		
2673	010074'	040522	051516	044515		

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 57
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2674	010102°	052124	042105	020072	
2675	010110°	042045	022464	000116	
2676	010116°	040445	040504	040524	FORM54:::ASCIZ /%ADATA PATTERN: %06%N/
2677	010124°	050040	052101	042524	
2678	010132°	047122	020072	047445	
2679	010140°	022466	000116		
2680	010144°	040445	042504	047125	FORM55:::ASCIZ /%ADEUNA FAILED TO REJECT A RUNT PACKET%N/
2681	010152°	020101	040506	046111	
2682	010160°	042105	052040	020117	
2683	010166°	042522	042512	052103	
2684	010174°	040440	051040	047125	
2685	010202°	020124	040520	045503	
2686	010210°	052105	047045	000	
2687	010215°	045	042101	052505	FORM56:::ASCIZ /%ADEUNA FAILED TO RECOVER RECEIVE BUFFER%N/
2688	010222°	040516	043040	044501	
2689	010230°	042514	020104	047524	
2690	010236°	051040	041505	053117	
2691	010244°	051105	051040	041505	
2692	010252°	044505	042526	041040	
2693	010260°	043125	042506	022522	
2694	010266°	000116			
2695	010270°	040445	052516	041115	FORM57:::ASCIZ /%ANUMBER OF BYTES IN RUNT PACKET: %D2%N/
2696	010276°	051105	047440	020106	
2697	010304°	054502	042524	020123	
2698	010312°	047111	051040	047125	
2699	010320°	020124	040520	045503	
2700	010326°	052105	020072	042045	
2701	010334°	022462	000116		
2702	010340°	040445	052516	041115	FORM58:::ASCIZ /%ANUMBER OF BYTES IN LEGITIMATE PACKET: %D4%N/
2703	010346°	051105	047440	020106	
2704	010354°	054502	042524	020123	
2705	010362°	047111	046040	043505	
2706	010370°	052111	046511	052101	
2707	010376°	020105	040520	045503	
2708	010404°	052105	020072	042045	
2709	010412°	022464	000116		
2710	010416°	040445	042522	042503	FORM59:::ASCIZ /%ARECEIVE BUFFER ADDRESS AVAILABLE BEFORE RECEPTION: %06%N/
2711	010424°	053111	020105	052502	
2712	010432°	043106	051105	040440	
2713	010440°	042104	042522	051523	
2714	010446°	040440	040526	046111	
2715	010454°	041101	042514	041040	
2716	010462°	043105	051117	020105	
2717	010470°	042522	042503	052120	
2718	010476°	047511	035116	022440	
2719	010504°	033117	047045	000	
2720	010511°	045	051101	041505	FORM60:::ASCIZ /%ARECEIVE BUFFER ADDRESS COMPLETED AFTER RECEPTION%N/
2721	010516°	044505	042526	041040	
2722	010524°	043125	042506	020122	
2723	010532°	042101	051104	051505	
2724	010540°	020123	047503	050115	
2725	010546°	042514	042524	020104	
2726	010554°	043101	042524	020122	
2727	010562°	042522	042503	052120	
2728	010570°	047511	022516	000116	
2729	010576°	040445	040504	040524	FORM61:::ASCIZ /%ADATA COMPARE ERROR IN RECOVERED RECEIVE BUFFER%N/

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 58
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2730	010604'	041440	046517	040520	
2731	010612'	042522	042440	051122	
2732	010620'	051117	044440	020116	
2733	010626'	042522	047503	042526	
2734	010634'	042522	020104	042522	
2735	010642'	042503	053111	020105	
2736	010650'	052502	043106	051105	
2737	010656'	047045	000		
2738	010661'	045	022524	020101	FORM62:::ASCIZ /XTXA DID NOT CLEAR AFTER WRITING 1 TO ITXN/
2739	010666'	044504	020104	047516	
2740	010674'	020124	046103	040505	
2741	010702'	020122	043101	042524	
2742	010710'	020122	051127	052111	
2743	010716'	047111	020107	020061	
2744	010724'	047524	044440	022524	
2745	010732'	000116			
2746	010734'	040445	042523	043114	FORM63:::ASCIZ /XASELF TEST ERROR CODE = %02XN/
2747	010742'	052040	051505	020124	
2748	010750'	051105	047522	020122	
2749	010756'	047503	042504	036440	
2750	010764'	022440	031117	047045	
2751	010772'	000			
2752	010773'	045	022516	051101	FORM64:::ASCIZ /XNZAROM MICROCODE VERSION (DECIMAL): %D2/
2753	011000'	046517	046440	041511	
2754	011006'	047522	047503	042504	
2755	011014'	053040	051105	044523	
2756	011022'	047117	024040	042504	
2757	011030'	044503	040515	024514	
2758	011036'	020072	042045	000062	
2759	011044'	047045	040445	053523	FORM65:::ASCIZ /XNZASWITCH PACK = %06/
2760	011052'	052111	044103	050040	
2761	011060'	041501	020113	020075	
2762	011066'	047445	000066		
2763	011072'	040445	047516	044440	FORM66:::ASCIZ /XANO INTERRUPT FROM TRANSMIT STATE MACHINE TO T-11XN/
2764	011100'	052116	051105	052522	
2765	011106'	052120	043040	047522	
2766	011114'	020115	051124	047101	
2767	011122'	046523	052111	051440	
2768	011130'	040524	042524	046440	
2769	011136'	041501	044510	042516	
2770	011144'	052040	020117	026524	
2771	011152'	030461	047045	000	
2772	011157'	045	047101	020117	FORM67:::ASCIZ /XANO INTERRUPT FROM RECEIVE STATE MACHINE TO T-11XN/
2773	011164'	047111	042524	051122	
2774	011172'	050125	020124	051106	
2775	011200'	046517	051040	041505	
2776	011206'	044505	042526	051440	
2777	011214'	040524	042524	046440	
2778	011222'	041501	044510	042516	
2779	011230'	052040	020117	026524	
2780	011236'	030461	047045	000	
2781	011243'	045	051101	041505	FORM68:::ASCIZ /XARECEIVER BYTE COUNTER FAILED TO LOCK UP AT MAXIMUM VALUEXN/
2782	011250'	044505	042526	020122	
2783	011256'	054502	042524	041440	
2784	011264'	052517	052116	051105	
2785	011272'	043040	044501	042514	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 59
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2786	011300'	020104	047524	046040	
2787	011306'	041517	020113	050125	
2788	011314'	040440	020124	040515	
2789	011322'	044530	052515	020115	
2790	011330'	040526	052514	022505	
2791	011336'	000116			
2792	011340'	040445	042504	047125	FORM69:::ASCII /%ADEUNA DID NOT REJECT A PACKET TRANSMITTED TO ITSELF/
2793	011346'	020101	044504	020104	
2794	011354'	047516	020124	042522	
2795	011362'	042512	052103	040440	
2796	011370'	050040	041501	042513	
2797	011376'	020124	051124	047101	
2798	011404'	046523	052111	042524	
2799	011412'	020104	047524	044440	
2800	011420'	051524	046105	106	
2801	011425'	045	020101	047111	.ASCIZ /%A IN HALF-DUPLEX MODE%N/
2802	011432'	044040	046101	026506	
2803	011440'	052504	046120	054105	
2804	011446'	046440	042117	022505	
2805	011454'	000116			
2806	011456'	040445	051124	047101	FORM70:::ASCIZ /%ATRANSMIT BUFFER ADDRESS = %06%N/
2807	011464'	046523	052111	041040	
2808	011472'	043125	042506	020122	
2809	011500'	042101	051104	051505	
2810	011506'	020123	020075	047445	
2811	011514'	022466	000116		
2812	011520'	040445	042522	042503	FORM71:::ASCIZ /%ARECEIVE BUFFER ADDRESS = %06%N/
2813	011526'	053111	020105	052502	
2814	011534'	043106	051105	040440	
2815	011542'	042104	042522	051523	
2816	011550'	020040	020075	047445	
2817	011556'	022466	000116		
2818	011562'	040445	030524	020061	FORM72:::ASCIZ /%AT11 LINK MEMORY PARITY ERROR OCCURRED%N/
2819	011570'	044514	045516	046440	
2820	011576'	046505	051117	020131	
2821	011604'	040520	044522	054524	
2822	011612'	042440	051122	051117	
2823	011620'	047440	041503	051125	
2824	011626'	042522	022504	000116	
2825	011634'	040445	030524	020061	FORM73:::ASCIZ /%AT11 NPR TIMEOUT ERROR OCCURRED%N/
2826	011642'	050116	020122	044524	
2827	011650'	042515	052517	020124	
2828	011656'	051105	047522	020122	
2829	011664'	041517	052503	051122	
2830	011672'	042105	047045	000	
2831	011677'	045	052101	030461	FORM74:::ASCIZ /%AT11 NON-EXISTANT MEMORY TIMEOUT OCCURRED%N/
2832	011704'	047040	047117	042455	
2833	011712'	044530	052123	047101	
2834	011720'	020124	042515	047515	
2835	011726'	054522	052040	046511	
2836	011734'	047505	052125	047440	
2837	011742'	041503	051125	042522	
2838	011750'	022504	000116		
2839	011754'	040445	030524	020061	FORM75:::ASCIZ /%AT11 UNEXPECTED INTERRUPT OCCURRED%N/
2840	011762'	047125	054105	042520	
2841	011770'	052103	042105	044440	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 60
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2842	011776'	052116	051105	052522	
2843	012004'	052120	047440	041503	
2844	012012'	051125	042522	022504	
2845	012020'	000116			
2846	012022'	040445	040515	041524	FORM76:::ASCIZ /%AMATCH BIT FAILED TO SET%/
2847	012030'	020110	044502	020124	
2848	012036'	040506	046111	042105	
2849	012044'	052040	020117	042523	
2850	012052'	022524	000116		
2851	012056'	040445	040515	041524	FORM77:::ASCIZ /%AMATCH BIT SET BUT NO RECEIVER INTERRUPT%/
2852	012064'	020110	044502	020124	
2853	012072'	042523	020124	052502	
2854	012100'	020124	047516	051040	
2855	012106'	041505	044505	042526	
2856	012114'	020122	047111	042524	
2857	012122'	051122	050125	022524	
2858	012130'	000116			
2859	012132'	040445	044123	052517	FORM78:::ASCIZ /%ASHOULD BE: %06%\$2%AWAS: %06%/
2860	012140'	042114	041040	035105	
2861	012146'	022440	033117	051445	
2862	012154'	022462	053501	051501	
2863	012162'	020072	047445	022466	
2864	012170'	000116			
2865	012172'	040445	042504	047125	FORM79:::ASCIZ /%ADEUNA FAILED TO REJECT A DATAGRAM.%/
2866	012200'	020101	040506	046111	
2867	012206'	042105	052040	020117	
2868	012214'	042522	042512	052103	
2869	012222'	040440	042040	052101	
2870	012230'	043501	040522	027115	
2871	012236'	047045	000		
2872	012241'	045	042101	051505	FORM80:::ASCIZ /%ADESTINATION ADDRESS OF DATAGRAM IS ALL 1'S%/
2873	012246'	044524	040516	044524	
2874	012254'	047117	040440	042104	
2875	012262'	042522	051523	047440	
2876	012270'	020106	040504	040524	
2877	012276'	051107	046501	044440	
2878	012304'	020123	046101	020114	
2879	012312'	023461	022523	000116	
2880	012320'	040445	052123	052101	FORM81:::ASCIZ /%ASTATION ADDRESS RAM IS ALL 0'S%/
2881	012326'	047511	020116	042101	
2882	012334'	051104	051505	020123	
2883	012342'	040522	020115	051511	
2884	012350'	040440	046114	030040	
2885	012356'	051447	047045	000	
2886	012363'	045	052101	046511	FORM82:::ASCIZ /%ATIMEOUT WAITING FOR MICROCODE TO ENTER MICROMONITOR%/
2887	012370'	047505	052125	053440	
2888	012376'	044501	044524	043516	
2889	012404'	043040	051117	046440	
2890	012412'	041511	047522	047503	
2891	012420'	042504	052040	020117	
2892	012426'	047105	042524	020122	
2893	012434'	044515	051103	046517	
2894	012442'	047117	052111	051117	
2895	012450'	047045	000		
2896	012453'	045	050101	051503	FORM83:::ASCIZ /%APCSR%D1% = %06%/
2897	012460'	022522	030504	040445	

:MAC001

GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 61
CZUAAB.MAC 07-APR-83 17:03 GLOBAL TEXT SECTION

2898	012466'	036440	022440	033117	
2899	012474'	047045	000		
2900		012500'			.EVEN
2901					
2902					

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:03
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 62
GLOBAL ERROR REPORT SECTION

.SBTTL GLOBAL ERROR REPORT SECTION

:++
: THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
: USED BY MORE THAN TEST TO OUTPUT ADDITIONAL ERROR INFORMATION. PRINTB
: (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
:--

2903
2904
2905
2906
2907
2908
2909
2910
2911
2912
2913
2914 012500'
2915 012500'
2916 012500'
2917 012500' 013746 000304'
2918 012504' 012746 004141'
2919 012510' 012746 000002
2920 012514' 010600
2921 012516' 104414
2922 012520' 062706 000006
2923 012524'
2924 012524'
2925 012524' 104423
2926
2927 012526'
2928 012526'
2929 012526'
2930 012526' 013746 000312'
2931 012532' 013746 000306'
2932 012536' 013746 000304'
2933 012542' 012746 004176'
2934 012546' 012746 000004
2935 012552' 010600
2936 012554' 104414
2937 012556' 062706 000012
2938 012562' 004737 017764'
2939 012566'
2940 012566'
2941 012566' 104423
2942
2943 012570'
2944 012570'
2945 012570'
2946 012570' 013746 000304'
2947 012574' 012746 004234'
2948 012600' 012746 000002
2949 012604' 010600
2950 012606' 104414
2951 012610' 062706 000006
2952 012614'
2953 012614' 010446
2954 012616' 010346
2955 012620' 012746 004303'
2956 012624' 012746 000003
2957 012630' 010600
2958 012632' 104414

BGNMSG RACMG1
PRINTB #FORM1,CSRNUM

RACMG1::

MOV CSRNUM,-(SP)
MOV #FORM1,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP CSPNTB
ADD #6,SP

ENDMSG

L10001:

TRAP CMSG

BGNMSG RACMG2
PRINTB #FORM2,CSRNUM,BITNUM,BITSTA

RACMG2::

MOV BITSTA,-(SP)
MOV BITNUM,-(SP)
MOV CSRNUM,-(SP)
MOV #FORM2,-(SP)
MOV #4,-(SP)
MOV SP,R0
TRAP CSPNTB
ADD #12,SP
:PRINT PCRS
:MAC001

ENDMSG JSR PC,PRNPCR

L10002:

TRAP CMSG

BGNMSG RACMG3
PRINTB #FORM3,CSRNUM

RACMG3::

MOV CSRNUM,-(SP)
MOV #FORM3,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP CSPNTB
ADD #6,SP

PRINTB #FORM4,R3,R4

MOV R4,-(SP)
MOV R3,-(SP)
MOV #FORM4,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP CSPNTB

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 63
 CZUAAB.MAC 07-APR-83 17:03

GLOBAL ERROR REPORT SECTION

2959	012634'	062706	000010				ADD	#10,SP
2960	012640'			ENDMSG				
2961	012640'					L10003:		
2962	012640'	104423					TRAP	CSMSG
2963								
2964	012642'			BGNMSG	RACMG4			
2965	012642'							RACMG4::
2966	012642'				PRINTB	#FORM5		
2967	012642'	012746	004352'				MOV	#FORM5,-(SP)
2968	012646'	012746	000001				MOV	#1,-(SP)
2969	012652'	010600					MOV	SP,RO
2970	012654'	104414					TRAP	CSPNTB
2971	012656'	062706	000004				ADD	#4,SP
2972	012662'	004737	017764'					:PRINT PCSR'S
2973	012666'			ENDMSG	JSR	PC,PRNPCR		
2974	012666'							L10004:
2975	012666'	104423					TRAP	CSMSG
2976								
2977	012670'			BGNMSG	RACMG7			
2978	012670'							RACMG7::
2979	012670'				PRINTB	#FORM8		
2980	012670'	012746	004555'				MOV	#FORM8,-(SP)
2981	012674'	012746	000001				MOV	#1,-(SP)
2982	012700'	010600					MOV	SP,RO
2983	012702'	104414					TRAP	CSPNTB
2984	012704'	062706	000004				ADD	#4,SP
2985	012710'	004737	017764'					:PRINT PCSR'S
2986	012714'			ENDMSG	JSR	PC,PRNPCR		
2987	012714'							L10005:
2988	012714'	104423					TRAP	CSMSG
2989								
2990	012716'			BGNMSG	MSG1			
2991	012716'							MSG1::
2992	012716'				PRINTB	#FORM6,BITNAM,BITSTA,PWHEN,PCOMND		
2993	012716'	013746	000316'				MOV	PCOMND,-(SP)
2994	012722'	013746	000314'				MOV	PWHEN,-(SP)
2995	012726'	013746	000312'				MOV	BITSTA,-(SP)
2996	012732'	013746	000310'				MOV	BITNAM,-(SP)
2997	012736'	012746	004415'				MOV	#FORM6,-(SP)
2998	012742'	012746	000005				MOV	#5,-(SP)
2999	012746'	010600					MOV	SP,RO
3000	012750'	104414					TRAP	CSPNTB
3001	012752'	062706	000014				ADD	#14,SP
3002	012756'	004737	017764'					:PRINT PCSR'S
3003	012762'			ENDMSG	JSR	PC,PRNPCR		
3004	012762'							L10006:
3005	012762'	104423					TRAP	CSMSG
3006								
3007	012764'			BGNMSG	MSG2			
3008	012764'							MSG2::
3009	012764'				PRINTB	#FORM7		
3010	012764'	012746	004473'				MOV	#FORM7,-(SP)
3011	012770'	012746	000001				MOV	#1,-(SP)
3012	012774'	010600					MOV	SP,RO
3013	012776'	104414					TRAP	CSPNTB
3014	013000'	062706	000004				ADD	#4,SP

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 64
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3015	013004'			PRINTB #FORM13,R4			
3016	013004'	010446				MOV	R4,-(SP)
3017	013006'	012746	005123'			MOV	#FORM13,-(SP)
3018	013012'	012746	000002			MOV	#2,-(SP)
3019	013016'	010600				MOV	SP,R0
3020	013020'	104414				TRAP	CSPNTB
3021	013022'	062706	000006			ADD	#6,SP
3022	013026'			ENDMSG			
3023	013026'					L10007:	TRAP
3024	013026'	104423					CMSG
3025							
3026	013030'			BGNMSG MSG3			
3027	013030'					MSG3::	
3028	013030'			PRINTB #FORM9,CSRNUM,BITNAM,BITSTA,PWHEN			
3029	013030'	013746	000314'			MOV	PWHEN,-(SP)
3030	013034'	013746	000312'			MOV	BITSTA,-(SP)
3031	013040'	013746	000310'			MOV	BITNAM,-(SP)
3032	013044'	013746	000304'			MOV	CSRNUM,-(SP)
3033	013050'	012746	004637'			MOV	#FORM9,-(SP)
3034	013054'	012746	000005			MOV	#5,-(SP)
3035	013060'	010600				MOV	SP,R0
3036	013062'	104414				TRAP	CSPNTB
3037	013064'	062706	000014			ADD	#14,SP
3038	013070'	004737	017764'	JSR PC,PRNPCR	:PRINT PCSR'S		:MAC001
3039	013074'			ENDMSG			
3040	013074'					L10010:	TRAP
3041	013074'	104423					CMSG
3042							
3043	013076'			BGNMSG MSG4			
3044	013076'					MSG4::	
3045	013076'			PRINTB #FORM10			
3046	013076'	012746	004715'			MOV	#FORM10,-(SP)
3047	013102'	012746	000001			MOV	#1,-(SP)
3048	013106'	010600				MOV	SP,R0
3049	013110'	104414				TRAP	CSPNTB
3050	013112'	062706	000004			ADD	#4,SP
3051	013116'	004737	017764'	JSR PC,PRNPCR	:PRINT PCSR'S		:MAC001
3052	013122'			ENDMSG			
3053	013122'					L10011:	TRAP
3054	013122'	104423					CMSG
3055							
3056	013124'			BGNMSG MSG5			
3057	013124'					MSG5::	
3058	013124'			PRINTB #FORM11			
3059	013124'	012746	005001'			MOV	#FORM11,-(SP)
3060	013130'	012746	000001			MOV	#1,-(SP)
3061	013134'	010600				MOV	SP,R0
3062	013136'	104414				TRAP	CSPNTB
3063	013140'	062706	000004			ADD	#4,SP
3064	013144'			PRINTB #FORM12,R1,(R4),(R1)			
3065	013144'	011146				MOV	(R1),-(SP)
3066	013146'	011446				MOV	(R4),-(SP)
3067	013150'	010146				MOV	R1,-(SP)
3068	013152'	012746	005030'			MOV	#FORM12,-(SP)
3069	013156'	012746	000004			MOV	#4,-(SP)
3070	013162'	010600				MOV	SP,R0

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 65
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3071	013164'	104414				TRAP	CSPNTB
3072	013166'	062706	000012			ADD	#12,SP
3073	013172'			ENDMSG			
3074	013172'				L10012:		
3075	013172'	104423				TRAP	CSMSG
3076							
3077	013174'			BGNMSG MSG6			
3078	013174'				MSG6::		
3079	013174'			PRINTB #FORM11			
3080	013174'	012746	005001'			MOV	#FORM11,-(SP)
3081	013200'	012746	000001			MOV	#1,-(SP)
3082	013204'	010600				MOV	SP,RO
3083	013206'	104414				TRAP	CSPNTB
3084	013210'	062706	000004			ADD	#4,SP
3085	013214'			PRINTB #FORM15,R1			
3086	013214'	010146				MOV	R1,-(SP)
3087	013216'	012746	005174'			MOV	#FORM15,-(SP)
3088	013222'	012746	000002			MOV	#2,-(SP)
3089	013226'	010600				MOV	SP,RO
3090	013230'	104414				TRAP	CSPNTB
3091	013232'	062706	000006			ADD	#6,SP
3092	013236'			PRINTB #FORM16,R2			
3093	013236'	010246				MOV	R2,-(SP)
3094	013240'	012746	005250'			MOV	#FORM16,-(SP)
3095	013244'	012746	000002			MOV	#2,-(SP)
3096	013250'	010600				MOV	SP,RO
3097	013252'	104414				TRAP	CSPNTB
3098	013254'	062706	000006			ADD	#6,SP
3099	013260'			ENDMSG			
3100	013260'				L10013:		
3101	013260'	104423				TRAP	CSMSG
3102							
3103	013262'			BGNMSG MSG7			
3104	013262'				MSG7::		
3105	013262'			PRINTB #FORM17			
3106	013262'	012746	005326'			MOV	#FORM17,-(SP)
3107	013266'	012746	000001			MOV	#1,-(SP)
3108	013272'	010600				MOV	SP,RO
3109	013274'	104414				TRAP	CSPNTB
3110	013276'	062706	000004			ADD	#4,SP
3111	013302'	004737	017764'	JSR PC,PRNPCR	:PRINT PCSR'S		:MAC001
3112	013306'			ENDMSG			
3113	013306'				L10014:		
3114	013306'	104423				TRAP	CSMSG
3115							
3116	013310'			BGNMSG MSG8			
3117	013310'				MSG8::		
3118	013310'			PRINTB #FORM18			
3119	013310'	012746	005411'			MOV	#FORM18,-(SP)
3120	013314'	012746	000001			MOV	#1,-(SP)
3121	013320'	010600				MOV	SP,RO
3122	013322'	104414				TRAP	CSPNTB
3123	013324'	062706	000004			ADD	#4,SP
3124	013330'			ENDMSG			
3125	013330'				L10015:		
3126	013330'	104423				TRAP	CSMSG

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:03
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 66
GLOBAL ERROR REPORT SECTION

3127							
3128	013332'			BGNMSG	MSG9		
3129	013332'					MSG9::	
3130	013332'				PRINTB	#FORM19, @BITNAM	
3131	013332'	017746	164752				MOV @BITNAM, -(SP)
3132	013336'	012746	005467'				MOV #FORM19, -(SP)
3133	013342'	012746	000002				MOV #2, -(SP)
3134	013346'	010600					MOV SP, R0
3135	013350'	104414					TRAP CSPNTB
3136	013352'	062706	000006				ADD #6, SP
3137	013356'			ENDMSG			
3138	013356'					L10016:	
3139	013356'	104423					TRAP CMSG
3140							
3141	013360'			BGNMSG	MSG10		
3142	013360'					MSG10::	
3143	013360'				PRINTB	#FORM20	
3144	013360'	012746	005544'				MOV #FORM20, -(SP)
3145	013364'	012746	000001				MOV #1, -(SP)
3146	013370'	010600					MOV SP, R0
3147	013372'	104414					TRAP CSPNTB
3148	013374'	062706	000004				ADD #4, SP
3149	013400'			ENDMSG			
3150	013400'					L10017:	
3151	013400'	104423					TRAP CMSG
3152							
3153	013402'			BGNMSG	MSG11		
3154	013402'					MSG11::	
3155	013402'				PRINTB	#FORM21	
3156	013402'	012746	005604'				MOV #FORM21, -(SP)
3157	013406'	012746	000001				MOV #1, -(SP)
3158	013412'	010600					MOV SP, R0
3159	013414'	104414					TRAP CSPNTB
3160	013416'	062706	000004				ADD #4, SP
3161	013422'				PRINTB	#FORM22	
3162	013422'	012746	005656'				MOV #FORM22, -(SP)
3163	013426'	012746	000001				MOV #1, -(SP)
3164	013432'	010600					MOV SP, R0
3165	013434'	104414					TRAP CSPNTB
3166	013436'	062706	000004				ADD #4, SP
3167	013442'				PRINTB	#FORM23, R1	
3168	013442'	010146					MOV R1, -(SP)
3169	013444'	012746	005736'				MOV #FORM23, -(SP)
3170	013450'	012746	000002				MOV #2, -(SP)
3171	013454'	010600					MOV SP, R0
3172	013456'	104414					TRAP CSPNTB
3173	013460'	062706	000006				ADD #6, SP
3174	013464'			ENDMSG			
3175	013464'					L10020:	
3176	013464'	104423					TRAP CMSG
3177							
3178	013466'			BGNMSG	MSG12		
3179	013466'					MSG12::	
3180	013466'				PRINTB	#FORM24, R2	
3181	013466'	010246					MOV R2, -(SP)
3182	013470'	012746	006006'				MOV #FORM24, -(SP)

62GLOBAL AREAS MAC11 30A(1052) 07-APR-83 17:13 PAGE 67
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3183	013474'	012746	000002			MOV	#2,-(SP)
3184	013500'	010600				MOV	SP,R0
3185	013502'	104414				TRAP	CSPNTB
3186	013504'	062706	000006			ADD	#6,SP
3187	013510'			ENDMSG			
3188	013510'				L10021:		
3189	013510'	104423				TRAP	C\$MSG
3190							
3191	013512'			BGNMSG MSG13			
3192	013512'				MSG13::		
3193	013512'			PRINTB #FORM25,R3			
3194	013512'	010346				MOV	R3,-(SP)
3195	013514'	012746	006040'			MOV	#FORM25,-(SP)
3196	013520'	012746	000002			MOV	#2,-(SP)
3197	013524'	010600				MOV	SP,R0
3198	013526'	104414				TRAP	CSPNTB
3199	013530'	062706	000006			ADD	#6,SP
3200	013534'			PRINTB #FORM26,R4			
3201	013534'	010446				MOV	R4,-(SP)
3202	013536'	012746	006113'			MOV	#FORM26,-(SP)
3203	013542'	012746	000002			MOV	#2,-(SP)
3204	013546'	010600				MOV	SP,R0
3205	013550'	104414				TRAP	CSPNTB
3206	013552'	062706	000006			ADD	#6,SP
3207	013556'			ENDMSG			
3208	013556'				L10022:		
3209	013556'	104423				TRAP	C\$MSG
3210							
3211	013560'			BGNMSG MSG14			
3212	013560'				MSG14::		
3213	013560'			PRINTB #FORM27,R3,R4			
3214	013560'	010446				MOV	R4,-(SP)
3215	013562'	010346				MOV	R3,-(SP)
3216	013564'	012746	006166'			MOV	#FORM27,-(SP)
3217	013570'	012746	000003			MOV	#3,-(SP)
3218	013574'	010600				MOV	SP,R0
3219	013576'	104414				TRAP	CSPNTB
3220	013600'	062706	000010			ADD	#10,SP
3221	013604'			ENDMSG			
3222	013604'				L10023:		
3223	013604'	104423				TRAP	C\$MSG
3224							
3225	013606'			BGNMSG MSG15			
3226	013606'				MSG15::		
3227	013606'			PRINTB #FORM12,R2,(R1),(R2)			
3228	013606'	011246				MOV	(R2),-(SP)
3229	013610'	011146				MOV	(R1),-(SP)
3230	013612'	010246				MOV	R2,-(SP)
3231	013614'	012746	005030'			MOV	#FORM12,-(SP)
3232	013620'	012746	000004			MOV	#4,-(SP)
3233	013624'	010600				MOV	SP,R0
3234	013626'	104414				TRAP	CSPNTB
3235	013630'	062706	000012			ADD	#12,SP
3236	013634'			ENDMSG			
3237	013634'				L10024:		
3238	013634'	104423				TRAP	C\$MSG

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 68
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3239
3240 013636'
3241 013636'
3242 013636'
3243 013636' 010246
3244 013640' 012746 006236'
3245 013644' 012746 000002
3246 013650' 010600
3247 013652' 104414
3248 013654' 062706 000006
3249 013660'
3250 013660' 010146
3251 013662' 012746 006243'
3252 013666' 012746 000002
3253 013672' 010600
3254 013674' 104414
3255 013676' 062706 000006
3256 013702'
3257 013702' 010446
3258 013704' 010346
3259 013706' 012746 006166'
3260 013712' 012746 000003
3261 013716' 010600
3262 013720' 104414
3263 013722' 062706 000010
3264 013726'
3265 013726'
3266 013726' 104423
3267
3268 013730'
3269 013730'
3270 013730'
3271 013730' 010446
3272 013732' 012746 006266'
3273 013736' 012746 000002
3274 013742' 010600
3275 013744' 104414
3276 013746' 062706 000006
3277 013752'
3278 013752' 010146
3279 013754' 012746 006316'
3280 013760' 012746 000002
3281 013764' 010600
3282 013766' 104414
3283 013770' 062706 000006
3284 013774'
3285 013774' 010346
3286 013776' 010246
3287 014000' 012746 006166'
3288 014004' 012746 000003
3289 014010' 010600
3290 014012' 104414
3291 014014' 062706 000010
3292 014020'
3293 014020'
3294 014020' 104423

BGNMSG MSG16
PRINTB #FORM28,R2

PRINTB #FORM29,R1

PRINTB #FORM27,R3,R4

ENDMSG

BGNMSG MSG17
PRINTB #FORM30,R4

PRINTB #FORM31,R1

PRINTB #FORM27,R2,R3

ENDMSG

MSG16::
MOV R2,-(SP)
MOV #FORM28,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV R1,-(SP)
MOV #FORM29,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV R4,-(SP)
MOV R3,-(SP)
MOV #FORM27,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #10,SP

L10025:
TRAP C\$MSG

MSG17::
MOV R4,-(SP)
MOV #FORM30,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV R1,-(SP)
MOV #FORM31,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV R3,-(SP)
MOV R2,-(SP)
MOV #FORM27,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #10,SP

L10026:
TRAP C\$MSG

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 69
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3295				BGNMSG MSG18	MSG18::	
3296	014022'					MOV BITNAM,-(SP)
3297	014022'			PRINTB #FORM32,R1,BITNAM		MOV R1,-(SP)
3298	014022'					MOV #FORM32,-(SP)
3299	014022'	013746	000310'			MOV #3,-(SP)
3300	014026'	010146				MOV SP,R0
3301	014030'	012746	006344'			TRAP CSPNTB
3302	014034'	012746	000003			ADD #10,SP
3303	014040'	010600				
3304	014042'	104414				
3305	014044'	062706	000010			
3306	014050'			ENDMSG	L10027:	TRAP C\$MSG
3307	014050'					
3308	014050'	104423				
3309				BGNMSG MSG19	MSG19::	
3310	014052'					MOV R1,-(SP)
3311	014052'			PRINTB #FORM33,R1		MOV #FORM33,-(SP)
3312	014052'					MOV #2,-(SP)
3313	014052'	010146				MOV SP,R0
3314	014054'	012746	006441'			TRAP CSPNTB
3315	014060'	012746	000002			ADD #6,SP
3316	014064'	010600				MOV R3,-(SP)
3317	014066'	104414				MOV R2,-(SP)
3318	014070'	062706	000006			MOV #FORM34,-(SP)
3319	014074'			PRINTB #FORM34,R2,R3		MOV #3,-(SP)
3320	014074'	010346				MOV SP,R0
3321	014076'	010246				TRAP CSPNTB
3322	014100'	012746	006477'			ADD #10,SP
3323	014104'	012746	000003			
3324	014110'	010600				
3325	014112'	104414				
3326	014114'	062706	000010			
3327	014120'			PRINTB #FORM35,R1,R4		MOV R4,-(SP)
3328	014120'	010446				MOV R1,-(SP)
3329	014122'	010146				MOV #FORM35,-(SP)
3330	014124'	012746	006562'			MOV #3,-(SP)
3331	014130'	012746	000003			MOV SP,R0
3332	014134'	010600				TRAP CSPNTB
3333	014136'	104414				ADD #10,SP
3334	014140'	062706	000010			
3335	014144'			ENDMSG	L10030:	TRAP C\$MSG
3336	014144'					
3337	014144'	104423				
3338				BGNMSG MSG20	MSG20::	
3339	014146'					MOV #FORM11,-(SP)
3340	014146'			PRINTB #FORM11		MOV #1,-(SP)
3341	014146'					MOV SP,R0
3342	014146'	012746	005001'			TRAP CSPNTB
3343	014152'	012746	000001			ADD #4,SP
3344	014156'	010600				
3345	014160'	104414				
3346	014162'	062706	000004			
3347	014166'			PRINTB #FORM36,R3		MOV R3,-(SP)
3348	014166'	010346				MOV #FORM36,-(SP)
3349	014170'	012746	006662'			MOV #2,-(SP)
3350	014174'	012746	000002			

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 70
 CZUAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3351	014200'	010600				MOV	SP,RO
3352	014202'	104414				TRAP	CSPNTB
3353	014204'	062706	000006			ADD	#6,SP
3354	014210'			PRINTB	#FORM27,R1,R2		
3355	014210'	010246				MOV	R2,-(SP)
3356	014212'	010146				MOV	R1,-(SP)
3357	014214'	012746	006166'			MOV	#FORM27,-(SP)
3358	014220'	012746	000003			MOV	#3,-(SP)
3359	014224'	010600				MOV	SP,RO
3360	014226'	104414				TRAP	CSPNTB
3361	014230'	062706	000010			ADD	#10,SP
3362	014234'			ENDMSG			
3363	014234'					L10031:	
3364	014234'	104423				TRAP	C\$MSG
3365							
3366	014236'			BGNMSG	MSG21	MSG21::	
3367	014236'						
3368	014236'			PRINTB	#FORM11		
3369	014236'	012746	005001'			MOV	#FORM11,-(SP)
3370	014242'	012746	000001			MOV	#1,-(SP)
3371	014246'	010600				MOV	SP,RO
3372	014250'	104414				TRAP	CSPNTB
3373	014252'	062706	000004			ADD	#4,SP
3374	014256'			PRINTB	#FORM29,R1		
3375	014256'	010146				MOV	R1,-(SP)
3376	014260'	012746	006243'			MOV	#FORM29,-(SP)
3377	014264'	012746	000002			MOV	#2,-(SP)
3378	014270'	010600				MOV	SP,RO
3379	014272'	104414				TRAP	CSPNTB
3380	014274'	062706	000006			ADD	#6,SP
3381	014300'			PRINTB	#FORM27,R2,R3		
3382	014300'	010346				MOV	R3,-(SP)
3383	014302'	010246				MOV	R2,-(SP)
3384	014304'	012746	006166'			MOV	#FORM27,-(SP)
3385	014310'	012746	000003			MOV	#3,-(SP)
3386	014314'	010600				MOV	SP,RO
3387	014316'	104414				TRAP	CSPNTB
3388	014320'	062706	000010			ADD	#10,SP
3389	014324'			ENDMSG			
3390	014324'					L10032:	
3391	014324'	104423				TRAP	C\$MSG
3392							
3393	014326'			BGNMSG	MSG22	MSG22::	
3394	014326'						
3395	014326'	010146		MOV	R1,-(SP)		
3396	014330'			PRINTB	#FORM37,R2		
3397	014330'	010246				MOV	R2,-(SP)
3398	014332'	012746	006720'			MOV	#FORM37,-(SP)
3399	014336'	012746	000002			MOV	#2,-(SP)
3400	014342'	010600				MOV	SP,RO
3401	014344'	104414				TRAP	CSPNTB
3402	014346'	062706	000006			ADD	#6,SP
3403	014352'	005001		CLR	R1 ; TRANSMIT STATUS WORD 0		
3404	014354'			PRINTB	#FORM38,R1,R3,PCBB+2		
3405	014354'	013746	000610'			MOV	PCBB+2,-(SP)
3406	014360'	010346				MOV	R3,-(SP)

62GLOBAL AREAS MACY11 30A(1052)
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 71
GLOBAL ERROR REPORT SECTION

3407 014362' 010146
 3408 014364' 012746 007031'
 3409 014370' 012746 000004
 3410 014374' 010600
 3411 014376' 104414
 3412 014400' 062706 000012
 3413 014404' 005201
 3414 014406' 005201
 3415 014408' 013746 000612'
 3416 014410' 010446
 3417 014414' 010146
 3418 014416' 012746 007031'
 3419 014422' 012746 000004
 3420 014426' 010600
 3421 014430' 104414
 3422 014432' 062706 000012
 3423 014436' 012601
 3424 014440'
 3425 014440'
 3426 014440' 104423
 3427
 3428 014442'
 3429 014442'
 3430 014442'
 3431 014442' 012746 007122'
 3432 014446' 012746 000001
 3433 014452' 010600
 3434 014454' 104414
 3435 014456' 062706 000004
 3436 014462'
 3437 014462'
 3438 014462' 104423
 3439
 3440 014464'
 3441 014464'
 3442 014464'
 3443 014464' 012746 007163'
 3444 014470' 012746 000001
 3445 014474' 010600
 3446 014476' 104414
 3447 014500' 062706 000004
 3448 014504'
 3449 014504' 012746 007246'
 3450 014510' 012746 000001
 3451 014514' 010600
 3452 014516' 104414
 3453 014520' 062706 000004
 3454 014524' 012701 000001
 3455 014530' 012702 000626'
 3456 014534' 012203
 3457 014536'
 3458 014536' 010146
 3459 014540' 012746 007314'
 3460 014544' 012746 000002
 3461 014550' 010600
 3462 014552' 104414

INC R1 : TRANSMIT STATUS WORD 1
 PRINTB #FORM38,R1,R4,PCBB+4
 MOV (SP)+,R1
 ENDMMSG
 BGNMSG MSG23
 PRINTB #FORM39
 ENDMMSG
 BGNMSG MSG24
 PRINTB #FORM40
 PRINTB #FORM41
 103: MOV #1,R1
 MOV #CNTTAB,R2
 MOV (R2)+,R3
 PRINTB #FORM42,R1

MOV R1,-(SP)
 MOV #FORM38,-(SP)
 MOV #4,-(SP)
 MOV SP,R0
 TRAP C\$PNTB
 ADD #12,SP
 MOV PCBB+4,-(SP)
 MOV R4,-(SP)
 MOV R1,-(SP)
 MOV #FORM38,-(SP)
 MOV #4,-(SP)
 MOV SP,R0
 TRAP C\$PNTB
 ADD #12,SP
 L10033: TRAP C\$MSG
 MSG23::
 MOV #FORM39,-(SP)
 MOV #1,-(SP)
 MOV SP,R0
 TRAP C\$PNTB
 ADD #4,SP
 L10034: TRAP C\$MSG
 MSG24::
 MOV #FORM40,-(SP)
 MOV #1,-(SP)
 MOV SP,R0
 TRAP C\$PNTB
 ADD #4,SP
 MOV #FORM41,-(SP)
 MOV #1,-(SP)
 MOV SP,R0
 TRAP C\$PNTB
 ADD #4,SP
 MOV R1,-(SP)
 MOV #FORM42,-(SP)
 MOV #2,-(SP)
 MOV SP,R0
 TRAP C\$PNTB

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 72
 CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3463	014554'	062706	000006				ADD	#6,SP
3464	014560'			PRINTB	#FORM43,R3			
3465	014560'	010346					MOV	R3,-(SP)
3466	014562'	012746	007323'				MOV	#FORM43,-(SP)
3467	014566'	012746	000002				MOV	#2,-(SP)
3468	014572'	010600					MOV	SP,R0
3469	014574'	104414					TRAP	CSPNTB
3470	014576'	062706	000006				ADD	#6,SP
3471	014602'	005201		INC	R1			
3472	014604'	020127	000021	CMP	R1,#17.			
3473	014610'	001351		BNE	10\$			
3474	014612'			ENDMSG				
3475	014612'					L10035:	TRAP	C\$MSG
3476	014612'	104423						
3477								
3478	014614'			BGNMSG	MSG25			
3479	014614'					MSG25::		
3480	014614'	122777	000003	163516	CMPB	#INERR,@PCSR1		;WAS MATCH BIT SET?
3481	014622'	001011			BNE	10\$;YES
3482	014624'				PRINTB	#FORM76		;NO
3483	014624'	012746	012022'				MOV	#FORM76,-(SP)
3484	014630'	012746	000001				MOV	#1,-(SP)
3485	014634'	010600					MOV	SP,R0
3486	014636'	104414					TRAP	CSPNTB
3487	014640'	062706	000004				ADD	#4,SP
3488	014644'	000410						
3489	014646'			10\$:	BR	20\$		
3490	014646'	012746	012056'		PKINTB	#FORM77		
3491	014652'	012746	000001				MOV	#FORM77,-(SP)
3492	014656'	010600					MOV	#1,-(SP)
3493	014660'	104414					MOV	SP,R0
3494	014662'	062706	000004				TRAP	CSPNTB
3495	014666'			20\$:	PRINTB	#FORM44	ADD	#4,SP
3496	014666'	012746	007331'				MOV	#FORM44,-(SP)
3497	014672'	012746	000001				MOV	#1,-(SP)
3498	014676'	010600					MOV	SP,R0
3499	014700'	104414					TRAP	CSPNTB
3500	014702'	062706	000004				ADD	#4,SP
3501	014706'				PRINTB	#FORM45,(R1)		
3502	014706'	011146					MOV	(R1),-(SP)
3503	014710'	012746	007410'				MOV	#FORM45,-(SP)
3504	014714'	012746	000002				MOV	#2,-(SP)
3505	014720'	010600					MOV	SP,R0
3506	014722'	104414					TRAP	CSPNTB
3507	014724'	062706	000006				ADD	#6,SP
3508	014730'				PRINTB	#FORM46,2(R1)		
3509	014730'	016146	000002				MOV	2(R1),-(SP)
3510	014734'	012746	007436'				MOV	#FORM46,-(SP)
3511	014740'	012746	000002				MOV	#2,-(SP)
3512	014744'	010600					MOV	SP,R0
3513	014746'	104414					TRAP	CSPNTB
3514	014750'	062706	000006				ADD	#6,SP
3515	014754'				PRINTB	#FORM47,4(R1)		
3516	014754'	016146	000004				MOV	4(R1),-(SP)
3517	014760'	012746	007465'				MOV	#FORM47,-(SP)
3518	014764'	012746	000002				MOV	#2,-(SP)

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 73
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3519	014770'	010600						MOV	SP,RO
3520	014772'	104414						TRAP	CSPNTB
3521	014774'	062706	000006					ADD	#6,SP
3522	015000'			ENDMSG					
3523	015000'					L10036:		TRAP	C\$MSG
3524	015000'	104423							
3525									
3526	015002'			BGNMSG	MSG26	MSG26::			
3527	015002'								
3528	015002'				PRINTB	#FORM48			
3529	015002'	012746	007514'					MOV	#FORM48,-(SP)
3530	015006'	012746	000001					MOV	#1,-(SP)
3531	015012'	010600						MOV	SP,RO
3532	015014'	104414						TRAP	CSPNTB
3533	015016'	062706	000004					ADD	#4,SP
3534	015022'				PRINTB	#FORM49,R1			
3535	015022'	010146						MOV	R1,-(SP)
3536	015024'	012746	007611'					MOV	#FORM49,-(SP)
3537	015030'	012746	000002					MOV	#2,-(SP)
3538	015034'	010600						MOV	SP,RO
3539	015036'	104414						TRAP	CSPNTB
3540	015040'	062706	000006					ADD	#6,SP
3541	015044'			ENDMSG					
3542	015044'					L10037:		TRAP	C\$MSG
3543	015044'	104423							
3544									
3545	015046'			BGNMSG	MSG27	MSG27::			
3546	015046'								
3547	015046'				PRINTB	#FORM51			
3548	015046'	012746	007754'					MOV	#FORM51,-(SP)
3549	015052'	012746	000001					MOV	#1,-(SP)
3550	015056'	010600						MOV	SP,RO
3551	015060'	104414						TRAP	CSPNTB
3552	015062'	062706	000004					ADD	#4,SP
3553	015066'				PRINTB	#FORM50,R4,R3			
3554	015066'	010346						MOV	R3,-(SP)
3555	015070'	010446						MOV	R4,-(SP)
3556	015072'	012746	007665'					MOV	#FORM50,-(SP)
3557	015076'	012746	000003					MOV	#3,-(SP)
3558	015102'	010600						MOV	SP,RO
3559	015104'	104414						TRAP	CSPNTB
3560	015106'	062706	000010					ADD	#10,SP
3561	015112'			ENDMSG					
3562	015112'					L10040:		TRAP	C\$MSG
3563	015112'	104423							
3564									
3565	015114'			BGNMSG	MSG28	MSG28::			
3566	015114'								
3567	015114'				PRINTB	#FORM52			
3568	015114'	012746	010006'					MOV	#FORM52,-(SP)
3569	015120'	012746	000001					MOV	#1,-(SP)
3570	015124'	010600						MOV	SP,RO
3571	015126'	104414						TRAP	CSPNTB
3572	015130'	062706	000004					ADD	#4,SP
3573	015134'				PR.NTB	#FORM50,R4,R3			
3574	015134'	010346						MOV	R3,-(SP)

62GLOBAL AREAS MACY11 30A(1052)
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 74
GLOBAL ERROR REPORT SECTION

3575	015136'	010446				MOV	R4,-(SP)
3576	015140'	012746	007665'			MOV	#FORM50,-(SP)
3577	015144'	012746	000003			MOV	#3,-(SP)
3578	015150'	010600				MOV	SP,RO
3579	015152'	104414				TRAP	CSPNTB
3580	015154'	062706	000010			ADD	#10,SP
3581	015160'			ENDMSG			
3582	015160'				L10041:		
3583	015160'	104423				TRAP	C\$MSG
3584							
3585	015162'			BGNMSG	MSG29		
3586	015162'					MSG29::	
3587	015162'						
3588	015162'	013746	000612'				
3589	015166'	012746	000000			MOV	PCBB+4,-(SP)
3590	015172'	012746	007665'			MOV	#0,-(SP)
3591	015176'	012746	000003			MOV	#FORM50,-(SP)
3592	015202'	010600				MOV	#3,-(SP)
3593	015204'	104414				MOV	SP,RO
3594	015206'	062706	000010			TRAP	CSPNTB
3595	015212'					ADD	#10,SP
3596	015212'	013746	000610'				
3597	015216'	012746	010044'			MOV	PCBB+2,-(SP)
3598	015222'	012746	000002			MOV	#FORM53,-(SP)
3599	015226'	010600				MOV	#2,-(SP)
3600	015230'	104414				MOV	SP,RO
3601	015232'	062706	000006			TRAP	CSPNTB
3602	015236'					ADD	#6,SP
3603	015236'	013746	000606'				
3604	015242'	012746	010116'			MOV	PCBB,-(SP)
3605	015246'	012746	000002			MOV	#FORM54,-(SP)
3606	015252'	010600				MOV	#2,-(SP)
3607	015254'	104414				MOV	SP,RO
3608	015256'	062706	000006			TRAP	CSPNTB
3609	015262'			ENDMSG		ADD	#6,SP
3610	015262'				L10042:		
3611	015262'	104423				TRAP	C\$MSG
3612							
3613	015264'			BGNMSG	MSG30		
3614	015264'					MSG30::	
3615	015264'						
3616	015264'	012746	010144'				
3617	015270'	012746	000001			MOV	#FORM55,-(SP)
3618	015274'	010600				MOV	#1,-(SP)
3619	015276'	104414				MOV	SP,RO
3620	015300'	062706	000004			TRAP	CSPNTB
3621	015304'					ADD	#4,SP
3622	015304'	013746	000606'				
3623	015310'	012746	010270'			MOV	PCBB,-(SP)
3624	015314'	012746	000002			MOV	#FORM57,-(SP)
3625	015320'	010600				MOV	#2,-(SP)
3626	015322'	104414				MOV	SP,RO
3627	015324'	062706	000006			TRAP	CSPNTB
3628	015330'			ENDMSG		ADD	#6,SP
3629	015330'				L10043:		
3630	015330'	104423				TRAP	C\$MSG

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 75
 CZUAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3631						
3632	015332'	BGNMSG	MSG31			
3633	015332'				MSG31::	
3634	015332'		PRINTB	#FORM56		
3635	015332'	012746	010215'		MOV	#FORM56,-(SP)
3636	015336'	012746	000001		MOV	#1,-(SP)
3637	015342'	010600			MOV	SP,R0
3638	015344'	104414			TRAP	CSPNTB
3639	015346'	062706	000004		ADD	#4,SP
3640	015352'		PRINTB	#FORM57,R1		
3641	015352'	010146			MOV	R1,-(SP)
3642	015354'	012746	010270'		MOV	#FORM57,-(SP)
3643	015360'	012746	000002		MOV	#2,-(SP)
3644	015364'	010600			MOV	SP,R0
3645	015366'	104414			TRAP	CSPNTB
3646	015370'	062706	000006		ADD	#6,SP
3647	015374'		PRINTB	#FORM58,#104.		
3648	015374'	012746	000150		MOV	#104,-(SP)
3649	015400'	012746	010340'		MOV	#FORM58,-(SP)
3650	015404'	012746	000002		MOV	#2,-(SP)
3651	015410'	010600			MOV	SP,R0
3652	015412'	104414			TRAP	CSPNTB
3653	015414'	062706	000006		ADD	#6,SP
3654	015420'		PRINTB	#FORM59,#100000		
3655	015420'	012746	100000		MOV	#100000,-(SP)
3656	015424'	012746	010416'		MOV	#FORM59,-(SP)
3657	015430'	012746	000002		MOV	#2,-(SP)
3658	015434'	010600			MOV	SP,R0
3659	015436'	104414			TRAP	CSPNTB
3660	015440'	062706	000006		ADD	#6,SP
3661	015444'		PRINTB	#FORM60,#100000,PCBB+2		
3662	015444'	013746	000610'		MOV	PCBB+2,-(SP)
3663	015450'	012746	100000		MOV	#100000,-(SP)
3664	015454'	012746	010511'		MOV	#FORM60,-(SP)
3665	015460'	012746	000003		MOV	#3,-(SP)
3666	015464'	010600			MOV	SP,R0
3667	015466'	104414			TRAP	CSPNTB
3668	015470'	062706	000010		ADD	#10,SP
3669	015474'		ENDMSG			
3670	015474'				L10044:	
3671	015474'	104423			TRAP	CMSG
3672						
3673	015476'	BGNMSG	MSG32		MSG32::	
3674	015476'					
3675	015476'		PRINTB	#FORM61		
3676	015476'	012746	010576'		MOV	#FORM61,-(SP)
3677	015502'	012746	000001		MOV	#1,-(SP)
3678	015506'	010600			MOV	SP,R0
3679	015510'	104414			TRAP	CSPNTB
3680	015512'	062706	000004		ADD	#4,SP
3681	015516'		PRINTB	#FORM27,#52525,PCBB+4		
3682	015516'	013746	000612'		MOV	PCBB+4,-(SP)
3683	015522'	012746	052525		MOV	#52525,-(SP)
3684	015526'	012746	006166'		MOV	#FORM27,-(SP)
3685	015532'	012746	000003		MOV	#3,-(SP)
3686	015536'	010600			MOV	SP,R0

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:03
CZUAAB.MAC

07-APR-83 17:13 PAGE 76
GLOBAL ERROR REPORT SECTION

3687	015540'	104414			TRAP	CSPNTB
3688	015542'	062706	000010		ADD	#10,SP
3689	015546'			PRINTB		#FORM57,PCBB
3690	015546'	013746	000606'		MOV	PCBB,-(SP)
3691	015552'	012746	010270'		MOV	#FORM57,-(SP)
3692	015556'	012746	000002		MOV	#2,-(SP)
3693	015562'	010600			MOV	SP,R0
3694	015564'	104414			TRAP	CSPNTB
3695	015566'	062706	000006		ADD	#6,SP
3696	015572'			ENDMSG		
3697	015572'				L10045:	
3698	015572'	104423			TRAP	CMSG
3699						
3700	015574'			BGNMSG	MSG33	
3701	015574'				MSG33::	
3702	015574'			PRINTB		#FORM62,@BITNAM
3703	015574'	017746	162510		MOV	@BITNAM,-(SP)
3704	015600'	012746	010661'		MOV	#FORM62,-(SP)
3705	015604'	012746	000002		MOV	#2,-(SP)
3706	015610'	010600			MOV	SP,R0
3707	015612'	104414			TRAP	CSPNTB
3708	015614'	062706	000006		ADD	#6,SP
3709	015620'			ENDMSG		
3710	015620'				L10046:	
3711	015620'	104423			TRAP	CMSG
3712						
3713	015622'			BGNMSG	MSG34	
3714	015622'				MSG34::	
3715	015622'			PRINTB		#FORM63,R4
3716	015622'	010446			MOV	R4,-(SP)
3717	015624'	012746	010734'		MOV	#FORM63,-(SP)
3718	015630'	012746	000002		MOV	#2,-(SP)
3719	015634'	010600			MOV	SP,R0
3720	015636'	104414			TRAP	CSPNTB
3721	015640'	062706	000006		ADD	#6,SP
3722	015644'			PRINTB		#FORM28,STMSG
3723	015644'	013746	024406'		MOV	STMSG,-(SP)
3724	015650'	012746	006236'		MOV	#FORM28,-(SP)
3725	015654'	012746	000002		MOV	#2,-(SP)
3726	015660'	010600			MOV	SP,R0
3727	015662'	104414			TRAP	CSPNTB
3728	015664'	062706	000006		ADD	#6,SP
3729	015670'			ENDMSG		
3730	015670'				L10047:	
3731	015670'	104423			TRAP	CMSG
3732						
3733	015672'			BGNMSG	MSG35	
3734	015672'				MSG35::	
3735	015672'			PRINTB		#FORM59,PCBB
3736	015672'	013746	000606'		MOV	PCBB,-(SP)
3737	015676'	012746	010416'		MOV	#FORM59,-(SP)
3738	015702'	012746	000002		MOV	#2,-(SP)
3739	015706'	010600			MOV	SP,R0
3740	015710'	104414			TRAP	CSPNTB
3741	015712'	062706	000006		ADD	#6,SP
3742	015716'			PRINTB		#FORM60

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 77
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3743	015716'	012746	010511'		MOV	#FORM60,-(SP)
3744	015722'	012746	000001		MOV	#1,-(SP)
3745	015726'	010600			MOV	SP,RO
3746	015730'	104414			TRAP	CSPNTB
3747	015732'	062706	000004		ADD	#4,SP
3748	015736'			PRINTB	#FORM78,PCBB,PCBB+2	
3749	015736'	013746	000610'		MOV	PCBB+2,-(SP)
3750	015742'	013746	000606'		MOV	PCBB,-(SP)
3751	015746'	012746	012132'		MOV	#FORM78,-(SP)
3752	015752'	012746	000003		MOV	#3,-(SP)
3753	015756'	010600			MOV	SP,RO
3754	015760'	104414			TRAP	CSPNTB
3755	015762'	062706	000010		ADD	#10,SP
3756	015766'			ENDMSG		
3757	015766'				L10050:	TRAP
3758	015766'	104423				CSMSG
3759						
3760	015770'			BGNMSG	MSG36	
3761	015770'					MSG36::
3762	015770'			PRINTB	#FORM66	
3763	015770'	012746	011072'		MOV	#FORM66,-(SP)
3764	015774'	012746	000001		MOV	#1,-(SP)
3765	016000'	010600			MOV	SP,RO
3766	016002'	104414			TRAP	CSPNTB
3767	016004'	062706	000004		ADD	#4,SP
3768	016010'			ENDMSG		
3769	016010'				L10051:	TRAP
3770	016010'	104423				CSMSG
3771						
3772	016012'			BGNMSG	MSG37	
3773	016012'					MSG37::
3774	016012'			PRINTB	#FORM67	
3775	016012'	012746	011157'		MOV	#FORM67,-(SP)
3776	016016'	012746	000001		MOV	#1,-(SP)
3777	016022'	010600			MOV	SP,RO
3778	016024'	104414			TRAP	CSPNTB
3779	016026'	062706	000004		ADD	#4,SP
3780	016032'			ENDMSG		
3781	016032'				L10052:	TRAP
3782	016032'	104423				CSMSG
3783						
3784	016034'			BGNMSG	MSG38	
3785	016034'					MSG38::
3786	016034'			PRINTB	#FORM68	
3787	016034'	012746	011243'		MOV	#FORM68,-(SP)
3788	016040'	012746	000001		MOV	#1,-(SP)
3789	016044'	010600			MOV	SP,RO
3790	016046'	104414			TRAP	CSPNTB
3791	016050'	062706	000004		ADD	#4,SP
3792	016054'			ENDMSG		
3793	016054'				L10053:	TRAP
3794	016054'	104423				CSMSG
3795						
3796	016056'			BGNMSG	MSG39	
3797	016056'					MSG39::
3798	016056'			PRINTB	#FORM69	

62GLOBAL AREAS MACY11 30A(1052)
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 78
GLOBAL ERROR REPORT SECTION

3799 016056' 012746 011340'
3800 016062' 012746 000001
3801 016066' 010600
3802 016070' 104414
3803 016072' 062706 000004
3804 016076'
3805 016076'
3806 016076' 104423
3807
3808 016100'
3809 016100'
3810 016100'
3811 016100' 012746 010215'
3812 016104' 012746 000001
3813 016110' 010600
3814 016112' 104414
3815 016114' 062706 000004
3816 016120'
3817 016120' 012746 100000
3818 016124' 012746 010416'
3819 016130' 012746 000002
3820 016134' 010600
3821 016136' 104414
3822 016140' 062706 000006
3823 016144'
3824 016144' 013746 000606'
3825 016150' 012746 100000
3826 016154' 012746 010511'
3827 016160' 012746 000003
3828 016164' 010600
3829 016166' 104414
3830 016170' 062706 000010
3831 016174'
3832 016174'
3833 016174' 104423
3834
3835 016176'
3836 016176'
3837 016176'
3838 016176' 012746 010576'
3839 016202' 012746 000001
3840 016206' 010600
3841 016210' 104414
3842 016212' 062706 000004
3843 016216'
3844 016216' 013746 000610'
3845 016222' 012746 052525
3846 016226' 012746 006166'
3847 016232' 012746 000003
3848 016236' 010600
3849 016240' 104414
3850 016242' 062706 000010
3851 016246'
3852 016246'
3853 016246' 104423
3854

ENDMSG

BGNMSG MSG40

PRINTB #FORM56

PRINTB #FORM59,#100000

PRINTB #FORM60,#100000,PCBB

ENDMSG

BGNMSG MSG41

PRINTB #FORM61

PRINTB #FORM27,#52525,PCBB+2

ENDMSG

L10054:

MOV #FORM69,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #4,SP

TRAP C\$MSG

MSG40::

MOV #FORM56,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #4,SP

MOV #100000,-(SP)
MOV #FORM59,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV PCBB,-(SP)
MOV #100000,-(SP)
MOV #FORM60,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #10,SP

L10055:

TRAP C\$MSG

MSG41::

MOV #FORM61,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #4,SP

MOV PCBB+2,-(SP)
MOV #52525,-(SP)
MOV #FORM27,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #10,SP

L10056:

TRAP C\$MSG

62GLOBAL AREAS MACY11 30A(1052)
CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 79
GLOBAL ERROR REPORT SECTION

3855 016250'
3856 016250'
3857 016250'
3858 016250' 013746 000610'
3859 016254' 012746 011456'
3860 016260' 012746 000002
3861 016264' 010600
3862 016266' 104414
3863 016270' 062706 000006
3864 016274'
3865 016274' 013746 000606'
3866 016300' 012746 011520'
3867 016304' 012746 000002
3868 016310' 010600
3869 016312' 104414
3870 016314' 062706 000006
3871 016320'
3872 016320' 010146
3873 016322' 012746 006441'
3874 016326' 012746 000002
3875 016332' 010600
3876 016334' 104414
3877 016336' 062706 000006
3878 016342'
3879 016342' 013746 000612'
3880 016346' 012746 006662'
3881 016352' 012746 000002
3882 016356' 010600
3883 016360' 104414
3884 016362' 062706 000006
3885 016366'
3886 016366' 013746 000616'
3887 016372' 013746 000614'
3888 016376' 012746 006166'
3889 016402' 012746 000003
3890 016406' 010600
3891 016410' 104414
3892 016412' 062706 000010
3893 016416'
3894 016416'
3895 016416' 104423
3896
3897 016420'
3898 016420'
3899 016420'
3900 016420' 012746 011562'
3901 016424' 012746 000001
3902 016430' 010600
3903 016432' 104414
3904 016434' 062706 000004
3905 016440'
3906 016440'
3907 016440' 104423
3908
3909 016442'
3910 016442'

BGNMSG MSG42

PRINTB #FORM70,PCBB+2

PRINTB #FORM71,PCBB

PRINTB #FORM33,R1

PRINTB #FORM36,PCBB+4

PRINTB #FORM27,PCBB+6,PCBB+10

ENDMSG

BGNMSG MSG43

PRINTB #FORM72

ENDMSG

BGNMSG MSG44

MSG42::

MOV PCBB+2,-(SP)
MOV #FORM70,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV PCBB,-(SP)
MOV #FORM71,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV R1,-(SP)
MOV #FORM33,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV PCBB+4,-(SP)
MOV #FORM36,-(SP)
MOV #2,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #6,SP

MOV PCBB+10,-(SP)
MOV PCBB+6,-(SP)
MOV #FORM27,-(SP)
MOV #3,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #10,SP

L10057:

TRAP C\$MSG

MSG43::

MOV #FORM72,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #4,SP

L10060:

TRAP C\$MSG

MSG44::

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 80
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3911	016442'	032737	100000	000670'	BIT	#NPRERR,ERRINT	:NPR ERROR OCCUR?		
3912	016450'	001410			BEQ	108	:NO		
3913	016452'				PRINTB	#FORM73	:YES, PRINT NPR ERROR MESSAGE		
3914	016452'	012746	011634'				MOV	#FORM73,-(SP)	
3915	016456'	012746	000001				MOV	#1,-(SP)	
3916	016462'	010600					MOV	SP,RO	
3917	016464'	104414					TRAP	CSPNTB	
3918	016466'	062706	000004				ADD	#4,SP	
3919	016472'	032737	040000	000670'	108:	BIT	#NXMERR,ERRINT	:NON-EXISTANT MEMORY OCCUR?	
3920	016500'	001410			BEQ	208	:NO		
3921	016502'				PRINTB	#FORM74	:YES, PRINT NON-EXISTANT MEMORY MESSAGE		
3922	016502'	012746	011677'				MOV	#FORM74,-(SP)	
3923	016506'	012746	000001				MOV	#1,-(SP)	
3924	016512'	010600					MOV	SP,RO	
3925	016514'	104414					TRAP	CSPNTB	
3926	016516'	062706	000004				ADD	#4,SP	
3927	016522'	032737	020000	000670'	208:	BIT	#UNIERR,ERRINT	:UNEXPECTED INTERRUPT OCCUR?	
3928	016530'	001410			BEQ	308	:NO		
3929	016532'				PRINTB	#FORM75	:YES, PRINT UNEXPECTED INTERRUPT MESSAGE		
3930	016532'	012746	011754'				MOV	#FORM75,-(SP)	
3931	016536'	012746	000001				MOV	#1,-(SP)	
3932	016542'	010600					MOV	SP,RO	
3933	016544'	104414					TRAP	CSPNTB	
3934	016546'	062706	000004				ADD	#4,SP	
3935	016552'	032737	010000	000670'	308:	BIT	#PARERR,ERRINT	:PARITY ERROR OCCUR?	
3936	016560'	001410			BEQ	408	:NO		
3937	016562'				PRINTB	#FORM72	:YES, PRINT PARITY ERROR MESSAGE		
3938	016562'	012746	011562'				MOV	#FORM72,-(SP)	
3939	016566'	012746	000001				MOV	#1,-(SP)	
3940	016572'	010600					MOV	SP,RO	
3941	016574'	104414					TRAP	CSPNTB	
3942	016576'	062706	000004				ADD	#4,SP	
3943	016602'				408:				
3944	016602'				ENDMSG				
3945	016602'								
3946	016602'	104423					L10061:	TRAP	CMSG
3947									
3948	016604'				BGNMSG	MSG45			
3949	016604'						MSG45::		
3950	016604'				PRINTB	#FORM79			
3951	016604'	012746	012172'				MOV	#FORM79,-(SP)	
3952	016610'	012746	000001				MOV	#1,-(SP)	
3953	016614'	010600					MOV	SP,RO	
3954	016616'	104414					TRAP	CSPNTB	
3955	016620'	062706	000004				ADD	#4,SP	
3956	016624'				PRINTB	#FORM80			
3957	016624'	012746	012241'				MOV	#FORM80,-(SP)	
3958	016630'	012746	000001				MOV	#1,-(SP)	
3959	016634'	010600					MOV	SP,RO	
3960	016636'	104414					TRAP	CSPNTB	
3961	016640'	062706	000004				ADD	#4,SP	
3962	016644'				PRINTB	#FORM81			
3963	016644'	012746	012320'				MOV	#FORM81,-(SP)	
3964	016650'	012746	000001				MOV	#1,-(SP)	
3965	016654'	010600					MOV	SP,RO	
3966	016656'	104414					TRAP	CSPNTB	

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 81
CZUAAB.MAC 07-APR-83 17:03 GLOBAL ERROR REPORT SECTION

3967 016660' 062706 000004
3968 016664'
3969 016664'
3970 016664' 104423
3971
3972 016666'
3973 016666'
3974 016666'
3975 016666' 012746 012363'
3976 016672' 012746 000001
3977 016676' 010600
3978 016700' 104414
3979 016702' 062706 000004
3980 016706'
3981 016706'
3982 016706' 104423

ENDMSG

BGNMSG MSG46

PRINTB #FORMB2

ENDMSG

ADD #4,SP
L10062: TRAP CMSG

MSG46::

MOV #FORMB2,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTB
ADD #4,SP

L10063: TRAP CMSG

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 82
 CZUAAB.MAC 07-APR-83 17:03

GLOBAL SUBROUTINES SECTION

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016710'
 016710' 010046
 016712' 010146
 016714' 010246
 016716' 010346
 016720' 012704 177777
 016724' 012705 177777
 016730' 112001
 016732' 004737 016752'
 016736' 077204
 016740' 012603
 016742' 012602
 016744' 012601
 016746' 012600
 016750' 000207

.SBTTL GLOBAL SUBROUTINES SECTION

++
 : THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
 : THAT ARE USED IN MORE THAN ONE TEST.

--
 .SBTTL 32 BIT CRC CALCULATOR

++
 : FUNCTIONAL DESCRIPTION:
 : SUBROUTINE TO CALCULATE A 32 BIT CRC ON A BLOCK OF DATA

INPUTS:
 R0 = ADDRESS OF DATA BLOCK
 R2 = BYTE COUNT

IMPLICIT INPUTS: NONE

OUTPUTS:
 R4 = CRC HIGH WORD
 R5 = CRC LOW WORD

SUBORDINATE ROUTINES USED: GETCRC

FUNCTIONAL SIDE EFFECTS: NONE

CALLING SEQUENCE: PUT ADDRESS OF DATA TO PERFORM CRC ON IN R0
 PUT NUMBER OF BYTES TO CHECK IN R2
 JSR PC,BLKCRC

```

CRC32::
        MOV     R0,-(SP)           :SAVE REGISTERS 0-3
        MOV     R1,-(SP)
        MOV     R2,-(SP)
        MOV     R3,-(SP)
        MOV     #INITH,R4         :INITIAL CRC HIGH WORD
        MOV     #INITL,R5         :INITIAL CRC LOW WORD
10$:    MOVB    (R0)+,R1           :GET NEXT BYTE OF DATA
        JSR     PC,GETCRC         :CALCULATE THE CRC
        SOB    R2,10$            :LOOP TILL DONE
        MOV     (SP)+,R3         :RESTORE REGISTERS
        MOV     (SP)+,R2
        MOV     (SP)+,R1
        MOV     (SP)+,R0
        RTS     PC                :RETURN
    
```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 83
 CZUAAB.MAC 07-APR-83 17:03 32 BIT CRC CALCULATOR

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 4041
 4042
 4043
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 4046 016752' 010146
 4047 016752' 010146
 4048 016754' 010246
 4049 016756' 010346
 4050 016760' 042701 177400
 4051 016764' 074105
 4052 016766' 012702 166670
 4053 016772' 012703 101440
 4054 016776' 012701 000010
 4055 017002' 000241
 4056 017004' 006004
 4057 017006' 006005
 4058 017010' 103002
 4059 017012' 074204
 4060 017014' 074305
 4061 017016' 077107
 4062 017020' 012603
 4063 017022' 012602
 4064 017024' 012601
 4065 017026' 000207

```

:++
:BYTE WISE 32-BIT CRC CALCULATOR
:INPUTS:
:      R1 = NEW BYTE TO ADD TO CRC
:      R4,R5 = CURRENT PARTIAL CRC CODE
:OUTPUTS:
:      R4,R5 = UPDATED CRC
:NOTE: THIS ROUTINE IS ONLY USED BY BLKCRC
:--

GETCRC:
      MOV     R1,-(SP)           ;SAVE R1-3
      MOV     R2,-(SP)
      MOV     R3,-(SP)
      BIC     #^C377,R1        ;CLEAR HIGH BYTE
      XOR     R1,R5            ;MERGE NEW BYTE WITH OLD CRC
      MOV     #POLYH,R2        ;GET CRC POLYNOMIAL HIGH WORD
      MOV     #POLYL,R3        ;GET CRC POLYNOMIAL LOW WORD
      MOV     #8.,R1           ;LOOP COUNT
1$:    CLC                     ;CLEAR THE CARRY
      ROR     R4               ;SHIFT RIGHT THE CRC
      ROR     R5               ;32 BITS WORTH
      BCC     2$              ;SKIP IF BIT 0 NOT SET
      XOR     R2,R4            ;EXCLUSIVE OR IN THE POLY
      XOR     R3,R5            ;BOTH HIGH AND LOW WORDS
      SOB     R1,1$           ;AND LOOP ON ALL 8 BITS
      MOV     (SP)+,R3         ;RESTORE REGISTERS
      MOV     (SP)+,R2
      MOV     (SP)+,R1
      RTS     PC               ;RETURN
    
```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 84
CZ1AAB.MAC 07-APR-83 17:03 32 BIT CRC CALCULATOR

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4110
4111
4112

017030'
017030' 010046
017032' 010146
017034' 010246
017036' 010346
017040' 010546
017042' 010203
017044' 010002
017046' G12705 120001
C17052' 112200
017054' 042700 177400
017060' 074004
017062' 012701 000010
017066' 000241
017070' 006004
017072' 103001
017074' 074504
017076' 077105
017100' 077314
017102' 012605
017104' 012603
017106' 012602
017110' 012601
017112' 012600
017114' 000207

.SBTTL 16 BIT CRC CALCULATOR

SUBROUTINE - CRC16
THIS SUBROUTINE CALCULATES A 16 BIT CRC
ON A BLOCK OF DATA.
INPUTS: R0 = ADDRESS OF DATA BLOCK
R2 = BYTE COUNT
R4 = INITIAL CRC VALUE
OUTPUTS: R4 = CRC
CALLING SEQUENCE:
JSR PC,CRC16

```
CRC16::
MOV R0,-(SP) ; SAVE R0
MOV R1,-(SP) ; SAVE R1
MOV R2,-(SP) ; SAVE R2
MOV R3,-(SP) ; SAVE R3
MOV R5,-(SP) ; SAVE R5
MOV R2,R3 ; R3 = BYTE COUNT
MOV R0,R2 ; R2 = ADDRESS OF DATA BLOCK
MOV #POLY16,R5 ; CRC POLYNOMIAL
1$: MOVB (R2)+,R0 ; GET NEXT BYTE
BIC #*C377,R0 ; CLEAR HIGH BYTE
XOR R0,R4 ; MERGE BYTE WITH OLD CRC
MOV #8.,R1 ; LOOP COUNT
2$: CLC ; CLEAR CARRY
ROR R4 ; SHIFT RIGHT THE CRC
BCC 3$ ; SKIP IF BIT ZERO NOT SET
XOR R5,R4 ; EXCLUSIVE OR IN THE POLY
3$: SOB R1,2$ ; AND LOOP ON ALL 8 BITS
SOB R3,1$
MOV (SP)+,R5 ; RESTORE R5
MOV (SP)+,R3 ; RESTORE R3
MOV (SP)+,R2 ; RESTORE R2
MOV (SP)+,R1 ; RESTORE R1
MOV (SP)+,R0 ; RESTORE R0
RTS PC ; AND RETURN
```


62GLOBAL APEAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 85
CZUAAB.MAC 07-APR-83 17:03 16 BIT CRC CALCULATOR

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017116'
017116' 010046
017120' 010346
017122' 010546

017124' 012700 000006
017130' 012703 052625'
017134' 012705 052542'

017140' 112537 052560'
017144' 004737 017200'
017150' 113723 052561'
017154' 004737 017236'
017160' 113723 052561'
017164' 105723
017166' 077014

017170' 012605
017172' 012603
017174' 012600
017176' 00020'

.SBTTL HEXIDECIMAL CONVERTER FOR DEFAULT PHYSICAL ADDRESS

.....
SUBROUTINE - HEXDPA
THIS SUBROUTINE LOADS DEFADR WITH THE ASCII HEX VALUE FOR THE DEFAULT PHYSICAL ADDRESS DPA.
INPUTS: NONE
IMPLICIT INPUTS: DPA = DEFAULT PHYSICAL ADDRESS
OUTPUTS: DEFADR = ASCII HEX VALUE FOR DPA
CALLING SEQUENCE:
JSR PC,HEXDPA
.....

```
HEXDPA::
      MOV     R0,-(SP)      ; SAVE R0
      MOV     R3,-(SP)      ; SAVE R3
      MOV     R5,-(SP)      ; SAVE R5
      :
      MOV     #6,R0         ; DO LOOP = 6 BYTES
      MOV     #DEFADR,R3    ; POINT TO ASCII MESSAGE
      MOV     #DPA,R5       ; POINT TO DEFAULT PHYSICAL ADDR
      :
10$:  MOVB    (R5)+,HEXDAT   ; LOAD BYTE FOR CONVERSION
      JSR     PC,HEXH       ; CONVERT HIGH NIBBLE
      MOVB   HEXVAL,(R3)+  ; LOAD INTO ASCII MESSAGE
      JSR     PC,HEXL       ; CONVERT LOW NIBBLE
      MOVB   HEXVAL,(R3)+  ; LOAD INTO ASCII MESSAGE
      TSTB   (R3)+         ; SKIP OVER HYPHEN IN MESSAGE
      SOB    R0,10$        ; LOOP TILL ALL 6 BYTES ARE DONE
      :
      MOV     (SP)+,R5      ; RESTORE R5
      MOV     (SP)+,R3      ; RESTORE R3
      MOV     (SP)+,R0      ; RESTORE R0
      RTS     PC            ; AND RETURN
```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 86
CZUAAB.MAC 07-APR-83 17:03

HEXIDECIMAL CONVERTER FOR DEFAULT PHYSICAL ADDRESS

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4176 017200'
4177 017200' 010146
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4179 017202' 013701 052560'
4180 017206' 042701 177417
4181
4182 017212' 006201
4183 017214' 006201
4184 017216' 006201
4185 017220' 006201
4186
4187 017222' 062701 052651'
4188 017226' 111137 052561'
4189
4190 017232' 012601
4191 017234' 000207

```

*****
SUBROUTINE - HEXH
THIS SUBROUTINE LOADS HEXVAL WITH THE ASCII HEX VALUE
FOR THE HIGH NIBBLE IN HEXDAT
INPUTS:          NONE
IMPLICIT
INPUTS:          HEXDAT = BYTE TO BE CONVERTED
OUTPUTS:         HEXVAL = ASCII HEX VALUE FOR THE HIGH NIBBLE
CALLING SEQUENCE:
                  JSR      PC,HEXH
*****

```

```

HEXH::
MOV      R1,-(SP)          ; SAVE R1
:
MOV      HEXDAT,R1        ; LOAD DATA FOR CONVERSION
BIC      #177417,R1       ; MASK HIGH NIBBLE
:
ASR      R1                ; SHIFT RIGHT
ASR      R1
ASR      R1
ASR      R1
:
ADD      #HEXTBL,R1        ; GET INDEX INTO HEXTBL
MOVB    (R1),HEXVAL       ; AND LOAD HEXVAL
:
MOV      (SP)+,R1         ; RESTORE R1
RTS     PC                 ; AND RETURN

```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 87
CZUAAB.MAC 07-APR-83 17:03

HEXIDECIMAL CONVERTER FOR DEFAULT PHYSICAL ADDRESS

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4222

017236'
017236' 010146
017240' 013701 052560'
017244' 042701 177760
017250' 062701 052651'
017254' 111137 052561'
017260' 012601
017262' 000207

.....
SUBROUTINE - HEXL
THIS SUBROUTINE LOADS HEXVAL WITH THE ASCII HEX VALUE
FOR THE LOW NIBBLE IN HEXDAT
INPUTS: NONE
IMPLICIT
INPUTS: HEXDAT = BYTE TO BE CONVERTED
OUTPUTS: HEXVAL = ASCII HEX VALUE FOR THE LOW NIBBLE
CALLING SEQUENCE:
JSR PC,HEXL
.....

HEXL::
MOV R1,-(SP) ; SAVE R1
:
MOV HEXDAT,R1 ; LOAD DATA FOR CONVERSION
BIC #177760,R1 ; MASK LOW NIBBLE
:
ADD #HEXTBL,R1 ; GET INDEX INTO HEXTBL
MOVB (R1),HEXVAL ; AND LOAD HEXVAL
:
MOV (SP)+,R1 ; RESTORE R1
RTS PC ; AND RETURN

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 88
CZUAAB.MAC 07-APR-83 17:03

HEXIDECIMAL CONVERTER FOR DEFAULT PHYSICAL ADDRESS

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017264' 012700 000240
017264' 104441
017270' 012777 000100 160774
017300' 000207

017302' 005077 160766
017306' 012700 000340
017306' 104441
017312' 000207
017314'

.SBTTL TURN ON THE CLOCK

: THIS ROUTINE TURNS ON THE CLOCK

TIMON:: SETPRI #PRI05 ;SET PROCESSOR PRIORITY TO 5
MOV #PRI05,R0
TRAP C\$SPRI
MOV #IE,BCLKCSR ;ENABLE CLOCK INTERRUPTS
RTS PC

: THIS ROUTINE TURNS THE CLOCK OFF

TIMOFF:: CLR BCLKCSR ;CLEAR INTERRUPT ENABLE
SETPRI #PRI07 ;PUT PRIORITY BACK UP
MOV #PRI07,R0
TRAP C\$SPRI
RTS PC

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 89
CZUAAB.MAC 07-APR-83 17:03 CHECK FOR DONE INTERRUPT

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.SBTTL CHECK FOR DONE INTERRUPT

:FUNCTIONAL DESCRIPTION:
:ROUTINE TO WAIT FOR THE 'DONE INTERRUPT' BIT TO SET IN PCSRO
:INPUTS: NONE
:IMPLICIT INPUTS: METER
:OUTPUTS: C BIT SET IN PSW IF 'DNI' NOT SET
:C BIT CLEAR IN PSW IF 'DNI' SET
:SUBORDINATE ROUTINES USED: TIMON, TIMOFF
:FUNCTIONAL SIDE EFFECTS: PSW CHANGED, LINE CLOCK INTERRUPTS ARE ENABLED
:CALLING SEQUENCE: PUT NUMBER OF CLOCK TICKS TO WAIT FOR IN--->METER
:JSR PC,CHKDNI

017316° 004737 017264°
017322° 032777 004000 161006
017330° 001010
017332°
017332° 104422
017334° 005737 000332°
017340° 001370
017342° 004737 017302°
017346° 000261
017350° 000403
017352° 004737 017302°
017356° 000241
017360° 000207

CHKDNI::JSR PC,TIMON
10S: BIT #DNI,BPCSRO
BNE 20S
BREAK

TST METER
BNE 10S
JSR PC,TIMOFF
SEC
BR 30S
20S: JSR PC,TIMOFF
CLC
30S: RTS PC

:TURN ON THE LINE CLOCK
:IS 'DNI' SET?
:YES
:RETURN TO THE DRS FOR A MOMENT TRAP CSBRK
:HAS THE TIME EXPIRED?
:NO, KEEP WAITING
:TURN THE CLOCK OFF
:INDICATE 'DNI' DID NOT SET
:LEAVE
:STOP THE CLOCK
:INDICATE 'DNI' SET

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 90
CZUAAB.MAC 07-APR-83 17:03 CLEAR DONE INTERRUPT

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.SBTTL CLEAR DONE INTERRUPT
:*****
:FUNCTIONAL DESCRIPTION:
:ROUTINE TO CLEAR THE 'DNI' BIT IN PCSRO
:INPUTS: NONE
:IMPLICIT INPUTS: PCSRO
:OUTPUTS: C BIT SET IN PCSW IF 'DNI' WILL NOT CLEAR
:C BIT CLEAR IN PSW IF 'DNI' CLEARED SUCCESSFULLY
:SUBORDINATE ROUTINES CALLED: NONE
:FUNCTIONAL SIDE EFFECTS: PSW CHANGED
:CALLING SEQUENCE: JSR PC,CLRDNI
:*****

017362	112777	000010	160756	CLRDNI::MOVB	#DNIB,BPCSR0UB	:CLEAR 'DNI' BIT	:RSJ001
017370	032777	004000	160740	BIT	#DNI,BPCSR0	:DID IS CLEAR?	
017376	001402			BEG	108	:YES	
017400	000261			SEC		:NO, INDICATE ERROR	
017402	000401			BR	208		
017404	000241			108: CLC		:YES, INDICATE SUCCESS	
017406	000207			208: RTS	PC		

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 91
CZUAAB.MAC 07-APR-83 17:03 CLEAR OUTSTANDING INTERRUPT BITS

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4337 017410° 032777 100000 160720
4338 017416° 001413
4339 017420° 112777 000200 160720
4340 017426° 032777 100000 160702
4341 017434° 001404
4342 017436° 012737 000736° 000310°
4343 017444° 000531
4344 017446° 032777 040000 160662 1CS:
4345 017454° 001413
4346 017456° 112777 000100 160662
4347 017464° 032777 040000 160644
4348 017472° 001404
4349 017474° 012737 000747° 000310°
4350 017502° 000512
4351 017504° 032777 020000 160624 20S:
4352 017512° 001413
4353 017514° 112777 000040 160624
4354 017522° 032777 020000 160606
4355 017530° 001404
4356 017532° 012737 000760° 000310°
4357 017540° 000473
4358 017542° 032777 010000 160566 30S:
4359 017550° 001413
4360 017552° 112777 000020 160566
4361 017560° 032777 010000 160550
4362 017566° 001404
4363 017570° 012737 000770° 000310°
4364 017576° 000454
4365 017600° 032777 004000 160530 40S:
4366 017606° 001413
4367 017610° 112777 000010 160530
4368 017616° 032777 004000 160512
4369 017624° 001404
4370 017626° 012737 001000° 000310°

.SBTTL CLEAR OUTSTANDING INTERRUPT BITS
:*****8
:FUNCTIONAL DESCRIPTION:
:ROUTINE TO CLEAR ALL INTERRUPT BITS IN PCSRO
:INPUTS: NONE
:IMPLICIT INPUTS: NONE
:OUTPUTS: C BIT SET IF UNABLE TO CLEAR A INTERRUPT BIT
:C BIT CLEARED IF SUCCESSFUL
:SUBORDINATE ROUTINES USED: NONE
:FUNCTIONAL SIDE EFFECTS: ANY OUTSTANDING INTERRUPT IS CLEARED
:CALLING SEQUENCE: JSR PC,CLRINT
:*****

CLRINT: BIT #SERI,@PCSRO ;IS 'SERI' BIT SET?
BEQ 10S ;NO
MOV #SERIB,@PCSROUB ;WRITE ONE TO CLEAR 'SERI' ;RSJ001
BIT #SERI,@PCSRO ;DID IT CLEAR?
BEQ 10S ;YES
MOV #SSERI,BITNAM ;NO GET POINTER TO BIT NAME STRING
BR 70S ;LEAVE
BIT #PCEI,@PCSRO ;IS 'PCEI' BIT SET?
BEQ 20S ;NO
MOV #PCEIB,@PCSROUB ;YES, WRITE ONE TO CLEAR 'PCEI' ;RSJ001
BIT #PCEI,@PCSRO ;DID IT CLEAR?
BEQ 20S ;YES
MOV #SPCEI,BITNAM ;NO, GET POINTER TO BIT NAME STRING
BR 70S ;LEAVE
BIT #RXI,@PCSRO ;IS 'RXI' BIT SET?
BEQ 30S ;NO
MOV #RXIB,@PCSROUB ;YES, WRITE ONE TO CLEAR 'RXI' ;RSJ001
BIT #RXI,@PCSRO ;DID IT CLEAR?
BEQ 30S ;YES
MOV #SRXI,BITNAM ;NO, GET POINTER TO BIT NAME STRING
BR 70S ;LEAVE
BIT #TXI,@PCSRO ;IS 'TXI' BIT SET?
BEQ 40S ;NO
MOV #TXIB,@PCSROUB ;YES, WRITE ONE TO CLEAR 'TXI' ;RSJ001
BIT #TXI,@PCSRO ;DID IT CLEAR?
BEQ 40S ;YES
MOV #STXI,BITNAM ;NO, GET POINTER TO BIT NAME STRING
BR 70S ;LEAVE
BIT #DNI,@PCSRO ;IS 'DNI' BIT SET?
BEQ 50S ;NO
MOV #DNIB,@PCSROUB ;YES, WRITE ONE TO CLEAR 'DNI' ;RSJ001
BIT #DNI,@PCSRO ;DID IT CLEAR?
BEQ 50S ;YES
MOV #SDNI,BITNAM ;NO, GET POINTER TO BIT NAME STRING

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 92
CZUAAB.MAC 07-APR-83 17:03 CLEAR OUTSTANDING INTERRUPT BITS

```

4371 017634' 000435      BR      70$      :LEAVE
4372 017636' 032777 002000 160472 50$: BIT    #RCEI,BPCSR0 :IS 'RCEI' BIT SET?
4373 017644' 001413      BEQ    60$      :NO
4374 017646' 112777 000004 160472      MOVB   #RCEIB,BPCSR0UB :WRITE ONE TO CLEAR 'RCEI'      :RSJ001
4375 017654' 032777 002000 160454      BIT    #RCEI,BPCSR0 :DID IT CLEAR?
4376 017662' 001404      BEQ    60$      :YES
4377 017664' 012737 001010' 000310'      MOV    #RCEI,BITNAM :NO, GET POINTER TO BIT NAME STRING
4378 017672' 000416      BR     70$      :LEAVE
4379 017674' 032777 000400 160434 60$: BIT    #FATI,BPCSR0 :IS 'FATI' BIT SET?
4380 017702' 001426      BEQ    80$      :NO
4381 017704' 112777 000001 160434      MOVB   #FATIB,BPCSR0UB :WRITE ONE TO CLEAR 'FATI'      :RSJ001
4382 017712' 032777 000400 160416      BIT    #FATI,BPCSR0 :DID IS CLEAR?
4383 017720' 001417      BEQ    80$      :YES
4384 017722' 012737 001021' 000310'      MOV    #SFATI,BITNAM :NO, GET POINTER TO BIT NAME STRING
4385 017730'          PRINTF #FORM62,BITNAM :PRINT ERROR MESSAGE
4386 017730' 013746 000310'      MOV    BITNAM,-(SP)
4387 017734' 012746 010661'      MOV    #FORM62,-(SP)
4388 017740' 012746 000002      MOV    #2,-(SP)
4389 017744' 010600      MOV    SP,RO
4390 017746' 104417      TRAP   CSPNTF
4391 017750' 062706 000006      ADD    #6,SP
4392 017754' 000261      SEC
4393 017756' 000401      BR     100$
4394 017760' 000241      80$: CLC
4395 017762' 000207      100$: RTS    PC

```

:INDICATE ERROR TO CALLER
:LEAVE
:INDICATE SUCCESS

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 94
CZUAAB.MAC 07-APR-83 17:03 CHECK MICROMONITOR

```

4435 .SBTTL CHECK MICROMONITOR
4436
4437 :*****
4438 :
4439 :FUNCTIONAL DESCRIPTION:
4440 :   ROUTINE TO WAIT FOR THE MICROCODE TO ENTER THE MICROMONITOR
4441 :
4442 :INPUTS: NONE
4443 :
4444 :IMPLICIT INPUTS: PCSR1
4445 :
4446 :OUTPUTS: C BIT SET IN PSW IF TIMEOUT WAITING FOR MICROMONITOR
4447 :          C BIT CLEAR IN PSW IF MICROCODE IN MICROMONITOR
4448 :
4449 :SUBORDINATE ROUTINES CALLED: TIMON, TIMOFF
4450 :
4451 :FUNCTIONAL SIDE EFFECTS: PSW CHANGED, LINE CLOCK INTERRUPTS ARE ENABLED
4452 :
4453 :CALLING SEQUENCE: JSR PC,CHKMON
4454 :
4455 :*****

```

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4456
4457 020060' 012737 000077 000332' CHKMON: MOV #1<SECOND,METER ;TIMEOUT PERIOD IS 1 SECOND
4458 020066' 004737 017264' JSR PC,TIMON ;TURN ON THE CLOCK
4459 020072' 122777 000001 160240 10$: CMPB #INMON,BPCSR1 ;IS THE MICROCODE IN THE MICROMONITOR?
4460 020100' 001410 BEQ 20$ ;YES
4461 020102' BREAK ;RETURN TO DRS FOR A MOMENT
4462 020102' 104422 TRAP CSBRK
4463 020104' 005737 000332' TST METER ;HAS THE TIMER EXPIRED?
4464 020110' 001370 BNE 10$ ;NOT YET, KEEP CHECKING MICROCODE
4465 020112' 004737 017302' JSR PC,TIMOFF ;TIMER HAS EXPIRED TURN OFF THE TIMER
4466 020116' 000261 SEC ;INDICATE ERROR TO CALLER
4467 020120' 000403 BR 30$ ;LEAVE
4468 020122' 004737 017302' 20$: JSR PC,TIMOFF ;STOP THE CLOCK
4469 020126' 000241 CLC ;INDICATE TO CALLER MICROCODE IS IN
4470 ;MICROMONITOR
4471 020130' 000207 30$: RTS PC

```

GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 95
CZUAAB.MAC 07-APR-83 17:03

CHECK INTERRUPT ERROR BITS

.SBTTL CHECK INTERRUPT ERROR BITS

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:FUNCTIONAL DESCRIPTION:
:ROUTINE TO CHECK FOR ANY T11 INTERRUPT ERROR BITS IN PCSRO
:INPUTS: NONE
:IMPLICIT INPUTS: PCSRO
:OUTPUTS: C BIT SET IN PSW IF AN INTERRUPT BIT IS SET
:C BIT CLEAR IN NO INTERRUPT BITS ARE SET
:'ERRINT' CONTAINS COPY OF PCSRO
:SUBORDINATE ROUTINES CALLED: NONE
:FUNCTIONAL SIDE EFFECTS: ANY INTERRUPT BIT SET IS CLEARED
:CALLING SEQUENCE: JSR PC,CHKINT

```
4495 020132 017737 160200 000670 CHKINT: MOV @PCSRO,ERRINT ;GET PCSRO CONTENTS
4496 020140 032737 170000 000670 BIT #NPRERR!NXMERR!UNIERR!PARERR,ERRINT ;ANY INTERRUPT ERRORS SET?
4497 020146 001405 BEQ 10$ ;NO
4498 020150 012777 170000 160160 MOV #NPRERR!NXMERR!UNIERR!PARERR,@PCSRO ;CLEAR ANY ERROR INTERRUPT
4499 020156 000261 SEC ;INDICATE ERROR
4500 020160 000401 BR 20$
4501 020162 000241 10$: CLC ;INDICATE NO ERRORS
4502 020164 000207 20$: RTS PC
```

62GLOBAL AREAS MACY11 30A(1052) CZUAAB.MAC 07-APR-83 17:03

07-APR-83 17:13 PAGE 96 CHECK INTERRUPT ERROR BITS

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.SBTTL RESET UNA

:FUNCTIONAL DESCRIPTION:
:ROUTINE TO RESET DEUNA
:INPUTS: NONE
:IMPLICIT INPUTS: NONE
:OUTPUTS: C BIT SET IF ERROR OCCURRED
:C BIT CLEARED IF SUCCESS
:SUBORDINATE ROUTINES USED: CHKDNI, CLRDNI
:FUNCTIONAL SIDE EFFECTS: PSW CHANGED, LINE CLOCK IS TURNED ON, OPERATIONAL
:MICROCODE IS STARTED.
:CALLING SEQUENCE: JSR PC,REUNA
*****8

REUNA::	MOV	#RSET,BPCSR0		:RESET DEUNA BACK TO OPERATIONAL MICRO
	MOV	#12,*SECOND,METER		:PUT SOME TIME ON THE METER
	JSR	PC,CHKDNI		:WAIT FOR 'DNI'
	BCC	10\$:OK
				:ERROR DNI NOT SET AFTER RESET!
				:SETUP ERROR MESSAGE
	MOV	#SDNI,BITNAM		
	MOV	#SNSET,BITSTA		
	MOV	#SAFTER,PWHEN		
	CLR	CSRNUM		
	PRINTF	#FORM9,CSRNUM,BITNAM,BITSTA,PWHEN		
				MOV PWHEN,-(SP)
				MOV BITSTA,-(SP)
				MOV BITNAM,-(SP)
				MOV CSRNUM,-(SP)
				MOV #FORM9,-(SP)
				MOV #5,-(SP)
				MOV SP,R0
				TRAP CSPNTF
				ADD #14,SP
				:MAC001
	JSR	PC,PRNPCR		:PRINT PCSR'S
	SEC			:INDICATE ERROR
	BR	20\$		
10\$:	JSR	PC,CLRDNI		:GO CLEAR DNI
	BCC	20\$:OK
	PRINTF	#FORM8		
				MOV #FORM8,-(SP)
				MOV #1,-(SP)
				MOV SP,R0
				TRAP CSPNTF
				ADD #4,SP

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 97
CZUAAB.MAC 07-APR-83 17:03 RESET UNA

4559 020334' 000261
4560 020336' 000207

208: SEC
RTS PC

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 98
CZUAAB.MAC 07-APR-83 17:03 RESET UNA

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4561
4562 .SBTTL LOAD MICROMODULE
4563
4564 :*****
4565 :
4566 :THIS SUBROUTINE LOADS THE MICROMODULE FOR TESTS THAT REQUIRE CUSTOM
4567 :MICROCODE.
4568 :
4569 :*****
4570
4571 020340' 012737 000326' 000320' LODMIC: MOV #MICRO,MICMOD ;POINT TO MICRO MODULE NAME
4572 020346' 004737 020166' JSR PC,REUNA ;GO START OPERATION MICROCODE
4573 020352' 103015 BCC 5$ ;OK
4574 020354' PRINTF #UNLOD,MICMOD ;PRINT ERROR MESSAGE
4575 020354' 013746 000320' MOV MICMOD,-(SP)
4576 020360' 012746 001517' MOV #UNLOD,-(SP)
4577 020364' 012746 000002 MOV #2,-(SP)
4578 020370' 010600 MOV SP,R0
4579 020372' 104417 TRAP CSPNTF
4580 020374' 062706 000006 ADD #6,SP
4581 020400' 000261 SEC ;INDICATE ERROR OCCURRED
4582 020402' 000137 021174' JMP 20$ ;LEAVE
4583 020406' 023727 000326' 000101 5$: CMP MICRO,#'A ;LOAD MICROCODE MODULE A?
4584 020414' 001007 BNE 10$ ;NO
4585 ;YES
4586 020416' 013737 000000G 000616' MOV MICASZ,UDBB ;SIZE OF MODULE A
4587 020424' 012737 000000G 000620' MOV #MICROA,UDBB+2 ;BASE ADDRESS OF MODULE A
4588 020432' 000475 BR 70$
4589
4590 020434' 023727 000326' 000102 10$: CMP MICRO,#'B ;LOAD MICROCODE MODULE B?
4591 020442' 001007 BNE 20$ ;NO
4592 ;YES
4593 020444' 013737 000000G 000616' MOV MICBSZ,UDBB ;SIZE OF MODULE B
4594 020452' 012737 000000G 000620' MOV #MICROB,UDBB+2 ;BASE ADDRESS OF MODULE B
4595 020460' 000462 BR 70$
4596
4597 020462' 023727 000326' 000103 20$: CMP MICRO,#'C ;LOAD MICROCODE MODULE C?
4598 020470' 001007 BNE 30$ ;NO
4599 ;YES
4600 020472' 013737 000000G 000616' MOV MICCSZ,UDBB ;SIZE OF MODULE C
4601 020500' 012737 000000G 000620' MOV #MICROC,UDBB+2 ;BASE ADDRESS OF MODULE C
4602 020506' 000447 BR 70$
4603
4604 020510' 023727 000326' 000104 30$: CMP MICRO,#'D ;LOAD MICROCODE MODULE D?
4605 020516' 001007 BNE 40$ ;NO
4606 ;YES
4607 020520' 013737 000000G 000616' MOV MICDSZ,UDBB ;SIZE OF MODULE D
4608 020526' 012737 000000G 000620' MOV #MICROD,UDBB+2 ;BASE ADDRESS OF MODULE D
4609 020534' 000434 BR 70$
4610
4611 020536' 023727 000326' 000105 40$: CMP MICRO,#'E ;LOAD MICROCODE MODULE E?
4612 020544' 001007 BNE 50$ ;NO
4613 ;YES
4614 020546' 013737 000000G 000616' MOV MICESZ,UDBB ;SIZE OF MODULE E
4615 020554' 012737 000000G 000620' MOV #MICROE,UDBB+2 ;BASE ADDRESS OF MODULE E
4616 020562' 000421 BR 70$

```

62GLOBAL AREAS MACY11 30A(1052) 07-APR-83 17:13 PAGE 99
CZUAAB.MAC 07-APR-83 17:03 LOAD MICROMODULE

```

4617
4618 020564' 023727 000326' 000106 50$: CMP MICRO,#'F ;LOAD MICROCODE MODULE F?
4619 020572' 001007 BNE 60$ ;NO
4620 ;YES
4621 020574' 013737 000000G 000616' MOV MIC+SZ,UDBB ;SIZE OF MODULE F
4622 020602' 012737 000000G 000620' MOV #MICROF,UDBB+2 ;BASE ADDRESS OF MODULE F
4623 020610' 000406 BR 70$
4624
4625 020612' 013737 000000G 000616' 60$: MOV MICGSZ,UDBB ;SIZE OF MODULE G
4626 020620' 012737 000000G 000620' MOV #MICROG,UDBB+2 ;BASE ADDRESS OF MODULE G
4627
4628 020626' 005037 000622' 70$: CLR UDBB+4
4629 020632' 012737 010000 000624' MOV #WCSADR+<WCSIZ/2>,UDBB+6 ;LOAD INTO TOP HALF OF WCS
4630
4631 ;SETUP PCB
4632 020640' 012737 000021 000606' MOV #LIM,PCBB ;'LOAD INTERNAL MEMORY' FUNCTION
4633 020646' 012737 000616' 000610' MOV #UDBB,PCBB+2 ;SET ADDRESS OF UDBB
4634 020654' 005037 000612' CLR PCBB+4
4635 020660' 012777 000606' 157454 MOV #PCBB,@PCSR2 ;TELL DEUNA WHERE PCBB IS
4636 020666' 005077 157452 CLR @PCSR3
4637
4638 020672' 004737 017410' JSR PC,CLRINT ;CLEAR ANY OUTSTANDING INTERRUPT BITS
4639 020676' 103014 BCC 75$ ;OK
4640 020700' PRINTF #UNLOD,MICMOD ;CAN'T CONTINUE WITH INTERRUPT BITS SET
4641 020700' 013746 000320' MOV MICMOD,-(SP)
4642 020704' 012746 001517' MOV #UNLOD,-(SP)
4643 020710' 012746 000002 MOV #2,-(SP)
4644 020714' 010600 MOV SP,RO
4645 020716' 104417 TRAP CSPNTF
4646 020720' 062706 000006 ADD #6,SP
4647 020724' 000261 SEC
4648 020726' 000522 BR 200$
4649
4650 020730' 012777 000001 157400 75$: MOV #GETPCB,@PCSR0 ;ISSUE 'GET PCB' PORT COMMAND
4651 020736' 012737 001364 000332' MOV #12.*SECOND,METER ;SETUP TIMER
4652 020744' 004737 017316' JSR PC,CHKDNI ;WAIT FOR 'DNI' TO SET
4653 020750' 103014 BCC 80$ ;OK
4654 ;ERROR DNI NOT SET!
4655 PRINTF #UNLOD,MICMOD ;PRINT MESSAGE
4656 020752' 013746 000320' MOV MICMOD,-(SP)
4657 020756' 012746 001517' MOV #UNLOD,-(SP)
4658 020762' 012746 000002 MOV #2,-(SP)
4659 020766' 010600 MOV SP,RO
4660 020770' 104417 TRAP CSPNTF
4661 020772' 062706 000006 ADD #6,SP
4662 020776' 000261 SEC ;INDICATE ERROR
4663 021000' 000475 BR 200$
4664 021002' 80$:
4665 021002' 004737 017362' JSR PC,CLR DNI ;GO CLEAR 'DNI'
4666 021006' 103014 BCC 90$ ;OK
4667 ;ERROR 'DNI' NOT CLEAR!
4668 PRINTF #UNLOD,MICMOD ;PRINT MESSAGE
4669 021010' 013746 000320' MOV MICMOD,-(SP)
4670 021014' 012746 001517' MOV #UNLOD,-(SP)
4671 021020' 012746 000002 MOV #2,-(SP)
4672 021024' 010600 MOV SP,RO

```


73MISCELLANEOUS SECTIONS
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 101
LOAD MICROMODULE

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4713
4714
4715 021176'
4716 021176'
4717 021176'
4718 021176' 000167
4719 021200' 000000
4720 021202'
4721 021202'
4722 021202' 104425
4723
4724
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4729
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4731
4732 021204'
4733 021204'
4734
4735 021204' 177777
4736 021206' 177777
4737 021210' 177777
4738
4739 021212'
4740

.TITLE MISCELLANEOUS SECTIONS
.SBTTL REPORT CODING SECTION
BGNRPT
EXIT RPT
ENDRPT

LSRPT::
.WORD JSJMP
.WORD L10064-2-.
L10064: TRAP CSRPT

.SBTTL PROTECTION TABLE
:++
: THIS TABLE IS USED BY THE RUNTIME SERVICES
: TO PROTECT THE LOAD MEDIA.
:--
BGNPROT
LSPROT::
-1 ;OFFSET INTO P-TABLE FOR CSR ADDRESS
-1 ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
-1 ;OFFSET INTO P-TABLE FOR DRIVE NUMBER
ENDPROT

```

73MISCELLANEOUS SECTIONS
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 102
INITIALIZE SECTION

.SBTTL INITIALIZE SECTION

: THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
: AT THE BEGINNING OF EACH PASS.
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4747
4748 021212'          BGNINIT
4749 021212'          LSINIT::
4750
4751
4752
4753 021212'          READEF #EF.CONTINUE          ;WAS A CONTINUE COMMAND ENTERED
4754 021212' 012700 000036          ;YES, LEAVE INIT CODE          MOV #EF.CONTINUE,RO
4755 021216' 104447          TRAP CSREFG
4756 021220'          BCOMPLETE          30$          ;YES, LEAVE INIT CODE          BCS 30$
4757 021220' 103572          READEF #EF.PWR          ;WAS THERE A POWER FAILURE?          MOV #EF.PWR,RO
4758 021222'          ;MAC001 BCOMPLETE          30$          ;YES, LEAVE INIT CODE          TRAP CSREFG
4759 021222' 012700 000034          ;NO          ;MAC001
4760 021226' 104447          BCC 2$
4761
4762 021230'          ; DELAY A PERIOD OF TIME (APPROX 25 SECS ) FOR SELF TEST TO FINISH
4763 021230' 103007          ;MAC001
4764
4765
4766
4767 021232' 012701 000150          MOV #150,R1          ;INIT OUTER LOOP          ;MAC001
4768 021236' 005000          CLR RO          ;INIT INNER LOOP          ;MAC001
4769 021240' 005300          3$: DEC RO          ;MAC001
4770 021242' 001376          BNE 3$          ;MAC001
4771 021244' 005301          DEC R1          ;MAC001
4772 021246' 001374          BNE 3$          ;MAC001
4773 021250'          2$: READEF #EF.NEW          ;IS THIS A NEW PASS?
4774 021250' 012700 000035          ;NO SKIP THE NEW PASS TIME STUFF          MOV #EF.NEW,RO
4775 021254' 104447          TRAP CSREFG
4776 021256'          BCOMPLETE          10$          ;IS THIS THE VERY FIRST TIME THOUGH?          BCC 10$
4777 021256' 103072          READEF #EF.START          ;NO SKIP THE FIRST TIME STUFF          MOV #EF.START,RO
4778 021260'          ;MAC001
4779 021260' 012700 000040          TRAP CSREFG
4780 021264' 104447          BCOMPLETE          6$          ;SET THE FIRST TIME FLAG          BCC 6$
4781 021266'          ;GET FREE MEMORY INFO          ;MAC001
4782 021266' 103061          MOV #1,FRSTIM          ;SIZE OF FREE MEMORY IN FRESIZ          TRAP CSMEM
4783 021270' 012737 000001 000674'          MEMORY FRESIZ          ;START OF FREE MEMORY IN FREMEM          MOV RO,FRESIZ
4784 021276'          ;GET LINE CLOCK INFO
4785 021276' 104431          MOV FRESIZ,FREMEM          ;SIZE OF FREE MEMORY IN FRESIZ
4786 021300' 010037 000322'          ADD #2,FREMEM          ;START OF FREE MEMORY IN FREMEM
4787 021304' 013737 000322' 000324'          CLOCK L,R1          ;GET LINE CLOCK INFO
4788 021312' 062737 000002 000324'
4789 021320'          ;MAC001
4790 021320' 012700 000114          ;NO SKIP THE NEW PASS TIME STUFF          MOV #L,RO
4791 021324' 104462          TRAP CSCLCK
4792 021326' 010001          MOV RO,R1
4793 021330'          BCOMPLETE          1$          ;ERROR MESSAGE          BCS 1$
4794 021330' 103411          PRINTF #NOCLK
4795 021332'          ;MAC001
4796 021332' 012746 021610'          MOV #NOCLK,-(SP)

```

73MISCELLANEOUS SECTIONS
CZUAAB.MAC 07-APR-83 17:03

MACY1: 30A(1052) 07-APR-83 17:13 PAGE 103
INITIALIZE SECTION

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4797 021336' 012746 000001          MOV      #1,-(SP)
4798 021342' 010600          MOV      SP,RO
4799 021344' 104417          TRAP    CSPNTE
4800 C21346' 062706 000004          ADD     #4,SP
4801 021352' 000512          BR      20$
4802 021354' 012137 000274'    18:    MOV     (R1)+,CLKCSR      ;CANNOT CONTINUE
4803 021360' 012102          MOV     (R1)+,R2        ;LINE CLOCK CSR
4804 021362' 072227 000005          ASH    #5,R2           ;GET CLOCK PRIORITY
4805 021366' 010237 000276'    MOV     R2,CLKBR
4806 021372' 012137 000300'    MOV     (R1)+,CLKVEC    ;VECTOR
4807 021376' 012137 000302'    MOV     (R1)+,CLKFRE    ;FREQUENCY
4808 021402'          SETVEC CLKVEC,#CLKSRV,CLKBR ;SETUP CLOCK INTERRUPT VECTOR
4809 021402' 013746 000276'    MOV     CLKBR,-(SP)
4810 021406' 012746 022062'    MOV     #CLKSRV,-(SP)
4811 021412' 013746 000300'    MOV     CLKVEC,-(SP)
4812 021416' 012746 000003          MOV     #3,-(SP)
4813 021422' 104437          TRAP    CSSVEC
4814 021424' 062706 000010          ADD     #10,SP
4815 021430' 000402          BR      5$
4816 021432' 005037 000674'    6$:    CLR     FRSTIM          ;INDICATE NOT THE FIRST TIME THROUGH
4817 021436' 012737 177777 000330'    5$:    MOV     #-1,UNIT      ;YES, INITIALIZE UNIT #
4818 021444' 005237 000330'    10$:   INC     UNIT          ;SETUP FOR NEXT UNIT
4819 021450' 023737 000330'    000012' CMP     UNIT,LSUNIT    ;WE TESTED ALL AVAILABLE UNITS?
4820 021456' 003050          BGT     20$           ;YES, LEAVE
4821 021460'          GPHARD UNIT,R1        ;GET P-TAB POINTER FOR THIS UNIT
4822 021460' 013700 000330'    MOV     UNIT,RO
4823 021464' 104442          TRAP    CSGPHRD
4824 021466' 010001          MOV     RO,R1
4825 021470'          UNCOMPLETE          10$      ;THIS ONE IS NOT AVAILABLE
4826 021470' 103365          BCC     10$
4827 021472' 012137 000266'    MOV     (R1)+,UNACSR    ;SAVE CSR
4828 021476' 012137 000270'    MOV     (R1)+,UNAVEC    ;SAVE VECTOR
4829 021502' 012737 000240 000272'    MOV     #PRIOS,UNAPRI  ;SAVE PRIORITY
4830 021510' 013737 000266' 000336'    MOV     UNACSR,PCSR0    ;PCSR0
4831 021516' 013737 000336' 000346'    MOV     PCSR0,PCSR0UB   ;PCSR0 UPPER BYTE
4832 021524' 062737 000001 000346'    ADD     #1,PCSR0UB      ;
4833 021532' 013737 000336' 000340'    MOV     PCSR0,PCSR1
4834 021540' 062737 000002 000340'    ADD     #2,PCSR1        ;PCSR1
4835 021546' 013737 000340' 000342'    MOV     PCSR1,PCSR2
4836 021554' 062737 000002 000342'    ADD     #2,PCSR2        ;PCSR2
4837 021562' 013737 000342' 000344'    MOV     PCSR2,PCSR3
4838 021570' 062737 000002 000344'    ADD     #2,PCSR3        ;PCSR3
4839 021576' 000403          BR      30$           ;LEAVE
4840 021600' 005037 000674'    20$:   CLR     FRSTIM          ;CLEAR FIRST TIME THROUGH FLAG
4841 021604'          DOCLN                ;ABORT PASS
4842 021604' 104444          TRAP    CSOCLN
4843 021606'          ENDINIT              30$:
4844 021606'          L10066:              TRAP    CSINIT
4845 021606'          TRAP    CSINIT
4846 021606' 104411          TRAP    CSINIT
4847 021606'          TRAP    CSINIT
4848 021606'          TRAP    CSINIT
4849 021610' 040503 047116 052117 NOCLK:: .ASCIZ /CANNOT CONTINUE - NEED LINE CLOCK/ ;MAC001
4850 021616' 041440 047117 044524
4851 021624' 052516 020105 020055
4852 021632' 042516 042105 046040

```

73MISCELLANEOUS SECTIONS
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 104
INITIALIZE SECTION

4853 021640' 047111 020105 046103
4854 021646' 041517 000113
4855
4856

.EVEN

73MISCELLANEOUS SECTIONS
C7UAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 105
AUTODROP SECTION

4857
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4899
4900
4901
4902
4903
4904
4905

021652'
021652'
021652'
021652'
021652' 104461

021654'
021654'
021654' 005737 000666'
021660' 001025
021662' 012777 000040 156446

021670' 012737 001364 000332'
021676' 004737 017316'
021702' 103012
021704'
021704' 012746 021744'
021710' 012746 000001
021714' 010600
021716' 104417
021720' 062706 000004
021724' 004737 017764'
021730' 004737 017362'
021734' 004737 017302'
021740'
021740' 104432
021742' 000054

021744' 047045 040445 051105
021752' 047522 020122 041517
021760' 052503 051122 042105
021766' 042040 051125 047111
021774' 020107 042504 044526
022002' 042503 051125 051505
022010' 052105 047045 000
022016'
022016'
022016' 104412

.SBTTL AUTODROP SECTION

BGNAUTO

LSAUTO::

ENDAUTO

L10067:

TRAP CSAUTO

.SBTTL CLEANUP CODING SECTION

: THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
: AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
:--

BGNCLN

LSCLEAN::

TST NEXMEM
BNE 208
MOV #RSET,BPCSR0

: DOES PCSR0 EXIST?
: NO SKIP RESET
: RESTORE DEUNA TO OPERATIONAL
: STATE

:MAC001 MOV #10*SECOND,METER
MOV #12*SECOND,METER
JSR PC,CHKDNI
BCC 108
PRINTF #CLNERR

: SETUP TIMER
: SET UP TIMER
: DNI SET WHEN DONE

:MAC001

MOV #CLNERR,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C\$PNTF
ADD #4,SP

108: JSR PC,PRMPCR
208: JSR PC,CLRDMI
JSR PC,TIMOFF
EXIT CLN

: PRINT PCSR'S
: CLEAR DNI BIT
: TURN OFF THE LINE CLOCK

:MAC001

:CC

TRAP C\$EXIT
.WORD L10070-

CLNERR: .ASCIZ /%N%ERROR OCCURRED DURING DEVILE RESET%/

.EVEN

ENDCLN

L10070:

TRAP CSCLEAN

73MISCELLANEOUS SECTIONS
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 106
DROP UNIT SECTION

4906
4907
4908 022020'
4909 022020'
4910 022020'
4911 022020' 000167
4912 022022' 000000
4913 022024'
4914 022024'
4915 022024' 104453

.SBTTL DROP UNIT SECTION

BGNDU

LSDU::

EXIT DU

.WORD JSJMP
.WORD L10071-2-

ENDDU

L10071:

TRAP CSDU

4916
4917
4918
4919 022026'
4920 022026'
4921 022026'
4922 022026' 000167
4923 022030' 000000
4924 022032'
4925 022032'
4926 022032' 104452

.SBTTL ADD UNIT SECTION

BGNAU

LSAU::

EXIT AU

.WORD JSJMP
.WORD L10072-2-

ENDAU

L10072:

TRAP CSAU

4927
4928
4929
4930
4931
4932
4933
4934
4935
4936
4937
4938
4939
4940
4941

.TITLE GLOBAL INTERRUPT SERVICE ROUTINES

.SBTTL NON-EXISTANT MEMORY INTERRUPT SERVICE ROUTINE

:FUNCTIONAL DESCRIPTION:

THIS ROUTINE IS ASSIGNED TO VECTOR 4 BY THE ACCESS TESTS
IT SETS THE NEXMEM FLAG SIGNALING THAT AN ACCESS WAS
ATTEMPTED ON NON-EXISTANT MEMORY.

4942 022034'
4943 022034'
4944 022034' 012737 000001 000666'
4945 022042'
4946 022042'
4947 022042' 000002

BGNSRV TRAP4

TRAP4::

ENDSRV MOV #1,NEXMEM ;SET FLAG

L10073:

RTI

84GLOBAL INTERRUPT SERVICE ROUTINES
CZUAAB.MAC 07-APR-83 17:03

MACY11 30A(1052) 07-APR-83 17:13 PAGE 107
NON-EXISTANT MEMORY INTERRUPT SERVICE ROUTINE

- 4948
- 4949
- 4950
- 4951
- 4952
- 4953
- 4954
- 4955
- 4956
- 4957
- 4958
- 4959
- 4960
- 4961
- 4962
- 4963
- 4964
- 4965
- 4966
- 4967
- 4968
- 4969
- 4970
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- 4976
- 4977
- 4978
- 4979
- 4980
- 4981
- 4982
- 4983
- 4984
- 49J5
- 4986
- 4987
- 4988
- 4989
- 4990
- 4991
- 4992
- 4993
- 4994
- 4995
- 4996
- 4997

```

022044'
022044'
022044' 017737 156266 000672'
022052' 016637 000002 000676'
022060'
022060'
022060' 000002
022062'
022062'
022062' 005737 000332'
022066' 001402
022070' 005337 000332'
022074'
022074'
022074'
022074' 000002

```

.SBTTL UNA INTERRUPT SERVICE ROUTINE

```

:*****
:
:FUNCTIONAL DESCRIPTION:
:CONTROL GOES HERE WHEN THE INTERRUPT ENABLE BIT IS SET
:AND ANY OF THE INTERRUPT BITS SET.
:A COPY OF PCSRO IS STORED AT 'UNAIMT:' AND A COPY OF THE
:PSW AT THE TIME OF THE INTERRUPT IS STORED AT 'CPUPRI:'.
:*****

```

```

BGNSRV UNASRV
                                UNASRV::
                                :INDICATE UNA INTERRUPTED
                                :GET CPU PRIORITY AT TIME OF INTERRUPT
                                L10074:
                                RTI
ENDSRV

```

.SBTTL CLOCK INTERRUPT SERVICE ROUTINE

```

:*****
:
:FUNCTIONAL DESCRIPTION:
:THIS ROUTINE COUNTS A PRESET NUMBER OF CLOCK TICKS THEN IT
:URNS THE CLOCK OFF
:
:INPUTS: METER
:
:OUTPUTS: METER
:
:ROUTINES CALLED: NONE
:*****

```

```

BGNSRV CLKSrv
                                CLKSrv::
                                :HAS THE METER EXPIRED?
                                :YES, STOP COUNTING
                                :COUNT TICKS
                                L10075:
                                RTI
20S:
ENDSRV

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 108
CZUAAB.MAC 07-APR-83 17:03 CLOCK INTERRUPT SERVICE ROUTINE

.TITLE HARDWARE TESTS

.SBTTL TEST 1: PCSKO READ ACCESS TEST

: THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 0
: CAN BE READ FROM THE UNIBUS AND THAT THE PREDETERMINED BITS APPEAR
: IN THE EXPECTED BIT POSITIONS.
: TEST SEQUENCE: 1-READ PCSRO
: 2-VERIFY BITS 9 AND 4 = 0

4998
4999
5000
5001
5002
5003
5004
5005
5006
5007
5008
5009
5010
5011
5012
5013 022076'
5014 022076'
5015 022076'
5016 022076' 012746 000340
5017 022102' 012746 022034'
5018 022106' 012746 000004
5019 022112' 012746 000003
5020 022116' 104437
5021 022120' 062706 000010
5022 022124'
5023 022124'
5024 022124' 104402
5025
5026
5027
5028 022126' 005037 000666'
5029 022132' 005037 000304'
5030 022136' 005777 156174
5031 022142' 005737 000666'
5032 022146' 001414
5033 022150'
5034 022150' 104455
5035 022152' 000001
5036 022154' 001570'
5037 022156' 012500'
5038 022160'
5039 022160' 104406
5040 022162'
5041 022162' 012700 000004
5042 022166' 104436
5043 022170'
5044 022170' 013700 000330'
5045 022174' 104451
5046 022176'
5047 022176' 104444
5048 022200'
5049 022200'
5050 022200'
5051 022200' 104403
5052 022202'
5053 022202'

BGNTST

SETVEC #4,#TRAP4,#PRI07 ;SETUP TIME-OUT TRAP
MOV #PRI07,-(SP)
MOV #TRAP4,-(SP)
MOV #4,-(SP)
MOV #3,-(SP)
TRAP CSVEC
ADD #10,SP

BGNSUB :#1

T1.1: TRAP CSBSUB

:CHECK TO SEE IF PCSRO EXISTS

CLR NEXMEM ;CLEAR NON-EXISTANT MEMORY FLAG
CLR CSRNUM ;HOLDS WHICH PCSR WE ARE DOING
TST @PCSRO ;DOES PCSRO EXIST?
TST NEXMEM
BEQ 10\$;YES
ERRDF 001,RACERR,RACMG1 ;NO, PRINT FATAL ERROR MESSAGE

TRAP CSERDF
.WORD 1
.WORD RACERR
.WORD RACMG1

CKLJOP ;LOOP BACK FROM HERE IF ERROR TRAP CSCLP1

CLRVEC #4 ;RELEASE TRAP 4 VECTOR
MOV #4,R0
TRAP CSCVEC

DODU UNIT ;DROP UNIT
MOV UNIT,R0
TRAP CSODDU

DOCLN ;ABORT SUB-PASS
TRAP CSOCLN

10\$:
ENDSUB :#1

L10077: TRAP CSSESUB

BGNSUB :#2

T1.2:

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 109
TEST 1: PCSRO READ ACCESS TEST

```

5054 022202' 104402                                TRAP  CSBSUB
5055
5056          :OK, PCSRO EXISTS NOW CHECK SOME BITS
5057          :
5058 022204'                                BGNSEG
5059 022204' 104404                                TRAP  CSBSEG
5060
5061          :CHECK BIT 4 = 0
5062          :
5063 022206' 012737 001313' 000312'          MOV    #SNCLR,BITSTA          ;TESTING FOR CLEARED BITS
5064 022214' 012737 000004 000306'          MOV    #4,BITNUM             ;TESTING BIT 4
5065 022222' 032777 000020 156106          BIT    #BIT4,@PCSRO         ;IS BIT 4=0?
5066 022230' 001404                                BEQ    20$                   ;YES
5067 022232'                                ERRHRD 002,RACERR,RACMG2     ;NO,PRINT HARD ERROR MESSAGE
5068 022232' 104456                                TRAP  CSERHRD
5069 022234' 000002                                .WORD 2
5070 022236' 001570'                                .WORD RACERR
5071 022240' 012526'                                .WORD RACMG2
5072 022242'                                20$:
5073 022242'                                ENDSEG
5074 022242'                                10000$:
5075 022242' 104405                                TRAP  CSESEG
5076 022244'                                BGNSEG
5077 022244' 104404                                TRAP  CSBSEG
5078
5079          :CHECK BIT 9 = 0
5080          :
5081 022246' 012737 000011 000306'          MOV    #9,BITNUM             ;TESTING BIT 9 NOW
5082 022254' 032777 001000 156054          BIT    #BIT9,@PCSRO         ;IS BIT 9=0?
5083 022262' 001404                                BEQ    30$                   ;YES
5084 022264'                                ERRHRD 003,RACERR,RACMG2     ;NO,PRINT HARD ERROR MESSAGE
5085 022264' 104456                                TRAP  CSERHRD
5086 022266' 000003                                .WORD 3
5087 022270' 001570'                                .WORD RACERR
5088 022272' 012526'                                .WORD RACMG2
5089 022274'                                30$:
5090 022274'                                ENDSEG
5091 022274'                                10001$:
5092 022274' 104405                                TRAP  CSESEG
5093 022276'                                ENDSUB :#2
5094 022276'                                L10100:
5095 022276' 104403                                TRAP  CSESUB
5096 022300'                                CLRVEC #4                    ;FREE TRAP 4 VECTOR
5097 022300' 012700 000004                                MOV    #4,R0
5098 022304' 104436                                TRAP  CSCVEC
5099 022306'                                ENDTST
5100 022306'                                L10076:
5101 022306' 104401                                TRAP  CSETST

```

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 110
TEST 1: PCSRO READ ACCESS TEST

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.SBTTL TEST 2: PCSR1 READ ACCESS TEST

: THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER
: CAN BE READ FROM THE UNIBUS AND THAT THE PREDETERMINED BITS
: APPEAR IN THE EXPECTED BIT POSITIONS.
: TEST SEQUENCE: 1-READ PCSR1
: 2-VERIFY BITS 4,5,6,14,15 = 0

BGNTST

SETVEC #4,#TRAP4,#PRI07 ; SETUP TIMEOUT TRAP T2::
MOV #PRI07,-(SP)
MOV #TRAP4,-(SP)
MOV #4,-(SP)
MOV #3,-(SP)
TRAP CSVEC
ADD #10,SP

BGNSUB :#1

T2.1: TRAP CSBSUB

: CHECK TO SEE IF PCSR1 EXISTS

CLR NEXMEM ; CLEAR NON-EXISTANT MEMORY FLAG
MOV #1,CSRMUM ; TESTING PCSR1
TST @PCSR1 ; DOES PCSR1 EXIST?
TST NEXMEM
BEQ 10\$; YES
ERRDF 004,RACERR,RACMG1 ; NO,PRINT FATAL ERROR MESSAGE

TRAP CSERDF
.WORD 4
.WORD RACERR
.WORD RACMG1

CKLOOP ; LOOP FROM HERE IF ERROR TRAP CSCLP1

CLRVEC #4 ; RELEASE TRAP 4 VECTOR
MOV #4,R0
TRAP CSCVEC

DODU UNIT ; DROP THE UNIT
MOV UNIT,R0
TRAP CSDODU

DOCLN ; ABORT SUB-PASS TRAP CSDECLN

10\$:
ENDSUB :#1

L10102: TRAP CSSESUB

BGNSUB :#2

T2.2: TRAP CSBSUB

022310' 012746 000340
022310' 012746 022034'
022310' 012746 000004
022320' 012746 000003
022324' 012746 000003
022330' 104437
022332' 062706 000010
022336'
022336'
022336' 104402
022340' 005037 000666'
022344' 012737 000001 000304'
022352' 005777 155762
022356' 005737 000666'
022362' 001414
022364'
022364' 104455
022366' 000004
022370' 001570'
022372' 012500'
022374'
022374' 104406
022376'
022376' 012700 000004
022402' 104436
022404'
022404' 013700 000330'
022410' 104451
022412'
022412' 104444
022414'
022414'
022414'
022414' 104403
022416'
022416'
022416' 104402

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 111
CZUAAB.MAC 07-APR-83 17:03 TEST 2: PCSR1 READ ACCESS TEST

```

5158
5159      :OK, PCSR1 EXISTS NOW CHECK SOME BITS
5160      :
5161      : BGNSEG
5162      :                                TRAP      CSBSEG
5163      :
5164      : CHECK BIT 4 = 0
5165      :
5166      :                                MOV      #SNCLR,BITSTA      :TESTING CLEARED BITS
5167      :                                MOV      #4,BITNUM        :TESTING BIT 4
5168      :                                BIT      #BIT4,@PCSR1      :IS BIT 4=0?
5169      :                                BEQ      20$                :YES
5170      :                                ERRHRD  005,RACERR,RACMG2    :NO, PRINT HARD ERROR MESSAGE
5171      :                                TRAP      CSERHRD
5172      :                                .WORD    5
5173      :                                .WORD    RACERR
5174      :                                .WORD    RACMG2
5175      :
5176      : 20$:
5177      : ENDSEG
5178      :                                10000$:
5179      :                                TRAP      CSESEG
5180      :                                TRAP      CSBSEG
5181      :
5182      : CHECK BIT 5 = 0
5183      :
5184      :                                MOV      #5,BITNUM        :TESTING BIT 5
5185      :                                BIT      #BIT5,@PCSR1      :IS BIT 5=0?
5186      :                                BEQ      30$                :YES
5187      :                                ERRHRD  006,RACERR,RACMG2    :NO,PRINT HARD ERROR MESSAGE
5188      :                                TRAP      CSERHRD
5189      :                                .WORD    6
5190      :                                .WORD    RACERR
5191      :                                .WORD    RACMG2
5192      :
5193      : 30$:
5194      : ENDSEG
5195      :                                10001$:
5196      :                                TRAP      CSESEG
5197      :                                TRAP      CSBSEG
5198      :
5199      : CHECK BIT 6 = 0
5200      :
5201      :                                MOV      #6,BITNUM        :TESTING BIT 6
5202      :                                BIT      #BIT6,@PCSR1      :IS BIT 6=0?
5203      :                                BEQ      40$                :YES
5204      :                                ERRHRD  007,RACERR,RACMG2    :NO,PRINT HARD ERROR MESSAGE
5205      :                                TRAP      CSERHRD
5206      :                                .WORD    7
5207      :                                .WORD    RACERR
5208      :                                .WORD    RACMG2
5209      :
5210      : 40$:
5211      : ENDSEG
5212      :                                10002$:
5213      :                                TRAP      CSESEG
5214      :                                TRAP      CSBSEG
5215      :
5216      : BGNSEG

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 112
CZUAB.MAC 07-APR-83 17:03 TEST 2: PCSR1 READ ACCESS TEST

```

5214 022544' 104404 TRAP CSBSEG
5215
5216 ;CHECK BIT 14 = 0
5217
5218 022546' 012737 000016 000306' MOV #14,BITNUM ;TESTING BIT 14
5219 022554' 032777 040000 155556 BIT #BIT14,PCSR1 ;IS BIT 14 = 0?
5220 022562' 001404 BEQ 50$ ;YES
5221 022564' ERRHRD 008,RACERR,RACMG2 ;NO, PRINT ERROR MESSAGE
5222 022564' 104456 TRAP CSERHRD
5223 022566' 000010 .WORD 8
5224 022570' 001570' .WORD RACERR
5225 022572' 012526' .WORD RACMG2
5226 022574'
5227 022574' 50$:
5228 022574' ENDSEG 100038:
5229 022574' 104405 TRAP CSESEG
5230 022576' BGNSEG
5231 022576' 104404 TRAP CSBSEG
5232
5233 ;CHECK BIT 15 = 0
5234
5235 022600' 012737 000017 000306' MOV #15,BITNUM ;TESTING BIT 15
5236 022606' 032777 100000 155524 BIT #BIT15,PCSR1 ;IS BIT 15 = 0?
5237 022614' 001404 BEQ 60$ ;YES
5238 022616' ERRHRD 009,RACERR,RACMG2 ;NO, PRINT ERROR MESSAGE
5239 022616' 104456 TRAP CSERHRD
5240 022620' 000011 .WORD 9
5241 022622' 001570' .WORD RACERR
5242 022624' 012526' .WORD RACMG2
5243 022626'
5244 022626' 60$:
5245 022626' ENDSEG 100048:
5246 022626' 104405 TRAP CSESEG
5247 022630' ENDSUB :#2
5248 022630' L10103:
5249 022630' 104403 TRAP CSESUB
5250 022632' CLRVEC #4 ;FREE VECTOR 4
5251 022632' 012700 000004 MOV #4,R0
5252 022636' 104436 TRAP CSCVEC
5253 022640' ENDTST
5254 022640' L10101:
5255 022640' 104401 TRAP CSETST
5256

```

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 113
TEST 3: PCSR2 READ ACCESS TEST

5257
5258
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5264
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5294
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5296
5297
5298
5299
5300
5301
5302
5303
5304

.SBTTL TEST 3: PCSR2 READ ACCESS TEST

: THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 2
: CAN BE READ FROM THE UNIBUS
: TEST SEQUENCE: 1-READ PCSR2

BGNTST

T3::
SETVEC #4,#TRAP4,PRI07 ;SETUP TIMEOUT TRAP VECTOR
MOV PRI07,-(SP)
MOV #TRAP4,-(SP)
MOV #4,-(SP)
MOV #3,-(SP)
TRAP CSCVEC
ADD #10,SP
CLR NEXMEM ;CLEAR NON-EXISTANT MEMORY FLAG
MOV #2,CSRNUM ;TESTING PCSR2
TST @PCSR2 ;DOES PCSR2 EXIST?
TST NEXMEM
BEQ 10\$;YES
ERRDF 010,RACERR,RACMG1 ;NO,PRINT FATAL ERROR MESSAGE
TRAP CSERDF
.WORD 10
.WORD RACERR
.WORD RACMG1
CKLOOP ;LOOP BACK FROM HERE IF ERROR
TRAP CSCLP1
CLRVEC #4 ;RELEASE TRAP 4 VECTOR
MOV #4,R0
TRAP CSCVEC
DODU UNIT ;DROP THE UNIT
MOV UNIT,R0
TRAP CSODDU
DOCLN ;ABORT SUBPASS
TRAP CSOCLN
10\$: CLRVEC #4 ;RELEASE TRAP 4 VECTOR
MOV #4,R0
TRAP CSCVEC
ENDTST
L10104: TRAP CSETST

022642' 013746 000340
022642' 012746 022034'
022642' 012746 000004
022652' 012746 000004
022656' 012746 000003
022662' 104437
022664' 062706 000010
022670' 005037 000666'
022674' 012737 000002 000304'
022702' 005777 155434
022706' 005737 000666'
022712' 001414
022714' 104455
022716' 000012
022720' 001570'
022722' 012500'
022724' 104406
022726' 012700 000004
022732' 104436
022734' 013700 000330'
022740' 104451
022742' 104444
022744' 012700 000004
022750' 104436

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 114
TEST 4: PCRS3 READ ACCESS TEST

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022754'
022754'
022754'
022754' 012746 000340
022760' 012746 022034'
022764' 012746 000004
022770' 012746 000003
022774' 104437
022776' 062706 000010
023002'
023002' 104404
023004' 005037 000666'
023010' 012737 000003 000304'
023016' 005777 155322
023022' 005737 000666'
023026' 001414
023030'
023030' 104455
023032' 000013
023034' 001570'
023036' 012500'
023040'
023040' 104406
023042'
023042' 012700 000004
023046' 104436
023050'
023050' 013700 000330'
023054' 104451
023056'
023056' 104444
023060'
023060'
023060'
023060' 104405
023062'
023062' 012700 000004
023066' 104436
023070'
023070'
023070' 104401

.SBTTL TEST 4: PCRS3 READ ACCESS TEST

.....
: THIS TEST WILL VERIFY THAT THE PORT CONTROL AND STATUS REGISTER 3
: CAN BE READ FROM THE UNIBUS
: TEST SEQUENCE: 1-READ PCRS3
:

BGNTST

T4::
SETVEC #4,#TRAP4,#PRI07- :SETUP VECTOR FOR TIME-OUT
MOV #PRI07,-(SP)
MOV #TRAP4,-(SP)
MOV #4,-(SP)
MOV #3,-(SP)
TRAP CSSEVEC
ADD #10,SP

BGNSEG

TRAP CSBSEG
CLR NEXMEM :CLEAR NON-EXISTANT MEMORY FLAG
MOV #3,CSRNUM :TESTING PCRS3
TST @PCRS3 :DOES PCRS3 EXIST?
TST NEXMEM
BEQ 108 :YES
ERRDF 011,RACERR,RACMG1 :NO,PRINT FATAL ERROR MESSAGE

TRAP CSERDF
.WORD 11
.WORD RACERR
.WORD RACMG1
CKLOOP :LOOP BACK FROM HERE IF ERROR
TRAP CSCLP1

CLRVEC #4 :RELEASE TRAP 4 VECTOR
MOV #4,R0
TRAP CSCVEC

DODU UNIT :DROP UNIT
MOV UNIT,R0
TRAP CSODDU

DOCLN :ABORT SUB-PASS
TRAP CSOCLN

108:
ENDSEG

10000S:
TRAP CSESEG
CLRVEC #4 :RETURN TIME-OUT TRAP
MOV #4,R0
TRAP CSCVEC

ENDTST

L1010S:
TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 115
CZUAAB.MAC 07-APR-83 17:03 TEST 5: RESET TEST

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.SBTTL TEST 5: RESET TEST

:THIS TEST WILL VERIFY THE RESET STATE FOR ALL DEUMA UNIBUS REGISTERS
:TEST SEQUENCE:
1-WRITE A 1 TO PCSRO BIT 5
2-READ PCSRO
-VERIFY DNI SET
-VERIFY INTR SET
3-VERIFY PCSRO BITS 15:12 AND 10:08 AND 06:04 FOR LOGICAL 0 :MAC01
4-READ PCSR1
5-VERIFY PCSR1 BITS 07:03 AND 14 AND 15 FOR LOGICAL 0 AND
PORT STATE FIELD BITS 02:00 FOR READY STATE

BGNTST

CLR CSNUM T5::
MOV #SAFTER,PWHEN ;TESTING PCSRO FIRST
;SETUP PART OF ERROR MESSAGE
;FOR THE FOLLOWING TEST SEGMENTS

BGNSUB :#1

T5.1: TRAP CSBSUB

:SET THE RESET BIT IN PCSRO AND WAIT FOR 'DNI' TO SET

MOV #RSET,PCSRO ;RESET DEUMA
:MAC01 MOV #10*SECOND,METER ;PUT SOME TIME ON THE METER
MOV #12*SECOND,METER ;PUT PLENTY OF TIME ON THE METER;MAC01
JSR PC,CHKDNI ;WAIT FOR DNI TO SET
BCC 10\$;OK
MOV #SDNI,BITNAM ;ERROR 'DNI' DID NOT SET
MOV #SNSET,BITSTA ;SETUP ERROR MESSAGE
ERRHRD 012,RSETER,MSG3 ;PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 12
.WORD RSETER
.WORD MSG3

ESCAPE TST

:NO POINT IN CONTINUING TEST
TRAP CSESCAPE
.WORD L10106-

10\$:
ENDSUB :#1

L10107.
TRAP CSBSUB

BGNSUB :#2

T5.2: TRAP CSBSUB

:CHECK ALL THE BITS AFFECTED BY RESET

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 116
CZUAAB.MAC 07-APR-83 17:03 TEST 5: R2SET TEST

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5413 023164'          BGNSEG
5414 023164' 104404          TRAP      CSBSEG
5415
5416          :CHECK THE INTERRUPT SUMMARY BIT = 0
5417
5418 023166' 032777 000200 155142      BIT      #INTR,BPCSR0      :IS THE INTERRUPT SUMMARY BIT SET?
5419 023174' 001012          BNE      118              :YES
5420
5421 023176' 012737 001032' 000310'      MOV      #SINTR,BITNAM      :ERROR, INTERRUPT SUMMARY NOT SET!
5422 023204' 012737 001277' 000312'      MOV      #SNSET,BITSTA      :PREPARE ERROR MESSAGE
5423 023212'          ERRHRD  013,RSETER,MSG3      :PRINT ERROR MESSAGE
5424 023212' 104456          TRAP      CSERHRD
5425 023214' 000015          .WORD   13
5426 023216' 001624'          .WORD   RSETER
5427 023220' 013030'          .WORD   MSG3
5428 023222'
5429 023222'          118:
5430 023222'          ENDSEG
5431 023222' 104405          100008: TRAP      CSESEG
5432
5433          :CHECK BITS 15:12 AND 10:08 AND 06:04 OF PCSRO FOR 0      :MAC001
5434
5435 023224' 012701 000360'      MOV      #DNANTO,R1          :POINT TO BIT NAME MNEMONICS
5436 023230' 062701 000010      ADD      #4*2,R1            :INDEX DOWN TO BIT 4 MNEMONIC      :MAC001
5437          :MAC001 MOV      #BIT0,R2          :START TESTING AT LSB
5438 023234' 012702 000020      MOV      #BIT4,R2          :START TESTING AT BIT 4      :MAC001
5439 023240' 012737 001313' 000312'      MOV      #SNCLR,BITSTA      :TESTING FOR CLEARED BITS
5440 023246'
5441 023246'          158:
5442 023246' 104404          BGNSEG
5443 023250' 030277 155062      BIT      R2,BPCSR0          :IS THIS BIT CLEARED?
5444 023254' 001406          BEQ      208              :YES
5445
5446 023256' 011137 000310'      MOV      (R1),BITNAM        :GET MNEMONIC FOR THIS BIT
5447 023262'          ERRHRD  014,RSETER,MSG3      :PRINT ERROR MESSAGE
5448 023262' 104456          TRAP      CSERHRD
5449 023264' 000016          .WORD   14
5450 023266' 001624'          .WORD   RSETER
5451 023270' 013030'          .WORD   MSG3
5452 023272'
5453 023272'          208:
5454 023272'          ENDSEG
5455 023272' 104405          100018: TRAP      CSESEG
5456 023274' 005702      218:  TST      R2          :WE TESTED ALL BITS IN PCSRO?
5457 023276' 100411      BMI      258              :YES
5458 023300' 006302      ASL      R2          :POINT TO NEXT BIT TO TEST
5459 023302' 062701 000002      ADD      #2,R1          :POINT TO NEXT MNEMONIC
5460 023306' 105702      TSTB    R2          :ARE WE POINTING TO 'INTR' BIT?
5461 023310' 100771      BMI      218              :YES, SKIP IT
5462 023312' 022702 004000      CMP      #DNI,R2        :ARE WE POINTING TO 'DNI' BIT?
5463 023316' 001766      BEQ      218              :YES SKIP IT
5464 023320' 000752      BR       158              :CONTINUE TESTING
5465
5466 023322'          258:
5467 023322'          BGNSEG
5468 023322' 104404          TRAP      CSBSEG

```


65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 117
CZUAAB.MAC 07-APR-83 17:03 TEST 5: RESET TEST

```

5469
5470      :CHECK PCSR1 BITS 02:00 FOR THE READY STATE
5471
5472 023324' 012737 000001 000304'      MOV      #1,CSRMUM      :TESTING PCSR1
5473 023332' 017701 155002      MOV      @PCSR1,R1      :GET PCSR1 CONTENTS
5474 023336' 042701 177770      BIC      @^CPSTATE,R1   :MASK ALL BUT PORT STATUS BITS
5475 023342' 022701 000002      CMP      @READY,R1      :IS THE DEUNA IN THE READY STATE?
5476 023346' 001404      BEQ      308            :YES
5477
5478      ERRHRD 015,RSETER,MSG4      :ERROR, DEUNA NOT IN READY STATE!
5479 023350' 104456      :PRINT ERROR MESSAGE
5480 023352' 000017      TRAP      CSERHRD
5481 023354' 001624'      .WORD    15
5482 023356' 013076'      .WORD    RSETER
5483 023360'
5484 023360'
5485 023360'
5486 023360' 104405      .WORD    MSG4
5487
5488      308:
5489      ENDSEG
5490
5491      :CHECK PCSR1 BITS 07:03 FOR 0
5492
5493 023362' 012701 000420'      MOV      @BNAMT1,R1     :POINT TO MNEMONIC TABLE FOR PCSR1
5494 023366' 062701 000006      ADD      #3*2,R1        :INDEX PAST STATE BITS
5495 023372' 012737 001313' 000312'      MOV      @SNCLR,BITSTA  :PREPARE ERROR MESSAGE
5496 023400' 012737 001342' 000314'      MOV      @SAFTER,PWHEN
5497 023406' 012702 000010      MOV      @BIT3,R2
5498
5499      408:
5500      BGNSEG
5501
5502 023412' 104404      TRAP      CSBSEG
5503 023414' 030277 154720      BIT      R2,@PCSR1     :IS THIS BIT A 0?
5504 023420' 001406      BEQ      458            :YES
5505
5506      MOV      (R1),BITNAM  :ERROR, BIT IS NOT A 0 AFTER RESET!
5507      ERRHRD 016,RSETER,MSG3  :GET MNEMONIC FOR THIS BIT
5508
5509      TRAP      CSERHRD
5510 023422' 011137 000310'      :PRINT ERROR MESSAGE
5511 023426' 104456      TRAP      CSBSEG
5512 023430' 000020      .WORD    16
5513 023432' 001624'      .WORD    RSETER
5514 023434' 013030'      .WORD    MSG3
5515
5516      458:
5517      ENDSEG
5518
5519      100038:
5520      TRAP      CSSESEG
5521 023436' 104405
5522 023440' 105702      TSTB    R2              :WE TESTED BITS 07:03?
5523 023442' 100404      BMI     508            :YES
5524 023444' 006302      ASL     R2              :NO, POINT TO NEXT BIT
5525 023446' 062701 000002      ADD     #2,R1          :POINT TO MNEMONIC FOR NEXT BIT
5526 023452' 000757      BR      408            :CONTINUE TESTING
5527
5528      508:
5529      BGNSEG
5530
5531      TRAP      CSBSEG
5532
5533      :CHECK PCSR1 BIT 14 = 0
5534
5535 023456' 032777 040000 154654      BIT     @ICAB,@PCSR1   :IS PORT/CABLING BIT CLEAR?
5536 023464' 001412      BEQ     608            :YES
5537
5538      :ERROR, PORT/CABLING BIT NOT CLEAR!

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 118
CZUAAB.MAC 07-APR-83 17:03 TEST 5: RESET TEST

```

5525 023466' 012737 001313' 000312'      MOV    #SNCLR,BITSTA      ;PREPARE ERROR MESSAGE
5526 023474' 012737 001076' 000310'      MOV    #SICAB,BITNAM     ;GET MNEMONIC
5527 023502'          ERRHRD 017,RSETER,MSG3 ;PRINT ERROR MESSAGE
5528 023502' 104456          TRAP   CSERHRD
5529 023504' 000021          .WORD 17
5530 023506' 001624'          .WORD RSETER
5531 023510' 013030'          .WORD MSG3
5532 023512'          60S:
5533 023512'          ENDSEG
5534 023512'          10004S:
5535 023512' 104405          TRAP   CSESEG
5536 023514'          BGNSEG
5537 023514' 104404          TRAP   CSBSEG
5538
5539          ;CHECK PCSR1 BIT 15 = 0
5540
5541 023516' 032777 100000 154614      BIT    #XPWR,@PCSR1      ;IS TRANSCEIVER POWER BIT CLEAR?
5542 023524' 001412          BEQ    70S                ;YES
5543          ;ERROR, TRANSCEIVER POWER BIT NOT CLEAR!
5544 023526' 012737 001313' 000312'      MOV    #SNCLR,BITSTA      ;PREPARE ERROR MESSAGE
5545 023534' 012737 001065' 000310'      MOV    #XPWR,BITNAM     ;GET MNEMONIC
5546 023542'          ERRHRD 018,RSETER,MSG3 ;PRINT ERROR MESSAGE
5547 023542' 104456          TRAP   CSERHRD
5548 023544' 000022          .WORD 18
5549 023546' 001624'          .WORD RSETER
5550 023550' 013030'          .WORD MSG3
5551 023552'          70S:
5552 023552'          ENDSEG
5553 023552'          10005S:
5554 023552' 104405          TRAP   CSESEG
5555 023554'          ENDSUB ;#2
5556 023554'          L10110:
5557 023554' 104403          TRAP   CSesub
5558 023556'          ENDTST
5559 023556'          L10106:
5560 023556' 104401          TRAP   CSETST

```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 119
CZUAAB.MAC 07-APR-83 17:03 TEST 6: PCSR2 REGISTER READ/WRITE TEST

.SBTTL TEST 6: PCSR2 REGISTER READ/WRITE TEST

: THIS TEST WILL CHECK THE REGISTER FOR ALL SA0 AND SA1 ERRORS (STUCK AT
: 0 AND STUCK AT 1 ERRORS). THE HOST WILL WRITE PATTERNS TO THE REGISTER
: AND READ THEM BACK TO VERIFY. THE PATTERNS TO BE USED ARE AT THE LABEL
: PATERN:: IN THE GLOBAL DATA SECTION OF THIS PROGRAM.

: NOTE: SINCE PCSR2 BIT 00 IS ALWAYS PRESET TO LOGIC 0, THE LOWEST ORDER
: BIT OF THE PATTERN WILL BE MASKED BEFORE DOING THE COMPARISON.

: TEST SEQUENCE:
: 1-WRITE PATTERN TO REGISTER PCSR2
: 2-COMPARE MASKED PATTERN WITH REGISTER PCSR2 CONTENTS
: 3-REPEAT STEPS 1 TO 2 FOR ALL PATTERNS

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5580 023560'
5581 023560'
5582 023560' 012737 000002 000304'
5583 023566' 012701 000520'
5584 023572' 012705 000005
5585 023576' 012103
5586 023600'
5587 023600' 104404
5588 023602' 010377 154534
5589 023606' 017704 154530
5590 023612' 042703 000001
5591 023616' 020304
5592
5593 023620' 001404
5594 023622'
5595 023622' 104456
5596 023624' 000023
5597 023626' 001646'
5598 023630' 012570'
5599 023632'
5600 023632'
5601 023632'
5602 023632' 104405
5603 023634' 005305
5604 023636' 001357
5605 023640'
5606 023640'
5607 023640' 104401
5608

BGNTST
T6::
: TESTING PCSR2
: GET ADDRESS OF DATA PATTERNS
: 5 DATA PATTERNS
: GET DATA PATTERN
10\$:
MOV #2,CSRNUM
MOV #PATERN,R1
MOV #5,R5
MOV (R1)+,R3
BGNSEG
: WRITE PATTERN TO PCSR2 TRAP CSBSEG
MOV R3,@PCSR2
MOV @PCSR2,R4
BIC #BIT0,R3
CMP R3,R4
: READ PCSR2
: MASK BIT 00
: COMPARE WHAT WAS WRITTEN TO...
: WHAT WAS READ
: COMPARED OK
BEG 20\$
ERRHRD 019,RRWER,RACMG3
: PRINT ERROR MESSAGE TRAP CSERHRD
: WORD 19
: WORD RRWER
: WORD RACMG3
20\$:
ENDSEG
10000\$:
: DONE ALL DATA PATTERNS? TRAP CSESEG
: NO, CONTINUE TESTING
ENDTST
L10111:
TRAP CSETST

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 120
TEST 7: REGISTER PCRS3 READ/WRITE TEST

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023642'
023642'
023642' 012737 000003 000304'
023650' 012703 000001
023654'
023654' 104404
023656' 010377 154462
023662' 017704 154456
023666' 020304
023670' 001404
023672'
023672' 104456
023674' 000024
023676' 001646'
023700' 012570'
023702'
023702'
023702'
023702' 104405
023704' 006303
023706'
023706' 104404
023710' 010377 154430
023714' 017704 154424
023720' 020304
023722' 001404
023724'
023724' 104456
023726' 000025
023730' 001646'
023732' 012570'
023734'
023734'
023734'
023734' 104405
023736'
023736'
023736' 104401

.SBTTL TEST 7: REGISTER PCRS3 READ/WRITE TEST

: THIS TEST WILL WRITE PATTERNS TO THE WRITEABLE FIELD OF PCRS3
: AND WILL READ THESE BACK FOR VERIFICATION.
: TEST SEQUENCE:
: 1-WRITE PATTERN 000001 TO PCRS3
: 2-VERIFY PATTERN IN PCRS3
: 3-WRITE PATTERN 000002 TO PCRS3
: 4-VERIFY PATTERN IN PCRS3

BGNTST

MOV #3,CSNUM
MOV #BIT00,R3
BGNSEG
MOV R3,@PCRS3
MOV @PCRS3,R4
CMP R3,R4
BEQ 10\$
ERRHRD 020,RRWER,RACMG3

T7::
: TESTING PCRS3
: DATA PATTERN =1

TRAP CSBSEG

: WRITE PATTERN TO PCRS3
: READ PCRS3
: COMPARE
: IF = GOOD
: ELSE PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 20
.WORD RRWER
.WORD RACMG3

10\$:
ENDSEG

10000\$:

TRAP CSESEG

ASL R3
BGNSEG

: DATA PATTERN =2

TRAP CSBSEG

MOV R3,@PCRS3
MOV @PCRS3,R4
CMP R3,R4
BEQ 20\$
ERRHRD 021,RRWER,RACMG3

: WRITE PATTERN TO PCRS3
: READ PCRS3
: COMPARE
: IF = GOOD
: ELSE PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 21
.WORD RRWER
.WORD RACMG3

20\$:
ENDSEG

10001\$:

TRAP CSESEG

ENDTST

L10112:

TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 121
CZUAAB.MAC 07-APR-83 17:03 TEST 8: NOP TEST

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023740'
023740'
023740'
023740' 104402

023742' 013701 000336'
023746' 011102
023750' 032702 000100
023754' 001412
023756' 112711 000000
023762' 011102
023764' 032702 000100
023770' 001404
023772' 104456
023774' 000026
023776' 001706'
024000' 012642'
024002'
024002'
024002'
024002' 104403
024004'
024004'
024004' 104402

.SBTTL TEST 8: NOP TEST

: THIS TEST WILL VERIFY THAT THE DEUNA PROCESSOR IS ALIVE AND CAN
: RESPOND TO A PORT COMMAND ISSUED. THE NOP PORT COMMAND WILL BE ISSUED
: TO THE DEUNA IN PCSRO BITS 3:0 AND WILL WAIT FOR THE 'DNI' BIT TO
: SET IN PCSRO.
:
: THE NOP PORT COMMAND USES A MINIMUM OF HARDWARE BUT FORCES THE T11
: TO EXECUTE THE PORT COMMAND SEQUENCE.
:
: TEST SEQUENCE:
: 1-READ REGISTER PCSRO
: 2-VERIFY INTERRUPT ENABLE BIT 06 = LOGIC 0
: 3-VERIFY DONE INTERRUPT BIT 11 = LOGIC 0
: 4-WRITE PORT COMMAND NOP TO PCSRO BITS 3:0
: 5-READ REGISTER PCSRO
: 6-VERIFY DONE INTERRUPT BIT 11 = LOGIC 1
: 7-WRITE REGISTER PCSRO BIT 11 WITH LOGIC 1
: 8-READ REGISTER PCSRO
: 9-VERIFY PCSRO BIT 11 = 0

BGNTST

BGNSUB :#1

T8::

T8.1:

TRAP CSBSUB

: CHECK THE INTERRUPT ENABLE BIT; IF SET CLEAR IT

MOV PCSRO,R1 :GET PCSRO ADDRESS
MOV (R1),R2 :GET CONTENTS
BIT #INTE,R2 :IS INTERRUPT ENABLE SET?
BEQ 10\$:NO
MOVB #0,(R1) :CLEAR INTERRUPT ENABLE
MOV (R1),R2 :GET PCSRO CONTENTS
BIT #INTE,R2 :IS INTERRUPT ENABLE CLEAR NOW?
BEQ 10\$:YES
ERRHRD 022,NOPERR,RACMG4 :NO,PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 22
.WORD NOPERR
.WORD RACMG4

10\$:
ENDSUB :#2

L10114:

TRAP CS\$SUB

BGNSUB :#2

T8.2:

TRAP CSBSUB

: CHECK THE DONE INTERRUPT BIT; IF SET WRITE ONE TO CLEAR IT

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 122
 CZUAAB.MAC 07-APR-83 17:03 TEST 8: NOP TEST

```

5718 024006' 032702 004000 BIT #DNI,R2 ;IS DONE INTERRUPT CLEAR?
5719 024012' 001413 BEQ 20$ ;YES
5720 024014' 000302 SWAB R2 ;NO,ORIENT UPPER & LOWER BYTES
5721 024016' 110261 000001 MOVB R2.1(R1) ;SO WE CAN CLEAR UPPER BITS
5722 024022' 011102 MOV (R1),R2 ;GET PCSRO CONTENT
5723 024024' 032702 004000 BIT #DNI,R2 ;IS DNI CLEAR NOW?
5724 024030' 001404 BEQ 20$ ;YES
5725 024032' ERRHRD 023,NOPERR,RACMG7 ;NO,PRINT ERROR MESSAGE
5726 024032' 104456 TRAP CSERHRD
5727 024034' 000027 .WORD 23
5728 024036' 001706' .WORD NOPERR
5729 024040' 012670' .WORD RACMG7
5730 024042' 20$:
5731 024042' ENDSUB ;#2
5732 024042' L10115:
5733 024042' 104403 TRAP CSESUB
5734 024044' BGNSUB ;#3
5735 024044' T8.3:
5736 024044' 104402 TRAP CSBSUB
5737
5738 ;ISSUE NOP PORT COMMAND AND CHECK FOR DNI
5739
5740 024046' 012777 000006 154262 MOV #PNOP,@PCSRO ;ISSUE NOP PORT COMMAND
5741 024054' 012737 000176 000332' MOV #2*SECOND,METER ;SETUP TIMER
5742 024062' 004737 017316' JSR PC,CHKDNI ;WAIT FOR DNI TO SET
5743 024066' 103022 BCC 30$ ;OK
5744 ;ERROR DNI DID NOT SET!
5745 ;SETUP TO PRINT ERROR MESSAGE
5746 024070' 012737 001000' 000310' MOV #SDNI,BITNAM ;POINT TO 'DNI' ASCII STRING
5747 024076' 012737 001277' 000312' MOV #SNSET,BITSTA ;POINT TO 'NOT SET' ASCII STRING
5748 024104' 012737 001342' 000314' MOV #SAFTER,PWHEN ;POINT TO 'AFTER' ASCII STRING
5749 024112' 012737 001405' 000316' MOV #SNOP,PCOMND ;POINT TO 'NOP' ASCII STRING
5750 024120' ERRHRD 024,NOPERR,MSG1 ;PRINT ERROR MESSAGE
5751 024120' 104456 TRAP CSERHRD
5752 024122' 000030 .WORD 24
5753 024124' 001706' .WORD NOPERR
5754 024126' 012716' .WORD MSG1
5755 024130' ESCAPE TST ;DON'T CONTINUE TEST IF ERROR OCCURRED
5756 024130' 104410 TRAP CSESUB
5757 024132' 000026 .WORD L10113-
5758 024134' 30$:
5759 024134' BGNSUB
5760 024134' 104404 TRAP CSBSEG
5761
5762 ;WRITE ONE TO CLEAR 'DNI'
5763
5764 024136' 004737 017362' JSR PC,CLRDN1 ;GO CLEAR DNI BIT
5765 024142' 103004 BCC 40$ ;IT CLEARED OK
5766 ;ERROR DNI DID NOT CLEAR!
5767 024144' ERRHRD 025,NOPERR,RACMG7 ;NO,PRINT ERROR MESSAGE
5768 024144' 104456 TRAP CSERHRD
5769 024146' 000031 .WORD 25
5770 024150' 001706' .WORD NOPERR
5771 024152' 012670' .WORD RACMG7
5772 024154' 40$:
5773 024154' ENDSEG
    
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 123
CZUAAB.MAC 07-APR-83 17:03 TEST 8: NOP TEST

5774 024154'
5775 024154' 104405
5776 024156'
5777 024156'
5778 024156' 104403
5779 024160'
5780 024160'
5781 024160' 104401
5782

ENDSUB ;#3

ENDTST

100008: TRAP CSESEG
L10116: TRAP CSESUB
L10113: TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR 83 17:13 PAGE 124
CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

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.SBTTL TEST 9: SELF TEST

THIS TEST VERIFIES THAT THE ROM BASED SELF TEST
CAN BE RUN SUCCESSFULLY WHEN INVOKED VIA
THE SELF TEST PORT COMMAND.
TEST SEQUENCE:
1. CLEAR OUTSTANDING INTERRUPTS
2. ISSUE THE SELF TEST PORT COMMAND
3. WAIT FOR DNI
4. CHECK LITE BITE REGISTER FOR SUCCESSFUL SELF TEST
5. WRITE ONE TO CLEAR DNI

BGNTST

```
T9::
JSR PC,CLRINT ;CLEAR ANY OUTSTANDING INTERRUPTS
BCC 10$ ;OK
ERRHRD 026,SLFTST ;ERROR OCCURRED TRYING TO CLEAR
TRAP CSEHRD
.WORD 26
.WORD SLFTST
.WORD 0
ESCAPE TST ;LEAVE THIS TEST
TRAP C$ESCAPE
.WORD L10117-.
MOV #12.*SECOND,METER ;PUT SOME TIME ON THE METER
MOV #SLFT,@PCSR0 ; RUN SELF TEST
JSR PC,CHKDNI ; DNI ?
BCC 30$ ; YES
;ERROR DNI FAILED TO SET!
MOV #SDNI,BITNAM
MOV #SNSET,BITSTA
MOV #SAFTER,PWHEN
MOV #SSLFT,PCOMND
ERRHRD 027,SLFTST,MSG1 ;PRINT ERROR MESSAGE
TRAP CSEHRD
.WORD 27
.WORD SLFTST
.WORD MSG1
;MAC001 ESCAPE TST
; AND ABORT TEST
30$: MOV @PCSR1,R3 ;GET PCSR1 CONTENTS
BIT #SFT,R3 ;WAS SELF TEST SUCCESSFUL?
BEQ 40$ ;YES
COM R3 ;GET TEST NUMBER CORRECT POLARITY
BIC #^CSFT,R3 ;MASK ALL BUT SELF TEST FIELD
MOV #8.,R1 ;SHIFT RESULT OVER 8 BIT POSTIONS
35$: ASR R3
DEC R1
BNE 35$
MOV R3,R4 ;SAVE ERROR NUMBER
ASL R3 ;MAKE NUMBER A BYTE OFFSET
```


65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 125
CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

5839	024324'	062703	024410'		ADD	#STTBL,R3	:	INDEX INTO SELF TEST TABLE	
5840	024330'	105773	000000		TSTB	0(R3)	:	IS ERROR CODE UNUSED?	:MAC001
5841	024334'	001004			BNE	36\$:	NO, CODE IS OK	:MAC001
5842	024336'	012737	027112'	024406'	MOV	#UNUSED,STMSG	:	BOGUS ERROR CODE MESSAGE	:MAC001
5843	024344'	000402			BR	37\$:		:MAC001
5844	024346'	011337	024406'	36\$:	MOV	(R3),STMSG	:	LOAD INTO SELF TEST MESSAGE	
5845	024352'			37\$:	ERRHRD	028,SLFTST,MSG34	:	REPORT SELF TEST FAILURE	
5846	024352'	104456						TRAP	C\$ERHRD
5847	024354'	000034						.WORD	28
5848	024356'	001726'						.WORD	SLFTST
5849	024360'	015622'						.WORD	MSG34
5850	024362'				ESCAPE	TST	:	AND ABORT TEST	
5851	024362'	104410						TRAP	C\$ESCAPE
5852	024364'	000020						.WORD	L10117-
5853									
5854	024366'	004737	017362'	40\$:	JSR	PC,CLRDN1	:	WRITE ONE TO CLEAR DNI	
5855							:	ERROR?	
5856	024372'	103004			BCC	50\$:	NO	
5857							:	ERROR DNI FAILED TO CLEAR!	
5858	024374'				ERRHRD	029,SLFTST,RACMG7	:	PRINT ERROR MESSAGE	
5859	024374'	104456						TRAP	C\$ERHRD
5860	024376'	000035						.WORD	29
5861	024400'	001726'						.WORD	SLFTST
5862	024402'	012670'						.WORD	RACMG7
5863	024404'			50\$:					
5864	024404'				ENDTST				
5865	024404'							L10117:	
5866	024404'	104401						TRAP	C\$ETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 126
CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

5867
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5870 024406' 000000
5871
5872
5873
5874 024410' 024610'
5875 024412' 024632'
5876 024414' 024652'
5877 024416' 024656'
5878 024420' 024706'
5879 024422' 024742'
5880 024424' 024766'
5881 024426' 025030'
5882 024430' 025073'
5883 024432' 025140'
5884 024434' 025160'
5885 024436' 025166'
5886 024440' 025213'
5887 024442' 025214'
5888 024444' 025215'
5889 024446' 025216'
5890 024450' 025217'
5891 024452' 025233'
5892 024454' 025234'
5893 024456' 025235'
5894 024460' 025236'
5895 024462' 025237'
5896 024464' 025240'
5897 024466' 025241'
5898 024470' 025242'
5899 024472' 025304'
5900 024474' 025347'
5901 024476' 025413'
5902 024500' 025450'
5903 024502' 025512'
5904 024504' 025546'
5905 024506' 025610'
5906 024510' 025644'
5907 024512' 025721'
5908 024514' 025773'
5909 024516' 026046'
5910 024520' 026112'
5911 024522' 026163'
5912 024524' 026226'
5913 024526' 026227'
5914 024530' 026230'
5915 024532' 026307'
5916 024534' 026363'
5917 024536' 026440'
5918 024540' 026506'
5919 024542' 026561'
5920 024544' 026626'
5921 024546' 026627'
5922 024550' 026630'

: LOCAL STORAGE FOR TEST 9

: STMSG:: .WORD 0

: SELF TEST MESSAGE ADDRESS

: SELF TEST MESSAGE TABLE

: STTBL:: .WORD SMSG00
: .WORD SMSG01
: .WORD SMSG02
: .WORD SMSG03
: .WORD SMSG04
: .WORD SMSG05
: .WORD SMSG06
: .WORD SMSG07
: .WORD SMSG10
: .WORD SMSG11
: .WORD SMSG12
: .WORD SMSG13
: .WORD SMSG14
: .WORD SMSG15
: .WORD SMSG16
: .WORD SMSG17
: .WORD SMSG20
: .WORD SMSG21
: .WORD SMSG22
: .WORD SMSG23
: .WORD SMSG24
: .WORD SMSG25
: .WORD SMSG26
: .WORD SMSG27
: .WORD SMSG30
: .WORD SMSG31
: .WORD SMSG32
: .WORD SMSG33
: .WORD SMSG34
: .WORD SMSG35
: .WORD SMSG36
: .WORD SMSG37
: .WORD SMSG40
: .WORD SMSG41
: .WORD SMSG42
: .WORD SMSG43
: .WORD SMSG44
: .WORD SMSG45
: .WORD SMSG46
: .WORD SMSG47
: .WORD SMSG50
: .WORD SMSG51
: .WORD SMSG52
: .WORD SMSG53
: .WORD SMSG54
: .WORD SMSG55
: .WORD SMSG56
: .WORD SMSG57
: .WORD SMSG60

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 127
 CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

5923	024552'	026644'			.WORD	SMSG61	
5924	024554'	026670'			.WORD	SMSG62	
5925	024556'	026714'			.WORD	SMSG63	
5926	024560'	026734'			.WORD	SMSG64	
5927	024562'	026740'			.WORD	SMSG65	
5928	024564'	026752'			.WORD	SMSG66	
5929	024566'	026764'			.WORD	SMSG67	
5930	024570'	027000'			.WORD	SMSG70	
5931	024572'	027012'			.WORD	SMSG71	
5932	024574'	027036'			.WORD	SMSG72	
5933	024576'	027060'			.WORD	SMSG73	
5934	024600'	027061'			.WORD	SMSG74	
5935	024602'	027062'			.WORD	SMSG75	
5936	024604'	027063'			.WORD	SMSG76	
5937	024606'	027064'			.WORD	SMSG77	
5938							
5939	024610'	042516	042526	020122	:ASCII MESSAGES		
5940	024616'	047507	020124	052123	SMSG00::	.ASCIZ /NEVER GOT STARTED/	
5941	024624'	051101	042524	000104			
5942	024632'	050103	020125	047111	SMSG01::	.ASCIZ /CPU INSTRUCTION/	:MAC001
5943	024640'	052123	052522	052103			
5944	024646'	047511	000116				
5945	024652'	047522	000115		SMSG02::	.ASCIZ /ROM/	:MAC001
5946	024656'	051127	052111	040505	SMSG03::	.ASCIZ /WRITEABLE CONTROL STORE/	:MAC001
5947	024664'	046102	020105	047503			
5948	024672'	052116	047522	020114			
5949	024700'	052123	051117	000105			
5950					:MAC001SMSG04::	.ASCIZ /PHYSICAL ADDRESS ROM/	
5951	024706'	030524	020061	047125	SMSG04::	.ASCIZ /T11 UNIBUS ADDRESS REGISTER/	:MAC001
5952	024714'	041111	051525	040440			
5953	024722'	042104	042522	051523			
5954	024730'	051040	043505	051511			
5955	024736'	042524	000122				
5956	024742'	042522	042503	053111	SMSG05::	.ASCIZ /RECEIVER UNIBUS DMA/	:MAC001
5957	024750'	051105	052440	044516			
5958	024756'	052502	020123	046504			
5959	024764'	000101					
5960	024766'	041520	051123	020061	SMSG06::	.ASCIZ /PCSR1 LOWER BYTE AND T11 DMA READ/	:MAC001
5961	024774'	047514	042527	020122			
5962	025002'	054502	042524	040440			
5963	025010'	042116	052040	030461			
5964	025016'	042040	040515	051040			
5965	025024'	040505	000104				
5966	025030'	041520	051123	020060	SMSG07::	.ASCIZ /PCSR0 UPPER BYTE AND T11 DMA WRITE/	:MAC001
5967	025036'	050125	042520	020122			
5968	025044'	054502	042524	040440			
5969	025052'	042116	052040	030461			
5970	025060'	042040	040515	053440			
5971	025066'	044522	042524	000			
5972	025073'	120	051503	030122	SMSG10::	.ASCIZ /PCSR0 LOWER BYTE AND LINK MEMORY DMA/	:MAC001
5973	025100'	046040	053517	051105			
5974	025106'	041040	052131	020105			
5975	025114'	047101	020104	044514			
5976	025122'	045516	046440	046505			
5977	025130'	051117	020131	046504			
5978	025136'	000101					

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 128
 CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

5979	025140'	041520	051123	020062	SMSG11::	.ASCIZ	/PCSR2 AND PCSR3/	:MAC001
5980	025146'	047101	020104	041520				
5981	025154'	051123	000063					
5982	025160'	044524	042515	000122	SMSG12::	.ASCIZ	/TIMER/	:MAC001
5983	025166'	044120	051531	041511	SMSG13::	.ASLIZ	/PHYSICAL ADDRESS ROM/	:MAC001
5984	025174'	046101	040440	042104				
5985	025202'	042522	051523	051040				
5986	025210'	046517	000					
5987	025213'	000			SMSG14::	.BYTE	0	:UNUSED
5988	025214'	000			SMSG15::	.BYTE	0	:UNUSED
5989	025215'	000			SMSG16::	.BYTE	0	:UNUSED
5990	025216'	000			SMSG17::	.BYTE	0	:UNUSED
5991	025217'	114	047111	020113	SMSG20::	.ASCIZ	/LINK MEMORY/	:MAC001
5992	025224'	042515	047515	054522				
5993	025232'	000						
5994	025233'	000			SMSG21::	.BYTE	0	:UNUSED
5995	025234'	000			SMSG22::	.BYTE	0	:UNUSED
5996	025235'	000			SMSG23::	.BYTE	0	:UNUSED
5997	025236'	000			SMSG24::	.BYTE	0	:UNUSED
5998	025237'	000			SMSG25::	.BYTE	0	:UNUSED
5999	025240'	000			SMSG26::	.BYTE	0	:UNUSED
6000	025241'	000			SMSG27::	.BYTE	0	:UNUSED
6001	025242'	047514	040503	020114	SMSG30::	.ASCIZ	/LOCAL LOOPBACK - XMITTER TIMEOUT/	:MAC001
6002	025250'	047514	050117	040502				
6003	025256'	045503	026440	020040				
6004	025264'	046530	052111	042524				
6005	025272'	020122	044524	042515				
6006	025300'	052517	000124					
6007	025304'	047514	040503	020114	SMSG31::	.ASCIZ	/LOCAL LOOPBACK - RECEIVER TIMEOUT/	:MAC001
6008	025312'	047514	050117	040502				
6009	025320'	045503	026440	020040				
6010	025326'	042522	042503	053111				
6011	025334'	051105	052040	046511				
6012	025342'	047505	052125	000				
6013	025347'	114	041517	046101	SMSG32::	.ASCIZ	/LOCAL LOOPBACK - BUFFER COMPARSION/	:MAC001
6014	025354'	046040	047517	041120				
6015	025362'	041501	020113	020055				
6016	025370'	041040	043125	042506				
6017	025376'	020122	047503	050115				
6018	025404'	051101	044523	047117				
6019	025412'	000						
6020	025413'	114	041517	046101	SMSG33::	.ASCIZ	/LOCAL LOOPBACK - BYTE COUNT/	:MAC001
6021	025420'	046040	047517	041120				
6022	025426'	041501	020113	020055				
6023	025434'	041040	052131	020105				
6024	025442'	047503	047125	000124				
6025	025450'	047514	040503	020114	SMSG34::	.ASCIZ	/LOCAL LOOPBACK - RECEIVER STATUS/	:MAC001
6026	025456'	047514	050117	040502				
6027	025464'	045503	026440	020040				
6028	025472'	042522	042503	053111				
6029	025500'	051105	051440	040524				
6030	025506'	052524	000123					
6031	025512'	047514	040503	020114	SMSG35::	.ASCIZ	/LOCAL LOOPBACK - CRC ERROR/	:MAC001
6032	025520'	047514	050117	040502				
6033	025526'	045503	026440	020040				
6034	025534'	051103	020103	051105				

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 129
 CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

6035	025542°	047522	000122				
6036	025546°	047514	040503	020114	SMSG36::	.ASCIZ /LOCAL LOOPBACK - MATCH BIT ERROR/	:MAC001
6037	025554°	047514	050117	040502			
6038	025562°	045503	026440	020040			
6039	025570°	040515	041524	020110			
6040	025576°	044502	020124	051105			
6041	025604°	047522	000122				
6042	025610°	047514	040503	020114	SMSG37::	.ASCIZ /LOCAL LOOPBACK - TDR ERROR/	:MAC001
6043	025616°	047514	050117	040502			
6044	025624°	045503	026440	020040			
6045	025632°	042124	020122	051105			
6046	025640°	047522	000122				
6047	025644°	046530	052111	042524	SMSG40::	.ASCIZ /XMITTER BUFFER ADDRESS - TRANSMITTER TIMEOUT/	:MAC001
6048	025652°	020122	052502	043106			
6049	025660°	051105	040440	042104			
6050	025666°	042522	051523	026440			
6051	025674°	052040	040522	051516			
6052	025702°	044515	052124	051105			
6053	025710°	052040	046511	047505			
6054	025716°	052125	000				
6055	025721°	130	044515	052124	SMSG41::	.ASCIZ /XMITTER BUFFER ADDRESS - RECEIVER TIMEOUT/	:MAC001
6056	025726°	051105	041040	043125			
6057	025734°	042506	020122	042101			
6058	025742°	051104	051505	020123			
6059	025750°	020055	042522	042503			
6060	025756°	053111	051105	052040			
6061	025764°	046511	047505	052125			
6062	025772°	000					
6063	025773°	130	044515	052124	SMSG42::	.ASCIZ /XMITTER BUFFER ADDRESS - BUFFER COMPARSION/	:MAC001
6064	026000°	051105	041040	043125			
6065	026006°	042506	020122	042101			
6066	026014°	051104	051505	020123			
6067	026022°	020055	052502	043106			
6068	026030°	051105	041440	046517			
6069	026036°	040520	051522	047511			
6070	026044°	000116					
6071	026046°	046530	052111	042524	SMSG43::	.ASCIZ /XMITTER BUFFER ADDRESS - BYTE COUNT/	:MAC001
6072	026054°	020122	052502	043106			
6073	026062°	051105	040440	042104			
6074	026070°	042522	051523	026440			
6075	026076°	041040	052131	020105			
6076	026104°	047503	047125	000124			
6077	026112°	046530	052111	042524	SMSG44::	.ASCIZ /XMITTER BUFFER ADDRESS - RECEIVER STATUS/	:MAC001
6078	026120°	020122	052502	043106			
6079	026126°	051105	040440	042104			
6080	026134°	042522	051523	026440			
6081	026142°	051040	041505	044505			
6082	026150°	042526	020122	052123			
6083	026156°	052101	051525	000			
6084	026163°	130	044515	052124	SMSG45::	.ASCIZ /XMITTER BUFFER ADDRESS - CRC ERROR/	:MAC001
6085	026170°	051105	041040	043125			
6086	026176°	042506	020122	042101			
6087	026204°	051104	051505	020123			
6088	026212°	020055	051105	020103			
6089	026220°	051105	047522	000122			
6090	026226°	000			SMSG46::	.BYTE 0	:UNUSED

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 130
CZUAAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

6091	026227'	000			SMSG47::	.BYTE 0	:UNUSED	:MAC001
6092	026230'	042522	042503	053111	SMSG50::	.ASCIZ /RECEIVER BUFFER ADDRESS -	TRANSMITTER TIMEOUT/	:MAC001
6093	026236'	051105	041040	043125				
6094	026244'	042506	020122	042101				
6095	026252'	051104	051505	020123				
6096	026260'	020055	052040	040522				
6097	026266'	051516	044515	052124				
6098	026274'	051105	052040	046511				
6099	026302'	047505	052125	000				
6100	026307'	122	041505	044505	SMSG51::	.ASCIZ /RECEIVER BUFFER ADDRESS -	RECEIVER TIMEOUT/	:MAC001
6101	026314'	042526	020122	052502				
6102	026322'	043106	051105	040440				
6103	026330'	042104	042522	051523				
6104	026336'	026440	020040	042522				
6105	026344'	042503	053111	051105				
6106	026352'	052040	046511	047505				
6107	026360'	052125	000					
6108	026363'	122	041505	044505	SMSG52::	.ASCIZ /RECEIVER BUFFER ADDRESS -	BUFFER COMPARSION/	:MAC001
6109	026370'	042526	020122	052502				
6110	026376'	043106	051105	040440				
6111	026404'	042104	042522	051523				
6112	026412'	026440	020040	052502				
6113	026420'	043106	051105	041440				
6114	026426'	046517	040520	051522				
6115	026434'	047511	000116					
6116	026440'	042522	042503	053111	SMSG53::	.ASCIZ /RECEIVER BUFFER ADDRESS -	BYTE COUNT/	:MAC001
6117	026446'	051105	041040	043125				
6118	026454'	042506	020122	042101				
6119	026462'	051104	051505	020123				
6120	026470'	020055	041040	052131				
6121	026476'	020105	047503	047125				
6122	026504'	000124						
6123	026506'	042522	042503	053111	SMSG54::	.ASCIZ /RECEIVER BUFFER ADDRESS -	RECEIVER STATUS/	:MAC001
6124	026514'	051105	041040	043125				
6125	026522'	042506	020122	042101				
6126	026530'	051104	051505	020123				
6127	026536'	020055	051040	041505				
6128	026544'	044505	042526	020122				
6129	026552'	052123	052101	051525				
6130	026560'	000						
6131	026561'	122	041505	044505	SMSG55::	.ASCIZ /RECEIVER BUFFER ADDRESS -	CRC ERROR/	:MAC001
6132	026566'	042526	020122	052502				
6133	026574'	043106	051105	040440				
6134	026602'	042104	042522	051523				
6135	026610'	026440	020040	051103				
6136	026616'	020103	051105	047522				
6137	026624'	000122						
6138	026626'	000			SMSG56::	.BYTE 0	:UNUSED	:MAC001
6139	026627'	000			SMSG57::	.BYTE 0	:UNUSED	:MAC001
6140	026630'	052522	052116	050040	SMSG60::	.ASCIZ /RUNT PACKET/		:MAC001
6141	026636'	041501	042513	000124				
6142	026644'	044515	044516	052515	SMSG61::	.ASCIZ /MINIMUM PACKET SIZE/		:MAC001
6143	026652'	020115	040520	045503				
6144	026660'	052105	051440	055111				
6145	026666'	000105						
6146	026670'	040515	044530	052515	SMSG62::	.ASCIZ /MAXIMUM PACKET SIZE/		:MAC001

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 131
 CZUAB.MAC 07-APR-83 17:03 TEST 9: SELF TEST

6147	026676'	020115	040520	045503				
6148	026704'	052105	051440	055111				
6149	026712'	000105						
6150	026714'	053117	051105	044523	SMSG63::	.ASCIZ	/OVERSIZE PACKET/	:MAC001
6151	026722'	042532	050040	041501				
6152	026730'	042513	000124					
6153	026734'	051103	000103		SMSG64::	.ASCIZ	/CRC/	:MAC001
6154	026740'	047503	046114	051511	SMSG65::	.ASCIZ	/COLLISION/	:MAC001
6155	026746'	047511	000116					
6156	026752'	042510	051101	041124	SMSG66::	.ASCIZ	/HEARTBEAT/	:MAC001
6157	026760'	040505	000124					
6158	026764'	040510	043114	042040	SMSG67::	.ASCIZ	/HALF DUPLEX/	:MAC001
6159	026772'	050125	042514	000130				
6160	027000'	052515	052114	041511	SMSG70::	.ASCIZ	/MULTICAST/	:MAC001
6161	027006'	051501	000124					
6162	027012'	042101	051104	051505	SMSG71::	.ASCIZ	/ADDRESS RECOGNITION/	:MAC001
6163	027020'	020123	042522	047503				
6164	027026'	047107	052111	047511				
6165	027034'	000116						
6166	027036'	054105	042524	047122	SMSG72::	.ASCIZ	/EXTERNAL LOOPBACK/	:MAC001
6167	027044'	046101	046040	047517				
6168	027052'	041120	041501	000113				
6169	027060'	000			SMSG73::	.BYTE	0	:UNUSED
6170	027061'	000			SMSG74::	.BYTE	0	:UNUSED
6171	027062'	000			SMSG75::	.BYTE	0	:UNUSED
6172	027063'	000			SMSG76::	.BYTE	0	:UNUSED
6173	027064'	047503	050115	042514	SMSG77::	.ASCIZ	/COMPLETED - NO ERRORS/	
6174	027072'	042524	020104	020055				
6175	027100'	047516	042440	051122				
6176	027106'	051117	000123					
6177	027112'	047125	042504	044506	UNUSED::	.ASCIZ	/UNDEFINED/	:MAC001
6178	027120'	042516	000104					
6179						.EVEN		

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 132
TEST 10: DEUNA ROM DUMP TEST

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027124'
027124'
027124'
027124'
027124' 104402

027126'
027126' 104404
027130' 012777 000606' 151204
027136' 005077 151202
027142' 012777 000001 151166
027150' 012737 000176 000332'
027156' 004737 017316'
027162' 103022

.SBTTL TEST 10: DEUNA ROM DUMP TEST

: THIS TEST WILL VERIFY THAT THE DATA PATH FROM THE T11 PROCESSOR
: TO THE UNIBUS INTERFACE IS INTACT AND ABLE TO TRANSFER DATA RELIABLY.
: THIS DATA PATH IS CRUCIAL FOR FURTHER TESTING BECAUSE IT IS NECESSARY
: FOR LOADING REPAIR-LEVEL DIAGNOSTICS INTO THE WCS.
:
: THE TEST STRATEGY IS TO TRANSFER KNOWN DATA OVER THE DATA PATH AND TO
: VERIFY THE TRANSFERRED DATA.
:
: THE DATA SOURCE FOR THE DUMP TEST IS THE ROM MICROCODE RESIDENT ON THE
: DEUNA PORT BOARD. A DUMP OF THE ROM WILL EXERCISE THE DATA PATH NEEDED
: FOR LOADING WCS AND THE ROM CONTENTS CAN BE VERIFIED. THE ROM MICROCODE
: WILL BE CHECKED BY VERIFYING THE CRC BYTES. THE CRC BYTES CHARACTERIZE
: THE DATA CONTENTS OF THE ROM AND ARE BURNED INTO THE ROM AT THE TIME OF
: MANUFACTURE. A FAILURE TO VERIFY THE CRC CALCULATION ON THE DUMPED ROM
: DATA DUMP WILL BE INTERPRETED AS AN ERROR IN THE DATA PATH.

: TEST SEQUENCE:

- 1-WRITE PCSR2 AND PCSR3 WITH THE ADDRESS OF THE PORT CONTROL BLOCK
- 2-WRITE <GET PCBB> PORT COMMAND TO PCSRO
- 3-READ PCSRO AND VERIFY DNI BIT SET
- 4-WRITE PCSRO DNI BIT TO RESET IT
- 5-FILL MEMORY BUFFER WITH A BACKGROUND PATTERN
- 6-WRITE PORT CONTROL BLOCK WITH 'DUMP INTERNAL MEMORY' FUNCTION CODE
- 7-WRITE PORT CONTROL BLOCK WITH UNIBUS DATA BLOCK BASE ADDRESS
- 8-WRITE DATA BLOCK LENGTH TO UNIBUS DATA BLOCK
- 9-WRITE MEMORY BUFFER ADDRESS TO UNIBUS DATA BLOCK
- 10-WRITE INTERNAL DATA BLOCK ADDRESS TO UNIBUS DATA BLOCK
- 11-WRITE <GET CMD> PORT COMMAND TO PCSRO
- 12-READ PCSRO AND VERIFY DNI SET
- 13-CALCULATE CRC ON DUMPED DATA
- 14-REPEAT STEPS 5-13 ON EACH 1K OF ROM
- 15-VERIFY CRC =0

BGNTST

BGNSUB ;#1

T10::

T10.1:

TRAP CSBSUB

: LOAD PCSR2+3; ISSUE GET PORT CONTROL BLOCK PORT COMMAND; AND WAIT FOR 'DNI'

BGNSEG

MOV #PCBB, @PCSR2 ;LOAD PCSR2+3 WITH PORT CONTROL BLOCK..
CLR @PCSR3 ;ADDRESS
MOV #GETPCB, @PCSRO ;ISSUE GET PORT CONTROL BLOCK COMMAND
MOV #2*SECOND, METER ;PUT SOME TIME IN THE METER
JSR PC, CHKDNI ;WAIT FOR DNI TO SET
BCC 20\$;OK

TRAP CSB EG

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 133
 CZUAAB.MAC 07-APR-83 17:03 TEST 10: DEUNA ROM DUMP TEST

;ERROR DNI DID NOT SET!
 ;NO, FORMAT ERROR MESSAGE

6236
 6237 027164' 012737 001000' 000310'
 6238 027172' 012737 001277' 000312'
 6239 027200' 012737 001342' 000314'
 6240 027206' 012737 001350' 000316'

MOV #SDNI,BITNAM
 MOV #SNSET,BITSTA
 MOV #SAFTER,PWHEN
 MOV #SGIPCB,PCOMND
 ERRHRD 030,ROMDMP,MSG1 ;PRINT ERROR MESSAGE

TRAP CSERHRD
 .WORD 30
 .WORD ROMDMP
 .WORD MSG1

6241 027214'
 6242 027214' 104456
 6243 027216' 000036
 6244 027220' 001747'
 6245 027222' 012716'

ESCAPE TST

;CAN NOT CONTINUE TESTING

TRAP C\$ESCAPE
 .WORD L10120-

6246 027224'
 6247 027224' 104410
 6248 027226' 000310

20\$:
 ENDSEG

10000\$:

6249 027230'
 6250 027230'
 6251 027230'
 6252 027230' 104405

BGNSEG

TRAP C\$ESEG

6253 027232'
 6254 027232' 104404

TRAP C\$BSEG

6255
 6256

;WRITE ONE TO CLEAR 'DNI'

6257
 6258 027234' 004737 017362'
 6259 027240' 103004

JSR PC,CLRDNI
 BCC 25\$

;GO CLEAR DNI
 ;OK
 ;ERROR DNI FAILED TO CLEAR!
 ;PRINT ERROR MESSAGE

6260
 6261 027242'
 6262 027242' 104456
 6263 027244' 000037

ERRHRD 031,ROMDMP,RACMG7

TRAP CSERHRD
 .WORD 31
 .WORD ROMDMP
 .WORD RACMG7

6264 027246' 001747'
 6265 027250' 012670'
 6266 027252'

25\$:
 ENDSEG

10001\$:

6267 027252'
 6268 027252' 104405
 6269 027252' 104405

ENDSUB ;#1

TRAP C\$ESEG

6270 027254'
 6271 027254' 104403
 6272 027254' 104403

BGNSUB ;#2

L10121:

TRAP C\$ESUB

6273 027256'
 6274 027256' 104402
 6275 027256' 104402

T10.2:

TRAP C\$BSUB

6276
 6277

;FILL BUFFER WITH PATTERN; FORMAT PCBB AND UDBB; ISSUE GET COMMAND PORT COMMAND
 ;AND WAIT FOR 'DNI'

6278
 6279
 6280 027260' 012737 000020 000606'
 6281 027266' 012737 000616' 000610'
 6282 027274' 005037 000612'

MOV #DIN,PCBB
 MOV #UDBB,PCBB+2
 CLR PCBB+4
 MOV #ROMADR,UDBB+6
 MOV #8.,R5
 CLR R4

;LOAD PCB WITH DUMP INTERNAL MEMORY FUNCTION
 ;LOAD UNIBUS DATA BLOCK BASE ADDRESS...
 ;INTO PCB
 ;INTERNAL BASE ADDRESS OF ROM
 ;DUMP ROM IN 8. 1K CHUNKS
 ;INITIAL CRC VALUE

6283 027300' 012737 040000 000624'
 6284 027306' 012705 000010
 6285 027312' 005004
 6286 027314'

26\$:
 BGNSEG

TRAP C\$BSEG

6287 027314' 104404
 6288 027314' 104404
 6289 027316' 013701 000324'
 6290 027322' 012702 002000

MOV FREMEM,R1
 MOV #SIZ1K/2,R2
 MOV #PAT1,R3

;GET POINTER TO BUFFER
 ;GET 1K WORD COUNT
 ;GET A BACKGROUND PATTERN

6291 027326' 012703 000520'

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 134
CZUAAB.MAC 07-APR-83 17:03 TEST 10: DEUNA ROM DUMP TEST

```

6292 027332' 011321      27$:  MOV      (R3),(R1)+      ;FILL BUFFER WITH BACKGROUND PATTERN
6293 027334' 005302      DEC      R2
6294 027336' 001375      BNE      27$
6295 027340' 012737      004000  000616'  MOV      #ROMSIZ/8.,UDBB      ;1K BYTE COUNT
6296 027346' 013737      000324'  000620'  MOV      FREMEM,UDBB+2      ;AND BUFFER ADDRESS
6297 027354' 005037      000622'  CLR      UDBB+4
6298 027360' 012737      000176  000332'  MOV      #2*SECOND,METER      ;PUT SOME TIME ON THE METER
6299 027366' 012777      000002  150742  MOV      #GETCMD,@PCSR0      ;LOAD 'GET COMMAND' PORT COMMAND
6300 027374' 004737      017316'  JSR      PC,CHKDNI      ;WAIT FOR DNI TO SET
6301 027400' 103022      BCC      30$      ;OK
6302                                     ;ERROR, DNI DID NOT SET!
6303 027402' 012737      001000'  000310'  MOV      #SDNI,BITNAM      ;FORMAT ERROR MESSAGE
6304 027410' 012737      001277'  000312'  MOV      #SNSET,BITSTA
6305 027416' 012737      001342'  000314'  MOV      #SAFTER,PWHEN
6306 027424' 012737      001357'  000316'  MOV      #SGTCMD,PCOMND
6307 027432'                                     ERRHRD   C32,ROMDMP,MSG1
6308 027432' 104456                                     TRAP    C$ERHRD
6309 027434' 000040                                     .WORD  32
6310 027436' 001747'                                     .WORD  ROMDMP
6311 027440' 012716'                                     .WORD  MSG1
6312 027442'                                     ESCAPE  TST
6313 027442' 104410                                     TRAP    C$ESCAPE
6314 027444' 000072                                     .WORD  L10120-.
6315 027446'
6316 027446'
6317 027446'
6318 027446' 104405
6319 027450'
6320 027450' 104404
6321
6322
6323
6324 027452' 004737  017362'  ;WRITE ONE TO CLEAR 'DNI'
6325 027456' 103004      JSR      PC,CLRDN1      ;GO CLEAR DNI BIT
6326                                     BCC      33$      ;OK
6327                                     ERRHRD   033,ROMDMP,RACMG7      ;ERROR DNI FAILED TO CLEAR
6328                                     ;PRINT ERROR MESSAGE
6329                                     TRAP    C$ERHRD
6330 027460' 104456                                     .WORD  33
6331 027460' 000041                                     .WORD  ROMDMP
6332 027462' 001747'                                     .WORD  RACMG7
6333 027464' 001747'
6334 027466' 012670'
6335 027470'
6336 027470'
6337 027470' 104405
6338
6339                                     ;CALCULATE CRC ON 1K OF DATA DUMPED FROM ROM
6340 027472' 013700      000324'  MOV      FREMEM,R0      ;GET BUFFER ADDRESS
6341 027476' 012702      004000  MOV      #SIZ1K,R2      ;GET BYTE COUNT
6342 027502' 004737      017030'  JSR      PC,CRC16      ;CALC CRC ON 1K BUFFER
6343 027506' 062737      004000  000624'  ADD      #ROMSIZ/8.,UDBB+6      ;POINT TO NEXT 1K OF ROM
6344 027514' 005305      DEC      R5      ;HAVE WE DONE ALL 8K?
6345 027516' 001276      BNE      26$      ;NO
6346 027520' 005704      TST      R4      ;YES, IS CRC = 0?
6347 027522' 001404      BEQ      40$      ;YES, OK
6347 027524'      ERRHRD   034,ROMDMP,MSG2      ;PRINT ERROR MESSAGE

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 135
CZUAAB.MAC 07-APR-83 17:03 TEST 10: DEUNA ROM DUMP TEST

6348 027524' 104456
6349 027526' 000042
6350 027530' 001747'
6351 027532' 012764'
6352 027534'
6353 027534'
6354 027534'
6355 027534' 104403
6356 027536'
6357 027536'
6358 027536' 104401
6359
6360
6361

40S:
ENDSUB :#2

ENDTST

TRAP C\$ERHD
.WORD 34
.WORD ROMDMP
.WORD MSG2

L10122: TRAP C\$ESUB

L10120: TRAP C\$ETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 136
CZUAAB.MAC 07-APR-83 17:03 TEST 10: DEUNA ROM DUMP TEST

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.SBTTL TEST 11: WCS LOAD/DUMP TEST

```

:*****
:THIS TEST WILL USE THE LOAD/DUMP PORT COMMAND TO VERIFY THE DATA
:PATHWAY TO/FROM THE WCS. PATTERNS WILL BE USED TO CHECK THE DATA PATHWAY
:FOR ALL SA0 AND SA1 ERRORS.
:BECAUSE THE OPERATIONAL MICROCODE NEEDS THE LOWER 2K OF WCS ONLY THE TOP HALF
:OF WCS WILL BE LOADED WITH A DATA PATTERN THEN DUMPED BACK
:TO MEMORY FOR VERIFICATION. THIS PROCEDURE WILL BE REPEATED FOR ALL PATTERNS.
:TEST SEQUENCE:
: 1-FORMAT UNIBUS DATA BLOCK WITH NUMBER OF WORDS, WCS DESTINATION
:   ADDRESS, AND SOURCE BUFFER ADDRESS.
: 2-FILL SOURCE BUFFER WITH DATA PATTERN
: 3-WRITE PORT CONTROL BLOCK WITH ADDRESS OF UNIBUS DATA BLOCK
:   AND WITH THE 'LOAD INTERNAL MEMORY' FUNCTION CODE
: 4-WRITE PCSR2 AND PCSR3 WITH PORT CONTROL BLOCK ADDRESS
: 5-WRITE PCSR0 WITH <GET CMD> PORT COMMAND
: 6-READ PCSR0 TO VERIFY DNI SET
: 7-WRITE ONE TO CLEAR DNI
: 8-FILL DESTINATION BUFFER WITH ZEROS
: 9-WRITE PORT CONTROL BLOCK WITH 'DUMP INTERNAL MEMORY'
:   FUNCTION CODE.
:10-WRITE PCSR0 WITH <GET CMD> PORT COMMAND
:11-VERIFY DNI SET
:12-WRITE ONE TO CLEAR DNI
:13-COMPARE DESTINATION BUFFER WITH DATA PATTERN
:14-REPEAT STEPS 1-13 FOR ALL DATA PATTERNS
:*****

```

```

027540'
027540'
027540' 012704 000520'
027544'
027544'
027544' 104402
027546'
027546' 104404
027550' 013702 000324'
027554' 012703 004000
027560' 011422
027562' 005303
027564' 001375

```

```

BGNTST
      MOV      #PATERM,R4          ;POINT TO LIST OF DATA PATTERNS
BGNSUB :#1
      T11.1:  TRAP      CSBSUB
:LOAD WCS
:
:  BGNSEG
      TRAP      CSBSEG
:
:  FILL SOURCE BUFFER; FORMAT UDBB AND PCBB; ISSUE GET PORT CONTROL BLOCK PORT
:  COMMAND AND WAIT FOR 'DNI'
:
      MOV      FREMEM,R2          ;GET UNIBUS BUFFER ADDRESS
      MOV      #WCSSIZ/4,R3      ;GET HALF SIZE OF WCS IN WORDS
10$:  MOV      (R4),(R2)+         ;FILL BUFFER WITH DATA PATTERN
      DEC      R3
      BNE     10$
:
:SETUP UNIBUS DATA BLOCK

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 137
CZUAAB.MAC 07-APR-83 17:03 TEST 11: WCS LOAD/DUMP TEST

```

6418 027566' 012737 010000 000616'      MOV      #WCSSIZ/2,UDBB      :BYTE COUNT
6419 027574' 013737 000324' 000620'      MOV      FREMEM,UDC3+2      :BUFFER ADDRESS
6420 027602' 005037 000622'      CLR      UDBB+4
6421 027606' 012737 010000 000624'      MOV      #4CSADR+<WCSSIZ/2>,UDBB+6 :BASE ADDRESS OF TOP HALF OF WCS
6422      :SETUP PORT CONTROL BLOCK
6423 027614' 012737 000021 000606'      MOV      #LIM,PCBB          :'LOAD INTERNAL MEMORY' FUNCTION
6424 027622' 012737 000616' 000610'      MOV      #UDBB,PCBB+2      :ADDRESS OF UNIBUS DATA BLOCK
6425 027630' 005037 000612'      CLR      PCBB+4
6426 027634' 012777 000606' 150500      MOV      #PCBB,@PCSR2      :LOAD PCSR2+3 WITH PCB ADDRESS
6427 027642' 005077 150476      CLR      @PCSR3
6428
6429 027646' 012777 000001 150462      MOV      #GETPCB,@PCSR0     :ISSUE 'GET PORT CONTROL BLOCK' PORT COMMAND
6430 027654' 012737 000176 000332'      MOV      #2*SECOND,METER    :PUT SOME TIME ON THE METER
6431 027662' 004737 017316'      JSR      PC,CHKDNI          :WAIT FOR DNI TO SET
6432 027666' 103022      BCC      20$               :OK
6433      :ERROR DNI DID NOT SET!
6434 027670' 012737 001000' 000310'      MOV      #SDNI,BITNAM       :POINT TO 'DNI' ASCII STRING
6435 027676' 012737 001277' 000312'      MOV      #NSET,BITSTA       :POINT TO 'NOT SET' ASCII STRING
6436 027704' 012737 001342' 000314'      MOV      #AFTER,PWHEN       :POINT TO 'AFTER' ASCII STRING
6437 027712' 012737 001350' 000316'      MOV      #SGTPCB,PCOMND     :POINT TO 'GET PORT CONTROL BLOCK' ASCII STRING
6438 027720'      ERRHRD  035,DATALD,MSG1    :PRINT ERROR MESSAGE
6439 027720' 104456      TRAP      C$ERHRD
6440 027722' 000043      .WORD     35
6441 027724' 001774'      .WORD     DATALD
6442 027726' 012716'      .WORD     MSG1
6443 027730'      ESCAPE  TST
6444 027730' 104410      TRAP      C$ESCAPE
6445 027732' 000372      .WORD     L10123-.
6446 027734'
6447 027734'      20$:
6448 027734'      ENDSEG
6449 027734' 104405      10000$:
6450 027736'      BGNSEG
6451 027736' 104404      TRAP      C$ESEG
6452
6453      :WRITE ONE TO CLEAR 'DNI'
6454
6455 027740' 004737 017362'      JSR      PC,CLRDN1         :GO CLEAR DNI
6456 027744' 103004      BCC      25$               :OK
6457
6458      ERRHRD  036,DATALD,RACMG7 :ERROR DNI FAILED TO CLEAR
6459 027746'      :PRINT ERROR MESSAGE
6460 027746' 104456      TRAP      C$ERHRD
6461 027750' 000044      .WORD     36
6462 027752' 001774'      .WORD     DATALD
6463 027754' 012670'      .WORD     RACMG7
6464 027756'
6465 027756'      25$:
6466 027756'      ENDSEG
6467 027756' 104405      10001$:
6468 027760'      BGNSEG
6469 027760' 104404      TRAP      C$ESEG
6470
6471      :ISSUE GET COMMAND PORT COMMAND AND WAIT FOR 'DNI'
6472 027762' 012777 000002 150346      MOV      #GETCMD,@PCSR0     :ISSUE GET COMMAND PORT COMMAND
6473 027770' 012737 000275 000332'      MOV      #3*SECOND,METER    :PUT SOME TIME ON THE METER

```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 138
CZUAAB.MAC 07-APR-83 17:03 TEST 11: WCS LOAD/DUMP TEST

```

6474 027776' 004737 017316'      JSR    PC,CHKDNI      :GO WAIT FOR DNI
6475 030002' 103022      BCC    30$           :OK
6476                                     :ERROR DNI DID NOT SET!
6477 030004' 012737 001000' 000310'  MOV    #DNI,BITNAM
6478 030012' 012737 001277' 000312'  MOV    #SNSET,BITSTA
6479 030020' 012737 001342' 000314'  MOV    #SAFTER,PWHEN
6480 030026' 012737 001357' 000316'  MOV    #SGTCRD,PCOMND
6481 030034'                                     ERRHRD 037,DATALD,MSG1 :PRINT ERROR MESSAGE
6482 030034' 104456                                     TRAP   CSERHRD
6483 030036' 000045                                     .WORD 37
6484 030040' 001774'                                     .WORD DATALD
6485 030042' 012716'                                     .WORD MSG1
6486 030044'                                     ESCAPE TST
6487 030044' 104410                                     TRAP   C$ESCAPE
6488 030046' 000256                                     .WORD L10123-
6489 030050' 30$:
6490 030050'     ENDSEG
6491 030050'                                     10002$:
6492 030050' 104405                                     TRAP   C$ESEG
6493 030052'     BGNSEG
6494 030052' 104404                                     TRAP   C$BSEG
6495
6496     :WRITE ONE TO CLEAR 'DNI'
6497     :
6498 030054' 004737 017362'      JSR    PC,CLRDNI      :GO CLEAR DNI
6499 030060' 103004      BCC    35$           :OK
6500                                     :ERROR DNI FAILED TO CLEAR
6501     ERRHRD 038,DATALD,RACMG7 :PRINT ERROR MESSAGE
6502 030062' 104456                                     TRAP   CSERHRD
6503 030064' 000046                                     .WORD 38
6504 030066' 001774'                                     .WORD DATALD
6505 030070' 012670'                                     .WORD RACMG7
6506 030072' 35$:
6507 030072'     ENDSEG
6508 030072'                                     10003$:
6509 030072' 104405                                     TRAP   C$ESEG
6510 030074'     ENDSUB :#1                                     L10124:
6511 030074'                                     TRAP   C$ESUB
6512 030074' 104403     BGNSUB :#2
6513 030076'                                     T11.2:
6514 030076'                                     TRAP   C$BSUB
6515 030076' 104402
6516     :
6517     :DUMP WCS
6518     :
6519 030100'     BGNSEG
6520 030100' 104404                                     TRAP   C$BSEG
6521     :
6522     :CLEAR DESTINATION BUFFER; FORMAT PCBB AND UDBB; ISSUE GET COMMAND PORT COMMAND
6523     :AND WAIT FOR 'DNI'
6524     :
6525 030102' 013702 000324'      MOV    FREPEN,R2      :GET ADDRESS OF FREE MEMORY
6526 030106' 012703 004000'      MOV    #WCSSIZ/4,R3  :SIZE IN WORDS OF BUFFER
6527 030112' 005022 40$:      CLR    (R2)+         :FILL DESTINATION BUFFER WITH ZEROS
6528 030114' 005303      DEC    R3
6529 030116' 001375      BNE   40$

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 139
CZUAB.MAC 07-APR-83 17:03 TEST 11: WCS LOAD/DUMP TEST

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6530
6531 030120' 013737 000324' 000620'      MOV    FREHEM,UDBB+2
6532 030126' 005037 000622'      CLR    UDBB+4
6533 030132' 012737 000020 000606'      MOV    #01M,PCBB      ;LOAD 'DUMP INTERNAL MEMORY' FUNCTION
6534 030140' 012777 000002 150170      MOV    #GE:CMD,BPCSR0 ;ISSUE GET COMMAND PORT COMMAND
6535 030146' 012737 000275 000332'      MOV    #3*SECOND,METER ;PUT SOME TIME ON THE METER
6536 030154' 004737 017316'      JSR    PC,CHKDNI      ;WAIT FOR DNI TO SET
6537 030160' 103022      BCC    50$           ;OK
6538 030162' 012737 001000' 000310'      MOV    #SDNI,BITNAM
6539 030170' 012737 001277' 000312'      MOV    #SNSET,BITSTA
6540 030176' 012737 001342' 000314'      MOV    #SAFTER,PWHEN
6541 030204' 012737 001357' 000316'      MOV    #SGTCMD,PCOMND
6542 030212'      ERRHRD 039,DATAID,MSG1
6543 030212' 104456      TRAP   CSERHRD
6544 030214' 000047      .WORD 39
6545 030216' 001774'      .WORD DATAID
6546 030220' 012716'      .WORD MSG1
6547 030222'      ESCAPE TST
6548 030222' 104410      TRAP   CSESCAPE
6549 030224' 000100      .WORD L10123-
6550 030226'      50$:
6551 030226'      ENDSEG
6552 030226'      10000$:
6553 030226' 104405      TRAP   CSESEG
6554 030230'      BGNSEG
6555 030230' 104404      TRAP   CSBSEG
6556 030232' 004737 017362'      JSR    PC,CLRDN1      ;GU CLEAR DNI
6557 030236' 103004      BCC    60$           ;OK
6558      ERRHRD 040,DATAID,RACMG7 ;ERROR DNI FAILED TO CLEAR
6559 030240'      ;PRINT ERROR MESSAGE
6560 030240' 104456      TRAP   CSERHRD
6561 030242' 000050      .WORD 40
6562 030244' 001774'      .WORD DATAID
6563 030246' 012670'      .WORD RACMG7
6564 030250'      60$:
6565 030250'      ENDSEG
6566 030250'      10001$:
6567 030250' 104405      TRAP   CSESEG
6568
6569      ;COMPARE DUMPED DATA TO WRITTEN PATTERN
6570
6571 030252' 013701 000324'      MOV    FREHEM,R1      ;SOURCE BUFFER ADDRESS
6572 030256' 012703 004000      MOV    #<WCSSIZ/2>/2,R3 ;# OF WORDS TO COMPARE
6573 030262' 021114      70$:  CMP    (R1),(R4)    ;IS WHAT WAS LOADED SAME AS...
6574      ;WHAT WAS DUMPED?
6575 030264' 001404      BEQ    80$           ;YES
6576 030266'      ERRHRD 041,DATAID,MSG5 ;ERROR DATA COMPARE
6577 030266' 104456      TRAP   CSERHRD
6578 030270' 000051      .WORD 41
6579 030272' 001774'      .WORD DATAID
6580 030274' 013124'      .WORD MSG5
6581 030276' 005721      80$:  TST    (R1)+      ;POINT TO NEXT LOCATION
6582 030300' 005303      DEC    R3           ;WE DONE ALL WORDS?
6583 030302' 001367      BNE    70$         ;NOT YET
6584 030304'
6585 030304'      ENDSUB ;#2

```

L10125:

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 140
CZUAAB.MAC 07-APR-83 17:03 TEST 11: WCS LOAD/DUMP TEST

6586 030304' 104403
6587
6588
6589
6590 030306' 062704 000002
6591 030312' 020427 000532'
6592 030316' 001402
6593 030320' 000137 027544'
6594 030324'
6595 030324'
6596 030324'
6597 030324' 104401

TRAP CSESUB

:CHECK TO SEE IF ALL PATTERNS HAVE BEEN RUN THROUGH

ADD #2,K4
CMP R4,#PAT6
BEQ 90\$
JMP T11.1

:POINT TO NEXT DATA PATTERN
:WE DONE ALL DATA PATTERNS?
:YES END OF TEST
:NO CONTINUE WITH NEW DATA PATTERN

90\$:
ENDTST

L10123: TRAP CSETST

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 141
CZUAAB.MAC 07-APR-83 17:03 TEST 11: WCS LOAD/DUMP TEST

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.SBTTL TEST 12: LOAD AND START FUNCTION TEST

: THIS TEST WILL VERIFY THAT THE LOAD AND START MICROADDRESS PORT COMMAND
: IS OPERATIONAL.

: THE PROCESS IS TO LOAD WCS WITH MICROCODE THAT WHEN STARTED WILL WRITE
: A PATTERN OF DATA TO THE LITE-BYTE FIELD OF PCSR1 REGISTER WHICH CAN BE READ
: FROM THE UNIBUS AND BE VERIFIED.

: NOTE: THIS TEST USES MICROCODE MODULE 'A'

: TEST SEQUENCE:

- 1-FORMAT UNIBUS DATA BLOCK WITH BYTE COUNT, WCS DESTINATION ADDRESS AND UNIBUS SOURCE ADDRESS OF THE MICROCODE.
- 2-WRITE PORT CONTROL BLOCK WITH ADDRESS OF UNIBUS DATA BLOCK AND LOAD INTERNAL MEMORY FUNCTION CODE.
- 3-WRITE PCSR2 AND PCSR3 WITH ADDRESS OF THE PORT CONTROL BLOCK.
- 4-WRITE PCSR0 WITH <GET PCB> PORT COMMAND
- 5-READ PCSR0 AND VERIFY 'DNI'
- 6-WRITE PCSR0 'DNI' TO CLEAR
- 7-WRITE PCSR0 WITH <GET COMMAND> PORT COMMAND
- 8-READ PCSR0 AND VERIFY 'DNI'
- 9-WRITE PCSR0 'DNI' TO CLEAR
- 10-WRITE PORT CONTROL BLOCK WITH START ADDRESS OF WCS MICROCODE AND WITH LOAD AND START FUNCTION CODE
- 11-WRITE PCSR0 WITH <GET COMMAND> PORT COMMAND
- 12-READ PCSR0 AND VERIFY 'DNI' SET
- 13-READ PCSR1 AND VERIFY BITS 13:8 ARE PATTERN WRITTEN BY MICROCODE
- 14-ISSUE RESET TO PCSR0 TO RESTART OPERATIONAL MICROCODE
- 15-READ PCSR0 AND VERIFY 'DNI' SET
- 16-WRITE PCSR0 WITH 'DNI' TO CLEAR

BGNTST

T12::

: LOAD MICROCODE MODULE 'A' INTO THE TOP HALF OF WCS

: BGNSEG

TRAP CSBSEG

: FORMAT THE UNIBUS DATA BLOCK AND THE PORT CONTROL BLOCK FOR THE LOAD
: INTERNAL MEMORY FUNCTION

030326'
030326'
030326'
030326' 104404
030330' 013737 000006 000616'
030336' 012737 000006 000620'
030344' 005037 000622'
030350' 012737 010000 000624'
030356' 012737 000021 000606'

```

: SETUP UDBB
MOV MICASZ,UDBB : SIZE OF MICROCODE MODULE TO LOAD
MOV #MICROA,UDBB+2 : BASE ADDRESS OF MICROCODE MODULE
CLR UDBB+4
MOV #WCSADR+<WCSSIZ/2>,UDBB+6 : LOAD INTO TOP HALF OF WCS
: SETUP PCB
MOV #LIM,PCBB : 'LOAD INTERNAL MEMORY' FUNCTION

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 142
 CZUAAB.MAC 07-APR-83 17:03 TEST 12: LOAD AND START FUNCTION TEST

```

6654 030364' 012737 000616' 000610'      MOV      #UDBB,PCBB+2      ;SET ADDRESS OF UDBB
6655 030372' 005037 000612'          CLR      PCBB+4
6656 030376' 012777 000606' 147736      MOV      #PCBB,BPCSR2    ;TELL DEUNA WHERE PCBB IS
6657 030404' 005077 147734          CLR      BPCSR3
6658
6659 030410' 012777 000001 147720      MOV      #GETPCB,BPCSR0  ;ISSUE 'GET PCB' PORT COMMAND
6660 030416' 012737 000176 000332'      MOV      #2*SECOND,METER ;SETUP TIMER
6661 030424' 004737 017316'          JSR      PC,CHKDNI        ;WAIT FOR 'DNI' TO SET
6662 030430' 103022          BCC      10$             ;OK
6663
6664 030432' 012737 001000' 000310'      MOV      #SDNI,BITNAM    ;ERROR DNI NOT SET!
6665 030440' 012737 001277' 000312'      MOV      #SNSET,BITSTA   ;SETUP ERROR MESSAGE
6666 030446' 012737 001342' 000314'      MOV      #AFTER,PWHEN
6667 030454' 012737 001350' 000316'      MOV      #SGTPCB,PCOMND
6668 030462'          ERRHRD 042,LASFT,MSG1    ;PRINT ERROR MESSAGE
6669 030462' 104456          TRAP    CSERHRD
6670 030464' 000052          .WORD  42
6671 030466' 002026'          .WORD  LASFT
6672 030470' 012716'          .WORD  MSG1
6673 030472'          ESCAPE TST              ;NO POINT IN CONTINUING TEST
6674 030472' 104410          TRAP    C$ESCAPE
6675 030474' 000310          .WORD  L10126-.
6676 030476'          10$:
6677 030476'          ENDSEG
6678 030476'          10000$:
6679 030476' 104405          TRAP    C$ESEG
6680 030500'          BGNSEG
6681 030500' 104404          TRAP    C$BSEG
6682
6683      ;WRITE ONE TO CLEAR 'DNI'
6684
6685 030502' 004737 017362'          JSR      PC,CLRDN1      ;GO CLEAR 'DNI'
6686 030506' 103006          BCC      20$
6687
6688          ERRHRD 043,LASFT,RACMG7    ;ERROR 'DNI' NOT CLEAR!
6689          ;PRINT ERROR MESSAGE
6690          TRAP    CSERHRD
6691          .WORD  43
6692          .WORD  LASFT
6693          .WORD  RACMG7
6694          ESCAPE TST              ;DO NOT CONTINUE TEST
6695          TRAP    C$ESCAPE
6696          .WORD  L10126-.
6697
6698          20$:
6699          ENDSEG
6700          10001$:
6701          BGNSEG
6702          TRAP    C$ESEG
6703          TRAP    C$BSEG
6704
6705      ;NOW THAT THE UNA KNOWS WHERE THE MICROCODE IS, ISSUE THE GET COMMAND PORT
6706      ;COMMAND SO THE MICROCODE CAN GET LOADED INTO WCS
6707
6708          ;ISSUE <GET COMMAND> PORT COMMAND
6709          MOV      #GETCMD,BPCSR0   ;SETUP TIMER
6710          MOV      #2*SECOND,METER  ;WAIT FOR 'DNI'
6711          JSR      PC,CHKDNI        ;OK
6712          BCC      30$
    
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 143
CZUAAB.MAC 07-APR-83 17:03 TEST 12: LOAD AND START FUNCTION TEST

```

6710                                     :ERROR 'DNI' NOT SET!
6711 030552' 012737 001000' 000310'   MOV   #SDNI,BITNAM   :SETUP ERROR MESSAGE
6712 030560' 012737 001277' 000312'   MOV   #SNSET,BITSTA
6713 030566' 012737 001342' 000314'   MOV   #AFTER,PWHEN
6714 030574' 012737 001357' 000316'   MOV   #SGICMD,PCOMND
6715 030602'                                     ERRHRD 044,LASFT,MSG1   :PRINT ERROR MESSAGE
6716 030602' 104456                                     TRAP  CSERHRD
6717 030604' 000054                                     .WORD 44
6718 030606' 002026'                                     .WORD LASFT
6719 030610' 012716'                                     .WORD MSG1
6720                                     ESCAPE TST                                     :LEAVE TEST
6721 030612' 104410                                     TRAP  CSESCAPE
6722 030614' 000170                                     .WORD L10126-.
6723 030616' 308:
6724 030616'   ENDSEG
6725 030616'                                     100028:
6726 030616' 104405                                     TRAP  CSESEG
6727 030620'   BGNSEG
6728 030620' 104404                                     TRAP  CSBSEG
6729                                     :
6730                                     :WRITE ONE TO CLEAR 'DNI'
6731                                     :
6732 030622' 004737 017362'   JSR   PC,CLRDN1     :GO CLEAR 'DNI'
6733 030626' 103006   BCC   408          :OK
6734                                     ERRHRD 045,LASFT,RACMG7 :ERROR 'DNI' NOT CLEAR
6735 030630'                                     :PRINT ERROR MESSAGE
6736 030630' 104456                                     TRAP  CSERHRD
6737 030632' 000055                                     .WORD 45
6738 030634' 002026'                                     .WORD LASFT
6739 030636' 012670'                                     .WORD RACMG7
6740                                     ESCAPE TST                                     :DO NOT CONTINUE TEST
6741 030640' 104410                                     TRAP  CSESCAPE
6742 030642' 000142                                     .WORD L10126-.
6743 030644' 408:
6744 030644'   ENDSEG
6745 030644'                                     100038:
6746 030644' 104405                                     TRAP  CSESEG
6747                                     :
6748                                     :OK, MICROCODE MODULE 'A' IS LOADED INTO WCS. NOW START IT AND CHECK PCSR1.
6749                                     :
6750                                     :
6751                                     :
6752 030646' 104404                                     TRAP  CSBSEG
6753 030650' 012737 000001 000606'   MOV   #LASH,PCBB   :LOAD PCBB WITH 'LOAD AND START' FUNCTION CODE
6754 030656' 012737 010000 000610'   MOV   #WCSADR+(WCSsiz/2),PCBB+2 :STARTING MICROADDRESS
6755 030664' 012777 000002 147444   MOV   #GETCMD,APCSRO :ISSUE <GET COMMAND> PORT COMMAND
6756 030672' 012737 000176 000332'   MOV   #2*SECOND,METER :SETUP TIMER
6757 030700' 004737 017316'   JSR   PC,CHKDNI    :GO WAIT FOR 'DNI' TO SET
6758 030704' 103020   BCC   508          :OK
6759 030706' 012737 001000' 000310'   MOV   #SDNI,BITNAM   :ERROR 'DNI' NOT SET!
6760 030714' 012737 001277' 000312'   MOV   #SNSET,BITSTA   :SETUP ERROR MESSAGE
6761 030722' 012737 001342' 000314'   MOV   #SAFTER,PWHEN
6762 030730' 012737 001357' 000316'   MOV   #SGTCMD,PCOMND
6763 030736'                                     ERRHRD 046,LASFT,MSG1   :PRINT ERROR MESSAGE
6764 030736' 104456                                     TRAP  CSERHRD
6765 030740' 000056                                     .WORD 46

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 144
CZUAAB.MAC 07-APR-83 17:03 TEST 12: LOAD AND START FUNCTION TEST

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6766 030742' 002026'                                .WORD  LASFT
6767 030744' 012716'                                .WORD  MSG1
6768 030746' 017702 147366                          50$:  MOV    BPCSR1,R2                ;GET PCSR1 CONTENTS
6769 030752' 042702 140370                          BIC    #^C<SFT!PSTATE>,R2          ;CLEAR ALL BUT SELF TEST AND STATE BITS
6770 030756' 012701 012402                          MOV    #SFTB0!SFTB2!SFTB4!INTST,R1 ;PATTERN THAT SHOULD BE IN PCSR1
6771 030762' 020102                                CMP    R1,R2                       ;IS PCSR1 PATTERN CORRECT?
6772 030764' 001404                                BEQ    60$                          ;YES
6773 030766'                                ERRHRD 047,LASFT,MSG6              ;NO, PRINT ERROR MESSAGE
6774 030766' 104456                                TRAP   CSEHRD
6775 030770' 000057                                .WORD  47
6776 030772' 002026'                                .WORD  LASFT
6777 030774' 013174'                                .WORD  MSG6
6778 030776'
6779 030776'
6780 030776'
6781 030776' 104405                                10004$: TRAP  CSESEG
6782
6783 ;EVERYTHING WORKED JUST FINE, NOW WE HAVE TO GET THE OPERATIONAL MICROCODE
6784 ;GOING AGAIN BEFORE WE LEAVE OTHERWISE EVERYTHING WILL BE SCREWED UP.
6785 ;
6786 031000' 004737 020166'                          JSR    PC.REUNA                    ;RESET DEUNA TO RESTORE OPERATIONAL
6787 ;MICROCODE
6788 031004'                                ENDTST
6789 031004'                                L10126:
6790 031004' 104401                                TRAP  CSETST

```

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 145
TEST 13: COMPREHENSIVE WCS MEMORY TEST

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031006'
031006'

031006'
031006' 104404
031010' 022737
031016' 001004
031020' 122777
031026' 001435
031030' 012737
031036' 004737
031042' 103564
031044' 012737
031052' 004737
031056' 103021
031060' 012737
031066' 012737
031074' 012737
031102' 012737
031110'
031110' 104456
031112' 000060
031114' 002072'
031116' 012716'

.SBTTL TEST 13: COMPREHENSIVE WCS MEMORY TEST

:*****8

: THIS TEST WILL EXHAUSTIVELY TEST THE WCS MEMORY.
: CUSTOM MICROCODE MODULE B, MICROTEST #1 IS USED TO DO THE ACTUAL TESTING.
: MICROTEST #1 RUNS A SERIES OF MICROSUBTESTS TESTS ON THE WCS MEMORY CHECKING
: FOR BOTH ADDRESS AND DATA ERRORS. IF AN ERROR DOES OCCUR THE PORT CONTROL
: BLOCK WILL CONTAIN THE INFORMATION ABOUT THE ERROR.

: PCBB+0: CONTAINS THE MICROSUBTEST THAT FAILED
: PCBB+1: 0 = DATA ERROR, 1 = ADDRESS ERROR
: PCBB+2: CONTAINS THE ADDRESS OF THE LOCATION
: PCBB+4: CONTAINS THE DATA THAT WAS WRITTEN
: PCBB+6: CONTAINS THE DATA THAT WAS READ

: TEST SEQUENCE:
: 1-LOAD MICROMODULE 'B' INTO THE TOP HALF OF WCS IF NOT ALREADY DONE SO
: 2-WAIT FOR THE MICROMONITOR TO BECOME ACTIVE
: 3-CLEAR PCBB LOCATIONS 0-7
: 4-TELL MICROMONITOR TO EXECUTE MICROTEST #1
: 5-WAIT FOR 'DNI'
: 6-IF ERROR PRINT PCBB CONTENTS
: 7-WRITE ONE TO CLEAR 'DNI'
: 8-RESTORE OPERATIONAL MICROCODE

:*****

BGNTST

T13::

: CHECK TO SEE IF MICROCODE MODULE 'B' HAS BEEN LOADED. IF NOT, LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'B' BEEN LOADED?
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICROCODE MODULE B
:ERROR
:WAIT FOR THE MICROMONITOR
:OK
:PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 48
.WORD WCSMEM
.WORD MSG1

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 146
CZUAAB.MAC 07-APR-83 17:03 TEST 13: COMPREHENSIVE WCS MEMORY TEST

```

6847 031120' 000535
6848 031122' 004737 017362'
6849 031126' 103005
6850 031130'
6851 031130' 104456
6852 031132' 000061
6853 031134' 002072'
6854 031136' 012670'
6855 031140' 000525
6856 031142'
6857 031142'
6858 031142'
6859 031142' 104405
6860
6861
6862
6863
6864
6865
6866 031144'
6867 031144' 104404
6868 031146' 004737 020060'
6869 031152' 103006
6870 031154'
6871 031154' 104456
6872 031156' 000062
6873 031160' 002072'
6874 031162' 016666'
6875 031164'
6876 031164' 104410
6877 031166' 000234
6878 031170' 012777 000606' 147144 30$:
6879 031176' 005077 147142
6880 031202' 005037 000606'
6881 031206' 005037 000610'
6882 031212' 005037 000612'
6883 031216' 005037 000614'
6884 031222' 012777 000001 147106
6885
6886 031230' 012737 000770 000332'
6887 031236' 004737 017316'
6888 031242' 103017
6889 031244' 004737 020132'
6890 031250' 103005
6891 031252'
6892 031252' 104456
6893 031254' 000063
6894 031256' 002072'
6895 031260' 016442'
6896 031262' 000454
6897 031264' 012702 000003 35$:
6898 031270'
6899 031270' 104456
6900 031272' 000064
6901 031274' 002072'
6902 031276' 013466'

```

```

20$: BR 55$
JSR PC,CLRDN1 ;CLEAR DNI
BCC 25$
ERRHRD 0'9,WCSMEM,RACMG7 ;DNI DID NOT CLEAR!
TRAP CSERHRD
.WORD 49
.WORD WCSMEM
.WORD RACMG7

25$: BR 55$
ENDSEG

10000$: TRAP CSESEG

;WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE THEN START MICROTEST #1.
;WAIT FOR 'DNI'. CHECK FOR ILLEGAL INTERRUPTS CHECK THE STATE BITS FOR AN
;ERROR CONDITION. IF ERROR REPORT IT. WRITE '1' TO CLEAR 'DNI' AND RESTORE
;OPERATIONAL MICROCODE.

BGNSEG

TRAP CSBSEG
JSR PC,CHKMON ;WAIT FOR MICROMONITOR
BCC 30$ ;OK
ERRHRD 050,WCSMEM,MSG46 ;PRINT ERROR

TRAP CSERHRD
.WORD 50
.WORD WCSMEM
.WORD MSG46

ESCAPE TST ;LEAVE TEST

TRAP CSESCAPE
.WORD L10127-.

;TELL MICROCODE TEST WHERE PCBB IS
MOV #PCBB,@PCSR2
CLR @PCSR3
CLR PCBB+0 ;CLEAR OUT THE PCBB
CLR PCBB+2
CLR PCBB+4
CLR PCBB+6
MOV #1,@PCSR0

;TELL MICROMONITOR TO EXECUTE...
;MICROTEST #1
;PUT SOME TIME ON THE METER
;WAIT FOR MICROTEST TO FINISH
;OK, IT FINISHED
;SEE IF ANY ERROR INTERRUPTS OCCURRED
;NO, OK
;PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 51
.WORD WCSMEM
.WORD MSG44

BR 55$ ;LEAVE
MOV #3,R2 ;MICROTEST # THAT IS HUNG
ERRHRD 052,WCSMEM,MSG12 ;TELL MICROTEST HUNG

TRAP CSERHRD
.WORD 52
.WORD WCSMEM
.WORD MSG12

```


65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 148
TEST 14: INTERRUPT VECTOR TEST

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031424'
031424'

031424'
031424' 104404
031426'
031426' 013746 000272'
031432' 012746 022044'
031436' 013746 000270'
031442' 012746 000003
031446' 104437
031450' 062706 000010
031454' 005037 000672'
031460' 012777 000100 146650
031466' 012777 000106 146642
031474' 012737 000176 000332'
031502' 004737 017316'
031506' 103020

031510' 012737 001000' 000310'
031516' 012737 001277' 000312'
031524' 012737 001342' 000314'
031532' 012737 001405' 000316'
031540'
031540' 104456
031542' 000067
031544' 002121'
031546' 012716'

.SBTTL TEST 14: INTERRUPT VECTOR TEST

: THIS TEST WILL VERIFY THAT THE INTERRUPT INTERFACE LOGIC OF THE DEUNA
: IS CAPABLE OF GENERATING AN INTERRUPT VECTOR AND ARBITRATING FOR CONTROL
: OF THE UNIBUS.
: THE DEUNA INTERRUPT ENABLE BIT WILL BE SET AND AN INTERRUPT WILL BE
: CAUSED BY ISSUING A NOP PORT COMMAND. AN INTERRUPT IS EXPECTED AT THE
: CORRECT VECTOR AND AT THE CORRECT PRIORITY.

: TEST SEQUENCE:
: 1-SETUP INTERRUPT VECTOR
: 2-CLEAR INTERRUPT FLAG
: 3-SET INTERRUPT ENABLE IN PCSRO
: 4-ISSUE NOP PORT COMMAND
: 5-WAIT FOR DNI SET IN PCSRO
: 6-VERIFY INTERRUPT FLAG SET
: 7-VERIFY INTERRUPT AT CORRECT PRIORITY
: 8-RELEASE INTERRUPT VECTOR
: 9-CLEAR INTERRUPT ENABLE IN PCSRO
: 10-WRITE DNI TO CLEAR

BGNTST

T14::

: SETUP INTERRUPT VECTOR, CLEAR INTERRUPT FLAG, SET INTERRUPT ENABLE,
: ISSUE NOP PORT COMMAND AND WAIT FOR 'DNI'

BGNSEG

SETVEC UNAVEC, #UNASRV, UNAPRI ; SETUP DEUNA INTERRUPT VECTOR TRAP CSBSEG
MOV UNAPRI, -(SP)
MOV #UNASRV, -(SP)
MOV UNAVEC, -(SP)
MOV #3, -(SP)
TRAP CSSVEC
ADD #10, SP

CLR UNAINTR ; CLEAR UNA INTERRUPTED FLAG
MOV #IE, @PCSRO ; SET INTERRUPT ENABLE
MOV #IE!PNOP, @PCSRO ; ISSUE NOP PORT COMMAND
MOV #2*SECOND, METER ; SETUP TIMER
JSR PC, CHKDNI ; GO WAIT FOR DNI
BCC 10\$; OK
MOV #SDNI, BITNAM ; ERROR DNI NOT SET!
MOV #SNSET, BITSTA ; SETUP ERROR MESSAGE
MOV #SAFTER, PUHEN
MOV #SNOP, PCONDD
ERRHRD 055, INTVEC, MSG1 ; PRINT ERROR MESSAGE TRAP CSERHRD
WORD 55
WORD INTVEC
WORD MSG1

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 149
CZUAAB.MAC 07-APR-83 17:03 TEST 14: INTERRUPT VECTOR TEST

```

6994 031550'
6995 031550'
6996 031550'
6997 031550' 104405
6998
6999
7000
7001 031552'
7002 031552' 104404
7003 031554' 012701 000006
7004
7005 031560' 010102
7006 031562' 072227 000005
7007 031566'
7008 031566' 010200
7009 031570' 104441
7010 031572' 000240
7011 031574' 005301
7012 031576' 100370
7013
7014 031600' 005737 000672'
7015 031604' 001006
7016
7017 031606'
7018 031606' 104456
7019 031610' 000070
7020 031612' 002121'
7021 031614' 013262'
7022 031616'
7023 031616' 104410
7024 031620' 000072
7025 031622'
7026 031622' 013701 000272'
7027 031626' 072127 177773
7028 031632' 005301
7029 031634' 072127 000005
7030 031640' 020137 000676'
7031 031644' 001404
7032
7033 031646'
7034 031646' 104456
7035 031650' 000071
7036 031652' 002121'
7037 031654' 013310'
7038 031656'
7039 031656'
7040 031656'
7041 031656' 104405
7042 031660'
7043 031660' 013700 000270'
7044 031664' 104436
7045 031666' 012777 000000 146442
7046 031674' 004737 017362'
7047 031700' 103004
7048 031702'
7049 031702' 104456

```

```

10$:
ENDSEG
10000$: TRAP C$ESEG
:
:VERIFY THAT INTERRUPT OCCURRED AT CORRECT PRIORITY
:
BGNSEG
:
:START CPU PRIORITY LOWERING
:FROM PRIORITY 7
:GET INTEGER PRIORITY
:PUT PRIORITY IN CORRECT POSITION
:SET NEW PRIORITY
20$: MOV #6,R1
MOV R1,R2
ASH #5,R2
SETPRI R2
MOV R2,R0
TRAP C$SPRI
:LET INTERRUPT OCCUR HERE IF PENDING
:LOWER PRIORITY
:IF DONE FROM 6-->0 THEN DONE
TST UNAIN
BNE 30$
ERRHRD 056,INTVEC,MSG7
TRAP C$ERRHD
WORD 56
WORD INTVEC
WORD MSG7
ESCAPE TST
:LEAVE TEST
TRAP C$ESCAPE
WORD L10130-.
30$: MOV UNAPRI,R1
ASH #-5,R1
DEC R1
ASH #5,R1
CMP R1,CPUPRI
BEQ 40$
ERRHRD 057,INTVEC,MSG8 ;PRINT ERROR MESSAGE
TRAP C$ERRHD
WORD 57
WORD INTVEC
WORD MSG8
40$:
ENDSEG
10001$: TRAP C$ESEG
CL$VEC UNAVEC
:RELEASE INTERRUPT VECTOR
MOV UNAVEC,R0
TRAP C$CVEC
MOV #0,@PCSR0
JSR PC,CLRDMI
BCC 50$
ERRHRD 058,INTVEC,RACMG7
:ERROR! DNI DID NOT CLEAR
TRAP C$ERRHD

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 150
CZUAAB.MAC 07-APR-83 17:03 TEST 14: INTERRUPT VECTOR TEST

7050 031704' 000072
7051 031706' 002121'
7052 031710' 012670'
7053 031712'
7054 031712'
7055 031712'
7056 031712' 104401

SOS:
ENDTST

.WORD 58
.WORD INTVEC
.WORD RACMG7

L10130:
TRAP CSETST

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 151
TEST 15: PCSRO INTERRUPT BIT TEST

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7111
7112

.SBTTL TEST 15: PCSRO INTERRUPT BIT TEST

```

:*****
:THIS TEST WILL VERIFY THAT EACH OF THE INTERRUPT BITS IN REGISTER PCSRO
:CAN CAUSE AN INTERRUPT.
:
: EACH OF THE INTERRUPTS OF REGISTER PCSRO IS SET UNDER THE CONTROL OF THE
:T11 AND NOT DIRECTLY BY HARDWARE. THE T11 THEREFORE CAN INITIATE UNIBUS
: INTERRUPTS BY SETTING BITS IN REGISTER PCSRO.
:
: THIS TEST USES MICROMODULE C, MICROTEST #1.
: MICROCODE MODULE C IS LOADED IF NOT ALREADY DONE SO BY A PREVIOUS TEST.
:
: THE DEUNA INTERRUPT VECTOR IS SETUP TO STORE THE CONTENTS OF PCSRO WHEN THE
: INTERRUPT OCCURS. PCBB+0 IS LOADED WITH THE INTERRUPT BIT THAT IS TO BE TESTED
: THEN PCSRO COMMAND BITS ARE LOADED WITH A 1 TO TELL THE T11 TO EXECUTE
: MICROTEST #1. WE WAIT FOR THE INTERRUPT TO OCCUR THEN SEE IF THE CONTENTS
: OF PCSRO AT THE TIME OF THE INTERRUPT CONTAINED THE CORRECT INTERRUPT BIT.
: THE TEST IS REPEATED FOR ALL THE INTERRUPT BITS.
:
: TEST SEQUENCE:
: 1-LOAD MICROMODULE C INTO THE TOP HALF OF WCS IF NOT ALREADY DONE SO
: 2-SETUP DEUNA INTERRUPT VECTOR
: 3-WAIT FOR THE MICROMONITOR TO BECOME ACTIVE
: 4-SET A BIT IN PCBB+0 THAT CORRESPONDS TO THE INTERRUPT BIT TO TEST
: 5-SET INTERRUPT ENABLE
: 6-TELL MICROMONITOR TO EXECUTE MICROTEST #1
: 7-VERIFY INTERRUPT OCCURRED
: 8-VERIFY CORRECT BIT CAUSED INTERRUPT
: 9-WRITE ONE TO CLEAR INTERRUPT BIT
: 10-REPEAT STEPS 3-9 FOR ALL THE INTERRUPT BITS
:*****

```

031714'
031714'

BGNTST

T15::

```

:CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
:

```

BGNSEG

031714' 104404
031714' 022737
031724' 001004
031726' 122777
031734' 001440
031736' 012737
031744' 004737
031750' 103002
031752' 104410
031754' 000444
031756' 012737
031764' 004737

000103 000326'
000001 146404
000103 000326'
020340'
000176 000332'
017316'

```

CMP #'C,MICRO
BNE 58
CMPB #INNON,DPCSR1
BEQ 20$
MOV #'C,MICRO
JSR PC,LODMIC
BCC 10$
ESCAPE TST
MOV #2*SECOND,METER
JSR PC,CHKDNI

```

```

;HAS MICROCODE MODULE C BEEN LOADED?
;NO
;YES, IS THE MICROMONITOR ACTIVE?
;YES SKIP LOADING THE MICROMODULE
;SETUP TO LOAD MODULE C
;GO LOAD MICROMODULE C
;SUCCESS
;ERROR OCCURRED LEAVE
TRAP CSBSEG
WORD L10131-.
TRAP CSESCAPE
;PUT SOME TIME ON THE METER
;GO WAIT FOR DNI TO SET AFTER THE

```

6SHARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 152
ZUAAB.MAC 07-APR-83 17:03 TEST 15: PCSRO INTERRUPT BIT TEST

```

7113                                     ;LOAD AND START FUNCTION
7114 031770' 103022                       BCC      20$      ;OK
7115 031772' 012737 001000' 000310'      MOV      #SDNI,BITNAM ;SETUP ERROR MESSAGE
7116 032000' 012737 001277' 000312'      MOV      #SNSET,BITSTA
7117 032006' 012737 001342' 000314'      MOV      #SAFTER,PWHEN
7118 032014' 012737 001357' 000316'      MOV      #SGTCMD,PCOMND
7119 032022'                                     ERRHRD  059,INTBIT,MSG1 ;PRINT ERROR MESSAGE
7120 032022' 104456                       TRAP    CSERHRD
7121 032024' 000073                       .WORD  59
7122 032026' 002156'                       .WORD  INTBIT
7123 032030' 012716'                       .WORD  MSG1
7124 032032'                                     ESCAPE TST
7125 032032' 104410                       TRAP    CGESCAPE
7126 032034' 000364                       .WORD  L10131-.
7127 032036' 004737 017362' 20$:         JSR      PC,CLRDMI ;CLEAR DNI
7128 032042' 103006                       BCC      25$
7129 032044'                                     ERRHRD  060,INTBIT,RACMG7 ;ERROR! DNI DID NOT CLEAR
7130 032044' 104456                       TRAP    CSERHRD
7131 032046' 000074                       .WORD  60
7132 032050' 002156'                       .WORD  INTBIT
7133 032052' 012670'                       .WORD  RACMG7
7134 032054'                                     ESCAPE TST
7135 032054' 104410                       TRAP    CGESCAPE
7136 032056' 000342                       .WORD  L10131-.
7137 032060' 25$:         SETVEC  UNAVEC,#UNASRV,UNAPRI ;SETUP DEUNA INTERRUPT VECTOR
7138 032060' 013746 000272'               MOV      UNAPRI,-(SP)
7139 032064' 012746 022044'               MOV      #UNASRV,-(SP)
7140 032070' 013746 000270'               MOV      UNAVEC,-(SP)
7141 032074' 012746 000003               MOV      #3,-(SP)
7142 032100' 104437                       TRAP    CSSVEC
7143 032102' 062706 000010               ADD      #10,SP
7144 032106'                                     ENDSEG
7145 032106'                                     10000$: TRAP    CSESEG
7146 032106' 104405
7147
7148 ;THE FOLLOWING LOOP WILL BE EXECUTED 6 TIMES- ONCE FOR EACH BIT 10 THRU 15
7149 ;OF PCSRO. IT WAITS FOR THE MICROMONITOR TO BECOME ACTIVE THEN CALLS
7150 ;MICROTEST #1 TO SET A BIT IN PCSRO AS DEFINED BY THE PARAMETER IN PCBB+0.
7151 ;THIS OPERATION SHOULD CAUSE AN INTERRUPT WHICH WILL BE REFLECTED BY THE
7152 ;VARIABLE 'UNAIINT' WHICH IS SET BY THE UNA INTERRUPT SERVICE ROUTINE. UNAIINT
7153 ;IS LOADED WITH THE VALUE OF PCSRO AT THE TIME OF THE INTERRUPT. THIS WAY
7154 ;THE BIT THAT CAUSED THE INTERRUPT CAN BE CHECKED.
7155 ;
7156 032110' 005037 000304'               CLR      CSRMUR      ;CHECKING PCSRO
7157 032114' 012737 001277' 000312'      MOV      #SNSET,BITSTA ;CHECKING FOR SET BITS
7158 032122' 012701 002000               MOV      #BIT10,R1   ;START WITH BIT 10
7159 032126' 012737 000012 000306'      MOV      #10.,BITNUM
7160 032134' 26$:         BGNSEG
7161 032134'                                     TRAP    CSBSEG
7162 032134' 104404
7163 032136' 004737 020060'               JSR      PC,CHKMON   ;WAIT FOR MICROMONITOR
7164 032142' 103006                       BCC      30$        ;OK
7165 032144'                                     ERRHRD  061,INTBIT,MSG46 ;PRINT ERROR
7166 032144' 104456                       TRAP    CSERHRD
7167 032146' 000075                       .WORD  61
7168 032150' 002156'                       .WORD  INTBIT

```

6SHARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 153
 CZUAAB.MAC 07-APR-83 17:03 TEST 15: PCSRO INTERRUPT BIT TEST

```

7169 032152' 016666'
7170 032154'          ESCAPE TST          :LEAVE TEST          .WORD MSG46
7171 032154' 104410          TRAP CSESCAPE
7172 032156' 000242          .WORD L10131-
7173 032160' 005037 000672' 30$: CLR UNAINI          ;CLEAR UNA INTERRUPTED FLAG
7174 032164' 010137 000606' MOV R1,PCBB+0          ;TELL MICROMONITOR WHICH BIT TO SET
7175 032170' 012737 000077 000332' MOV #1*SECOND,METER          ;PUT SOME TIME ON THE METER
7176 032176' 012777 000100 146132 MOV #IE,APCSRO          ;SET INTERRUPT ENABLE AND...
7177          ;CLEAR SEL TEST BITS IN PCSRI
7178 032204' 012777 000101 146124 MOV #IE!1,APCSRO          ;INVOKC INTERRUPT BIT MICROTEST
7179 032212' 004737 017264' JSR PC,TIMON          ;TURN ON THE TIMER
7180 032216'          SETPRI #PRI04          ;LOWER PRIORITY TO ALLOW UNA INTERRUPT
7181 032216' 012700 000200          MOV #PRI04,RO
7182 032222' 104441          TRAP CSSPRI
7183 032224' 005737 000672' 35$: TST UNAINI          ;HAS INTERRUPT OCCURRED YET?
7184 032230' 001022          BNE 40$          ;YES
7185 032232' 005737 000332' TST METER          ;NO, HAS METER EXPIRED?
7186 032236' 001372          BNE 35$          ;NOT YET
7187 032240' 004737 017302' JSR PC,TIMOFF          ;TIMER HAS EXPIRED, SHUT IT OFF
7188          ;ERROR, NO UNA INTERRUPT!
7189 032244' 013703 000306' MOV BITNUM,R3          ;GET WHICH BIT
7190 032250' 006303          ASL R3          ;MAKE IT A BYTE OFFSET
7191 032252' 012737 000360' 000310' MOV #BNAMTO,BITNAM          ;POINT TO TABLE OF BIT MNEMONICS
7192 032260' 060337 000310' ADD R3,BITNAM          ;INDEX INTO TABLE OF BIT MNEMONICS
7193 032264'          ERRHRD 062,INTBIT,MSG9          ;PRINT ERROR MESSAGE
7194 032264' 104456          TRAP CSERHRD
7195 032266' 000076          .WORD 62
7196 032270' 002156'          .WORD INTBIT
7197 032272' 013332'          .WORD MSG9
7198 032274' 000402
7199 032276' 004737 017302' 40$: JSR PC,TIMOFF          ;INTERRUPT OCCURRED, SHUT OFF THE TIMER
7200 032302' 013703 000672' 45$: MOV UNAINI,R3          ;GET SAVED PCSRO CONTENTS
7201 032306' 042703 000377 BIC #377,R3          ;CLEAR UNWANTED BITS
7202 032312' 020103          CMP R1,R3          ;DID CORRECT BIT CAUSE INTERRUPT?
7203 032314' 001404          BEQ 50$          ;YES, OK
7204          ;ERROR, INCORRECT BIT CAUSED INTERRUPT!
7205          ;PRINT ERROR MESSAGE
7205 032316'          ERRHRD 063,INTBIT,RACMG2
7206 032316' 104456          TRAP CSERHRD
7207 032320' 000077          .WORD 63
7208 032322' 002156'          .WORD INTBIT
7209 032324' 012526'          .WORD RACMG2
7210 032326'
7211 032326'          50$:
7212 032326'          ENDSEG
7213 032326' 104405          10001$: TRAP CSESEG
7214
7215          ;NOW WRITE '1' TO CLEAR THE BIT THAT CAUSED THE INTERRUPT
7216          ;
7217          ;BGNSEG
7217 032330'          TRAP CSBSEG
7218 032330' 104404          ;WRITE '1' TO CLEAR INTERRUPT BIT
7219 032332' 010377 146000          MOV R3,APCSRO          ;READ IT BACK
7220 032336' 017704 145774          MOV APCSRO,R4          ;IS BIT CLEARED?
7221 032342' 030403          BIT R4,R3
7222 032344' 001420          BEQ 55$          ;YES
7223          ;ERROR, BIT DID NOT CLEAR!
7224 032346' 012705 000017          MOV #15.,R5
    
```

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 154
CZUAAB.MAC 07-APR-83 17:03 TEST 15: PCSR0 INTERRUPT BIT TEST

```

7225 032352' 006303      528:  ASL      R3      :IS THIS THE BIT WE SET?
7226 032354' 103402      BCS      538      :YES
7227 032356' 005305      DEC      R5      :NO
7228 032360' 000774      BR       528
7229 032362' 006305      538:  ASL      R5      :MAKE IT A BYTE OFFSET
7230 032364' 012737 000360' 000310'  MOV      #BNAMTO,BITNAM :GET POINTER TO BIT NAME MNEMONICS
7231 032372' 060537 000310'  ADD      R5,BITNAM  :INDEX INTO BIT NAME TABLE
7232 032376'           ERRHRD 064,INTBIT,MSG33 :PRINT ERROR MESSAGE
7233 032376' 104456      TRAP      CSEHRD
7234 032400' 000100      .WORD    64
7235 032402' 002156'      .WORD    INTBIT
7236 032404' 015574'      .WORD    MSG33
7237 032406'           558:
7238 032406'           ENDSEG
7239 032406'           100028:
7240 032406' 104405      TRAP      CSESEG
7241 032410' 005237 000306'      INC      BITNUM
7242 032414' 006301      ASL      R1
7243 032416' 103246      BCC      268
7244           :SETUP FOR NEXT BIT
7245           :POINT TO NEXT HIGHER BIT
7246           :IF BIT 15 NOT DONE YET GO ON
7247           :ELSE ALL DONE
           ENDTST
           L10131:
           TRAP      CSETST

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 155
CZUAAB.MAC 07-APR-83 17:03 TEST 16: TIMER TEST

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7300
7301
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7303

032422'
032422'

032422'

104404
022737
001004
122777
001440
012737
004737
103002
104410
000254
012737
004737
103022
012737
001000'
001277'
001342'
001357'
104456
000101
002216'

000103 000326'
000001 145676
000103 000326' 58:
020340'
000176 000332' 108:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

.SBTTL TEST 16: TIMER TEST

.....
: THIS TEST WILL USE THE CUSTOM MICROCODE MODULE 'C' TO CHECK THE OPERATION
: OF THE TIMER.
: THE TIMER IS ACCESSIBLE ONLY TO THE T11 PROCESSOR. THE HOST PROCESSOR
: CAN START THE TIMER ONLY WITH THE ASSISTANCE OF THE T11 PROCESSOR.
:
: FOR THIS TEST THE MICROCODE WILL BE LOADED ONLY IF IT HAS NOT ALREADY
: BEEN DONE BY A PREVIOUS TEST.
:
: WHEN THE MICROCODE IS STARTED THE T11 WILL START THE TIMER AND WILL
: SET 'DNI' WHEN THE TIMING INTERVAL HAS EXPIRED. THE INTERVAL IS 10 SECONDS.
:
: ANY TIME FROM 8 TO 12 SECONDS IS AN ACCEPTABLE RANGE.
:
: TEST SEQUENCE:
: 1-LOAD MICROCODE MODULE 'C' IF NOT ALREADY DONE SO
: 2-START MICROCODE
: 3-START TIMER
: 4-WAIT FOR 'DNI'
: 5-CHECK TIME INTERVAL
:.....

BGNTST

T16::

: CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
:

BGNSEG

TRAP CSBSEG
; HAS MICROCODE MODULE C BEEN LOADED?
: NO
: YES, IS THE MICROMONITOR ACTIVE?
: YES SKIP LOADING THE MICROMODULE
: NO
: GO LOAD MICROCODE MODULE C
: OK
: ERROR OCCURRED LOADING MICROCODE
TRAP CSBSEG
.WORD L10132-
: WAIT FOR MICROMONITOR TO TAKE OVER
NOV #2*SECOND,METER
JSR PC,CHKDNI
BCC 208
NOV #SDNI,BITNAM
NOV #SNSET,BITSTA
NOV #SAFTER,PWEN
NOV #SGTCMD,PCORND
ERRHRD 065,YINTST,MSG1
TRAP CSERHRD
.WORD 65
.WORD TIMTST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 156
 CZUAAB.MAC 07-APR-83 17:03 TEST 16: TIMER TEST

```

7304 032536' 012716' .WORD MSG1
7305 032540' ESCAPE TST
7306 032540' 104410 TRAP CSESCAPE
7307 032542' 000174 .WORD L10132-.
7308 032544' 004737 017362' 208: JSR PC,LLRDNI ;CLEAR DNI
7309 032550' 103006 BCC 258
7310 032552' ERRHRD 066,TIMTST,RACMG7 ;ERROR DNI DID NOT CLEAR!
7311 032552' 104456 TRAP CSEHRD
7312 032554' 000102 .WORD 66
7313 032556' 002216' .WORD TIMTST
7314 032560' 012670' .WORD RACMG7
7315 032562' ESCAPE TST
7316 032562' 104410 TRAP CSESCAPE
7317 032564' 000152 .WORD L10132-.
7318 032566' 258:
7319 032566' ENDSEG
7320 032566' 100008:
7321 032566' 104405 TRAP CSESEG
7322
7323 ;WAIT FOR THE MICROCODE TO ENTER THE MICROMONITOR, SETUP OUR TIMEOUT TO BE
7324 ;12 SECONDS (THIS GIVES A BETTER RESOLUTION THAN 1 SECOND), START THE MICROTEST
7325 ;BY LOADING THE COMMAND FIELD OF PCSRD WITH THE MICROTEST # TO EXECUTE.
7326 ;CHECK FOR 'DNI' TO BE SET IN LESS THAN 12 SECONDS.
7327
7328 ; BGNSEG
7329 032570' TRAP C8BSEG
7330 032572' 104404 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
7331 032576' 103006 BCC 308 ;OK
7332 032600' ERRHRD 068,TIMTST,MSG46 ;PRINT ERROR
7333 032600' 104456 TRAP CSEHRD
7334 032602' 000104 .WORD 68
7335 032604' 002216' .WORD TIMTST
7336 032606' 016666' .WORD MSG46
7337 032610' ESCAPE TST ;LEAVE TEST
7338 032610' 104410 TRAP CSESCAPE
7339 032612' 000124 .WORD L10132-.
7340 032614' 012737 001356 000332' 308: MOV #750.,METER ;TIMEOUT = 12 SECONDS
7341 032622' 012777 000002 145506 MOV #2,BPCSRD ;START MICROTEST #2
7342 032630' 004737 017316' JSR PC,CHKDNI ;WAIT FOR DNI
7343 032634' 103006 BCC 408 ;OK IT FINISHED IN TIME
7344 032636' ERRHRD 069,TIMTST,MSG10 ;NO TIMER INTERRUPT
7345 032636' 104456 TRAP CSEHRD
7346 032640' 000105 .WORD 69
7347 032642' 002216' .WORD TIMTST
7348 032644' 013360' .WORD MSG10
7349 032646' ESCAPE TST
7350 032646' 104410 TRAP CSESCAPE
7351 032650' 000066 .WORD L10132-.
7352
7353 ;OK THE TIMER INTERRUPTED IN LESS THAN 12 SECONDS, SO NOW CHECK TO SEE IF IT
7354 ;HAPPENED IN LESS THAN 8.
7355
7356 032652' 023727 000332' 000764 408: CMP METER,#500. ;DID INTERRUPT OCCUR BEFORE 8 SECS.?
7357 032660' 003416 BLE 608 ;NO, OK
7358 032662' 012700 001161 MOV #625.,R0 ;CALC HOW MUCH TIME
7359 032666' 163700 000332' SUB METER,R0
    
```


65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 157
CZUAAB.MAC 07-APR-83 17:03 TEST 16: TIMER TEST

7360	032672'	005001							
7361	032674'	162700	000077	50S:	CLR R1			:CONTAINS SECS	
7362	032700'	103402			SUB #63.,R0			:FIND OUT HOW MAY SECS IT TOOK	
7363	032702'	005201			BCC 558				
7364	032704'	000773			INC R1				
7365	032706'			55S:	BR 508			:PRINT ERROR MESSAGE	
7366	032706'	104456			ERRHRD 070,TIMTST,MSG11				TRAP CSERHRD
7367	032710'	000106							.WORD 70
7368	032712'	002216'							.WORD TIMTST
7369	032714'	013402'							.WORD MSG11
7370	032716'	004737	017362'	60S:	JSR PC,CLRDNI			:CLEAR DNI	
7371	032722'	103004			BCC 708				
7372	032724'				ERRHRD 071,TIMTST,RACMG7			:ERROR DNI DID NOT CLEAR	
7373	032724'	104456							TRAP CSERHRD
7374	032726'	000107							.WORD 71
7375	032730'	002216'							.WORD TIMTST
7376	032732'	012670'							.WORD RACMG7
7377	032734'			70S:					
7378	032734'				ENDSEG				
7379	032734'							10001S:	
7380	032734'	104405						TRAP	CSESEG
7381	032736'			ENDTST					
7382	032736'							L10132:	
7383	032736'	104401						TRAP	CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 158
 CZUAAB.MAC 07-APR-83 17:03 TEST 17: LINK MEMORY TEST

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.SBTTL TEST 17: LINK MEMORY TEST

```

:*****
:THIS TEST WILL EXHAUSTIVELY TEST THE LINK MEMORY.
:THE LINK MEMORY OCCUPIES THE 16-32K ADDRESS SPACE OF THE T-11.
:CUSTOM MICROCODE MODULE C MICROTST #3 IS USED TO DO THE ACTUAL TESTING.
:MICROTST #3 RUNS A SERIES OF MICROSUBTESTS TESTS ON THE LINK MEMORY CHECKING
:FOR BOTH ADDRESS AND DATA ERRORS. IF AN ERROR DOES OCCUR THE PORT CONTROL
:BLOCK WILL CONTAIN THE INFORMATION ABOUT THE ERROR.
:PCBB+0: CONTAINS THE MICROSUBTEST THAT FAILED
:PCBB+1: 0 = DATA ERROR, 1 = ADDRESS ERROR,
:PCBB+2: CONTAINS THE ADDRESS OF THE LOCATION
:PCBB+4: CONTAINS THE DATA THAT WAS WRITTEN
:PCBB+6: CONTAINS THE DATA THAT WAS READ
  
```

MICROSUBTEST #	DESCRIPTION
1	ACCESS TEST
2	ADDRESS SHIFT TEST
3	DATA LATCH TEST
4	ADDRESS BIT SHIFT #1
5	ADDRESS BIT SHIFT #2
6	MARCH TEST

```

:TEST SEQUENCE:
:1-LOAD MICROMODULE 'C' INTO THE TOP HALF OF WCS IF NOT ALREADY DONE SO
:2-WAIT FOR THE MICROMONITOR TO BECOME ACTIVE
:3-TELL MICROMONITOR TO EXECUTE MICROTST #3
:4-VERIFY DNI SET INDICATING TEST COMPLETE
:5-CHECK STATE FIELD OF PCSR1 FOR ERROR CONDITION
  
```

BGNTST T17::

```

:CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
  
```

BGNSEG

Address	Label	Op	Op2	Op3	Op4	Op5	Op6	Op7	Op8	Op9	Op10
032740											
032740	104404										TRAP CSBSEG
032742	022737	000103	000326		CMP	#'C,MICRO					:HAS MICROCODE MODULE 'C' BEEN LOADED?
032750	001004				BNE	58					:NO
032752	122777	000001	145360		CMPS	#INMON,#PCSR1					:YES, IS THE MICROMONITOR ACTIVE?
032760	001440				BEQ	208					:YES SKIP LOADING THE MICROMODULE
032762	012737	000103	000326	58:	MOV	#'C,MICRO					:GO LOAD MICROCODE MODULE C
032770	004737	020340			JSR	PC,LODMIC					
032774	103002				BCC	108					:OK
032776					ESCAPE	TST					
032776	104410										TRAP CSBSEG
033000	000404										.WORD L10133-
033002	012737	000176	000332	108:	MOV	#2*SECOND,METER					:WAIT FOR THE MICROMONITOR

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 159
CZUAAB.MAC 07-APR-83 17:03 TEST 17: LINK MEMORY TEST

```

7440 033010' 004737 017316'      JSR      PC,CHKDNI
7441 033014' 103022                BCC      20$           :OK
7442 033016' 012737 001000' 000310'  MOV      #SDNI,BITNAM
7443 033024' 012737 001277' 000312'  MOV      #RSET,BITSTA
7444 033032' 012737 001342' 000314'  MOV      #SA+TER,PWHEN
7445 033040' 012737 001357' 000316'  MOV      #SGTCMD,PCOMND
7446 033046'                ERRHRD   072,LNKMEM,MSG1 ;PRINT ERROR MESSAGE
7447 033046' 104456                TRAP    CSERHRD
7448 033050' 000110                .WORD   72
7449 033052' 002240'                .WORD   LNKMEM
7450 033054' 012716'                .WORD   MSG1
7451 033056'                ESCAPE  TST
7452 033056' 104410                TRAP    CSESCAPE
7453 033060' 000324                .WORD   L10133-.
7454 033062' 004737 017362'      20$:   JSR      PC,CLRDNI           :CLEAR DNI
7455 033066' 103006                BCC      25$
7456 033070'                ERRHRD   073,LNKMEM,RACMG7
7457 033070' 104456                TRAP    CSERHRD
7458 033072' 000111                .WORD   73
7459 033074' 002240'                .WORD   LNKMEM
7460 033076' 012670'                .WORD   RACMG7
7461 033100'                ESCAPE  TST
7462 033100' 104410                TRAP    CSESCAPE
7463 033102' 000302                .WORD   L10133-.
7464 033104'                25$:
7465 033104'                ENDSEG
7466 033104'                10000$:
7467 033104' 104405                TRAP    CSESEG
7468
7469                :
7470                :WAIT FOR THE MICROMONITOR TO ENTER THE 'IN MONITOR' STATE, CLEAR THE
7471                :LOCATIONS FOR ERROR INFORMATION, LOAD COMMAND FIELD OF PCSRO WITH A 3
7472                :CAUSING THE MICROMONITOR TO EXECUTE MICROTEST #3, THIS WILL START THE
7473                :EXECUTION OF THE MICROSUBTEST SEQUENCE OF MEMORY TESTS. DNI WILL SET
7474                :WHEN THE TEST IS COMPLETE
7475                :
7476                : BGNSEG
7477                :
7478                :
7479                :
7480                :
7481                :
7482                :
7483                :
7484                :
7485                :
7486                :
7487                :
7488                :
7489                :
7490                :
7491                :
7492                :
7493                :
7494                :
7495                :
020060'      JSR      PC,CHKMON           :WAIT FOR MICROMONITOR
                BCC      30$           :OK
                ERRHRD   074,LNKMEM,MSG46 :PRINT ERROR
                TRAP    CSERHRD
                .WORD   74
                .WORD   LNKMEM
                .WORD   MSG46
                ESCAPE  TST           :LEAVE TEST
                TRAP    CSESCAPE
                .WORD   L10133-.
000606' 145202 30$:   MOV      #PCBB,@PCSR2           :TELL MICROCODE TEST WHERE PCBB IS
                CLR      @PCSR3
                CLR      PCBB+0           :CLEAR OUT THE PCBB
                CLR      PCBB+2
                CLR      PCBB+4
                CLR      PCBB+6
                MOV      #3,@PCSR0
                TRAP    CSERHRD
                .WORD   74
                .WORD   LNKMEM
                .WORD   MSG46
                ESCAPE  TST           :LEAVE TEST
                TRAP    CSESCAPE
                .WORD   L10133-.
000770 000332'      MOV      #10*SECOND,METER           :TELL MICROMONITOR TO EXECUTE...
                TRAP    CSERHRD
                .WORD   74
                .WORD   LNKMEM
                .WORD   MSG46
                ESCAPE  TST           :LEAVE TEST
                TRAP    CSESCAPE
                .WORD   L10133-.

```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 160
CZUAAB.MAC 07-APR-83 17:03 TEST 17: LINK MEMORY TEST

```

7496 033200' 004737 017316' JSR PC,CHKDNI ;WAIT FOR MICROTEST TO FINISH
7497 033204' 103021 BCC 40$ ;OK, IT FINISHED
7498 033206' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
7499 033212' 103006 BCC 35$ ;NO, OK
7500 033214' ERRHRD 075,LNKMEM,MSG44 ;PRINT ERROR MESSAGE
7501 033214' 104456 TRAP CSERHRD
7502 033216' 000113 .WORD 75
7503 033220' 002240' .WORD LNKMEM
7504 033222' 016442' .WORD MSG44
7505 033224' ESCAPE TST ;LEAVE TEST
7506 033224' 104410 TRAP CSERHRD
7507 033226' 000156 .WORD L10133-
7508 033230' 012702 000003 35$: MOV #3,R2 ;MICROTEST #
7509 033234' ERRHRD 076,LNKMEM,MSG12 ;TELL MICROTEST HUNG
7510 033234' 104456 TRAP CSERHRD
7511 033236' 000114 .WORD 76
7512 033240' 002240' .WORD LNKMEM
7513 033242' 013466' .WORD MSG12
7514 033244' ESCAPE TST
7515 033244' 104410 TRAP CSERHRD
7516 033246' 000136 .WORD L10133-
7517 ;
7518 ;MICROTEST IS COMPLETE, NOW CHECK FOR AN ERROR CONDITION
7519 ;
7520 033250' 122777 000003 145062 40$: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
7521 033256' 001027 BNE 47$ ;NO
7522 033260' 122737 000000 000607' CMPB #DATERR,PCBB+1 ;YES, WAS IT A DATA ERROR?
7523 033266' 001003 BNE 45$ ;NO
7524 033270' 012702 001446' MOV #SDATER,R2 ;YES, POINT TO DATA ERROR STRING
7525 033274' 000406 BR 46$
7526 033276' 122737 000001 000607' 45$: CMPB #ADRERR,PCBB+1 ;WAS IT AN ADDRESS ERROR
7527 033304' 001014 BNE 47$ ;NO
7528 033306' 012702 001461' MOV #SADRER,R2 ;POINT TO ADDRESS ERROR STRING
7529 033312' 013701 000610' 46$: MOV PCBB+2,R1 ;GET FAILING ADDRESS
7530 033316' 013703 000612' MOV PCBB+4,R3 ;GET GOOD DATA
7531 033322' 013704 000614' MOV PCBB+6,R4 ;GET BAD DATA
7532 033326' ERRHRD 077,LNKMEM,MSG16 ;PRINT ERROR MESSAGE
7533 033326' 104456 TRAP CSERHRD
7534 033330' 000115 .WORD 77
7535 033332' 002240' .WORD LNKMEM
7536 033334' 013636' .WORD MSG16
7537 033336' 032777 010000 144772 47$: BIT #PARERR,@PCSR0 ;DID A PARITY ERROR OCCUR?
7538 033344' 001407 BEQ 50$ ;NO
7539 033346' ERRHRD 078,LNKMEM,MSG43 ;YES PRINT ERROR
7540 033346' 104456 TRAP CSERHRD
7541 033350' 000116 .WORD 78
7542 033352' 002240' .WORD LNKMEM
7543 033354' 016420' .WORD MSG43
7544 033356' 012777 010000 144752 MOV #PARERR,@PCSR0 ;CLEAR PARITY ERROR FLAG
7545 ;
7546 ;WRITE ONE TO CLEAR THE DNI BIT
7547 ;
7548 ;
7549 033364' 004737 017362' 50$: JSR PC,CLRDN1 ;CLEAR DNI
7550 033370' 103004 BCC 55$
7551 033372' ERRHRD 079,LNKMEM,RACMG7

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 161
CZUAAB.MAC 07-APR-83 17:03 TEST 17: LINK MEMORY TEST

7552 033372' 104456
7553 033374' 000117
7554 033376' 002240'
7555 033400' 012670'
7556 033402'
7557 033402'
7558 033402'
7559 033402' 104405
7560 033404'
7561 033404'
7562 033404' 104401
7563

558:
ENDSEG

ENDTST

TRAP CSERHRD
.WORD 79
.WORD LNKMEM
.WORD RACMG7

100018: TRAP CSESEG

L10133: TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 162
CZUAAB.MAC 07-APR-83 17:03 TEST 18: DMA 'TO' ADDRESS TEST

.SBTTL TEST 18: DMA 'TO' ADDRESS TEST

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033406'
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033406'
033406' 104404
033410' 022737
033416' 001004
033420' 122777
033426' 001440
033430' 012737
033436' 004737
033442' 103002
033444'
033444' 104410
033446' 000314
033450' 012737
033456' 004737
033462' 103022
033464' 012737
033472' 012737
033500' 012737
033506' 012737
033514'
033514' 104456
033516' 000120
033520' 002270'
033522' 012716'
033524'
033524' 104410
033526' 000234
033530' 004737

: THIS TEST WILL VERIFY THAT THE INTERNAL REGISTER 'DMATO' CAN BE READ
: AND WRITTEN. THE T11 WILL BE USED TO WRITE AND READ THIS REGISTER.
: THIS TEST REQUIRES THE USE OF CUSTOM MICROCODE MODULE C MICROTEST #4.
: PCBB+0 WILL BE WRITTEN WITH THE DATA PATTERN TO TEST, THE T11 WILL
: WRITE THIS PATTERN TO THE 'DMATO' REGISTER AND READ IT BACK AND PUT
: THE DATA READ INTO PCBB+2. THE DATA AT PCBB+2 WILL BE VERIFIED.
: TEST SEQUENCE:
: 1-LOAD MICROCODE MODULE 'C' IF NOT ALREADY DONE SO
: 2-LOAD PCBB+0 WITH DATA PATTERN
: 3-START MICROCODE
: 4-WAIT FOR 'DNI'
: 5-VERIFY PCBB+2 FOR CORRECT PATTERN
: 6-REPEAT STEPS 2-6 FOR ALL DATA PATTERNS

BGNTST

T18::

: CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
;HAS MICROCODE MODULE 'C' BEEN LOADED?
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:NO
:GO LOAD MICROCODE MODULE C
:OK

TRAP C\$ESCAPE
.WORD L10134-

:WAIT FOR MICROMONITOR TO TAKE OVER
:OK

TRAP CSERHRD
.WORD 80
.WORD DMATO
.WORD MSG1

TRAP C\$ESCAPE
.WORD L10134-

:CLEAR DNI

000103 000326'
000001 144712
000103 000326' 5\$:
020340'

000176 000332' 10\$:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

017362' 20\$:

CMP #'C,MICRO
BNE 5\$
CMPB #INMON,@PCSR1
BEQ 20\$
MOV #'C,MICRO
JSR PC,LODMIC
BCC 10\$
ESCAPE TST

MOV #2*SECOND,METER
JSR PC,CHKDNI
BCC 20\$
MOV #SDNI,BITNAM
MOV #SNSET,BITSTA
MOV #SAFTER,PWHEN
MOV #SGTCMD,PCOMND
ERRHRD 080,DMATO,MSG1

JSR PC,CLRDN1

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 163
 CZUAAB.MAC 07-APR-83 17:03 TEST 18: DMA 'TO' ADDRESS TEST

7620	033534'	103006		BCC	258				
7621	033536'			ERRHRD	081,DMATO,RACMG7				
7622	033536'	104456					TRAP	C8ERHRD	
7623	033540'	000121					.WORD	81	
7624	033542'	002270'					.WORD	DMATO	
7625	033544'	012670'					.WORD	RACMG7	
7626	033546'			ESCAPE	TST				
7627	033546'	104410					TRAP	C8ESCAPE	
7628	033550'	000212					.WORD	L10134-	
7629	033552'			258:					
7630	033552'			ENDSEG					
7631	033552'						100008:		
7632	033552'	104405					TRAP	C8ESEG	
7633									
7634									
7635									
7636									
7637	033554'	012701	000520'	MOV	#PATERN,R1				
7638	033560'	012705	000005	MOV	#5,R5				
7639	033564'								
7640				308:					
7641									
7642									
7643									
7644									
7645	033564'			BGNSEG					
7646	033564'	104404					TRAP	C8BSEG	
7647	033566'	004737	020060'	JSR	PC,CHKMON				
7648	033572'	103006		BCC	358				
7649	033574'			ERRHRD	082,DMATO,MSG46				
7650	033574'	104456							
7651	033576'	000122					TRAP	C8ERHRD	
7652	033600'	002270'					.WORD	82	
7653	033602'	016666'					.WORD	DMATO	
7654	033604'						.WORD	MSG46	
7655	033604'	104410		ESCAPE	TST				
7656	033606'	000154					TRAP	C8ESCAPE	
7657	033610'	012137	000606'				.WORD	L10134-	
7658	033614'	012777	000004	358:	MOV	(R1)+,PCBB+0			
7659	033622'	012737	000176		MOV	#4,APCSRO			
7660	033630'	004737	017316'		MOV	#2*SECOND,METER			
7661	033634'	103021			JSR	PC,CHKDNI			
7662	033636'	004737	020132'		BCC	408			
7663	033642'	103006			JSR	PC,CHKINT			
7664	033644'				BCC	368			
7665	033644'	104456			ERRHRD	083,DMATO,MSG44			
7666	033646'	000123							
7667	033650'	002270'					TRAP	C8ERHRD	
7668	033652'	016442'					.WORD	83	
7669	033654'						.WORD	DMATO	
7670	033654'	104410					.WORD	MSG44	
7671	033656'	000104		ESCAPE	TST				
7672	033660'	012702	000004				TRAP	C8ESCAPE	
7673	033664'						.WORD	L10134-	
7674	033664'	104456		368:	MOV	#4,R2			
7675	033666'	000124			ERRHRD	084,DMATO,MSG12			

:POINT TO LIST OF DATA PATTERNS TO USE, THERE ARE FIVE ENTRIES IN THE LIST
 :SO THE LOOP WILL BE EXECUTED 5 TIMES ONCE FOR EACH DATA PATTERN.

:GET ADDRESS OF DATA PATTERNS
 :NUMBER OF DATA PATTERNS

:WAIT FOR THE MICROMONITOR TO ENTER THE 'IN MONITOR' STATE, LOAD PCBB+0 WITH
 :A DATA PATTERN, LOAD THE COMMAND FIELD OF PCSRO WITH 4 TO START THE EXECUTION
 :OF MICROTEST #4, DNI SETS WHEN IT IS COMPLETE

:WAIT FOR MICROMONITOR
 :OK
 :PRINT ERROR

:GET A DATA PATTERN
 :START MICROTEST #4
 :PUT SOME TIME ON THE METER
 :WAIT FOR DNI
 :OK
 :SEE IF ANY ERROR INTERRUPTS OCCURRED
 :NO, OK
 :PRINT ERROR MESSAGE

:MICROTEST #
 :TELL MICROTEST HUNG

6SHARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 164
CZUAAB.MAC 07-APR-83 17:03 TEST 18: DMA 'TO' ADDRESS TEST

```

7676 033670' 002270' .WORD DMATO
7677 033672' 013466' .WORD MSG12
7678 033674'          ESCAPE TST
7679 033674' 104410 TRAP CSESLAPE
7680 033676' 000064 .WORD L10134-.
7681
7682 :OK NOW CHECK TO SEE IF DATA READ IS SAME AS THE DATA WRITTEN
7683 :REMEMBER BIT 0 OF DMATO IS NOT USED
7684
7685 033700' 013703 000606' 40$: MOV PCBB+0,R3 ;GET ORIGINAL DATA PATTERN
7686 033704' 042703 000001' BIC #BIT0,R3 ;STRIP LSB
7687 033710' 020337 000610' CMP R3,PCBB+2 ;SEE IF DATA WRITTEN = DATA READ
7688 033714' 001407 BEQ 50$ ;YES
7689 033716' 013704 000610' MOV PCBB+2,R4 ;NO, ERROR
7690 033722' ERRHRD 085,DMATO,MSG13 ;PRINT ERROR
7691 033722' 104456 TRAP CSERHRD
7692 033724' 000125 .WORD 85
7693 033726' 002270' .WORD DMATO
7694 033730' 013512' .WORD MSG13
7695 033732'          ENDSEG
7696 033732'          10001$:
7697 033732' 104405 TRAP CSESEG
7698
7699 :WRITE ONE TO CLEAR DNI BIT
7700
7701 033734' 004737 017362' 50$: JSR PC,CLRDNI ;CLEAR DNI
7702 033740' 103006 BCC 55$
7703 033742' ERRHRD 086,DMATO,RACMG7;ERROR DNI DID NOT CLEAR
7704 033742' 104456 TRAP CSERHRD
7705 033744' 000126 .WORD 86
7706 033746' 002270' .WORD DMATO
7707 033750' 012670' .WORD RACMG7
7708 033752'          ESCAPE TST
7709 033752' 104410 TRAP CSESCAPE
7710 033754' 000006 .WORD L10134-.
7711 033756' 005305 55$: DEC R5 ;ANY MORE DATA PATTERNS?
7712 033760' 001301 BNE 30$ ;YES
7713 033762'          ENDTST
7714 033762'          L10134:
7715 033762' 104401 TRAP CSETST

```


65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 165
TEST 19: DMA 'FROM' ADDRESS REGISTER TEST

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033764'
033764'

033764'
033764' 104404
033766' 022737
033774' 001004
033776' 122777
034004' 001440
034006' 012737
034014' 004737
034020' 103002
034022'
034022' 104410
034024' 000316
034026' 012737
034034' 004737
034040' 103022
034042' 012737
034050' 012737
034056' 012737
034064' 012737
034072'
034072' 104456

.SBTTL TEST 19: DMA 'FROM' ADDRESS REGISTER TEST

: THIS TEST CHECKS THE OPERATION OF THE REGISTER/COUNTER THAT CONTAINS
: THE ADDRESS OF THE LINK MEMORY WORD TO BE MOVED TO THE HOST DURING
: DMA OPERATIONS. THE REGISTER CAN BE WRITTEN BY THE T11 BUT IT CAN
: NOT BE READ BACK FOR VERIFICATION, THEREFORE IT MUST BE CHECKED
: INDIRECTLY.

: THE METHOD USED IS TO LOAD MICROCODE MODULE C IF IT HAS NOT ALREADY
: BEEN DONE. THE MICROTTEST #5 LOADS EACH LOCATION OF LINK MEMORY WITH
: ITS ADDRESS THEN IT TAKES THE CONTENTS OF PCBB+0 AND LOADS IT INTO
: THE DMA 'FROM' ADDRESS REGISTER, THE 'TO' REGISTER IS LOADED WITH
: THE ADDRESS OF PCBB+2, THE WORD COUNT IS LOADED FOR A ONE WORD TRANSFER
: AND THE DMA ENGINE IS STARTED. THE HOST VERIFIES PCBB+2 = PCBB+0

: TEST SEQUENCE:

- 1-LOAD MICROCODE MODULE 'C' IF NOT ALREADY DONE SO
- 2-LOAD PCBB+0 WITH ADDRESS OF LINK MEMORY TO LOAD
- 3-START MICROCODE
- 4-WAIT FOR 'DNI'
- 5-VERIFY PCBB+2 = PCBB+0
- 6-CHANGE PCBB+0 BY 1K CHUNKS
- 7-REPEAT 2-6

BGNTST

T19::

: CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

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                                     TRAP   CSBSEG
:HAS MICRO MODULE C BEEN LOADED?
: NO
: YES, IS THE MICROMONITOR ACTIVE?
: YES SKIP LOADING THE MICROMODULE
: NO, LOAD MICRO MODULE C
: OK

                                     TRAP   CSBSEG
                                     .WORD  L10135-.
: PUT SOME TIME ON THE METER
: WAIT FOR THE MICROMONITOR
: OK

MOV   #2*SECOND,METER
JSR   PC,CHKDNI
BCC   20$
MOV   #SDNI,BITNAM
MOV   #SNSET,BITSTA
MOV   #SAFTER,PWHEN
MOV   #SGTCMD,PCOMND
ERRHRD 087,DMAFRM,MSG1
```

TRAP CSERHRD

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 166
CZUAAB.MAC 07-APR-83 17:03 TEST 19: DMA 'FROM' ADDRESS REGISTER TEST

7772	034074'	000127						.WORD	87
7773	034076'	002336'						.WORD	DMAFRM
7774	034100'	012716'						.WORD	MSG1
7775	034102'				ESCAPE TST				
7776	034102'	104410						TRAP	CSESCAPE
7777	034104'	000236						.WORD	L10135-
7778	034106'	004737	017362'	208:	JSR PC,CLRDNI				:CLEAR DNI BIT
7779	034112'	103006			BCC 258				
7780	034114'				ERRHRD 088,DMAFRM,RACMG7				:DNI BIT DID NOT CLEAR!
7781	034114'	104456						TRAP	CSEHRD
7782	034116'	000130						.WORD	88
7783	034120'	002336'						.WORD	DMAFRM
7784	034122'	012670'						.WORD	RACMG7
7785	034124'				ESCAPE TST				
7786	034124'	104410						TRAP	CSESCAPE
7787	034126'	000214						.WORD	L10135-
7788	034130'			258:					
7789	034130'				ENDSEG				
7790	034130'							100008:	
7791	034130'	104405						TRAP	CSESEG
7792	034132'	005037	000606'		CLR PCBB+0				:TELL T11 TO START LOAD AT BASE
7793									:OF LINK MEMORY
7794	034136'			308:					
7795									
7796									:WAIT FOR THE MICROMONITOR TO ENTER 'IN MONITOR' STATE, LOAD COMMAND FIELD
7797									:OF PCSRD WITH 5 TO START THE EXECUTION OF MICROTEST #5, WAIT FOR DNI
7798									
7799	034136'				BGNSEG				
7800	034136'	104404						TRAP	C8BSEG
7801	034140'	004737	020060'		JSR PC,CHKNOI				:WAIT FOR MICROMONITOR
7802	034144'	103006			BCC 408				:OK
7803	034146'				ERRHRD 089,DMAFRM,RJG46				:PRINT ERROR
7804	034146'	104456						TRAP	CSEHRD
7805	034150'	000131						.WORD	89
7806	034152'	002336'						.WORD	DMAFRM
7807	034154'	016666'						.WORD	MSG46
7808	034156'				ESCAPE TST				:LEAVE TEST
7809	034156'	104410						TRAP	CSESCAPE
7810	034160'	000162						.WORD	L10135-
7811	034162'	012777	000005	144146	408:	MOV #5,BPCSRD			:TELL T11 TO START MICROTEST #5
7812	034170'	012737	000176	000332'		MOV #2*SECOND,METER			:WAIT A WHILE FOR DNI
7813	034176'	004737	017316'			JSR PC,CHKDNI			
7814	034202'	103021				BCC 508			
7815	034204'	004737	020132'			JSR PC,CHKINT			:SEE IF ANY ERROR INTERRUPTS OCCURRED
7816	034210'	103006				BCC 458			:NO, OK
7817	034212'					ERRHRD 090,DMAFRM,MSG44			:PRINT ERROR MESSAGE
7818	034212'	104456						TRAP	CSEHRD
7819	034214'	000132						.WORD	90
7820	034216'	002336'						.WORD	DMAFRM
7821	034220'	016442'						.WORD	MSG44
7822	034222'				ESCAPE TST				:LEAVE TEST
7823	034222'	104410						TRAP	CSESCAPE
7824	034224'	000116						.WORD	L10135-
7825	034226'	012702	000005	458:	MOV #5,R2				:WE WERE EXECUTING TEST 5
7826	034232'				ERRHRD 091,DMAFRM,MSG12				:TELL HIM IT HUNG
7827	034232'	104456						TRAP	CSEHRD

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 167
 CZUAB.MAC 07-APR-83 17:03 TEST 19: DMA 'FROM' ADDRESS REGISTER TEST

7828	034234'	000133				.WORD	91
7829	034236'	002336'				.WORD	DMAFRM
7830	034240'	013466'				.WORD	MSG12
7831	034242'			ESCAPE TST			
7832	034242'	104410				TRAP	CSESCAPE
7833	034244'	000076				.WORD	L10135-
7834							
7835							
7836							
7837							
7838							
7839							
7840	034246'	013703	000606'	50S:	MOV PCBB+0,R3		:GET ORIGINAL 'FROM' ADDRESS
7841	034252'	052703	100004		BIS #BIT15!BIT2,R3		:MAKE IT ACTUAL LINK MEMORY ADDRESS
7842	034256'	013704	000610'		MOV PCBB+2,R4		:GET WHAT WAS READ FROM LINK MEMORY
7843	034262'	020304			CMF R3,R4		:IS DATA CORRECT?
7844	034264'	001404			BEQ 55S		:YES
7845	034266'				ERRHRD 092,DMAFRM,MSG14		:NO
7846	034266'	104456				TRAP	CSEHRD
7847	034270'	000134				.WORD	92
7848	034272'	002336'				.WORD	DMAFRM
7849	034274'	013560'				.WORD	MSG14
7850	034276'			55S:			
7851	034276'			ENDSEG			
7852	034276'					10001S:	
7853	034276'	104405				TRAP	CSESEG
7854							
7855							
7856							
7857	034300'	004737	017362'		JSR PC,CLRDNI		
7858	034304'	103006			BCC 57S		
7859	034306'				ERRHRD 093,DMAFRM,RACMG7		:ERROR DNI DID NOT CLEAR!
7860	034306'	104456				TRAP	CSEHRD
7861	034310'	000135				.WORD	93
7862	034312'	002336'				.WORD	DMAFRM
7863	034314'	012670'				.WORD	RACMG7
7864	034316'				ESCAPE TST		
7865	034316'	104410				TRAP	CSESCAPE
7866	034320'	000022				.WORD	L10135-
7867	034322'	022737	074000 000606'	57S:	CMF #74000,PCBB+0		:HAVE WE CHECKED ALL 1K CHUNKS?
7868	034330'	001404			BEQ 60S		:YES
7869	034332'	062737	004000 000606'		ADD #4000,PCBB+0		:NO, CHECK NEXT 1K
7870	034340'	000676			BR 30S		:DO AGAIN
7871	034342'			60S:			
7872	034342'			ENDTST			
7873	034342'					L10135:	
7874	034342'	104401				TRAP	CSETST

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 168
CZUAAB.MAC 07-APR-83 17:03 TEST 20: DMA BLOCK TRANSFER TEST

.SBTTL TEST 20: DMA BLOCK TRANSFER TEST

: THIS TEST WILL VERIFY THAT THE DMA ENGINE CAN TRANSFER A MAXIMUM SIZE DATA
: BLOCK TO HOST MEMORY.
: THIS TEST USES CUSTOM MICROCODE MODULE C, MICROTEST #6. THE MICROTEST
: FILLS EACH LOCATION OF LINK MEMORY WITH ITS ADDRESS AND THEN SETS
: UP A TRANSFER FROM LINK MEMORY TO THE ADDRESS POINTED TO BY PCBB+0.
: THE TRANSFER SIZE IS 1776 WORDS. AFTER THE MICROTEST FINISHES THE
: BUFFER IS CHECKED TO SEE IF IT CONTAINS THE INCREMENTING ADDRESS PATTERN.
: TEST SEQUENCE:
: 1-LOAD MICROCODE MODULE 'C' IF NOT ALREADY DONE SO
: 2-LOAD PCBB+0 WITH IIBUFFER ADDRESS
: 3-START MICROCODE
: 4-WAIT FOR DNI
: 5-VERIFY ALL 1776 WORDS STARTING AT BUFFER ADDRESS BASE

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7895

7897 034344'
7898 034344'

BGNTST

T20::

: CHECK TO SEE IF MODULE 'C' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF UCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
:

7899
7900
7901
7902
7903

BGNSEG

7904 034344'
7905 034344' 104404
7906 034346' 022737 000103 000326'
7907 034354' 001004
7908 034356' 122777 000001 143754
7909 034364' 001435
7910 034366' 012737 000103 000326' 58:
7911 034374' 004737 020340'
7912 034400' 103530
7913 034402' 012737 000176 000332' 108:
7914 034410' 004737 017316'
7915 034414' 103021
7916 034416' 012737 001000' 000310'
7917 034424' 012737 001277' 000312'
7918 034432' 012737 001342' 000314'
7919 034440' 012737 001357' 000316'
7920 034446'
7921 034446' 104456
7922 034450' 000136
7923 034452' 002406'
7924 034454' 012716'
7925 034456' 000501
7926 034460' 004737 017362' 208:
7927 034464' 103005
7928 034466'
7929 034466' 104456
7930 034470' 000137

CMP #'C,MICRO
BNE 58
CMPB #INMON,#PCSR1
BEQ 20\$
MOV #'C,MICRO
JSR PC,LODMIC
BCS 70\$
MOV #2*SECOND,METER
JSR PC,CHKDNI
BCC 20\$
MOV #SDNI,BITNAM
MOV #SNSET,BITSTA
MOV #SAFTER,PWHEN
MOV #BGTCHD,PCOMND
ERRHRD 094,DMABLK,MSG1

TRAP CSBSEG
: HAS MICRO MODULE C BEEN LOADED?
: NO
: YES, IS THE MICROMONITOR ACTIVE?
: YES SKIP LOADING THE MICROMODULE
: NO, LOAD MICRO MODULE C
: ERROR
: PUT SOME TIME ON THE METER
: WAIT FOR THE MICROMONITOR
: OK

TRAP CSERHRD
.WORD 94
.WORD DMABLK
.WORD MSG1

: GO CLEAR THE DNI BIT
: DNI DID NOT CLEAR!

TRAP CSERHRD
.WORD 95

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 169
 CZUAAB.MAC 07-APR-83 17:03 TEST 20: DMA BLOCK TRANSFER TEST

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7931 034472' 002406' .WORD DMABLK
7932 034474' 012670' .WORD RACMG7
7933 034476' 000471 BR 708
7934 034500' 258:
7935 034500' ENDSEG
7936 034500' 100008:
7937 034500' 104405 TRAP CSESEG
7938
7939 :TELL MICROCODE TO DMA TO A BUFFER IN FREE MEMORY LOCATED ABOVE THIS DIAGNOSTIC
7940 :BY LOADING PCBB+0 WITH THE ADDRESS TO DMA TO. WAIT FOR THE MICROMONITOR TO
7941 :ENTER THE 'IN MONITOR' STATE AND LOAD THE COMMAND FIELD OF PCSRO WITH 1. 6
7942 :TO START THE EXECUTION OF MICROTEST #6. WAIT FOR DNI TO SET INDICATING IT IS
7943 :COMPLETE
7944
7945 BGNSEG
7946 034502' 104404 TRAP CSBSEG
7947 034504' 013737 000324' 000606' MOV FREMEM,PCBB+0 ;GET ADDRESS OF FREE MEMORY
7948 034512' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
7949 034516' 103006 BCC 308 ;OK
7950 034520' ERRHRD 096,DMABLK,MSG46 ;PRINT ERROR
7951 034520' 104456 TRAP CSERHRD
7952 034522' 000140 .WORD 96
7953 034524' 002406' .WORD DMABLK
7954 034526' 016666' .WORD MSG46
7955 034530' ESCAPE TST ;LEAVE TEST
7956 034530' 104410 TRAP CSESCAPE
7957 034532' 000136 .WORD L10136-
7958 034534' 012777 000006 143574 308: MOV #6,PCSRO ;START MICROTEST #6
7959 034542' 012737 000473 000332' MOV #5*SECOND,METER ;PUT SOME TIME ON THE METER
7960 034550' 004737 017316' JSR PC,CHKDNI ;WAIT FOR MICROTEST FINISH
7961 034554' 103020 BCC 408 ;OK
7962 034556' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
7963 034562' 103006 BCC 358 ;NO, OK
7964 034564' ERRHRD 097,DMABLK,MSG44 ;PRINT ERROR MESSAGE
7965 034564' 104456 TRAP CSERHRD
7966 034566' 000141 .WORD 97
7967 034570' 002406' .WORD DMABLK
7968 034572' 016442' .WORD MSG44
7969 034574' ESCAPE TST ;LEAVE TEST
7970 034574' 104410 TRAP CSESCAPE
7971 034576' 000072 .WORD L10136-
7972 034600' 012702 000006 358: MOV #6,R2 ;MICROTEST NEVER FINISHED!
7973 034604' ERRHRD 098,DMABLK,MSG12
7974 034604' 104456 TRAP CSERHRD
7975 034606' 000142 .WORD 98
7976 034610' 002406' .WORD DMABLK
7977 034612' 013466' .WORD MSG12
7978 034614' 000422 BR 708
7979
7980 :OK NOW CHECK THE DATA TRANSFERRED FROM LINK MEMORY TO UNIBUS MEMORY.
7981 :THE DATA PATTERN IS ACTUALLY THE ADDRESS FROM WHICH THE DATA CAME FROM.
7982 :THE FIRST LOCATION WILL BE 4 BYTES FROM THE BEGINING OF LINK MEMORY BECAUSE
7983 :THE DMA FROM ADDRESS REGISTER DOES NOT USE BITS 0 AND 1.
7984
7985 408: MOV PCBB+0,R2 ;GET ADDRESS OF BUFFER
7986 034622' 012746 100004' MOV #100004,-(SP) ;STARTING DATA PATTERN
    
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 170
CZUAAB.MAC 07-APR-83 17:33 TEST 20: DMA BLOCK TRANSFER TEST

7987 034626' 021216
7988 034630' 001405
7989 034632' 010601
7990 034634'
7991 034634' 104456
7992 034636' 000143
7993 034640' 002406'
7994 034642' 013606'
7995 034644' 021627 103776
7996 034650' 002004
7997 034652' 062716 000002
7998 034656' 005722
7999 034660' 000762
8000 034662' 004737 020166'
8001 034666'
8002 034666'
8003 034666' 104405
8004 034670'
8005 034670'
8006 034670' 104401

50S: CMP (R2),(SP)
BEQ 60S
MOV SP,R1
ERRHRD 009,DMA BLK,MSG15

:IS DATA PATTERN CORRECT?
:YES
:NO GET GOOD DATA
:PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 99
.WORD DMA BLK
.WORD MSG15

60S: CMP (SP),#103776
BGE 70S
ADD #2,(SP)
TST (R2)+
BR 50S
70S: JSR PC,REUNA
ENDSEG

:DONE ALL DATA?
:YES
:NEXT GOOD DATA PATTERN
:NEXT BUFFER ADDRESS
:CONTINUE CHECKING
:RESTORE OPERATIONAL MICROCODE

10001S: TRAP CSESEG

ENDTST

L10136: TRAP CSETST

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 171
CZUAAB.MAC 07-APR-83 17:03 TEST 21: TRANSMIT DONE TEST

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.SBTTL TEST 21: TRANSMIT DONE TEST

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:THE TRANSMIT STATE MACHINE INFORMS THE PORT MODULE PROCESSOR OF A
:'TRANSMIT DONE' CONDITION. IT DOES THIS BY GENERATING AN INTERRUPT WHENEVER
:IT FINISHES TRANSMITTING A DATAGRAM. SINCE THE 'TRANSMIT DONE' INTERRUPT IS
:A NECESSARY CONDITION OF EVERY DATAGRAM TRANSMISSION, THIS TEST WILL USE THE
:INTERRUPT TO INDICATE THAT THE TRANSMIT STATE MACHINE IS FUNCTIONING.

:MICROCODE MODULE D MICROTEST #1 WILL BE USED FOR THIS TEST. IT SETS
:UP THE T-11 FOR AN INTERRUPT, STARTS A DATAGRAM LOOPBACK AND WAITS FOR A
:TRANSMIT INTERRUPT. THE T-11 WILL BE RELEASED FROM THE LOOP IF THE XMIT DONE
:INTERRUPT OCCURS. UPON RELEASE THE DNI BIT WILL BE SET IN PCSRO SIGNALING
:THAT THE TEST IS COMPLETE.

:TEST SEQUENCE:

- 1-LOAD MICROCODE MODULE 'D' IF NOT ALREADY DONE SO
- 2-VERIFY THE MICROMONITOR IN THE 'IN MONITOR' STATE
- 3-SELECT MICROTEST #1
- 4-VERIFY 'DNI' BIT IN PCSRO AFTER A REASONABLE PERIOD OF TIME
- 5-WRITE ONE TO CLEAR DNI

.....

BGNTST

T21::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

034672'
034672'

034672'

034672' 104404

034674' 022737 000104 000326'

034702' 001004 000001 143426

034704' 122777 000001 143426

034712' 001440 000104 000326' 5\$:

034714' 012737 020340'

034722' 004737 020340'

034726' 103002

034730'

034730' 104410

034732' 000246

034734' 012737 000176 000332' 10\$:

034742' 004737 017316'

034746' 103022

034750' 012737 001000' 000310'

034756' 012737 001277' 000312'

034764' 012737 001342' 000314'

034772' 012737 001357' 000316'

035000'

035000' 104456

035002' 000144

035004' 002445'

035006' 012716'

CMP	#'D,MICRO	:	HAS MICROCODE MODULE 'D' BEEN LOADED
BNE	5\$:	NO
CMPB	#INMON,@PCSR1	:	YES, IS THE MICROMONITOR ACTIVE?
BEQ	20\$:	YES SKIP LOADING THE MICROMODULE
MOV	#'D,MICRO	:	GO LOAD MICRO MODULE 'D'
JSR	PC,LODMIC	:	
BCC	10\$:	OK
ESCAPE	TST	:	
		:	TRAP C\$BSEG
		:	.WORD L10137-
MOV	#2*SECOND,METER	:	WAIT FOR THE MICROMONITOR
JSR	PC,CHKDNI	:	
BCC	20\$:	OK
MOV	#SDNI,BITNAM	:	
MOV	#SNSET,BITSTA	:	
MOV	#SAFTER,PWEN	:	
MOV	#SGTCRD,PCOMND	:	
ERRHRD	100,TRNDON,MSG1	:	
		:	TRAP C\$ERHRD
		:	.WORD 100
		:	.WORD TRNDON
		:	.WORD MSG1

TRAP C\$ERHRD
.WORD 100
.WORD TRNDON
.WORD MSG1

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 172
 CZUAAB.MAC 07-APR-83 17:03 TEST 21: TRANSMIT DONE TEST

```

8063 035010'          ESCAPE TST
8064 035010' 104410          TRAP      C$ESCAPE
8065 035012' 000166          .WORD    L10137-.
8066 035014' 004737 017362' 20$: JSR      PC,CLRDN1          ;CLEAR DNI BIT
8067 035020' 103006          BCC      25$
8068 035022'          ERRHRD  101,TRNDON,RACMG7 ;DNI DID NOT CLEAR!
8069 035022' 104456          TRAP      C$ERRHRD
8070 035024' 000145          .WORD    101
8071 035026' 002445'          .WORD    TRNDON
8072 035030' 012670'          .WORD    RACMG7
8073 035032'          ESCAPE TST
8074 035032' 104410          TRAP      C$ESCAPE
8075 035034' 000144          .WORD    L10137-.
8076 035036'          25$:
8077 035036'          ENDSEG
8078 035036'          10000$:
8079 035036' 104405          TRAP      C$ESEG
8080
8081          ;WAIT FOR THE MICROMONITOR TO ENTER THE 'IN MONITOR' STATE. LOAD THE COMMAND
8082          ;FIELD BITS OF PCSRD WITH A 1 TO START THE EXECUTION OF MICROTEST #1.
8083          ;WAIT ABOUT 1 SECOND FOR IT TO FINISH. IF NO 'DNI' SET PRINT ERROR.
8084          ;
8085          BGNSEG
8086 035040' 104404          TRAP      C$BSEG
8087 035042' 004737 020060' JSR      PC,CHKMON          ;WAIT FOR MICROMONITOR
8088 035046' 103006          BCC      30$
8089 035050'          ERRHRD  102,TRNDON,MSG46 ;OK
8090 035050' 104456          ;PRINT ERROR          TRAP      C$ERRHRD
8091 035052' 000146          .WORD    102
8092 035054' 002445'          .WORD    TRNDON
8093 035056' 016666'          .WORD    MSG46
8094 035060'          ESCAPE TST          ;LEAVE TEST
8095 035060' 104410          TRAP      C$ESCAPE
8096 035062' 000116          .WORD    L10137-.
8097 035064' 012777 000001 143244 30$: MOV      #1,@PCSR0          ;TELL T11 TO EXECUTE FIRST MICROTEST
8098 035072' 012737 000077 000332' MOV      #1*SECOND,METER ;WAIT FOR DNI
8099 035100' 004737 017316' JSR      PC,CHKDNI
8100 035104' 103025          BCC      40$
8101          ;OK-'DNI' SET
8102          ;ERROR 'DNI' DID NOT SET! NO TRANSMIT
8103          ;INTERRUPT!
8104          ;PRINT ERROR MESSAGE
8105 035106' 104456          ERRHRD  103,TRNDON,MSG36
8106 035106' 000147          TRAP      C$ERRHRD
8107 035110' 002445'          .WORD    103
8108 035112' 015770'          .WORD    TRNDON
8109 035114' 004737 020132'          .WORD    MSG36
8110 035116' 103006          JSR      PC,CHKINT          ;SEE IF ANY ERROR INTERRUPTS OCCURRED
8111 035122' 103006          BCC      35$
8112 035124'          ERRHRD  103,TRNDON,MSG44 ;NO, OK
8113 035124' 104456          ;PRINT ERROR MESSAGE
8114 035126' 000147          TRAP      C$ERRHRD
8115 035130' 002445'          .WORD    103
8116 035132' 016442'          .WORD    TRNDON
8117 035134' 104410          .WORD    MSG44
8118 035136' 000042          ESCAPE TST          ;LEAVE TEST
8119 035140' 012702 000001 35$: MOV      #1,R2          ;MICROTEST #1 IS HUNG

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 173
CZUAAB.MAC 07-APR-83 17:03 TEST 21: TRANSMIT DONE TEST

8119	035144'		ERRHRD 104,TRNDON,MSG12		:PRINT MESSAGE ABOUT HUNG MICROTST		
8120	035144'	104456				TRAP	C\$ERHRD
8121	035146'	000150				.WORD	104
8122	035150'	002445'				.WORD	TRNDON
8123	035152'	013466'				.WORD	MSG12
8124	035154'		ESCAPE TST				
8125	035154'	104410				TRAP	C\$ESCAPE
8126	035156'	000022				.WORD	L10137-
8127							
8128			:WRITE 1 TO CLEAR DNI BIT				
8129			:				
8130	035160'	004737 017362'	408: JSR PC,CLRDNI		:CLEAR DNI BIT		
8131	035164'	103004	BCC 558				
8132	035166'		ERRHRD 105,TRNDON,RACMG7		:ERROR DNI DID NOT CLEAR!		
8133	035166'	104456				TRAP	C\$ERHRD
8134	035170'	000151				.WORD	105
8135	035172'	002445'				.WORD	TRNDON
8136	035174'	012670'				.WORD	RACMG7
8137	035176'		558:				
8138	035176'		ENDSEG				
8139	035176'				10001\$:		
8140	035176'	104405				TRAP	C\$ESEG
8141	035200'		ENDTST				
8142	035200'				L10137:		
8143	035200'	104401				TRAP	C\$ETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 174
CZUAAB.MAC 07-APR-83 17:03 TEST 22: RECEIVER DONE TEST

.SBTTL TEST 22: RECEIVER DONE TEST

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:*****
:THE LINK HARDWARE INCLUDES LOGIC TO TELL THE DEUNA PROCESSOR WHEN
:A LINK MEMORY BUFFER HAS BEEN FILLED AND DATA IS AVAILABLE FOR PROCESSING.
:THE HARDWARE INTERRUPTS THE DEUNA PROCESSOR. BECAUSE THE INTERRUPT HAPPENS
:WHEN A LINK MEMORY BUFFER IS FULL AND THE LINK MEMORY IS FILLED BY THE
:OPERATION OF THE RECEIVE STATE MACHINE, THE INTERRUPT CAN BE USED TO CHECK
:IF THE STATE MACHINE WORKS.
:
:MICROCODE MODULE D MICROTST #2 WILL BE USED FOR THIS TEST. IT SETS
:UP THE T-11 FOR AN INTERRUPT, STARTS A DATAGRAM LOOPBACK AND WAITS FOR A
:RECEIVER INTERRUPT. THE T-11 WILL BE RELEASED FROM THE LOOP IF THE
:INTERRUPT OCCURS. UPON RELEASE THE DNI BIT WILL BE SET IN PCSRO SIGNALING
:THAT THE TEST IS COMPLETE.
:
:TEST SEQUENCE:
: 1-LOAD MICROCODE MODULE 'D' IF NOT ALREADY DONE SO
: 2-VERIFY THE MICROMONITOR IN THE 'IN MONITOR' STATE
: 3-SELECT MICROTST #2
: 4-VERIFY 'DNI' BIT IN PCSRO AFTER A REASONABLE PERIOD OF TIME
: 5-WRITE ONE TO CLEAR DNI
:*****

```

035202'
035202'

035202'
035202' 104404
035204' 022737
035212' 001004
035214' 122777
035222' 001440
035224' 012737
035232' 004737
035236' 103002
035240'
035240' 104410
035242' 000246
035244' 012737
035252' 004737
035256' 103022
035260' 012737
035266' 012737
035274' 012737
035302' 012737
035310'
035310' 104456
035312' 000152
035314' 002477'

BGNTST

T22::

```

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
:
:

```

BGNSEG

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                                TRAP   CSBSEG
                                .WORD   L10140-.
CMP      #'D,MICRO              ;HAS MICROCODE MODULE 'D' BEEN LOADED
BNE      5$                      ;NO
CMPB     #INMON,@PCSR1          ;YES, IS THE MICROMONITOR ACTIVE?
BEQ      20$                      ;YES SKIP LOADING THE MICROMODULE
MOV      #'D,MICRO              ;GO LOAD MICRO MODULE 'D'
JSR      PC,LODMIC
BCC      10$                      ;OK
ESCAPE   TST

                                TRAP   C$ESCAPE
                                .WORD   L10140-.
MOV      #2*SECOND,METER        ;WAIT FOR THE MICROMONITOR
JSR      PC,CHKDNI
BCC      20$                      ;OK
MOV      #$DNI,BITNAM
MOV      #$NSET,BITSTA
MOV      #$AFTER,PWHEN
MOV      #$GTCHD,PCOMND
ERRHRD   106,RCVDON,MSG1

                                TRAP   CSERHRD
                                .WORD   106
                                .WORD   RCVDON

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 175
 CZUAAB.MAC 07-APR-83 17:03 TEST 22: RECEIVER DONE TEST

8200	035316'	012716'					.WORD	MSG1
8201	035320'			ESCAPE	TST			
8202	035320'	104410					TRAP	CSESCAPE
8203	035322'	000166					.WORD	L10140-
8204	035324'	004737	017362'	208:	JSR	PC,LLRDNI		:CLEAR DNI BIT
8205	035330'	103006			BCC	25\$		
8206	035332'				ERRHRD	107,RCVDON,RACMG7		:DNI DID NOT CLEAR!
8207	035332'	104456					TRAP	CSEHRD
8208	035334'	000153					.WORD	107
8209	035336'	002477'					.WORD	RCVDON
8210	035340'	012670'					.WORD	RACMG7
8211	035342'			ESCAPE	TST			
8212	035342'	104410					TRAP	CSESCAPE
8213	035344'	000144					.WORD	L10140-
8214	035346'			25\$:				
8215	035346'			ENDSEG				
8216	035346'						10000\$:	
8217	035346'	104405					TRAP	CSESEG
8218				:				
8219				:				
8220				:				
8221				:				
8222				:				
8223	035350'			:				
8224	035350'	104404		:				
8225	035352'	004737	020060'		JSR	PC,CHKMON		:WAIT FOR MICROMONITOR
8226	035356'	103006			BCC	30\$:OK
8227	035360'				ERRHRD	108,RCVDON,MSG46		:PRINT ERROR
8228	035360'	104456					TRAP	CSEHRD
8229	035362'	000154					.WORD	108
8230	035364'	002477'					.WORD	RCVDON
8231	035366'	016666'					.WORD	MSG46
8232	035370'			ESCAPE	TST			:LEAVE TEST
8233	035370'	104410					TRAP	CSESCAPE
8234	035372'	000116					.WORD	L10140-
8235	035374'	012777	000002 142734	30\$:	MOV	#2,@PCSR0		:TELL T11 TO EXECUTE MICROTEST #2
8236	035402'	012737	000077 000332'		MOV	#1*SECOND,METER		:WAIT FOR DNI
8237	035410'	004737	017316'		JSR	PC,CHKDNI		
8238	035414'	103025			BCC	40\$:OK DNI SET
8239								:ERROR-DNI NOT SET, NO RECEIVER
8240								:INTERRUPT
8241	035416'				ERRHRD	109,RCVDON,MSG37		:PRINT ERROR MESSAGE
8242	035416'	104456					TRAP	CSEHRD
8243	035420'	000155					.WORD	109
8244	035422'	002477'					.WORD	RCVDON
8245	035424'	016012'					.WORD	MSG37
8246	035426'	004737	020132'		JSR	PC,CHKINT		:SEE IF ANY ERRGR INTERRUPTS OCCURRED
8247	035432'	103006			BCC	35\$:NO, OK
8248	035434'				ERRHRD	110,RCVDON,MSG44		:PRINT ERROR MESSAGE
8249	035434'	104456					TRAP	CSEHRD
8250	035436'	000156					.WORD	110
8251	035440'	002477'					.WORD	RCVDON
8252	035442'	016442'					.WORD	MSG44
8253	035444'			ESCAPE	TST			
8254	035444'	104410					TRAP	CSESCAPE
8255	035446'	000042					.WORD	L10140-

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 176
CZUAAB.MAC 07-APR-83 17:03 TEST 22: RECEIVER DONE TEST

8256	035450'	012702	000002	35\$:	MOV #2,R2				
8257	035454'				ERRHRD 111,RCVDON,MSG12				
8258	035454'	104456							
8259	035456'	000157							
8260	035460'	002477'							
8261	035462'	013466'							
8262	035464'				ESCAPE TST				
8263	035464'	104410							
8264	035466'	000022							
8265									
8266					:WRITE 1 TO CLEAR DNI BIT				
8267									
8268	035470'	004737	017362'	40\$:	JSR PC,CLRDNI				
8269	035474'	103004			BCC 55\$				
8270	035476'				ERRHRD 112,RCVDON,RACMG7				
8271	035476'	104456							
8272	035500'	000160							
8273	035502'	002477'							
8274	035504'	012670'							
8275	035506'			55\$:					
8276	035506'				ENDSEG				
8277	035506'								
8278	035506'	104405							
8279	035510'				ENDTST				
8280	035510'								
8281	035510'	104401							

:MICROTEST #2 IS HUNG
:PRINT ERROR MESSAGE

TRAP CSERHRD
.WORD 111
.WORD RCVDON
.WORD MSG12

TRAP CSESCAPE
.WORD L10140~.

:CLEAR DNI BIT
:ERROR DNI DID NOT CLEAR!

TRAP CSERHRD
.WORD 112
.WORD RCVDON
.WORD RACMG7

100018: TRAP CSESEG

L10140: TRAP CSETST

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 177
CZUAAB.MAC 07-APR-83 17:03 TEST 22: RECEIVER DONE TEST

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.SBTTL TEST 23: DATA BYTE FRAMING TEST

: THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR BYTE DATA BOUNDARY
: CONDITIONS.
: THE T-11 PROCESSOR WILL TRANSMIT DATA IN LOOPBACK MODE. THE DATA WILL BE
: ORGANIZED SUCH THAT DATA BOUNDARIES ARE CREATED BETWEEN ADJACENT BYTES
: IN THE DATA STREAM (I.E. 11111111000000011...) THE T-11 PROCESSOR WILL
: VERIFY THE CONDITION OF THE DATA AFTER IT IS LOOPED BACK TO THE RECEIVER
: DATA BUFFER.
: THIS TEST WILL USE MICROCODE MODULE 'D' MICROTTEST #3. TESTING OF THE DATA
: FRAMING WILL BE DONE BY THE T-11 PROCESSOR. THE HOST PROCESSOR, MEANWHILE,
: WILL WAIT FOR A 'DNI' IN REGISTER PCSRO. IF 'DNI' APPEARS, THE HOST PROCESSOR
: WILL CHECK PCSR1 FOR AN ERROR CONDITION. IF AN ERROR CONDITION IS SET,
: ADDITIONAL ERROR INFORMATION WILL BE FOUND IN THE PCBB AS FOLLOWS:
: PCBB+0: RECEIVER STATUS WORD
: PCBB+2: DATA TRANSMITTED
: PCBB+4: DATA RECEIVED
: PCBB+6: WORD OFFSET INTO RECEIVER BUFFER OF BAD DATA
: TEST SEQUENCE:
: 1-LOAD MICROCODE MODULE 'D' IF NOT ALREADY DONE SO
: 2-VERIFY MICROMONITOR TO ENTER THE 'INMON' STATE
: 3-CLEAR OUT THE PCBB+,+2,+4,+6
: 4-SELECT MICROTTEST #3
: 5-VERIFY 'DNI' BIT SET IN PCSRO
: 6-CHECK FOR AN ERROR CONDITION IN PCSR1
: 7-WRITE ONE TO CLEAR THE DNI BIT

BGNTST

T23::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

035512'							TRAP	CSBSEG
035512'	104404							
035514'	022737	000104	000326'		CMP	#'D,MICRO		:HAS MICROCODE MODULE 'D' BEEN LOADED
035522'	001004				BNE	5\$:NO
035524'	122777	000001	142606		CMPB	#INMON,@PCSR1		:YES, IS THE MICROMONITOR ACTIVE?
035532'	001440				BEQ	20\$:YES SKIP LOADING THE MICROMODULE
035534'	012737	000104	000326'	5\$:	MOV	#'D,MICRO		:GO LOAD MICRO MODULE 'D'
035542'	004737	020340'			JSR	PC,LODMIC		
035546'	103002				BCC	10\$:OK
035550'					ESCAPE	TST		
035550'	104410						TRAP	CSBSEG
035552'	000316						.WORD	L10141-
035554'	012737	000176	000332'	10\$:	MOV	#2*SECOND,METER		:WAIT FOR THE MICROMONITOR

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 178
 CZUAAB.MAC 07-APR-83 17:03 TEST 23: DATA BYTE FRAMING TEST

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8338 035562' 004737 017316'      JSR    PC,CHKDNI
8339 035566' 103022                BCC    20$
8340 035570' 012737 001000' 000310'  :OK
8341 035576' 012737 001277' 000312'  :ERROR 'DNI' BIT NEVER SET
8342 035604' 012737 001342' 000314'  :
8343 035612' 012737 001357' 000316'  :
8344 035620'
8345 035620' 104456                TRAP   CSERHRD
8346 035622' 000161                .WORD 113
8347 035624' 002531'                .WORD DBFRAM
8348 035626' 012716'                .WORD MSG1
8349 035630'
8350 035630' 104410                TRAP   CSESCAPE
8351 035632' 000236                .WORD L10141-.
8352 035634' 004737 017362' 20$: JSR    PC,CLRDNI      :CLEAR DNI BIT
8353 035640' 103006                BCC    25$
8354 035642'                ERRHRD 114,DBFRAM,RACMG7 :DNI DID NOT CLEAR!
8355 035642' 104456                TRAP   CSERHRD
8356 035644' 000162                .WORD 114
8357 035646' 002531'                .WORD DBFRAM
8358 035650' 012670'                .WORD RACMG7
8359 035652'
8360 035652' 104410                TRAP   CSESCAPE
8361 035654' 000214                .WORD L10141-.
8362 035656'
8363 035656'
8364 035656'
8365 035656' 104405                10000$: TRAP   CSESEG
8366
8367
8368
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8370
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8373
8374 035660' 104404                :
8375 035662' 004737 020060' 20$: JSR    PC,CHKMON      :WAIT FOR MICROMONITOR
8376 035666' 103022                BCC    30$
8377 035670'                ERRHRD 115,DBFRAM,MSG46 :OK
8378 035670' 104456                :PRINT ERROR
8379 035672' 000163                TRAP   CSERHRD
8380 035674' 002531'                .WORD 115
8381 035676' 016666'                .WORD DBFRAM
8382 035700'                .WORD MSG46
8383 035700' 104410                TRAP   CSESCAPE
8384 035702' 000166                .WORD L10141-.
8385 035704' 005037 000606' 30$: CLR    PCBB
8386
8387 035710' 005037 000610'  :THIS IS WHERE MICROCODE WILL PUT...
8388 035714' 005037 000612'  :RECEIVE BUFFER STATUS WORD
8389 035720' 005037 000614'  :HERE IS WHERE THE GOOD DATA GOES
8390 035724' 012777 000003 142404 :HERE IS WHERE THE BAD DATA GOES
8391 035732' 012737 000176 000332' :HERE IS WHERE THE BUFFER OFFSET GOES
8392 035740' 004737 017316'  :TELL T11 TO EXECUTE MICROTEST #3
8393 035744' 103021                :WAIT FOR DNI
      JSR    PC,CHKDNI
      BCC    40$

```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 179
 CZUAAB.MAC 07-APR-83 17:03 TEST 23: DATA BYTE FRAMING TEST

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8394 035746' 004737 020132'      JSR      PC,CHKINT      ;SEE IF ANY ERROR INTERRUPTS OCCURRED
8395 035752' 103006      BCC      55$           ;NO, OK
8396 035754'             ERRHRD   116,DBFRAM,MSG44 ;PRINT ERROR MESSAGE
8397 035754' 104456      TRAP    CSERHRD
8398 035756' 000164      .WORD   116
8399 035760' 002531'      .WORD   DBFRAM
8400 035762' 016442'      .WORD   MSG44
8401 035764'             ESCAPE   TST
8402 035764' 104410      TRAP    CSESCAPE
8403 035766' 000102      .WORD   L10141-
8404 035770' 012702 000003 35$:  MOV     #3,R2          ;MICROTEST #3 IS HUNG
8405 035774'             ERRHRD   117,DBFRAM,MSG12
8406 035774' 104456      TRAP    CSERHRD
8407 035776' 000165      .WORD   117
8408 036000' 002531'      .WORD   DBFRAM
8409 036002' 013466'      .WORD   MSG12
8410 036004'             ESCAPE   TST
8411 036004' 104410      TRAP    CSESCAPE
8412 036006' 000062      .WORD   L10141-
8413
8414      ;OK WE GOT 'DNI' NOW CHECK PCSR1 TO SEE IF THE T-11 FOUND A BOGUS BYTE IN THE
8415      ;RECEIVED DATA. IF SO, GET THE INFORMATION FROM THE PCBB AND PRINT ERROR
8416
8417 036010' 122777 000003 142322 40$: CMPB   #INERR,PCSR1      ;DID AN ERROR OCCUR?
8418 036016' 001014      BNE     50$           ;NO
8419 036020' 013701 000614'      MOV     PCBB+6,R1      ;GET BUFFER OFFSET FOR ERROR REPORT
8420 036024' 013702 000610'      MOV     PCBB+2,R2      ;THIS IS THE GOOD DATA FOR ERROR REPORT
8421 036030' 013703 000612'      MOV     PCBB+4,R3      ;THIS IS THE BAD DATA FOR ERROR REPORT
8422 036034' 013704 000606'      MOV     PCBB,R4        ;THIS IS THE RECEIVER STATUS WORD
8423 036040'             ERRHRD   118,DBFRAM,MSG17 ;PRINT ERROR MESSAGE
8424 036040' 104456      TRAP    CSERHRD
8425 036042' 000166      .WORD   118
8426 036044' 002531'      .WORD   DBFRAM
8427 036046' 013730'      .WORD   MSG17
8428
8429      ;WRITE '1' TO CLEAR 'DNI' BIT
8430
8431 036050' 004737 017362' 50$:  JSR     PC,CLRDN1      ;CLEAR DNI BIT
8432 036054' 103004      BCC     55$           ;ERROR DNI DID NOT CLEAR!
8433 036056'             ERRHRD   119,DBFRAM,RACMG7
8434 036056' 104456      TRAP    CSERHRD
8435 036060' 000167      .WORD   119
8436 036062' 002531'      .WORD   DBFRAM
8437 036064' 012670'      .WORD   RACMG7
8438 036066'             55$:
8439 036066'             ENDSEG
8440 036066'             10001$:
8441 036066' 104405      TRAP    CSESEG
8442 ^36070'             ENDTST
8443 ^6070'             L10141:
8444 ^6070' 104401      TRAP    CSETST

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 180
CZUAAB.MAC 07-APR-83 17:03 TEST 24: DATA WORD FRAMING TEST

.SBTTL TEST 24: DATA WORD FRAMING TEST

:THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR WORD DATA BOUNDARY
:CONDITIONS.

:THE T-11 PROCESSOR WILL TRANSMIT DATA IN LOOPBACK MODE. THE DATA WILL BE
:ORGANIZED SUCH THAT DATA BOUNDARIES ARE CREATED BETWEEN ADJACENT WORDS
:IN THE DATA STREAM (I.E. 11111111111111110000000000000011...) THE T-11
:PROCESSOR WILL VERIFY THE CONDITION OF THE DATA AFTER IT IS LOOPED BACK TO
:THE RECEIVER DATA BUFFER.

:THIS TEST WILL USE MICROCODE MODULE 'D' MICROTTEST #4. TESTING OF THE DATA
:FRAMING WILL BE DONE BY THE T-11 PROCESSOR. THE HOST PROCESSOR, MEANWHILE,
:WILL WAIT FOR A 'DNI' IN REGISTER PCSRO. IF 'DNI' APPEARS, THE HOST PROCESSOR
:WILL CHECK PCSR1 FOR AN ERROR CONDITION. IF AN ERROR CONDITION IS SET,
:ADDITIONAL ERROR INFORMATION WILL BE FOUND IN THE PCBB AS FOLLOWS:

- :PCBB+0: RECEIVER STATUS WORD
- :PCBB+2: DATA TRANSMITTED
- :PCBB+4: DATA RECEIVED
- :PCBB+6: WORD OFFSET INTO RECEIVER BUFFER OF BAD DATA

:TEST SEQUENCE:

- 1-LOAD MICROCODE MODULE 'D' IF NOT ALREADY DONE SO
- 2-VERIFY MICROMONITOR IS IN THE 'INMON' STATE
- 3-CLEAR OUT THE PCBB+0,+2,+4,+6
- 4-SELECT MICROTTEST #4
- 5-VERIFY 'DNI' BIT SET IN PCSRO
- 6-CHECK FOR AN ERROR CONDITION IN PCSR1
- 7-WRITE ONE TO CLEAR THE DNI BIT

BGNTST

T24::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

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036072'
036072'

036072' 104404
036072' 022737
036074' 001004
036102' 122777
036112' 001440
036114' 012737
036122' 004737
036126' 103002
036130'
036130' 104410
036132' 000316
036134' 012737
036142' 004737

000104 000326'
000001 142226
000104 000326' 5S:
020340'
000176 000332' 10S:
017316'

CMR #D,MICRO
BNE 5S
CMPB #INMON,PCSR1
BEQ 20S
MOV #D,MICRO
JSR PC,LODMIC
BCC 10S
ESCAPE TST
MOV #2*SECOND,METER
JSR PC,CHKDNI

TRAP CSBSEG
:HAS MICROCODE MODULE 'D' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'D'
:OK
TRAP CSBSEG
:WORD L10142-
:WAIT FOR THE MICROMONITOR

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 181
CZUAAB.MAC 07-APR-83 17:03 TEST 24: DATA WORD FRAMING TEST

```

8501 036146' 03022          BCC      20$          :OK
8502 036150' 012737 001000' 000310'   MOV      #SDNI,BITNAM
8503 036156' 012737 001277' 000312'   MOV      #SNSET,BITSTA
8504 036164' 012737 001342' 000314'   MOV      #AFTER,PWHEN
8505 036172' 012737 001357' 000316'   MOV      #SGICMD,PCOMND
8506 036200'          ERRHRD  120,DWFRAM,MSG1
8507 036200' 104456          TRAP    CSERHRD
8508 036202' 000170          .WORD  120
8509 036204' 002567'          .WORD  DWFRAM
8510 036206' 012716'          .WORD  MSG1
8511 036210'          ESCAPE  TST
8512 036210' 104410          TRAP    CSERHRD
8513 036212' 000236          .WORD  L10142-.
8514 036214' 004737 017362' 20$:   JSR      PC,CLRDNI   :CLEAR DNI BIT
8515 036220' 103006          BCC      25$
8516 036222'          ERRHRD  121,DWFRAM,RACMG7 :DNI DID NOT CLEAR!
8517 036222' 104456          TRAP    CSERHRD
8518 036224' 000171          .WORD  121
8519 036226' 002567'          .WORD  DWFRAM
8520 036230' 012670'          .WORD  RACMG7
8521 036232'          ESCAPE  TST
8522 036232' 104410          TRAP    CSERHRD
8523 036234' 000214          .WORD  L10142-.
8524 036236'          25$:
8525 036236'          ENDSEG
8526 036236'          10000$:
8527 036236' 104405          TRAP    CSESEG
8528          :
8529          :WAIT FOR MICROMONITOR TO ENTER THE 'INMON' STATE. CLEAR THE PCBB. LOAD THE
8530          :COMMAND FIELD OF PCSRO WITH A 4 TO START THE EXECUTION OF MICROTEST #4.
8531          :WAIT FOR THE 'DNI' BIT. IF NO 'DNI' OR IF ANY EXTRANEIOUS INTERRUPTS HAPPEN
8532          :PRINT ERROR
8533          :
8534          : BGNSEG
8535 036240' 104404          TRAP    CSBSEG
8536 036242' 004737 020060'   JSR      PC,CHKMON   :WAIT FOR MICROMONITOR
8537 036246' 103006          BCC      30$          :OK
8538 036250'          ERRHRD  122,DWFRAM,MSG46 :PRINT ERROR
8539 036250' 104456          TRAP    CSERHRD
8540 036252' 000172          .WORD  122
8541 036254' 002567'          .WORD  DWFRAM
8542 036256' 016666'          .WORD  MSG46
8543 036260'          ESCAPE  TST          :LEAVE TEST
8544 036260' 104410          TRAP    CSERHRD
8545 036262' 000166          .WORD  L10142-.
8546 036264' 005037 000606' 30$:   CLR      PCBB        :THIS IS WHERE MICROCODE WILL PUT...
8547          :RECEIVE BUFFER STATUS WORD
8548 036270' 005037 000610'   CLR     PCBB+2      :HERE IS WHERE THE GOOD DATA GOES
8549 036274' 005037 000612'   CLR     PCBB+4      :HERE IS WHERE THE BAD DATA GOES
8550 036300' 005037 000614'   CLR     PCBB+6      :HERE IS WHERE THE BUFFER OFFSET GOES
8551 036304' 012777 000004 142024  MOV      #4,@PCSRO   :TELL T11 TO EXECUTE MICROTEST #4
8552 036312' 012737 000176 000332' MOV      #2*SECOND,METER :WAIT FOR DNI
8553 036320' 004737 017316'   JSR      PC,CHKDNI
8554 036324' 103021          BCC      40$
8555 036326' 004737 020132'   JSR      PC,CHKINT
8556 036332' 103006          BCC      35$          :SEE IF ANY ERROR INTERRUPTS OCCURRED
                        :NO, OK

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 182
 CZUAAB.MAC 07-APR-83 17:03 TEST 24: DATA WORD FRAMING TEST

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8557 036334' ERRHRD 123,DWFRAM,MSG44 :PRINT ERROR MESSAGE
8558 036334' 104456 TRAP CSERHRD
8559 036336' 000173 .WORD 123
8560 036340' 002567' .WORD DWFRAM
8561 036342' 016442' .WORD MSG44
8562 036344' ESCAPE TST
8563 036344' 104410 TRAP CSERHRD
8564 036346' 000102 .WORD L10142-
8565 036350' 012702 000004 35$: MOV #4,R2 :MICROTEST #4 IS HUNG
8566 036354' ERRHRD 124,DWFRAM,MSG12
8567 036354' 104456 TRAP CSERHRD
8568 036356' 000174 .WORD 124
8569 036360' 002567' .WORD DWFRAM
8570 036362' 013466' .WORD MSG12
8571 036364' ESCAPE TST
8572 036364' 104410 TRAP CSERHRD
8573 036366' 000062 .WORD L10142-
8574
8575 :OK WE GOT 'DNI' NOW CHECK PCSR1 TO SEE IF THE T-11 DETECTED A BOGUS WORD
8576 :IN THE RECEIVER BUFFER. IF SO, PRINT ERROR.
8577
8578 036370' 122777 000003 141742 40$: CMPB #INERR,APCSR1 :DID AN ERROR OCCUR?
8579 036376' 001014 BNE 50$ :NO
8580 036400' 013701 000614' MOV PCBB+6,R1 :GET BUFFER OFFSET FOR ERROR REPORT
8581 036404' 013702 000610' MOV PCBB+2,R2 :THIS IS THE GOOD DATA FOR ERROR REPORT
8582 036410' 013703 000612' MOV PCBB+4,R3 :THIS IS THE BAD DATA FOR ERROR REPORT
8583 036414' 013704 000606' MOV PCBB,R4 :THIS IS THE RECEIVER STATUS WORD
8584 036420' ERRHRD 125,DWFRAM,MSG17 :PRINT ERROR MESSAGE
8585 036420' 104456 TRAP CSERHRD
8586 036422' 000175 .WORD 125
8587 036424' 002567' .WORD DWFRAM
8588 036426' 013730' .WORD MSG17
8589
8590 :WRITE '1' TO CLEAR 'DNI' BIT
8591
8592 036430' 004737 017362' 50$: JSR PC,CLRDNI :CLEAR DNI BIT
8593 036434' 103004 BCC 55$
8594 036436' ERRHRD 126,DWFRAM,RACMG7 :ERROR DNI DID NOT CLEAR!
8595 036436' 104456 TRAP CSERHRD
8596 036440' 000176 .WORD 126
8597 036442' 002567' .WORD DWFRAM
8598 036444' 012670' .WORD RACMG7
8599 036446' 55$:
8600 036446' ENDSEG
8601 036446' 10001$:
8602 036446' 104405 TRAP CSESEG
8603 036450' ENDTST
8604 036450' L10142:
8605 036450' 104401 TRAP CSETST
    
```

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052) 07-APR-83 17:13
07-APR-83 17:03

07-APR-83 17:13 PAGE 183
TEST 25: DATA PATH PATTERN TEST

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036452'
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022737
001004
122777
001440
012737
004737
103002
104410
000332
012737
004737
103022
012737
001000'
001277'
001342'
001357'
000310'
000312'
000314'
000316'
104456
000177

000104 000326'
000001 141646
000104 000326' 58:
020340'
000176 000332' 108:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

.SBTTL TEST 25: DATA PATH PATTERN TEST

: THIS TEST WILL CHECK THE LINK MODULE DATA PATH FOR ALL 'STUCK AT 0' AND
: 'STUCK AT 1' ERRORS.
: THE T-11 PROCESSOR WILL TRANSMIT DATAGRAMS OF MAXIMUM LENGTH IN LOOPBACK MODE.
: THIS PATTERN LOOPBACK PROCEDURE WILL BE USED FOR ALL PATTERNS OF UP TO WORD
: WIDTH.
: THIS TEST USES MICROMODULE 'D' MICROTEST #5 TO DO THE TESTING. THE HOST
: PROCESSOR WILL PASS A DATA PATTERN TO THE T-11 PROCESSOR THROUGH THE PCBB.
: THE T-11 WILL FILL A XMIT BUFFER WITH THE DATA PATTERN AND TRANSMIT THE
: DATAGRAM OVER THE LOOPBACK. THE T-11 PROCESSOR WILL VERIFY THE PATTERN
: IN THE RECEIVER BUFFER. IF THE T-11 FINDS AN ERROR, IT WILL WRITE THE FAILING
: PATTERN TO THE PCBB ALONG WITH THE OFFSE: INTO THE RECEIVER BUFFER AT WHICH
: THE PATTERN WAS FOUND. IT WILL INFORM THE HOST OF THE ERROR BY SETTING PCSR1
: TO AN ERROR CONDITION. THE PCBB IS FORMATTED AS FOLLOWS:
: PCBB+0: DATA PATTERN
: PCBB+2: RECEIVER STATUS WORD
: PCBB+4: BAD DATA PATTERN
: PCBB+6: OFFSET INTO RECEIVER BUFFER WHERE BAD DATA WAS FOUND
: *****

BGNTST

T25::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF UCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
:

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'D' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'D'
:OK
TRAP CSESCAPE
:WORD L10143 .
:WAIT FOR THE MICROMONITOR
:OK
TRAP CSERHRD
:WORD 127

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 184
 CZUAAB.MAC 07-APR-83 17:03 TEST 25: DATA PATH PATTERN TEST

8662	036564'	002625'						.WORD	DPPAT
8663	036566'	012716'						.WORD	MSG1
8664	036570'			ESCAPE	TST				
8665	036570'	104410						TRAP	CS_ESCAPE
8666	036572'	000252						.WORD	L10143-
8667	036574'	004737	017362'	20\$:	JSR	PC,CLRDNI			:CLEAR DNI BIT
8668	036600'	103006			BCC	25\$			
8669	036602'				ERRHRD	128,DPPAT,RACMG7			:DNI DID NOT CLEAR!
8670	036602'	104456						TRAP	CSERHRD
8671	036604'	000200						.WORD	128
8672	036606'	002625'						.WORD	DPPAT
8673	036610'	012670'						.WORD	RACMG7
8674	036612'			ESCAPE	TST				
8675	036612'	104410						TRAP	CS_ESCAPE
8676	036614'	000230						.WORD	L10143-
8677	036616'			25\$:					
8678	036616'			ENDSEG					
8679	036616'							10000\$:	
8680	036616'	104405						TRAP	CS_SEG
8681									
8682									
8683									
8684									
8685	036620'	005037	000610'		CLR	PCBB+2			:HERE IS WHERE MICROCODE WILL PUT...
8686									:STATUS WORD
8687	036624'	005037	000612'		CLR	PCBB+4			:HERE IS WHERE BAD DATA GOES
8688	036630'	005037	000614'		CLR	PCBB+6			:HERE IS WHERE BUFFER OFFSET GOES
8689	036634'	012701	000520'		MOV	#PATERM,R1			:GET ADDRESS OF DATA PATTERN TABLE
8690	036640'	012705	000005		MOV	#5,R5			:# OF DATA PATTERNS
8691	036644'	012137	000606'		MOV	(R1)+,PCBB			:LOAD PCBB WITH A DATA PATTERN
8692	036650'			27\$:					
8693	036650'	104404		BGNSEG					
8694									TRAP
8695									CSBSEG
8696									
8697									
8698	036652'	004737	020060'		JSR	PC,CHKMON			:WAIT FOR MICROMONITOR
8699	036656'	103006			BCC	30\$:OK
8700	036660'				ERRHRD	129,DPPAT,MSG46			:PRINT ERROR
8701	036660'	104456						TRAP	CSERHRD
8702	036662'	000201						.WORD	129
8703	036664'	002625'						.WORD	DPPAT
8704	036666'	016666'						.WORD	MSG46
8705	036670'			ESCAPE	TST				:LEAVE TEST
8706	036670'	104410						TRAP	CS_ESCAPE
8707	036672'	000152						.WORD	L10143-
8708	036674'	012777	000005	30\$:	MOV	#5,@PCSRO			:TELL T11 TO EXECUTE MICROTEST #5
8709	036702'	012737	000176		MOV	#2*SECOND,METER			:WAIT FOR DNI
8710	036710'	004737	017316'		JSR	PC,CHKDNI			
8711	036714'	103021			BCC	40\$			
8712	036716'	004737	020132'		JSR	PC,CHKINT			:SEE IF ANY ERROR INTERRUPTS OCCURRED
8713	036722'	103006			BCC	35\$:NO, OK
8714	036724'				ERRHRD	130,DPPAT,MSG44			:PRINT ERROR MESSAGE
8715	036724'	104456						TRAP	CSERHRD
8716	036726'	000202						.WORD	130
8717	036730'	002625'						.WORD	DPPAT

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8718 036732' 016442' .WORD MSG44
8719 036734' ESCAPE TST
8720 036734' 104410 TRAP C$ESCAPE
8721 036736' 000106 .WORD L10143-
8722 036740' 012702 000005 358: MOV #5,R2 ;MICROTEST #5 IS HUNG
8723 036744' ERRHRD 131,DPPAT,MSG12
8724 036744' 104456 TRAP C$ERHRD
8725 036746' 000203 .WORD 131
8726 036750' 002625' .WORD DPPAT
8727 036752' 013466' .WORD MSG12
8728 036754' ESCAPE TST
8729 036754' 104410 TRAP C$ESCAPE
8730 036756' 000066 .WORD L10143-
8731
8732 ;OK WE GOT 'DNI' NOW CHECK PCSR1 TO SEE IF AN ERROR HAPPENED, IF SO, PRINT
8733 ;PERTINENT INFORMATION
8734
8735 036760' 122777 000003 141352 408: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
8736 036766' 001014 BNE 508 ;NO
8737 036770' 013701 000614' MOV PCBB+6,R1 ;GET BUFFER OFFSET FOR ERROR REPORT
8738 036774' 013702 000606' MOV PCBB,R2 ;THIS IS THE GOOD DATA FOR ERROR REPORT
8739 037000' 013703 000612' MOV PCBB+4,R3 ;THIS IS THE BAD DATA FOR ERROR REPORT
8740 037004' 013704 000610' MOV PCBB+2,R4 ;THIS IS THE RECEIVER STATUS WORD
8741 037010' ERRHRD 132,DPPAT,MSG17 ;PRINT ERROR MESSAGE
8742 037010' 104456 TRAP C$ERHRD
8743 037012' 000204 .WORD 132
8744 037014' 002625' .WORD DPPAT
8745 037016' 013730' .WORD MSG17
8746
8747 ;WRITE '1' TO CLEAR 'DNI' BIT
8748
8749 037020' 004737 017362' 508: JSR PC,CLRDMI ;CLEAR DNI BIT
8750 037024' 103004 BCC 558
8751 037026' ERRHRD 133,DPPAT,RACMG7 ;ERROR DNI DID NOT CLEAR!
8752 037026' 104456 TRAP C$ERHRD
8753 037030' 000205 .WORD 133
8754 037032' 002625' .WORD DPPAT
8755 037034' 012670' .WORD RACMG7
8756 037036' 558:
8757 037036' ENDSEG
8758 037036' 100018:
8759 037036' 104405 TRAP C$ESEG
8760 037040' 005305 ;HAVE WE TESTED WITH ALL DATA PATTERNS?
8761 037042' 001300 ;NOT YET
8762 037044'
8763 037044' L10143:
8764 037044' 104401 TRAP C$ETST

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65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 186
TEST 26: STATUS MUX VERIFICATION TEST

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037046'

037046' 104404
037046' 022737 000104 000326'
037050' 001004
037056' 001004

.SBTTL TEST 26: STATUS MUX VERIFICATION TEST

:THE LINK WRITES STATUS IN LINK MEMORY AFTER EACH TRANSMIT ATTEMPT. THE STATUS
:GIVES INFORMATION ABOUT THE ATTEMPTED OPERATION. THE STATUS INFORMATION IS
:WRITTEN INTO THE FIRST TWO LOCATIONS OF THE TRANSMIT BUFFER. THIS INFORMATION
:IS ACCESSIBLE TO THE T-11 BY SIMPLY READING IT FROM LINK MEMORY.

:THIS TEST WILL VERIFY THAT THE STATUS INFORMATION IS WRITTEN INTO THE FIRST
:LOCATION OF THE TRANSMIT BUFFER. THE TEST WILL ALSO CHECK THE SECOND WORD
:OF THE TRANSMIT BUFFER.

:THIS TEST WILL USE MICROMODULE 'D' MICROTEST #6.
:WHEN THE TEST IS STARTED, THE T-11 PROCESSOR WILL SET UP THE LINK FOR LOOPBACK
:OF A DATA PATTERN. A BACKGROUND PATTERN WILL BE WRITTEN INTO THE FIRST WORD
:OF THE TRANSMIT BUFFER. THIS WORD SHOULD BE OVER-WRITTEN BY THE STATUS WHEN
:THE BUFFER IS TRANSMITTED. THE SECOND WORD OF THE TRANSMIT BUFFER CAN NOT BE
:WRITTEN WITH A BACKGROUND BECAUSE IT MUST DESIGNATE THE TRANSMIT BYTE COUNT.

:WHEN THE DATAGRAM HAS BEEN LOOPED BACK, THE T-11 PROCESSOR WILL PASS THE FIRST
:TWO WORDS OF THE TRANSMIT BUFFER TO THE HOST THRU THE PCBB+0 AND PCBB+2.

:PCBB+0: FIRST WORD OF TRANSMIT BUFFER
:PCBB+2: SECOND WORD OF TRANSMIT BUFFER

:THE CORRECT STATUS SHOULD BE:

TRANSMIT STATUS WORD 0 BITS 15,09:00 SHOULD BE ALL 0 AND
BIT 13 SHOULD BE A 1

TRANSMIT STATUS WORD 1 BITS 15:13 SHOULD ALL BE 0

:TEST SEQUENCE:

- 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
- 2-VERIFY MICROMONITOR IS IN THE 'INMON' STATE
- 3-CLEAR PCBB+0 AND PCBB+2
- 4-SELECT MICROTEST #6
- 5-VERIFY 'DNI' SET
- 6-VERIFY PCBB+0 BITS 15,09:00 = 0 AND BIT 13 = 1
AND PCBB+2 BITS 15:13 = 0
- 7-WRITE ONE TO CLEAR 'DNI'

BGNTST

T26::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

:
BGNSEG

CMP #D,MICRO ;HAS MICROCODE MODULE 'D' BEEN LOADED
BNE 58 ;NO TRAP CSBSEG

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 187
 CZUAAB.MAC 07-APR-83 17:03 TEST 26: STATUS MUX VERIFICATION TEST

```

8821 037060' 122777 000001 141252      CMPB   #INMON,BPCSR1      ;YES, IS THE MICROMONITOR ACTIVE?
8822 037066' 001440                      BEQ    20$                ;YES SKIP LOADING THE MICROMODULE
8823 037070' 012737 000104 000326' 5$:  MOV    #'D,MICRO        ;GO LOAD MICRO MODULE 'D'
8824 037076' 004737 020340'                JSR    PC,LODMIC
8825 037102' 103002                      BCC    10$                ;OK
8826 037104'                                ESCAPE TST
8827 037104' 104410                                TRAP   C$ESCAPE
8828 037106' 000500                                .WORD L10144-.
8829 037110' 012737 000176 000332' 10$:  MOV    #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
8830 037116' 004737 017316'                JSR    PC,CHKDNI
8831 037122' 103022                      BCC    20$                ;OK
8832 037124' 012737 001000' 000310'      MOV    #SDNI,BITNAM
8833 037132' 012737 001277' 000312'      MOV    #SNSET,BITSTA
8834 037140' 012737 001342' 000314'      MOV    #SAFTER,PWHEN
8835 037146' 012737 001357' 000316'      MOV    #SGTCMD,PCOMND
8836 037154'                                ERRHRD 134,STAMUX,MSG1
8837 037154' 104456                                TRAP   C$ERHRD
8838 037156' 000206                                .WORD 134
8839 037160' 002663'                                .WORD STAMUX
8840 037162' 012716'                                .WORD MSG1
8841 037164'                                ESCAPE TST
8842 037164' 104410                                TRAP   C$ESCAPE
8843 037166' 000420                                .WORD L10144-.
8844 037170' 004737 017362' 20$:        JSR    PC,CLRDN1          ;CLEAR DNI BIT
8845 037174' 103006                      BCC    25$
8846 037176'                                ERRHRD 135,STAMUX,RACMG7 ;DNI DID NOT CLEAR!
8847 037176' 104456                                TRAP   C$ERHRD
8848 037200' 000207                                .WORD 135
8849 037202' 002663'                                .WORD STAMUX
8850 037204' 012670'                                .WORD RACMG7
8851 037206'                                ESCAPE TST
8852 037206' 104410                                TRAP   C$ESCAPE
8853 037210' 000376                                .WORD L10144-.
8854 037212' 25$:
8855 037212'     ENDSEG
8856 037212' 10000$:
8857 037212' 104405                                TRAP   C$ESEG
8858
8859 ;WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE, THEN CLEAR OUT THE
8860 ;FIRST TWO WORDS OF THE PCBB. EXECUTE MICROTST #6 BY LOADING THE COMMAND
8861 ;FIELD BITS OF PCSRO WITH A 6, WAIT FOR 'DNI'.
8862
8863 ;BGNSEG
8864 037214' 104404                                TRAP   C$BSEG
8865 037216' 004737 020060'                JSR    PC,CHKMON        ;WAIT FOR MICROMONITOR
8866 037222' 103006                      BCC    30$                ;OK
8867 037224'                                ERRHRD 136,STAMUX,MSG46 ;PRINT ERROR
8868 037224' 104456                                TRAP   C$ERHRD
8869 037226' 000210                                .WORD 136
8870 037230' 002663'                                .WORD STAMUX
8871 037232' 016666'                                .WORD MSG46
8872 037234'                                ESCAPE TST                ;LEAVE TEST
8873 037234' 104410                                TRAP   C$ESCAPE
8874 037236' 000350                                .WORD L10144-.
8875 037240' 005037 000606' 30$:        CLR    PCBB              ;THIS IS WHERE THE MICROCODE WILL...
8876                                ;PUT THE CONTENTS OF THE FIRST WORD
    
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 188
 CZUAB.MAC 07-APR-83 17:03 TEST 26: STATUS MUX VERIFICATION TEST

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8877                                     :OF THE TRANSMIT BUFFER
8878 037244' 005037 000610'          CLR   PCBB+2          :HERE IS WHERE THE SECOND WORD GOES
8879 037250' 012777 000006 141060    MOV   #6,@PCSR0      :TELL T11 TO EXECUTE MICROTEST #6
8880 037256' 012737 000176 000332'    MOV   #2*SECOND,METER :WAIT FOR DNI
8881 037264' 004737 017316'          JSR   PC,LHKDNI
8882 037270' 103021                    BCC   45$
8883 037272' 004737 020132'          JSR   PC,CHKINT      :SEE IF ANY ERROR INTERRUPTS OCCURRED
8884 037276' 103006                    BCC   35$           :NO, OK
8885 037300'                                ERRHRD 137,STAMUX,MSG44 :PRINT ERROR MESSAGE
8886 037300' 104456                                TRAP  C$ERHRD
8887 037302' 000211                                .WORD 137
8888 037304' 002663'                                .WORD STAMUX
8889 037306' 016442'                                .WORD MSG44
8890 037310'                                ESCAPE TST
8891 037310' 104410                                TRAP  C$ESCAPE
8892 037312' 000274                                .WORD L10144-.
8893 037314' 012702 000006          35$: MOV   #6,R2          :MICROTEST #6 IS HUNG
8894 037320'                                ERRHRD 138,STAMUX,MSG12
8895 037320' 104456                                TRAP  C$ERHRD
8896 037322' 000212                                .WORD 138
8897 037324' 002663'                                .WORD STAMUX
8898 037326' 013466'                                .WORD MSG12
8899 037330'                                ESCAPE TST
8900 037330' 104410                                TRAP  C$ESCAPE
8901 037332' 000254                                .WORD L10144-.
8902                                     :
8903                                     :OK, NOW PCBB+0 SHOULD CONTAIN THE TRANSMIT STATUS WORD 0 AND PCBB+2 SHOULD
8904                                     :CONTAIN TRANSMIT STATUS WORD 1. CHECK THAT PCBB+0 CONTAINS STATUS BITS
8905                                     :FOR A GOOD TRANSMIT I.E. BITS 09:00 SHOULD ALL BE 0 BIT 13 SHOULD BE A 1
8906                                     :AND BIT 15 SHOULD BE A 0
8907                                     :
8908 037334' 005001          45$: CLR   R1          :WE ARE GOING TO CHECK TRANSMIT WORD 0
8909 037336' 012703 000460'    MOV   #BNAMT2,R3    :POINT TO A TABLE OF BIT MNEMONICS
8910 037342' 012704 000012    MOV   #10.,R4      :FIRST 10 BITS SHOULD BE 0
8911 037346' 012702 000001    MOV   #1,R2        :R2 POINTS TO THE BIT WE ARE TESTING
8912 037352' 030237 000606'    50$: BIT   R2,PCBB  :IS THIS BIT A 0?
8913 037356' 001406          BEQ   55$           :YES
8914 037360' 011337 000310'    MOV   (R3),BITNAM  :NO, GET POINTER TO BIT NAME ASCII STRING
8915 037364'                                ERRHRD 139,STAMUX,MSG18 :PRINT ERROR MESSAGE
8916 037364' 104456                                TRAP  C$ERHRD
8917 037366' 000213                                .WORD 139
8918 037370' 002663'                                .WORD STAMUX
8919 037372' 014022'                                .WORD MSG18
8920 037374' 062703 000002          55$: ADD   #2,R3          :POINT TO NEXT BIT MNEMONIC
8921 037400' 006302          ASL   R2          :POINT TO NEXT BIT
8922 037402' 005304          DEC   R4          :HAVE WE DONE ALL 10 BITS?
8923 037404' 001362          BNE   50$           :NO
8924                                     :
8925 037406' 032737 020000 000606'    BIT   #BIT13,PCBB  :IS BIT 13 A 1?
8926 037414' 001007          BNE   60$           :YES
8927 037416' 012737 001147' 000310'    MOV   #BIT13,BITNAM :NO, POINT TO ASCII STRING
8928 037424'                                ERRHRD 140,STAMUX,MSG18 :PRINT ERROR MESSAGE
8929 037424' 104456                                TRAP  C$ERHRD
8930 037426' 000214                                .WORD 140
8931 037430' 002663'                                .WORD STAMUX
8932 037432' 014022'                                .WORD MSG18

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 189
CZUAAB.MAC 07-APR-83 17:03 TEST 26: STATUS MUX VERIFICATION TEST

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8933
8934 037434' 032737 100000 000606' 60$: BIT #BIT15,PCBB :IS BIT 15 A 0?
8935 037442' 001407 BEQ 65$ :YES
8936 037444' 012737 001131' 000310' MOV #BIT15,BITNAM :NO, POINT TO ASCII STRING
8937 037452' ERRHRD 141,STAMUX,MSG18 :PRINT ERROR MESSAGE
8938 037452' 14456 TRAP CSERHRD
8939 037454' 000215 .WORD 141
8940 037456' 002663' .WORD STAMUX
8941 037460' 014022' .WORD MSG18
8942
8943 ;NOW CHECK TRANSMIT WORD 1 BITS 15,14 AND 13 TO BE ALL 0
8944
8945 037462' 005201 65$: INC R1 :WE ARE CHECKING TRNASMIT WORD 1 NOW
8946 037464' 032737 020000 000610' BIT #BIT13,PCBB+2 :IS BIT 13 A 0?
8947 037472' 001407 BEQ 70$ :YES
8948 037474' 012737 001147' 000310' MOV #BIT13,BITNAM :NO, POINT TO ASCII STRING
8949 037502' ERRHRD 142,STAMUX,MSG18 :PRINT ERROR MESSAGE
8950 037502' 104456 TRAP CSERHRD
8951 037504' 000216 .WORD 142
8952 037506' 002663' .WORD STAMUX
8953 037510' 014022' .WORD MSG18
8954
8955 037512' 032737 040000 000610' 70$: BIT #BIT14,PCBB+2 :IS BIT 14 A 0?
8956 037520' 001407 BEQ 75$ :YES
8957 037522' 012737 001140' 000310' MOV #BIT14,BITNAM :NO, POINT TO ASCII STRING
8958 037530' ERRHRD 143,STAMUX,MSG18 :PRINT ERROR MESSAGE
8959 037530' 104456 TRAP CSERHRD
8960 037532' 000217 .WORD 143
8961 037534' 002663' .WORD STAMUX
8962 037536' 014022' .WORD MSG18
8963
8964 037540' 032737 100000 000610' 75$: BIT #BIT15,PCBB+2 :IS BIT 15 A 0?
8965 037546' 001407 BEQ 80$ :YES
8966 037550' 012737 001131' 000310' MOV #BIT15,BITNAM :NO, POINT TO ASCII STRING
8967 037556' ERRHRD 144,STAMUX,MSG18 :PRINT ERROR MESSAGE
8968 037556' 104456 TRAP CSERHRD
8969 037560' 000220 .WORD 144
8970 037562' 002663' .WORD STAMUX
8971 037564' 014022' .WORD MSG18
8972
8973 ;WRITE '1' TO CLEAR 'DNI' BIT
8974
8975 037566' 004737 017362' 80$: JSR PC,CLRDMI :CLEAR DNI BIT
8976 037572' 103004 BCC 85$
8977 037574' ERRHRD 145,STAMUX,RACMG7 :ERROR DNI DID NOT CLEAR!
8978 037574' 104456 TRAP CSERHRD
8979 037576' 000221 .WORD 145
8980 037600' 002663' .WORD STAMUX
8981 037602' 012670' .WORD RACMG7
8982 037604'
8983 037604' 85$: ENDSEG
8984 037604' 100018: TRAP CSESEG
8985 037604' 104405
8986 037606' ENDTST
8987 037606' L10144: TRAP
8988 037606' 104401 TRAP CSETST

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65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 190
TEST 27: LINK BYTE COUNTER TEST

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.SBTTL TEST 27: LINK BYTE COUNTER TEST

:BYTE COUNTERS ARE INVOLVED BOTH WITH THE LINK TRANSMIT FUNCTION AND THE LINK
:RECEIVE FUNCTION. WHEN THE T-11 PREPARES A TRANSMIT BUFFER FOR TRANSMISSION
:OF A DATAGRAM, IT WRITES THE INTENDED BYTE COUNT IN THE SECOND WORD OF THE
:TRANSMIT BUFFER. WHEN TRANSMISSION OF THE TRANSMIT BUFFER BEGINS, THE BYTE
:COUNT VALUE IS USED TO LOAD THE TRANSMIT BYTE COUNTER. THIS COUNTER IS
:DECREMENTED BY THE TRANSMIT STATE MACHINE AS THE DATAGRAM IS TRANSMITTED.
:THE DATAGRAM TRANSMISSION WILL CONTINUE UNTIL THE BYTE COUNTER IS DECREMENTED
:TO ZERO.

:THE RECEIVER ALSO HAS A BYTE COUNTER. THIS COUNTER IS CLEARED AT THE START OF
:A DATAGRAM RECEPTION AND IS INCREMENTED BY THE RECEIVE STATE MACHINE AS THE
:DATAGRAM IS RECEIVED. THE VALUE IN THIS COUNTER IS WRITTEN INTO WORD TWO
:OF THE RECEIVE BUFFER AT THE END OF RECEPTION.

:THIS TEST WILL USE MICROMODULE 'D' MICROTEST #7.
:THIS TEST WILL VERIFY THE BYTE COUNT LOGIC BY LOOPING MESSAGES AND VERIFYING
:THAT THE BYTE COUNT APPEARING IN THE RECEIVE BUFFER CORRESPONDS TO THE BYTE
:COUNT THAT WAS WRITTEN TO THE TRANSMIT BYTE COUNTER. THE TEST WILL ALSO
:VERIFY THAT THE ACTUAL NUMBER OF BYTES TRANSFERRED TO THE RECEIVE BUFFER
:CORRESPONDS TO THE INTENDED BYTE COUNT.

:THE TRANSMIT BYTE COUNT IS PASSED TO THE T-11 VIA THE PCBB+0. AFTER THE
:DATAGRAM LOOPBACK THE RECEIVE BYTE COUNT IS PLACED INTO PCBB+2 BY THE T-11
:PROCESSOR. PCBB+4 IS LOADED BY THE T-11 PROCESSOR WITH THE ACTUAL NUMBER OF
:BYTES THAT WERE TRANSFERRED TO THE RECEIVER BUFFER.

:PCBB+0: TRANSMIT BYTE COUNT
:PCBB+2: RECEIVE BYTE COUNT
:PCBB+4: ACTUAL NUMBER OF BYTES RECEIVED

:TEST SEQUENCE:
1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
2-WRITE MINIMUM BYTE COUNT IN PCBB+0
3-CLEAR PCBB+2 AND PCBB+4
4-VERIFY MICROMONITOR IS IN 'INMON' STATE
5-SELECT MICROTEST #7
6-VERIFY TRANSMIT BYTE COUNT SAME AS RECEIVE BYTE COUNT
7-VERIFY ACTUAL NUMBER OF BYTES RECEIVED IS CORRECT
8-WRITE '1' TO CLEAR 'DNI'
9-ADD 2 TO BYTE COUNT IN PCBB+0
10-REPEAT STEPS 3-9 UNTIL PCBB+0 REACHES MAXIMUM BYTE COUNT

BGNTST

T27::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

65HARDWARE TESTS MACY11 37A(1052) 07-APR-83 17:13 PAGE 191
 CZUAAB.MAL 07-APR-83 17:03 TEST 27: LINK BYTE COUNTER TEST

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9045 037610' 104404
9046 037612' 022737 000104 000326' CMP #'D,MICRO ;HAS MICROCODE MODULE 'D' BEEN LOADED
9047 037620' 001004 BNE 5$ ;NO
9048 037622' 122777 000001 140510 CMPB #'INMON,APCSR1 ;YES, IS THE MICROMONITOR ACTIVE?
9049 037630' 001440 BEQ 20$ ;YES SKIP LOADING THE MICROMODULE
9050 037632' 012737 000104 000326' 5$: MOV #'D,MICRO ;GO LOAD MICRO MODULE 'D'
9051 037640' 004737 020340' JSR PC,LODMIC
9052 037644' 103002 BCC 10$ ;OK
9053 037646'
9054 037646' 104410
9055 037650' 000334 TRAP CSBSEG
9056 037652' 012737 000176 000332' 10$: MOV #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
9057 037660' 004737 017316' JSR PC,CHKDNI
9058 037664' 103022 BCC 20$ ;OK
9059 037666' 012737 001000' 000310' MOV #SDNI,BITNAM
9060 037674' 012737 001277' 000312' MOV #SNSET,BITSTA
9061 037702' 012737 001342' 000314' MOV #SAFTER,PWHEN
9062 037710' 012737 001357' 000316' MOV #SGTCMD,PCOMND
9063 037716'
9064 037716' 104456 ERRHRD 146,LNKBYT,MSG1 TRAP CSERHRD
9065 037720' 000222 .WORD 146
9066 037722' 002727' .WORD LNKBYT
9067 037724' 012716' .WORD MSG1
9068 037726'
9069 037726' 104410 ESCAPE TST TRAP CSERHRD
9070 037730' 000254 .WORD L10145-.
9071 037732' 004737 017362' 20$: JSR PC,CLRDNI ;CLEAR DNI BIT
9072 037736' 103006 BCC 25$
9073 037740' ERRHRD 147,LNKBYT,RACMG7 ;DNI DID NOT CLEAR!
9074 037740' 104456 TRAP CSERHRD
9075 037742' 000223 .WORD 147
9076 037744' 002727' .WORD LNKBYT
9077 037746' 012670' .WORD RACMG7
9078 037750'
9079 037750' 104410 ESCAPE TST TRAP CSERHRD
9080 037752' 000232 .WORD L10145-.
9081 037754'
9082 037754' 25$:
9083 037754' ENDSEG
9084 037754' 104405 10000$: TRAP CSESEG
9085
9086 ;LOAD PCBB+0 WITH THE MINIMUM BYTE COUNT
9087 ;
9088 037756' 012737 000100 000606' MOV #MINBYT,PCBB ;BEGIN WITH MINIMUM BYTE COUNT
9089 ;
9090 ;CLEAR PCBB+2 AND PCBB+4, AIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
9091 ;EXECUTE MICROTTEST #7 BY LOADING THE COMMAND FIELD OF PCSRO WITH A 7.
9092 ;WAIT FOR 'DNI'
9093 ;
9094 037764' 30$:
9095 037764' BGNSEG
9096 037764' 104404 TRAP CSBSEG
9097 037766' 005037 000610' CLR PCBB+2 ;THIS IS WHERE MICROCODE WILL PUT...
9098 ;RECEIVER BYTE COUNT
9099 037772' 005037 000612' CLR PCBB+4 ;HERE IS WHERE MICROCODE WILL PUT...
9100 ;ACTUAL NUMBER OF BYTES RECEIVED

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 192
 CZUAAB.MAC 07-APR-83 17:03 TEST 27: LINK BYTE COUNTER TEST

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9101 037776' 004737 020060'      JSR      PC,CHKMON      ;WAIT FOR MICROMONITOR
9102 040002' 103006      BCC      35$           ;OK
9103 040004'           ERRHRD   148,LNKBYT,MSG46 ;PRINT ERROR
9104 040004' 104456           TRAP     CSERHRD
9105 040006' 000224           .WORD   148
9106 040010' 002727'           .WORD   LNKBYT
9107 040012' 016666'           .WORD   MSG46
9108 040014'           ESCAPE   TST           ;LEAVE TEST
9109 040014' 104410           TRAP     CSERHRD
9110 040016' 000166           .WORD   L10145-
9111 040020' 012777 000007 140310 35$:  MOV      #7,BPCSR0     ;TELL T11 TO EXECUTE MICROTEST #7
9112 040026' 012737 000176 000332'  MOV      #2*SECOND,METER ;WAIT FOR DNI
9113 040034' 004737 017316'  JSR      PC,CHKDNI
9114 040040' 103021      BCC      40$
9115 040042' 004737 020132'  JSR      PC,CHKINT     ;SEE IF ANY ERROR INTERRUPTS OCCURRED
9116 040046' 103006      BCC      36$           ;NO, OK
9117 040050'           ERRHRD   149,LNKBYT,MSG44 ;PRINT ERROR MESSAGE
9118 040050' 104456           TRAP     CSERHRD
9119 040052' 000225           .WORD   149
9120 040054' 002727'           .WORD   LNKBYT
9121 040056' 016442'           .WORD   MSG44
9122 040060'           ESCAPE   TST
9123 040060' 104410           TRAP     CSERHRD
9124 040062' 000122           .WORD   L10145-
9125 040064' 012702 000007 36$:  MOV      #7,R2         ;MICROTEST #7 IS HUNG
9126 040070'           ERRHRD   150,LNKBYT,MSG12
9127 040070' 104456           TRAP     CSERHRD
9128 040072' 000226           .WORD   150
9129 040074' 002727'           .WORD   LNKBYT
9130 040076' 013466'           .WORD   MSG12
9131 040100'           ESCAPE   TST
9132 040100' 104410           TRAP     CSERHRD
9133 040102' 000102           .WORD   L10145-
9134
9135 ;OK, CHECK PCBB+2, WHICH CONTAINS THE BYTE COUNT WRITTEN INTO THE RECEIVER
9136 ;BUFFER BY THE LINK, TO SEE IF IT IS THE SAME AS THE TRANSMIT BYTE COUNT. ALSO
9137 ;CHECK PCBB+4, WHICH IS THE ACTUAL NUMBER OF BYTES RECEIVED IN THE RECEIVER
9138 ;BUFFER, TO SEE IF IT IS THE SAME AS THE RECEIVE BYTE COUNT
9139 ;IF NOT PRINT AN ERROR
9140
9141 040104' 013701 000606' 40$:  MOV      PCBB,R1       ;GET TRANSMIT BYTE COUNT
9142 040110' 010102      MOV      R1,R2
9143 040112' 013703 000610'  MOV      PCBB+2,R3     ;GET RECEIVE BYTE COUNT
9144 040116' 013704 000612'  MOV      PCBB+4,R4     ;GET ACTUAL NUMBER OF BYTES TRANSMITTED
9145 040122' 020203      CMP      R2,R3         ;IS THE RECEIVE BYTE COUNT CORRECT?
9146 040124' 001002      BNE      45$           ;NO, ERROR
9147 040126' 020104      CMP      R1,R4         ;IS THE ACTUAL NUMBER OF BYTES CORRECT?
9148 040130' 001404      BEQ      50$           ;YES
9149 040132'           ERRHRD   151,LNKBYT,MSG19 ;PRINT ERROR MESSAGE
9150 040132' 104456           TRAP     CSERHRD
9151 040134' 000227           .WORD   151
9152 040136' 002727'           .WORD   LNKBYT
9153 040140' 014052'           .WORD   MSG19
9154 040142'           50$:
9155 040142'           ENDSEG
9156 040142'

```

10001\$:

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 193
CZUAAB.MAC 07-APR-83 17:03 TEST 27: LINK BYTE COUNTER TEST

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9157 040142' 104405 TRAP CSESEG
9158
9159 :WRITE '1' TO CLEAR THE 'DNI' BIT
9160 :
9161 040144' 004737 017362' JSR PC,LLRDNI :CLEAR DNI BIT
9162 040150' 103006 BCC 60$
9163 040152' ERRHRD 152,LNKBYT,RACMG7 :ERROR DNI DID NOT CLEAR!
9164 040152' 104456 TRAP CSERHRD
9165 040154' 000230 .WORD 152
9166 040156' 002727' .WORD LNKBYT
9167 040160' 012670' .WORD RACMG7
9168 040162' ESCAPE TST
9169 040162' 104410 TRAP C$ESCAPE
9170 040164' 000020 .WORD L10145-
9171
9172 :CONTINUE CALLING MICROTST #7 EACH TIME PASSING A LARGER (EVEN) BYTE COUNT
9173 :UNTIL THE BYTE COUNT REACHES THE MAXIMUM COUNT ALLOWED
9174 :
9175 040166' 062737 000002 000606' 60$: ADD #2,PCBB :UP THE BYTE COUNT
9176 040174' 023727 000606' 002756 CMP PCBB,#MAXBYT :HAVE WE DONE ALL EVEN BYTE COUNTS?
9177 040202' 003670 BLE 30$ :NO, CONTINUE TESTING WITH NEW BYTE COUNT
9178 040204'
9179 040204'
9180 040204' 104401 L10145: TRAP C$ETST

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 194
CZUAAB.MAC 07-APR-83 17:03 TEST 28: ODD BYTE TEST

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040206'
040206'

040206'

104404
022737
001004
122777
001440
012737
004737
103002
040244'
104410
040246'
000340
012737
004737
103022
012737
001277'
012737
001342'
012737
040314'
104456
040316'
000231
040320'
002765'
040322'
012716'

000104 000326'
000001 140112
000104 000326' 5S:
020340'
000176 000332' 10S:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

.SBTTL TEST 28: ODD BYTE TEST

: THIS TEST WILL VERIFY THAT THE LINK CAN TRANSMIT AND RECEIVE DATAGRAMS
: HAVING ONLY ODD BYTE COUNTS.
: THIS TEST IS IDENTICAL TO THE PREVIOUS BYTE COUNTER TEST W. TH THE ONLY
: EXCEPTION THAT IT PASSES ONLY ODD BYTE COUNTS TO THE MICROCODE. IT ALSO
: USES MICROMODULE 'D' MICROTEST #7
: TEST SEQUENCE:
: 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
: 2-WRITE MINIMUM ODD BYTE COUNT IN PCBB+0
: 3-CLEAR PCBB+2 AND PCBB+4
: 4-VERIFY MICROMONITOR IS IN 'INMON' STATE
: 5-SELECT MICROTEST #7
: 6-VERIFY TRANSMIT BYTE COUNT SAME AS RECEIVE BYTE COUNT
: 7-VERIFY ACTUAL NUMBER OF BYTES RECEIVED IS CORRECT
: 8-WRITE '1' TO CLEAR 'DNI'
: 9-ADD 2 TO BYTE COUNT IN PCBB+0
: 10-REPEAT STEPS 3-9 UNTIL PCBB+0 REACHES MAXIMUM BYTE COUNT

BGNTS7

T28::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'D' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'D'
:OK
TRAP CS\$ESCAPE
.WORD L10146-.
:WAIT FOR THE MICROMONITOR
:OK
TRAP CSERHRD
.WORD 153
.WORD ODDBYT
.WORD MSG1

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 195
 C7UAAB.MAC 07-APR-83 17:03 TEST 28: ODD BYTE TEST

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9237 040324'          ESCAPE TST
9238 040324' 104410          TRAP      C$ESCAPE
9239 040326' 000260          .WORD    L10146-
9240 040330' 004737 017362' 20$: JSR      PC,CLRDN1      ;CLEAR DNI BIT
9241 040334' 103006          BCC      25$
9242 040336'          ERRHRD   154,ODDBYT,RACMG7 ;DNI DID NOT CLEAR!
9243 040336' 104456          TRAP      C$ERHRD
9244 040340' 000232          .WORD    154
9245 040342' 002765'          .WORD    ODDBYT
9246 040344' 012670'          .WORD    RACMG7
9247 040346'          ESCAPE TST
9248 040346' 104410          TRAP      C$ESCAPE
9249 040350' 000236          .WORD    L10146-
9250 040352'          25$:
9251 040352'          ENDSEG
9252 040352'          10000$:
9253 040352' 104405          TRAP      C$ESEG
9254
9255          ;LOAD PCBB+0 WITH THE MINIMUM ODD BYTE COUNT
9256          ;
9257 040354' 012737 000101 000606' 30$: MOV      #MINBYT+1,PCBB      ;BEGIN WITH MINIMUM ODD BYTE COUNT
9258 040362'
9259          ;
9260          ;CLEAR PCBB+2 AND PCBB+4. WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON'
9261          ;STATE. EXECUTE MICROTEST #7 BY LOADING THE COMMAND FIELD OF PCSRO WITH A
9262          ;'7'. WAIT FOR 'DNI'
9263          ;
9264          BGNSEG
9265 040362' 104404          TRAP      C$BSEG
9266 040364' 005037 000610'          CLR      PCBB+2          ;THIS IS WHERE MICROCODE WILL PUT...
9267          ;RECEIVER BYTE COUNT
9268 040370' 005037 000612'          CLR      PCBB+4          ;HERE IS WHERE MICROCODE WILL PUT...
9269          ;ACTUAL NUMBER OF BYTES RECEIVED
9270 040374' 004737 020060'          JSR      PC,CHKMON      ;WAIT FOR MICROMONITOR
9271 040400' 100006          BCC      35$
9272 040402'          ERRHRD   156,ODDBYT,MSG46 ;PRINT ERROR
9273 040402' 104456          TRAP      C$ERHRD
9274 040404' 000234          .WORD    156
9275 040406' 002765'          .WORD    ODDBYT
9276 040410' 016666'          .WORD    MSG46
9277 040412'          ESCAPE TST          ;LEAVE TEST
9278 040412' 104410          TRAP      C$ESCAPE
9279 040414' 000172          .WORD    L10146-
9280 040416' 012777 000007 137712 35$: MOV      #7,APCSRO      ;TELL T11 TO EXECUTE MICROTEST #7
9281 040424' 012737 000176 000332' MOV      #2*SECOND,METER ;WAIT FOR DNI
9282 040432' 004737 017316'          JSR      PC,CHKDNI
9283 040436' 103021          BCC      40$
9284 040440' 004737 020132'          JSR      PC,CHKINT      ;SEE IF ANY ERROR INTERRUPTS OCCURRED
9285 040444' 103006          BCC      36$
9286 040446'          ERRHRD   157,ODDBYT,MSG44 ;PRINT ERROR MESSAGE
9287 040446' 104456          TRAP      C$ERHRD
9288 040450' 000235          .WORD    157
9289 040452' 002765'          .WORD    ODDBYT
9290 040454' 016442'          .WORD    MSG44
9291 040456'          ESCAPE TST
9292 040456' 104410          TRAP      C$ESCAPE
    
```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 196
CZUAAB.MAC 07-APR-83 17:03 TEST 28: ODD BYTE TEST

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9293 040460' 000126
9294 040462' 012702 000007
9295 040466'
9296 040466' 104456
9297 040470' 000236
9298 040472' 002765'
9299 040474' 013466'
9300 040476'
9301 040476' 104410
9302 040500' 000106
9303
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9310 040502' 013701 000606'
9311 040506' 010102
9312 040510' 013703 000610'
9313 040514' 013704 000612'
9314 040520' 020203
9315 040522' 001004
9316 040524' 162704 000001
9317 040530' 020104
9318 040532' 001404
9319 040534'
9320 040534' 104456
9321 040536' 000237
9322 040540' 002765'
9323 040542' 014052'
9324 040544'
9325 040544'
9326 040544'
9327 040544' 104405
9328
9329
9330
9331 040546' 004737 017362'
9332 040552' 103006
9333 040554'
9334 040554' 104456
9335 040556' 000240
9336 040560' 002765'
9337 040562' 012670'
9338 040564'
9339 040564' 104410
9340 040566' 000020
9341
9342
9343
9344
9345 040570' 062737 000002 000606'
9346 040576' 023727 000606' 002756
9347 040604' 003666
9348 040606'

```

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36S:  MOV #7,R2
      ERRHRD 158,ODDBYT,MSG12
      :MICROTEST #7 IS MUNG
      .WORD L10146-.
      TRAP CSERHRD
      .WORD 158
      .WORD ODDBYT
      .WORD MSG12
      ESCAPE TST
      TRAP CSESCAPE
      .WORD L10146-.
      :CHECK PCBB+2 TO SEE IF IT IS THE SAME AS PCBB+0, THIS WILL VERIFY THE
      :THE TRANSMIT AND RECEIVE BYTE COUNTS ARE THE SAME. THEN CHECK PCBB+4
      :TO SEE IF IT IS ONE LARGER THAN THE RECEIVE BYTE COUNT. THIS IS BECAUSE
      :THE RECEIVE CAN ONLY ADDRESS LINK MEMORY IN WORD BOUNDARIES SO THE ACTUAL
      :NUMBER OF BYTES THAT ARE CHANGED IS ONE MORE THAN WHAT WAS TRANSMITTED
      :
      40S:  MOV PCBB,R1
          MOV R1,R2
          MOV PCBB+2,R3
          MOV PCBB+4,R4
          CMP R2,R3
          BNE 45S
          SUB #1,R4
          CMP R1,R4
          BEQ 50S
          :GET TRANSMIT BYTE COUNT
          :GET RECEIVE BYTE COUNT
          :GET ACTUAL NUMBER OF BYTES TRANSMITTED
          :IS THE RECEIVE BYTE COUNT CORRECT?
          :NO, ERROR
          :ACCOUNT FOR THE GARBAGE BYTE
          :IS THE ACTUAL NUMBER OF BYTES CORRECT?
          :YES
      45S:  ERRHRD 159,ODDBYT,MSG19
          :PRINT ERROR MESSAGE
          TRAP CSERHRD
          .WORD 159
          .WORD ODDBYT
          .WORD MSG19
      50S:  ENDSEG
          10001S: TRAP CSESEG
      :WRITE '1' TO CLEAR 'DNI'
      :
      JSR PC,CLRDN1
      BCC 60S
      ERRHRD 160,ODDBYT,RACMG7
      :CLEAR DNI BIT
      :ERROR DNI DID NOT CLEAR!
      TRAP CSERHRD
      .WORD 160
      .WORD ODDBYT
      .WORD RACMG7
      ESCAPE TST
      TRAP CSESCAPE
      .WORD L10146-.
      :REPEAT MICROTEST #7 EACH TIME GIVING IT A LARGER ODD BYTE COUNT. CONTINUE
      :UNTIL THE MAXIMUM BYTE COUNT IS REACHED
      :
      60S:  ADD #2,PCBB
          CMP PCBB,#MAXBYT
          BLE 30S
          :UP THE BYTE COUNT
          :HAVE WE DONE ALL ODD BYTE COUNTS?
          :NO, CONTINUE TEST WITH NEW BYTE COUNT
      ENDTST

```


65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 197
CZUAAB.MAC 07-APR-83 17:03 TEST 28: ODD BYTE TEST

9349 040606'
9350 040606' 104401

L10146: TRAP CSETST

6SHARDWARE TESTS
CZUAAB.MAC 07-APR-83

MACY11 30A(1052) 07-APR-83 17:03

07-APR-83 17:13 PAGE 198
TEST 29: LINK MAXIMUM BYTE COUNTER TEST

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040610'
040610'

040610'
040610' 104404
040612' 022737
040620' 001004
040622' 122777
040630' 001440
040632' 012737
040640' 004737
040644' 103002
040646'
040646' 104410
040650' 000256
040652' 012737
040660' 004737
040664' 103022
040666' 012737
040674' 012737
040702' 012737
040710' 012737
040716'
040716' 104456

000104 000326'
000001 137510
000104 000326' 5\$:
020340'

000176 000332' 10\$:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

.SBTTL TEST 29: LINK MAXIMUM BYTE COUNTER TEST

:*****

: THE RECEIVE BYTE COUNTER IS A 12 BIT BINARY COUNTER THAT COUNTS THE NUMBER OF
: BYTES THAT WERE RECEIVED DURING A DATAGRAM TRANSMISSION. THE BYTE COUNTER IS
: INCREMENTED AS EACH BYTE IS RECEIVED. THE RECEIVE BYTE COUNTER HAS LOGIC THAT
: DISABLES THE COUNTER IF THE MAXIMUM VALUE IS REACHED AND PREVENTS THE COUNTER
: FROM ROLLING OVER TO ZERO.

: THIS TEST WILL CHECK THAT THE COUNTER 'TOPS OUT' AT THE MAXIMUM COUNTER VALUE.
: IT DO THIS MICROMODULE 'D' MICROTEST #9 IS USED. IT WILL TRANSMIT A DATAGRAM
: OF MAXIMUM COUNTER LENGTH OVER THE LOOPBACK. THE LINK CRC HARDWARE WILL BE
: ALLOCATED TO THE TRANSMIT SIDE SO THAT CRC BYTES WILL APPENDED TO THE DATAGRAM.
: THE LENGTH OF THE DATAGRAM WILL THEREFORE EXCEED THE LENGTH OF THE RECEIVE
: BYTE COUNTER. THE RECEIVE COUNTER WILL BE CHECKED TO INSURE THAT THE COUNTER
: HAS REMAINED AT THE MAXIMUM VALUE, IF NOT AN ERROR IS PASSED TO THE HOST.

: TEST SEQUENCE:

- 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
- 2-VERIFY MICROMONITOR IS IN THE 'INMON' STATE
- 3-SELECT MICROTEST #9
- 4-WAIT FOR 'DNI'
- 5-CHECK FOR AN ERROR IN PCSR1
- 6-WRITE '1' TO CLEAR 'DNI'

:*****

BGNTST

T29::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

CMP	#'D,MICRO	:	HAS MICROCODE MODULE 'D' BEEN LOADED?
BNE	5\$:	NO
CMPB	#INMON,#PCSR1	:	YES, IS THE MICROMONITOR ACTIVE?
BEQ	20\$:	YES SKIP LOADING THE MICROMODULE
MOV	#'D,MICRO	:	GO LOAD MICROCODE MODULE D
JSR	PC,LCDMIC	:	
BCC	10\$:	OK
ESCAPE	TST	:	

TRAP CSBSEG
.WORD L10147-

MOV	#2*SECOND,METER	:	WAIT FOR THE MICROMONITOR
JSR	PC,CHKDNI	:	
BCC	20\$:	OK

MOV	#SDNI,BITNAM	:	
MOV	#SNSET,BITSTA	:	
MOV	#SAFTER,PWHEN	:	
MOV	#SGTCMD,PCOMND	:	
ERRHRD	161,MAXCNT,MSG1	:	PRINT ERROR MESSAGE

TRAP CSERHRD

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 199
 CZUAAB.MAC 07-APR-83 17:03 TEST 29: LINK MAXIMUM BYTE COUNTER TEST

9407	040720'	000241						.WORD	161
9408	040722'	003027'						.WORD	MAXCNT
9409	040724'	012716'						.WORD	MSG1
9410	040726'			ESCAPE	TST				
9411	040726'	104410						TRAP	CSESCAPE
9412	040730'	000176						.WORD	L10147-
9413	040732'	004737	017362'	20\$:	JSR	PC,CLRDNI			:CLEAR DNI
9414	040736'	103006			BCC	25\$			
9415	040740'				ERRHRD	162,MAXCNT,RACMG7			
9416	040740'	104456						TRAP	CSEHRD
9417	040742'	000242						.WORD	162
9418	040744'	003027'						.WORD	MAXCNT
9419	040746'	012670'						.WORD	RACMG7
9420	040750'			ESCAPE	TST				
9421	040750'	104410						TRAP	CSESCAPE
9422	040752'	000154						.WORD	L10147-
9423	040754'			25\$:					
9424	040754'			ENDSEG					
9425	040754'							10000\$:	
9426	040754'	104405						TRAP	CSESEG
9427				:					
9428				:	:WAIT FOR THE MICROMONITOR TO ENTER THE 'IN MONITOR' STATE, LOAD COMMAND				
9429				:	:FIELD OF PCSRO WITH A 9 CAUSING THE MICROMONITOR TO EXECUTE MICROTEST #9.				
9430				:	:WAIT FOR DNI				
9431				:					
9432	040756'			BGNSEG					
9433	040756'	104404						TRAP	C\$BSEG
9434	040760'	004737	020060'		JSR	PC,CHKMON			:WAIT FOR MICROMONITOR
9435	040764'	103006			BCC	30\$:OK
9436	040766'				ERRHRD	163,MAXCNT,MSG46			:PRINT ERROR
9437	040766'	104456						TRAP	CSEHRD
9438	040770'	000243						.WORD	163
9439	040772'	003027'						.WORD	MAXCNT
9440	040774'	016666'						.WORD	MSG46
9441	040776'			ESCAPE	TST				:LEAVE TEST
9442	040776'	104410						TRAP	CSESCAPE
9443	041000'	000126						.WORD	L10147-
9444	041002'	012777	000011	137326	30\$:	MOV	#9.,@PCSRO		:TELL MICROMONITOR TO EXECUTE...
9445									:MICROTEST #9
9446	041010'	012737	000176	000332'		MOV	#2*SECOND,METER		:PUT SOME TIME ON THE METER
9447	041016'	004737	017316'			JSR	PC,CHKDNI		:WAIT FOR MICROTEST TO FINISH
9448	041022'	103021				BCC	40\$:OK, IT FINISHED
9449	041024'	004737	020132'			JSR	PC,CHKINT		:SEE IF ANY ERROR INTERRUPTS OCCURRED
9450	041030'	103006				BCC	35\$:NO, OK
9451	041032'					ERRHRD	164,MAXCNT,MSG44		:PRINT ERROR MESSAGE
9452	041032'	104456						TRAP	CSEHRD
9453	041034'	000244						.WORD	164
9454	041036'	003027'						.WORD	MAXCNT
9455	041040'	016442'						.WORD	MSG44
9456	041042'			ESCAPE	TST				
9457	041042'	104410						TRAP	CSESCAPE
9458	041044'	000062						.WORD	L10147-
9459	041046'	012702	000011		35\$:	MOV	#9.,R2		:MICROTEST #
9460	041052'					ERRHRD	165,MAXCNT,MSG12		:TELL MICROTEST HUNG
9461	041052'	104456						TRAP	CSEHRD
9462	041054'	000245						.WORD	165

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 200
CZUAAB.MAC 07-APR-83 17:03 TEST 29: LINK MAXIMUM BYTE COUNTER TEST

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9463 041056' 003027' .WORD MAXCNT
9464 041060' 013466' .WORD MSG12
9465 041062' ESCAPE TST
9466 041062' 104410 TRAP C$ESCAPE
9467 041064' 000042 .WORD L10147-
9468
9469 ;MICROTEST IS COMPLETE, NOW CHECK TO SEE IF IT WAS SUCCESSFULL
9470
9471 041066' 122777 000003 137244 40$: CMPB #INERR,BPCSR1 ;DID AN ERROR OCCUR?
9472 041074' 001004 BNE 50$ ;NO
9473 041076' ERRHRD 166,MAXCNT,MSG38 ;PRINT ERROR MESSAGE
9474 041076' 104456 TRAP CSERHRD
9475 041100' 000246 .WORD 166
9476 041102' 003027' .WORD MAXCNT
9477 041104' 016034' .WORD MSG38
9478
9479 ;WRITE ONE TO CLEAR THE DNI BIT
9480
9481 041106' 004737 017362' 50$: JSR PC,CLRDNI ;CLEAR DNI
9482 041112' 103004 BCC 55$
9483 041114' ERRHRD 167,MAXCNT,RACMG7
9484 041114' 104456 TRAP CSERHRD
9485 041116' 000247 .WORD 167
9486 041120' 003027' .WORD MAXCNT
9487 041122' 012670' .WORD RACMG7
9488 041124' 55$:
9489 041124' ENDSEG
9490 041124' 10001$:
9491 041124' 104405 TRAP C$ESEG
9492 041126' ENDTST
9493 041126' L10147:
9494 041126' 104401 TRAP C$ETST

```

55HARDWARE TESTS
CZUAAB.MAC

MACY11
07-APR-83 17:03

30A(1052) 07-APR-83 17:13 PAGE 201
TEST 30: FIFO TEST

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.SBTTL TEST 30: FIFO TEST

:THERE ARE TWO FIFO'S USED IN THE DEUNA TO KEEP TRACK OF RECEIVER BUFFERS.
:THE FIRST IS CALLED THE 'RECEIVER BUFFER AVAILABLE FIFO' AND THE SECOND IS
:CALLED THE 'RECEIVER BUFFER DONE FIFO'.

:THE T11 LOADS THE RECEIVER BUFFER AVAILABLE FIFO WITH A LIST OF UNUSED 1K
:BUFFERS IN LINK MEMORY. WHEN THE DEUNA SENSES THAT A PACKET IS COMING IN IT
:PULLS AN AVAILABLE BUFFER ADDRESS FROM THE OUTPUT OF THE RECEIVER BUFFER
:AVAILABLE FIFO AND USES IT TO ADDRESS LINK MEMORY FOR THE STORAGE OF THE
:RECEIVED DATA. AFTER THE DATA HAS BEEN LOADED THE RECEIVER STATE MACHINE
:PUTS THE USED BUFFER ADDRESS INTO THE RECEIVER BUFFER DONE FIFO WHERE AN
:INTERRUPT IS GENERATED TO THE T11 WHEN IT BUBBLES TO THE TOP OF THE FIFO.

:THESE FIFO'S ARE 64 DEEP BY 4 BITS WIDE. THE OPERATIONAL MICROCODE ONLY FILLS
:THE FIFO TO A MAXIMUM OF 16. THE 4 BIT WIDTH REPRESENTS BITS 14-11 OF THE
:LINK MEMORY ADDRESS. THESE BITS ALLOW THE ADDRESSING OF A 1K BUFFER IN LINK
:MEMORY.

:THIS TEST WILL VERIFY THAT THE RECEIVE BUFFER AVAILABLE FIFO AND THE RECEIVER
:BUFFER DONE FIFO OPERATE CORRECTLY. THIS WILL BE DONE BY LOADING THE RECEIVER
:BUFFER AVAILABLE FIFO WITH A 1K BUFFER ADDRESS THEN A PACKET WILL BE
:TRANSMITTED IN LOOPBACK MODE. AFTER THE RECEIVER INTERRUPT OCCURS THE RECEIVER
:BUFFER DONE FIFO IS READ AND THE ADDRESS IS COMPARED WITH WHAT WAS GIVEN
:THE RECEIVER BUFFER AVAILABLE FIFO. THEY SHOULD BE THE SAME IF EVERYTHING IS
:WORKING CORRECTLY. THE OPERATION IS PERFORMED WITH THE TRANSMITTER BUFFER
:SET TO 0 AND WILL BE REPEATED WITH RECEIVER BUFFERS 1-15.
:THIS TEST WILL USE MICROMODULE 'D' MICROTST #10.

:PARAMETERS PASSED TO THE MICROCODE WILL BE FORMATTED IN THE PCBB AS FOLLOWS:

:PCBB+0: RECEIVE BUFFER ADDRESS
:PCBB+2: RECEIVE BUFFER COMPLETED ADDRESS

:TEST SEQUENCE:

- 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
- 2-LOAD PCBB+0 WITH A RECEIVER BUFFER
- 3-CLEAR PCBB+2
- 4-VERIFY MICROMONITOR IS IN THE 'INMON' STATE
- 5-SELECT MICROTST #10
- 6-WAIT FOR 'DNI' BIT
- 7-VERIFY PCBB+2 SAME AS PCBB+0
- 8-WRITE '1' TO CLEAR 'DNI'
- 9-REPEAT STEPS 2-8 FOR RECEIVER BUFFERS 1-15

BGNTST

T30::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

041130'
041130'

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 202
 CZUAB.MAC 07-APR-83 17:03 TEST 30: FIFO TEST

```

9551 041130'          BGNSEG
9552 041130' 104404          TRAP  CSBSEG
9553 041132' 022737 000104 000326'      CMP      #'D,MICRO      ;HAS MICROCODE MODULE 'D' BEEN LOADED
9554 041140' 001004          BNE      5$           ;NO
9555 041142' 122777 000001 137170      CMPB    #INMON,@PCSR1 ;YES, IS THE MICROMONITOR ACTIVE?
9556 041150' 001440          BEQ      20$           ;YES SKIP LOADING THE MICROMODULE
9557 041152' 012737 000104 000326' 5$:  MOV      #'D,MICRO      ;GO LOAD MICRO MODULE 'D'
9558 041160' 004737 020340'          JSR      PC,LODMIC
9559 041164' 103002          BCC      10$           ;OK
9560 041166'          ESCAPE  TST
9561 041166' 104410          TRAP  C$ESCAPE
9562 041170' 000326          .WORD  L10150-.
9563 041172' 012737 000176 000332' 10$: MOV      #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
9564 041200' 004737 017316'          JSR      PC,CHKDNI
9565 041204' 103022          BCC      20$           ;OK
9566 041206' 012737 001000' 000310'      MOV      #SDNI,BITNAM
9567 041214' 012737 001277' 000312'      MOV      #SNSET,BITSTA
9568 041222' 012737 001342' 000314'      MOV      #SAFTER,PWHEN
9569 041230' 012737 001357' 000316'      MOV      #SGTCMD,PCOMND
9570 041236'          ERRHRD 168,FIFTST,MSG1
9571 041236' 104456          TRAP  C$SERHRD
9572 041240' 000250          .WORD  168
9573 041242' 003073'          .WORD  FIFTST
9574 041244' 012716'          .WORD  MSG1
9575 041246'          ESCAPE  TST
9576 041246' 104410          TRAP  C$ESCAPE
9577 041250' 000246          .WORD  L10150-.
9578 041252' 004737 017362' 20$:  JSR      PC,CLRDNI      ;CLEAR DNI BIT
9579 041256' 103006          BCC      25$           ;DNI DID NOT CLEAR!
9580 041260'          ERRHRD 169,FIFTST,RACMG7
9581 041260' 104456          TRAP  C$SERHRD
9582 041262' 000251          .WORD  169
9583 041264' 003073'          .WORD  FIFTST
9584 041266' 012670'          .WORD  RACMG7
9585 041270'          ESCAPE  TST
9586 041270' 104410          TRAP  C$ESCAPE
9587 041272' 000224          .WORD  L10150-.
9588 041274'          25$:
9589 041274'          ENDSEG
9590 041274'          10000$:
9591 041274' 104405          TRAP  C$ESEG
9592          ;
9593          ;LINK MEMORY STARTS AT MICROMEMORY ADDRESS 100000, THE MICROTEST WILL USE
9594          ;100000 AS THE TRANSMIT BUFFER ADDRESS SO THE FIRST RECEIVE BUFFER ADDRESS
9595          ;WE WILL PASS TO THE MICROCODE WILL BE 104000
9596          ;
9597 041276' 012701 104000      MOV      #LINADR+SIZ1K,R1 ;FIRST RECEIVE BUFFER STARTS 1K FROM
9598          ;BASE OF LINK MEMORY
9599 041302'          30$:
9600          ;
9601          ;PUT THE BUFFER ADDRESS WE WANT THE MICROCODE TO LOAD INTO THE AVAILABLE BUFFER
9602          ;INTO PCBB AND CLEAR PCBB+2. WAIT FOR THE MICROMONITOR TO BECOME READY, THEN
9603          ;SELECT MICROTEST #10 BY LOADING THE COMMAND FIELD OF PCSR0 WITH A 10. WAIT FOR
9604          ;'DNI'
9605          ;
9606 041302'          BGNSEG

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 203
CZUAAB.MAC 07-APR-83 17:03 TEST 30: FIFO TEST

```

9607 041302' 104404 TRAP CSBSEG
9608 041304' 010137 000606' MOV R1,PCBB ;PASS AVAILABLE RECEIVER BUFFER TO DEUNA
9609 041310' 005037 000610' CLR PCBB+2 ;HERE IS WHERE THE MICRO WILL PUT THE
9610 ; 'DONE' RECEIVE BUFFER FIFO ADDRESS
9611 041314' 004737 020060' JSR PC,LHKMON ;WAIT FOR MICROMONITOR
9612 041320' 103006 BCC 35$ ;OK
9613 041322' ERRHRD 170,FIFTST,MSG46 ;PRINT ERROR
9614 041322' 104456 TRAP CSERHRD
9615 041324' 000252 .WORD 170
9616 041326' 003073' .WORD FIFTST
9617 041330' 016666' .WORD MSG46
9618 041332' ESCAPE TST ;LEAVE TEST
9619 041332' 104410 TRAP C$ESCAPE
9620 041334' 000162 .WORD L10150-
9621 041336' 012777 000012 136772 35$: MOV #10.,@PCSR0 ;TELL T11 TO EXECUTE MICROTEST #10
9622 041344' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
9623 041352' 004737 017316' JSR PC,CHKDNI
9624 041356' 103021 BCC 45$ ;OK
9625 041360' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
9626 041364' 103006 BCC 40$ ;NO, OK
9627 041366' ERRHRD 171,FIFTST,MSG44 ;PRINT ERROR MESSAGE
9628 041366' 104456 TRAP CSERHRD
9629 041370' 000253 .WORD 171
9630 041372' 003073' .WORD FIFTST
9631 041374' 016442' .WORD MSG44
9632 041376' ESCAPE TST
9633 041376' 104410 TRAP C$ESCAPE
9634 041400' 000116 .WORD L10150-
9635 041402' 012702 000012 40$: MOV #10.,R2 ;MICROTEST #10 IS HUNG
9636 041406' ERRHRD 172,FIFTST,MSG12 ;PRINT ERROR MESSAGE
9637 041406' 104456 TRAP CSERHRD
9638 041410' 000254 .WORD 172
9639 041412' 003073' .WORD FIFTST
9640 041414' 013466' .WORD MSG12
9641 041416' ESCAPE TST
9642 041416' 104410 TRAP C$ESCAPE
9643 041420' 000076 .WORD L10150-
9644
9645 ;OK, THE MICROCODE HAS FILLED PCBB+2 WITH THE OUTPUT OF THE RECEIVER BUFFER
9646 ;DONE FIFO HOWEVER, THIS VALUE IS NOT IN ADDRESS FORM BECAUSE THERE ARE SOME
9647 ;UNUSED BITS (15,10:00) THAT COULD BE FLOATING SO, STRIP THESE BITS FIRST.
9648 ;THEN SET BIT 15 TO FORCE THE ADDRESS TO BE A LINK MEMORY ADDRESS, COMPARE
9649 ;THE ADDRESS GIVEN TO THE MICROCODE WITH THE ONE JUST GENERATED, THEY SHOULD
9650 ;BE IDENTICAL, IF NOT, PRINT ERROR.
9651
9652 041422' 042737 103777 000610' 45$: BIC #103777,PCBB+2 ;STRIP OFF THE FLOATING BITS
9653 041430' 052737 100000 000610' BIS #100000,PCBB+2 ;MAKE IT A LINK MEMORY ADDRESS
9654 041436' 023737 000606' 000610' CMP PCBB,PCBB+2 ;DID THE DEUNA USE THE BUFFER AVAILABLE
9655 041444' 001404 BEQ 50$ ;YES
9656 041446' ERRHRD 173,FIFTST,MSG35 ;NO, PRINT ERROR MESSAGE
9657 041446' 104456 TRAP CSERHRD
9658 041450' 000255 .WORD 173
9659 041452' 003073' .WORD FIFTST
9660 041454' 015672' .WORD MSG35
9661 041456'
9662 041456' 50$:
ENDSEG

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 204
CZUAAB.MAC 07-APR-83 17:03 TEST 30: FIFO TEST

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9663 041456'
9664 041456' 104405
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9668 041460' 004737 017362'
9669 041464' 103006
9670 041466'
9671 041466' 104456
9672 041470' 000256
9673 041472' 003073'
9674 041474' 012670'
9675 041476'
9676 041476' 104410
9677 041500' 000016
9678
9679
9680
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9682 041502' 020127 174000
9683 041506' 001403
9684 041510' 062701 004000
9685 041514' 000672
9686 041516'
9687 041516'
9688 041516'
9689 041516' 104401

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:WRITE '1' TO CLEAR 'DNI' BIT
:
JSR PC,CLRDNI ;GO CLEAR DNI
BCC 60$ ;OK
ERRHRD 174,FIFTST,RACMG7 ;ERROR DNI DID NOT CLEAR!
TRAP CSERHRD
.WORD 174
.WORD FIFTST
.WORD RACMG7
ESCAPE TST
TRAP CSESCAPE
.WORD L10150-.
:CHECK TO SEE IF WE HAVE TRIED ALL 15 RECEIVER BUFFER ADDRESSES, IF NOT,
:GENERATE A NEW ADDRESS TO PASS TO THE MICROCODE AND RUN THRU THE TEST AGAIN
:
60$: CMP R1,#LINADR+<SIZ1K*15.> ;HAVE WE TRIED ALL 15 BUFFERS
BEQ 70$ ;YES ALL DONE
ADD #SIZ1K,R1 ;NO POINT TO NEXT RECEIVER BUFFER
BR 30$ ;DO AGAIN
70$:
ENDTST

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10001$: TRAP CSESEG
L10150: TRAP CSETST

```


65 HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 205
TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

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.SBTTL TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

: THIS TEST WILL VERIFY THAT BUFFERS 1-15 OF LINK MEMORY CAN BE ADDRESSED
: CORRECTLY BY THE RECEIVER. THIS WILL BE DONE BY DIRECTING THE MICROCODE TO
: TRANSMIT A DATA PATTERN FROM BUFFER 0 AND TO RECEIVE THE DATA IN BUFFER X
: WHERE X = 1-15. THEN A CHECK WILL BE MADE TO SEE IF THE PATTERN NOT ONLY
: ARRIVED IN THE CORRECT RECEIVER BUFFER BUT THAT THE PATTERN DOES NOT SHOW UP
: ANYWHERE ELSE IN LINK MEMORY EXCEPT WHERE IT WAS SUPPOSE TO.

: THIS TEST WILL USE MICROMODULE 'D' MICROTEST #11. THIS MICROTEST ACCEPTS 2
: PARAMETERS: THE TRANSMIT BUFFER AND THE RECEIVER BUFFER. IT WILL SET UP
: A DATA PATTERN IN THE TRANSMIT BUFFER AND TELL THE LINK TO TRANSMIT, IN
: LOOPBACK MODE, FROM THE TRANSMIT BUFFER GIVEN TO THE RECEIVER BUFFER GIVEN.
: AFTER THE RECEIVER INTERRUPT, THE DATA IS CHECKED IN THE EXPECTED RECEIVER
: BUFFER FOR THE CORRECT DATA PATTERN. THEN ALL OF LINK MEMORY (EXCEPT FOR THE
: TRANSMIT BUFFER) IS CHECKED TO SEE IF THE PATTERN ENDS UP ELSEWHERE. IF
: AN ERROR IS FOUND THE MICROCODE PASSES THE ADDRESS OF LINK MEMORY WHERE THE
: ERROR WAS FOUND, THE DATA THAT WAS FOUND THERE ALONG WITH THE DATA THAT SHOULD
: HAVE BEEN THERE.

: THE PARAMETERS FOR THE MICROCODE ARE FORMATED IN THE PCBB AS FOLLOWS:

: PCBB+0: RECEIVER BUFFER ADDRESS
: PCBB+2: TRANSMIT BUFFER ADDRESS
: PCBB+4: LINK MEMORY ADDRESS (IF ERROR)
: PCBB+6: GOOD DATA PATTERN (IF ERROR)
: PCBB+10: BAD DATA PATTERN (IF ERROR)

: TEST SEQUENCE:

- 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
- 2-SET PCBB+0 WITH TRANSMIT BUFFER 0 ADDRESS
- 3-SET PCBB+2 WITH RECEIVER BUFFER ADDRESS
- 4-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
- 5-SELECT MICROTEST #11
- 6-WAIT FOR 'DNI'
- 7-CHECK FOR ERROR IN PCSR1 IF SO PRINT ERROR MESSAGE
- 8-WRITE '1' TO CLEAR 'DNI'
- 9-REPEAT STEPS 2-8 WITH RECEIVER BUFFERS 1-15

BGNTST

T31::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

041520'
041520'

041520' 104404
041522' 022737 000104 000326'
041530' 001004
041532' 122777 000001 136600
041540' 001440

CMP #D,MICRO :HAS MICROCODE MODULE 'D' BEEN LOADED
BNE 58 :NO
CMPB #INMON,@PCSR1 :YES, IS THE MICROMONITOR ACTIVE?
BEQ 208 :YES SKIP LOADING THE MICROMODULE

65HARDWARE TESTS
CZUAAB.MAC

07-APR-83

MACY11 30A(1052)
17:0307-APR-83 17:13 PAGE 206
TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

```

9746 041542' 012737 000104 000326' 5$:  MOV      #'D,MICRO          ;GO LOAD MICRO MODULE 'D'
9747 041550' 004737 020340'          JSR      PC,LODMIC
9748 041554' 103002          BCC     10$          ;OK
9749 041556'          ESCAPE  TST
9750 041556' 104410          TRAP    CSERHRD
9751 041560' 000322          .WORD  L10151-.
9752 041562' 012737 000176 000332' 10$:  MOV      #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
9753 041570' 004737 017316'          JSR      PC,CHKDNI
9754 041574' 103022          BCC     20$          ;OK
9755 041576' 012737 001000' 000310'  MOV      #SDNI,BITNAM
9756 041604' 012737 001277' 000312'  MOV      #SNSET,BITSTA
9757 041612' 012737 001342' 000314'  MOV      #SAFTER,PWHEN
9758 041620' 012737 001357' 000316'  MOV      #SGTCMD,PCOMND
9759 041626'          ERRHRD  175,RLNKAD,MSG1
9760 041626' 104456          TRAP    CSERHRD
9761 041630' 000257          .WORD  175
9762 041632' 003114'          .WORD  RLNKAD
9763 041634' 012716'          .WORD  MSG1
9764 041636'          ESCAPE  TST
9765 041636' 104410          TRAP    CSERHRD
9766 041640' 000242          .WORD  L10151-.
9767 041642' 004737 017362' 20$:  JSR      PC,CLRDNI          ;CLEAR DNI BIT
9768 041646' 103006          BCC     25$
9769 041650'          ERRHRD  176,RLNKAD,RACMG7 ;DNI DID NOT CLEAR!
9770 041650' 104456          TRAP    CSERHRD
9771 041652' 000260          .WORD  176
9772 041654' 003114'          .WORD  RLNKAD
9773 041656' 012670'          .WORD  RACMG7
9774 041660'          ESCAPE  TST
9775 041660' 104410          TRAP    CSERHRD
9776 041662' 000220          .WORD  L10151-.
9777 041664'          25$:
9778 041664'          ENDSEG
9779 041664'          10000$:
9780 041664' 104405          TRAP    CSESEG
9781          ;
9782          ;LOAD PCBB+2 WITH THE ADDRESS OF THE FIRST TRANSMIT BUFFER
9783          ;LOAD PCBB+0 WITH THE FIRST RECEIVER BUFFER ADDRESS
9784          ;
9785 041666' 012701 002756          MOV      #MAXBYT,R1          ;TRANSMIT BYTE COUNT
9786 041672' 012737 100000 000610'  MOV      #LINADR,PCBB+2      ;SET TRANSMIT BUFFER AT BASE OF LINK
9787          ;MEMORY
9788 041700' 012737 104000 000606'  MOV      #LINADR+SIZ1K,PCBB ;FIRST RECEIVE BUFFER STARTS 1K FROM
9789          ;BASE OF LINK MEMORY
9790 041706'          30$:
9791 041706'          BGNSEG
9792 041706' 104404          TRAP    CSBSEG
9793          ;
9794          ;WAIT FOR THE MICROMONITOR, THEN SELECT MICROTTEST #11 BY LOADING THE COMMAND
9795          ;FIELD OF PCSRO WITH 11 , WAIT FOR 'DNI'
9796          ;
9797 041710' 004737 020060'          JSR      PC,CHKMON          ;WAIT FOR MICROMONITOR
9798 041714' 103006          BCC     35$          ;OK
9799 041716'          ERRHRD  177,RLNKAD,MSG46 ;PRINT ERROR
9800 041716' 104456          TRAP    CSERHRD
9801 041720' 000261          .WORD  177

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 207
CZUAAB.IIAC 07-APR-83 17:03 TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

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9802 041722' 003114' .WORD RLNKAD
9803 041724' 016666' .WORD MSG46
9804 041726' ESCAPE TST ;LEAVE TEST
9805 041726' 104410 TRAP C$ESCAPE
9806 041730' 000152 .WORD L10151-.
9807 041732' 012777 000013 136376 35$: MOV #11,@PCSR0 ;TELL T11 TO EXECUTE MICROTEST #11
9808 041740' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
9809 041746' 004737 017316' JSR PC,CHKDNI
9810 041752' 103021 BCC 45$ ;OK
9811 041754' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
9812 041760' 103006 BCC 40$ ;NO, OK
9813 041762' ERRHRD 178,RLNKAD,MSG44 ;PRINT ERROR MESSAGE
9814 041762' 104456 TRAP C$ERHRD
9815 041764' 000262 .WORD 178
9816 041766' 003114' .WORD RLNKAD
9817 041770' 016442' .WORD MSG44
9818 041772' ESCAPE TST
9819 041772' 104410 TRAP C$ESCAPE
9820 041774' 000106 .WORD L10151-.
9821 041776' 012702 000013 40$: MOV #11,R2 ;MICROTEST #11 IS HUNG
9822 042002' ERRHRD 179,RLNKAD,MSG12 ;PRINT ERROR MESSAGE
9823 042002' 104456 TRAP C$ERHRD
9824 042004' 000263 .WORD 179
9825 042006' 003114' .WORD RLNKAD
9826 042010' 013466' .WORD MSG12
9827 042012' ESCAPE TST
9828 042012' 104410 TRAP C$ESCAPE
9829 042014' 000066 .WORD L10151-.
9830
9831 ;IF THE MICROCODE FOUND AN ERROR IT SETS PCSR1 TO THE ERROR STATE SO, CHECK
9832 ;PCSR1 TO SEE IF AN ERROR OCCURRED
9833 ;IF SO PRINT ERROR MESSAGE
9834
9835 042016' 122777 000003 136314 45$: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
9836 042024' 001004 BNE 50$ ;NO
9837 042026' ERRHRD 180,RLNKAD,MSG42 ;YES, PRINT ERROR MESSAGE
9838 042026' 104456 TRAP C$ERHRD
9839 042030' 000264 .WORD 180
9840 042032' 003114' .WORD RLNKAD
9841 042034' 016250' .WORD MSG42
9842 042036' 50$:
9843 042036' ENDSEG
9844 042036' 100018:
9845 042036' 104405 TRAP C$ESEG
9846
9847 ;WRITE '1' TO CLEAR 'DNI'
9848
9849 042040' 004737 017362' JSR PC,CLEAR DNI ;GO CLEAR DNI
9850 042044' 103006 BCC 60$ ;OK
9851 042046' ERRHRD 181,RLNKAD,RACMG7 ;ERROR DNI DID NOT CLEAR!
9852 042046' 104456 TRAP C$ERHRD
9853 042050' 000265 .WORD 181
9854 042052' 003114' .WORD RLNKAD
9855 042054' 012670' .WORD RACMG7
9856 042056' ESCAPE TST
9857 042056' 104410 TRAP C$ESCAPE

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65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 208
TEST 31: RECEIVER LINK MEMORY ADDRESS TEST

.WORD L10151-

9858 042060' 000022
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9865 042062' 023727 000606' 174000
9866 042070' 001404
9867 042072' 062737 004000 000606'
9868 042100' 000702
9869 042102'
9870 042102'
9871 042102'
9872 042102' 104401
9873

:
:THIS TEST IS TO BE REPEATED 15 TIMES ONCE FOR EACH RECEIVER BUFFER (1-15).
:CHECK TO SEE IF WE HAVE PASSED THE LAST RECEIVER BUFFER TO THE MICROCODE.
:IF SO STOP, ELSE ADD 1K TO THE CONTENTS OF PCBB TO MAKE THE NEW RECEIVER
:BUFFER AND REPEAT THE TEST AGAIN

60S: CMP PCBB,#LINADR+<SIZ1K*15.> ;HAVE WE TRIED ALL 15 BUFFERS
BEQ 70S ;YES ALL DONE
ADD #SIZ1K,PCBB ;NO POINT TO NEXT RECEIVER BUFFER
BR 30S ;DO AGAIN

70S:
ENDTST

L10151: TRAP C\$ETST

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 209
TEST 32: TRANSMITTER LINK MEMORY ADDRESS TEST

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042104'
042104'

042104'

042104' 104404
042106' 022737
042114' 001004
042116' 122777
042124' 001440
042126' 012737
042134' 004737
042140' 103002
042142'
042142' 104410
042144' 000322
042146' 012737
042154' 004737
042160' 103022
042162' 012737
042170' 012737
042176' 012737
042204' 012737
042212'
042212' 104456
042214' 000266
042216' 003165'
042220' 012716'
042222'
042222' 104410
042224' 000242

000104 000326'
000001 136214
000104 000326' 5\$:
020340'
000176 000332' 10\$:
017316'
001000' 000310'
001277' 000312'
001342' 000314'
001357' 000316'

.SBTTL TEST 32: TRANSMITTER LINK MEMORY ADDRESS TEST

: THIS TEST WILL VERIFY THAT BUFFERS 1-15 CAN BE CORRECTLY ADDRESSED BY THE
: TRANSMITTER. THIS TEST IS IDENTICAL TO THE RECEIVER ADDRESS TEST IN THAT
: IT USES THE SAME MICROCODE (MICROMODULE 'D' MICROTEST #11) EXCEPT IT
: FIXES THE RECEIVER BUFFER AT 0 AND VARIES THE TRANSMIT BUFFER FROM 1-15.
: TEST SEQUENCE:
: 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
: 2-SET PCBB+0 TO 100000 (BASE OF LINK MEMORY) AS RECEIVER BUFFER ADDRESS
: 3-SET PCBB+2 WITH A TRANSMITTER BUFFER ADDRESS
: 4-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
: 5-SELECT MICROTEST #11
: 6-WAIT FOR 'DNI'
: 7-CHECK PCSR1 FOR AN ERROR CONDITION IF SO PRINT ERROR MESSAGE
: 8-WRITE '1' TO CLEAR 'DNI'
: 9-REPEAT STEPS 2-8 FOR ALL TRANSMIT BUFFERS 1-15

BGNTST

T32::

: CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'D' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'D'
:OK
TRAP C\$ESCAPE
.WORD L10152-
:WAIT FOR THE MICROMONITOR
:OK
TRAP C\$ERHRD
.WORD 182
.WORD TLNKAD
.WORD MSG1
ESCAPE TST
TRAP C\$ESCAPE
.WORD L10152-

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 210
 CZUAAB.MAC 07-APR-83 17:03 TEST 32: TRANSMITTER LINK MEMORY ADDRESS TEST

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9930 042226' 004737 017362' 20$: JSR PC,CLRDN1 ;CLEAR DNI BIT 4
9931 042232' 103006 BCC 25$
9932 042234' ERRHRD 183,TLNKAD,RACMG7 ;DNI DID NOT CLEAR!
9933 042234' 104456 TRAP CSERHRD
9934 042236' 000267 .WORD 183
9935 042240' 003165' .WORD TLNKAD
9936 042242' 012670' .WORD RACMG7
9937 042244' ESCAPE TST
9938 042244' 104410 TRAP C$ESCAPE
9939 042246' 000220 .WORD L10152-.
9940 042250' 25$:
9941 042250' ENDSEG
9942 042250' 10000$:
9943 042250' 104405 TRAP C$ESEG
9944
9945 ;LOAD PCBB+0 WITH THE BASE ADDRESS OF LINK MEMORY. THIS IS WHERE THE RECEIVER
9946 ;BUFFER WILL BE FIXED AT. LOAD PCBB+2 WITH THE ADDRESS OF BUFFER #1 (104000)
9947
9948 042252' 012701 002756 MOV #MAXBYT,R1 ;TRANSMIT BYTE COUNT
9949 042256' 012737 100000 000606' MOV #LINADR,PCBB ;SET RECEIVE BUFFER AT BASE OF LINK
9950 ;MEMORY
9951 042264' 012737 104000 000610' MOV #LINADR+SIZ1K,PCBB+2 ;TRANSMIT BUFFER STARTS 1K FROM
9952 ;BASE OF LINK MEMORY
9953 042272' 30$:
9954
9955 ;WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE. THEN EXECUTE MICROTEST
9956 ;#11 BY LOADING PCSRO COMMAND FIELD BITS WITH A 11. WAIT FOR 'DNI'
9957
9958 042272' BGNSEG
9959 042272' 104404 TRAP C$BSEG
9960 042274' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
9961 042300' 103006 BCC 35$ ;OK
9962 042302' ERRHRD 184,TLNKAD,MSG46 ;PRINT ERROR
9963 042302' 104456 TRAP CSERHRD
9964 042304' 000270 .WORD 184
9965 042306' 003165' .WORD TLNKAD
9966 042310' 016666' .WORD MSG46
9967 042312' ESCAPE TST ;LEAVE TEST
9968 042312' 104410 TRAP C$ESCAPE
9969 042314' 000152 .WORD L10152-.
9970 042316' 012777 000013 136012 35$: MOV #11,@PCSRO ;TELL T11 TO EXECUTE MICROTEST #11
9971 042324' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
9972 042332' 004737 017316' JSR PC,CHKDNI
9973 042336' 103021 BCC 45$ ;OK
9974 042340' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
9975 042344' 103006 BCC 40$ ;NO, OK
9976 042346' ERRHRD 185,TLNKAD,MSG44 ;PRINT ERROR MESSAGE
9977 042346' 104456 TRAP CSERHRD
9978 042350' 000271 .WORD 185
9979 042352' 003165' .WORD TLNKAD
9980 042354' 016442' .WORD MSG44
9981 042356' ESCAPE TST
9982 042356' 104410 TRAP C$ESCAPE
9983 042360' 000106 .WORD L10152-.
9984 042362' 012702 000013 40$: MOV #11,R2 ;MICROTEST #11 IS HUNG
9985 042366' ERRHRD 186,TLNKAD,MSG12 ;PRINT ERROR MESSAGE

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 211
CZUAAB.MAC 07-APR-83 17:03 TEST 32: TRANSMITTER LINK MEMORY ADDRESS TEST

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9986 042366' 104456 TRAP CSERHRD
9987 042370' 000272 .WORD 186
9988 042372' 003165' .WORD TLNKAD
9989 042374' 013466' .WORD MSG12
9990 042376' ESCAPE TST
9991 042376' 104410 TRAP C$ESCAPE
9992 042400' 000066 .WORD L10152-.
9993
9994 ;THE MICROCODE WILL SET PCSR1 TO AN ERROR CONDITION IF IT DETECTED AN ERROR.
9995 ;SO CHECK PCSR1 IF ERROR, PRINT ERROR MESSAGE
9996
9997 042402' 122777 000003 135730 45$: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
9998 042410' 001084 BNE 50$ ;NO
9999 042412' ERRHRD 187,TLNKAD,MSG42 ;YES, PRINT ERROR MESSAGE
10000 042412' 104456 TRAP CSERHRD
10001 042414' 000273 .WORD 187
10002 042416' 003165' .WORD TLNKAD
10003 042420' 016250' .WORD MSG42
10004 042422' 50$:
10005 042422' ENDSEG
10006 042422'
10007 042422' 104405 10001$: TRAP C$ESEG
10008
10009 ;WRITE '1' TO CLEAR 'DNI'
10010
10011 042424' 004737 017362' JSR PC,CLRDN1 ;GO CLEAR DNI
10012 042430' 103006 BCC 60$ ;OK
10013 042432' ERRHRD 188,TLNKAD,RACMG7 ;ERROR DNI DID NOT CLEAR!
10014 042432' 104456 TRAP CSERHRD
10015 042434' 000274 .WORD 188
10016 042436' 003165' .WORD TLNKAD
10017 042440' 012670' .WORD RACMG7
10018 042442' ESCAPE TST
10019 042442' 104410 TRAP C$ESCAPE
10020 042444' 000022 .WORD L10152-.
10021
10022 ;THIS TEST IS TO BE REPEATED FOR EACH TRANSMIT BUFFER SO CHECK IF THE MICROCODE
10023 ;HAS BEEN PASSED THE LAST TRANSMIT BUFFER, IF NOT, CHANGE PCBB+2 TO POINT
10024 ;TO THE NEXT TRANSMIT BUFFER BY ADDING 1K TO IT
10025
10026 042446' 023727 000610' 174000 60$: CMP PCBB+2,#LINADR+<SIZ1K*15.> ;TRIED BUFFERS 1-15 FOR TRANSMITTER?
10027 042454' 001404 BEQ 70$ ;YES ALL DONE
10028 042456' 062737 004000 000610' ADD #SIZ1K,PCBB+2 ;NO POINT TO NEXT TRANSMIT BUFFER
10029 042464' 000702 BR 30$ ;DO AGAIN
10030 042466' 70$:
10031 042466' ENDTST
10032 042466' L10152:
10033 042466' 104401 TRAP C$ETST
10034

```

65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 212
TEST 33: LINK MEMORY ARBITRATION TEST

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.SBTTL TEST 33: LINK MEMORY ARBITRATION TEST

:THE LINK MEMORY CAN BE ACCESSED BY FOUR PROCESSES; THE T-11 PROCESSOR, THE
:DMA ENGINE, THE RECEIVE STATE MACHINE AND THE TRANSMIT STATE MACHINE. THE
:PORT MODULE HAS ARBITRATION CIRCUITRY TO MANAGE LINK MEMORY ACCESSES. THIS
:CIRCUITRY PREVENTS CONFLICTS BETWEEN PROCESSES AND ASSURES THAT HIGHER
:PRIORITY PROCESSES GET PRECEDENCE.

:THIS TEST WILL VERIFY THE ABILITY OF THE LINK MEMORY ARITRATOR TO HANDLE
:SIMULTANEOUS REQUESTS BY FOUR PROCESSES. EACH OF THESE PROCESSES WILL INVOLVE
:TASKS THAT REQUIRE HEAVY ACCESSES OF LINK MEMORY. DATA WILL BE MOVED INTO OR
:OUT OF LINK MEMORY BY EACH. WHEN THAT TASKS ARE FINISHED THE DATA WILL BE
:VERIFIED.

:THE FOUR PROCESSES ARE:

1-TRANSMIT STATE MACHINE

WILL TRANSMIT A DATAGRAM OF MAXIMUM DATA LENGTH IN LOOPBACK
MODE. THE DATA FIELD WILL CONTAIN A BIT PATTERN STRING OF
TWO 1'S FOLLOWED BY TWO 0'S I.E. 31463 (OCTAL).

2-RECEIVE STATE MACHINE

WILL RECEIVE A DATAGRAM OF MAXIMUM DATA LENGTH OVER THE
LOOPBACK. THE RECEIVE DATA BUFFER WILL BE FILLED WITH 0'S
PRIOR TO THE RECEPTION.

3-T-11 MICROPROCESSOR DMA

A 1K BUFFER IN LINK MEMORY WILL BE FILLED WITH AN ALL 1'S DATA
PATTERN PRIOR TO THE OPERATION THEN ALTERNATING 1'S AND 0'S
DATA PATTERN WILL BE WRITTEN.

4-DMA ENGINE

WILL TRANSFER A 1K BLOCK OF DATA FROM LINK MEMORY TO UNIBUS
MEMORY. THE DATA IN LINK MEMORY WILL A BIT PATTERN STRING
OF FOUR 1'S FOLLOWED BY A STRING OF FOUR 0'S. THE BUFFER
IN UNIBUS MEMORY WILL BE CLEARED PRIOR TO THE OPERATION.

:THE FOUR PROCESSES WILL WORK OUT OF FOUR SEPARATE AREAS OF LINK MEMORY.

:BASE OF LINK MEMORY--> +-----+
! RECEIVE BUFFER !
BASE + 4000--> +-----+
! TRANSMIT BUFFER !
BASE + 10000--> +-----+
! DMA ENGINE BUFFER !
BASE + 14000--> +-----+
! T-11 PROCESSOR BUFFER !
+-----+

:THIS WILL ALLOW THE ARITRATION CIRCUITRY TO BE TESTED AND YET ALLOWS THE DATA

65HARDWARE TESTS
CZUAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

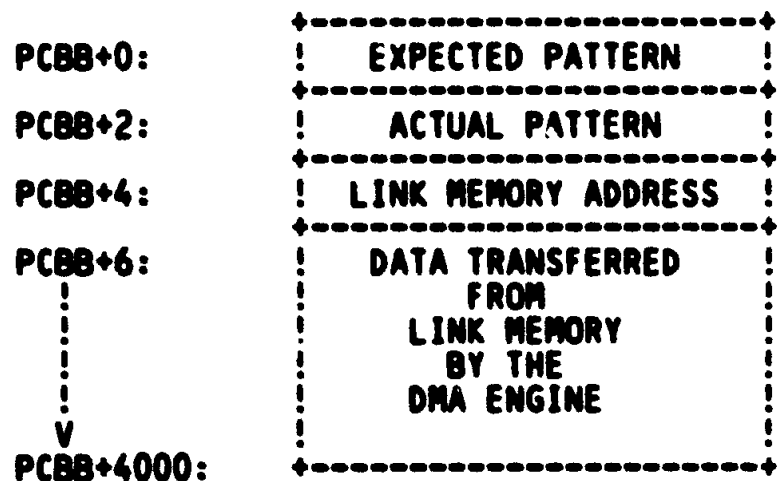
07-APR-83 17:13 PAGE 213
TEST 33: LINK MEMORY ARBITRATION TEST

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042470'
042470'
042470'
042472'
042500'
042502'
042470'
042470'
042472'
042500'
042502'

104404
022737
001004
001004
000001
000326'
135630

:TO BE VERIFIED EASILY AND ASSOCIATED WITH A SINGLE PROCESS.
:A DATAGRAM WILL BE LOOPED BACK FROM THE TRANSMIT BUFFER TO THE RECEIVE BUFFER.
:AS THE DATAGRAM IS BEING TRANSFERRED, THE T-11 PROCESSOR WILL FILL IT'S BUFFER
:AND THE DMA ENGINE WILL TRANSFER IT'S BUFFER FROM LINK MEMORY TO UNIBUS MEMORY.
:WHEN THE RECEIVE STATE MACHINE IS DONE, THE T-11 WILL VERIFY THE DATA IN THE
:RECEIVE BUFFER. IF AN ERROR IS FOUND PCSR1 WILL BE SET TO INDICATE AN ERROR.
:THE HOST WILL WAIT FOR THE MICROCODE TO FINISH AND WHEN DONE, IT WILL VERIFY
:THE DATA TRANSFERRED BY THE DMA ENGINE TO UNIBUS MEMORY.
:THE FIRST 3 WORDS OF THE PCBB ARE USED FOR ERROR INFORMATION, THE REST
:WILL BE THE UNIBUS ADDRESS THAT THE DMA ENGINE WILL TRANSFER TO.



TEST SEQUENCE:

- 1-LOAD MICROMODULE 'D' IF NOT ALREADY DONE SO
- 2-LOAD PCSR2 AND PCSR3 WITH ADDRESS OF PCBB
- 3-CLEAR DMA ENGINE 'TO' BUFFER
- 4-WAIT FOR MICROMONITOR TO ENTER 'INMON' STATE
- 5-SELECT MICROTTEST #8
- 6-WAIT FOR 'DNI'
- 7-CHECK FOR ERROR IN PCSR1
- 8-VERIFY DATA IN DMA 'TO' BUFFER
- 9-WRITE '1' TO CLEAR 'DNI'

BGNTST

T33::

:CHECK TO SEE IF MODULE 'D' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'D' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
CMP #'D,MICRO
BNE SS
CMPS #'INMON,@PCSR1

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 214
 CZUAAB.MAC 07-APR-83 17:03 TEST 33: LINK MEMORY ARBITRATION TEST

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10147 042510' 001440          BEQ      20$          ;YES SKIP LOADING THE MICROMODULE
10148 042512' 012737 000104 000326' 5$:  MOV     #'D,MICRO    ;GO LOAD MICRO MODULE 'D'
10149 042520' 004737 020340'          JSR     PC,LODMIC
10150 042524' 103002          BCC     10$          ;OK
10151 042526'          ESCAPE  TST
10152 042526' 104410          TRAP    C$ESCAPE
10153 042530' 000376          .WORD  L10153-.
10154 042532' 012737 000176 000332' 10$:  MOV     #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
10155 042540' 004737 017316'          JSR     PC,CHKDNI
10156 042544' 103022          BCC     20$          ;OK
10157 042546' 012737 001000' 000310'  MOV     #SDNI,BITNAM
10158 042554' 012737 001277' 000312'  MOV     #SNSET,BITSTA
10159 042562' 012737 001342' 000314'  MOV     #SAFTER,PWHEN
10160 042570' 012737 001357' 000316'  MOV     #SGTCHD,PCOMND
10161 042576'          ERRHRD  189,LNKARB,MSG1
10162 042576' 104456          TRAP    C$ERHRD
10163 042600' 000275          .WORD  189
10164 042602' 003241'          .WORD  LNKARB
10165 042604' 012716'          .WORD  MSG1
10166 042606'          ESCAPE  TST
10167 042606' 104410          TRAP    C$ESCAPE
10168 042610' 000316          .WORD  L10153-.
10169 042612' 004737 017362'  20$:  JSR     PC,CLRDNI      ;CLEAR DNI BIT
10170 042616' 103006          BCC     25$
10171 042620'          ERRHRD  190,LNKARB,RACMG7 ;DNI DID NOT CLEAR!
10172 042620' 104456          TRAP    C$ERHRD
10173 042622' 000276          .WORD  190
10174 042624' 003241'          .WORD  LNKARB
10175 042626' 012670'          .WORD  RACMG7
10176 042630'          ESCAPE  TST
10177 042630' 104410          TRAP    C$ESCAPE
10178 042632' 000274          .WORD  L10153-.
10179 042634'          25$:
10180 042634'          ENDSEG
10181 042634'          10000$:
10182 042634' 104405          TRAP    C$ESEG
10183          ;
10184          ;SETUP PCBB TO BE JUST AFTER LAST LOCATION USED BY THIS DIAGNOSTIC
10185          ;TELL MICROCODE WHERE PCBB IS BY LOADING PCRS2 AND PCRS3 WITH THE PCBB ADDRESS
10186          ;
10187 042636' 013777 000324' 135476  MOV     FREMEM,@PCRS2 ;TELL MICROCODE WHERE PCBB IS
10188 042644' 005077 135474  CLR     @PCRS3
10189          ;
10190          ;FIRST CLEAR THE 3 WORDS THAT WILL BE USED BY THE MICROCODE IF AN ERROR OCCURS.
10191          ;THEN CLEAR OUT THE BUFFER TO BE USED AS THE DMA ENGINE'S 'TO' BUFFER.
10192          ;
10193 042650' 013700 000324'  MOV     FREMEM,R0      ;GET A POINTER TO PCBB
10194 042654' 005020  CLR     (R0)+          ;HERE IS WHERE MICROCODE WILL PUT
10195          ;EXPECTED DATA PATTERN IF ERROR
10196 042656' 005020  CLR     (R0)+          ;HERE, THE BAD DATA
10197 042660' 005020  CLR     (R0)+          ;AND HERE THE LINK MEMORY ADDRESS
10198          ;
10199 042662' 012701 002000  MOV     #SIZ1K/2,R1    ;SIZE OF DMA ENGINE 'TO' BUFFER
10200 042666' 005020  30$:  CLR     (R0)+          ;CLEAR THE AREA WHERE THE DMA ENGINE...
10201 042670' 005301  DEC     R1              ;WILL LOAD DATA
10202 042672' 001375  BNE    30$

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 215
 CZUAAB.MAC 07-APR-83 17:03 TEST 33: LINK MEMORY ARBITRATION TEST

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10203 042674'
10204 042674'
10205 042674' 104404 TRAP CSBSEG
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10211 042676' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
10212 042702' 103006 BCC 368 ;OK
10213 042704' ERRHRD 191,LNKARB,MSG46 ;PRINT ERROR
10214 042704' 104456 TRAP CSERHRD
10215 042706' 000277 .WORD 191
10216 042710' 003241' .WORD LNKARB
10217 042712' 016666' .WORD MSG46
10218 042714' ESCAPE TST ;LEAVE TEST
10219 042714' 104410 TRAP CSESCAPE
10220 042716' 000210 .WORD L10153-.
10221 042720' 012777 000010 135410 36$: MOV #8.,OPCSRO ;TELL T11 TO EXECUTE MICROTEST #8
10222 042726' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
10223 042734' 004737 017316' JSR PC,CHKDNI
10224 042740' 103021 BCC 40$
10225 042742' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
10226 042746' 103006 BCC 37$ ;NO, OK
10227 042750' ERRHRD 192,LNKARB,MSG44 ;PRINT ERROR MESSAGE
10228 042750' 104456 TRAP CSERHRD
10229 042752' 000300 .WORD 192
10230 042754' 003241' .WORD LNKARB
10231 042756' 016442' .WORD MSG44
10232 042760' ESCAPE TST
10233 042760' 104410 TRAP CSESCAPE
10234 042762' 000144 .WORD L10153-.
10235 042764' 012702 000010 37$: MOV #8.,R2 ;MICROTEST #8 IS HUNG
10236 042770' ERRHRD 193,LNKARB,MSG12
10237 042770' 104456 TRAP CSERHRD
10238 042772' 000301 .WORD 193
10239 042774' 003241' .WORD LNKARB
10240 042776' 013466' .WORD MSG12
10241 043000' ESCAPE TST
10242 043000' 104410 TRAP CSESCAPE
10243 043002' 000124 .WORD L10153-.
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10248 043004' 122777 000003 135326 40$: CMP# #INERR,#PCSR1 ;DID AND ERROR OCCUR?
10249 043012' 001013 BNE 50$ ;NO
10250 043014' 013701 000324' MOV FREM,R1 ;YES, GET EXPECTED DATA PATTERN
10251 043020' 013702 000326' MOV FREM+2,R2 ;GET BAD DATA
10252 043024' 013703 000330' MOV FREM+4,R3 ;GET LINK MEMORY ADDRESS
10253 043030' ERRHRD 194,LNKARB,MSG20 ;PRINT ERROR MESSAGE
10254 043030' 104456 TRAP CSERHRD
10255 043032' 000302 .WORD 194
10256 043034' 003241' .WORD LNKARB
10257 043036' 014146' .WORD MSG20
10258 043040' 000410 BR 60$

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 216
 CZUAAB.MAC 07-APR-83 17:03 TEST 33: LINK MEMORY ARBITRATION TEST

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10259
10260      ;CHECK DATA THAT THE DMA ENGINE TRANSFERRED TO UNIBUS MEMORY
10261      ;
10262 043042' 013701 000324' 50$:  MOV    FPEM,R1      ;GET POINTER TO DMA ENGINE BUFFER
10263 043046' 062701 000006      ADD    #6,R1
10264 043052' 012704 003774      MOV    #3774,R4      ;NUMBER OF BYTES
10265 043056' 012702 000017      MOV    #17,R2      ;DATA THAT SHOULD BE IN BUFFER
10266 043062' 111103      60$:  MOVB   (R1),R3      ;GET DATA FROM BUFFER
10267 043064' 120211      CMPB  R2,(R1)      ;IS DATA CORRECT?
10268 043066' 001404      BEQ   70$          ;YES
10269 043070'      ERRHRD 195,LNKARB,MSG21 ;NO, PRINT ERROR
10270 043070' 104456      TRAP  C$ERHRD
10271 043072' 000303      .WORD 195
10272 043074' 003241'      .WORD LNKARB
10273 043076' 014236'      .WORD MSG21
10274 043100' 005201      70$:  INC    R1
10275 043102' 005304      DEC    R4
10276 043104' 001366      BNE   60$          ;CONTINUE CHECKING
10277      ;ALL DONE
10278      ;
10279      ;WRITE '1' TO CLEAR 'DNI'
10280      ;
10281 043106' 004737 017362' 80$:  JSR    PC,CLRDNI      ;CLEAR DNI BIT
10282 043112' 103004      BCC   90$
10283 043114'      ERRHRD 196,LNKARB,RACMG7 ;ERROR DNI DID NOT CLEAR!
10284 043114' 104456      TRAP  C$ERHRD
10285 043116' 000304      .WORD 196
10286 043120' 003241'      .WORD LNKARB
10287 043122' 012670'      .WORD RACMG7
10288 043124'      90$:
10289 043124'      ENDSEG
10290 043124'      10001$:
10291 043124' 104405      TRAP  C$ESEG
10292 043126'      ENDTST
10293 043126'      L10153:
10294 043126' 104401      TRAP  C$ETST

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 217
CZUAAB.MAC 07-APR-83 17:03 TEST 34: STATION ADDRESS PATTERN TEST

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.SBTTL TEST 34: STATION ADDRESS PATTERN TEST

*****8

:WITHOUT EITHER THE PROMISCUIOUS MODE OR THE MULTICAST MODE ENABLED, THE LINK
:LOGIC WILL RECOGNIZE DATAGRAM ADDRESSES ONLY IF THE ADDRESS IS CONTAINED IN
:THE STATION ADDRESS RAM.

:WHEN A DATAGRAM ARRIVES, THE LINK LOGIC COMPARES THE DATAGRAM DESTINATION
:ADDRESS FIELD TO THE 12 ADDRESSES WRITTEN IN THE STATION ADDRESS RAM. IF THE
:INCOMING ADDRESS MATCHES ONE OF THESE, THEN THE DATAGRAM WILL BE ACCEPTED BY
:THE LINK. THE 'MATCH' BIT IS SET IN THE TRANSMIT BUFFER AND THE RECEIVING
:PROCESS BEGINS.

:THIS TEST WILL VERIFY THAT THE LINK CAN RECOGNIZE A DATAGRAM WHEN THE
:DESTINATION ADDRESS OF THE DATAGRAM MATCHES ONE OF THE ADDRESSES STORED IN
:THE STATION ADDRESS RAM.

:THIS TEST WILL USE MICROMODULE 'E' MICROTEST #1.
:PATTERNS WILL BE USED FOR ADDRESSES IN CHECKING THE STATION ADDRESS LOGIC.
:THE PATTERNS WILL BE SUPPLIED TO THE T-11 THROUGH THE PCBB. THE MICROCODE
:WILL BE RESTARTED FOR EACH DIFFERENT PATTERN TO BE TESTED. UPON START-UP, THE
:T-11 PROCESSOR WILL PICK UP THE CURRENT PATTERN/ADDRESS, LOAD THE SAME PATTERN
:INTO ALL 12 LOCATIONS OF THE STATION ADDRESS RAM, FORMAT THE TRANSMIT BUFFER
:AND LOGIC FOR A LOOPBACK, PRESET PCSR1 TO AN ERROR CONDITION, START THE LINK
:AND WAIT FOR THE MATCH BIT IN THE TRANSMIT BUFFER. IF THE MATCH BIT SETS
:THE PCSR1 ERROR CONDITION IS CLEARED AND THE T-11 WAITS FOR BOTH THE
:TRANSMITTER AND RECEIVER INTERRUPTS BEFORE IT SETS 'DNI' TO INDICATE T-
:TEST WAS SUCCESSFUL

:THE PCBB WILL BE USED TO PASS THE 48 BIT STATION ADDRESS PATTERN:



- :THE FOLLOWING PATTERNS WILL BE USED:
- ALTERNATING 1'S AND 0'S
 - ALTERNATING 0'S AND 1'S
 - PAIR OF 0'S FOLLOWED BY PAIR OF 1'S
 - FOUR 0'S FOLLOWED BY FOUR 1'S
 - EIGHT 0'S FOLLOWED BY EIGHT 1'S
 - SIXTEEN 1'S FOLLOWED BY SIXTEEN 0'S FOLLOWED BY 16 1'S
 - TWENTYFOUR 1'S FOLLOWED BY TWENTYFOUR 0'S

- :TEST SEQUENCE:
- 1-LOAD MICROMODULE 'E' IF NOT ALREADY DONE SO
 - 2-LOAD PCBB+0,+2,+4 WITH A PATTERN
 - 3-WAIT FOR MICROMONITOR TO ENTER THE 'INPROH' STATE
 - 4-SELECT MICROTEST #1
 - 5-WAIT FOR 'DNI'
 - 6-IF NO DNI AND PCSR1 INDICATES ERROR THEN PRINT NO MATCH BIT SET

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 218
CZUAAB.MAC 07-APR-83 17:03 TEST 34: STATION ADDRESS PATTERN TEST

10351 : 7-IF NO DNI AND PCSR1 INDICATES NO ERROR THEN PRINT MATCH BIT SET
10352 : BUT DATAGRAM WAS NOT RECEIVED.
10353 : 8-WRITE '1' TO CLEAR 'DNI'
10354 : 9-REPEAT STEPS 2-8 FOR ALL SEVEN DATA PATTERNS
10355 :
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10401 :
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BGNTST

T34::

:CHECK TO SEE IF MODULE 'E' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'E' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'E'
:OK
TRAP CSESCAPE
.WORD L10154-
:WAIT FOR THE MICROMONITOR
:OK
TRAP CSERHRD
.WORD 197
.WORD STAPAT
.WORD MSG1
TRAP CSESCAPE
.WORD L10154-
:CLEAR DNI BIT
:DNI DID NOT CLEAR!
TRAP CSERHRD
.WORD 198
.WORD STAPAT
.WORD RACMG7
TRAP CSESCAPE
.WORD L10154-
10003: TRAP CSESEG

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 219
CZUAAB.MAC 07-APR-83 17:03 TEST 34: STATION ADDRESS PATTERN TEST

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10407      :SELECT ONE OF THE PATTERNS FROM THE STATION ADDRESS PATTERN TABLE AND LOAD
10408      :IT INTO THE PCBB
10409      :
10410      043276' 012701 000534'      MOV      #SPAT1,R1      ;POINT TO STATION ADDRESS PATTERN TABLE
10411      043302' 012705 000007'      MOV      #7,R5        ;# OF ADDRESS PATTERNS
10412      043306' 011137 000606'      27$:    MOV      (R1),PCBB      ;LOAD PCBB WITH AN ADDRESS PATTERN
10413      043312' 016137 000002 000610'    MOV      2(R1),PCBB+2    ;MIDDLE ORDER
10414      043320' 016137 000004 000612'    MOV      4(R1),PCBB+4    ;UPPER ORDER
10415      043326'
10416      043326' 104404      BGNSEG      TRAP      CSBSEG
10417
10418      :
10419      :WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE. SELECT MICROTEST #1
10420      :BY LOADING PCSRO COMMAND FIELD BITS WITH A 1. WAIT FOR DNI.
10421      043330' 004737 020060'      JSR      PC,CHKMON      ;WAIT FOR MICROMONITOR
10422      043334' 103006      BCC      30$           ;OK
10423      043336'      ERRHRD  199,STAPAT,MSG46 ;PRINT ERROR
10424      043336' 104456      TRAP      CSERHRD
10425      043340' 000307      .WORD    199
10426      043342' 003305'      .WORD    STAPAT
10427      043344' 016666'      .WORD    MSG46
10428      043346'      ESCAPE  TST           ;LEAVE TEST
10429      043346' 104410      TRAP      CSESCAPE
10430      043350' 000106      .WORD    L10154-.
10431      043352' 012777 000001 134756 30$:    MOV      #1,@PCSRO      ;TELL T11 TO EXECUTE MICROTEST #1
10432      043360' 012737 000176 000332'    MOV      #2*SECOND,METER ;WAIT FOR DNI
10433      043366' 004737 017316'      JSR      PC,CHKDNI
10434      043372' 103015      BCC      40$
10435
10436      :
10437      :DNI DID NOT SET WHICH INDICATES THAT THE RECEIVER INTERRUPT NEVER HAPPENED.
10438      :THE REASON MIGHT BE BECAUSE THE MATCH BIT NEVER SET IN THE TRANSMIT
10439      :STATUS REGISTER INDICATING THAT THE STATION ADDRESS COMPARATOR FAILED
10440      :TO RECOGNIZE THE DATAGRAM DESTINATION ADDRESS. THE MICROCODE CHECKS
10441      :FOR THE MATCH BIT AND IF IT IS NOT SET IT PUTS AN ERROR STATUS IN PCSR1.
10442      :IF PCSR1 DOES NOT HAVE AN ERROR STATE THEN THE RECEIVER INTERRUPT FAILED
10443      :FOR SOME OTHER REASON AND ITS NOT THE STATION ADDRESS RECOGNITION'S FAULT.
10444      043374' 004737 020132'      JSR      PC,CHKINT      ;SEE IF ANY ERROR INTERRUPTS OCCURRED
10445      043400' 103006      BCC      35$           ;NO
10446      043402'      ERRHRD  200,STAPAT,MSG44 ;PRINT ERROR MESSAGE
10447      043402' 104456      TRAP      CSERHRD
10448      043404' 000310      .WORD    200
10449      043406' 003305'      .WORD    STAPAT
10450      043410' 016442'      .WORD    MSG44
10451      043412'      ESCAPE  TST           ;LEAVE TST
10452      043412' 104410      TRAP      CSESCAPE
10453      043414' 000042      .WORD    L10154-.
10454      043416'      35$:    ERRHRD  201,STAPAT,MSG25 ;STATION ADDRESS PATTERN WAS NOT
10455      043416' 104456      TRAP      CSERHRD
10456      043420' 000311      .WORD    201
10457      043422' 003305'      .WORD    STAPAT
10458      043424' 014614'      .WORD    MSG25
10459
10460      :
10461      :WRITE '1' TO CLEAR 'DNI'
10462

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 220
CZUAAB.MAC 07-APR-83 17:03 TEST 34: STATION ADDRESS PATTERN TEST

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10463 043426' 004737 017362'      40$: JSR PC,CLRDNI      ;CLEAR DNI BIT
10464 043432' 103004                BCC 50$
10465 043434'                        ERRHRD 202,STAPAT,RACMG7 ;ERROR DNI DID NOT CLEAR'
10466 043434' 104456                TRAP CSERHRD
10467 043436' 000312                .WORD 202
10468 043440' 003305'                .WORD STAPAT
10469 043442' 012670'                .WORD RACMG7
10470 043444'                        50$:
10471 043444'                        ENDSEG
10472 043444'                        10001$:
10473 043444' 104405                TRAP CSESEG
10474
10475 ;REPEAT THE TEST WITH ALL SEVEN PATTERNS
10476 ;
10477 043446' 062701 000006          ADD #6,R1      ;POINT TO NEXT PATTERN
10478 043452' 005305                DEC R5         ;TESTED WITH ALL ADDRESS PATTERNS?
10479 043454' 001314                BNE 27$       ;NOT YET
10480
10481 043456'                        ENDTST
10482 043456'                        L10154:
10483 043456' 104401                TRAP CSETST

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 221
CZUAAB.MAC 07-APR-83 17:03 TEST 35: STATION ADDRESS REJECTION TEST

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10513 043460'
10514 043460'
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10520 043460'
10521 043460' 104404
10522 043462' 022737 000105 000326'
10523 043470' 001004
10524 043472' 122777 000001 134640
10525 043500' 001440
10526 043502' 012737 000105 000326' 5S:
10527 043510' 004737 020340'
10528 043514' 103002
10529 043516'
10530 043516' 104410
10531 043520' 000256
10532 043522' 012737 000176 000332' 10S:
10533 043530' 004737 017316'
10534 043534' 103022
10535 043536' 012737 001000' 000310'
10536 043544' 012737 001277' 000312'
10537 043552' 012737 001342' 000314'
10538 043560' 012737 001357' 000316'
10539 043566'

.SBTTL TEST 35: STATION ADDRESS REJECTION TEST

: THIS TEST WILL VERIFY THAT THE STATION ADDRESS DETECTION LOGIC DOES NOT
: RECOGNIZE A DATAGRAM WHEN THE DATAGRAM ADDRESS IS NOT CONTAINED IN THE
: STATION ADDRESS RAM.

: THE MICROCODE WILL FILL THE STATION ADDRESS RAM WITH 0'S. THE DESTINATION
: FIELD OF THE TRANSMIT BUFFER IS FILLED WITH 1'S. A TRANSMISSION IS STARTED
: IN LOOPBACK MODE AND THE T-11 WILL WAIT FOR A RECEIVER INTERRUPT. OF COURSE,
: THE RECEIVER INTERRUPT SHOULD NEVER HAPPEN BECAUSE THE STATION ADDRESS
: LOGIC SHOULD NOT GET A SUCCESSFUL COMPARISON BETWEEN 0'S IN THE DESTINATION
: ADDRESS OF THE INCOMING DATAGRAM AND THE 1'S IN THE STATION ADDRESS RAM.
: THE T-11 WILL BE PUT INTO A LOOP WAITING FOR A RECEIVER INTERRUPT AND THE
: DEUNA TIMER IS STARTED. IF THE LOOP IS BROKEN BY THE RECEIVER INTERRUPT
: AN ERROR WILL BE PRESENTED IN PCSR1 BY THE MICROCODE. IF THE LOOP IS BROKEN
: BY THE TIMER THEN THE TEST WAS SUCCESSFUL.

: TEST SEQUENCE:

- 1-LOAD MICROMODULE 'E' IF NOT ALREADY DONE SO
- 2-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
- 3-SELECT MICROTST #2
- 4-WAIT FOR 'DNI'
- 5-CHECK PCSR1 FOR AN ERROR CONDITION
- 6-WRITE '1' TO CLEAR 'DNI'

BGNTST

T35::

: CHECK TO SEE IF MODULE 'E' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

: BGNSEG

						TRAP	CSBSEG
				CMP	#'E,MICRO		:HAS MICROCODE MODULE 'E' BEEN LOADED
				BNE	5S		:NO
				CMPB	#INMON,@PCSR1		:YES, IS THE MICROMONITOR ACTIVE?
				BEQ	20S		:YES SKIP LOADING THE MICROMODULE
				MOV	#'E,MICRO		:GO LOAD MICRO MODULE 'E'
				JSR	PC,LODMIC		
				BCC	10S		:OK
				ESCAPE	TST		
						TRAP	CSESCAPE
						.WORD	L10155-
				MOV	#2*SECOND,METER		:WAIT FOR THE MICROMONITOR
				JSR	PC,CHKDNI		
				BCC	20S		:OK
				MOV	#SDNI,BITNAM		
				MOV	#SNSET,BITSTA		
				MOV	#SAFTER,PWHEN		
				MOV	#SGTCMD,PCOMND		
				ERRHRD	203,STAREJ,MSG1		

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 222
 CZUAAB.MAC 07-APR-83 17:03 TEST 35: STATION ADDRESS REJECTION TEST

10540	043566'	104456					TRAP	C\$ERHRD
10541	043570'	000313					.WORD	203
10542	043572'	003351'					.WORD	STAREJ
10543	043574'	012716'					.WORD	MSG1
10544	043576'			ESCAPE	TST			
10545	043576'	104410					TRAP	C\$ESCAPE
10546	043600'	000176					.WORD	L10155-.
10547	043602'	004737	017362'	20\$:	JSR	PC,CLRDN1		:CLEAR DNI BIT
10548	043606'	103006			BCC	25\$		
10549	043610'				ERRHRD	204,STAREJ,RACMG7		:DNI DID NOT CLEAR!
10550	043610'	104456					TRAF	C\$ERHRD
10551	043612'	000314					.WORD	204
10552	043614'	003351'					.WORD	STAREJ
10553	043616'	012670'					.WORD	RACMG7
10554	043620'			ESCAPE	TST			
10555	043620'	104410					TRAP	C\$ESCAPE
10556	043622'	000154					.WORD	L10155-.
10557	043624'			25\$:				
10558	043624'			ENDSEG				
10559	043624'						10000\$:	
10560	043624'	104405					TRAP	C\$ESEG
10561				:				
10562				:				
10563				:				
10564				:				
10565	043626'			:				
10566	043626'	104404		BGNSEG			TRAP	C\$BSEG
10567	043630'	004737	020060'		JSR	PC,CHKMON		:WAIT FOR MICROMONITOR
10568	043634'	103006			BCC	30\$:OK
10569	043636'				ERRHRD	205,STAREJ,MSG46		:PRINT ERROR
10570	043636'	104456					TRAP	C\$ERHRD
10571	043640'	000315					.WORD	205
10572	043642'	003351'					.WORD	STAREJ
10573	043644'	016666'					.WORD	MSG46
10574	043646'			ESCAPE	TST			:LEAVE TEST
10575	043646'	104410					TRAP	C\$ESCAPE
10576	043650'	000126					.WORD	L10155-.
10577	043652'	012737	000275 000332'	30\$:	MOV	#3*SECOND,METER		:TIMEOUT MUST BE GREATER THAN TIMER
10578								:PERIOD IN THE MICROCODE.
10579	043660'	012777	000002 134450		MOV	#2,@PC\$RO		:TELL T11 TO EXECUTE MICROTEST #2
10580	043666'	004737	017316'		JSR	PC,CHKDNI		:WAIT FOR DNI
10581								
10582	043672'	103021			BCC	40\$		
10583	043674'	004737	020132'		JSR	PC,CHKINT		:SEE IF ANY ERROR INTERRUPTS OCCURRED
10584	043700'	103006			BCC	35\$:NO, OK
10585	043702'				ERRHRD	206,STAREJ,MSG44		:PRINT ERROR MESSAGE
10586	043702'	104456					TRAP	C\$ERHRD
10587	043704'	000316					.WORD	206
10588	043706'	003351'					.WORD	STAREJ
10589	043710'	016442'					.WORD	MSG44
10590	043712'			ESCAPE	TST			
10591	043712'	104410					TRAP	C\$ESCAPE
10592	043714'	000062					.WORD	L10155-.
10593	043716'	012702	000002	35\$:	MOV	#2,R2		:MICROTEST #2 IS HUNG
10594	043722'				ERRHRD	207,STAREJ,MSG12		
10595	043722'	104456					TRAP	C\$ERHRD

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 223
CZUAAB.MAC 07-APR-83 17:03 TEST 35: STATION ADDRESS REJECTION TEST

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10596 043724' 000317 .WORD 207
10597 043726' 003351' .WORD STAREJ
10598 043730' 013466' .WORD MSG12
10599 043732' ESCAPE TST
10600 043732' 104410 TRAP C$ESCAPE
10601 043734' 000042 .WORD L10155-.
10602
10603 ;OK 'DNI' SET INDICATING EITHER THE RECEIVER INTERRUPT HAPPENED OR THE TIMER
10604 ;BROKE THE LOOP, CHECK PC$R1 TO FIND OUT WHICH
10605
10606 043736' 122777 000003 134374 40$: CMPB #INERR,@PC$R1 ;DID AN ERROR OCCUR?
10607 043744' 001004 BNE 50$ ;NO
10608 043746' ERRHRD 208,STAREJ ;YES, PRINT ERROR MESSAGE
10609 043746' 104456 TRAP C$ERHRD
10610 043750' 000320 .WORD 208
10611 043752' 003351' .WORD STAREJ
10612 043754' 000000 .WORD 0
10613
10614 ;WRITE '1' TO CLEAR 'DNI'
10615
10616 043756' 004737 017362' 50$: JSR PC,CLRDNI ;CLEAR DNI BIT
10617 043762' 103004 BCC 60$
10618 043764' ERRHRD 209,STAREJ,RACMG7 ;ERROR DNI DID NOT CLEAR!
10619 043764' 104456 TRAP C$ERHRD
10620 043766' 000321 .WORD 209
10621 043770' 003351' .WORD STAREJ
10622 043772' 012670' .WORD RACMG7
10623 043774' 60$:
10624 043774' ENDSEG
10625 043774' 10001$:
10626 043774' 104405 TRAP C$ESEG
10627 043776' ENDTST
10628 043776' L10155:
10629 043776' 104401 TRAP C$ETST

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65HARDWARE TESTS
CZUAAB.MAC

MACY11 30A(1052)
07-APR-83 17:03

07-APR-83 17:13 PAGE 224
TEST 36: STATION ADDRESS RAM POSITION TEST

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044000'
044000'

044000' 104404
044002' 022737 000105 000326'
044010' 001004
044012' 122777 000001 134320
044020' 001440

.SBTTL TEST 36. STATION ADDRESS RAM POSITION TEST

:THE STATION ADDRESS RAM CAN HOLD UP TO 12 STATION ADDRESSES. WHEN A DATAGRAM
:IS RECEIVED THE STATION ADDRESS COMPARISON LOGIC DOES A BIT-WISE COMPARISON
:OF ALL 12 RAM STATION ADDRESS WITH THE INCOMING DATAGRAM STATION ADDRESS.

:THIS TEST WILL VERIFY THAT THE DEUNA CAN RECOGNIZE A STATION ADDRESS
:REGARDLESS OF THE LOCATION OF THE ADDRESS IN THE STATION ADDRESS RAM.

:THIS TEST WILL USE MICROMODULE 'E' MICROTEST #3. THE MICROCODE WILL WRITE
:A STATION ADDRESSES OF ALL 1'S INTO A SINGLE LOCATION OF THE STATION ADDRESS
:RAM. THE OTHER ELEVEN LOCATION WILL BE LOADED WITH 0'S. A DATAGRAM WITH
:AN ALL 1'S DESTINATION ADDRESS WILL BE TRANSMITTED IN LOOPBACK MODE. THE TEST
:WILL VERIFY THAT THE DATAGRAM IS RECEIVED. THE TEST WILL BE REPEATED FOR ALL
:TWELVE LOCATIONS OF THE STATION ADDRESS RAM.

:THE MICROTEST WILL BE REPEATED FOR EACH OF THE 12 TEST ITERATIONS. THE PCBB
:WILL BE USED TO PASS TO THE MICROCODE WHICH POSITION IS TO BE LOADED WITH
:1'S. WHEN THE STATION ADDRESS IS LOADED, THE STATION ADDRESSES MUST BE
:ROTATED ORTHOGONALLY, I.E. BIT 0 OF ALL STATION ADDRESSES LOADED TOGETHER,
:THEN BIT 1, THEN BIT 2 ETC. THIS MAKES IT DIFFICULT TO DESCRIBE THE POSITION
:OF ANY SINGLE STATION ADDRESS IN TERMS OF AN OFFSET FROM THE RAM BASE ADDRESS.

:THE PCBB IS FORMATTED AS FOLLOWS:

PCBB+0: +-----+
 | RAM ADDRESS POSTION |
 +-----+

:TEST SEQUENCE:

- 1-LOAD MICROMODULE 'E' IF NOT ALREADY DONE SO.
- 2-LOAD PCBB+0 WITH THE RAM POSTION TO BE TESTED
- 3-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
- 4-SELECT MICROTEST #3
- 5-WAIT FOR 'DNI'
- 6-CHECK PCSR1 FOR AN ERROR CONDITION
- 7-WRITE '1' TO CLEAR 'DNI'
- 8-REPEAT STEPS 2-7 FOR ALL 12 RAM POSTIONS

BGNTST

T36::

:CHECK TO SEE IF MODULE 'E' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

CMP	#'E,MICRO	:	HAS MICROCODE MODULE 'E' BEEN LOADED
BNE	5\$:	NO
CMPB	#INMON,@PCSR1	:	YES, IS THE MICROMONITOR ACTIVE?
BEQ	20\$:	YES SKIP LOADING THE MICROMODULE

6SHARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 225
CZUAAB.MAC 07-APR-83 17:03 TEST 36: STATION ADDRESS RAM POSITION TEST

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10686 044022' 012737 000105 000326' 5$: MOV #'E,MICRO ;GO LOAD MICRO MODULE 'E'
10687 044030' 004737 020340' JSR PC,LODMIC
10688 044034' 103002 BCC 10$ ;OK
10689 044036' ESCAPE TST
10690 044036' 104410 TRAP C$ESCAPE
10691 044040' 000306 .WORD L10156-
10692 044042' 012737 000176 000332' 10$: MOV #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
10693 044050' 004737 017316' JSR PC,CHKDNI
10694 044054' 103022 BCC 20$ ;OK
10695 044056' 012737 001000' 000310' MOV #SDNI,BITNAM
10696 044064' 012737 001277' 000312' MOV #SNET,BITSTA
10697 044072' 012737 001342' 000314' MOV #SAFTER,PWHEN
10698 044100' 012737 001357' 000316' MOV #SGTCMD,PCOMND
10699 044106' ERRHRD 210,STAPOS,MSG1
10700 044106' 104456 TRAP C$ERHRD
10701 044110' 000322 .WORD 210
10702 044112' 003417' .WORD STAPOS
10703 044114' 012716' .WORD MSG1
10704 044116' ESCAPE TST
10705 044116' 104410 TRAP C$ESCAPE
10706 044120' 000226 .WORD L10156-
10707 044122' 004737 017362' 20$: JSR PC,CLR'DNI ;CLEAR DNI BIT
10708 044126' 103006 BCC 25$
10709 044130' ERRHRD 211,STAPOS,RACMG7 ;DNI DID NOT CLEAR!
10710 044130' 104456 TRAP C$ERHRD
10711 044132' 000323 .WORD 211
10712 044134' 003417' .WORD STAPOS
10713 044136' 012670' .WORD RACMG7
10714 044140' ESCAPE TST
10715 044140' 104410 TRAP C$ESCAPE
10716 044142' 000204 .WORD L10156-
10717 044144' 25$:
10718 044144' ENDSEG
10719 044144' 10000$:
10720 044144' 104405 TRAP C$ESEG
10721 :
10722 :R1 WILL CONTAIN THE RAM POSTION TO BE TESTED
10723 :
10724 044146' 012701 000001 MOV #1,R1 ;BEGIN WITH RAM POSTION #1
10725 044152' 30$:
10726 :
10727 :WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE, LOAD PCBB WITH
10728 :THE RAM POSTION TO BE TESTED, SELECT MICROTST #3 BY LOADING PCSRO COMMAND
10729 :FIELD WITH A 3, AND WAIT FOR 'DNI' TO SET.
10730 :
10731 : BGNSEG
10732 044152' 104404 TRAP C$BSEG
10733 044154' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
10734 044160' 103006 BCC 35$ ;OK
10735 044162' ERRHRD 212,STAPOS,MSG46 ;PRINT ERROR
10736 044162' 104456 TRAP C$ERHRD
10737 044164' 000324 .WORD 212
10738 044166' 003417' .WORD STAPOS
10739 044170' 016666' .WORD MSG46
10740 044172' ESCAPE TST ;LEAVE TEST
10741 044172' 104410 TRAP C$ESCAPE

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 226
CZUAAB.MAC 07-APR-83 17:03 TEST 36: STATION ADDRESS RAM POSITION TEST

```

10742 044174' 000152                                .WORD L10156-
10743 044176' 010137 000606' 35$: MOV R1,PCBB      ;TELL MICROCODE WHICH RAM POSTION TO USE
10744 044202' 012777 000003 134126  MOV #3,@PCSR0  ;TELL T11 TO EXECUTE MICROTEST #3
10745 044210' 012737 000275 000332'  MOV #3*SECOND,METER ;WAIT FOR DNI
10746 044216' 004737 017316'      JSR PC,LHKDNI
10747 044222' 103021      BCC 40$
10748 044224' 004737 020132'      JSR PC,CHKINT    ;SEE IF ANY ERROR INTERRUPTS OCCURRED
10749 044230' 103006      BCC 36$         ;NO, OK
10750 044232'      ERRHRD 213,STAPOS,MSG44 ;PRINT ERROR MESSAGE
10751 044232' 104456      TRAP C$ERHRD
10752 044234' 000325      .WORD 213
10753 044236' 003417'      .WORD STAPOS
10754 044240' 016442'      .WORD MSG44
10755 044242'      ESCAPE TST
10756 044242' 104410      TRAP C$ESCAPE
10757 044244' 000102      .WORD L10156-
10758 044246' 012702 000003 36$: MOV #3,R2      ;MICROTEST #3 IS HUNG
10759 044252'      ERRHRD 214,STAPOS,MSG12
10760 044252' 104456      TRAP C$ERHRD
10761 044254' 000326      .WORD 214
10762 044256' 003417'      .WORD STAPOS
10763 044260' 013466'      .WORD MSG12
10764 044262'      ESCAPE TST
10765 044262' 104410      TRAP C$ESCAPE
10766 044264' 000062      .WORD L10156-
10767
10768      ;CHECK PCSR1 TO SEE IF THE DATAGRAM WAS RECEIVED
10769
10770 044266' 122777 000003 134044 40$: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
10771 044274' 001004      BNE 45$       ;NO
10772 044276'      ERRHRD 215,STAPOS,MSG26 ;PRINT ERROR MESSAGE
10773 044276' 104456      TRAP C$ERHRD
10774 044300' 000327      .WORD 215
10775 044302' 003417'      .WORD STAPOS
10776 044304' 015002'      .WORD MSG26
10777 044306'      45$:
10778 044306'      ENDSEG
10779 044306'      10001$:
10780 044306' 104405      TRAP C$ESEG
10781
10782      ;WRITE '1' TO CLEAR 'DNI'
10783      ;
10784 044310'      BGNSEG
10785 044310' 104404      TRAP C$BSEG
10786 044312' 004737 017362'      JSR PC,CLRDNI    ;GO CLEAR DNI
10787 044316' 103006      BCC 50$        ;OK
10788 044320'      ERRHRD 216,STAPOS,RACMG7 ;ERROR OCCURRED PRINT MESSAGE
10789 044320' 104456      TRAP C$ERHRD
10790 044322' 000330      .WORD 216
10791 044324' 003417'      .WORD STAPOS
10792 044326' 012670'      .WORD RACMG7
10793 044330'      ECCAPE TST
10794 044330' 104410      TRAP C$ESCAPE
10795 044332' 000014      .WORD L10156-
10796 044334'
10797 044334'      50$:
ENDSEG

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 227
CZUAAB.MAC 07-APR-83 17:03 TEST 36: STATION ADDRESS RAM POSITION TEST

10798 044334'
10799 044334' 104405
10800
10801
10802
10803 044336' 005201
10804 044340' 020127 000014
10805 044344' 103702
10806 044346'
10807 044346'
10808 044346' 104401

:
:REPEAT TEST FOR ALL 12 RAM POSTIONS
:

INC R1
CMP R1,#12.
BLO 308

ENDTST

:DO NEXT RAM POSTION
:HAVE WE DONE ALL 12 RAM POSTIONS?
:NO KEEP GOING

100028: TRAP CSESEG

L10156: TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 228
CZUAAB.MAC 07-APR-83 17:03 TEST 37: MULTICAST ADDRESS TEST

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10864

044350'
044350'

044350'
044350' 104404
044352' 022737 000105 000326'
044360' 001004
044362' 122777 000001 133750
044370' 001440
044372' 012737 000105 000326' 5S:
044400' 004737 020340'
044404' 103002
044406'
044406' 104410
044410' 000256
044412' 012737 000176 000332' 10S:
044420' 004737 017316'
044424' 103022
044426' 012737 001000' 000310'
044434' 012737 001277' 000312'
044442' 012737 001342' 000314'

.SBTTL TEST 37: MULTICAST ADDRESS TEST
:*****
:MULTICAST ADDRESSING PERMITS THE DEUNA TO RESPOND TO MESSAGES AIMED AT
:LOGICALLY RELATED DEVICES ON THE NETWORK. THE MSB OF THE DESTINATION ADDRESS
:OF THESE MESSAGES IS A 1. THIS BIT IS DETECTED BY THE ADDRESS RECOGNITION
:LOGIC.
:THIS TEST WILL VERIFY THAT THE DEUNA CAN RECOGNIZE AND ACCEPT MESSAGES WITH
:THE MULTICAST BIT DESIGNATION.
:THIS TEST WILL USE MICROMODULE 'E' MICROTEST #4.
:THE MICROCODE WILL PREPARE A DATAGRAM WITH THE DESTINATION ADDRESS HAVING
:THE MULTICAST BIT SET. THE DEUNA WILL BE SETUP IN LOOPBACK MODE WITH 'ENABLE
:ALL MULTICAST'. THE DATAGRAM WILL BE TRANSMITTED AND THE T-11 WILL BE PUT IN
:A LOOP WAITING FOR A RECEIVER INTERRUPT. THE TIMER WILL INTERRUPT THE LOOP
:IF THE RECEIVER INTERRUPT DOES NOT OCCUR. IF THIS HAPPENS, PCSR1 WILL INDICATE
:AN ERROR, OTHERWISE WHEN THE RECEIVER INTERRUPT OCCURS IT WILL BREAK THE LOOP
:AND PCSR1 WILL INDICATE A SUCCESSFUL COMPLETION OF THE TEST.

:TEST SEQUENCE:
: 1-LOAD MICROMODULE 'E' IF NOT ALREADY DONE SO
: 2-WAIT FOR MICROMONITOR TO ENTER THE 'INMON' STATE
: 3-SELECT MICROTEST #4
: 4-WAIT FOR 'DNI'
: 5-CHECK PCSR1 FOR AN ERROR CONDITION
: 6-WRITE '1' TO CLEAR 'DNI'

BGNTST

T37::

:CHECK TO SEE IF MODULE 'E' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'E' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'E'
:OK
TRAP CSBSEG
:WORD L10157-
:WAIT FOR THE MICROMONITOR
:OK
:SDNI,BITNAM
:SNSET,BITSTA
:SAFTER,PWHEN

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 229
 CZUAAB.MAC 07-APR-83 17:03 TEST 37: MULTICAST ADDRESS TEST

10865	044450'	012737	001357'	000316'	MOV	#SGTCMD,PCOMND			
10866	044456'				ERRHRD	217,MUCAST,MSG1			
10867	044456'	104456						TRAP	CSEHRD
10868	044460'	000331						.WORD	217
10869	044462'	003470'						.WORD	MUCAST
10870	044464'	012716'						.WORD	MSG1
10871	044466'				ESCAPE	TST			
10872	044466'	104410						TRAP	CSESCAPE
10873	044470'	000176						.WORD	L10157-
10874	044472'	004737	017362'		208:	JSR	PC,CLRDNI		:CLEAR DNI BIT
10875	044476'	103006				BCC	258		
10876	044500'					ERRHRD	218,MUCAST,RACMG7		:DNI DID NOT CLEAR!
10877	044500'	104456						TRAP	CSEHRD
10878	044502'	000332						.WORD	218
10879	044504'	003470'						.WORD	MUCAST
10880	044506'	012670'						.WORD	RACMG7
10881	044510'				ESCAPE	TST			
10882	044510'	104410						TRAP	CSESCAPE
10883	044512'	000154						.WORD	L10157-
10884	044514'				258:	ENDSEG			
10885	044514'								
10886	044514'							100008:	
10887	044514'	104405						TRAP	CSESEG
10888					:				
10889					:	WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE			
10890					:				
10891	044516'				:	BGNSEG			
10892	044516'	104404						TRAP	CSESEG
10893	044520'	004737	020060'		JSR	PC,CHKMON			:WAIT FOR MICROMONITOR
10894	044524'	103006			BCC	308			:OK
10895	044526'				ERRHRD	219,MUCAST,MSG46			:PRINT ERROR
10896	044526'	104456						TRAP	CSEHRD
10897	044530'	000333						.WORD	219
10898	044532'	003470'						.WORD	MUCAST
10899	044534'	016666'						.WORD	MSG46
10900	044536'				ESCAPE	TST			:LEAVE TEST
10901	044536'	104410						TRAP	CSESCAPE
10902	044540'	000126						.WORD	L10157-
10903	044542'				308:				
10904					:				
10905					:	EXECUTE MICROTEST #4 BY LOADING THE COMMAND FIELD OF PCSRO WITH A 4			
10906					:				
10907	044542'	012777	000004	133566	MOV	#4,8PCSRO			:TELL T11 TO EXECUTE MICROTEST #4
10908					:				
10909					:	WAIT AT LEAST 3 SECONDS FOR TEST TO FINISH BECAUSE MICROCODE WAITS 2 SECONDS			
10910					:	FOR THE RECEIVER INTERRUPT			
10911					:				
10912	044550'	012737	000275	000332'	MOV	#3*SECOND,METER			:WAIT FOR DNI
10913	044556'	004737	017316'		JSR	PC,CHKDNI			
10914	044562'	103021			BCC	408			
10915	044564'	004737	020132'		JSR	PC,CHKINT			:SEE IF ANY ERROR INTERRUPTS OCCURRED
10916	044570'	103006			BCC	358			:NO, OK
10917	044572'				ERRHRD	220,MUCAST,MSG44			:PRINT ERROR MESSAGE
10918	044572'	104456						TRAP	CSEHRD
10919	044574'	000334						.WORD	220
10920	044576'	003470'						.WORD	MUCAST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 230
CZUAAB.MAC 07-APR-83 17:03 TEST 37: MULTICAST ADDRESS TEST

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10921 044600' 016442' .WORD MSG64
10922 044602' ESCAPE TST
10923 044602' 104410 TRAP C$ESCAPE
10924 044604' 000062 .WORD L10157-.
10925 044606' 012702 000004 35$: MOV #4,K2 ;MICROTEST #4 IS HUNG
10926 044612' ERRHRD 221,MUCAST,MSG12
10927 044612' 104456 TRAP C$ERHRD
10928 044614' 000335 .WORD 221
10929 044616' 003470' .WORD MUCAST
10930 044620' 013466' .WORD MSG12
10931 044622' ESCAPE TST
10932 044622' 104410 TRAP C$ESCAPE
10933 044624' 000042 .WORD L10157-.
10934
10935 ;OK, EITHER THE TIMER BROKE THE LOOP OR THE RECEIVER INTERRUPT DID.
10936 ;WHICH WAS IT?
10937
10938 044626' 122777 000003 133504 40$: CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
10939 044634' 001004 BNE 50$ ;NO
10940 044636' ERRHRD 222,MUCAST ;YES, PRINT ERROR MESSAGE
10941 044636' 104456 TRAP C$ERHRD
10942 044640' 000336 .WORD 222
10943 044642' 003470' .WORD MUCAST
10944 044644' 000000 .WORD 0
10945
10946 ;WRITE '1' TO CLEAR 'DNI'
10947
10948 044646' 004737 017362' 50$: JSR PC,CLRDNI ;CLEAR DNI BIT
10949 044652' 103004 BCC 60$
10950 044654' ERRHRD 223,MUCAST,RACMG7 ;ERROR DNI DID NOT CLEAR!
10951 044654' 104456 TRAP C$ERHRD
10952 044656' 000337 .WORD 223
10953 044660' 003470' .WORD MUCAST
10954 044662' 012670' .WORD RACMG7
10955 044664' 60$:
10956 044664' ENDSEG
10957 044664' 10001$:
10958 044664' 104405 TRAP C$ESEG
10959 044666' ENDTST
10960 044666' L10157:
10961 044666' 104401 TRAP C$ETST

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 231
CZUAAB.MAC 07-APR-83 17:03 TEST 38: CRC DATA PATTERN TEST

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044670'
044670'

.SBTTL TEST 38: CRC DATA PATTERN TEST
:*****8
:THE LINK MODULE HAS HARDWARE TO GUARANTEE THAT DATAGRAMS HAVE NOT BEEN
:CORRUPTED DURING TRANSMISSION AND RECEPTION. THE HARDWARE GENERATES A CRC
:FOR DATAGRAMS TRANSMITTED AND VERIFIES THE CRC FOR DATAGRAMS RECEIVED.
:THE CRC IS A 32 BIT NUMBER GENERATED BY DIVIDING THE DATAGRAM BIT STREAM BY A
:CRC POLYNOMIAL. THE DIVISION RESULTS IN A UNIQUE NUMBER THAT CAN ONLY BE
:REPRODUCED IN CRC CALCULATIONS IF THE BIT STREAM EXACTLY MATCHES THE ORIGINAL.
:THE CRC IS CALCULATED DURING DATAGRAM TRANSMISSION AND IS APPENDED TO THE
:PACKET. THE CRC IS TRANSMITTED AS PART OF THE PACKET. THE CRC IS AGAIN
:CALCULATED WHEN THE DATAGRAM IS RECEIVED AND THE CALCULATED IS COMPARED TO
:THE CRC TRANSMITTED. IF THE DATAGRAM HAS BEEN FAITHFULLY TRANSMITTED, THE
:CRC'S SHOULD MATCH EXACTLY.
:THE DEUNA CALCULATES THE CRC WITH DEDICATED CRC LOGIC. THE LOGIC IS EITHER
:DEDICATED TO THE CALCULATION OF THE OUTGOING DATAGRAM OR THE CALCULATION OF
:THE INCOMING DATAGRAM, BUT NOT BOTH.
:THIS TEST WILL VERIFY THE OPERATION OF THE CRC CALCULATION CIRCUITRY.
:MICROMODULE 'F' MICROTEST #1 WILL BE USED.
:THE MICROCODE WILL TRANSMIT DATAGRAMS IN LOOPBACK MODE. THE CRC HARDWARE WILL
:BE DEDICATED TO THE TRANSMITTER. WHEN THE DATAGRAM IS RECEIVED THE T-11 WILL
:CALCULATE A CRC ON THE DATA RECEIVED (INCLUDING THE TRANSMITTED CRC).
:THE RESULT OF THIS CALCULATION WILL BE A 32 BIT CONSTANT. THIS CONSTANT IS
:THEN COMPARED TO WHAT WAS EXPECTED AND IF THEY DO NOT MATCH. AN ERROR IS
:PLACED IN PCSR1.
:PATTERNS WILL BE PASSED TO THE MICROCODE THROUGH THE PCBB. THE MICROCODE WILL
:FILL THE TRANSMIT BUFFER WITH THIS PATTERN BEFORE EACH TRANSMISSION TAKES
:PLACE.
:THE PCBB WILL BE FORMATTED AS FOLLOWS:
:PCBB+0: !-----!
: ! DATA PATTERN !
: !-----!
:TEST SEQUENCE:
: 1-LOAD MICROMODULE 'F' IF NOT ALREADY DONE SO
: 2-PLACE A DATA PATTERN IN PCBB+0
: 3-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
: 4-SELECT MICROTEST #1
: 5-WAIT FOR 'DNI'
: 6-CHECK PCSR1 FOR AN ERROR CONDITION
: 7-WRITE '1' TO CLEAR 'DNI'
:*****8
BGNTST
T38::
:CHECK TO SEE IF MODULE 'F' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 232
 CZUAAB.MAC 07-APR-83 17:03 TEST 38: CRC DATA PATTERN TEST

```

11018
11019 044670'          ; BGNSEG
11020 044670' 104404
11021 044672' 022737 000106 000326'          CMP    #'F,MICRO          ;HAS MICROCODE MODULE 'F' BEEN LOADED
11022 044700' 001004          BNE    5$                ;NO
11023 044702' 122777 000001 133430          CMPB   #INMON,@PCSR1     ;YES, IS THE MICROMONITOR ACTIVE?
11024 044710' 001440          BEQ    20$                ;YES SKIP LOADING THE MICROMODULE
11025 044712' 012737 000106 000326' 5$:    MOV    #'F,MICRO          ;GO LOAD MICRO MODULE 'F'
11026 044720' 004737 020340'          JSR    PC,L0DMIC
11027 044724' 103002          BCC    10$                ;OK
11028 044726'          ESCAPE  TST
11029 044726' 104410
11030 044730' 000276          TRAP   .WORD             C$ESCAPE
11031 044732' 012737 000176 000332' 10$:    MOV    #2*SECOND,METER   ;WAIT FOR THE MICROMONITOR
11032 044740' 004737 017316'          JSR    PC,CHKDNI
11033 044744' 103022          BCC    20$                ;OK
11034 044746' 012737 001000' 000310'          MOV    #SDNI,BITNAM
11035 044754' 012737 001277' 000312'          MOV    #SNSET,BITSTA
11036 044762' 012737 001342' 000314'          MOV    #SAFTER,PWHEN
11037 044770' 012737 001357' 000316'          MOV    #SGTCMD,PCOMND
11038 044776'          ERRHRD  224,CRCDAT,MSG1
11039 044776' 104456          TRAP   .WORD             C$ERHRD
11040 045000' 000340          .WORD  224
11041 045002' 003526'          .WORD  CRCDAT
11042 045004' 012716'          .WORD  MSG1
11043 045006'          ESCAPE  TST
11044 045006' 104410          TRAP   .WORD             C$ESCAPE
11045 045010' 000216          .WORD  L10160-.
11046 045012' 004737 017362' 20$:    JSR    PC,CLRDNI          ;CLEAR DNI BIT
11047 045016' 103006          BCC    25$
11048 045020'          ERRHRD  225,CRCDAT,RACMG7 ;DNI DID NOT CLEAR!
11049 045020' 104456          TRAP   .WORD             C$ERHRD
11050 045022' 000341          .WORD  225
11051 045024' 003526'          .WORD  CRCDAT
11052 045026' 012670'          .WORD  RACMG7
11053 045030'          ESCAPE  TST
11054 045030' 104410          TRAP   .WORD             C$ESCAPE
11055 045032' 000174          .WORD  L10160-.
11056 045034' 25$:
11057 045034'          ENDSEG
11058 045034'          10000$:
11059 045034' 104405          TRAP   C$ESEG
11060
11061          ;SELECT A DATA PATTERN FROM A TABLE OF PREDEFINED DATA PATTERNS
11062          ;AND LOAD IT INTO PCBB+0 FOR THE MICROCODE
11063
11064 045036' 012701 000520'          MOV    #PATERN,R1        ;GET ADDRESS OF DATA PATTERN TABLE
11065 045042' 012705 000005          MOV    #5,R5             ;# OF DATA PATTERNS
11066 045046' 012137 000606' 27$:    MOV    (R1)+,PCBB        ;LOAD PCBB WITH A DATA PATTERN
11067 045052'          BGNSEG
11068 045052' 104404          TRAP   C$BSEG
11069
11070          ;WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
11071
11072 045054' 004737 020060'          JSR    PC,CHKMON        ;WAIT FOR MICROMONITOR
11073 045060' 103006          BCC    30$                ;OK

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 233
CZUAAB.MAC 07-APR-83 17:03 TEST 38: CRC DATA PATTERN TEST

```

11074 045062' ERRHRD 227,CRCDAT,MSG46 ;PRINT ERROR
11075 045062' 104456 TRAP CSERHRD
11076 045064' 000343 .WORD 227
11077 045066' 003526' .WORD CRCDAT
11078 045070' 016666' .WORD MSG46
11079 045072' ESCAPE TST ;LEAVE TEST
11080 045072' 104410 TRAP CSERHRD
11081 045074' 000132 .WORD L10160-
11082 045076'
11083
11084 :EXECUTE MICROTEST #1 BY LOADING PCSRO COMMAND FIELD WITH A 1
11085 :WAIT FOR DNI
11086
11087 045076' 012777 000001 133232 MOV #1,@PCSRO ;TELL T11 TO EXECUTE MICROTEST #1
11088 045104' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
11089 045112' 004737 017316' JSR PC,CHKDNI
11090 045116' 103021 BCC 40$
11091 045120' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
11092 045124' 103006 BCC 35$ ;NO, OK
11093 045126' ERRHRD 228,CRCDAT,MSG44 ;PRINT ERROR MESSAGE
11094 045126' 104456 TRAP CSERHRD
11095 045130' 000344 .WORD 228
11096 045132' 003526' .WORD CRCDAT
11097 045134' 016442' .WORD MSG44
11098 045136' ESCAPE TST
11099 045136' 104410 TRAP CSERHRD
11100 045140' 000066 .WORD L10160-
11101 045142' 012702 000005 35$ MOV #5,R2 ;MICROTEST #1 IS HUNG
11102 045146' ERRHRD 229,CRCDAT,MSG12
11103 045146' 104456 TRAP CSERHRD
11104 045150' 000345 .WORD 229
11105 045152' 003526' .WORD CRCDAT
11106 045154' 013466' .WORD MSG12
11107 045156' ESCAPE TST
11108 045156' 104410 TRAP CSERHRD
11109 045160' 000046 .WORD L10160-
11110
11111 :CHECK PCSR1 TO SEE IF THE MICROCODE DETECTED AN ERROR IN THE CRC CALCULATION
11112
11113 045162' 122777 000003 133150 40$ CMPB #INERR,@PCSR1 ;DID AN ERROR OCCUR?
11114 045170' 001004 BNE 50$ ;NO
11115 045172' ERRHRD 230,CRCDAT ;PRINT ERROR MESSAGE
11116 045172' 104456 TRAP CSERHRD
11117 045174' 000346 .WORD 230
11118 045176' 003526' .WORD CRCDAT
11119 045200' 000000 .WORD 0
11120
11121 :WRITE '1' TO CLEAR 'DNI'
11122
11123 045202' 004737 017362' 50$ JSR PC,CLRDNI ;CLEAR DNI BIT
11124 045206' 103004 BCC 55$
11125 045210' ERRHRD 231,CRCDAT,RACMG7 ;ERROR DNI DID NOT CLEAR!
11126 045210' 104456 TRAP CSERHRD
11127 045212' 000347 .WORD 231
11128 045214' 003526' .WORD CRCDAT
11129 045216' 012670' .WORD RACMG7

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 234
CZUAAB.MAC 07-APR-83 17:03 TEST 38: CRC DATA PATTERN TEST

11130
11131 045220'
11132 045220'
11133 045220'
11134 045220' 104405
11135
11136
11137
11138 045222' 005305
11139 045224' 001310
11140 045226'
11141 045226'
11142 045226' 104401

558:
ENDSEG

100018: TRAP CSESEG

:REPEAT THE TEST EACH TIME WITH A NEW DATA PATTERN

:

DEC R5
BNE 278

:HAVE WE TESTED WITH ALL DATA PATTERNS?
:NOT YET

ENDTST

L10160: TRAP CSETST

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.SBTTL TEST 39: CRC ERROR TEST

:THIS TEST WILL VERIFY THAT THE LINK CRC CIRCUITRY CAN DETECT A BAD CRC.
:MICROMODULE 'F' MICROTEST #2 WILL BE USED. THE MICROCODE WILL TRANSMIT
:DATAGRAMS IN LOOPBACK MODE. EACH DATAGRAM WILL HAVE AN ERRONEOUS CRC
:APPENDED TO THE DATA FIELD. THE DEUNA CRC LOGIC WILL BE SETUP SUCH THAT
:THE CRC LOGIC WILL BE DEDICATED TO THE RECEIVER. THIS IS EXPECTED TO CAUSE
:A CRC ERROR.

:THE DATA FIELDS OF EACH DATAGRAM WILL CONSIST OF PATTERNS. THE PATTERNS
:WILL BE PASSED TO THE MICROCODE VIA THE PCBB.
:AFTER THE RECEIVER INTERRUPT THE MICROCODE WILL PASS THE RECEIVER STATUS WORD
:0 BACK VIA PCBB+2. THE CRC BIT IN THIS WORD IS CHECKED TO SEE IF IT IS SET.

:THE PCBB IS FORMATTED AS FOLLOWS:



:TEST SEQUENCE:
1-LOAD MICROMODULE 'F' IF NOT ALREADY DONE SO
2-PLACE A DATA PATTERN IN PCBB+0
3-WAIT FOR THE MICROCODE TO ENTER THE 'INMON' STATE
4-SELECT MICROTEST #2
5-WAIT FOR 'DNI'
6-VERIFY CRC BIT AND ERROR SUMMARY BIT SET IN PCBB+2
7-WRITE '1' TO CLEAR 'DNI'

BGNTST

T39::

:CHECK TO SEE IF MODULE 'F' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

045230'
045230'
045230'
045232'
045240'
045242'
045250'
045252'
045260'
045264'
045266'
045266'
045270'

```
000106 000326' CMP #'F,MICRO ;HAS MICROCODE MODULE 'F' BEEN LOADED
BNE 58 ;NO
000001 133070 CMPB #INMON,@PCSR1 ;YES, IS THE MICROMONITOR ACTIVE?
BEQ 208 ;YES SKIP LOADING THE MICROMODULE
000106 000326' 58: MOV #'F,MICRO ;GO LOAD MICRO MODULE 'F'
JSR PC,LODMIC
BCC 108 ;OK
ESCAPE TST
TRAP C$BSEG
TRAP C$ESCAPE
.WORD L10161-
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 236
 CZUAAB.MAC 07-APR-83 17:03 TEST 39: CRC ERROR TEST

```

11199 045272' 012737 000176 000332' 10$: MOV #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
11200 045300' 004737 017316' JSR PC,CHKDNI
11201 045304' 103022 BCC 20$ ;OK
11202 045306' 012737 001000' 000310' MOV #DNI,BITNAM
11203 045314' 012737 001277' 000312' MOV #SNSET,BITSTA
11204 045322' 012737 001342' 000314' MOV #SAFTER,PWHEN
11205 045330' 012737 001357' 000316' MOV #SGTCMD,PCOMND
11206 045336' ERRHRD 232,CRCERR,MSG1
11207 045336' 104456 TRAP C$ERHRD
11208 045340' 000350 .WORD 232
11209 045342' 003563' .WORD CRCERR
11210 045344' 012716' .WORD MSG1
11211 045346' ESCAPE TST
11212 045346' 104410 TRAP C$ESCAPE
11213 045350' 000246 .WORD L10161-.
11214 045352' 004737 017362' 20$: JSR PC,CLRDN1 ;CLEAR DNI BIT
11215 045356' 103006 BCC 25$
11216 045360' ERRHRD 233,CRCERR,RACMG7 ;DNI DID NOT CLEAR!
11217 045360' 104456 TRAP C$ERHRD
11218 045362' 000351 .WORD 233
11219 045364' 003563' .WORD CRCERR
11220 045366' 012670' .WORD RACMG7
11221 045370' ESCAPE TST
11222 045370' 104410 TRAP C$ESCAPE
11223 045372' 000224 .WORD L10161-.
11224 045374' 25$:
11225 045374' ENDSEG
11226 045374' 10000$:
11227 045374' 104405 TRAP C$ESEG
11228 :
11229 :CLEAR PCBB+2, GET A DATA PATTERN FROM A LIST OF PRESELECTED DATA PATTERNS
11230 :AND PLACE IT IN PCBB+0 FOR THE MICROCODE
11231 :
11232 045376' 005037 000610' CLR PCBB+2 ;HERE IS WHERE MICROCODE WILL PUT...
11233 :STATUS WORD
11234 045402' 012701 000520' MOV #PATERM,R1 ;GET ADDRESS OF DATA PATTERN TABLE
11235 045406' 012705 000005 MOV #5,R5 ;# OF DATA PATTERNS
11236 045412' 012137 000606' 27$: MOV (R1)+,PCBB ;LOAD PCBB WITH A DATA PATTERN
11237 :
11238 :WAIT FOR THE MICROMONITOR TO BECOME READY
11239 :
11240 : BGNSEG
11241 045416' 104404 TRAP C$BSEG
11242 045420' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
11243 045424' 103006 BCC 30$ ;OK
11244 045426' ERRHRD 234,CRCERR,MSG46 ;PRINT ERROR
11245 045426' 104456 TRAP C$ERHRD
11246 045430' 000352 .WORD 234
11247 045432' 003563' .WORD CRCERR
11248 045434' 016666' .WORD MSG46
11249 045436' ESCAPE TST ;LEAVE TEST
11250 045436' 104410 TRAP C$ESCAPE
11251 045440' 000156 .WORD L10161-.
11252 045442' 30$:
11253 :
11254 :EXECUTE MICROTEST #2 BY LOADING THE COMMAND FIELD OF PCSRO WITH A 2

```


65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 237
 CZUAAB.MAC 07-APR-83 17:03 TEST 39: CRC ERROR TEST

```

11255          ;WAIT FOR 'DNI'
11256          ;
11257 045442' 012777 000002 132666      MOV      #2,@PCSR0      ;TELL T11 TO EXECUTE MICROTEST #2
11258 045450' 012737 000176 000332'      MOV      #2*SECOND,METER ;WAIT FOR DNI
11259 045456' 004737 017316'      JSR      PC,LHKDNI
11260 045462' 103021      BCC      40$
11261 045464' 004737 020132'      JSR      PC,CHI.INT      ;SEE IF ANY ERROR INTERRUPTS OCCURRED
11262 045470' 103006      BCC      35$            ;NO, OK
11263 045472'          ERRHRD 235,CRCERR,MSG44 ;PRINT ERROR MESSAGE
11264 045472' 104456          TRAP      C$ERHRD
11265 045474' 000353          .WORD    235
11266 045476' 003563'          .WORD    CRCERR
11267 045500' 016442'          .WORD    MSG44
11268 045502'          ESCAPE  TST
11269 045502' 104410          TRAP      C$ESCAPE
11270 045504' 000112          .WORD    L10161-.
11271 045506' 012702 000002      35$:  MOV      #2,R2      ;MICROTEST #2 IS HUNG
11272 045512'          ERRHRD 236,CRCERR,MSG12
11273 045512' 104456          TRAP      C$ERHRD
11274 045514' 000354          .WORD    236
11275 045516' 003563'          .WORD    CRCERR
11276 045520' 013466'          .WORD    MSG12
11277 045522'          ESCAPE  TST
11278 045522' 104410          TRAP      C$ESCAPE
11279 045524' 000072          .WORD    L10161-.
11280          ;
11281          ;OK, TEST IS COMPLETED, NOW CHECK PCBB+2. PCBB+2 CONTAINS THE RECEIVER STATUS
11282          ;WORD. IT SHOULD HAVE THE CRC ERROR BIT SET AND THE ERROR SUMMARY BIT SET
11283          ;
11284 045526' 013704 000610'      40$:  MOV      PCBB+2,R4      ;THIS IS THE RECEIVER STATUS WORD
11285 045532' 012703 004000      MOV      #BIT11,R3      ;BIT CRC SHOULD BE SET
11286 045536' 030304      BIT      R3,R4          ;IS CRC BIT SET?
11287 045540' 001004      BNE      45$            ;YES, OK
11288 045542'          ERRHRD 237,CRCERR,MSG27 ;NO, PRINT ERROR MESSAGE
11289 045542' 104456          TRAP      C$ERHRD
11290 045544' 000355          .WORD    237
11291 045546' 003563'          .WORD    CRCERR
11292 045550' 015046'          .WORD    MSG27
11293 045552' 012703 040000      45$:  MOV      #BIT14,R3      ;ERROR SUMMARY BIT SHOULD BE SET
11294 045556' 030304      BIT      R3,R4          ;IS ERROR SUMMARY BIT SET?
11295 045560' 001004      BNE      50$            ;YES, GOOD
11296 045562'          ERRHRD 238,CRCERR,MSG28 ;NO, PRINT ERROR MESSAGE
11297 045562' 104456          TRAP      C$ERHRD
11298 045564' 000356          .WORD    238
11299 045566' 003563'          .WORD    CRCERR
11300 045570' 015114'          .WORD    MSG28
11301          ;
11302          ;WRITE '1' TO CLEAR 'DNI'
11303          ;
11304 045572' 004737 017362'      50$:  JSR      PC,CLRDN1      ;CLEAR DNI BIT
11305 045576' 103004      BCC      55$
11306 045600'          ERRHRD 239,CRCERR,RACMG7 ;ERROR DNI DID NOT CLEAR!
11307 045600' 104456          TRAP      C$ERHRD
11308 045602' 000357          .WORD    239
11309 045604' 003563'          .WORD    CRCERR
11310 045606' 012670'          .WORD    RACMG7
    
```

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 238
CZUAAB.MAC 07-APR-83 17:03 TEST 39: CRC ERROR TEST

11311 045610'
11312 045610'
11313 045610'
11314 045610' 104405
11315
11316
11317
11318 045612' 005305
11319 045614' 001276
11320
11321 045616'
11322 045616'
11323 045616' 104401

558:
ENDSEG

100018: TRAP CSESEG

:REPEAT TEST WITH ALL DATA PATTERNS

DEC R5
BNE 278

:HAVE WE TESTED WITH ALL DATA PATTERNS?
:NOT YET

ENDTST

L10161: TRAP CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 239
CZUAAB.MAC 07-APR-83 17:03 TEST 40: CRC PATTERN LENGTH TEST

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045620'
045620'

045620'
045620' 104404
045622' 022737 000106 000326'
045630' 001004

.SBTTL TEST 40: CRC PATTERN LENGTH TEST

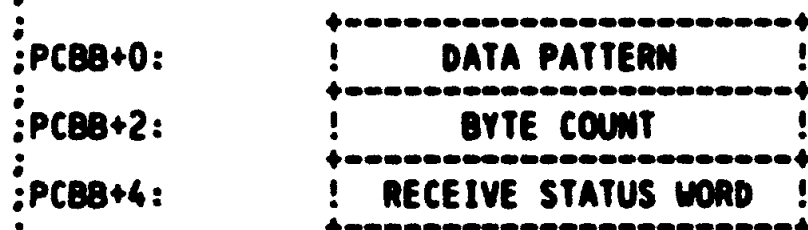
: THIS TEST WILL VERIFY THAT THE RECEIVE CRC HARDWARE CAN CALCULATE CRC FOR
: DATAGRAMS OF VARYING LENGTHS.

: DATAGRAMS WILL BE TRANSMITTED FOR THE TRANSMIT BUFFER TO THE RECEIVE BUFFER
: IN LOOPBACK MODE. THE TRANSMIT CRC WILL BE DISABLED WHICH WILL ASSIGN THE
: CRC LOGIC TO CALCULATION OF INCOMING DATAGRAMS. THE CRC FOR TRANSMIT DATAGRAMS
: WILL BE CALCULATED BY THE MICROCODE. IT IS EXPECTED THAT THE CRC LOGIC WILL
: VERIFY THE CRC APPENDED TO THE DATAGRAM AS IT IS BEING RECEIVED.

: PATTERNS WILL BE USED TO FILL THE DATAGRAM DATA FIELD. THE PATTERNS WILL BE
: PASSED TO THE MICROCODE THROUGH THE PCBB ALONG WITH THE BYTE COUNT TO BE USED.

: AFTER THE RECEPTION OF THE DATAGRAM THE RECEIVER STATUS WORD WILL BE PASSED
: BACK VIA THE PCBB SO IT CAN BE CHECKED

: THE PCBB IS FORMATTED AS FOLLOWS:



: TEST SEQUENCE:

- 1-LOAD MICROMODULE 'F' IF NOT ALREADY DONE SO
- 2-PLACE A PATTERN IN PCBB+0
- 3-PREPARE A MINIMUM BYTE COUNT
- 4-PLACE BYTE COUNT IN PCBB+4
- 5-WAIT FOR MICROMONITOR TO ENTER 'INMON' STATE
- 6-SELECT MICROTTEST #3
- 7-WAIT FOR 'DNI'
- 8-VERIFY NO ERRORS IN PCBB+4
- 9-WRITE '1' TO CLEAR 'DN!'
- 10-MULTIPLY BYTE COUNT BY 2
- 11-REPEAT STEPS 4-10 UNTIL MAXIMUM BYTE COUNT IS REACHED
- 12-REPEAT STEPS 2-11 WITH ALL DATA PATTERNS

BGNTST

T40::

: CHECK TO SEE IF MODULE 'F' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF UCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
: AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

CMP #F,MICRO :HAS MICROCODE MODULE 'F' BEEN LOADED
BNE 58 :NO TRAP CSBSEG

65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 240
 CZUAAB.MAC 07-APR-83 17:03 TEST 40: CRC PATTERN LENGTH TEST

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11380 045632' 122777 000001 132500      CMPB   #INMON,@PCSR1      ;YES, IS THE MICROMONITOR ACTIVE?
11381 045640' 001440      BEQ    20$                ;YES SKIP LOADING THE MICROMODULE
11382 045642' 012737 000106 000326' 5$:      MOV    #'F,MICRO        ;GO LOAD MICRO MODULE 'F'
11383 045650' 004737 020340'      JSR    PC,L0DMIC
11384 045654' 103002      BCC    10$                ;OK
11385 045656'      ESCAPE TST
11386 045656' 104410      TRAP   CSERHRD           ;TRAP
11387 045660' 000320      .WORD 240                ;.WORD L10162-.
11388 045662' 012737 000176 000332' 10$:      MOV    #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
11389 045670' 004737 017316'      JSR    PC,CHKDNI
11390 045674' 103022      BCC    20$                ;OK
11391 045676' 012737 001000' 000310'      MOV    #SDNI,BITNAM
11392 045704' 012737 001277' 000312'      MOV    #SNSET,BITSTA
11393 045712' 012737 001342' 000314'      MOV    #SAFTER,PWHEN
11394 045720' 012737 001357' 000316'      MOV    #SGTCHD,PCOMND
11395 045726'      ERRHRD 240,CRCPAT,MSG1
11396 045726' 104456      TRAP   CSERHRD           ;TRAP
11397 045730' 000360      .WORD 240                ;.WORD
11398 045732' 003611'      .WORD CRCPAT            ;.WORD
11399 045734' 012716'      .WORD MSG1              ;.WORD
11400 045736'      ESCAPE TST
11401 045736' 104410      TRAP   CSERHRD           ;TRAP
11402 045740' 000240      .WORD L10162-.          ;.WORD
11403 045742' 004737 017362' 20$:      JSR    PC,CLRDN1        ;CLEAR DNI BIT
11404 045746' 103006      BCC    25$                ;DNI DID NOT CLEAR!
11405 045750'      ERRHRD 241,CRCPAT,RACMG7
11406 045750' 104456      TRAP   CSERHRD           ;TRAP
11407 045752' 000361      .WORD 241                ;.WORD
11408 045754' 003611'      .WORD CRCPAT            ;.WORD
11409 045756' 012670'      .WORD RACMG7           ;.WORD
11410 045760'      ESCAPE TST
11411 045760' 104410      TRAP   CSERHRD           ;TRAP
11412 045762' 000216      .WORD L10162-.          ;.WORD
11413 045764' 25$:      ENDSEG
11414 045764'
11415 045764' 10000$:
11416 045764' 104405      TRAP   CSESEG           ;TRAP
11417
11418      ;POINT TO LIST OF DATA PATTERNS
11419
11420 045766' 012701 000520'      MOV    #PATERN,R1      ;GET ADDRESS OF DATA PATTERN TABLE
11421 045772' 012705 000005      MOV    #5,R5           ;# OF DATA PATTERNS
11422
11423      ;GET A DATA PATTERN FROM THE LIST AND PLACE IT IN PCBB+0
11424
11425 045776' 27$:
11426 045776' 012137 000606'      MOV    (R1)+,PCBB      ;LOAD PCBB WITH A DATA PATTERN
11427 046002'      BGNSEG
11428 046002' 104404      TRAP   CSBSEG           ;TRAP
11429
11430      ;GENERATE A MINIMUM BYTE COUNT
11431
11432 046004' 012703 000100      MOV    #BIT6,R3        ;R3 WILL BE BYTE COUNT
11433 046010' 28$:
11434
11435      ;LOAD BYTE COUNT INTO THE PCBB+4

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 241
 CZUAAB.MAC 07-APR-83 17:03 TEST 40: CRC PATTERN LENGTH TEST

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11436
11437 046010'
11438 046010' 104404
11439 046012' 010337 000610'
11440
11441
11442
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11445 046016' 004737 020060'
11446 046022' 103006
11447 046024'
11448 046024' 104456
11449 046026' 000362
11450 046030' 003611'
11451 046032' 016666'
11452 046034'
11453 046034' 104410
11454 046036' 000142
11455 046040' 012777 000003 132270 308:
11456 046046' 012737 000176 000332'
11457 046054' 004737 017316'
11458 046060' 103021
11459 046062' 004737 020132'
11460 046066' 103006
11461 046070'
11462 046070' 104456
11463 046072' 000363
11464 046074' 003611'
11465 046076' 016442'
11466 046100'
11467 046100' 104410
11468 046102' 000076
11469 046104' 012702 000003 358:
11470 046110'
11471 046110' 104456
11472 046112' 000364
11473 046114' 003611'
11474 046116' 013466'
11475 046120'
11476 046120' 104410
11477 046122' 000056
11478
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11482 046124' 005737 000612'
11483 046130' 001404
11484 046132'
11485 046132' 104456
11486 046134' 000365
11487 046136' 003611'
11488 046140' 015162'
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11490
11491

```

; BGNSEG
 ; TRAP CSBSEG
 MOV R3.PCBB+2 ;LOAD BYTE COUNT INTO PCBB
 ;WAIT FOR THE MICROCODE TO ENTER THE 'INPMON' STATE
 ;EXECUTE MICROTEST #3 BY LOADING THE COMMAND FIELD OF PCSRO WITH A 3
 ;WAIT FOR 'DNI'
 ;
 JSR PC.CHKMON ;WAIT FOR MICROMONITOR
 BCC 308 ;OK
 ERRHRD 242,CRCPAT,MSG46 ;PRINT ERROR
 ; TRAP CSERHRD
 ;.WORD 242
 ;.WORD CRCPAT
 ;.WORD MSG46
 ESCAPE TST ;LEAVE TEST
 ; TRAP CSERHRD
 ;.WORD L10162-
 MOV #3,SPCSRO ;TELL T11 TO EXECUTE MICROTEST #3
 MOV #2*SECOND,METER ;WAIT FOR DNI
 JSR PC,CHKDNI
 BCC 408
 JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
 BCC 358 ;NO, OK
 ERRHRD 243,CRCPAT,MSG44 ;PRINT ERROR MESSAGE
 ; TRAP CSERHRD
 ;.WORD 243
 ;.WORD CRCPAT
 ;.WORD MSG44
 ESCAPE TST
 ; TRAP CSERHRD
 ;.WORD L10162-
 MOV #3,R2 ;MICROTEST #3 IS HUNG
 ERRHRD 244,CRCPAT,MSG12
 ; TRAP CSERHRD
 ;.WORD 244
 ;.WORD CRCPAT
 ;.WORD MSG12
 ESCAPE TST
 ; TRAP CSERHRD
 ;.WORD L10162-
 ;CHECK THE RECEIVER STATUS WORD, WHICH THE MICROCODE PLACED IN PCBB+4, FOR ANY
 ;ERRORS
 ;
 TST PCBB+4 ;ANYTHING SET IN RECEIVER STATUS WORD 0
 BEQ 508 ;NO, OK
 ERRHRD 245,CRCPAT,MSG29 ;PRINT ERROR MESSAGE
 ; TRAP CSERHRD
 ;.WORD 245
 ;.WORD CRCPAT
 ;.WORD MSG29
 ;WRITE '1' TO CLEAR 'DNI'
 ;

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 242
CZUAAB.MAC 07-APR-83 17:03 TEST 40: CRC PATTERN LENGTH TEST

```

11492 046142' 004737 017362'      508:   JSR      PC,CLRDNI      ;CLEAR DNI BIT
11493 046146' 103004                BCC      558
11494 046150'                        ERRHRD   246,CRCPAT,RACMG7 ;ERROR DNI DID NOT CLEAR!
11495 046150' 104456                TRAP    CSEHRD
11496 046152' 000366                .WORD  246
11497 046154' 003611'                .WORD  CRCPAT
11498 046156' 012670'                .WORD  RACMG7
11499 046160'
11500 046160'
11501 046160'
11502 046160' 104405                100028: TRAP    CSESEG
11503
11504      ;GENERATE A NEW BYTE COUNT BY SHIFTING IT OVER ONE PLACE TO THE LEFT.
11505      ;THIS EFFECTIVELY MULTIPLIES THE NUMBER BY TWO.
11506      ;CHECK TO SEE IF THE NEW NUMBER IS NOT TOO LARGE.
11507      ;REPEAT THE TEST WITH THE NEW BYTE COUNT
11508      ;
11509 046162' 006303                ASL     R3                ;UP THE BYTE COUNT TO NEXT BIT POSTION
11510 046164' 020327 002000        CMP     R3,#BIT10        ;HAVE WE CHECKED ALL BIT POSTIONS IN
11511                                BNE     288                ;THE BYTE COUNT REGISTER?
11512 046170' 001307                ENDSEG   ;NOT YET
11513 046172'
11514 046172'
11515 046172' 104405                100018: TRAP    CSESEG
11516
11517      ;GET A NEW DATA PATTERN FROM THE LIST OF PRESELECTED DATA PATTERNS
11518      ;REPEAT TEST WITH NEW DATA PATTERN
11519      ;
11520 046174' 005305                DEC     R5                ;HAVE WE TESTED WITH ALL DATA PATTERNS?
11521 046176' 001277                BNE     278                ;NOT YET
11522
11523 046200'                        ENDTST
11524 046200'
11525 046200' 104401                L10162: TRAP    CSETST

```

HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 243
CZUAAB.MAC 07-APR-83 17:03

TEST 41: RECEIVER BUFFER RECOVERY - RUNT TEST

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.SBTTL TEST 41: RECEIVER BUFFER RECOVERY - RUNT TEST

: THIS TEST WILL CHECK THE ABILITY OF THE RECEIVE STATE MACHINE TO REJECT A
: DATAGRAM OF LESS THAN 64 BYTES AND TO RECOVER THE RECEIVER BUFFER.

: THIS TEST WILL USE MICROMODULE 'F' MICROTEST #4.
: EACH TRIAL WILL CONSIST OF TWO DATAGRAM TRANSMISSIONS IN LOOPBACK MODE. EACH
: TRANSMISSION WILL LOOPBACK A DATAGRAM FILLED WITH UNIQUE DATA. THE FIRST
: DATAGRAM WILL BE A RUNT OF LESS THAN 64 BYTES. THE SECOND WILL BE A DATAGRAM
: OF LEGAL SIZE.

: EACH TRIAL WILL START WITH THE LINK BUFFER POINTER RESET TO THE FIRST LINK
: BUFFER. THE RUNT WILL BE TRANSMITTED, THEN THE VALID DATAGRAM. IF THE BUFFER
: RECOVERY IS WORKING CORRECTLY, THE SECOND DATAGRAM IS EXPECTED TO BE WRITTEN
: INTO THE SAME LINK MEMORY BUFFER AS WAS THE RUNT.

: THIS TEST WILL BE REPEATED WITH VARIOUS RUNT PACKET SIZES.

: THE BYTE COUNT FOR THE RUNT PACKET TRANSMISSION WILL BE PASSED VIA THE PCBB.
: AFTER THE TWO TRANSMISSIONS, THE MICROCODE WILL PASS BACK THE CONTENTS OF THE
: BUFFER DONE FIFO, AND THE CONTENTS OF THE FIRST DATA WORD OF THE RECEIVER
: BUFFER.

: THE PCBB WILL BE FORMATTED AS FOLLOWS:

: PCBB+0:	!-----!-----!	: RUNT BYTE COUNT	!-----!-----!
: PCBB+2:	!-----!-----!	: BUFFER DONE FIFO CONTENTS	!-----!-----!
: PCBB+4:	!-----!-----!	: FIRST DATA WORD OF BUFFER	!-----!-----!

: TEST SEQUENCE:

- 1-LOAD MICROMODULE 'F' IF NOT ALREADY DONE SO
- 2-PLACE A RUNT BYTE COUNT IN PCBB+0
- 3-CLEAR PCBB+2,+4
- 4-WAIT FOR MICROMONITOR TO ENTER THE 'INMON' STATE
- 5-SELECT MICROTEST #4
- 6-WAIT FOR 'DNI'
- 7-CHECK PCSR1 FOR AN ERROR CONDITION (RECEIVER INTERRUPT OCCURRED ON RUNT PACKET RECEPTION)
- 8-CHECK PCBB+2 FOR CORRECT BUFFER DONE ADDRESS
- 9-CHECK PCBB+4 FOR CORRECT DATA PATTERN
- 10-WRITE '1' TO CLEAR 'DNI'
- 11-REPEAT STEPS 2-10 WITH A NEW RUNT BYTE COUNT

046202'
046202'

BGNTST

T41::

: CHECK TO SEE IF MODULE 'F' HAS BEEN LOADED. IF NOT LOAD IT INTO
: THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 245
 CZUAAB.MAC 07-APR-83 17:03 TEST 41: RECEIVER BUFFER RECOVERY - RUNT TEST

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11638 046366' 005037 000612'          CLR      PCBB+4          ;HERE IS WHERE THE MICRO WILL PUT THE
11639                                     ;FIRST WORD OF DATA FROM THE RECEIVE BUFFER
11640
11641                                     ;WAIT FOR THE MICROCODE TO ENTER THE 'INMON' STATE, START MICROTEST #4 BY
11642                                     ;LOADING THE COMMAND FIELD OF PCSRO WITH A 4, WAIT FOR 'DNI'
11643
11644 046372' 004737 020060'          JSR      PC,CHKMON      ;WAIT FOR MICROMONITOR
11645 046376' 103006          BCC      35$           ;OK
11646 046400'          ERRHRD  249,RBRRUN,MSG46 ;PRINT ERROR
11647 046400' 104456          TRAP     CSERMPD
11648 046402' 000371          .WORD   249
11649 046404' 003650'          .WORD   RBRRUN
11650 046406' 016666'          .WORD   MSG46
11651 046410'          ESCAPE  TST           ;LEAVE TEST
11652 046410' 104410          TRAP     C$ESCAPE
11653 046412' 000220          .WORD   L10163-.
11654 046414' 012777 000004 131714 35$: MOV      #4,APCSRO      ;TELL T11 TO EXECUTE MICROTEST #4
11655 046422' 012737 000275 000332' MOV      #3*SECOND,METER ;WAIT FOR DNI
11656 046430' 004737 017316'          JSR      PC,CHKDNI
11657 046434' 103021          BCC      40$           ;OK
11658 046436' 004737 020132'          JSR      PC,CHKINT     ;SEE IF ANY ERROR INTERRUPTS OCCURRED
11659 046442' 103006          BCC      36$           ;NO, OK
11660 046444'          ERRHRD  250,RBRRUN,MSG44 ;PRINT ERROR MESSAGE
11661 046444' 104456          TRAP     CSERHRD
11662 046446' 000372          .WORD   250
11663 046450' 003650'          .WORD   RBRRUN
11664 046452' 016442'          .WORD   MSG44
11665 046454'          ESCAPE  TST
11666 046454' 104410          TRAP     C$ESCAPE
11667 046456' 000154          .WORD   L10163-.
11668 046460' 012702 000004          36$: MOV      #4,R2           ;MICROTEST #4 IS HUNG
11669 046464'          ERRHRD  251,RBRRUN,MSG12 ;PRINT ERROR MESSAGE
11670 046464' 104456          TRAP     CSERHRD
11671 046466' 000373          .WORD   251
11672 046470' 003650'          .WORD   RBRRUN
11673 046472' 013466'          .WORD   MSG12
11674 046474'          ESCAPE  TST
11675 046474' 104410          TRAP     C$ESCAPE
11676 046476' 000134          .WORD   L10163-.
11677
11678                                     ;'DNI' SET INDICATING THE TEST IS FINISHED, NOW CHECK PCSR1 FOR AN ERROR
11679                                     ;CONDITION. THIS CONDITION WILL BE SET IF, AFTER THE MICROCODE TRANSMITTED THE
11680                                     ;RUNT PACKET, A RECEIVER INTERRUPT OCCURRED. THIS SHOULD NOT HAPPEN BECAUSE
11681                                     ;THE RECEIVER STATE MACHINE SHOULD GO THROUGH A BAD PACKET STATE AND NOT
11682                                     ;CAUSE A RECEIVER INTERRUPT
11683
11684 046500' 122777 000003 131632 40$: CMPB    #INERR,APCSR1 ;DID AN ERROR OCCUR?
11685 046506' 001005          BNE      45$           ;NO
11686 046510'          ERRHRD  252,RBRRUN,MSG30 ;YES, PRINT ERROR MESSAGE
11687 046510' 104456          TRAP     CSERHRD
11688 046512' 000374          .WORD   252
11689 046514' 003650'          .WORD   RBRRUN
11690 046516' 015264'          .WORD   MSG30
11691 046520' 000425          BR       55$
11692
11693                                     ;OK, NO RECEIVER INTERRUPT. NOW CHECK PCBB+2, WHICH IS THE CONTENTS OF THE
    
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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 246
CZUAAB.MAC 07-APR-83 17:03 TEST 41: RECEIVER BUFFER RECOVERY - RUNT TEST

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11694 ;BUFFER DONE FIFO AFTER THE SECOND PACKET WAS RECEIVED. BITS 14:11 SHOULD
11695 ;ALL BE ZERO INDICATING BUFFER 0 WAS RECOVERED BY THE RECEIVER STATE MACHINE.
11696
11697 046522' 042737 103777 000610' 45$: BIC #103777,PCBB+2 ;STRIP OFF THE FLOATING BITS
11698 046530' 005737 000610' TST PCBB+2 ;DID DEUNA RECOVER RECEIVE BUFFER?
11699 046534' 001407 BEQ 50$ ;YES
11700 046536' 052737 100000 000610' BIS #100000,PCBB+2 ;NO, MAKE IT A LINK MEMORY ADDRESS
11701 046544' ERRMRD 253,RBRRUN,MSG31 ;PRINT ERROR MESSAGE
11702 046544' 104456 TRAP CSERHRD
11703 046546' 000375 .WORD 253
11704 046550' 003650' .WORD RBRRUN
11705 046552' 015332' .WORD MSG31
11706
11707 ;NOW CHECK THE DATA THAT WAS RECEIVED INTO THE RECEIVER BUFFER. IT SHOULD
11708 ;BE AN ALTERNATING 1'S AND 0'S PATTERN.
11709
11710 046554' 022737 052525 000612' 50$: CMP #52525,PCBB+4 ;IS DATA GOOD IN LEGIT RECEIVE BUFFER?
11711 046562' 001404 BEQ 55$ ;YES
11712 046564' ERRMRD 254,RBRRUN,MSG32 ;NO,PRINT ERROR MESSAGE
11713 046564' 104456 TRAP CSERHRD
11714 046566' 000376 .WORD 254
11715 046570' 003650' .WORD RBRRUN
11716 046572' 015476' .WORD MSG32
11717 046574' 55$:
11718 046574' ENDSEG
11719 046574' 10001$:
11720 046574' 104405 TRAP CSESEG
11721
11722 ;WRITE '1' TO CLEAR 'DNI'
11723
11724 046576' 004737 017362' JSR PC,CLRDN1 ;GO CLEAR DNI
11725 046602' 103006 BCC 60$ ;OK
11726 046604' ERRMRD 255,RBRRUN,RACMG7 ;ERROR DNI DID NOT CLEAR!
11727 046604' 104456 TRAP CSERHRD
11728 046606' 000377 .WORD 255
11729 046610' 003650' .WORD RBRRUN
11730 046612' 012670' .WORD RACMG7
11731 046614' ESCAPE TST
11732 046614' 104410 TRAP CSESCAPE
11733 046616' 000014 .WORD L10163-.
11734
11735 ;GENERATE A NEW RUNT PACKET BYTE COUNT. WE WILL JUST SLIDE A BIT THROUGH
11736 ;THE COUNTER, UP TO THE LAST RUNT PACKET SIZE OF 63
11737
11738 046620' 006301 60$: ASL R1 ;MOVE OVER THE ALREADY SET BITS
11739 046622' 005201 INC R1 ;SET LSB
11740 046624' 020127 000100 CMP R1,#MINBYT ;STOP WITH A BYTE COUNT GREATER THAN
11741 ;MINIMUM SIZE
11742 046630' 002651 BLT 30$
11743 046632' ENDTST
11744 046632' L10163:
11745 046632' 104401 TRAP CSETST

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 247
CZUAAB.MAC 07-APR-83 17:03 TEST 42: HALF-DUPLEX TEST

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11792 046634'
11793 046634'
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11799 046634'
11800 046634' 104404
11801 046636' 022737 600106 000326'

.SBTTL TEST 42: HALF-DUPLEX TEST
:*****
:THE LINK INCLUDES A 'HALF DUPLEX' MODE OF OPERATION. THIS MODE CAN BE ENABLED
:OR DISABLED THROUGH THE LINK MODE REGISTER. THE OPERATIONAL MICROCODE NORMALLY
:USES HALF-DUPLEX MODE.
:IN THE HALF-DUPLEX MODE, THE LINK WILL NOT RECEIVE MESSAGES ADDRESSED TO
:ITSELF. INCOMING MESSAGES LOOPED BACK WILL BE IGNORED BY THE RECEIVE STATE
:MACHINE. THE STATE MACHINE WILL NOT ISSUE A 'RECEIVER DONE' INTERRUPT AND THE
:BUFFER CAN BE RECOVERED FOR RECEIVING A LATER DATAGRAM.
:THIS TEST USES MICROMODULE 'F' MICROTEST #5.
:THIS TEST WILL VERIFY THE OPERATION OF HALF-DUPLEX MODE. A DATAGRAM WILL BE
:TRANSMITTED IN LOOPBACK MODE WITH THE HALF-DUPLEX BIT SET. THE MICROCODE
:WILL VERIFY THAT THE RECEIVER INTERRUPT DOES NOT OCCUR. THE MICROCODE WILL
:THEN CLEAR THE HALF-DUPLEX BIT AND LOOP A DATAGRAM AND VERIFY THAT THE
:ORIGINAL BUFFER WAS RECOVERED.
:THIS TEST WILL USE THE PCBB TO PASS INFORMATION. PCBB+0 WILL BE USED TO PASS
:THE CONTENTS OF THE BUFFER DONE FIFO AFTER THE SECOND DATAGRAM IS RECEIVED.
:PCBB+4 WILL BE USED TO PASS THE FIRST WORD OF DATA FROM THE RECEIVER BUFFER
:AFTER THE SECOND DATAGRAM IS TRANSMITTED.
:PCBB+0: !-----!
: ! CONTENTS OF BUFFER DONE FIFO !
: !-----!
:PCBB+2: !-----!
: ! FIRST DATA WORD OF BUFFER DONE!
: !-----!
:THE CONTENTS OF THE BUFFER DONE FIFO SHOULD BE 0 AND THE FIRST DATA WORD
:SHOULD BE AN ALTERNATING 1'S AND 0'S PATTERN.
:TEST SEQUENCE:
: 1-LOAD MICROMODULE 'F' IF NOT ALREADY DONE SO.
: 2-CLEAR PCBB+0 AND PCBB+2
: 3-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
: 4-WAIT FOR 'DNI'
: 5-CHECK PCSR1 FOR AND ERROR CONDITION (THIS SIGNIFIES THAT THE DATAGRAM
: SENT IN HALF-DUPLEX MODE CAUSED AN INTERRUPT)
: 6-VERIFY PCBB+0 IS LINK BUFFER 0
: 7-VERIFY PCBB+2 HAS ALTERNATING 1'S AND 0'S

BGNTST
T42::
:CHECK TO SEE IF MODULE 'F' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF UCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
BGNSEG
CMP #'F,MICRO TRAP CSBSEG
:HAS MICROCODE MODULE 'F' BEEN LOADED

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 248
 CZUAAB.MAC 07-APR-83 17:03 TEST 42: HALF-DUPLEX TEST

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11802 046644' 001004      BNE      58      ;NO
11803 046646' 122777 000001 131464      CMPB     #INMON,&PCSR1 ;YES, IS THE MICROMONITOR ACTIVE?
11804 046654' 001440      BEQ      208     ;YES SKIP LOADING THE MICROMODULE
11805 046656' 012737 000106 000326' 58:      MOV      #'F,MICRO    ;GO LOAD MICRO MODULE 'F'
11806 046664' 004737 020340'      JSR      PC,LODMIC
11807 046670' 103002      BCC      108     ;OK
11808 046672'      ESCAPE  TST
11809 046672' 104410      TRAP      CSBESCAPE
11810 046674' 000342      .WORD    L10164-.
11811 046676' 012737 000176 000332' 108:     MOV      #2*SECOND,METER ;WAIT FOR THE MICROMONITOR
11812 046704' 004737 017316'      JSR      PC,CHKDNI
11813 046710' 103022      BCC      208     ;OK
11814 046712' 012737 001000' 000310'      MOV      #SDNI,BITNAM
11815 046720' 012737 001277' 000312'      MOV      #SNSET,BITSTA
11816 046726' 012737 001342' 000314'      MOV      #SAFTER,PWHEN
11817 046734' 012737 001357' 000316'      MOV      #SGTCMD,PCOMND
11818 046742'      ERRHRD  256,HAFDUP,MSG1
11819 046742' 104456      TRAP      CSERHRD
11820 046744' 000400      .WORD    256
11821 046746' 003723'      .WORD    HAFDUP
11822 046750' 012716'      .WORD    MSG1
11823 046752'      ESCAPE  TST
11824 046752' 104410      TRAP      CSBESCAPE
11825 046754' 000262      .WORD    L10164-.
11826 046756' 004737 017362' 208:     JSR      PC,CLRDNI      ;CLEAR DNI BIT
11827 046762' 103006      BCC      258
11828 046764'      ERRHRD  257,HAFDUP,RACMG7 ;DNI DID NOT CLEAR!
11829 046764' 104456      TRAP      CSERHRD
11830 046766' 000401      .WORD    257
11831 046770' 003723'      .WORD    HAFDUP
11832 046772' 012670'      .WORD    RACMG7
11833 046774'      ESCAPE  TST
11834 046774' 104410      TRAP      CSBESCAPE
11835 046776' 000240      .WORD    L10164-.
11836 047000' 258:
11837 047000'      ENDSEG
11838 047000' 10000S:
11839 047000' 104405      TRAP      CSESEG
11840
11841      ;CLEAR PCBB+0 AND PCBB+2 THESE LOCATIONS ARE WHERE THE MICROCODE WILL PLACE
11842      ;INFORMATION ABOUT THE TEST SUCCESS
11843      ;
11844      BGNSEG
11845 047002' 104404      TRAP      CSBSEG
11846 047004' 005037 000606'      CLR      PCBB+0      ;HERE IS WHERE THE MICRO WILL PUT THE
11847      ;'DONE' RECEIVE BUFFER FIFO ADDRESS
11848 047010' 005037 000610'      CLR      PCBB+2      ;HERE IS WHERE THE MICRO WILL PUT THE
11849      ;FIRST WORD OF DATA FROM THE RECEIVE BUFFER
11850
11851      ;WAIT FOR THE MICROCODE TO ENTER THE 'INMON' STATE
11852      ;THEN EXECUTE MICROTST #5 BY LOADING PCRSO WITH A 5
11853      ;WAIT FOR 'DNI'
11854      ;
11855 047014' 004737 020060'      JSR      PC,CHKMON    ;WAIT FOR MICROMONITOR
11856 047020' 103006      BCC      358
11857 047022'      ERRHRD  258,HAFDUP,MSG46 ;OK
;PRINT ERROR

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 250
CZUAAB.MAC 07-APR-83 17:03 TEST 42: HALF-DUPLEX TEST

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11918 047176' 022737 052525 000610' 508:  CMP #52>25,PCBB+2      :IS DATA GOOD IN LEGIT RECEIVE BUFFER?
11919 047204' 001404      BEQ 558                :YES
11920 047206'                ERRHRD 263,HAFDUP,MSG41 :NC,PRINT ERROR MESSAGE
11921 047206' 104456                TRAP CSERHRD
11922 047210' 000407                .WORD 263
11923 047212' 003723'                .WORD HAFDUP
11924 047214' 016176'                .WORD MSG41
11925 047216'
11926 047216'
11927 047216'
11928 047216' 104405                100018: TRAP CSESEG
11929
11930
11931
11932 047220' 004737 017362'      :WRITE '1' TO CLEAR 'DNI'
11933 047224' 103004      JSR PC,CLRDNI          :GO CLEAR DNI
11934 047226'                BCC 608                :OK
11935 047226' 104456                ERRHRD 264,HAFDUP,RACMG7 :ERROR DNI DID NOT CLEAR!
11936 047230' 000410                TRAP CSERHRD
11937 047232' 003723'                .WORD 264
11938 047234' 012670'                .WORD HAFDUP
11939 047236'                .WORD RACMG7
11940 047236'
11941 047236'
11942 047236' 104401                608:
ENDTST                L10164: TRAP CSETST

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.SBTTL TEST 43: COLLISION TEST

:THE RECEIVE STATE MACHINE REACTS TO COLLISIONS ON THE WIRE BY ACTIVATING
:THE RETRY LOGIC. THE RETRY LOGIC WAITS AN INTERVAL OF TIME BEFORE ATTEMPTING
:TO RETRANSMIT THE DATAGRAM. THE INTERVALS ARE NOT UNIFORM BUT ARE OF
:GENERALLY INCREASING PSEUDO-RANDOM DURATION. THE RETRY LOGIC WILL ATTEMPT
:TO RETRANSMIT UP TO 15 ADDITIONAL TIMES BEFORE GIVING UP.

:THIS TEST WILL VERIFY THAT THE RECEIVE STATE MACHINE RESPONDS TO A COLLISION
:AND THAT THE RETRY SEQUENCE IS REPORTED CORRECTLY IN THE TRANSMIT STATUS WORD.

:THIS TEST WILL USE MICROMODULE 'G' MICROTEST #1.
:THE LINK BOARD CONTAINS DIAGNOSTIC LOGIC THAT ALLOWS COLLISIONS TO BE SIMULATED.
:WITH THE FORCE COLLISIONS LOGIC ACTIVATED, THE RETRY HARDWARE CAN BE STEPPED
:THROUGH THE RETRY SEQUENCE. THAT IS, EVERY DATAGRAM LOOPED BACK WILL STEP
:THE RETRY LOGIC THROUGH ONE STEP OF THE RETRY SEQUENCE. THE RETRY SEQUENCE
:CAN BE VERIFIED BY CHECKING THE TRANSMIT BUFFER STATUS WORDS AFTER EACH RETRY
:STEP.

:THE PCBB WILL BE USED TO PASS PARAMETERS BETWEEN THE MICROCODE AND THE HOST
:PROCESSOR. PCBB+0 WILL BE USED TO PASS THE DATA TO BE LOADED INTO THE LINK
:MODE WORD. PCBB+2 WILL BE PASSED BACK BY THE MICROCODE, IT IS THE FIRST WORD
:OF THE TRANSMIT BUFFER (TRANSMIT STATUS WORD 0). PCBB+4 WILL ALSO BE PASSED
:BACK, IT IS TRANSMIT STATUS WORD 1.

:THE TRANSMIT STATUS WORDS SHOULD SHOW THE FOLLOWING STATUS:

	STATUS BITS			
	WORD 0			WORD 1
LOOPBACK STEP #	ERRS (14)	MORE (12)	ONE (11)	RETRY (10)
1	0	0	1	0
2-15	0	1	0	0
16	1	0	0	1

:THE PCBB IS FORMATTED AS FOLGWS:

```

PCBB+0:  +-----+
          | LINK MODE WORD |
          +-----+
PCBB+2:  +-----+
          | TRANSMIT STATUS WORD 0!
          +-----+
PCBB+4:  +-----+
          | TRANSMIT STATUS WORD 1!
          +-----+

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 252
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

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12029 047240'
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12035 047240'
12036 047240' 104404
12037 047242' 022737 000107 000326'
12038 047250' 001004
12039 047252' 122777 000001 131060
12040 047260' 001440
12041 047262' 012737 000107 000326' 5\$:
12042 047270' 004737 020340'
12043 047274' 103002
12044 047276'
12045 047276' 104410
12046 047300' 001026
12047 047302' 012737 000176 000332' 10\$:
12048 047310' 004737 017316'
12049 047314' 103022
12050 047316' 012737 001000' 000310'
12051 047324' 012737 001277' 000312'
12052 047332' 012737 001342' 000314'
12053 047340' 012737 001357' 000316'
12054 047346'

TEST SEQUENCE:
1-LOAD MICROMODULE 'G' IF NOT ALREADY SOME SO
2-LOAD PCBB+0 WITH PROMISCUOUS MODE, INTERNAL LOOPBACK AND FORCE COLLISIONS.
3-WAIT FOR MICROMONITOR TO ENTER THE 'INMON' STATE
4-EXECUTE MICROTEST #1
5-WAIT FOR 'DNI'
6-CHECK FOR 'ONE' BIT IN PCBB+0
7-WRITE '1' TO CLEAR 'DNI'
8-LOAD PCBB+0 WITH PROMISCUOUS MODE, INTERNAL LOOPBACK AND FORCE COLLISIONS.
9-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
10-EXECUTE MICROTEST #1
11-WAIT FOR 'DNI'
12-CHECK PCBB+2 FOR 'MORE' BIT
13-WRITE '1' TO CLEAR 'DNI'
14-REPEAT STEPS 8-13 15 TIMES
15-LOAD PCBB+0 WITH PROMISCUOUS MODE, INTERNAL LOOPBACK AND FORCE COLLISIONS
16-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
17-EXECUTE MICROTEST #1
18-WAIT FOR 'DNI'
19-CHECK PCBB+4 FOR ERROR SUMMARY BIT IN PCBB+2 AND RETRY BIT IN PCBB+4
20-WRITE '1' TO CLEAR 'DNI'

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BGNTST
T43::
:CHECK TO SEE IF MODULE 'G' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG
TRAP CSBSEG
:HAS MICROCODE MODULE 'G' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'G'
:OK
TRAP CSESCAPE
.WORD L10165-
:WAIT FOR THE MICROMONITOR
:OK
MOV #2*SECOND,METER
JSR PC,CHKDNI
BCC 20\$
MOV #SDNI,BITNAM
MOV #SNSET,BITSTA
MOV #SAFTER,PWHEN
MOV #SGTCMD,PCORND
ERRHRD 265,COLTST,MSG1

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 253
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

```

12055 047346' 104456 TRAP CSERHRD
12056 047350' 000411 .WORD 265
12057 047352' 003753' .WORD COLTST
12058 047354' 012716' .WORD MSG1
12059 047356' ESCAPE TST
12060 047356' 104410 TRAP CSESCAPE
12061 047360' 000746 .WORD L10165-
12062 047362' 004737 017362' 20S: JSR PC,CLRDNI ;CLEAR DNI BIT
12063 047366' 103006 BCC 25$
12064 047370' ERRHRD 266,COLTST,RACMG7 ;DNI DID NOT CLEAR!
12065 047370' 104456 TRAP CSERHRD
12066 047372' 000412 .WORD 266
12067 047374' 003753' .WORD COLTST
12068 047376' 012670' .WORD RACMG7
12069 047400' ESCAPE TST
12070 047400' 104410 TRAP CSESCAPE
12071 047402' 000724 .WORD L10165-
12072 047404' 25$:
12073 047404' ENDSEG
12074 047404'
12075 047404' 104405 10000S: TRAP CSESEG
12076
12077 ;LOAD PCSR2 WITH ADDRESS OF PORT CONTROL BLOCK
12078 ;LOAD REGISTER 5 WITH BITS TO BE LOADED INTO THE LINK MODE REGISTER BY THE
12079 ;MICROCODE
12080
12081 047406' 012777 000606' 130726 MOV #PCBB,@PCSR2 ;TELL DEUMA WHERE PCBB IS
12082 047414' 005077 130724 CLR @PCSR3
12083 047420' 012705 100024 MOV #BIT15!BIT4!BIT2,R5 ;TELL MICROCODE TO LOAD THE FOLLOWING
12084 ;INTO THE LINK MODE REGISTER:
12085 ;PROMISCUOUS MODE, INTERNAL LOOPBACK,
12086 ;AND FORCE COLLISIONS
12087
12088 ;BEGIN FIRST LOOPBACK
12089
12090 BGNSEG
12091 047424' 104404 TRAP C8BSEG
12092 047426' 012702 000001 MOV #1,R2 ;START LOOPBACK STEP #1
12093 047432' 010537 000606' MOV R5,PCBB ;LOAD PCBB WITH LINK MODE REGISTER DATA
12094 047436' 005037 000610' CLR PCBB+2 ;MICROCODE WILL PUT XMIT STAT WORD 0
12095 047442' 005037 000612' CLR PCBB+4 ;MICROCODE WILL PUT XMIT STAT WORD 1
12096 047446' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
12097 047452' 103006 BCC 30$ ;OK
12098 047454' ERRHRD 267,COLTST,MSG46 ;PRINT ERROR
12099 047454' 104456 TRAP CSERHRD
12100 047456' 000413 .WORD 267
12101 047460' 003753' .WORD COLTST
12102 047462' 016666' .WORD MSG46
12103 047464' ESCAPE TST ;LEAVE TEST
12104 047464' 104410 TRAP CSESCAPE
12105 047466' 000640 .WORD L10165-
12106 047470' 012777 000001 130640 30S: MOV #1,@PCSR0 ;EXECUTE MICROTEST #1
12107 047476' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
12108 047504' 004737 017316' JSR PC,CHKDNI
12109 047510' 103021 BCC 40$
12110 047512' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED

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65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 254
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

```

12111 047516' 103006          BCC      358          :NO, OK
12112 047520'          ERRHRD  268, COLTST,MSG44 :PRINT ERROR MESSAGE
12113 047520' 104456          TRAP    CSERHRD
12114 047522' 000414          .WORD  268
12115 047524' 003753'          .WORD  COLTST
12116 047526' 016442'          .WORD  MSG44
12117 047530'          ESCAPE  TST
12118 047530' 104410          TRAP    CSERHRD
12119 047532' 000574          .WORD  L10165-.
12120 047534' 012702 000001      358:  MOV    #1,R2          :MICROTEST #1 IS MUNG
12121 047540'          ERRHRD  269, COLTST,MSG12
12122 047540' 104456          TRAP    CSERHRD
12123 047542' 000415          .WORD  269
12124 047544' 003753'          .WORD  COLTST
12125 047546' 013466'          .WORD  MSG12
12126 047550'          ESCAPE  TST
12127 047550' 104410          TRAP    CSERHRD
12128 047552' 000554          .WORD  L10165-.
12129
12130          :THE RESULT OF THE FIRST LOOPBACK SHOULD BE TX WORD 0 'ONE' BIT SET AND NO
12131          :OTHERS
12132
12133 047554' 012703 004000      408:  MOV    #BIT11,R3          :'ONE' BIT SHOULD BE SET IN TX WORD 0
12134 047560' 005004          CLR    R4                :NO BITS SHOULD BE SET IN TX WORD 1
12135 047562' 032737 040000 000610' BIT    #BIT14,PCBB+2      :IS 'ERROR SUMMARY' SET IN WORD 0?
12136 047570' 001014          BNE   458                :YES, ERROR
12137 047572' 032737 010000 000610' BIT    #BIT12,PCBB+2      :IS 'MORE' BIT SET IN WORD 0?
12138 047600' 001010          BNE   458                :YES, ERROR
12139 047602' 032737 004000 000610' BIT    #BIT11,PCBB+2      :IS 'ONE' BIT SET IN WORD 0?
12140 047610' 001404          BEQ   458                :NO, ERROR
12141 047612' 032737 002000 000612' BIT    #BIT10,PCBB+4      :IS 'RETRY' BIT SET IN WORD 1?
12142 047620' 001404          BEQ   508                :NO
12143 047622'          458:  ERRHRD  270, COLTST,MSG22 :PRINT ERROR MESSAGE
12144 047622' 104456          TRAP    CSERHRD
12145 047624' 000416          .WORD  270
12146 047626' 003753'          .WORD  COLTST
12147 047630' 014326'          .WORD  MSG22
12148
12149
12150          :WRITE 'ONE' TO CLEAR 'DNI'
12151
12152 047632' 004737 017362'      508:  JSR    PC,CLRDNI          :GO CLEAR DNI
12153 047636' 103004          BCC   558                :OK
12154 047640'          ERRHRD  271, COLTST,RACMG7 :PRINT ERROR MESSAGE
12155 047640' 104456          TRAP    CSERHRD
12156 047642' 000417          .WORD  271
12157 047644' 003753'          .WORD  COLTST
12158 047646' 012670'          .WORD  RACMG7
12159 047650'          558:
12160 047650'          ENDSEG
12161 047650'
12162 047650' 104405          100018: TRAP    CSESEG
12163
12164          :BEGIN LOOPBACKS 2-15
12165
12166 047652'          BGNSEG

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 255
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

```

12167 047652' 104404
12168 047654' 012702 000002      MOV      #2,R2      ;START LOOPS 2-15      TRAP      CSBSEG
12169
12170 047660' 010537 000606'      60S:  MOV      R5,PCBB      ;LOAD PCBB WITH LINK MODE REGISTER DATA
12171 047664' 005037 000610'      CLR      PCBB+2      ;MICROCODE WILL PUT XMIT STAT WORD 0
12172 047670' 005037 000612'      CLR      PCBB+4      ;MICROCODE WILL PUT XMIT STAT WORD 1
12173 047674' 004737 020060'      JSR      PC,CHKMON    ;WAIT FOR MICROMONITOR
12174 047700' 103006      BCC      70S          ;OK
12175 047702'      ERRHRD  272,COLTST,MSG46 ;PRINT ERROR
12176 047702' 104456      TRAP      CSERHRD
12177 047704' 000420      .WORD    272
12178 047706' 003753'      .WORD    COLTST
12179 047710' 016666'      .WORD    MSG46
12180 047712'      ESCAPE  TST          ;LEAVE TEST
12181 047712' 104410      TRAP      CSESCAPE
12182 047714' 000412      .WORD    L10165-
12183 047716' 012777 000001 130412 70S:  MOV      #1,BPCSR0    ;EXECUTE MICROTEST #1
12184 047724' 012737 000176 000332'  MOV      #2*SECOND,METER ;WAIT FOR DNI
12185 047732' 004737 017316'      JSR      PC,CHKDNI
12186 047736' 103017      BCC      80S
12187 047740' 004737 020132'      JSR      PC,CHKINT    ;SEE IF ANY ERROR INTERRUPTS OCCURRED
12188 047744' 103004      BCC      75S          ;NO, OK
12189 047746'      ERRHRD  273,COLTST,MSG44 ;PRINT ERROR MESSAGE
12190 047746' 104456      TRAP      CSERHRD
12191 047750' 000421      .WORD    273
12192 047752' 003753'      .WORD    COLTST
12193 047754' 016442'      .WORD    MSG44
12194 047756' 012702 000001      75S:  MOV      #1,R2          ;MICROTEST #1 IS HUNG
12195 047762'      ERRHRD  274,COLTST,MSG12
12196 047762' 104456      TRAP      CSERHRD
12197 047764' 000422      .WORD    274
12198 047766' 003753'      .WORD    COLTST
12199 047770' 013466'      .WORD    MSG12
12200 047772'      ESCAPE  TST
12201 047772' 104410      TRAP      CSESCAPE
12202 047774' 000332      .WORD    L10165-
12203
12204      ;THE RESULT OF LOOPBACKS 2-15 SHOULD BE THE 'MORE' BIT IN TX 0 AND NO OTHERS
12205
12206 047776' 012703 010000      80S:  MOV      #BIT12,R3    ;'MORE' BIT SHOULD BE SET IN TX0
12207 050002' 032737 040000 000610'  BIT      #BIT14,PCBB+2 ;IS 'ERROR SUMMARY' SET IN TX 0?
12208 050010' 001014      BNE      90S          ;YES, ERROR
12209 050012' 032737 010000 000610'  BIT      #BIT12,PCBB+2 ;IS 'MORE' BIT SET IN TX 0?
12210 050020' 001410      BEQ      90S          ;NO, ERROR
12211 050022' 032737 004000 000610'  BIT      #BIT11,PCBB+2 ;IS 'ONE' BIT SET IN TX 0?
12212 050030' 001004      BNE      90S          ;YES, ERROR
12213 050032' 032737 002000 000612'  BIT      #BIT10,PCBB+4 ;IS 'RETRY' BIT SET IN TX 1?
12214 050040' 001404      BEQ      100S         ;NO
12215 050042'      90S:  ERRHRD  275,COLTST,MSG22 ;PRINT ERROR MESSAGE
12216 050042' 104456      TRAP      CSERHRD
12217 050044' 000423      .WORD    275
12218 050046' 003753'      .WORD    COLTST
12219 050050' 014326'      .WORD    MSG22
12220
12221      ;WRITE '1' TO CLEAR 'DNI'
12222

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 256
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

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12223
12224 050052' 004737 017362' 1008: JSR PC,CLRDNI ;GO CLEAR DNI
12225 050056' 103004 BCC 1058 ;OK
12226 050060' ERRHRD 276,COLTST,RACMG7 ;PRINT ERROR MESSAGE
12227 050060' 04456 TRAP CSERHRD
12228 050062' 000424 .WORD 276
12229 050064' 003753' .WORD COLTST
12230 050066' 012670' .WORD RACMG7
12231 050070' 005202 1058: INC R2 ;LOOP COUNT
12232 050072' 022702 000020 CMP #16.,R2 ;HAVE WE DONE LOOP STEPS 2-15?
12233 050076' 001270 BNE 608 ;NO CONTINUE
12234 050100' ENDSEG
12235 050100'
12236 050100' 104405 100028: TRAP CSESEG
12237
12238 ;BEGIN LOOPBACK #16
12239 ;
12240 050102' BGNSEG
12241 050102' 104404 TRAP CSBSEG
12242 050104' 010537 000606' MOV R5,PCBB ;LOAD PCBB WITH LINK MODE REGISTER DATA
12243 050110' 005037 000610' CLR PCBB+2 ;MICROCODE WILL PUT XMIT STAT WORD 0
12244 050114' 005037 000612' CLR PCBB+4 ;MICROCODE WILL PUT XMIT STAT WORD 1
12245 050120' 004737 020060' JSR PC,CHKMON ;WAIT FOR MICROMONITOR
12246 050124' 103006 BCC 1108 ;OK
12247 050126' ERRHRD 277,COLTST,MSG46 ;PRINT ERROR
12248 050126' 104456 TRAP CSERHRD
12249 050130' 000425 .WORD 277
12250 050132' 003753' .WORD COLTST
12251 050134' 016666' .WORD MSG46
12252 050136' ESCAPE TST ;LEAVE TEST
12253 050136' 104410 TRAP C$ESCAPE
12254 050140' 000166 .WORD L10165-.
12255 050142' 012777 000001 130166 1108: MOV #1,BPCSR0 ;EXECUTE MICROTEST #1
12256 050150' 012737 000176 000332' MOV #2*SECOND,METER ;WAIT FOR DNI
12257 050156' 004737 017316' JSR PC,CHKDNI
12258 050162' 103021 BCC 1208
12259 050164' 004737 020132' JSR PC,CHKINT ;SEE IF ANY ERROR INTERRUPTS OCCURRED
12260 050170' 103006 BCC 1158 ;NO, OK
12261 050172' ERRHRD 278,COLTST,MSG44 ;PRINT ERROR MESSAGE
12262 050172' 104456 TRAP CSERHRD
12263 050174' 000426 .WORD 278
12264 050176' 003753' .WORD COLTST
12265 050200' 016442' .WORD MSG44
12266 050202' ESCAPE TST
12267 050202' 104410 TRAP C$ESCAPE
12268 050204' 000122 .WORD L10165-.
12269 050206' 012702 000001 1158: MOV #1,R2 ;MICROTEST #1 IS HUNG
12270 050212' ERRHRD 279,COLTST,MSG12
12271 050212' 104456 TRAP CSERHRD
12272 050214' 000427 .WORD 279
12273 050216' 003753' .WORD COLTST
12274 050220' 013466' .WORD MSG12
12275 050222' ESCAPE TST
12276 050222' 104410 TRAP C$ESCAPE
12277 050224' 000102 .WORD L10165-.
12278

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 257
CZUAAB.MAC 07-APR-83 17:03 TEST 43: COLLISION TEST

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12279
12280      ;PCBB+2 HAS TX WORD 0, IT SHOULD HAVE ERROR SUMMARY SET. PCBB+4 HAS TX WORD 1
12281      ;IT SHOULD HAVE RETRY SET
12282
12283 050226' 012703 040000      120$:  MOV      #BIT14,R3      ;'ERROR SUMMARY' SHOULD BE SET IN TX 0
12284 050232' 012704 002000      MOV      #BIT10,R4      ;'RETRY' BIT SHOULD BE SET IN TX 1
12285
12286 050236' 032737 040000 000610'      BIT      #BIT14,PCBB+2      ;IS 'ERROR SUMMARY' BIT SET?
12287 050244' 001414      BEQ      130$      ;NO, ERROR
12288 050246' 032737 010000 000610'      BIT      #BIT12,PCBB+2      ;IS 'MORE' BIT SET?
12289 050254' 001010      BNE      130$      ;YES, ERROR
12290 050256' 032737 004000 000610'      BIT      #BIT11,PCBB+2      ;IS 'ONE' BIT SET?
12291 050264' 001004      BNE      130$      ;YES, ERROR
12292 050266' 032737 002000 000612'      BIT      #BIT10,PCBB+4      ;IS 'RETRY' BIT SET?
12293 050274' 001004      BNE      140$      ;YES
12294 050276'      130$:  ERRHRD  280,COLTST,MSG22      ;PRINT ERROR MESSAGE
12295 050276' 104456      TRAP      CSERHRD
12296 050300' 000430      .WORD    280
12297 050302' 003753'      .WORD    COLTST
12298 050304' 014326'      .WORD    MSG22
12299
12300      ;WRITE '1' TO CLEAR 'DNI'
12301
12302 050306' 004737 017362'      140$:  JSR      PC,CLRDNI      ;GO CLEAR DNI BIT
12303 050312' 103004      BCC      150$      ;OK
12304 050314'      ERRHRD  281,COLTST,RACMG7      ;PRINT ERROR MESSAGE
12305 050314' 104456      TRAP      CSERHRD
12306 050316' 000431      .WORD    281
12307 050320' 003753'      .WORD    COLTST
12308 050322' 012670'      .WORD    RACMG7
12309 050324'      150$:
12310 050324'      ENDSEG
12311 050324'      10003$:
12312 050324' 104405      TRAP      CSESEG
12313 050326'      ENDTST
12314 050326'      L10165:
12315 050326' 104401      TRAP      CSETST

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 258
CZUAAB.MAC 07-APR-83 17:03 TEST 44: TDR COUNTER TEST

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12345
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12348
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12371

.SBTTL TEST 44: TDR COUNTER TEST
:*****
:THE DEUNA HAS A COUNTER DESIGNED TO HELP LOCATE FAULTS IN THE COAXIAL CABLE.
:THE COUNTER IS INITIALIZED WHEN A MESSAGE IS TRANSMITTED AND INCREMENTS AS
:THE DATAGRAM IS TRANSMITTED. COUNTING WILL STOP IF A COLLISION OCCURS OR THE
:CARRIER IS LOST. COUNTING ALSO STOPS IF THE 10 BIT COUNTER REACHES ITS
:MODULUS.
:THIS TEST WILL DETERMINE THAT THE TDR COUNTER VALUE WILL CHANGE AND THAT THE
:COUNTER IS NOT STUCK.
:BECAUSE THE COUNTER COUNTS DURING TRANSMISSION OF A DATAGRAM AND WILL CONTINUE
:TO COUNT DURING THE TIME THAT THE TRANSMIT STATE MACHINE OPERATES, THE COUNT
:ACCUMULATED IN THE COUNTER DURING TRANSMISSION IS PROPORTIONAL TO THE LENGTH
:OF THE DATAGRAM. THIS TEST WILL USE THIS RELATION TO VERIFY THAT THE COUNTER
:IS NOT STUCK.
:THIS TEST USES MICROMODULE 'G' MICROTEST #2.
:THE TEST WILL SEND DATAGRAMS OVER THE LOOPBACK. THE LENGTH OF THE DATAGRAM
:WILL BE VARIED BY USING AN INCREASING BYTE COUNT IN THE TRANSMIT BUFFER.
:AFTER EACH DATAGRAM HAS BEEN LOOPED BACK, THE TRANSMIT BUFFER WORD 1 WILL BE
:PASSED BACK TO THE HOST TO VERIFY THAT IT IS CORRECT. THE CRITERIA FOR
:CORRECTNESS WILL BE: INCREASING BYTE COUNTS SHOULD RESULT IN INCREASING TDR
:VALUES IN TRANSMIT STATUS WORD 1.
:THE PCBB WILL BE FORMATED AS FOLLOWS:
:PCBB+0: +-----+
: | BYTE COUNT |
: +-----+
:PCBB+2: +-----+
: | TRANSMIT STATUS WORD 1 |
: +-----+
:TEST SEQUENCE:
:1-LOAD MICROMODULE 'G' IF NOT ALREADY DONE SO
:2-LOAD MINIMUM BYTE COUNT INTO PCBB+0
:3-CLEAR PCBB+2
:4-WAIT FOR THE MICROMONITOR TO ENTER THE 'INMON' STATE
:5-SELECT MICROTEST #2
:6-WAIT FOR 'DNI'
:7-VERIFY PCBB+2 HAS NON-ZERO VALUE (TDR COUNTER NOT ZERO)
:8-WRITE '1' TO CLEAR 'DNI'
:9-INCREASE BYTE COUNT IN PCBB+0 BY 1
:10-WAIT FOR MICROMONITOR TO ENTER 'INMON' STATE
:11-SELECT MICROTEST #2
:12-WAIT FOR 'DNI'
:13-VERIFY VALUE IN PCBB+2 IS GREATER THAN PREVIOUS VALUE IN PCBB+2
:(VERIFY THAT TDR VALUE IS GETTING LARGER WITH LARGER BYTE COUNTS)
:14-WRITE '1' TO CLEAR 'DNI'
:15-REPEAT STEPS 9-14 UNTIL BYTE REACHES MINIMUM SIZE +64
:*****

050330'

DBNTST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 259
CZUAAB.MAC 07-APR-83 17:03 TEST 44: TDR COUNTER TEST

12372 050330'

12373

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12378 050330'

12379 050330' 104404

12380 050332' 022737 000107 000326'

12381 050340' 001004

12382 050342' 122777 000001 127770

12383 050350' 001440

12384 050352' 012737 000107 000326' 58:

12385 050360' 004737 020340'

12386 050364' 103002

12387 050366'

12388 050366' 104410

12389 050370' 000460

12390 050372' 012737 000176 000332' 108:

12391 050400' 004737 017316'

12392 050404' 103022

12393 050406' 012737 001000' 000310'

12394 050414' 012737 001277' 000312'

12395 050422' 012737 001342' 000314'

12396 050430' 012737 001357' 000316'

12397 050436'

12398 050436' 104456

12399 050440' 000432

12400 050442' 004001'

12401 050444' 012716'

12402 050446'

12403 050446' 104410

12404 050450' 000400

12405 050452' 004737 017362'

12406 050456' 103006

12407 050460'

12408 050460' 104456

12409 050462' 000433

12410 050464' 004001'

12411 050466' 012670'

12412 050470'

12413 050470' 104410

12414 050472' 000356

12415 050474'

12416 050474'

12417 050474'

12418 050474' 104405

12419

12420

12421

12422

12423

12424 050476'

12425 050476' 104404

12426 050500' 012737 000100 000606'

12427 050506' 005037 000610'

T44::

:CHECK TO SEE IF MODULE 'G' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF UCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.
:AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.

BGNSEG

TRAP CSBSEG
:HAS MICROCODE MODULE 'G' BEEN LOADED
:NO
:YES, IS THE MICROMONITOR ACTIVE?
:YES SKIP LOADING THE MICROMODULE
:GO LOAD MICRO MODULE 'G'
:OK

TRAP CSESCAPE
.WORD L10166-
:WAIT FOR THE MICROMONITOR
:OK

TRAP CSERHRD
.WORD 282
.WORD TDRCNT
.WORD MSG1

TRAP CSESCAPE
.WORD L10166-
:CLEAR DNI BIT
:DNI DID NOT CLEAR!

TRAP CSERHRD
.WORD 283
.WORD TDRCNT
.WORD RACMG7

TRAP CSESCAPE
.WORD L10166-

258:

ENDSEG

100008:

TRAP CSESEG

:LOAD MINIMUM BYTE COUNT INTO PCBB+0, CLEAR PCBB+2, WAIT FOR MICROMONITOR
:EXECUTE MICROTEST #2 BY LOADING PCSRO WITH A 2
:WAIT FOR 'DNI'

BGNSEG

TRAP CSBSEG
:BEGIN WITH MINIMUM BYTE COUNT
:THIS IS WHERE MICROCODE WILL PUT...

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 261
CZUAAB.MAC 07-APR-83 17:03 TEST 44: TDR COUNTER TEST

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12484 050654'          ENDSEG
12485 050654'          100018:
12486 050654' 104405          TRAP      CSESEG
12487
12488          : INCREASE THE BYTE COUNT
12489
12490 050656' 005237 000606' 478:  INC      PCBB          ; INCREASE BYTE COUNT BY 1
12491 050662'          BGNSEG
12492 050662' 104404          TRAP      CSBSEG
12493
12494          : WAIT FOR THE MICROMONITOR, EXECUTE MICROTEST #2, AND WAIT FOR 'DNI'
12495
12496 050664' 004737 020060'          JSR      PC,CHKMON          ; WAIT FOR MICROMONITOR
12497 050670' 103006          BCC     50$
12498 050672'          ERRHRD 289,TDRCNT,MSG46 ; PRINT ERROR
12499 050672' 104456          TRAP      CSERHRD
12500 050674' 000441          .WORD   289
12501 050676' 004001'          .WORD   TDRCNT
12502 050700' 016666'          .WORD   MSG46
12503 050702'          ESCAPE  TST          ; LEAVE TEST
12504 050702' 104410          TRAP      CSERHRD
12505 050704' 000144          .WORD   L10166-
12506 050706' 012777 000002 127422 50$:  MOV     #2,BPCSR0          ; TELL T11 TO EXECUTE MICROTEST #2
12507 050714' 012737 000176 000332'  MOV     #2*SECOND,METER ; WAIT FOR DNI
12508 050722' 004737 017316'          JSR     PC,CHKDNI
12509 050726' 103021          BCC     55$
12510 050730' 004737 020132'          JSR     PC,CHKINT          ; SEE IF ANY ERROR INTERRUPTS OCCURRED
12511 050734' 103006          BCC     51$
12512 050736'          ERRHRD 290,TDRCNT,MSG44 ; PRINT ERROR MESSAGE
12513 050736' 104456          TRAP      CSERHRD
12514 050740' 000442          .WORD   290
12515 050742' 004001'          .WORD   TDRCNT
12516 050744' 016442'          .WORD   MSG44
12517 050746'          ESCAPE  TST
12518 050746' 104410          TRAP      CSERHRD
12519 050750' 000100          .WORD   L10166-
12520 050752' 012702 000002          51$:  MOV     #2,R2          ; MICROTEST #2 IS HUNG
12521 050756'          ERRHRD 291,TDRCNT,MSG12
12522 050756' 104456          TRAP      CSERHRD
12523 050760' 000443          .WORD   291
12524 050762' 004001'          .WORD   TDRCNT
12525 050764' 013466'          .WORD   MSG12
12526 050766'          ESCAPE  TST
12527 050766' 104410          TRAP      CSERHRD
12528 050770' 000060          .WORD   L10166-
12529
12530          : VERIFY THAT THE TRANSMIT STATUS WORD 1 TDR VALUE IS LARGER THAN THE PREVIOUS
12531          : VALUE
12532
12533 050772' 013702 000610'          55$:  MOV     PCBB+2,R2          ; GET NEW TDR VALUE
12534 050776' 020201          CMP     R2,R1          ; IS TDR GETTING LARGER?
12535 051000' 101006          BHI     60$
12536 051002'          ERRHRD 292,TDRCNT,MSG23 ; YES
12537 051002' 104456          TRAP      CSERHRD
12538 051004' 000444          .WORD   292
12539 051006' 004001'          .WORD   TDRCNT

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 262
CZUAAB.MAC 07-APR-83 17:03 TEST 44: TDR COUNTER TEST

```

12540 051010' 014442' .WORD MSG23
12541 051012' ESCAPE TST
12542 051012' 104410 TRAP C$ESCAPE
12543 051014' 000034 .WORD L10166-
12544
12545 .:WRITE '1' TO CLEAR 'DNI'
12546
12547 051016' 004737 017362' 60$: JSR PC,CLRDNI ;GO CLEAR DNI
12548 051022' 103004 BCC 65$ ;OK
12549 051024' ERRHRD 293,TDRCNT,RACMG7 ;ERROR OCCURRED PRINT ERROR MESSAGE
12550 051024' 104456 TRAP C$ERHRD
12551 051026' 000445 .WORD 293
12552 051030' 004001' .WORD TDRCNT
12553 051032' 012670' .WORD RACMG7
12554 051034'
12555 051034' 65$: ENDSEG
12556 051034'
12557 051034' 104405 10002$: TRAP C$ESEG
12558
12559 .:CONTINUE THE LOOP UNTIL THE BYTE COUNT IS TOO LARGE FOR THE COUNTER MODULUS
12560
12561 051036' 010201 MOV R2,R1 ;HOLD NEW TDR VALUE FOR LATER COMPARE
12562 051040' 023727 000610' 000164 CMP PCBB+2,#116. ;HAVE WE DONE ENOUGH PACKETS?
12563 051046' 103703 BLO 47$ ;NO KEEP GOING
12564 051050'
12565 051050'
12566 051050' 104401 L10166: TRAP C$ETST

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 263
CZUAAB.MAC 07-APR-83 17:03 TEST 45: RETRY LOGIC TEST

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051052'

.SBTTL TEST 45: RETRY LOGIC TEST

:THE RETRY LOGIC IS ACTIVATED WHENEVER A COLLISION IS ENCOUNTERED DURING A
:TRANSMISSION ATTEMPT. THE LINK STOPS TRANSMISSION AND WAITS FOR A PERIOD OF
:TIME BEFORE ATTEMPTING TO RETRANSMIT.

:THE WAIT TIME IS AN INTEGRAL NUMBER OF 'SLOT TIMES'. THE NUMBER COMES FROM
:A RANDOM NUMBER GENERATOR. THE NUMBER OF SLOT TIMES IS NOT EXACTLY RANDOM
:SINCE THE RETRY LOGIC WAITS A GENERALLY INCREASING NUMBER OF SLOT TIMES BEFORE
:TRYING TO RETRANSMIT. THIS TEST WILL VERIFY THAT THE RETRY LOGIC IS CAPABLE OF
:GENERATING VARIABILITY IN THE DURATION OF THE RETRY WAIT TIMES.

:THIS TEST WILL USE MICROMODULE 'G' MICROTEST #3
:THE LINK MODULE HAS A DIAGNOSTIC MAINTENANCE FACILITY MAKING IT POSSIBLE TO
:SINGLE STEP THE RETRY LOGIC THROUGH THE MAXIMUM SIXTEEN RETRY STEPS. THIS
:FEATURE WILL ALSO MAKE IT POSSIBLE TO MEASURE THE RETRY WAIT INTERVAL.

:THE MICROCODE WILL SET THE COLLISION BIT IN THE LINK MODE REGISTER AND
:AND TRANSMIT A DATAGRAM IN LOOPBACK MODE. THE T-11 WILL COUNT WHILE WAITING
:FOR THE TRANSMIT STATE MACHINE TO INTERRUPT. THE ACCUMULATED COUNT SHOULD
:PROVIDE A MEASURE OF TIME TAKEN FOR THE TRANSMISSION ATTEMPT TO OCCUR. SINCE
:THE COLLISION BIT IS SET, THIS INTERVAL WILL INCLUDE THE RETRY WAIT INTERVAL.
:THE ACCUMULATED COUNT WILL BE WRITTEN BY THE MICROCODE TO THE PCBB.

:THE MICROTEST WILL BE EXECUTED 16 TIMES. AFTER EACH EXECUTION, THE COUNT WILL
:BE READ FROM THE PCBB AND STORED IN A TABLE. THE TABLE WILL BE SCANNED TO
:VERIFY THAT THEY ARE NOT ALL THE SAME.

:THE PCBB IS FORMATTED AS FOLLOWS:

```
PCBB+0:      +-----+
              |         |
              |  BYTE COUNT  |
              |         |
              +-----+
PCBB+2:      +-----+
              |         |
              | TRANSMIT WAIT COUNT |
              |         |
              +-----+
```

:TEST SEQUENCE:

- 1-LOAD MICROMODULE 'G' IF NOT ALREADY DONE SO
- 2-PLACE A MINIMUM BYTE COUNT IN PCBB+0
- 3-CLEAR PCBB+2
- 4-WAIT FOR MICROMONITOR TO ENTER THE 'INMON' STATE
- 5-SELECT MICROTEST #3
- 6-WAIT FOR 'DNI'
- 7-WRITE '1' TO CLEAR 'DNI'
- 8-READ PCBB+2 AND PUT COUNT IN TABLE
- 9-REPEAT STEPS 2-8 15 TIMES
- 10-VERIFY NO 10 CONSECUTIVE ENTRIES IN THE TABLE ARE THE SAME.

BGNTST

T45::

:CHECK TO SEE IF MODULE 'G' HAS BEEN LOADED. IF NOT LOAD IT INTO
:THE TOP HALF OF WCS, START IT AND WAIT FOR THE MICROMONITOR TO SET 'DNI'.

```

12623                                     :AFTER 'DNI' SETS WRITE '1' TO CLEAR IT.
12624                                     :
12625 051052'                               : BGNSEG
12626 051052' 104404                               : TRAP CSBSEG
12627 051054' 022737 000107 000326'             :HAS MICROCODE MODULE 'G' BEEN LOADED
12628 051062' 001004                               :NO
12629 051064' 122777 000001 127246             :YES, IS THE MICROMONITOR ACTIVE?
12630 051072' 001440                               :YES SKIP LOADING THE MICROMODULE
12631 051074' 012737 000107 000326' 53:        :GO LOAD MICRO MODULE 'G'
12632 051102' 004737 020340'
12633 051106' 103002                               :OK
12634 051110'
12635 051110' 104410                               : TRAP CSBSEG
12636 051112' 000352                               :.WORD L10167-.
12637 051114' 012737 000176 000332' 108:        :WAIT FOR THE MICROMONITOR
12638 051122' 004737 017316'
12639 051126' 103022                               :OK
12640 051130' 012737 001000' 000310'
12641 051136' 012737 001277' 000312'
12642 051144' 012737 001342' 000314'
12643 051152' 012737 001357' 000316'
12644 051160' ERRHRD 294,RETLOG,MSG1
12645 051160' 104456                               : TRAP CSERHRD
12646 051162' 000446                               :.WORD 294
12647 051164' 004031'                               :.WORD RETLOG
12648 051166' 012716'                               :.WORD MSG1
12649 051170' ESCAPE TST
12650 051170' 104410                               : TRAP CSBSEG
12651 051172' 000272                               :.WORD L10167-.
12652 051174' 004737 017362' 208:
12653 051200' 103006                               :CLEAR DNI BIT
12654 051202' ERRHRD 295,RETLOG,RACMG7          :DNI DID NOT CLEAR!
12655 051202' 104456                               : TRAP CSERHRD
12656 051204' 000447                               :.WORD 295
12657 051206' 004031'                               :.WORD RETLOG
12658 051210' 012670'                               :.WORD RACMG7
12659 051212' ESCAPE TST
12660 051212' 104410                               : TRAP CSBSEG
12661 051214' 000250                               :.WORD L10167-.
12662 051216'
12663 051216' 258:
12664 051216' ENDSEG
12665 051216' 104405                               : 100008: TRAP CSESEG
12666
12667                                     :WRITE A BYTE COUT TO PCBB+0, CLEAR PCBB+2, GET POINTER TO TOP OF TABLE
12668                                     :INITALIZE A COUNTER TO 16
12669
12670 051220' 012737 000100 000606'             :MOV #MINBYT,PCBB :BEGIN WITH MINIMUM BYTE COUNT
12671 051226' 005037 000610'                   :CLR PCBB+2       :THIS IS WHERE MICROCODE WILL PUT...
12672
12673 051232' 012702 000626'                   :MOV #CNTTAB,R2  :THE RETRY WAIT INTERVAL
12674 051236' 012701 000020                   :MOV #16.,R1     :GET POINTER TO WAIT INTERVAL STORAGE AREA
12675
12676                                     :WAIT FOR THE MICROCODE TO ENTER THE MICROMONITOR. EXECUTE MICROTEST #3 BY
12677                                     :LOADING THE COMMAND FIELD OF PCSRO WITH A 3. WAIT FOR 'DNI'
12678

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 265
 CZUAAB.MAC 07-APR-83 17:03 TEST 45: RETRY LOGIC TEST

```

12679 051242'          BGNSEG
12680 051242' 104404
12681 051244' 004737 020060'      JSR    PC,CHKMON      ;WAIT FOR MICROMONITOR
12682 051250' 103006          BCC    358           ;OK
12683 051252'          ERRHRD 296,RETLOG,MSG46 ;PRINT ERROR
12684 051252' 104456
12685 051254' 000450          TRAP   CSBSEG
12686 051256' 004031'          .WORD 296
12687 051260' 016666'          .WORD RETLOG
12688 051262'          .WORD MSG46
12689 051262' 104410          ESCAPE TST           ;LEAVE TEST
12690 051264' 000200          TRAP   CSERHRD
12691 051266' 012777 000003 127042 358:  MOV    #3,@PCSR0      ;TELL T11 TO EXECUTE MICROTEST #3
12692 051274' 012737 000770 000332'  MOV    #10*SECOND,METER ;WAIT FOR DNI
12693 051302' 004737 017316'      JSR    PC,CHKDNI
12694 051306' 103021          BCC    408
12695 051310' 004737 020132'      JSR    PC,CHKINT      ;SEE IF ANY ERROR INTERRUPTS OCCURRED
12696 051314' 103006          BCC    368           ;NO, OK
12697 051316'          ERRHRD 297,RETLOG,MSG44 ;PRINT ERROR MESSAGE
12698 051316' 104456          TRAP   CSERHRD
12699 051320' 000451          .WORD 297
12700 051322' 004031'          .WORD RETLOG
12701 051324' 016442'          .WORD MSG44
12702 051326'          ESCAPE TST
12703 051326' 104410          TRAP   CSERHRD
12704 051330' 000134          .WORD L10167-.
12705 051332' 012702 000003 368:  MOV    #3,R2          ;MICROTEST #3 IS HUNG
12706 051336'          ERRHRD 298,RETLOG,MSG12
12707 051336' 104456          TRAP   CSERHRD
12708 051340' 000452          .WORD 298
12709 051342' 004031'          .WORD RETLOG
12710 051344' 013466'          .WORD MSG12
12711 051346'          ESCAPE TST
12712 051346' 104410          TRAP   CSERHRD
12713 051350' 000114          .WORD L10167-.
12714
12715          ;WRITE '1' TO CLEAR 'DNI'
12716
12717 051352' 004737 017362'      408:  JSR    PC,CLRDNI      ;GO CLEAR DNI
12718 051356' 103006          BCC    458           ;OK
12719 051360'          ERRHRD 299,RETLOG,RACMG7 ;ERROR
12720 051360' 104456          TRAP   CSERHRD
12721 051362' 000453          .WORD 299
12722 051364' 004031'          .WORD RETLOG
12723 051366' 012670'          .WORD RACMG7
12724 051370'          ESCAPE TST           ;LEAVE
12725 051370' 104410          TRAP   CSERHRD
12726 051372' 000072          .WORD L10167-.
12727
12728          ;STORE THE VALUE FORM PCBB+2 IN THE TABLE AND BUMP THE POINTER TO NEXT ENTRY
12729          ;REPEAT THE TEST UNTIL ALL 16 ENTRIES ARE OBTAINED
12730
12731 051374' 013722 000610'      458:  MOV    PCBB+2,(R2)+   ;STORE COUNTER VALUE IN THE TABLE
12732 051400' 005301          DEC    R1             ;HAVE WE STORED 16 VALUES?
12733 051402' 001331          BNE    358           ;NOT YET
12734
    
```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 266
CZUAAB.MAC 07-APR-83 17:03 TEST 45: RETRY LOGIC TEST

```

12735                                     ;TREAT THE TABLE AS 7 GROUPS OF 10 ENTRIES. VERIFY THAT ALL 10 ENTRIES OF EACH
12736                                     ;GROUP ARE NOT THE SAME.
12737                                     ;
12738 051404' 012701 000626'                50$:  MOV     #CNTTAB,R1                ;POINT TO TOP OF TABLE
12739 051410' 010102                50$:  MOV     R1,R2                ;GET POINTER TO FIRST ELEMENT IN THIS
12740                                     ;GROUP
12741 051412' 010204                50$:  MOV     R2,R4                ;GET POINTER TO SECOND ELEMENT IN THIS
12742                                     ;GROUP
12743 051414' 062704 000002                50$:  ADD     #2,R4                ;NUMBER OF GROUPS OF 10 TO COMPARE
12744 051420' 012703 000007                50$:  MOV     #7,R3                ;IS THIS PAIR THE SAME?
12745 051424' 022224                50$:  CMP     (R2)+,(R4)+        ;NO, START A NEW GROUP TO CHECK
12746 051426' 001010                50$:  BNE    60$                ;HAVE WE CHECKED ALL 10 VALUES IN THIS
12747 051430' 005303                50$:  DEC     R3                ;GROUP?
12748                                     ;NOT YET
12749 051432' 001374                50$:  BNE    55$                ;YES, PRINT ERROR MESSAGE AND DUMP TABLE
12750 051434'                                50$:  ERRHRD 300,RETLOG,MSG24
12751 051434' 104456                                TRAP  C$ERHRD
12752 051436' 000454                                .WORD 300
12753 051440' 004031'                                .WORD RETLOG
12754 051442' 014464'                                .WORD MSG24
12755 051444'                                ESCAPE TST
12756 051444' 104410                                TRAP  C$ESCAPE
12757 051446' 000016                                .WORD L10167-
12758 051450' 062701 000002                60$:  ADD     #2,R1                ;POINT TO NEXT GROUP OF 10 ELEMENTS
12759 051454' 020127 000644'                60$:  CMP     R1,#CNTTAB+16        ;CHECKED ALL GROUPS OF 10?
12760 051460' 001353                60$:  BNE    50$                ;NOT YET
12761 051462'                                ENDSEG
12762 051462'                                10001$: TRAP  C$ESEG
12763 051462' 104405                                L10167: TRAP  C$ESETST
12764 051464'                                ENDTST
12765 051464'
12766 051464' 104401

```

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 267
CZUAAB.MAC 07-APR-83 17:03 TEST 45: RETRY LOGIC TEST

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051466'
051466'
051466' 005737 000674'
051472' 001002
051474'
051474' 104432
051476' 001042
051500' 004737 020166'
051504' 103002
051506'
051506' 104410
051510' 001030
051512' 012777 000606' 126622
051520' 005077 126620
051524' 012777 000001 126604
051532' 012737 000077 000332'
051540' 004737 017316'
051544' 103022
051546' 012737 001000' 000310'
051554' 012737 001277' 000312'
051562' 012737 001342' 000314'
051570' 012737 001350' 000316'
051576'
051576' 104456
051600' 000455
051602' 004061'
051604' 012716'
051606'
051606' 104410
051610' 000730
051612' 004737 017362'
051616' 103006

.SBTTL TEST 46: PRINT DEVICE PARAMETERS TEST

THIS TEST PRINTS THE DEFAULT PHYSICAL ADDRESS, THE MICROCODE REVISION AND THE SWITCH PACK SETTINGS.

TEST SEQUENCE:

1. READ DEFAULT PHYSICAL ADDRESS
2. READ MICROCODE REVISION
3. READ SWITCH PACK SETTINGS
4. PRINT

:NOTE:

THIS TEST IS ONLY EXECUTED ONCE FOR EACH UNIT REGARDLESS OF THE PASS #

BGNTST

```

                                T46::
TST      FRSTIM                : RUN THIS TEST ?
BNE      SS                    : YES
EXIT     TST                   : NO, EXIT
                                TRAP   CSEXIT
                                .WORD  L10170-.

;
;S:      JSR      PC,REUNA      :GU RESET UNA
        BCC      208          :OK
        ESCAPE  TST          : ABORT TEST
                                TRAP   CSESCAPE
                                .WORD  L10170-.

;
;208:    MOV      #PCBB,BPCSR2 :LOAD PCSR2 WITH PORT CONTROL BLOCK ADR
        CLR      BPCSR3      :LOAD PCSR3 WITH 0
        MOV      #GETPCB,BPCSR0 : ISSUE GET PCBB PORT COMMAND
        MOV      #1*SECOND,METER :PUT SOME TIME ON THE METER
        JSR      PC,CHKDNI    : DNI?
        BCC      408          : YES
                                :ERROR DNI FAILED TO SET!
                                :FORMAT ERROR MESSAGE

        MOV      #SDNI,BITNAM
        MOV      #SNSET,BITSTA
        MOV      #SAFTER,PWHEN
        MOV      #SGTPCB,PCOMND
        ERRHRD  301,PRTPAR,MSG1
                                TRAP   CSEHRD
                                .WORD  301
                                .WORD  PRTPAR
                                .WORD  MSG1

        ESCAPE  TST          : AND ABORT TEST
                                TRAP   CSESCAPE
                                .WORD  L10170-.

;
;408:    JSR      PC,CLRDN1    : WRITE ONE TO CLEAR DNI
        BCC      508          : ERROR ?
                                : NO

```


65 HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 269
 CZUAAB.MAC 07-APR-83 17:03 TEST 46: PRINT DEVICE PARAMETERS TEST

```

12879 052000' 012737 000016 000606' 100$: MOV #RPS,PCBB ;LOAD PCBB WITH READ PORT STATUS FUNCTION
12880 052006' 012737 000176 000332' MOV #2*SECOND,METER ;PUT SOME TIME ON THE METER
12881 052014' 012777 000002 126314 MOV #GETCMD,BPCSR0 ;ISSUE GET_CMD PORT COMMAND
12882 052022' 004737 017316' JSR PC,CHKDNI ;DNI ?
12883 052026' 103022 BCC 110$ ;YES
12884 ;ERROR DNI FAILED TO SET
12885 052030' 012737 001000' 000310' MOV #SDNI,BITNAM
12886 052036' 012737 001277' 000312' MOV #SNSET,BITSTA
12887 052044' 012737 001342' 000314' MOV #SAFTER,PWHEN
12888 052052' 012737 001357' 000316' MOV #SGTCMD,PCOMND
12889 052060' ERRHRD 305,PRTPAR,MSG1 ;PRINT ERROR MESSAGE
12890 052060' 104456 TRAP CSERHRD
12891 052062' 000461 .WORD 305
12892 052064' 004061' .WORD PRTPAR
12893 052066' 012716' .WORD MSG1
12894 052070' ESCAPE TST ;AND ABORT TEST
12895 052070' 104410 TRAP CSESCAPE
12896 052072' 000446 .WORD L10170-.
12897
12898 052074' 004737 017362' 110$: JSR PC,CLRDN1 ;WRITE ONE TO CLEAR DNI
12899 BCC 120$ ;ERROR ?
12900 052100' 103006 ;NO
12901 ERRHRD 306,PRTPAR,RACMG7 ;ERROR DNI FAILED TO SET
12902 ;PRINT ERROR MESSAGE
12903 052102' 104456 TRAP CSERHRD
12904 052104' 000462 .WORD 306
12905 052106' 004061' .WORD PRTPAR
12906 052110' 012670' .WORD RACMG7
12907 052112' ESCAPE TST ;AND ABORT TEST
12908 052112' 104410 TRAP CSESCAPE
12909 052114' 000424 .WORD L10170-.
12910
12911 ;MOVE MICROCODE REVISION FROM PCBB -> RREV
12912
12913 052116' 013737 000610' 052550' 120$: MOV PCBB+2,RREV
12914 052124' 042737 177700 052550' BIC #177700,RREV ;MASK RREV
12915 ;READ SWITCH PACK
12916
12917
12918 052132' 012737 000020 000606' 130$: MOV #DIN,PCBB ;LOAD DUMP INTERNAL MEMORY FUNCTION
12919 052140' 012737 000616' 000610' MOV #UDBB,PCBB+2 ;GIVE THE UNIBUS DATA BLOCK BASE ADR
12920 052146' 005037 000612' CLR PCBB+4
12921 052152' 012737 000002 000616' MOV #2,UDBB ;SETUP TO LOAD 2 BYTES
12922 052160' 012737 052552' 000620' MOV #SWPACK,UDBB+2 ;LOAD ADDRESS
12923 052166' 005037 000622' CLR UDBB+4
12924 052172' 013737 000334' 000624' MOV SWADDR,UDBB+6 ;LOAD INTERNAL ADDRESS
12925 052200' 012737 000176 000332' MOV #2*SECOND,METER ;PUT SOME TIME ON THE METER
12926 052206' 012777 000002 126122 MOV #GETCMD,BPCSR0 ;ISSUE GET COMMAND PORT COMMAND
12927 052214' 004737 017316' JSR PC,CHKDNI ;DNI ?
12928 052220' 103022 BCC 140$ ;YES
12929 ;ERROR DNI FAILED TO SET
12930 052222' 012737 001000' 000310' MOV #SDNI,BITNAM
12931 052230' 012737 001277' 000312' MOV #SNSET,BITSTA
12932 052236' 012737 001342' 000314' MOV #SAFTER,PWHEN
12933 052244' 012737 001357' 000316' MOV #SGTCMD,PCOMND
12934 052252' ERRHRD 307,PRTPAR,MSG1

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 270
CZUAAB.MAC 07-APR-83 17:03 TEST 46: PRINT DEVICE PARAMETERS TEST

12935	052252'	104456				TRAP	CSEHRD
12936	052254'	000463				.WORD	307
12937	052256'	004061'				.WORD	PRTPAR
12938	052260'	012716'				.WORD	MSG1
12939	052262'			ESCAPE	TST	:	AND ABORT TEST
12940	052262'	104410				TRAP	CSESCAPE
12941	052264'	000254				.WORD	L10170-
12942							
12943	052266'	004737	017362'	140\$:	JSR	PC,CLRDNI	: WRITE ONE TO CLEAR DNI
12944							: ERROR ?
12945	052272'	103006					: NO
12946	052274'				BCC	150\$	
12947	052274'	104456			ERRHRD	308,PRTPAR,RACMG7	
12948	052276'	000464					TRAP
12949	052300'	004061'					.WORD
12950	052302'	012670'					.WORD
12951	052304'						.WORD
12952	052304'	104410			ESCAPE	TST	: AND ABORT TEST
12953	052306'	000232					TRAP
12954							.WORD
12955							CSESCAPE
12956							L10170-
12957	052310'	013704	052552'				
12958	052314'	042704	167777	150\$:	MOV	SUPACK,R4	: SWITCH PACK -> R4
12959	052320'	012700	000013		BIC	#167777,R4	: MASK BIT 12
12960	052324'	006204			MOV	#11.,R0	: SHIFT BIT FOR INDEX
12961	052326'	005300		160\$:	ASR	R4	
12962	052330'	001375			DEC	R0	
12963	052332'	062704	052672'		BNE	160\$	
12964	052336'	011437	052554'		ADD	#LPTBL,R4	: INDEX INTO LOOP TABLE
12965	052342'	013704	052552'		MOV	(R4),LPMSG	: LOAD INTO LOOP MESSAGE
12966	052346'	042704	171777	170\$:	MOV	SUPACK,R4	: SWITCH PACK -> R4
12967	052352'	012700	000011		BIC	#171777,R4	: MASK BITS 10 AND 11
12968	052356'	006204			MOV	#9.,R0	: SHIFT BITS FOR INDEX
12969	052360'	005300		180\$:	ASR	R4	
12970	052362'	001375			DEC	R0	
12971	052364'	062704	052676'		BNE	180\$	
12972	052370'	011437	052556'		ADD	#BTTBL,R4	: INDEX INTO BOOT TABLE
12973					MOV	(R4),BTMSG	: LOAD INTO BOOT MESSAGE
12974							
12975							
12976	052374'						
12977	052374'	012746	052562'		PRINTB	#FORM28,#DEFHDR	: PRINT DEFAULT PHYSICAL ADDRESS
12978	052400'	012746	006236'				MOV
12979	052404'	012746	000002				MOV
12980	052410'	010600					MOV
12981	052412'	104414					TRAP
12982	052414'	062706	000006				ADD
12983	052420'						#6,SP
12984	052420'	013746	052550'		PRINTB	#FORM64,RREV	: PRINT MICROCODE REV
12985	052424'	012746	010773'				MOV
12986	052430'	012746	000002				MOV
12987	052434'	010600					MOV
12988	052436'	104414					TRAP
12989	052440'	062706	000006				ADD
12990	052444'						#6,SP
					PRINTB	#FORM28,#SWHDR	: PRINT SWITCH PACK HEADER

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 271
CZUAB.MAC 07-APR-83 17:03 TEST 46: PRINT DEVICE PARAMETERS TEST

12991	052444'	012746	052706'			MOV	#SUMDR,-(SP)	
12992	052450'	012746	006236'			MOV	#FORM28,-(SP)	
12993	052454'	012746	000002			MOV	#2,-(SP)	
12994	052460'	010600				MOV	SP,R0	
12995	052462'	104414				TRAP	CSPNTB	
12996	052464'	062706	000006			ADD	#6,SP	
12997	052470'			PRINTB	#FORM28,LPMSG		; PRINT LOOPBACK MESSAGE	
12998	052470'	013746	052554'			MOV	LPMSG,-(SP)	
12999	052474'	012746	006236'			MOV	#FORM28,-(SP)	
13000	052500'	012746	000002			MOV	#2,-(SP)	
13001	052504'	010600				MOV	SP,R0	
13002	052506'	104414				TRAP	CSPNTB	
13003	052510'	062706	000006			ADD	#6,SP	
13004	052514'			PRINTB	#FORM28,BTMSG		; PRINT BOOT MESSAGE	
13005	052514'	013746	052556'			MOV	BTMSG,-(SP)	
13006	052520'	012746	006236'			MOV	#FORM28,-(SP)	
13007	052524'	012746	000002			MOV	#2,-(SP)	
13008	052530'	010600				MOV	SP,R0	
13009	052532'	104414				TRAP	CSPNTB	
13010	052534'	062706	000006			ADD	#6,SP	
13011								
13012	052540'			250\$:				
13013	052540'				ENDTST			
13014	052540'						L10170:	
13015	052540'	104401					TRAP	CSETST

65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 272
CZUAAB.MAC 07-APR-83 17:03 TEST 46: PRINT DEVICE PARAMETERS TEST

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13016          :LOCAL STORAGE FOR TEST 41
13017 052542' 000000 DPA::          .WORD 0          : DEFAULT PHYSICAL ADDRESS (15:00)
13018 052544' 000000          .WORD 0          : DEFAULT PHYSICAL ADDRESS (31:16)
13019 052546' 000000          .WORD 0          : DEFAULT PHYSICAL ADDRESS (47:32)
13020          :
13021 052550' 000000 RREV::          .WORD 0          : MICROCODE REVISION
13022          :
13023 052552' 000000 SWPACK::          .WORD 0          : SWITCH PACK CONTENTS
13024 052554' 000000 LPMMSG::          .WORD 0          : LOOPBACK MESSAGE ADDRESS
13025 052556' 000000 BTMSG::          .WORD 0          : BOOT MESSAGE ADDRESS
13026          :
13027 052560' 000      HEXDAT::          .BYTE 0          : HEX DATA FOR CONVERSION
13028 052561' 000      HEXVAL::          .BYTE 0          : ASCII HEX VALUE
13029          :
13030 052562' 005015 052105 042510 DEFHDR::          .ASCII <15><12>/ETHERNET DEFAULT ADDRESS (HEX): /
13031 052570' 047122 052105 042040
13032 052576' 043105 052501 052114
13033 052604' 040440 042104 042522
13034 052612' 051523 024040 042510
13035 052620' 024530 020072 040
13036 052625' 040      040      DEFADR::          .ASCII / /
13037 052627' 055      .ASCII /- /
13038 052630' 020040      .ASCII / /
13039 052632' 055      .ASCII /- /
13040 052633' 040      040      .ASCII / /
13041 052635' 055      .ASCII /- /
13042 052636' 020040      .ASCII / /
13043 052640' 055      .ASCII /- /
13044 052641' 040      040      .ASCII / /
13045 052643' 055      .ASCII /- /
13046 052644' 020040      .ASCII / /
13047 052646' 005015 000      .ASCII <15><12>
13048          :
13049 052651' 060      HEXTBL::          .ASCII /0 /
13050 052652' 061      .ASCII /1 /
13051 052653' 062      .ASCII /2 /
13052 052654' 063      .ASCII /3 /
13053 052655' 064      .ASCII /4 /
13054 052656' 065      .ASCII /5 /
13055 052657' 066      .ASCII /6 /
13056 052660' 067      .ASCII /7 /
13057 052661' 070      .ASCII /8 /
13058 052662' 071      .ASCII /9 /
13059 052663' 101      .ASCII /A /
13060 052664' 102      .ASCII /B /
13061 052665' 103      .ASCII /C /
13062 052666' 104      .ASCII /D /
13063 052667' 105      .ASCII /E /
13064 052670' 106      .ASCII /F /
13065          052672'          .EVEN
13066          :
13067          :
13068          :LOOP MESSAGE TABLE
13069 052672' 052740' LPTBL::          .WORD LPMMSG0
13070 052674' 052777'          .WORD LPMMSG1
13071          :BOOT MESSAGE TABLE

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65HARDWARE TESTS MACY11 30A(1052) 07-APR-83 17:13 PAGE 273
 CZUAAB.MAC 07-APR-83 17:03 TEST 46: PRINT DEVICE PARAMETERS TEST

13072	052676'	053035'			BTBTL::	.WORD	BTMSG0
13073	052700'	053073'				.WORD	BTMSG1
13074	052702'	053126'				.WORD	BTMSG2
13075	052704'	053172'				.WORD	BTMSG3
13076					:ASCII MESSAGES		
13077	052706'	005015	053523	052111	SWHDR::	.ASCII	<15><12>/SWITCH PACK SET FOR :/
13078	052714'	044103	050040	041501			
13079	052722'	020113	042523	020124			
13080	052730'	047506	020122	072			
13081	052735'	015	000012				
13082	052740'	020040	020040	051440	LPMMSG0::	.ASCIZ	<15><12>
13083	052746'	046105	020106	042524		.ASCII	/ SELF TEST LOOP DISABLED/
13084	052754'	052123	046040	047517			
13085	052762'	020120	044504	040523			
13086	052770'	046102	042105				
13087	052774'	005015	000				
13088	052777'	040	020040	020040	LPMMSG1::	.ASCIZ	<15><12>
13089	053004'	042523	043114	052040		.ASCII	/ SELF TEST LOOP ENABLED/
13090	053012'	051505	020124	047514			
13091	053020'	050117	042440	040516			
13092	053026'	046102	042105				
13093	053032'	005015	000				
13094	053035'	040	020040	020040	BTMSG0::	.ASCIZ	<15><12>
13095	053042'	047516	051040	046505		.ASCII	/ NO REMOTE BOOT ENABLED/
13096	053050'	052117	020105	047502			
13097	053056'	052117	042440	040516			
13098	053064'	046102	042105				
13099	053070'	005015	000				
13100	053073'	040	020040	020040	BTMSG1::	.ASCIZ	<15><12>
13101	053100'	042522	047515	042524		.ASCII	/ REMOTE BOOT ENABLED/
13102	053106'	041040	047517	020124			
13103	053114'	047105	041101	042514			
13104	053122'	104					
13105	053123'	015	000012				
13106	053126'	020040	020040	051040	BTMSG2::	.ASCIZ	<15><12>
13107	053134'	046505	052117	020105		.ASCII	/ REMOTE BOOT ENABLED WITH ROM/
13108	053142'	047502	052117	042440			
13109	053150'	040516	046102	042105			
13110	053156'	053440	052111	020110			
13111	053164'	047522	115				
13112	053167'	015	000012				
13113	053172'	020040	020040	051040	BTMSG3::	.ASCIZ	<15><12>
13114	053200'	046505	052117	020105		.ASCII	/ REMOTE BOOT AND POWER UP BOOT BOTH ENABLED/
13115	053206'	047502	052117	040440			
13116	053214'	042116	050040	053517			
13117	053222'	051105	052440	020120			
13118	053230'	047502	052117	041040			
13119	053236'	052117	020110	047105			
13120	053244'	041101	042514	104			
13121	053251'	015	000012			.ASCIZ	<15><12>
13122						.EVEN	

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.TITLE PARAMETER CODING
.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.
:--

053254' BGNHRD
053254' 000010 .WORD L10171-LSHARD/2
053256' LSHARD::
053256' GPRMA ASKCSR,0,0,160000,177776,NO :FIRST P-TABLE QUESTION
053256' 000021 .WORD TSCODE
053260' 053276' .WORD ASKCSR
053262' 160000 .WORD TSLOLIM
053264' 177776 .WORD TSHILIM
053266' GPRMA ASKVEC,2,0,0,776,NO :SECOND P-TABLE QUESTION
053266' 001021 .WORD TSCODE
053270' 053331' .WORD ASKVEC
053272' 000000 .WORD TSLOLIM
053274' 000776 .WORD TSHILIM
053276' ENDHRD
053276' L10171: .EVEN
053276' 044127 052101 044440 ASKCSR: .ASCIZ /WHAT IS THE PCSRO ADDRESS?/
053304' 020123 044124 020105
053312' 041520 051123 020060
053320' 042101 051104 051505
053326' 037523 000
053331' 127 040510 020124 ASKVEC: .ASCIZ /WHAT IS THE VECTOR ADDRESS?/
053336' 051511 052040 042510
053344' 053040 041505 047524
053352' 020122 042101 051104
053360' 051505 037523 000
053366' .EVEN

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 275
CZUAAB.MAC 07-APR-83 17:03 HARDWARE PARAMETER CODING SECTION

13167	053366'	000100	SPATCH::BLKW	100
13168				
13169				
13170		000000'	.CSECT	MICRA
13171		000000'	.CSECT	MICRB
13172		000000'	.CSECT	MICRC
13173		000000'	.CSECT	MICRD
13174		000000'	.CSECT	MICRE
13175		000000'	.CSECT	MICRF
13176		000000'	.CSECT	MICRG
13177		000000'	.CSECT	NOMORE
13178	000000'		ENDMOD	
13179		000001	.END	

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 277
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

ADR = 000020 G		1659#																		
ADRERR= 000001 G		1694#	6910	7526																
ASKCSR 053276R	002	13143	13156#																	
ASKVEC 053331R	002	13148	13161#																	
ASSEMB= 000010		1416																		
BITNAM 000310RG	002	1819#	2996	3031	3131	3299	3703	4342*	4349*	4356*	4363*	4370*	4377*	4384*						
		4386	4534*	4541	5392*	5421*	5446*	5501*	5526*	5545*	5746*	5817*	6237*	6303*						
		6434*	6477*	6538*	6664*	6711*	6759*	6838*	6985*	7115*	7191*	7192*	7230*	7231*						
		7296*	7442*	7607*	7766*	7916*	8054*	8192*	8340*	8502*	8655*	8832*	8914*	8927*						
		8936*	8948*	8957*	8966*	9059*	9228*	9401*	9566*	9755*	9918*	10157*	10380*	10535*						
		10695*	10862*	11034*	11202*	11391*	11599*	11814*	12050*	12393*	12640*	12807*	12841*	12885*						
		12930*																		
BITNUM 000306RG	002	1818#	2931	5064*	5081*	5167*	5184*	5201*	5218*	5235*	7159*	7189	7241*							
BITSTA 000312RG	002	1820#	2930	2995	3030	4535*	4540	5063*	5166*	5393*	5422*	5439*	5492*	5525*						
		5544*	5747*	5818*	6238*	6304*	6435*	6478*	6539*	6665*	6712*	6760*	6839*	6986*						
		7116*	7157*	7297*	7443*	7608*	7767*	7917*	8055*	8193*	8341*	8503*	8656*	8833*						
		9060*	9229*	9402*	9567*	9756*	9919*	10158*	10381*	10536*	10696*	10863*	11035*	11203*						
		11392*	11600*	11815*	12051*	12394*	12641*	12808*	12842*	12886*	12931*									
BIT0 = 000001 G		1632#	5590	7686																
BIT00 = 000001 G		1621#	1632	1719	1733	1736	1757	1759	1761	1762	1764	5627								
BIT01 = 000002 G		1620#	1631	1734	1735	1736	1757	1760	1761	1763	1764									
BIT02 = 000004 G		1619#	1630	1716	1735	1757	1762	1763	1764											
BIT03 = 000010 G		1618#	1629	1714	1746															
BIT04 = 000020 G		1617#	1628	1712																
BIT05 = 000040 G		1616#	1627	1710	1722															
BIT06 = 000100 G		1615#	1626	1708	1721															
BIT07 = 000200 G		1614#	1625	1706	1720	1744														
BIT08 = 000400 G		1613#	1624	1718	1770															
BIT09 = 001000 G		1612#	1623	1769																
BIT1 = 000002 G		1631#																		
BIT10 = 002000 G		1611#	1715	1749	1753	7158	11510	12141	12213	12284	12292									
BIT11 = 004000 G		1610#	1713	1750	1753	11285	12133	12139	12211	12290										
BIT12 = 010000 G		1609#	1711	1730	1751	1753	12137	12206	12209	12288										
BIT13 = 020000 G		1608#	1709	1729	1752	1753	8925	8946												
BIT14 = 040000 G		1607#	1707	1728	1740	1768	5219	8955	11293	12135	12207	12283	12286							
BIT15 = 100000 G		1606#	1705	1727	1739	1767	5236	7841	8934	8964	12083									
BIT2 = 000004 G		1630#	7841	12083																
BIT3 = 000010 G		1629#	5494																	
BIT4 = 000020 G		1628#	5065	5168	5438	12083														
BIT5 = 000040 G		1627#	5185																	
BIT6 = 000100 G		1626#	1687	5202	11432															
BIT7 = 000200 G		1625#																		
BIT8 = 000400 G		1624#	1747	1753																
BIT9 = 001000 G		1623#	1748	1753	5082															
BNAMT0 000360RG	002	1844#	5435	7191	7230															
BNAMT1 000420RG	002	1861#	5490																	
BNAMT2 000460RG	002	1879#	8909																	
BOE = 000400 G		1663#																		
BTMSG 052556RG	002	12972*	13005	13025#																
BTMSG0 053035RG	002	13072	13094#																	
BTMSG1 053073RG	002	13073	13100#																	
BTMSG2 053126RG	002	13074	13106#																	
BTMSG3 053172RG	002	13075	13113#																	
BTBL 052676RG	002	12971	13072#																	
CHKDN1 017316RG	002	4273#	4531	4652	4680	4879	5389	5742	5814	6234	6300	6431	6474	6536						
		6661	6708	6756	6836	6887	6982	7112	7294	7342	7440	7496	7605	7660						

67PARAMETER CODING MACY11 30A(1052) C7-APR-83 17:13 PAGE 279
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

CFCLOS= 000035	1416#													
CSCLP1= 000006	1416#	5039	5142	5288	5338									
CSCVEC= 000036	1416#	5042	5098	5145	5252	5291	5299	5341	5353	7044				
CSOCLN= 000044	1416#	4842	5047	5150	5296	5346								
CSODDU= 000051	1416#	5045	5148	5294	5344									
CSDRPT= 000024	1416#													
CSOU = 000053	1416#	4915												
CSREDIT= 000003	1416#	1474												
CSERDF= 000055	1416#	5034	5137	5283	5333									
CSERHR= 000056	1416#	5068	5085	5171	5188	5205	5222	5239	5395	5424	5448	5479	5503	
	5528	5547	5595	5635	5651	5704	5726	5751	5768	5805	5822	5846	5859	
	6242	6262	6308	6328	6348	6439	6459	6482	6502	6543	6560	6577	6669	
	6689	6716	6736	6764	6774	6843	6851	6871	6892	6899	6919	6926	6990	
	7018	7034	7049	7120	7130	7166	7194	7206	7233	7301	7311	7333	7345	
	7366	7373	7447	7457	7480	7501	7510	7533	7540	7552	7612	7622	7650	
	7665	7674	7691	7704	7771	7781	7804	7818	7827	7846	7860	7921	7929	
	7951	7965	7974	7991	8059	8069	8090	8104	8111	8120	8133	8197	8207	
	8228	8242	8249	8258	8271	8345	8355	8378	8397	8406	8424	8434	8507	
	8517	8539	8558	8567	8585	8595	8660	8670	8701	8715	8724	8742	8752	
	8837	8847	8868	8886	8895	8916	8929	8938	8950	8959	8968	8978	9064	
	9074	9104	9118	9127	9150	9164	9233	9243	9273	9287	9296	9320	9334	
	9406	9416	9437	9452	9461	9474	9484	9571	9581	9614	9628	9637	9657	
	9671	9760	9770	9800	9814	9823	9838	9852	9923	9933	9963	9977	9986	
	10000	10014	10162	10172	10214	10228	10237	10254	10270	10284	10385	10395	10424	
	10447	10455	10466	10540	10550	10570	10586	10595	10609	10619	10700	10710	10736	
	10751	10760	10773	10789	10867	10877	10896	10918	10927	10941	10951	11039	11049	
	11075	11094	11103	11116	11126	11207	11217	11245	11264	11273	11289	11297	11307	
	11396	11406	11448	11462	11471	11485	11495	11604	11614	11647	11661	11670	11687	
	11702	11713	11727	11819	11829	11858	11872	11881	11895	11910	11921	11935	12055	
	12065	12099	12113	12122	12144	12155	12176	12190	12196	12216	12227	12248	12262	
	12271	12295	12305	12398	12408	12432	12446	12455	12469	12479	12499	12513	12522	
	12537	12550	12645	12655	12684	12698	12707	12720	12751	12812	12825	12846	12859	
	12890	12903	12935	12947										
CSERRO= 000060	1416#													
CSERSF= 000054	1416#													
CSERSO= 000057	1416#													
CSERCA= 000010	1416#	5400	5756	5810	5851	6247	6313	6444	6487	6548	6674	6694	6721	
	6741	6876	7023	7109	7125	7135	7171	7291	7306	7316	7338	7350	7437	
	7452	7462	7485	7506	7515	7602	7617	7627	7655	7670	7679	7709	7761	
	7776	7786	7809	7823	7832	7865	7956	7970	8049	8064	8074	8095	8116	
	8125	8187	8202	8212	8233	8254	8263	8335	8350	8360	8383	8402	8411	
	8497	8512	8522	8544	8563	8572	8650	8665	8675	8706	8720	8729	8827	
	8842	8852	8873	8891	8900	9054	9069	9079	9109	9123	9132	9169	9223	
	9238	9248	9278	9292	9301	9339	9396	9411	9421	9442	9457	9466	9561	
	9576	9586	9619	9633	9642	9676	9750	9765	9775	9805	9819	9828	9857	
	9913	9928	9938	9968	9982	9991	10019	10152	10167	10177	10219	10233	10242	
	10375	10390	10400	10429	10452	10530	10545	10555	10575	10591	10600	10690	10705	
	10715	10741	10756	10765	10794	10857	10872	10882	10901	10923	10932	11029	11044	
	11054	11080	11099	11108	11197	11212	11222	11250	11269	11278	11386	11401	11411	
	11453	11467	11476	11594	11609	11619	11652	11666	11675	11732	11809	11824	11834	
	11863	11877	11886	12045	12060	12070	12104	12118	12127	12181	12201	12253	12267	
	12276	12388	12403	12413	12437	12451	12460	12504	12518	12527	12542	12635	12650	
	12660	12689	12703	12712	12725	12756	12796	12817	12830	12851	12864	12895	12903	
	12940	12952												
CSEREG= 000005	1416#	5075	5092	5178	5195	5212	5229	5246	5350	5431	5455	5486	5510	
	5535	5554	5602	5642	5658	5775	6252	6269	6318	6335	6449	6466	6492	

57PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 283
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

FSAU = 000015
FSAUTO= 000020
FSBGM = 000040

1416#	4920	4925											
1416#	4860	4862											
1416#	1420	2915	2928	2944	2965	2978	2991	3008	3027	3044	3057	3078	
3104	3117	3129	3142	3154	3179	3192	3212	3226	3241	3269	3297	---	
3340	3367	3394	3429	3441	3479	3527	3546	3566	3586	3614	3633		
3701	3714	3734	3761	3773	3785	3797	3809	3836	3856	3898	3910	3949	
3973	4716	4720	4733	4749	4860	4872	4891	4909	4913	4920	4924	4943	
4962	4988	5014	5023	5050	5053	5059	5077	5094	5100	5117	5126	5153	
5156	5162	5180	5197	5214	5231	5248	5254	5269	5302	5317	5326	5355	
5376	5381	5400	5404	5408	5414	5442	5468	5497	5518	5537	5556	5559	
5581	5587	5606	5625	5629	5645	5660	5688	5690	5710	5713	5732	5735	
5756	5760	5777	5780	5801	5810	5851	5865	6221	6223	6229	6247	6254	
6271	6274	6288	6313	6320	6354	6357	6397	6400	6406	6444	6451	6468	
6487	6494	6511	6514	6520	6548	6555	6585	6596	6636	6641	6674	6681	
6694	6701	6721	6728	6741	6751	6789	6820	6827	6867	6876	6935	6964	
6970	7002	7023	7055	7093	7100	7109	7125	7135	7162	7171	7218	7246	
7275	7282	7291	7306	7316	7329	7338	7350	7382	7421	7428	7437	7452	
7462	7476	7485	7506	7515	7561	7586	7593	7602	7617	7627	7646	7655	
7670	7679	7709	7714	7745	7752	7761	7776	7786	7800	7809	7823	7832	
7865	7873	7898	7905	7946	7956	7970	8005	8033	8040	8049	8064	8074	
8086	8095	8116	8125	8142	8171	8178	8187	8202	8212	8224	8233	8254	
8263	8280	8319	8326	8335	8350	8360	8374	8383	8402	8411	8443	8481	
8488	8497	8512	8522	8535	8544	8563	8572	8604	8634	8641	8650	8665	
8675	8693	8706	8720	8729	8763	8811	8818	8827	8842	8852	8864	8873	
8891	8900	8987	9038	9045	9054	9069	9079	9096	9109	9123	9132	9169	
9179	9207	9214	9223	9238	9248	9265	9278	9292	9301	9339	9349	9380	
9387	9396	9411	9421	9433	9442	9457	9466	9493	9545	9552	9561	9576	
9586	9607	9619	9633	9642	9676	9688	9734	9741	9750	9765	9775	9792	
9805	9819	9828	9857	9871	9897	9904	9913	9928	9938	9959	9968	9982	
9991	10019	10032	10136	10143	10152	10167	10177	10205	10219	10233	10242	10293	
10359	10366	10375	10390	10400	10416	10429	10452	10482	10514	10521	10530	10545	
10555	10566	10575	10591	10600	10628	10674	10681	10690	10705	10715	10732	10741	
10756	10765	10785	10794	10807	10841	10848	10857	10872	10882	10892	10901	10923	
10932	10960	11013	11020	11029	11044	11054	11068	11080	11099	11108	11141	11181	
11188	11197	11212	11222	11241	11250	11269	11278	11322	11370	11377	11386	11401	
11411	11428	11438	11453	11467	11476	11524	11578	11585	11594	11609	11619	11634	
11652	11666	11675	11732	11744	11793	11800	11809	11824	11834	11845	11863	11877	
11886	11941	12029	12036	12045	12060	12070	12091	12104	12118	12127	12167	12181	
12201	12241	12253	12267	12276	12314	12372	12379	12388	12403	12413	12425	12437	
12451	12460	12492	12504	12518	12527	12542	12565	12619	12626	12635	12650	12660	
12680	12689	12703	12712	12725	12756	12765	12786	12790	12796	12817	12830	12851	
12864	12895	12908	12940	12952	13014	13139	13179						

FSCLEA= 000007
FSDU = 000016
FSEND = 000041

1416#	4872	4904											
1416#	4909	4914											
1416#	1420	2926	2942	2963	2976	2989	3006	3025	3042	3055	3076	3102	
3115	3127	3140	3152	3177	3190	3210	3224	3239	3267	3295	3309	3338	
3365	3392	3427	3439	3477	3525	3544	3564	3584	3612	3631	3672	3699	
3712	3732	3759	3771	3783	3795	3807	3834	3854	3896	3908	3947	3971	
3983	4718	4723	4847	4864	4891	4906	4911	4916	4922	4927	4948	4968	
4996	5014	5023	5050	5052	5053	5076	5093	5094	5096	5100	5102	5117	
5126	5153	5155	5156	5179	5196	5213	5230	5247	5248	5250	5254	5256	
5269	5302	5304	5317	5351	5355	5357	5376	5381	5400	5404	5406	5408	
5432	5456	5487	5511	5536	5555	5556	5558	5559	5561	5581	5603	5606	
5608	5625	5643	5659	5660	5662	5688	5690	5710	5712	5713	5732	5734	
5735	5756	5776	5777	5779	5780	5782	5801	5810	5851	5865	5867	6221	
6223	6247	6253	6270	6271	6273	6274	6313	6319	6336	6354	6356	6357	

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 284
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

6359	6397	6400	6444	6450	6467	6487	6493	6510	6511	6513	6514	6548
6554	6568	6585	6587	6596	6598	6636	6674	6680	6694	6700	6721	6727
6741	6747	6782	6789	6791	6820	6860	6876	6934	6935	6937	6964	6998
7023	7042	7055	7057	7093	7109	7125	7135	7147	7171	7214	7241	7246
7248	7275	7291	7306	7316	7322	7338	7350	7381	7382	7384	7421	7437
7452	7462	7468	7485	7506	7515	7560	7561	7563	7586	7602	7617	7627
7633	7655	7670	7679	7698	7709	7714	7716	7745	7761	7776	7786	7792
7809	7823	7832	7854	7865	7873	7875	7898	7938	7956	7970	8004	8005
8007	8033	8049	8064	8074	8080	8095	8116	8125	8141	8142	8144	8171
8187	8202	8212	8218	8233	8254	8263	8279	8280	8282	8319	8335	8350
8360	8366	8383	8402	8411	8442	8443	8445	8481	8497	8512	8522	8528
8544	8563	8572	8603	8604	8606	8634	8650	8665	8675	8681	8706	8720
8729	8760	8763	8765	8811	8827	8842	8852	8858	8873	8891	8900	8986
8987	8989	9038	9054	9069	9079	9085	9109	9123	9132	9158	9169	9179
9181	9207	9223	9238	9248	9254	9278	9292	9301	9328	9339	9349	9351
9380	9396	9411	9421	9427	9442	9457	9466	9492	9493	9495	9545	9561
9576	9586	9592	9619	9633	9642	9665	9676	9688	9690	9734	9750	9765
9775	9781	9805	9819	9828	9846	9857	9871	9873	9897	9913	9928	9938
9944	9968	9982	9991	10008	10019	10032	10034	10136	10152	10167	10177	10183
10219	10233	10242	10292	10293	10295	10359	10375	10390	10400	10406	10429	10452
10474	10482	10484	10514	10530	10545	10555	10561	10575	10591	10600	10627	10628
10630	10674	10690	10705	10715	10721	10741	10756	10765	10781	10794	10800	10807
10809	10841	10857	10872	10882	10888	10901	10923	10932	10959	10960	10962	11013
11029	11044	11054	11060	11080	11099	11108	11135	11141	11143	11181	11197	11212
11222	11228	11250	11269	11278	11315	11322	11324	11370	11386	11401	11411	11417
11453	11467	11476	11516	11524	11526	11578	11594	11609	11619	11625	11652	11666
11675	11721	11732	11744	11746	11793	11809	11824	11834	11840	11863	11877	11886
11929	11941	11943	12029	12045	12060	12070	12076	12104	12118	12127	12163	12181
12201	12237	12253	12267	12276	12313	12314	12316	12372	12388	12403	12413	12419
12437	12451	12460	12487	12504	12518	12527	12542	12558	12565	12567	12619	12635
12650	12660	12666	12689	12703	12712	12725	12756	12764	12765	12767	12786	12790
12796	12817	12830	12851	12864	12895	12908	12940	12952	13014	13016	13154	13179
FSHARD = 000004	1416#	13139	13152									
FSHW = 000013	1416#	1582	1590									
FSINIT = 000006	1416#	4749	4845									
FSJMP = 000050	1416#	4718	4891	4911	4922	12790						
FSMOD = 000000	1416#	1420	13179									
FSMSG = 000011	1416#	2915	2924	2928	2940	2944	2961	2965	2974	2978	2987	3004
	3008	3023	3027	3040	3044	3053	3057	3074	3078	3100	3104	3113
	3125	3129	3138	3142	3150	3154	3175	3179	3188	3192	3208	3212
	3226	3237	3241	3265	3269	3293	3297	3307	3311	3336	3340	3363
	3390	3394	3425	3429	3437	3441	3475	3479	3523	3527	3542	3546
	3566	3582	3586	3610	3614	3629	3633	3670	3674	3697	3701	3710
	3730	3734	3757	3761	3769	3773	3781	3785	3793	3797	3805	3809
	3836	3852	3856	3894	3898	3906	3910	3945	3949	3969	3973	3981
FSROT = 000021	1416#	4733	4740									
FSPWR = 000017	1416#											
FSRPT = 000012	1416#	4716	4721									
FSSEG = 000003	1416#	5059	5074	5077	5091	5162	5177	5180	5194	5197	5211	5214
	5231	5245	5326	5349	5414	5430	5442	5454	5468	5485	5497	5509
	5534	5537	5553	5587	5601	5629	5641	5645	5657	5760	5774	6229
	6254	6268	6288	6317	6320	6334	6406	6448	6451	6465	6468	6491
	6508	6520	6552	6555	6566	6641	6678	6681	6698	6701	6725	6728
	6751	6780	6827	6858	6867	6932	6970	6996	7002	7040	7100	7145
	7212	7218	7239	7282	7320	7329	7379	7428	7466	7476	7558	7593
	7646	7696	7752	7790	7800	7852	7905	7936	7946	8002	8040	8078

FSHARD = 000004
FSHW = 000013
FSINIT = 000006
FSJMP = 000050
FSMOD = 000000
FSMSG = 000011

FSROT = 000021
FSPWR = 000017
FSRPT = 000012
FSSEG = 000003

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 286
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

ICAB = 040000 G		1740#	5522											
IDU = 000040 G		1660#												
IE = 000100 G		1687#	4235	6979	6980	7176	7178							
IER = 020000 G		1668#												
INERR = 000003		1700#	3480	6904	7520	8417	8578	8735	9471	9835	9997	10248	10606	10770
		10938	11113	11684	11892									
INITM = 177777 G		1688#	4020											
INITL = 177777 G		1689#	4021											
INMON = 000001		1698#	4459	6830	7103	7285	7431	7596	7755	7908	8043	8181	8329	8491
		8644	8821	9048	9217	9390	9555	9744	9907	10146	10369	10524	10684	10851
		11023	11191	11380	11588	11803	12039	12382	12629					
INTBIT 002156RG	002	2126#	7122	7132	7168	7196	7208	7235						
INTE = 000100 G		1721#	5697	5701										
INTR = 000200 G		1720#	5418											
INTST = 000002		1699#	6770											
INTVEC 002121RG	002	2121#	6992	7020	7036	7051								
IOADR = 020000 G		1684#	1685											
IOSIZ = 020000 G		1680#	1685											
ISR = 000100 G		1661#												
IXE = 004000 G		1666#												
ISAU = 000041		1416#	4920#	4927#										
ISAUTO= 000041		1416#	4860#	4864#										
ISCLM = 000041		1416#	4872#	4891	4906#									
ISDU = 000041		1416#	4909#	4916#										
ISHRD = 000041		13139#	13154#											
ISINIT= 000041		1416#	4749#	4847#										
ISMOD = 000041		1416#	1420#	13179#										
ISMSG = 000041		1416#	2915#	2926#	2928#	2942#	2944#	2963#	2965#	2976#	2978#	2989#	2991#	3006#
		3008#	3025#	3027#	3042#	3044#	3055#	3057#	3076#	3078#	3102#	3104#	3115#	3117#
		3127#	3129#	3140#	3142#	3152#	3154#	3177#	3179#	3190#	3192#	3210#	3212#	3224#
		3226#	3239#	3241#	3267#	3269#	3295#	3297#	3309#	3311#	3338#	3340#	3365#	3367#
		3392#	3394#	3427#	3429#	3439#	3441#	3477#	3479#	3525#	3527#	3544#	3546#	3564#
		3566#	3584#	3586#	3612#	3614#	3631#	3633#	3672#	3674#	3699#	3701#	3712#	3714#
		3732#	3734#	3759#	3761#	3771#	3773#	3783#	3785#	3795#	3797#	3807#	3809#	3834#
		3836#	3854#	3856#	3896#	3898#	3908#	3910#	3947#	3949#	397#	3973#	3983#	
ISPROT= 000040		1416#	4733#											
ISPTAB= 000041		1416#												
ISPR = 000041		1416#												
ISRPT = 000041		1416#	4716#	4723#										
ISSEG = 000041		1416#	5014	5023	5053	5059#	5076#	5077#	5093#	5117	5126	5156	5162#	5179#
		5180#	5196#	5197#	5213#	5214#	5230#	5231#	5247#	5269	5317	5326#	5351#	5376
		5381	5408	5414#	5432#	5442#	5456#	5468#	5487#	5497#	5511#	5518#	5536#	5537#
		5555#	5581	5587#	5603#	5625	5629#	5643#	5645#	5659#	5688	5690	5713	5735
		5760#	5776#	5801	6221	6223	6229#	6253#	6254#	6270#	6274	6288#	6319#	6320#
		6336#	6397	6400	6406#	6450#	6451#	6467#	6468#	6493#	6496#	6510#	6514	6520#
		6554#	6555#	6568#	6636	6641#	6680#	6681#	6700#	6701#	6727#	6728#	6747#	6751#
		6782#	6820	6827#	6860#	6867#	6934#	6964	6970#	6998#	7002#	7042#	7093	7100#
		7147#	7162#	7214#	7218#	7241#	7275	7282#	7322#	7329#	7381#	7421	7428#	7468#
		7476#	7560#	7586	7593#	7633#	7646#	7698#	7745	7752#	7792#	7800#	7854#	7898
		7905#	7938#	7946#	8004#	8033	8040#	8080#	8086#	8141#	8171	8178#	8218#	8224#
		8279#	8319	8326#	8366#	8374#	8442#	8481	8488#	8528#	8535#	8603#	8634	8641#
		8681#	8693#	8760#	8811	8818#	8858#	8864#	8986#	9038	9045#	9085#	9096#	9158#
		9207	9214#	9254#	9265#	9328#	9380	9387#	9427#	9433#	9492#	9545	9552#	9592#
		9607#	9665#	9734	9741#	9781#	9792#	9846#	9897	9904#	9944#	9959#	10008#	10136
		10143#	10183#	10205#	10292#	10359	10366#	10406#	10416#	10474#	10514	10521#	10561#	10566#
		10627#	10674	10681#	10721#	10732#	10781#	10785#	10800#	10841	10848#	10888#	10892#	10959#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 288
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

LPMSG	052554RG	002	12964*	12998	13024#
LPMSG0	052740RG	002	13069	13082#	
LPMSG1	052777RG	002	13070	13088#	
LPTBL	052672RG	002	12963	13069#	
LSACP	000110RG	002	1504#		
LSAPT	000036RG	002	1462#		
LSAU	022026RG	002	1489	4920#	
LSAUT	000070RG	002	1488#		
LSAUTO	021652RG	002	1505	4860#	
LSCCP	000106RG	002	1502#		
LSCLEA	021654RG	002	1503	4872#	
LSCO	000032RG	002	1458#		
LSDEPO	000011RG	002	1440#		
LSDESC	000706RG	002	1495	1970#	
LSDESP	000076RG	002	1494#		
LSDEVP	000060RG	002	1480#		
LSDISP	000124RG	002	1465	1524#	
LSDL	000116RG	002	1510#		
LSDTP	000040RG	002	1464#		
LSDTYP	000034RG	002	1460#		
LSDU	077020RG	002	1491	4909#	
LSDUT	000072RG	002	1490#		
LSDVTY	000700RG	002	1481	1962#	
LSEF	000052RG	002	1475#		
LSENV1	000044RG	002	1468#		
LSETP	000102RG	002	1498#		
LSEXP1	000046RG	002	1470#		
LSEXP4	000064RG	002	1484#		
LSEXP5	000066RG	002	1486#		
LSHARD	053256RG	002	1447	13139	13140#
LSHIME	000120RG	002	1512#		
LSHPCP	000016RG	002	1446#		
LSHPTP	000022RG	002	1450#		
LSHW	000262RG	002	1451	1582	1583#
LSICP	000104RG	002	1500#		
LSINIT	021212RG	002	1501	4749#	
LSLADP	000026RG	002	1454#		
LSLAST=	***** GX		1455		
LSLOAD	000100RG	002	1496#		
LSLUN	000074RG	002	1492#		
LSMREV	000050RG	002	1472#		
LSNAME	000000RG	002	1429#		
LSPRIO	000042RG	002	1466#		
LSPROT	021204RG	002	1507	4733#	
LSPRT	000112RG	002	1506#		
LSREPP	000062RG	002	1482#		
LSREV	000010RG	002	1438#		
LSRPT	021176RG	002	1483	4716#	
LSSPC	000056RG	002	1478#		
LSSPCP	000020RG	002	1448#		
LSSPTP	000024RG	002	1452#		
LSSTA	000030RG	002	1456#		
LSTEST	000114RG	002	1508#		
LSTIML	000014RG	002	1444#		
LSUNIT	000012RG	002	1442#	4819	
L10000	000266R	002	1582	1590#	

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 289
 CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

L10001	012524R	002	2924#	
L10002	012566R	002	2940#	
L10003	012640R	002	2961#	
L10004	012666R	002	2974#	
L10005	012714R	002	2987#	
L10006	012762R	002	3004#	
L10007	013026R	002	3023#	
L10010	013074R	002	3040#	
L10011	013122R	002	3053#	
L10012	013172R	002	3074#	
L10013	013260R	002	3100#	
L10014	013306R	002	3113#	
L10015	013330R	002	3125#	
L10016	013356R	002	3138#	
L10017	013400R	002	3150#	
L10020	013464R	002	3175#	
L10021	013510R	002	3188#	
L10022	013556R	002	3208#	
L10023	013604R	002	3222#	
L10024	013634R	002	3237#	
L10025	013726R	002	3265#	
L10026	014020R	002	3293#	
L10027	014050R	002	3307#	
L10030	014144R	002	3336#	
L10031	014234R	002	3363#	
L10032	014324R	002	3390#	
L10033	014440R	002	3425#	
L10034	014462R	002	3437#	
L10035	014612R	002	3475#	
L10036	015000R	002	3523#	
L10037	015044R	002	3542#	
L10040	015112R	002	3562#	
L10041	015160R	002	3582#	
L10042	015262R	002	3610#	
L10043	015330R	002	3629#	
L10044	015474R	002	3670#	
L10045	015572R	002	3697#	
L10046	015620R	002	3710#	
L10047	015670R	002	3730#	
L10050	015766R	002	3757#	
L10051	016010R	002	3769#	
L10052	016032R	002	3781#	
L10053	016054R	002	3793#	
L10054	016076R	002	3805#	
L10055	016174R	002	3832#	
L10056	016246R	002	3852#	
L10057	016416R	002	3894#	
L10060	016440R	002	3906#	
L10061	016602R	002	3945#	
L10062	016664R	002	3969#	
L10063	016706R	002	3981#	
L10064	021202R	002	4719	4721#
L10066	021606R	002	4845#	
L10067	021652R	002	4862#	
L10070	022016R	002	4892	4904#
L10071	022024R	002	4912	4914#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 297
 CZUAA8.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

STMSG 024406RG STP = 001000 G STTBL 024410RG SVCGBL= 000001	002	3723	5842*	5844*	5870#										
		1769#													
	002	5839	5874#												
		1416#	1429	1438	1440	1442	1444	1446	1448	1450	1452	1454	1456	1458	
		1460	1462	1464	1466	1468	1470	1472	1475	1478	1480	1482	1484	1486	
		1488	1490	1492	1494	1496	1498	1500	1502	1504	1506	1508	1510	1512	
		1524	1583	1584	1962	1970	2915	2928	2944	2965	2978	2991	3008	3027	
	3044	3057	3078	3104	3117	3129	3142	3154	3179	3192	3212	3226	3241		
	3269	3297	3311	3340	3367	3394	3429	3441	3479	3527	3546	3566	3586		
	3614	3633	3674	3701	3714	3734	3761	3773	3785	3797	3809	3836	3856		
	3898	3910	3949	3973	4716	4733	4749	4860	4872	4909	4920	4943	4962		
	4988	13140													
SVCINS= 000001		1416#	1430	1431	1432	1433	1434	1435	1436	1437	1439	1441	1443	1445	
		1447	1449	1451	1453	1455	1457	1459	1461	1463	1465	1467	1469	1471	
		1473	1474	1476	1477	1479	1481	1483	1485	1487	1489	1491	1493	1495	
		1497	1499	1501	1503	1505	1507	1509	1511	1513	1523	1525	1526	1527	
		1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	
		1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	
		1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	
		1567	1568	1569	1570	1582	1963	1964	1971	1975	2917	2918	2919	2920	
		2921	2922	2925	2930	2931	2932	2933	2934	2935	2936	2937	2941	2946	
		2947	2948	2949	2950	2951	2953	2954	2955	2956	2957	2958	2959	2962	
		2967	2968	2969	2970	2971	2975	2980	2981	2982	2983	2984	2988	2993	
		2994	2995	2996	2997	2998	2999	3000	3001	3005	3010	3011	3012	3013	
		3014	3016	3017	3018	3019	3020	3021	3024	3029	3030	3031	3032	3033	
		3034	3035	3036	3037	3041	3046	3047	3048	3049	3050	3054	3059	3060	
		3061	3062	3063	3065	3066	3067	3068	3069	3070	3071	3072	3075	3080	
		3081	3082	3083	3084	3086	3087	3088	3089	3090	3091	3093	3094	3095	
		3096	3097	3098	3101	3106	3107	3108	3109	3110	3114	3119	3120	3121	
		3122	3123	3126	3131	3132	3133	3134	3135	3136	3139	3144	3145	3146	
		3147	3148	3151	3156	3157	3158	3159	3160	3162	3163	3164	3165	3166	
		3168	3169	3170	3171	3172	3173	3176	3181	3182	3183	3184	3185	3186	
		3189	3194	3195	3196	3197	3198	3199	3201	3202	3203	3204	3205	3206	
		3209	3214	3215	3216	3217	3218	3219	3220	3223	3228	3229	3230	3231	
		3232	3233	3234	3235	3238	3243	3244	3245	3246	3247	3248	3250	3251	
		3252	3253	3254	3255	3257	3258	3259	3260	3261	3262	3263	3266	3271	
		3272	3273	3274	3275	3276	3278	3279	3280	3281	3282	3283	3285	3286	
		3287	3288	3289	3290	3291	3294	3299	3300	3301	3302	3303	3304	3305	
		3308	3313	3314	3315	3316	3317	3318	3320	3321	3322	3323	3324	3325	
		3326	3328	3329	3330	3331	3332	3333	3334	3337	3342	3343	3344	3345	
		3346	3348	3349	3350	3351	3352	3353	3355	3356	3357	3358	3359	3360	
		3361	3364	3369	3370	3371	3372	3373	3375	3376	3377	3378	3379	3380	
		3382	3383	3384	3385	3386	3387	3388	3391	3397	3398	3399	3400	3401	
		3402	3405	3406	3407	3408	3409	3410	3411	3412	3415	3416	3417	3418	
		3419	3420	3421	3422	3426	3431	3432	3433	3434	3435	3438	3443	3444	
		3445	3446	3447	3449	3450	3451	3452	3453	3458	3459	3460	3461	3462	
		3463	3465	3466	3467	3468	3469	3470	3474	3483	3484	3485	3486	3487	
		3490	3491	3492	3493	3494	3496	3497	3498	3499	3500	3502	3503	3504	
		3505	3506	3507	3509	3510	3511	3512	3513	3514	3516	3517	3518	3519	
		3520	3521	3524	3529	3530	3531	3532	3533	3535	3536	3537	3538	3539	
		3540	3543	3548	3549	3550	3551	3552	3554	3555	3556	3557	3558	3559	
		3560	3563	3568	3569	3570	3571	3572	3574	3575	3576	3577	3578	3579	
		3580	3583	3588	3589	3590	3591	3592	3593	3594	3596	3597	3598	3599	
		3600	3601	3603	3604	3605	3606	3607	3608	3611	3616	3617	3618	3619	
		3620	3622	3623	3624	3625	3626	3627	3630	3635	3636	3637	3638	3639	
		3641	3642	3643	3644	3645	3646	3648	3649	3650	3651	3652	3653	3655	

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 298
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

3656	3657	3658	3659	3660	3662	3663	3664	3665	3666	3667	3668	3671
3676	3677	3678	3679	3680	3682	3683	3684	3685	3686	3687	3688	3690
3691	3692	3693	3694	3695	3698	3703	3704	3705	3706	3707	3708	3711
3716	3717	3718	3719	3720	3721	3723	3724	3725	3726	3727	3728	3731
3736	3737	3738	3739	3740	3741	3743	3744	3745	3746	3747	3749	3750
3751	3752	3753	3754	3755	3758	3763	3764	3765	3766	3767	3770	3775
3776	3777	3778	3779	3782	3787	3788	3789	3790	3791	3794	3799	3800
3801	3802	3803	3806	3811	3812	3813	3814	3815	3817	3818	3819	3820
3821	3822	3824	3825	3826	3827	3828	3829	3830	3833	3838	3839	3840
3841	3842	3844	3845	3846	3847	3848	3849	3850	3853	3858	3859	3860
3861	3862	3863	3865	3866	3867	3868	3869	3870	3872	3873	3874	3875
3876	3877	3879	3880	3881	3882	3883	3884	3886	3887	3888	3889	3890
3891	3892	3895	3900	3901	3902	3903	3904	3907	3914	3915	3916	3917
3918	3922	3923	3924	3925	3926	3930	3931	3932	3933	3934	3938	3939
3940	3941	3942	3946	3951	3952	3953	3954	3955	3957	3958	3959	3960
3961	3963	3964	3965	3966	3967	3970	3975	3976	3977	3978	3979	3982
4233	4234	4247	4248	4277	4386	4387	4388	4389	4390	4391	4422	4423
4424	4425	4426	4427	4428	4462	4539	4540	4541	4542	4543	4544	4545
4546	4547	4554	4555	4556	4557	4558	4575	4576	4577	4578	4579	4580
4641	4642	4643	4644	4645	4646	4656	4657	4658	4659	4660	4661	4669
4670	4671	4672	4673	4674	4684	4685	4686	4687	4688	4689	4697	4698
4699	4700	4701	4702	4718	4719	4722	4754	4755	4757	4759	4760	4763
4774	4775	4777	4779	4780	4782	4785	4786	4790	4791	4792	4794	4796
4797	4798	4799	4800	4809	4810	4811	4812	4813	4814	4822	4823	4824
4826	4842	4846	4863	4882	4883	4884	4885	4886	4891	4892	4905	4911
4912	4915	4922	4923	4926	4947	4967	4995	5016	5017	5018	5019	5020
5021	5024	5034	5035	5036	5037	5039	5041	5042	5044	5045	5047	5051
5054	5059	5068	5069	5070	5071	5075	5077	5085	5086	5087	5088	5092
5095	5097	5098	5101	5119	5120	5121	5122	5123	5124	5127	5137	5138
5139	5140	5142	5144	5145	5147	5148	5150	5154	5157	5162	5171	5172
5173	5174	5178	5180	5188	5189	5190	5191	5195	5197	5205	5206	5207
5208	5212	5214	5222	5223	5224	5225	5229	5231	5239	5240	5241	5242
5246	5249	5251	5252	5255	5271	5272	5273	5274	5275	5276	5283	5284
5285	5286	5288	5290	5291	5293	5294	5296	5298	5299	5303	5319	5320
5321	5322	5323	5324	5326	5333	5334	5335	5336	5338	5340	5341	5343
5344	5346	5350	5352	5353	5356	5382	5395	5396	5397	5398	5400	5401
5405	5409	5414	5424	5425	5426	5427	5431	5442	5448	5449	5450	5451
5455	5468	5479	5489	5481	5482	5486	5497	5503	5504	5505	5506	5510
5518	5528	5529	5530	5531	5535	5537	5547	5548	5549	5550	5554	5557
5560	5587	5595	5596	5597	5598	5602	5607	5629	5635	5636	5637	5638
5642	5645	5651	5652	5653	5654	5658	5661	5691	5704	5705	5706	5707
5711	5714	5726	5727	5728	5729	5733	5736	5751	5752	5753	5754	5756
5757	5760	5768	5769	5770	5771	5775	5778	5781	5805	5806	5807	5808
5810	5811	5822	5823	5824	5825	5846	5847	5848	5849	5851	5852	5859
5860	5861	5862	5866	6224	6229	6242	6243	6244	6245	6247	6248	6252
6254	6262	6263	6264	6265	6269	6272	6275	6288	6308	6309	6310	6311
6313	6314	6318	6320	6328	6329	6330	6331	6335	6348	6349	6350	6351
6355	6358	6401	6406	6439	6440	6441	6442	6444	6445	6449	6451	6459
6460	6461	6462	6466	6468	6482	6483	6484	6485	6487	6488	6492	6494
6502	6503	6504	6505	6509	6512	6515	6520	6543	6544	6545	6546	6548
6549	6553	6555	6560	6561	6562	6563	6567	6577	6578	6579	6580	6586
6597	6641	6669	6670	6671	6672	6674	6675	6679	6681	6689	6690	6691
6692	6694	6695	6699	6701	6716	6717	6718	6719	6721	6722	6726	6728
6736	6737	6738	6739	6741	6742	6746	6751	6764	6765	6766	6767	6774
6775	6776	6777	6781	6790	6827	6843	6844	6845	6846	6851	6852	6853
6854	6859	6867	6871	6872	6873	6874	6876	6877	6892	6893	6894	6895

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 299
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

6899	6900	6901	6902	6919	6920	6921	6922	6926	6927	6928	6929	6933
6936	6970	6972	6973	6974	6975	6976	6977	6990	6991	6992	6993	6997
7002	7008	7009	7018	7019	7020	7021	7023	7024	7034	7035	7036	7037
7041	7043	7044	7049	7050	7051	7052	7056	7100	7109	7110	7120	7121
7122	7123	7125	7126	7130	7131	7132	7133	7135	7136	7138	7139	7140
7141	7142	7143	7146	7162	7166	7167	7168	7169	7171	7172	7181	7182
7194	7195	7196	7197	7206	7207	7208	7209	7213	7218	7233	7234	7235
7236	7240	7247	7282	7291	7292	7301	7302	7303	7304	7306	7307	7311
7312	7313	7314	7316	7317	7321	7329	7333	7334	7335	7336	7338	7339
7345	7346	7347	7348	7350	7351	7366	7367	7368	7369	7373	7374	7375
7376	7380	7383	7428	7437	7438	7447	7448	7449	7450	7452	7453	7457
7458	7459	7460	7462	7463	7467	7476	7480	7481	7482	7483	7485	7486
7501	7502	7503	7504	7506	7507	7510	7511	7512	7513	7515	7516	7533
7534	7535	7536	7540	7541	7542	7543	7552	7553	7554	7555	7559	7562
7593	7602	7603	7612	7613	7614	7615	7617	7618	7622	7623	7624	7625
7627	7628	7632	7646	7650	7651	7652	7653	7655	7656	7665	7666	7667
7668	7670	7671	7674	7675	7676	7677	7679	7680	7691	7692	7693	7694
7697	7704	7705	7706	7707	7709	7710	7715	7752	7761	7762	7771	7772
7773	7774	7776	7777	7781	7782	7783	7784	7786	7787	7791	7800	7804
7805	7806	7807	7809	7810	7818	7819	7820	7821	7823	7824	7827	7828
7829	7830	7832	7833	7846	7847	7848	7849	7853	7860	7861	7862	7863
7865	7866	7874	7905	7921	7922	7923	7924	7929	7930	7931	7932	7937
7946	7951	7952	7953	7954	7956	7957	7965	7966	7967	7968	7970	7971
7974	7975	7976	7977	7991	7992	7993	7994	8003	8006	8040	8049	8050
8059	8060	8061	8062	8064	8065	8069	8070	8071	8072	8074	8075	8079
8086	8090	8091	8092	8093	8095	8096	8104	8105	8106	8107	8111	8112
8113	8114	8116	8117	8120	8121	8122	8123	8125	8126	8133	8134	8135
8136	8140	8143	8178	8187	8188	8197	8198	8199	8200	8202	8203	8207
8208	8209	8210	8212	8213	8217	8224	8228	8229	8230	8231	8233	8234
8242	8243	8244	8245	8249	8250	8251	8252	8254	8255	8258	8259	8260
8261	8263	8264	8271	8272	8273	8274	8278	8281	8326	8335	8336	8345
8346	8347	8348	8350	8351	8355	8356	8357	8358	8360	8361	8365	8374
8378	8379	8380	8381	8383	8384	8397	8398	8399	8400	8402	8403	8406
8407	8408	8409	8411	8412	8424	8425	8426	8427	8434	8435	8436	8437
8441	8444	8488	8497	8498	8507	8508	8509	8510	8512	8513	8517	8518
8519	8520	8522	8523	8527	8535	8539	8540	8541	8542	8544	8545	8558
8559	8560	8561	8563	8564	8567	8568	8569	8570	8572	8573	8585	8586
8587	8588	8595	8596	8597	8598	8602	8605	8641	8650	8651	8660	8661
8662	8663	8665	8666	8670	8671	8672	8673	8675	8676	8680	8693	8701
8702	8703	8704	8706	8707	8715	8716	8717	8718	8720	8721	8724	8725
8726	8727	8729	8730	8742	8743	8744	8745	8752	8753	8754	8755	8759
8764	8818	8827	8828	8837	8838	8839	8840	8842	8843	8847	8848	8849
8850	8852	8853	8857	8864	8868	8869	8870	8871	8873	8874	8886	8887
8888	8889	8891	8892	8895	8896	8897	8898	8900	8901	8916	8917	8918
8919	8929	8930	8931	8932	8938	8939	8940	8941	8950	8951	8952	8953
8959	8960	8961	8962	8968	8969	8970	8971	8978	8979	8980	8981	8985
8988	9045	9054	9055	9064	9065	9066	9067	9069	9070	9074	9075	9076
9077	9079	9080	9084	9096	9104	9105	9106	9107	9109	9110	9118	9119
9120	9121	9123	9124	9127	9128	9129	9130	9132	9133	9150	9151	9152
9153	9157	9164	9165	9166	9167	9169	9170	9180	9214	9223	9224	9233
9234	9235	9236	9238	9239	9243	9244	9245	9246	9248	9249	9253	9265
9273	9274	9275	9276	9278	9279	9287	9288	9289	9290	9292	9293	9296
9297	9298	9299	9301	9302	9320	9321	9322	9323	9327	9334	9335	9336
9337	9339	9340	9350	9387	9396	9397	9406	9407	9408	9409	9411	9412
9416	9417	9418	9419	9421	9422	9426	9433	9437	9438	9439	9440	9442
9443	9452	9453	9454	9455	9457	9458	9461	9462	9463	9464	9466	9467

9474	9475	9476	9477	9484	9485	9486	9487	9491	9494	9552	9561	9562
9571	9572	9573	9574	9576	9577	9581	9582	9583	9584	9586	9587	9591
9607	9614	9615	9616	9617	9619	9620	9628	9629	9630	9631	9633	9634
9637	9638	9639	9640	9642	9643	9657	9658	9659	9660	9664	9671	9672
9673	9674	9676	9677	9689	9741	9750	9751	9760	9761	9762	9763	9765
9766	9770	9771	9772	9773	9775	9776	9780	9792	9800	9801	9802	9803
9805	9806	9814	9815	9816	9817	9819	9820	9823	9824	9825	9826	9828
9829	9838	9839	9840	9841	9845	9852	9853	9854	9855	9857	9858	9872
9904	9913	9914	9923	9924	9925	9926	9928	9929	9933	9934	9935	9936
9938	9939	9943	9959	9963	9964	9965	9966	9968	9969	9977	9978	9979
9980	9982	9983	9986	9987	9988	9989	9991	9992	10000	10001	10002	10003
10007	10014	10015	10016	10017	10019	10020	10033	10143	10152	10153	10162	10163
10164	10165	10167	10168	10172	10173	10174	10175	10177	10178	10182	10205	10214
10215	10216	10217	10219	10220	10228	10229	10230	10231	10233	10234	10237	10238
10239	10240	10242	10243	10254	10255	10256	10257	10270	10271	10272	10273	10284
10285	10286	10287	10291	10294	10366	10375	10376	10385	10386	10387	10388	10390
10391	10395	10396	10397	10398	10400	10401	10405	10416	10424	10425	10426	10427
10429	10430	10447	10448	10449	10450	10452	10453	10455	10456	10457	10458	10466
10467	10468	10469	10473	10483	10521	10530	10531	10540	10541	10542	10543	10545
10546	10550	10551	10552	10553	10555	10556	10560	10566	10570	10571	10572	10573
10575	10576	10586	10587	10588	10589	10591	10592	10595	10596	10597	10598	10600
10601	10609	10610	10611	10612	10619	10620	10621	10622	10626	10629	10681	10690
10691	10700	10701	10702	10703	10705	10706	10710	10711	10712	10713	10715	10716
10720	10732	10736	10737	10738	10739	10741	10742	10751	10752	10753	10754	10756
10757	10760	10761	10762	10763	10765	10766	10773	10774	10775	10776	10780	10785
10789	10790	10791	10792	10794	10795	10799	10808	10848	10857	10858	10867	10868
10869	10870	10872	10873	10877	10878	10879	10880	10882	10883	10887	10892	10896
10897	10898	10899	10901	10902	10918	10919	10920	10921	10923	10924	10927	10928
10929	10930	10932	10933	10941	10942	10943	10944	10951	10952	10953	10954	10958
10961	11020	11029	11030	11039	11040	11041	11042	11044	11045	11049	11050	11051
11052	11054	11055	11059	11068	11075	11076	11077	11078	11080	11081	11094	11095
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11119	11126	11127	11128	11129	11134	11142	11188	11197	11198	11207	11208	11209
11210	11212	11213	11217	11218	11219	11220	11222	11223	11227	11241	11245	11246
11247	11248	11250	11251	11264	11265	11266	11267	11269	11270	11273	11274	11275
11276	11278	11279	11289	11290	11291	11292	11297	11298	11299	11300	11307	11308
11309	11310	11314	11323	11377	11386	11387	11396	11397	11398	11399	11401	11402
11406	11407	11408	11409	11411	11412	11416	11428	11438	11448	11449	11450	11451
11453	11454	11462	11463	11464	11465	11467	11468	11471	11472	11473	11474	11476
11477	11485	11486	11487	11488	11495	11496	11497	11498	11502	11515	11525	11585
11594	11595	11604	11605	11606	11607	11609	11610	11614	11615	11616	11617	11619
11620	11624	11634	11647	11648	11649	11650	11652	11653	11661	11662	11663	11664
11666	11667	11670	11671	11672	11673	11675	11676	11687	11688	11689	11690	11702
11703	11704	11705	11713	11714	11715	11716	11720	11727	11728	11729	11730	11732
11733	11745	11800	11809	11810	11819	11820	11821	11822	11824	11825	11829	11830
11831	11832	11834	11835	11839	11845	11858	11859	11860	11861	11863	11864	11872
11873	11874	11875	11877	11878	11881	11882	11883	11884	11886	11887	11895	11896
11897	11898	11910	11911	11912	11913	11921	11922	11923	11924	11928	11935	11936
11937	11938	11942	12036	12045	12046	12055	12056	12057	12058	12060	12061	12065
12066	12067	12068	12070	12071	12075	12091	12099	12100	12101	12102	12104	12105
12113	12114	12115	12116	12118	12119	12122	12123	12124	12125	12127	12128	12144
12145	12146	12147	12155	12156	12157	12158	12162	12167	12176	12177	12178	12179
12181	12182	12190	12191	12192	12193	12196	12197	12198	12199	12201	12202	12216
12217	12218	12219	12227	12228	12229	12230	12236	12241	12248	12249	12250	12251
12253	12254	12262	12263	12264	12265	12267	12268	12271	12272	12273	12274	12276
12277	12295	12296	12297	12298	12305	12306	12307	12308	12312	12315	12379	12388

57PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 301
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

12389	12398	12399	12400	12401	12403	12404	12408	12409	12410	12411	12413	12414
12418	12425	12432	12433	12434	12435	12437	12438	12446	12447	12448	12449	12451
12452	12455	12456	12457	12458	12460	12461	12469	12470	12471	12472	12479	12480
12481	12482	12486	12492	12499	12500	12501	12502	12504	12505	12513	12514	12515
12516	12518	12519	12522	12523	12524	12525	12527	12528	12537	12538	12539	12540
12542	12543	12550	12551	12552	12553	12557	12566	12626	12635	12636	12645	12646
12647	12648	12650	12651	12655	12656	12657	12658	12660	12661	12665	12680	12684
12685	12686	12687	12689	12690	12698	12699	12700	12701	12703	12704	12707	12708
12709	12710	12712	12713	12720	12721	12722	12723	12725	12726	12751	12752	12753
12754	12756	12757	12763	12766	12790	12791	12796	12797	12812	12813	12814	12815
12817	12818	12825	12826	12827	12828	12830	12831	12846	12847	12848	12849	12851
12852	12859	12860	12861	12862	12864	12865	12890	12891	12892	12893	12895	12896
12903	12904	12905	12906	12908	12909	12935	12936	12937	12938	12940	12941	12947
12948	12949	12950	12952	12953	12977	12978	12979	12980	12981	12982	12984	12985
12986	12987	12988	12989	12991	12992	12993	12994	12995	12996	12998	12999	13000
13001	13002	13003	13005	13006	13007	13008	13009	13010	13015	13139	13142	13143
13144	13145	13147	13148	13149	13150	13152						
1416#	5023	5053	5126	5156	5381	5408	5690	5713	5735	6223	6274	6400
6514												
1416#	1590	2924	2940	2961	2974	2987	3004	3023	3040	3053	3074	3100
3113	3125	3138	3150	3175	3188	3208	3222	3237	3265	3293	3307	3336
3363	3390	3425	3437	3475	3523	3542	3562	3582	3610	3629	3670	3697
3710	3730	3757	3769	3781	3793	3805	3832	3852	3894	3906	3945	3969
3981	4721	4845	4862	4904	4914	4925	4946	4966	4994	5050	5074	5091
5094	5100	5153	5177	5194	5211	5228	5245	5248	5254	5302	5349	5355
5404	5430	5454	5485	5509	5534	5553	5556	5559	5601	5606	5641	5657
5660	5710	5732	5774	5777	5780	5865	6251	6268	6271	6317	6334	6354
6357	6448	6465	6491	6508	6511	6552	6566	6585	6596	6678	6698	6725
6745	6780	6789	6858	6932	6935	6996	7040	7055	7145	7212	7239	7246
7320	7379	7382	7466	7558	7561	7631	7696	7714	7790	7852	7873	7936
8002	8005	8078	8139	8142	8216	8277	8280	8364	8440	8443	8526	8601
8604	8679	8758	8763	8856	8984	8987	9083	9156	9179	9252	9326	9349
9425	9490	9493	9590	9663	9688	9779	9844	9871	9942	10006	10032	10181
10290	10293	10404	10472	10482	10559	10625	10628	10719	10779	10798	10807	10886
10957	10960	11058	11133	11141	11226	11313	11322	11415	11501	11514	11524	11623
11719	11744	11838	11927	11941	12074	12161	12235	12311	12314	12417	12485	12556
12565	12664	12762	12765	13014	13153							
1416#	5014	5117	5269	5317	5376	5581	5625	5688	5801	6221	6397	6636
6820	6964	7093	7275	7421	7586	7745	7898	8033	8171	8319	8481	8634
8811	9038	9207	9380	9545	9734	9897	10136	10359	10514	10674	10841	11013
11181	11370	11578	11793	12029	12372	12619	12786					
1831#	12924											
12991	13077#											
12922	12957	12965	13023#									
1416#	1591#	2925#	2941#	2962#	2975#	2988#	3005#	3024#	3041#	3054#	3075#	3101#
3114#	3126#	3139#	3151#	3176#	3189#	3209#	3223#	3238#	3266#	3294#	3308#	3337#
3364#	3391#	3426#	3438#	3476#	3524#	3543#	3563#	3583#	3611#	3630#	3671#	3698#
3711#	3731#	3758#	3770#	3782#	3794#	3806#	3833#	3853#	3895#	3907#	3946#	3970#
3982#	4722#	4846#	4863#	4905#	4915#	4926#	4947#	4967#	4995#	5051#	5059#	5077#
5095#	5101#	5154#	5162#	5180#	5197#	5214#	5231#	5249#	5255#	5303#	5326#	5356#
5405#	5414#	5442#	5468#	5497#	5518#	5537#	5557#	5560#	5587#	5607#	5629#	5645#
5661#	5711#	5733#	5760#	5778#	5781#	5866#	6229#	6254#	6272#	6288#	6320#	6355#
6358#	6406#	6451#	6468#	6494#	6512#	6520#	6555#	6586#	6597#	6641#	6681#	6701#
6728#	6751#	6790#	6827#	6867#	6936#	6970#	7002#	7056#	7100#	7162#	7218#	7247#
7282#	7329#	7383#	7428#	7476#	7562#	7593#	7646#	7715#	7752#	7800#	7874#	7905#
7946#	8006#	8040#	8086#	8143#	8178#	8224#	8281#	8326#	8374#	8444#	8488#	8535#

SVCSUB= 000001

SVCTAG= 000001

SVCTST= 000001

SMADDR 000334RG 002
SMNDR 052706RG 002
SMPACK 052552RG 002
SLSYR= 010000

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 302
CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

			8605#	8641#	8693#	8764#	8818#	8864#	8988#	9045#	9096#	9180#	9214#	9265#	9350#
			9387#	9433#	9494#	9552#	9607#	9689#	9741#	9792#	9872#	9904#	9959#	10033#	10143#
			10205#	10294#	10366#	10416#	10483#	10521#	10566#	10629#	10681#	10732#	10785#	10808#	10848#
			10892#	10961#	11020#	11068#	11142#	11188#	11241#	11323#	11377#	11428#	11438#	11525#	11585#
			11634#	11745#	11800#	11845#	11942#	12036#	12091#	12167#	12241#	12315#	12379#	12425#	12492#
			12566#	12626#	12680#	12766#	13015#	13154#							
TDRCNT	004001RG	002	2296#	12400	12410	12434	12448	12457	12471	12481	12501	12515	12524	12539	12552
TIMOFF	017302RG	002	4245#	4280	4283	4465	4468	4889	7187	7199					
TIMON	017264RG	002	4232#	4273	4458	7179									
TIMTST	002216RG	002	2132#	7303	7313	7335	7347	7368	7375						
TLNKAD	003165RG	002	2223#	9925	9935	9965	9979	9988	10002	10016					
TRAP4	022034RG	002	4943#	5017	5120	5272	5320								
TRNDON	002445RG	002	2159#	8061	8071	8092	8106	8113	8122	8135					
TXI =	010000 G		1711#	4358	4361										
TXIB =	000020 G		1712#	4360											
TSARGC =	000002		1430#	1431#	1432#	1433#	1434#	1435#	2917#	2922	2930#	2937	2946#	2951	2953#
			2959	2967#	2971	2980#	2984	2993#	3001	3010#	3014	3016#	3021	3029#	3037
			3046#	3050	3059#	3063	3065#	3072	3080#	3084	3086#	3091	3093#	3098	3106#
			3110	3119#	3123	3131#	3136	3144#	3148	3156#	3160	3162#	3166	3168#	3173
			3181#	3186	3194#	3199	3201#	3206	3214#	3220	3228#	3235	3243#	3248	3250#
			3255	3257#	3263	3271#	3276	3278#	3283	3285#	3291	3299#	3305	3313#	3318
			3320#	3326	3328#	3334	3342#	3346	3348#	3353	3355#	3361	3369#	3373	3375#
			3380	3382#	3388	3397#	3402	3405#	3412	3415#	3422	3431#	3435	3443#	3447
			3449#	3453	3458#	3463	3465#	3470	3483#	3487	3490#	3494	3496#	3500	3502#
			3507	3509#	3514	3516#	3521	3529#	3533	3535#	3540	3548#	3552	3554#	3560
			3568#	3572	3574#	3580	3588#	3594	3596#	3601	3603#	3608	3616#	3620	3622#
			3627	3635#	3639	3641#	3646	3648#	3653	3655#	3660	3662#	3668	3676#	3680
			3682#	3688	3690#	3695	3703#	3708	3716#	3721	3723#	3728	3736#	3741	3743#
			3747	3749#	3755	3763#	3767	3775#	3779	3787#	3791	3799#	3803	3811#	3815
			3817#	3822	3824#	3830	3838#	3842	3844#	3850	3858#	3863	3865#	3870	3872#
			3877	3879#	3884	3886#	3892	3900#	3904	3914#	3918	3922#	3926	3930#	3934
			3938#	3942	3951#	3955	3957#	3961	3963#	3967	3975#	3979	4386#	4391	4422#
			4428	4539#	4547	4554#	4558	4575#	4580	4641#	4646	4656#	4661	4669#	4674
			4684#	4689	4697#	4702	4796#	4800	4882#	4886	12977#	12982	12984#	12989	12991#
			12996	12998#	13003	13005#	13010								
			13142#	13147#											
TSEREN =	001021		1416#	5035#	5069#	5086#	5138#	5172#	5189#	5206#	5223#	5240#	5284#	5334#	5396#
			5425#	5449#	5480#	5504#	5529#	5548#	5596#	5636#	5652#	5705#	5727#	5752#	5769#
			5806#	5823#	5847#	5860#	6243#	6263#	6309#	6329#	6349#	6440#	6460#	6483#	6503#
			6544#	6561#	6578#	6670#	6690#	6717#	6737#	6765#	6775#	6844#	6852#	6872#	6893#
			6900#	6920#	6927#	6991#	7019#	7035#	7050#	7121#	7131#	7167#	7195#	7207#	7234#
			7302#	7312#	7334#	7346#	7367#	7374#	7448#	7458#	7481#	7502#	7511#	7534#	7541#
			7553#	7613#	7623#	7651#	7666#	7675#	7692#	7705#	7772#	7782#	7805#	7819#	7828#
			7847#	7861#	7922#	7930#	7952#	7966#	7975#	7992#	8060#	8070#	8091#	8105#	8112#
			8121#	8134#	8198#	8208#	8229#	8243#	8250#	8259#	8272#	8346#	8356#	8379#	8398#
			8407#	8425#	8435#	8508#	8518#	8540#	8559#	8568#	8586#	8596#	8661#	8671#	8702#
			8716#	8725#	8743#	8753#	8838#	8848#	8869#	8887#	8896#	8917#	8930#	8939#	8951#
			8960#	8969#	8979#	9065#	9075#	9105#	9119#	9128#	9151#	9165#	9234#	9244#	9274#
			9288#	9297#	9321#	9335#	9407#	9417#	9438#	9453#	9462#	9475#	9485#	9572#	9582#
			9615#	9629#	9638#	9658#	9672#	9761#	9771#	9801#	9815#	9824#	9839#	9853#	9924#
			9934#	9964#	9978#	9987#	10001#	10015#	10163#	10173#	10215#	10229#	10238#	10255#	10271#
			10285#	10386#	10396#	10425#	10448#	10456#	10467#	10541#	10551#	10571#	10587#	10596#	10610#
			10620#	10701#	10711#	10737#	10752#	10761#	10774#	10790#	10868#	10878#	10897#	10919#	10928#
			10942#	10952#	11040#	11050#	11076#	11095#	11104#	11117#	11127#	11208#	11218#	11246#	11265#
			11274#	11290#	11298#	11308#	11397#	11407#	11449#	11463#	11472#	11486#	11496#	11605#	11615#
			11648#	11662#	11671#	11688#	11703#	11714#	11728#	11820#	11830#	11859#	11873#	11882#	11896#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 303
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

TSEXCP= 000000
TSFLAG= 000040

11911#	11922#	11936#	12056#	12066#	2100#	12114#	12123#	12145#	12156#	12177#	12191#	12197#
12217#	12228#	12249#	12263#	12272#	12296#	12306#	12399#	12409#	12433#	12447#	12456#	12470#
12480#	12500#	12514#	12523#	12538#	12551#	12646#	12656#	12685#	12699#	12708#	12721#	12752#
12813#	12826#	12847#	12860#	12891#	12904#	12936#	12948#					
13142#	13146	13147#	13151									
4718#	4720	4891#	4911#	4913	4922#	4924	5400#	5756#	5810#	5851#	6247#	6313#
6444#	6487#	6548#	6674#	6694#	6721#	6741#	6876#	7023#	7109#	7125#	7135#	7171#
7291#	7306#	7316#	7338#	7350#	7437#	7452#	7462#	7485#	7506#	7515#	7602#	7617#
7627#	7655#	7670#	7679#	7709#	7761#	7776#	7786#	7809#	7823#	7832#	7865#	7956#
7970#	8049#	8064#	8074#	8095#	8116#	8125#	8187#	8202#	8212#	8233#	8254#	8263#
8335#	8350#	8360#	8383#	8402#	8411#	8497#	8512#	8522#	8544#	8563#	8572#	8650#
8665#	8675#	8706#	8720#	8729#	8827#	8842#	8852#	8873#	8891#	8900#	9054#	9069#
9079#	9109#	9123#	9132#	9169#	9223#	9238#	9248#	9278#	9292#	9301#	9339#	9396#
9411#	9421#	9442#	9457#	9466#	9561#	9576#	9586#	9619#	9633#	9642#	9676#	9750#
9765#	9775#	9805#	9819#	9828#	9857#	9913#	9928#	9938#	9968#	9982#	9991#	10019#
10152#	10167#	10177#	10219#	10233#	10242#	10375#	10390#	10400#	10429#	10452#	10530#	10545#
10555#	10575#	10591#	10600#	10690#	10705#	10715#	10741#	10756#	10765#	10794#	10857#	10872#
10882#	10901#	10923#	10932#	11029#	11044#	11054#	11080#	11099#	11108#	11197#	11212#	11222#
11250#	11269#	11278#	11386#	11401#	11411#	11453#	11467#	11476#	11594#	11609#	11619#	11652#
11666#	11675#	11732#	11809#	11824#	11834#	11863#	11877#	11886#	12045#	12060#	12070#	12104#
12118#	12127#	12181#	12201#	12253#	12267#	12276#	12388#	12403#	12413#	12437#	12451#	12460#
12504#	12518#	12527#	12542#	12635#	12650#	12660#	12689#	12703#	12712#	12725#	12756#	12790#
12796#	12817#	12830#	12851#	12864#	12895#	12908#	12940#	12952#				

TSGMAN= 000000
TSMILI= 000776
TSLAST= 000000
TSLOLI= 000000
TSLSYM= 010000

1416#												
13142#	13145	13147#	13150									
1416#												
13142#	13144	13147#	13149									
1416#	1591	2925	2941	2962	2975	2988	3005	3024	3041	3054	3075	3101
3114	3126	3139	3151	3176	3189	3209	3223	3238	3266	3294	3308	3337
3364	3391	3426	3438	3476	3524	3543	3563	3583	3611	3630	3671	3698
3711	3731	3758	3770	3782	3794	3806	3833	3853	3895	3907	3946	3970
3982	4722	4846	4863	4905	4915	4926	4947	4967	4995	5051	5095	5101
5154	5249	5255	5303	5356	5405	5557	5560	5607	5661	5711	5733	5778
5781	5866	6272	6355	6358	6512	6586	6597	6790	6936	7056	7247	7383
7562	7715	7874	8006	8143	8281	8444	8605	8764	8988	9180	9350	9494
9689	9872	10033	10294	10483	10629	10808	10961	11142	11323	11525	11745	11942
12315	12566	12766	13015	13154								

TSNEST= 177777

1416#	1420#	1582#	1590#	2915#	2924#	2928#	2940#	2944#	2961#	2965#	2974#	2978#
2987#	2991#	3004#	3008#	3023#	3027#	3040#	3044#	3053#	3057#	3074#	3078#	3100#
3104#	3113#	3117#	3125#	3129#	3138#	3142#	3150#	3154#	3175#	3179#	3188#	3192#
3208#	3212#	3222#	3226#	3237#	3241#	3265#	3269#	3293#	3297#	3307#	3311#	3336#
3340#	3363#	3367#	3390#	3394#	3425#	3429#	3437#	3441#	3475#	3479#	3523#	3527#
3542#	3546#	3562#	3566#	3582#	3586#	3610#	3614#	3629#	3633#	3670#	3674#	3697#
3701#	3710#	3714#	3730#	3734#	3757#	3761#	3769#	3773#	3781#	3785#	3793#	3797#
3805#	3809#	3832#	3836#	3852#	3856#	3894#	3898#	3906#	3910#	3945#	3949#	3969#
3973#	3981#	4716#	4721#	4733#	4740#	4749#	4845#	4860#	4862#	4872#	4904#	4909#
4914#	4920#	4925#	4943#	4946#	4962#	4966#	4988#	4994#	5015#	5024#	5050#	5054#
5059#	5074#	5077#	5091#	5094#	5100#	5118#	5127#	5153#	5157#	5162#	5177#	5180#
5194#	5197#	5211#	5214#	5228#	5231#	5245#	5248#	5254#	5270#	5302#	5318#	5326#
5349#	5355#	5377#	5382#	5404#	5409#	5414#	5430#	5442#	5454#	5468#	5485#	5497#
5509#	5518#	5534#	5537#	5553#	5556#	5559#	5582#	5587#	5601#	5606#	5626#	5629#
5641#	5645#	5657#	5660#	5689#	5691#	5710#	5714#	5732#	5736#	5760#	5774#	5777#
5780#	5802#	5865#	6222#	6224#	6229#	6251#	6254#	6268#	6271#	6275#	6288#	6317#
6320#	6334#	6354#	6357#	6398#	6401#	6406#	6448#	6451#	6465#	6468#	6491#	6494#
6508#	6511#	6515#	6520#	6552#	6555#	6566#	6585#	6596#	6637#	6641#	6678#	6681#
6698#	6701#	6725#	6728#	6745#	6751#	6780#	6789#	6821#	6827#	6858#	6867#	6932#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 304
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

6935#	6965#	6970#	6996#	7002#	7040#	7055#	7094#	7100#	7145#	7162#	7212#	7218#
7239#	7246#	7276#	7282#	7320#	7329#	7379#	7382#	7422#	7428#	7466#	7476#	7558#
7561#	7587#	7593#	7631#	7646#	7696#	7714#	7746#	7752#	7790#	7800#	7852#	7873#
7899#	7905#	7936#	7946#	8002#	8005#	8034#	8040#	8078#	8086#	8139#	8142#	8172#
8178#	8216#	8224#	8277#	8280#	8320#	8326#	8364#	8374#	8440#	8443#	8482#	8488#
8526#	8535#	8601#	8604#	8635#	8641#	8679#	8693#	8758#	8763#	8812#	8818#	8856#
8864#	8984#	8987#	9039#	9045#	9083#	9096#	9156#	9179#	9208#	9214#	9252#	9265#
9326#	9349#	9381#	9387#	9425#	9433#	9490#	9493#	9546#	9552#	9590#	9607#	9663#
9688#	9735#	9741#	9779#	9792#	9844#	9871#	9898#	9904#	9942#	9959#	10006#	10032#
10137#	10143#	10181#	10205#	10290#	10293#	10360#	10366#	10404#	10416#	10472#	10482#	10515#
10521#	10559#	10566#	10625#	10628#	10675#	10681#	10719#	10732#	10779#	10785#	10798#	10807#
10842#	10848#	10886#	10892#	10957#	10960#	11014#	11020#	11058#	11068#	11133#	11141#	11182#
11188#	11226#	11241#	11313#	11322#	11371#	11377#	11415#	11428#	11438#	11501#	11514#	11524#
11579#	11585#	11623#	11634#	11719#	11744#	11794#	11800#	11836#	11845#	11927#	11941#	12030#
12036#	12074#	12091#	12161#	12167#	12235#	12241#	12311#	12314#	12373#	12379#	12417#	12425#
12485#	12492#	12556#	12565#	12620#	12626#	12664#	12680#	12762#	12765#	12787#	13014#	13139#
13152#	13179#											
1420#	13179											
1582#	1590	2915#	2924	2928#	2940	2944#	2961	2965#	2974	2978#	2987	2991#
3004	3008#	3023	3027#	3040	3044#	3053	3057#	3074	3078#	3100	3104#	3113
3117#	3125	3129#	3138	3142#	3150	3154#	3175	3179#	3188	3192#	3208	3212#
3222	3226#	3237	3241#	3265	3269#	3293	3297#	3307	3311#	3336	3340#	3363
3367#	3390	3394#	3425	3429#	3437	3441#	3475	3479#	3523	3527#	3542	3546#
3562	3566#	3582	3586#	3610	3614#	3629	3633#	3670	3674#	3697	3701#	3710
3714#	3730	3734#	3757	3761#	3769	3773#	3781	3785#	3793	3797#	3805	3809#
3832	3836#	3852	3856#	3894	3898#	3906	3910#	3945	3949#	3969	3973#	3981
4716#	4721	4733#	4740	4749#	4845	4860#	4862	4872#	4904	4909#	4914	4920#
4925	4943#	4946	4962#	4966	4988#	4994	5015#	5100	5118#	5254	5270#	5302
5318#	5355	5377#	5559	5582#	5606	5626#	5660	5689#	5780	5802#	5865	6222#
6357	6398#	6596	6637#	6789	6821#	6935	6965#	7055	7094#	7246	7276#	7382
7422#	7561	7587#	7714	7746#	7873	7899#	8005	8034#	8142	8172#	8280	8320#
8443	8482#	8604	8635#	8763	8812#	8987	9039#	9179	9208#	9349	9381#	9493
9546#	9688	9735#	9871	9898#	10032	10137#	10293	10360#	10482	10515#	10628	10675#
10807	10842#	10960	11014#	11141	11182#	11322	11371#	11524	11579#	11744	11794#	11941
12030#	12314	12373#	12565	12620#	12765	12787#	13014	13139#	13152			
5024#	5050	5054#	5094	5127#	5153	5157#	5248	5326#	5349	5382#	5404	5409#
5556	5587#	5601	5629#	5641	5645#	5657	5691#	5710	5714#	5732	5736#	5777
6224#	6271	6275#	6354	6401#	6511	6515#	6585	6641#	6678	6681#	6698	6701#
6725	6728#	6745	6751#	6780	6827#	6858	6867#	6932	6970#	6996	7002#	7040
7100#	7145	7162#	7212	7218#	7239	7282#	7320	7329#	7379	7428#	7466	7476#
7558	7593#	7631	7646#	7696	7752#	7790	7800#	7852	7905#	7936	7946#	8002
8040#	8078	8086#	8139	8178#	8216	8224#	8277	8326#	8364	8374#	8440	8488#
8526	8535#	8601	8641#	8679	8693#	8758	8818#	8856	8864#	8984	9045#	9083
9096#	9156	9214#	9252	9265#	9326	9387#	9425	9433#	9490	9552#	9590	9607#
9663	9741#	9779	9792#	9844	9904#	9942	9959#	10006	10143#	10181	10205#	10290
10366#	10404	10416#	10472	10521#	10559	10566#	10625	10681#	10719	10732#	10779	10785#
10798	10848#	10886	10892#	10957	11020#	11058	11068#	11133	11188#	11226	11241#	11313
11377#	11415	11428#	11514	11585#	11623	11634#	11719	11800#	11836	11845#	11927	12036#
12074	12091#	12161	12167#	12235	12241#	12311	12379#	12417	12425#	12485	12492#	12556
12626#	12664	12680#	12762									
5059#	5074	5077#	5091	5162#	5177	5180#	5194	5197#	5211	5214#	5228	5231#
5245	5414#	5430	5442#	5454	5468#	5485	5497#	5509	5518#	5534	5537#	5553
5760#	5774	6229#	6251	6254#	6268	6288#	6317	6320#	6334	6406#	6448	6451#
6465	6468#	6491	6494#	6508	6520#	6552	6555#	6566	11438#	11501		
1416#												
1416#												

TSNSO = 000000
TSNS1 = 000004

TSNS2 = 000003

TSNS3 = 000003

TSPTNU = 000000
TSSAVL = 177777

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 305
CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

TSSEGL= 177777

1416#	5059#	3074#	5076	5077#	5091#	5093	5162#	5177#	5179	5180#	5194#	5196
5197#	5211#	5213	5214#	5228#	5230	5231#	5245#	5247	5326#	5349#	5351	5414#
5430#	5432	5442#	5454#	5456	5468#	5485#	5487	5497#	5509#	5511	5518#	5534#
5536	5537#	5553#	5555	5587#	5601#	5603	5629#	5641#	5643	5645#	5657#	5659
5760#	5774#	5776	6229#	6251#	6253	6254#	6268#	6270	6288#	6317#	6319	6320#
6334#	6336	6406#	6448#	6450	6451#	6465#	6467	6468#	6491#	6493	6494#	6508#
6510	6520#	6552#	6554	6555#	6566#	6568	6641#	6678#	6680	6681#	6698#	6700
6701#	6725#	6727	6728#	6745#	6747	6751#	6780#	6782	6827#	6858#	6860	6867#
6932#	6934	6970#	6996#	6998	7002#	7040#	7042	7100#	7145#	7147	7162#	7212#
7214	7218#	7239#	7241	7282#	7320#	7322	7329#	7379#	7381	7428#	7466#	7468
7476#	7558#	7560	7593#	7631#	7633	7646#	7696#	7698	7752#	7790#	7792	7800#
7852#	7854	7905#	7936#	7938	7946#	8002#	8004	8040#	8078#	8080	8086#	8139#
8141	8178#	8216#	8218	8224#	8277#	8279	8326#	8364#	8366	8374#	8440#	8442
8488#	8526#	8528	8535#	8601#	8603	8641#	8679#	8681	8693#	8758#	8760	8818#
8856#	8858	8864#	8984#	8986	9045#	9083#	9085	9096#	9156#	9158	9214#	9252#
9254	9265#	9326#	9328	9387#	9425#	9427	9433#	9490#	9492	9552#	9590#	9592
9607#	9663#	9665	9741#	9779#	9781	9792#	9844#	9846	9904#	9942#	9944	9959#
10006#	10008	10143#	10181#	10183	10205#	10290#	10292	10366#	10404#	10406	10416#	10472#
10474	10521#	10559#	10561	10566#	10625#	10627	10681#	10719#	10721	10732#	10779#	10781
10785#	10798#	10800	10848#	10886#	10888	10892#	10957#	10959	11020#	11058#	11060	11068#
11133#	11135	11188#	11226#	11228	11241#	11313#	11315	11377#	11415#	11417	11428#	11438#
11501#	11503	11514#	11516	11585#	11623#	11625	11634#	11719#	11721	11800#	11838#	11840
11845#	11927#	11929	12036#	12074#	12076	12091#	12161#	12163	12167#	12235#	12237	12241#
12311#	12313	12379#	12417#	12419	12425#	12485#	12487	12492#	12556#	12558	12626#	12664#
12666	12680#	12762#	12764									

TSSEKO= 010001

5059#	5074	5077#	5091	5162#	5177	5180#	5194	5197#	5211	5214#	5228	5231#
5245	5326#	5349	5414#	5430	5442#	5454	5468#	5485	5497#	5509	5518#	5534
5537#	5553	5587#	5601	5629#	5641	5645#	5657	5760#	5774	6229#	6251	6254#
5268	6288#	6317	6320#	6334	6406#	6448	6451#	6465	6468#	6491	6494#	6508
6520#	6552	6555#	6566	6641#	6678	6681#	6698	6701#	6725	6728#	6745	6751#
6780	6827#	6858	6867#	6932	6970#	6996	7002#	7040	7100#	7145	7162#	7212
7218#	7239	7282#	7320	7329#	7379	7428#	7466	7476#	7558	7593#	7631	7646#
7696	7752#	7790	7800#	7852	7905#	7936	7946#	8002	8040#	8078	8086#	8139
8178#	8216	8224#	8277	8326#	8364	8374#	8440	8488#	8526	8535#	8601	8641#
8679	8693#	8758	8818#	8856	8864#	8984	9045#	9083	9096#	9156	9214#	9252
9265#	9326	9387#	9425	9433#	9490	9552#	9590	9607#	9663	9741#	9779	9792#
9844	9904#	9942	9959#	10026	10143#	10181	10205#	10290	10366#	10404	10416#	10472
10521#	10559	10566#	10625	10681#	10719	10732#	10779	10785#	10798	10848#	10886	10892#
10957	11020#	11058	11068#	11133	11188#	11226	11241#	11313	11377#	11415	11428#	11514
11585#	11623	11634#	11719	11800#	11838	11845#	11927	12036#	12074	12091#	12161	12167#
12235	12241#	12311	12379#	12417	12425#	12485	12492#	12556	12626#	12664	12680#	12762

TSSEK1= 010002

TSSEK2= 000000

11438#	11501		5023#	5053#	5117#	5126#	5156#	5269#	5317#	5376#	5381#	5408#	5581#
1416#	5014#	5023#	5053#	5117#	5126#	5156#	5269#	5317#	5376#	5381#	5408#	5581#	
5625#	5688#	5690#	5713#	5735#	5801#	6221#	6223#	6274#	6397#	6400#	6514#	6636#	
6820#	6964#	7093#	7275#	7421#	7586#	7745#	7898#	8033#	8171#	8319#	8481#	8634#	
8811#	9038#	9207#	9380#	9545#	9734#	9897#	10136#	10359#	10514#	10674#	10841#	11013#	
11181#	11370#	11578#	11793#	12029#	12372#	12619#	12786#						

TSSEK3= 177777

TSSEK4= 010172

1416#	1582#	2915#	2928#	2944#	2965#	2978#	2991#	3008#	3027#	3044#	3057#	3078#
3104#	3117#	3129#	3142#	3154#	3179#	3192#	3212#	3226#	3241#	3269#	3297#	3311#
3340#	3367#	3394#	3429#	3441#	3479#	3527#	3546#	3566#	3586#	3614#	3633#	3674#
3701#	3714#	3734#	3761#	3773#	3785#	3797#	3809#	3836#	3856#	3898#	3910#	3949#
3973#	4716#	4733#	4749#	4860#	4872#	4909#	4920#	4943#	4962#	4988#	5015#	5024#
5054#	5118#	5127#	5157#	5270#	5318#	5377#	5382#	5409#	5582#	5626#	5689#	5691#
5714#	5736#	5802#	6222#	6224#	6275#	6398#	6401#	6515#	6637#	6821#	6965#	7094#
7276#	7422#	7587#	7746#	7899#	8034#	8172#	8320#	8482#	8635#	8812#	9039#	9208#

PARAMETER CODING MACY11 30A('052) 07-APR-83 17:13 PAGE 306
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

TSTEMP= 000000

9381#	9546#	9735#	9898#	10137#	10360#	10515#	10675#	10842#	11014#	11182#	11371#	11579#
11794#	12030#	12373#	12620#	12787#	13139#							
1525#	1526#	1527#	1528#	1529#	1530#	1531#	1532#	1533#	1534#	1535#	1536#	1537#
1538#	1539#	1540#	1541#	1542#	1543#	1544#	1545#	1546#	1547#	1548#	1549#	1550#
1551#	1552#	1553#	1554#	1555#	1556#	1557#	1558#	1559#	1560#	1561#	1562#	1563#
1564#	1565#	1566#	1567#	1568#	1569#	1570#	1571#	1590#	2924#	2940#	2961#	2974#
2987#	3004#	3023#	3040#	3053#	3074#	3100#	3113#	3125#	3138#	3150#	3175#	3188#
3208#	3222#	3237#	3265#	3293#	3307#	3336#	3363#	3390#	3425#	3437#	3475#	3523#
3542#	3562#	3582#	3610#	3629#	3670#	3697#	3710#	3730#	3757#	3769#	3781#	3793#
3805#	3832#	3852#	3894#	3906#	3945#	3969#	3981#	4718#	4719	4721#	4740#	4845#
4862#	4891#	4892	4904#	4911#	4912	4914#	4922#	4923	4925#	4946#	4966#	4994#
5050#	5074#	5091#	5094#	5100#	5153#	5177#	5194#	5211#	5228#	5245#	5248#	5254#
5302#	5349#	5355#	5400#	5401	5404#	5430#	5454#	5485#	5509#	5534#	5553#	5556#
5559#	5601#	5606#	5641#	5657#	5660#	5710#	5732#	5756#	5757	5774#	5777#	5780#
5810#	5811	5851#	5852	5865#	6247#	6248	6251#	6268#	6271#	6313#	6314	6317#
6334#	6354#	6357#	6444#	6445	6448#	6465#	6487#	6488	6491#	6508#	6511#	6548#
6549	6552#	6566#	6585#	6596#	6674#	6675	6678#	6694#	6695	6698#	6721#	6722
6725#	6741#	6742	6745#	6780#	6789#	6858#	6876#	6877	6932#	6935#	6996#	7023#
7024	7040#	7055#	7109#	7110	7125#	7126	7135#	7136	7145#	7171#	7172	7212#
7239#	7246#	7291#	7292	7306#	7307	7316#	7317	7320#	7338#	7339	7350#	7351
7379#	7382#	7437#	7438	7452#	7453	7462#	7463	7466#	7485#	7486	7506#	7507
7515#	7516	7558#	7561#	7602#	7603	7617#	7618	7627#	7628	7631#	7655#	7656
7670#	7671	7679#	7680	7696#	7709#	7710	7714#	7761#	7762	7776#	7777	7786#
7787	7790#	7809#	7810	7823#	7824	7832#	7833	7852#	7865#	7866	7873#	7936#
7956#	7957	7970#	7971	8002#	8005#	8049#	8050	8064#	8065	8074#	8075	8078#
8095#	8096	8116#	8117	8125#	8126	8139#	8142#	8187#	8188	8202#	8203	8212#
8213	8216#	8233#	8234	8254#	8255	8263#	8264	8277#	8280#	8335#	8336	8350#
8351	8360#	8361	8364#	8383#	8384	8402#	8403	8411#	8412	8440#	8443#	8497#
8498	8512#	8513	8522#	8523	8526#	8544#	8545	8563#	8564	8572#	8573	8601#
8604#	8650#	8651	8665#	8666	8675#	8676	8679#	8706#	8707	8720#	8721	8729#
8730	8758#	8763#	8827#	8828	8842#	8843	8852#	8853	8856#	8873#	8874	8891#
8892	8900#	8901	8984#	8987#	9054#	9055	9069#	9070	9079#	9080	9083#	9109#
9110	9123#	9124	9132#	9133	9156#	9169#	9170	9179#	9223#	9224	9238#	9239
9248#	9249	9252#	9278#	9279	9292#	9293	9301#	9302	9326#	9339#	9340	9349#
9396#	9397	9411#	9412	9421#	9422	9425#	9442#	9443	9457#	9458	9466#	9467
9490#	9493#	9561#	9562	9576#	9577	9586#	9587	9590#	9619#	9620	9633#	9634
9642#	9643	9663#	9676#	9677	9688#	9750#	9751	9765#	9766	9775#	9776	9779#
9805#	9806	9819#	9820	9828#	9829	9844#	9857#	9858	9871#	9913#	9914	9928#
9929	9938#	9939	9942#	9968#	9969	9982#	9983	9991#	9992	10006#	10019#	10020
10032#	10152#	10153	10167#	10168	10177#	10178	10181#	10219#	10220	10233#	10234	10242#
10243	10290#	10293#	10375#	10376	10390#	10391	10400#	10401	10404#	10429#	10430	10452#
10453	10472#	10482#	10530#	10531	10545#	10546	10555#	10556	10559#	10575#	10576	10591#
10592	10600#	10601	10625#	10628#	10690#	10691	10705#	10706	10715#	10716	10719#	10741#
10742	10756#	10757	10765#	10766	10779#	10794#	10795	10798#	10807#	10857#	10858	10872#
10873	10882#	10883	10886#	10901#	10902	10923#	10924	10932#	10933	10957#	10960#	11029#
11030	11044#	11045	11054#	11055	11058#	11080#	11081	11099#	11100	11108#	11109	11133#
11141#	11197#	11198	11212#	11213	11222#	11223	11226#	11250#	11251	11269#	11270	11278#
11279	11313#	11322#	11386#	11387	11401#	11402	11411#	11412	11415#	11453#	11454	11467#
11468	11476#	11477	11501#	11514#	11524#	11594#	11595	11609#	11610	11619#	11620	11623#
11652#	11653	11666#	11667	11675#	11676	11719#	11732#	11733	11744#	11809#	11810	11824#
11825	11834#	11835	11838#	11863#	11864	11877#	11878	11886#	11887	11927#	11941#	12045#
12046	12060#	12061	12070#	12071	12074#	12104#	12105	12118#	12119	12127#	12128	12161#
12181#	12182	12201#	12202	12235#	12253#	12254	12267#	12268	12276#	12277	12311#	12314#
12388#	12389	12403#	12404	12413#	12414	12417#	12437#	12438	12451#	12452	12460#	12461
12485#	12504#	12505	12518#	12519	12527#	12528	12542#	12543	12556#	12565#	12635#	12636
12650#	12651	12660#	12661	12664#	12689#	12690	12703#	12704	12712#	12713	12725#	12726

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 307
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

TSTEST= 000056

TSTSTM= 177777

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13147#	13152#	13179#										
1416#	5014#	5023	5053	5117#	5126	5156	5269#	5317#	5376#	5381	5408	5581#
5625#	5688#	5690	5713	5755	5801#	6221#	6223	6274	6397#	6400	6514	6636#
6820#	6964#	7093#	7275#	7421#	7586#	7745#	7898#	8033#	8171#	8319#	8481#	8634#
8811#	9038#	9207#	9380#	9545#	9734#	9897#	10136#	10359#	10514#	10674#	10841#	11013#
11181#	11370#	11578#	11793#	12029#	12372#	12619#	12786#					
1416#	2921	2925	2936	2941	2950	2958	2962	2970	2975	2983	2988	3000
3005	3013	3020	3024	3036	3041	3049	3054	3062	3071	3075	3083	3090
3097	3101	3109	3114	3122	3126	3135	3139	3147	3151	3159	3165	3172
3176	3185	3189	3198	3205	3209	3219	3223	3234	3238	3247	3254	3262
3266	3275	3282	3290	3294	3304	3308	3317	3325	3333	3337	3345	3352
3360	3364	3372	3379	3387	3391	3401	3411	3421	3426	3434	3438	3446
3452	3462	3469	3476	3486	3493	3499	3506	3513	3520	3524	3532	3539
3543	3551	3559	3563	3571	3579	3583	3593	3600	3607	3611	3619	3626
3630	3638	3645	3652	3659	3667	3671	3679	3687	3694	3698	3707	3711
3720	3727	3731	3740	3746	3754	3758	3766	3770	3778	3782	3790	3794
3802	3806	3814	3821	3829	3833	3841	3849	3853	3862	3869	3876	3883
3891	3895	3903	3907	3917	3925	3933	3941	3946	3954	3960	3966	3970
3978	3982	4234	4248	4277	4390	4427	4462	4546	4557	4579	4645	4660
4673	4688	4701	4722	4755	4760	4775	4780	4785	4791	4799	4813	4823
4842	4846	4863	4885	4891	4905	4915	4926	5020	5024	5034	5039	5042
5045	5047	5051	5054	5059	5068	5075	5077	5085	5092	5095	5098	5101
5123	5127	5137	5142	5145	5148	5150	5154	5157	5162	5171	5178	5180
5188	5195	5197	5205	5212	5214	5222	5229	5231	5239	5246	5249	5252
5255	5275	5283	5288	5291	5294	5296	5299	5303	5323	5326	5333	5338
5341	5344	5346	5350	5353	5356	5382	5395	5400	5405	5409	5414	5424
5431	5442	5448	5455	5468	5479	5486	5497	5503	5510	5518	5528	5535
5537	5547	5554	5557	5560	5587	5595	5602	5607	5629	5635	5642	5645
5651	5658	5661	5691	5704	5711	5714	5726	5733	5736	5751	5756	5760
5768	5775	5778	5781	5805	5810	5822	5846	5851	5859	5866	6224	6229
6242	6247	6252	6254	6262	6269	6272	6275	6288	6308	6313	6318	6320
6328	6335	6348	6355	6358	6401	6406	6439	6444	6449	6451	6459	6466
6468	6482	6487	6492	6494	6502	6509	6512	6515	6520	6543	6548	6553
6555	6560	6567	6577	6586	6597	6641	6669	6674	6679	6681	6689	6694
6699	6701	6716	6721	6726	6728	6736	6741	6746	6751	6764	6774	6781
6790	6827	6843	6851	6859	6867	6871	6876	6892	6899	6919	6926	6933
6936	6970	6976	6990	6997	7002	7009	7018	7023	7034	7041	7044	7049
7056	7100	7109	7120	7125	7130	7135	7142	7146	7162	7166	7171	7182
7194	7206	7213	7218	7233	7240	7247	7282	7291	7301	7306	7311	7316
7321	7329	7333	7338	7345	7350	7366	7373	7380	7383	7428	7437	7447
7452	7457	7462	7467	7476	7480	7485	7501	7506	7510	7515	7533	7540
7552	7559	7562	7593	7602	7612	7617	7622	7627	7632	7646	7650	7655
7665	7670	7674	7679	7691	7697	7704	7709	7715	7752	7761	7771	7776
7781	7786	7791	7800	7804	7809	7818	7823	7827	7832	7846	7853	7860
7865	7874	7905	7921	7929	7937	7946	7951	7956	7965	7970	7974	7991
8003	8006	8040	8049	8059	8064	8069	8074	8079	8086	8090	8095	8104
8111	8116	8120	8125	8133	8140	8143	8178	8187	8197	8202	8207	8212
8217	8224	8228	8233	8242	8249	8254	8258	8263	8271	8278	8281	8326
8335	8345	8350	8355	8360	8365	8374	8378	8383	8397	8402	8406	8411
8424	8434	8441	8444	8488	8497	8507	8512	8517	8522	8527	8535	8539
8544	8558	8563	8567	8572	8585	8595	8602	8605	8641	8650	8660	8665
8670	8675	8680	8693	8701	8706	8715	8720	8724	8729	8742	8752	8759
8764	8818	8827	8837	8842	8847	8852	8857	8864	8868	8873	8886	8891
8895	8900	8916	8929	8938	8950	8959	8968	8978	8985	8988	9045	9054

9064	9069	9074	9079	9084	9096	9104	9109	9118	9123	9127	9132	9150	
9157	9164	9169	9180	9214	9223	9233	9238	9243	9248	9253	9265	9273	
9278	9287	9292	9296	9301	9320	9327	9334	9339	9350	9387	9396	9406	
9411	9416	9421	9426	9433	9437	9442	9452	9457	9461	9466	9474	9484	
9491	9494	9552	9561	9571	9576	9581	9586	9591	9607	9614	9619	9628	
9633	9637	9642	9657	9664	9671	9676	9689	9741	9750	9760	9765	9770	
9775	9780	9792	9800	9805	9814	9819	9823	9828	9838	9845	9852	9857	
9872	9904	9913	9923	9928	9933	9938	9943	9959	9963	9968	9977	9982	
9986	9991	10000	10007	10014	10019	10033	10143	10152	10162	10167	10172	10177	
10182	10205	10214	10219	10228	10233	10237	10242	10254	10270	10284	10291	10294	
10366	10375	10385	10390	10395	10400	10405	10416	10424	10429	10447	10452	10455	
10466	10473	10483	10521	10530	10540	10545	10550	10555	10560	10566	10570	10575	
10586	10591	10595	10600	10609	10619	10626	10629	10681	10690	10700	10705	10710	
10715	10720	10732	10736	10741	10751	10756	10760	10765	10773	10780	10785	10789	
10794	10799	10808	10848	10857	10867	10872	10877	10882	10887	10892	10896	10901	
10918	10923	10927	10932	10941	10951	10958	10961	11020	11029	11039	11044	11049	
11054	11059	11068	11075	11080	11094	11099	11103	11108	11116	11126	11134	11142	
11188	11197	11207	11212	11217	11222	11227	11241	11245	11250	11264	11269	11273	
11278	11289	11297	11307	11314	11323	11377	11386	11396	11401	11406	11411	11416	
11428	11438	11448	11453	11462	11467	11471	11476	11485	11495	11502	11515	11525	
11585	11594	11604	11609	11614	11619	11624	11634	11647	11652	11661	11666	11670	
11675	11687	11702	11713	11720	11727	11732	11745	11800	11809	11819	11824	11829	
11834	11839	11845	11858	11863	11872	11877	11881	11886	11895	11910	11921	11928	
11935	11942	12036	12045	12055	12060	12065	12070	12075	12091	12099	12104	12113	
12118	12122	12127	12144	12155	12162	12167	12176	12181	12190	12196	12201	12216	
12227	12236	12241	12248	12253	12262	12267	12271	12276	12295	12305	12312	12315	
12379	12388	12398	12403	12408	12413	12418	12425	12432	12437	12446	12451	12455	
12460	12469	12479	12486	12492	12499	12504	12513	12518	12522	12527	12537	12542	
12550	12557	12566	12626	12635	12645	12650	12655	12660	12665	12680	12684	12689	
12698	12703	12707	12712	12720	12725	12751	12756	12763	12766	12790	12796	12812	
12817	12825	12830	12846	12851	12859	12864	12890	12895	12903	12908	12935	12940	
12947	12952	12981	12988	12995	13002	13009	13015						
TSTSTS= 000001	1416#	5015#	5118#	5270#	5318#	5377#	5582#	5626#	5689#	5802#	6222#	6398#	6637#
	6821#	6965#	7094#	7276#	7422#	7587#	7746#	7899#	8034#	8172#	8320#	8482#	8635#
	8812#	9039#	9208#	9381#	9546#	9735#	9898#	10137#	10360#	10515#	10675#	10842#	11014#
	11182#	11371#	11579#	11794#	12030#	12373#	12620#	12787#					
TSSAU = 010072	4920#	4922	4925										
TSSAUT= 010067	4860#	4862											
TSSCLE= 010070	4872#	4891	4904										
TSSDU = 010071	4909#	4911	4914										
TSSHAR= 010171	13139#	13153											
TSSHW = 010000	1582#	1590											
TSSINI= 010066	4749#	4845											
TSSMSG= 010063	2915#	2924	2928#	2940	2944#	2961	2965#	2974	2978#	2987	2991#	3004	3008#
	3023	3027#	3040	3044#	3053	3057#	3074	3078#	3100	3104#	3113	3117#	3125
	3129#	3138	3142#	3150	3154#	3175	3179#	3188	3192#	3208	3212#	3222	3226#
	3237	3241#	3265	3269#	3293	3297#	3307	3311#	3336	3340#	3363	3367#	3390
	3394#	3425	3429#	3437	3441#	3475	3479#	3523	3527#	3542	3546#	3562	3566#
	3582	3586#	3610	3614#	3629	3633#	3670	3674#	3697	3701#	3710	3714#	3730
	3734#	3757	3761#	3769	3773#	3781	3785#	3793	3797#	3805	3809#	3832	3836#
	3852	3856#	3894	3898#	3906	3910#	3945	3949#	3969	3973#	3981		
TSSPRO= 010065	4733#												
TSSRPT= 010064	4716#	4718	4721										
TSSSEG= 010001	5059#	5074#	5077#	5091#	5162#	5177#	5180#	5194#	5197#	5211#	5214#	5228#	5231#
	5245#	5326#	5349#	5414#	5430#	5442#	5454#	5468#	5485#	5497#	5509#	5518#	5534#
	5537#	5553#	5587#	5601#	5629#	5641#	5645#	5657#	5760#	5774#	6229#	6251#	6254#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 309
CZUAAB.MAC 07-APP-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

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6520#	6552#	6555#	6566#	6641#	6678#	6681#	6698#	6701#	6725#	6728#	6745#	6751#
6780#	6827#	6858#	6867#	6932#	6970#	6996#	7002#	7040#	7100#	7145#	7162#	7212#
7218#	7239#	7282#	7320#	7329#	7379#	7428#	7466#	7476#	7558#	7593#	7631#	7646#
7696#	7752#	7790#	7800#	7852#	7905#	7936#	7946#	8002#	8040#	8078#	8086#	8139#
8178#	8216#	8224#	8277#	8326#	8364#	8374#	8440#	8488#	8526#	8535#	8601#	8641#
8679#	8693#	8758#	8818#	8856#	8864#	8984#	9045#	9083#	9096#	9156#	9214#	9252#
9265#	9326#	9387#	9425#	9433#	9490#	9552#	9590#	9607#	9663#	9711#	9779#	9792#
9844#	9904#	9942#	9959#	10006#	10143#	10181#	10205#	10290#	10366#	10404#	10416#	10472#
10521#	10559#	10566#	10625#	10681#	10719#	10732#	10779#	10785#	10798#	10848#	10886#	10892#
10957#	11020#	11058#	11068#	11133#	11188#	11226#	11241#	11313#	11377#	11415#	11428#	11438#
11501#	11514#	11585#	11623#	11634#	11719#	11800#	11838#	11845#	11927#	12036#	12074#	12091#
12161#	12167#	12235#	12241#	12311#	12379#	12417#	12425#	12485#	12492#	12556#	12626#	12664#
12680#	12762#											
4943#	4946	4962#	4966	4988#	4994							
5024#	5050	5054#	5094	5127#	5153	5157#	5248	5382#	5404	5409#	5556	5691#
5710	5714#	5732	5736#	5777	6224#	6271	6275#	6354	6401#	6511	6515#	6585
5015#	5100	5118#	5254	5270#	5302	5318#	5355	5377#	5400	5559	5582#	5606
5626#	5660	5689#	5756	5780	5802#	5810	5851	5865	6222#	6247	6313	6357
6398#	6444	6487	6548	6596	6637#	6674	6694	6721	6741	6789	6821#	6876
6935	6965#	7023	7055	7094#	7109	7125	7135	7171	7246	7276#	7291	7306
7316	7338	7350	7382	7422#	7437	7452	7462	7485	7506	7515	7561	7587#
7602	7617	7627	7655	7670	7679	7709	7714	7746#	7761	7776	7786	7809
7823	7832	7865	7873	7899#	7956	7970	8005	8034#	8049	8064	8074	8095
8116	8125	8142	8172#	8187	8202	8212	8233	8254	8263	8280	8320#	8335
8350	8360	8383	8402	8411	8443	8482#	8497	8512	8522	8544	8563	8572
8604	8635#	8650	8665	8675	8706	8720	8729	8763	8812#	8827	8842	8852
8873	8891	8900	8987	9039#	9054	9069	9079	9109	9123	9132	9169	9179
9208#	9223	9238	9248	9278	9292	9301	9339	9349	9381#	9396	9411	9421
9442	9457	9466	9493	9546#	9561	9576	9586	9619	9633	9642	9676	9688
9735#	9750	9765	9775	9805	9819	9828	9857	9871	9898#	9913	9928	9938
9968	9982	9991	10019	10032	10137#	10152	10167	10177	10219	10233	10242	10293
10360#	10375	10390	10400	10429	10452	10482	10515#	10530	10545	10555	10575	10591
10600	10628	10675#	10690	10705	10715	10741	10756	10765	10794	10807	10842#	10857
10872	10882	10901	10923	10932	10960	11014#	11029	11044	11054	11080	11099	11108
11141	11182#	11197	11212	11222	11250	11269	11278	11322	11371#	11386	11401	11411
11453	11467	11476	11524	11579#	11594	11609	11619	11652	11666	11675	11732	11744
11794#	11809	11824	11834	11863	11877	11886	11941	12030#	12045	12060	12070	12104
12118	12127	12181	12201	12253	12267	12276	12314	12373#	12388	12403	12413	12437
12451	12460	12504	12518	12527	12542	12565	12620#	12635	12650	12660	12689	12703
12712	12725	12756	12765	12787#	12790	12796	12817	12830	12851	12864	12895	12908
12940	12952	13014										

TSSSRV= 010075
TSSSUB= 010125
TSSTES= 010170

T1	022076RG	002	1525	5014#
T1.1	022124R	002	5023#	
T1.2	022202R	002	5053#	
T10	027124RG	002	1534	6221#
T10.1	027124R	002	6223#	
T10.2	027256R	002	6274#	
T11	027540RG	002	1535	6397#
T11.1	027544R	002	6400#	6593
T11.2	030076R	002	6514#	
T12	030326RG	002	1536	6636#
T13	031006RG	002	1537	6820#
T14	031424RG	002	1538	6964#
T15	031714RG	002	1539	7093#
T16	032422RG	002	1540	7275#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 312
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- USER SYMBOLS

SNOP	001405RG	002	2054#	5749	6988										
SNSET	001277RG	002	2037#	4535	5393	5422	5747	5818	6238	6304	6435	6478	6539	6665	6712
			6760	6839	6986	7116	7157	7297	7443	7608	7767	7917	8055	8193	8341
			8503	8656	8833	9060	9229	9402	9567	9756	9919	10158	10391	10536	10696
			10863	11035	11203	11392	11600	11815	12051	12394	12641	12808	12842	12886	12931
SPARER	001502RG	002	2067#	6914											
SPATCH	053366RG	002	13167#												
SPCEI	000747RG	002	1859	1979#	4349										
SPCTO	001107RG	002	1869	2001#											
SPDNOM	001417RG	002	2057#												
SRCEI	001010RG	002	1855	1987#	4377										
SRESET	001440RG	002	2061#												
SRMTC	001120RG	002	1865	2003#											
SRSET	001054RG	002	1850	1995#											
SRXI	000760RG	002	1858	1981#	4356										
SSERI	000736RG	002	1860	1977#	4342										
SSET	001307RG	002	2039#												
SSLFT	001373RG	002	2052#	5820											
SSTOP	001433RG	002	2060#												
SSTRT	001411RG	002	2055#												
STXI	000770RG	002	1857	1983#	4363										
XPWR	001065RG	002	1877	1997#	5545										
.	= 000000R	012	1937#	2900#	4719	4892	4901#	4912	4923	5401	5757	5811	5852	6248	6314
			6445	6488	6549	6675	6695	6722	6742	6877	7024	7110	7126	7136	7172
			7292	7307	7317	7339	7351	7438	7453	7463	7486	7507	7516	7603	7618
			7628	7656	7671	7680	7710	7762	7777	7787	7810	7824	7833	7866	7957
			7971	8050	8065	8075	8096	8117	8126	8188	8203	8213	8234	8255	8264
			8336	8351	8361	8384	8403	8412	8498	8513	8523	8545	8564	8573	8651
			8666	8676	8707	8721	8730	8828	8843	8853	8874	8892	8901	9055	9070
			9080	9110	9124	9133	9170	9224	9239	9249	9279	9293	9302	9340	9397
			9412	9422	9443	9458	9467	9562	9577	9587	9620	9634	9643	9677	9751
			9766	7776	9806	9820	9829	9858	9914	9929	9939	9969	9983	9992	10020
			10153	10168	10178	10220	10234	10243	10376	10391	10401	10430	10453	10531	10546
			10556	10576	10592	10601	10691	10706	10716	10742	10757	10766	10795	10858	10873
			10883	10902	10924	10933	11030	11045	11055	11081	11100	11109	11198	11213	11223
			11251	11270	11279	11387	11402	11412	11454	11468	11477	11595	11610	11620	11653
			11667	11676	11733	11810	11825	11835	11864	11878	11887	12046	12061	12071	12105
			12119	12128	12182	12202	12254	12268	12277	12389	12404	12414	12438	12452	12461
			12505	12519	12528	12543	12636	12651	12661	12690	12704	12713	12726	12757	12791
			12797	12818	12831	12852	12865	12896	12909	12941	12953	13065#	13166#	13167#	

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 315
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

ENDHRD	1#	1416#	13151												
ENDHW	1#	1416#	1589												
ENDINI	1#	1416#	4844												
ENDMOD	1#	1416#	13178												
ENDMSG	1#	1416#	2923	2939	2960	2973	2986	3003	3022	3039	3052	3073	3099	3112	3124
	3137	3149	3174	3187	3207	3221	3236	3264	3292	3306	3335	3362	3389	3424	3436
	3474	3522	3541	3561	3581	3609	3628	3669	3696	3709	3729	3756	3768	3780	3792
	3804	3831	3851	3893	3905	3944	3968	3980							
ENDPRO	1#	1416#	4739												
ENDPTA	1#	1416#													
ENDRPT	1#	1416#	4720												
ENDSEG	1#	1416#	5073	5090	5176	5193	5210	5227	5244	5348	5429	5453	5484	5508	5533
	5552	5600	5640	5656	5773	6250	6267	6316	6333	6447	6464	6490	6507	6551	6565
	6677	6697	6724	6744	6779	6857	6931	6995	7039	7144	7211	7238	7319	7378	7465
	7557	7630	7695	7789	7851	7935	8001	8077	8138	8215	8276	8363	8439	8525	8600
	8678	8757	8855	8983	9082	9155	9251	9325	9424	9489	9589	9662	9778	9843	9941
	10005	10180	10289	10403	10471	10558	10624	10718	10778	10797	10885	10956	11057	11132	11225
	11312	11414	11500	11513	11622	11718	11837	11926	12073	12160	12234	12310	12416	12484	12555
	12663	12761													
ENDSET	1#	1416#													
ENDSFT	1#	1416#													
ENDSRV	1#	1416#	4945	4965	4993										
ENDSUB	1#	1416#	5049	5093	5152	5247	5403	5555	5709	5731	5776	6270	6353	6510	6584
ENDSW	1#	1416#													
ENDTST	1#	1416#	5099	5253	5301	5354	5558	5605	5659	5779	5864	6356	6595	6788	6934
	7054	7245	7381	7560	7713	7872	8004	8141	8279	8442	8603	8762	8986	9178	9348
	9492	9687	9870	10031	10292	10481	10627	10806	10959	11140	11321	11523	11743	11940	12313
	12564	12764	13013												
EQUALS	1#	1416#	1602												
ERRDF	1#	1416#	5033	5136	5282	5332									
ERRHRD	1#	1416#	5067	5084	5170	5187	5204	5221	5238	5394	5423	5447	5478	5502	5527
	5546	5594	5634	5650	5703	5725	5750	5767	5804	5821	5845	5858	6241	6261	6307
	6327	6347	6438	6458	6481	6501	6542	6559	6576	6668	6688	6715	6735	6763	6773
	6842	6850	6870	6891	6898	6918	6925	6989	7017	7033	7048	7119	7129	7165	7193
	7205	7232	7300	7310	7332	7344	7365	7372	7446	7456	7479	7500	7509	7532	7539
	7551	7611	7621	7649	7664	7673	7690	7703	7770	7780	7803	7817	7826	7845	7859
	7920	7928	7950	7964	7973	7990	8058	8068	8089	8103	8110	8119	8132	8196	8206
	8227	8241	8248	8257	8270	8344	8354	8377	8396	8405	8423	8433	8506	8516	8538
	8557	8566	8584	8594	8659	8669	8700	8714	8723	8741	8751	8836	8846	8867	8885
	8894	8915	8928	8937	8949	8958	8967	8977	9063	9073	9103	9117	9126	9149	9163
	9232	9242	9272	9286	9295	9319	9333	9405	9415	9436	9451	9460	9473	9483	9570
	9580	9613	9627	9636	9656	9670	9759	9769	9799	9813	9822	9837	9851	9922	9932
	9962	9976	9985	9999	10013	10161	10171	10213	10227	10236	10253	10269	10283	10384	10394
	10423	10446	10454	10465	10539	10549	10569	10585	10594	10608	10618	10699	10709	10735	10750
	10759	10772	10788	10866	10876	10895	10917	10926	10940	10950	11038	11048	11074	11093	11102
	11115	11125	11206	11216	11244	11263	11272	11288	11296	11306	11395	11405	11447	11461	11470
	11484	11494	11603	11613	11646	11660	11669	11686	11701	11712	11726	11818	11828	11857	11871
	11880	11894	11909	11920	11934	12054	12064	12098	12112	12121	12143	12154	12175	12189	12195
	12215	12226	12247	12261	12270	12294	12304	12397	12407	12431	12445	12454	12468	12478	12498
	12512	12521	12536	12549	12644	12654	12683	12697	12706	12719	12750	12811	12824	12845	12858
	12889	12902	12934	12946											
ERROR	1#	1416#													
ERRSF	1#	1416#													
ERRSOF	1#	1416#													
ERRTBL	1#	1416#													
ESCAPE	1#	1416#	5399	5755	5809	5850	6246	6312	6443	6486	6547	6673	6693	6720	6740

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 316
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

	6875	7022	7108	7124	7134	7170	7290	7305	7315	7337	7349	7436	7451	7461	7484
	7505	7514	7601	7616	7626	7654	7669	7678	7708	7760	7775	7785	7808	7822	7831
	7864	7955	7969	8048	8063	8073	8094	8115	8124	8186	8201	8211	8232	8253	8262
	8334	8349	8359	8382	8401	8410	8496	8511	8521	8543	8562	8571	8649	8664	8674
	8705	8719	8728	8826	8841	8851	8872	8890	8899	9053	9068	9078	9108	9122	9131
	9168	9222	9237	9247	9277	9291	9300	9338	9395	9410	9420	9441	9456	9465	9560
	9575	9585	9618	9632	9641	9675	9749	9764	9774	9804	9818	9827	9856	9912	9927
	9937	9967	9981	9990	10018	10151	10166	10176	10218	10232	10241	10374	10389	10399	10428
	10451	10529	10544	10554	10574	10590	10599	10689	10704	10714	10740	10755	10764	10793	10856
	10871	10881	10900	10922	10931	11028	11043	11053	11079	11098	11107	11196	11211	11221	11249
	11268	11277	11385	11400	11410	11452	11466	11475	11593	11608	11618	11651	11665	11674	11731
	11808	11823	11833	11862	11876	11885	12044	12059	12069	12103	12117	12126	12180	12200	12252
	12266	12275	12387	12402	12412	12436	12450	12459	12503	12517	12526	12541	12634	12649	12659
	12688	12702	12711	12724	12755	12795	12816	12829	12850	12863	12894	12907	12939	12951	
EXIT	1#	1416#	4717	4890	4910	4921	12789								
FEQUAL	1#	1416#													
GETBYT	1#	1416#													
GETPRI	1#	1416#													
GETWOR	1#	1416#													
GMANIA	1#	1416#													
GMANID	1#	1416#													
GMANIL	1#	1416#													
GPHARD	1#	1416#	4821												
GPRMA	1#	1416#	13141	13146											
GPRMD	1#	1416#													
GPRML	1#	1416#													
HEADER	1#	1416#	1428												
INLOOP	1#	1416#													
IOSETU	1#	1416#													
IOSTAR	1#	1416#													
KT11	1#	1416#													
LASTAD	1#	1416#													
MANUAL	1#	1416#													
MEMORY	1#	1416#	4784												
MSBYTE	1#	1416#	1429#	1435	1436	1437									
MSCHEC	1#	1416#	4718#	4891#	4911#	4922#	12790#								
MSCNTO	1#	1416#	13142#	13147#											
MSCOUN	1#	1416#	2917#	2930#	2946#	2953#	2967#	2980#	2993#	3010#	3016#	3029#	3046#	3059#	3065#
	3080#	3086#	3093#	3106#	3119#	3131#	3144#	3156#	3162#	3168#	3181#	3194#	3201#	3214#	3228#
	3243#	3250#	3257#	3271#	3278#	3285#	3299#	3313#	3320#	3328#	3342#	3348#	3355#	3369#	3375#
	3382#	3397#	3405#	3415#	3431#	3443#	3449#	3458#	3465#	3483#	3490#	3496#	3502#	3509#	3516#
	3529#	3535#	3548#	3554#	3568#	3574#	3588#	3596#	3603#	3616#	3622#	3635#	3641#	3648#	3655#
	3662#	3676#	3682#	3690#	3703#	3716#	3723#	3736#	3743#	3749#	3763#	3775#	3787#	3799#	3811#
	3817#	3824#	3838#	3844#	3858#	3865#	3872#	3879#	3886#	3900#	3914#	3922#	3930#	3938#	3951#
	3957#	3963#	3975#	4386#	4422#	4539#	4554#	4575#	4641#	4656#	4669#	4684#	4697#	4796#	4882#
	12977#	12984#	12991#	12998#	13005#										
MSDATA	1#	1416#	1429#	1438	1440	1442	1444	1446	1448	1450	1452	1454	1456	1458	1460
	1462	1464	1466	1468#	1470	1472	1475	1478	1480	1482	1484	1486	1488	1490	1492
	1494	1496	1498	1500	1502	1504	1506	1508	1510	1512	1962#	1970#			
MSDECR	1#	1416#	1590#	2924#	2940#	2961#	2974#	2987#	3004#	3023#	3040#	3053#	3074#	3100#	3113#
	3125#	3138#	3150#	3175#	3188#	3208#	3222#	3237#	3265#	3293#	3307#	3336#	3363#	3390#	3425#
	3437#	3475#	3523#	3542#	3562#	3582#	3610#	3629#	3670#	3697#	3710#	3730#	3757#	3769#	3781#
	3793#	3805#	3832#	3852#	3894#	3906#	3945#	3969#	3981#	4721#	4740#	4845#	4862#	4904#	4914#
	4925#	4946#	4966#	4994#	5050#	5074#	5091#	5094#	5100#	5153#	5177#	5194#	5211#	5228#	5245#
	5248#	5254#	5302#	5349#	5355#	5404#	5430#	5454#	5485#	5509#	5534#	5553#	5556#	5559#	5601#
	5606#	5641#	5657#	5660#	5710#	5732#	5774#	5777#	5780#	5865#	6251#	6268#	6271#	6317#	6334#

	6354#	6357#	6448#	6465#	6491#	6508#	6511#	6552#	6566#	6585#	6596#	6678#	6698#	6725#	6745#
	6780#	6789#	6858#	6932#	6935#	6996#	7040#	7055#	7145#	7212#	7239#	7246#	7320#	7379#	7382#
	7466#	7558#	7561#	7631#	7696#	7714#	7790#	7852#	7873#	7936#	8002#	8005#	8078#	8139#	8142#
	8216#	8277#	8280#	8364#	8440#	8443#	8526#	8601#	8604#	8679#	8758#	8763#	8856#	8984#	8987#
	9083#	9156#	9179#	9252#	9326#	9349#	9425#	9490#	9493#	9590#	9663#	9688#	9779#	9844#	9871#
	9942#	10006#	10032#	10181#	10290#	10293#	10404#	10472#	10482#	10559#	10625#	10628#	10719#	10779#	10798#
	10807#	10886#	10957#	10960#	11058#	11133#	11141#	11226#	11313#	11322#	11415#	11501#	11514#	11524#	11623#
	11719#	11744#	11838#	11927#	11941#	12074#	12161#	12235#	12311#	12314#	12417#	12485#	12556#	12565#	12664#
	12762#	12765#	13014#	13152#	13179#										
MSDEFA	1#	1416#	13142#	13147#											
MSENDE	1#	1416#	1590#	2924#	2940#	2961#	2974#	2987#	3004#	3023#	3040#	3053#	3074#	3100#	3113#
	3125#	3138#	3150#	3175#	3188#	3208#	3222#	3237#	3265#	3293#	3307#	3336#	3363#	3390#	3425#
	3437#	3475#	3523#	3542#	3562#	3582#	3610#	3629#	3670#	3697#	3710#	3730#	3757#	3769#	3781#
	3793#	3805#	3832#	3852#	3894#	3906#	3945#	3969#	3981#	4721#	4845#	4862#	4904#	4914#	4925#
	4946#	4966#	4994#	5050#	5074#	5091#	5094#	5100#	5153#	5177#	5194#	5211#	5228#	5245#	5248#
	5254#	5302#	5349#	5355#	5404#	5430#	5454#	5485#	5509#	5534#	5553#	5556#	5559#	5601#	5606#
	5641#	5657#	5660#	5710#	5732#	5774#	5777#	5780#	5865#	6251#	6268#	6271#	6317#	6334#	6354#
	6357#	6448#	6465#	6491#	6508#	6511#	6552#	6566#	6585#	6596#	6678#	6698#	6725#	6745#	6780#
	6789#	6858#	6932#	6935#	6996#	7040#	7055#	7145#	7212#	7239#	7246#	7320#	7379#	7382#	7466#
	7558#	7561#	7631#	7696#	7714#	7790#	7852#	7873#	7936#	8002#	8005#	8078#	8139#	8142#	8216#
	8277#	8280#	8364#	8440#	8443#	8526#	8601#	8604#	8679#	8758#	8763#	8856#	8984#	8987#	9083#
	9156#	9179#	9252#	9326#	9349#	9425#	9490#	9493#	9590#	9663#	9688#	9779#	9844#	9871#	9942#
	10006#	10032#	10181#	10290#	10293#	10404#	10472#	10482#	10559#	10625#	10628#	10719#	10779#	10798#	10807#
	10886#	10957#	10960#	11058#	11133#	11141#	11226#	11313#	11322#	11415#	11501#	11514#	11524#	11623#	11719#
	11744#	11838#	11927#	11941#	12074#	12161#	12235#	12311#	12314#	12417#	12485#	12556#	12565#	12664#	12762#
	12765#	13014#	13152#	13179#											
MSERRI	1#	1416#	5034#	5068#	5085#	5137#	5171#	5188#	5205#	5222#	5239#	5283#	5333#	5395#	5424#
	5448#	5479#	5503#	5528#	5547#	5595#	5635#	5651#	5704#	5726#	5751#	5768#	5805#	5822#	5846#
	5859#	6242#	6262#	6308#	6328#	6348#	6439#	6459#	6482#	6502#	6543#	6560#	6577#	6669#	6689#
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	7120#	7130#	7166#	7194#	7206#	7233#	7301#	7311#	7333#	7345#	7366#	7373#	7447#	7457#	7480#
	7501#	7510#	7533#	7540#	7552#	7612#	7622#	7650#	7665#	7674#	7691#	7704#	7771#	7781#	7804#
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	8120#	8133#	8197#	8207#	8228#	8242#	8249#	8258#	8271#	8345#	8355#	8378#	8397#	8406#	8424#
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	9852#	9923#	9933#	9963#	9977#	9986#	10000#	10014#	10162#	10172#	10214#	10228#	10237#	10254#	10284#
	10284#	10385#	10395#	10424#	10447#	10455#	10466#	10540#	10550#	10570#	10586#	10595#	10609#	10619#	10670#
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	11049#	11075#	11094#	11103#	11116#	11126#	11207#	11217#	11245#	11264#	11273#	11289#	11297#	11307#	11396#
	11406#	11448#	11462#	11471#	11485#	11495#	11604#	11614#	11647#	11661#	11670#	11687#	11702#	11713#	11727#
	11819#	11829#	11858#	11872#	11881#	11895#	11910#	11921#	11935#	12055#	12065#	12099#	12113#	12122#	12144#
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	12812#	12825#	12846#	12859#	12890#	12903#	12935#	12947#							
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	7710	7761#	7762	7776#	7777	7786#	7787	7809#	7810	7823#	7824	7832#	7833	7865#	7866
	7956#	7957	7970#	7971	8049#	8050	8064#	8065	8074#	8075	8095#	8096	8116#	8117	8125#
	8126	8187#	8188	8202#	8203	8212#	8213	8233#	8234	8254#	8255	8263#	8264	8335#	8336
	8350#	8351	8360#	8361	8383#	8384	8402#	8403	8411#	8412	8497#	8498	8512#	8513	8522#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 318
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

8523	8544#	8545	8563#	8564	8572#	8573	8650#	8651	8665#	8666	8675#	8676	8706#	8707	
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9223#	9224	9238#	9239	9248#	9249	9278#	9279	9292#	9293	9301#	9302	9339#	9340	9396#	
9397	9411#	9412	9421#	9422	9442#	9443	9457#	9458	9466#	9467	9561#	9562	9576#	9577	
9586#	9587	9619#	9620	9633#	9634	9642#	9643	9676#	9677	9750#	9751	9765#	9766	9775#	
9776	9805#	9806	9819#	9820	9828#	9829	9857#	9858	9913#	9914	9928#	9929	9938#	9939	
9968#	9969	9982#	9983	9991#	9992	10019#	10020	10152#	10153	10167#	10168	10177#	10178	10219#	
10220	10233#	10234	10242#	10243	10375#	10376	10390#	10391	10400#	10401	10429#	10430	10452#	10453	
10530#	10531	10545#	10546	10555#	10556	10575#	10576	10591#	10592	10600#	10601	10690#	10691	10705#	
10706	10715#	10716	10741#	10742	10756#	10757	10765#	10766	10794#	10795	10857#	10858	10872#	10873	
10882#	10883	10901#	10902	10923#	10924	10932#	10933	11029#	11030	11044#	11045	11054#	11055	11080#	
11061	11099#	11100	11108#	11109	11197#	11198	11212#	11213	11222#	11223	11250#	11251	11269#	11270	
11278#	11279	11386#	11387	11401#	11402	11411#	11412	11453#	11454	11467#	11468	11476#	11477	11594#	
11595	11609#	11610	11619#	11620	11652#	11653	11666#	11667	11675#	11676	11732#	11733	11809#	11810	
11824#	11825	11834#	11835	11863#	11864	11877#	11878	11886#	11887	12045#	12046	12060#	12061	12070#	
12071	12104#	12105	12118#	12119	12127#	12128	12181#	12182	12201#	12202	12253#	12254	12267#	12268	
12276#	12277	12388#	12389	12403#	12404	12413#	12414	12437#	12438	12451#	12452	12460#	12461	12504#	
12505	12518#	12519	12527#	12528	12542#	12543	12635#	12636	12650#	12651	12660#	12661	12689#	12690	
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3150#	3154#	3175#	3179#	3188#	3192#	3208#	3212#	3222#	3226#	3237#	3241#	3265#	3269#	3293#	
3297#	3307#	3311#	3336#	3340#	3363#	3367#	3390#	3394#	3425#	3429#	3437#	3441#	3475#	3479#	
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3832#	3836#	3852#	3856#	3894#	3898#	3906#	3910#	3945#	3949#	3969#	3973#	3981#	4716#	4721#	
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5194#	5211#	5228#	5245#	5248#	5254#	5269#	5302#	5317#	5349#	5355#	5376#	5381#	5404#	5408#	
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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 319
CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

Table with 16 columns of macro names (e.g., 6566#, 6585#, 6596#, etc.) and labels (MSGEMB, MSGETS, MSGETT, MSGNGB, MSGNIN) on the left side. The table lists cross-referenced macro names across various categories.

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 320
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

1487	1488#	1489	1490#	1491	1492#	1493	1494#	1495	1496#	1497	1498#	1499	1500#	1501
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2983#	2984	2988#	2993#	2994#	2995#	2996#	2997#	2998#	2999	3000#	3001	3005#	3010#	3011#
3012	3013#	3014	3016#	3017#	3018#	3019	3020#	3021	3024#	3029#	3030#	3031#	3032#	3033#
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3063	3065#	3066#	3067#	3068#	3069#	3070	3071#	3072	3075#	3080#	3081#	3082	3083#	3084
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3108	3109#	3110	3114#	3119#	3120#	3121	3122#	3123	3126#	3131#	3132#	3133#	3134	3135#
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3235	3238#	3243#	3244#	3245#	3246	3247#	3248	3250#	3251#	3252#	3253	3254#	3255	3257#
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3847#	3848	3849#	3850	3853#	3858#	3859#	3860#	3861	3862#	3863	3865#	3866#	3867#	3868
3869#	3870	3872#	3873#	3874#	3875	3876#	3877	3879#	3880#	3881#	3882	3883#	3884	3886#
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4698#	4699#	4700	4701#	4702	4718#	4719#	4722#	4754#	4755#	4757#	4759#	4760#	4763#	4774#

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 321
CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

4775#	4777#	4779#	4780#	4782#	4785#	4786#	4790#	4791#	4792#	4794#	4796#	4797#	4798	4799#
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4906#	4967	4994#	4995	5016#	5017#	5018#	5019#	5020#	5021	5024#	5034#	5035#	5036#	5037#
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67PARAMETER CODING MACV11 30A(1052) 07-APR-83 17:13 PAGE 322
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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9152#	9153#	9157#	9164#	9165#	9166#	9167#	9169#	9170#	9180#	9214#	9223#	9224#	9233#	9234#
9235#	9236#	9238#	9239#	9243#	9244#	9245#	9246#	9248#	9249#	9253#	9265#	9273#	9274#	9275#
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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 323
CZUAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 324
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 325
 CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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MSMLO	1#	1416#													
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9942#	10006#	10032#	10181#	10290#	10293#	10404#	10472#	10482#	10559#	10625#	10628#	10719#	10779#	10798#
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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 327
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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	3394#	3429#	3441#	3479#	3527#	3546#	3566#	3586#	3614#	3633#	3674#	3701#	3714#	3734#	3761#						
	3773#	3785#	3797#	3809#	3836#	3856#	3878#	3910#	3949#	3973#	4715#	4733#	4749#	4860#	4872#						
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	5197#	5214#	5231#	5270#	5318#	5326#	5377#	5382#	5409#	5414#	5442#	5468#	5497#	5518#	5537#						
	5582#	5587#	5626#	5629#	5645#	5689#	5691#	5714#	5736#	5760#	5802#	6222#	6224#	6229#	6254#						
	6275#	6288#	6320#	6398#	6401#	6406#	6451#	6468#	6494#	6515#	6520#	6553#	6637#	6641#	6681#						
	6701#	6728#	6751#	6821#	6827#	6867#	6965#	6970#	7002#	7094#	7100#	7162#	7218#	7276#	7282#						
	7329#	7422#	7428#	7476#	7587#	7593#	7646#	7746#	7752#	7800#	7899#	7905#	7946#	8034#	8040#						
	8086#	8172#	8178#	8224#	8320#	8326#	8374#	8482#	8488#	8535#	8635#	8641#	8693#	8812#	8818#						
	8864#	9039#	9045#	9096#	9208#	9214#	9265#	9381#	9387#	9433#	9546#	9552#	9607#	9735#	9741#						
	9792#	9898#	9904#	9959#	10137#	10143#	10205#	10360#	10366#	10416#	10515#	10521#	10566#	10675#	10681#						
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	3266	3271#	3275	3278#	3282	3285#	3290	3293#	3294	3299#	3304	3307#	3308	3313#	3317						
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	4575#	4579	4641#	4645	4656#	4660	4669#	4673	4684#	4688	4697#	4701	4718#	4721#	4722						
	4754#	4755	4759#	4760	4774#	4775	4779#	4780	4785#	4790#	4791	4796#	4799	4809#	4813						
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57PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 328
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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6679	6681#	6689	6694#	6698#	6699	6701#	6716	6721#	6725#	6726	6728#	6736	6741#	6745#
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7002#	7008#	7009	7018	7023#	7034	7040#	7041	7043#	7044	7049	7055#	7056	7100#	7109#
7120	7125#	7130	7135#	7138#	7142	7145#	7146	7162#	7166	7171#	7181#	7182	7194	7206
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7321	7329#	7333	7338#	7345	7350#	7366	7373	7379#	7380	7382#	7383	7428#	7437#	7447
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7781	7786#	7790#	7791	7800#	7804	7809#	7818	7823#	7827	7832#	7846	7852#	7853	7860
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8281	8326#	8335#	8345	8350#	8355	8360#	8364#	8365	8374#	8378	8383#	8397	8402#	8406
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8535#	8539	8544#	8558	8563#	8567	8572#	8585	8595	8601#	8602	8604#	8605	8641#	8650#
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9150	9156#	9157	9164	9169#	9179#	9180	9214#	9223#	9233	9238#	9243	9248#	9252#	9253
9265#	9273	9278#	9287	9292#	9296	9301#	9320	9326#	9327	9334	9339#	9349#	9350	9387#
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11126	11133#	11134	11141#	11142	11188#	11197#	11207	11212#	11217	11222#	11226#	11227	11241#	11245
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12437#	12446	12451#	12455	12460#	12469	12479	12485#	12486	12492#	12499	12504#	12513	12518#	12522
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	13015														
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67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 330
 CZUAA8.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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	12557#	12566#	12626#	12635#	12645#	12650#	12655#	12660#	12665#	12680#	12684#	12689#	12698#	12703#	12707#
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	12859#	12864#	12890#	12895#	12903#	12908#	12935#	12940#	12947#	12952#	12981#	12988#	12995#	13002#	13009#
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	7350#	7366#	7373#	7380#	7383#	7428#	7437#	7447#	7452#	7457#	7462#	7467#	7476#	7480#	7485#
	7501#	7506#	7510#	7515#	7533#	7540#	7552#	7559#	7562#	7593#	7602#	7612#	7617#	7622#	7627#
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57PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 331
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

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10720#	10732#	10736#	10741#	10751#	10756#	10760#	10765#	10773#	10780#	10785#	10789#	10794#	10799#	10808#	
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	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564
	1565	1566	1567	1568	1569	1570	4718#	4891#	4911#	4922#	5034#	5035	5036	5037	5068#
	5069	5070	5071	5085#	5086	5087	5088	5137#	5138	5139	5140	5171#	5172	5173	5174
	5188#	5189	5190	5191	5205#	5206	5207	5208	5222#	5223	5224	5225	5239#	5240	5241
	5242	5283#	5284	5285	5286	5333#	5334	5335	5336	5395#	5396	5397	5398	5424#	5425
	5426	5427	5448#	5449	5450	5451	5479#	5480	5481	5482	5503#	5504	5505	5506	5526#
	5529	5530	5531	5547#	5548	5549	5550	5595#	5596	5597	5598	5635#	5636	5637	5638
	5651#	5652	5653	5654	5704#	5705	5706	5707	5726#	5727	5728	5729	5751#	5752	5753
	5754	5768#	5769	5770	5771	5805#	5806	5807	5808	5822#	5823	5824	5825	5846#	5847
	5848	5849	5859#	5860	5861	5862	6242#	6243	6244	6245	6262#	6263	6264	6265	6308#
	6309	6310	6311	6328#	6329	6330	6331	6348#	6349	6350	6351	6439#	6440	6441	6442
	6459#	6460	6461	6462	6482#	6483	6484	6485	6502#	6503	6504	6505	6543#	6544	6545
	6546	6560#	6561	6562	6563	6577#	6578	6579	6580	6669#	6670	6671	6672	6689#	6690
	6691	6692	6716#	6717	6718	6719	6736#	6737	6738	6739	6764#	6765	6766	6767	6774#
	6775	6776	6777	6843#	6844	6845	6846	6851#	6852	6853	6854	6871#	6872	6873	6874
	6892#	6893	6894	6895	6899#	6900	6901	6902	6919#	6920	6921	6922	6926#	6927	6928
	6929	6990#	6991	6992	6993	7018#	7019	7020	7021	7034#	7035	7036	7037	7049#	7050
	7051	7052	7120#	7121	7122	7123	7130#	7131	7132	7133	7166#	7167	7168	7169	7194#
	7195	7196	7197	7206#	7207	7208	7209	7233#	7234	7235	7236	7301#	7302	7303	7304
	7311#	7312	7313	7314	7333#	7334	7335	7336	7345#	7346	7347	7348	7366#	7367	7368
	7369	7373#	7374	7375	7376	7447#	7448	7449	7450	7457#	7458	7459	7460	7480#	7481
	7482	7483	7501#	7502	7503	7504	7510#	7511	7512	7513	7533#	7534	7535	7536	7540#
	7541	7542	7543	7552#	7553	7554	7555	7612#	7613	7614	7615	7622#	7623	7624	7625
	7650#	7651	7652	7653	7665#	7666	7667	7668	7674#	7675	7676	7677	7691#	7692	7693

7694	7704#	7705	7706	7707	7771#	7772	7773	7774	7781#	7782	7783	7784	7804#	7805
7806	7807	7818#	7819	7820	7821	7827#	7828	7829	7930	7846#	7847	7848	7819	7860#
7861	7862	7863	7921#	7922	7923	7924	7929#	7930	7931	7932	7951#	7952	7953	7954
7965#	7966	7967	7968	7974#	7975	7976	7977	7991#	7992	7993	7994	8059#	8060	8061
8062	8069#	8070	8071	8072	8090#	80y1	8092	8093	8104#	8105	8106	8107	8111#	8112
8113	8114	8120#	8121	8122	8123	8133#	8134	8135	8136	8197#	8198	8199	8200	8207#
8208	8209	8210	8228#	8229	8230	8231	8242#	8243	8244	8245	8249#	8250	8251	8252
8258#	8259	8260	8261	8271#	8272	8273	8274	8345#	8346	8347	8348	8355#	8356	8357
8358	8378#	8379	8380	8381	8397#	8398	8399	8400	8406#	8407	8408	8409	8424#	8425
8426	8427	8434#	8435	8436	8437	8507#	8508	8509	8510	8517#	8518	8519	8520	8539#
8540	8541	8542	8558#	8559	8560	8561	8567#	8568	8569	8570	8585#	8586	8587	8588
8595#	8596	8597	8598	8660#	8661	8662	8663	8670#	8671	8672	8673	8701#	8702	8703
8704	8715#	8716	8717	8718	8724#	8725	8726	8727	8742#	8743	8744	8745	8752#	8753
8754	8755	8837#	8838	8839	8840	8847#	8848	8849	8850	8868#	8869	8870	8871	8886#
8887	8888	8889	8895#	8896	8897	8898	8916#	8917	8918	8919	8929#	8930	8931	8932
8938#	8939	8940	8941	8950#	8951	8952	8953	8959#	8960	8961	8962	8966#	8969	8970
8971	8978#	8979	8980	8981	9064#	9065	9066	9067	9074#	9075	9076	9077	9104#	9105
9106	9107	9118#	9119	9120	9121	9127#	9128	9129	9130	9150#	9151	9152	9153	9164#
9165	9166	9167	9233#	9234	9235	9236	9243#	9244	9245	9246	9273#	9274	9275	9276
9287#	9288	9289	9290	9296#	9297	9298	9299	9320#	9321	9322	9323	9334#	9335	9336
9337	9406#	9407	9408	9409	9416#	9417	9418	9419	9437#	9438	9439	9440	9452#	9453
9454	9455	9461#	9462	9463	9464	9474#	9475	9476	9477	9484#	9485	9486	9487	9571#
9572	9573	9574	9581#	9582	9583	9584	9614#	9615	9616	9617	9628#	9629	9630	9631
9637#	9638	9639	9640	9657#	9658	9659	9660	9671#	9672	9673	9674	9760#	9761	9762
9763	9770#	9771	9772	9773	9800#	9801	9802	9803	9814#	9815	9816	9817	9823#	9824
9825	9826	9838#	9839	9840	9841	9852#	9853	9854	9855	9923#	9924	9925	9926	9933#
9934	9935	9936	9963#	9964	9965	9966	9977#	9978	9979	9980	9986#	9987	9988	9989
10000#	10001	10002	10003	10014#	10015	10016	10017	10162#	10163	10164	10165	10172#	10173	10174
10175	10214#	10215	10216	10217	10228#	10229	10230	10231	10237#	10238	10239	10240	10254#	10255
10256	10257	10270#	10271	10272	10273	10284#	10285	10286	10287	10385#	10386	10387	10388	10395#
10396	10397	10398	10424#	10425	10426	10427	10447#	10448	10449	10450	10455#	10456	10457	10458
10466#	10467	10468	10469	10540#	10541	10542	10543	10550#	10551	10552	10553	10570#	10571	10572
10573	10586#	10587	10588	10589	10595#	10596	10597	10598	10609#	10610	10611	10612	10619#	10620
10621	10622	10700#	10701	10702	10703	10710#	10711	10712	10713	10736#	10737	10738	10739	10751#
10752	10753	10754	10760#	10761	10762	10763	10773#	10774	10775	10776	10789#	10790	10791	10792
10867#	10868	10869	10870	10877#	10878	10879	10880	10896#	10897	10898	10899	10918#	10919	10920
10921	10927#	10928	10929	10930	10941#	10942	10943	10944	10951#	10952	10953	10954	11039#	11040
11041	11042	11049#	11050	11051	11052	11075#	11076	11077	11078	11094#	11095	11096	11097	11103#
11104	11105	11106	11116#	11117	11118	11119	11126#	11127	11128	11129	11207#	11208	11209	11210
11217#	11218	11219	11220	11245#	11246	11247	11248	11264#	11265	11266	11267	11273#	11274	11275
11276	11289#	11290	11291	11292	11297#	11298	11299	11300	11307#	11308	11309	11310	11396#	11397
11398	11399	11406#	11407	11408	11409	11448#	11449	11450	11451	11462#	11463	11464	11465	11471#
11472	11473	11474	11485#	11486	11487	11488	11495#	11496	11497	11498	11604#	11605	11606	11607
11614#	11615	11616	11617	11647#	11648	11649	11650	11661#	11662	11663	11664	11670#	11671	11672
11673	11687#	11688	11689	11690	11702#	11703	11704	11705	11713#	11714	11715	11716	11727#	11728
11729	11730	11819#	11820	11821	11822	11829#	11830	11831	11832	11858#	11859	11860	11861	11872#
11873	11874	11875	11881#	11882	11883	11884	11895#	11896	11897	11898	11910#	11911	11912	11913
11921#	11922	11923	11924	11935#	11936	11937	11938	12055#	12056	12057	12058	12065#	12066	12067
12068	12099#	12100	12101	12102	12113#	12114	12115	12116	12122#	12123	12124	12125	12144#	12145
12146	12147	12155#	12156	12157	12158	12176#	12177	12178	12179	12190#	12191	12192	12193	12196#
12197	12198	12199	12216#	12217	12218	12219	12227#	12228	12229	12230	12248#	12249	12250	12251
12262#	12263	12264	12265	12271#	12272	12273	12274	12295#	12296	12297	12298	12305#	12306	12307
12308	12398#	12399	12400	12401	12408#	12409	12410	12411	12432#	12433	12434	12435	12446#	12447
12448	12449	12455#	12456	12457	12458	12469#	12470	12471	12472	12479#	12480	12481	12482	12499#
12500	12501	12502	12513#	12514	12515	12516	12522#	12523	12524	12525	12537#	12538	12539	12540
12550#	12551	12552	12553	12645#	12646	12647	12648	12655#	12656	12657	12658	12684#	12685	12686

67PARAMETER CODING MACY11 30A(1052) 07-APR-83 17:13 PAGE 333
CZUAAB.MAC 07-APR-83 17:03 CROSS REFERENCE TABLE -- MACRO NAMES

	12687	12698#	12699	12700	12701	12707#	12708	12709	12710	12720#	12721	12722	12723	12751#	12752
	12753	12754	12790#	12812#	12813	12814	12815	12825#	12826	12827	12828	12846#	12847	12848	12849
	12859#	12860	12861	12862	12890#	12891	12892	12893	12903#	12904	12905	12906	12935#	12936	12937
	12938	12947#	12948	12949	12950	13142#	13147#								
MSXFER	1#	1416#													
OPEN	1#	1416#													
POINTE	1#	1416#	1426												
PRINT#	1#	1416#	2916	2929	2945	2952	2966	2979	2992	3009	3015	3028	3045	3058	3064
	3079	3085	3092	3105	3118	3130	3143	3155	3161	3167	3180	3193	3200	3213	3227
	3242	3249	3256	3270	3277	3284	3298	3312	3319	3327	3341	3347	3354	3368	3374
	3381	3396	3404	3414	3430	3442	3448	3457	3464	3482	3489	3495	3501	3508	3515
	3528	3534	3547	3553	3567	3573	3587	3595	3602	3615	3621	3634	3640	3647	3654
	3661	3675	3681	3689	3702	3715	3722	3735	3742	3748	3762	3774	3786	3798	3810
	3816	3823	3837	3843	3857	3864	3871	3878	3885	3899	3913	3921	3929	3937	3950
	3956	3962	3974	12976	12983	12990	12997	13004							
PRINTF	1#	1416#	4385	4538	4553	4574	4640	4655	4668	4683	4696	4795	4881		
PRINTS	1#	1416#													
PRINTX	1#	1416#	4421												
READBU	1#	1416#													
READEF	1#	1416#	4753	4758	4773	4778									
RFLAGS	1#	1416#													
SETPRI	1#	1416#	4232	4246	7007	7180									
SETVEC	1#	1416#	4808	5015	5118	5270	5318	6971	7137						
SLASH	1#	1416#													
STARS	1#	1416#													
SVC	1#	1416#													
XFER	1#	1416#	4718#	4891#	4911#	4922#	12790#								
XFERF	1#	1416#													
XFERT	1#	1416#													
. ABS.	000000	000													
	000000	001													
UNAREP	053566	002													
MICRA	000000	003													
MICRB	000000	004													
MICRC	000000	005													
MICRD	000000	006													
MICRE	000000	007													
MICRF	000000	010													
MICRG	000000	011													
NOMORE	000000	012													

ERRORS DETECTED: 0
% DEFAULT GLOBALS GENERATED: 15

CZUAAB.OBJ,CZUAAB.LST/CR/SOL/ML:TOC=SVC34R.P11,CZUAAB.MAC
RUN-TIME: 72 86 10 SECONDS
RUN-TIME RATIO: 215/168=1.2
CORE USED: 31K (61 PAGES)

68SVC.MLB SOURCE FILE MACY11 30A(1052) 07-APR-83 16:48 PAGE 2
 MICROA.MAC 07-APR-83 16:06

```

1
2
3      .TITLE  MICROA - MICROCODE MODULE A
4      000000'
5      .CSECT  MICRA
6      .SBTTL  REGISTER DEFINITIONS USED BY THE T11
7
8      02100C      IPCSR0      =      21000      ;INTERNAL PCSRO ADDRESS
9      021002      DMACSR      =      21002      ;DMA ENGINE CONTROL STATUS REGISTER
10     021004      DMATO       =      21004      ;DMA ENGINE TO ADDRESS REGISTER #0
11     021006      DMAT1       =      21006      ;DMA ENGINE TO ADDRESS REGISTER #1
12     021010      MDMA0       =      21010      ;MICROCPU DMA TO ADDRESS REGISTER #0
13     021012      MDMA1       =      21012      ;MICROCPU DMA TO ADDRESS REGISTER #1
14     021014      MDMPRO      =      21014      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
15     021016      MDMAR1      =      21016      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
16     021020      IPCSR1      =      21020      ;INTERNAL PCSR1 ADDRESS
17     021022      DMAF        =      21022      ;DMA ENGINE FROM ADDRESS REGISTER
18     021024      DMAWC       =      21024      ;DMA ENGINE WORD COUNT REGISTER
19     021026      MDMAW0      =      21026      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
20     021030      LTAC        =      21030      ;LINK TRANSMIT ADDRESS COUNTER REGISTER
21     021032      LFRBUF      =      21032      ;LINK RECIEVE BUFFER ADDRESS FIFO
22     021034      CLRFIF      =      21034      ;CLEAR FIFO
23     021036      MDMAW1      =      21036      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
24     021040      PCSRSW      =      21040      ;SWITCH PACK REGISTER
25     021042      MDMSR       =      21042      ;MICROCPU DMA STATUS REGISTER
26     021044      LRBUF       =      21044      ;LINK RECIEVE BUFFER COMPLETED
27     021060      PHYAD0      =      21060      ;PHYSICAL ADDRESS ROM BYTE 0
28     021062      PHYAD1      =      21062      ;PHYSICAL ADDRESS ROM BYTE 1
29     021064      PHYAD2      =      21064      ;PHYSICAL ADDRESS ROM BYTE 2
30     021066      PHYAD3      =      21066      ;PHYSICAL ADDRESS ROM BYTE 3
31     021070      PHYAD4      =      21070      ;PHYSICAL ADDRESS ROM BYTE 4
32     021072      PHYAD5      =      21072      ;PHYSICAL ADDRESS ROM BYTE 5
33
34     .SBTTL  OTHER DEFINITIONS USED BY THE MICROCODE
35
36     100000      BIT15       =      100000
37     040000      BIT14       =      40000
38     020000      BIT13       =      20000
39     010000      BIT12       =      10000
40     004000      BIT11       =      4000
41     002000      BIT10       =      2000
42     001000      BIT9        =      1000
43     000400      BIT8        =      400
44     000200      BIT7        =      200
45     000100      BIT6        =      100
46     000040      BIT5        =      40
47     000020      BIT4        =      20
48     000010      BIT3        =      10
49     000004      BIT2        =      4
50     000002      BIT1        =      2
51     000001      BIT0        =      1
52
53     012400      LASFTP      =      BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN
54     000340      PRI07       =      340
55     000300      PRI06       =      300
56     000240      PRI05       =      240

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76MICROA - MICROCODE MODULE A
MICROA.MAC 07-APR-83 16:06

MACY11 3GA(1052) 07-APR-83 16:48 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

57	000200	PRI04 =	200	
58	000140	PRI03 =	140	
59	000100	PRI02 =	100	
60	000040	PRI01 =	40	
61	000000	PRI00 =	0	
62		:		
63		:PCSR0 - PORT CONTROL STATUS REGISTER 0		
64		:		
65	100000	SERI =	BIT15	
66	040000	PCEI =	BIT14	
67	020000	RXI =	BIT13	
68	010000	TXI =	BIT12	
69	004000	DNI =	BIT11	
70	002000	RCEI =	BIT10	
71	000400	FATI =	BIT8	
72		:		
73	000134	SANVEC=	134	:VECTOR ADDRESS FOR THE SANITY TIMER
74	000150	NXMVEC=	150	:VECTOR ADDRESS FOR THE NON-EXISTANT MEMORY TIMEOUT
75	000064	CSRVEC=	64	:VECTOR ADDRESS FOR CSR WRITE INTERRUPT
76	000114	DMAVEC=	114	:VECTOR ADDRESS FOR DMA DONE INTERRUPT
77	000140	PARVEC=	140	:VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
78	000150	NXMVEC=	150	:VECTOR ADDRESS FOR NON-EXISTANT UNIBUS ADDRESS
79	001000	STACK=	1000	:STACK LOCATION
80	000001	INMON=	1	:IN MICROMONITOR STATE *** FOR ASSEMBLY WITH MACY11
81	000002	INTST=	2	:IN A TEST STATE *** THESE THREE VARIABLES MUST
82	000003	INERR=	3	:IN ERROR STATE *** BE CHANGED TO LOCAL(I.E.=)
83	000001	CSRFLG=	BIT0	:CSR WRITE INTERRUPT OCCURED
84	000002	ERRFLG=	BIT1	:UNEXPECTED ERROR OCCURED
85	000004	PARFLG=	BIT2	:PARITY ERROR OCCURED
86	000010	NXMFLG=	BIT3	:NON-EXISTANT MEMORY ERROR OCCURRED
87	020000	SIZ4K=	20000	:4K WORDS
88	040000	SIZ8K=	SIZ4K*2	:8K WORDS
89	020000	WCSSIZ=	SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
90	020000	IOSIZ=	SIZ4K	:SIZE OF I/O PAGE
91	040000	ROMSIZ=	SIZ8K	:SIZE OF ROM
92	077774	LINSIZ=	SIZ8K*2-4	:SIZE OF LINK MEMORY
93	000000	WCSADR=	0	:BASE ADDRESS OF WCS
94	020000	IOADR=	WCSADR+WCSIZ	:BASE ADDRESS OF I/O PAGE
95	040000	ROMADR=	IOADR+IOSIZ	:BASE ADDRESS OF ROM
96	100000	LINADR=	ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
97	000000	DATERR=	0	:FLAG INDICATING DATA ERROR OCCURRED
98	000001	ADRERR=	1	:FLAG INDICATING ADDRESS ERROR OCCURRED
99	000002	PARERR=	2	:FLAG INDICATING PARITY ERROR OCCURRED
100	177774	MODREG=	LINADR+LINSIZ	:LINK MODE REGISTER
101	177774	ADREG=	MODREG	:LINK STATION ADDRESS RAM REGISTER
102	177776	CMREG=	MODREG+2	:LINK COMMAND REGISTER
103				

76MICROA - MICROCODE MODULE A
MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 4
OTHER DEFINITIONS USED BY THE MICROCODE

104
105
106
107
108
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110
111
112
113
114
115
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118
119
120
121
122

.SBTTL A_MODULE MICROCODE

: THIS MODULE CONTAINS MICROCODE THAT IS USED FOR THE LOAD AND START
: FUNCTION TEST

000000' 106427 000340
000004' 012737 012402 021020
000012' 012737 004000 021000
000020' 000777
000022' 000024
000001

MICROA::MTPS #PRI07 ;DISABLE INTERRUPTS
MOV #LASFTP!INTST,@#IPCSR1 ;SET TEST PATTERN AND IN TEST STATE BITS
MOV #DNI,@#IPCSRO ;SET DONE BIT
BR . ;HANG HERE UNTIL HOST RESETS US

MICASZ::MICASZ-MICROA+2 ;SIZE OF MICROCODE MODULE A
.END

76MICROA - MICROCODE MODULE A
 MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 6
 CROSS REFERENCE TABLE -- USER SYMBOLS

ADDREG=	177774	101#		
ADRERR=	000001	98#		
BIT0 =	000001	51#	83	
BIT1 =	000002	50#	84	
BIT10 =	002000	41#	53	70
BIT11 =	004000	40#	69	
BIT12 =	010000	39#	53	68
BIT13 =	020000	38#	67	
BIT14 =	040000	37#	66	
BIT15 =	100000	36#	65	
BIT2 =	000004	49#	85	
BIT3 =	000010	48#	86	
BIT4 =	000020	47#		
BIT5 =	000040	46#		
BIT6 =	000100	45#		
BIT7 =	000200	44#		
BIT8 =	000400	43#	53	71
BIT9 =	001000	42#		
CLRFIF=	021034	22#		
CMDREG=	177776	102#		
CSRFLG=	000001	83#		
CSRVEC=	000064	75#		
DATERR=	000000	97#		
DMACSR=	021002	9#		
DMAF =	021022	17#		
DMATO =	021004	10#		
DMAT1 =	021006	11#		
DMAVEC=	000114	76#		
DMAVC =	021024	18#		
DNI =	004000	69#	118	
ERRFLG=	000002	84#		
FATI =	000400	71#		
INERR =	000003	82#		
INON =	000001	80#		
INTST =	000002	81#	117	
IQADR =	020000	94#	95	
IOSIZ =	020000	90#	95	
IPCSRO=	021000	8#	118*	
IPCSR1=	021020	16#	117*	
LASFTP=	012400	53#	117	
LFRBUF=	021032	21#		
LINADR=	100000	96#	100	
LINSIZ=	077774	92#	100	
LRFUF =	021044	26#		
LTAC =	021030	20#		
MDPAR0=	021014	14#		
MDPAR1=	021016	15#		
MDPAR0=	021026	19#		
MDPAR1=	021036	23#		
MDPAR0 =	021010	12#		
MDPAR1 =	021012	13#		
MDRSR =	021042	25#		
MICASZ	000022RG	002	121#	
MICROA	000000RG	002	116#	121
MODREG=	177774	100#	101	102
NXPFLG=	000010	86#		

76MICROA - MICROCODE MODULE A
MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 7
CROSS REFERENCE TABLE -- USER SYMBOLS

NXNVEC= 000150	74#	78#		
PARERR= 000002	99#			
PARFLG= 000004	85#			
PARVEC= 000140	77#			
PCEI = 040000	66#			
PCSRW= 021040	24#			
PHYAD0= 021060	27#			
PHYAD1= 021062	28#			
PHYAD2= 021064	29#			
PHYAD3= 021066	30#			
PHYAD4= 021070	31#			
PHYAD5= 021072	32#			
PRI00 = 000000	61#			
PRI01 = 000040	60#			
PRI02 = 000100	59#			
PRI03 = 000140	58#			
PRI04 = 000200	57#			
PRI05 = 000240	56#			
PRI06 = 000300	55#			
PRI07 = 000340	54#	116#		
RCEI = 002000	70#			
ROMADR= 040000	95#	96		
ROMSIZ= 040000	91#	96		
RXI = 020000	67#			
SANVEC= 000134	73#			
SERI = 100000	65#			
SIZ4K = 020000	87#	88	89	90
SIZ8K = 040000	88#	91	92	
STACK = 001000	79#			
TXI = 010000	68#			
WCSADR= 000000	93#	94		
WCSSIZ= 020000	89#	94		
. = 000024R	002	119		

76MICROA - MICROCODE MODULE A
MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 9
CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	10
BERROR	10
BGNAU	10
BGNAUT	10
BCICLN	10
BGNDU	10
BGNHRD	10
BGNHW	10
BGNINI	10
BGNMOD	10
BGNMSG	10
BGNPRO	10
BGNPTA	10
BGNRPT	10
BGNSEG	10
BGNSET	10
BGNSFT	10
BGNSRV	10
BGNSUB	10
BGNSU	10
BGNTST	10
BNCOMP	10
BNERRO	10
BREAK	10
BRESET	10
CKLOOP	10
CLOCK	10
CLOSE	10
CLVEC	10
COMEN	10
DELAY	10
DESCR	10
DEVTYP	10
DISPAT	10
DISPLA	10
DOCLN	10
DODU	10
DORPT	10
ENDAU	10
ENDAUT	10
ENDCLN	10
ENDCOM	10
ENDDU	10
ENDHRD	10
ENDHW	10
ENDINI	10
ENDMOD	10
ENDMSG	10
ENDPRO	10
ENDPTA	10
ENDRPT	10
ENDSEG	10
ENDSET	10
ENDSFT	10
ENDSRV	10
ENDSUB	10

77MICROA - MICROCODE MODULE A
 MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 10
 CROSS REFERENCE TABLE -- MACRO NAMES

ENDSY	10
ENDTST	10
EQUALS	10
ERRDF	10
ERRHRD	10
ERROR	10
ERRSF	10
ERRSOF	10
ERRTBL	10
ESCAPE	10
EXIT	10
FEQUAL	10
GETBYT	10
GETPRI	10
GETWOR	10
GMANIA	10
GMANID	10
GMANIL	10
GPHARD	10
GPRMA	10
GPRMD	10
GPRML	10
HEADER	10
INLOOP	10
IOSETU	10
IOSTAR	10
KT11	10
LASTAD	10
MANUAL	10
MEMORY	10
MSBYTE	10
MSCHEC	10
MSCNTO	10
MSCOUN	10
MSDATA	10
MSDECR	10
MSDEFA	10
MSBENDE	10
MSBERRI	10
MSBESCA	10
MSBESCS	10
MSBEXCP	10
MSBEXIT	10
MSBEXSE	10
MSBEXTJ	10
MSBGEN	10
MSBGENB	10
MSBGETS	10
MSBGETT	10
MSBONGB	10
MSBONIN	10
MSBONLS	10
MSBONSU	10
MSBNTA	10
MSBNTTE	10
MSBMAPT	10

77MICROA - MICROCODE MODULE A
MICROA.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:48 PAGE 11
CROSS REFERENCE TABLE -- MACRO NAMES

MSHMAP 1#
MSINCR 1#
MSIOSE 1#
MSLDRO 1#
MSMASK 1#
MSACHI 1#
MSACLO 1#
MSMSK1 1#
MSPOP 1#
MSPRIN 1#
MSPUSH 1#
MSPUT 1#
MSPUT1 1#
MSRADI 1#
MSRBRO 1#
MSRNRO 1#
MSSETS 1#
MSSTAR 1#
MSSVC 1#
MSTLAB 1#
MSTSTL 1#
MSWORD 1#
MSXFER 1#
OPEN 1#
POINTE 1#
PRINTB 1#
PRINTF 1#
PRINTS 1#
PRINTX 1#
READBU 1#
REDEF 1#
RFLAGS 1#
SETPRI 1#
SETVEC 1#
SLASH 1#
STARS 1#
SVC 1#
XFER 1#
XFERF 1#
XFERT 1#

. ABS. 000000 000
000000 001
MICRA 000024 002

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

MICROA.OBJ,MICROA.LST/CR/SOL/NL:TOC=SVC34R.P11,MICROA.MAC
RUN-TIME: 2 1 .2 SECONDS
RUN-TIME RATIO: 39/4=8.8
CORE USED: 31K (61 PAGES)

68SVC.MLB SOURCE FILE MACY11 50A(1052) 07-APR-83 16:49 PAGE 2
 MICROB.MAC 07-APR-83 16:06

```

1
2
3      .TITLE  MICROB - MICROCODE MODULE B
4
5      000000'
6
7      .CSECT  MICRB
8
9      .SBTTL  REGISTER DEFINITIONS USED BY THE T11
10
11      021000      IPCSRO =          21000      ;INTERNAL PCSRO ADDRESS
12      021002      DMACSR =          21002      ;DMA ENGINE CONTROL STATUS REGISTER
13      021004      DNATO  =          21004      ;DMA ENGINE TO ADDRESS REGISTER #0
14      021006      DMAT1  =          21006      ;DMA ENGINE TO ADDRESS REGISTER #1
15      021010      MDMAO  =          21010      ;MICROCPU DMA TO ADDRESS REGISTER #0
16      021012      MDMA1  =          21012      ;MICROCPU DMA TO ADDRESS REGISTER #1
17      021014      MDMAR0 =          21014      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
18      021016      MDMAR1 =          21016      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
19      021020      IPCSR1 =          21020      ;INTERNAL PCSR1 ADDRESS
20      021022      DMAF   =          21022      ;DMA ENGINE FROM ADDRESS REGISTER
21      021024      DMAWC  =          21024      ;DMA ENGINE WORD COUNT REGISTER
22      021026      MDMAW0 =          21026      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
23      021030      LTAC   =          21030      ;LINK TRANSMIT ADDRESS COUNTER REGISTER
24      021032      LFRBUF =          21032      ;LINK RECIEVE BUFFER ADDRESS FIFO
25      021034      CLRFIF =          21034      ;CLEAR FIFO
26      021036      MDMAW1 =          21036      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
27      021040      PCSRSW =          21040      ;SWITCH PACK REGISTER
28      021042      MDMSR  =          21042      ;MICROCPU DMA STATUS REGISTER
29      021044      LRBUF  =          21044      ;LINK RECIEVE BUFFER COMPLETED
30      021060      PHYAD0 =          21060      ;PHYSICAL ADDRESS ROM BYTE 0
31      021062      PHYAD1 =          21062      ;PHYSICAL ADDRESS ROM BYTE 1
32      021064      PHYAD2 =          21064      ;PHYSICAL ADDRESS ROM BYTE 2
33      021066      PHYAD3 =          21066      ;PHYSICAL ADDRESS ROM BYTE 3
34      021070      PHYAD4 =          21070      ;PHYSICAL ADDRESS ROM BYTE 4
35      021072      PHYAD5 =          21072      ;PHYSICAL ADDRESS ROM BYTE 5
36
37      .SBTTL  OTHER DEFINITIONS USED BY THE MICROCODE
38
39      100000      BIT15  =          100000
40      040000      BIT14  =           40000
41      020000      BIT13  =           20000
42      010000      BIT12  =           10000
43      004000      BIT11  =            4000
44      002000      BIT10  =            2000
45      001000      BIT9   =            1000
46      000400      BIT8   =             400
47      000200      BIT7   =             200
48      000100      BIT6   =             100
49      000040      BIT5   =              40
50      000020      BIT4   =              20
51      000010      BIT3   =              10
52      000004      BIT2   =               4
53      000002      BIT1   =               2
54      000001      BIT0   =               1
55
56      012400      ;
57      000340      LASFTP =          340      BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN
58      000300      PRI07  =           340
59      000300      PRI06  =           300
60      000240      PRI05  =           240

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76MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

57	000200	PRI04 =	200	
58	000140	PRI03 =	140	
59	000100	PRI02 =	100	
60	000040	PRI01 =	40	
61	000000	PRI00 =	0	
62		:		
63		;	PCSR0 - PORT CONTROL STATUS REGISTER 0	
64		:		
65	100000	SERI =	BIT15	
66	040000	PCEI =	BIT14	
67	020000	RXI =	BIT13	
68	010000	TXI =	BIT12	
69	004000	DNI =	BIT11	
70	002000	RCEI =	BIT10	
71	000400	FATI =	BIT8	
72		:		
73	000134	SANVEC=	134	;VECTOR ADDRESS FOR THE SANITY TIMER
74	000064	CSRVEC=	64	;VECTOR ADDRESS FOR CSR WRITE INTERRUPT
75	000114	DMAVEC=	114	;VECTOR ADDRESS FOR DMA DONE INTERRUPT
76	000140	PARVEC=	140	;VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
77	001000	STACK=	1000	;STACK LOCATION
78	000001	INMON=	1	;IN MICROMONITOR STATE
79	000002	INTST=	2	;IN A TEST STATE
80	000003	INERR=	3	;IN ERROR STATE
81	000001	CSRFLG=	BIT0	;CSR WRITE INTERRUPT OCCURED
82	000002	ERRFLG=	BIT1	;UNEXPECTED ERROR OCCURED
83	000004	PARFLG=	BIT2	;PARITY ERROR OCCURED
84	000010	NXMFLG=	BIT3	;NON-EXISTANT MEMORY ERROR OCCURRED
85	000020	NPRFLG=	BIT4	;NPR TIMEOUT OCCURRED
86	100000	NPRERR=	BIT15	;PCSR0 FLAG INDICATING NPR ERROR OCCURRED
87	040000	NXMERR=	BIT14	;PCSR0 FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURRED
88	020000	UNIERR=	BIT13	;PCSR0 FLAG INDICATING UNEXPECTED INTERRUPT OCCURRED
89	010000	PARERR=	BIT12	;PCSR0 FLAG INDICATING LINK MEMORY PARITY ERROR OCCURRED
90	020000	SIZ4K=	20000	;4K WORDS
91	040000	SIZ8K=	SIZ4K*2	;8K WORDS
92	020000	WCSSIZ=	SIZ4K	;SIZE OF WRITEABLE CONTROL STORE
93	020000	IOSIZ=	SIZ4K	;SIZE OF I/O PAGE
94	040000	ROMSIZ=	SIZ8K	;SIZE OF ROM
95	077774	LINSIZ=	SIZ8K*2-4	;SIZE OF LINK MEMORY
96	000000	WCSADR=	0	;BASE ADDRESS OF WCS
97	020000	IOADR=	WCSADR+WCSSIZ	;BASE ADDRESS OF I/O PAGE
98	040000	ROMADR=	IOADR+IOSIZ	;BASE ADDRESS OF ROM
99	100000	LINADR=	ROMADR+ROMSIZ	;BASE ADDRESS OF LINK MEMORY
100	000000	DATERR=	0	;FLAG INDICATING DATA ERROR OCCURRED
101	000001	ADRERR=	1	;FLAG INDICATING ADDRESS ERROR OCCURRED
102	177774	MODREG=	LINADR+LINSIZ	;LINK MODE REGISTER
103	177774	ADDREG=	MODREG	;LINK STATION ADDRESS RAM REGISTER
104	177776	CMDREG=	MODREG+2	;LINK COMMAND REGISTER
105				

76MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 4
OTHER DEFINITIONS USED BY THE MICROCODE

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.SBTTL B_MODULE MICROCODE

:THIS MODULE CONTAINS A MICROMONITOR AND MICROCODE FOR:
: 1-WCS MEMORY TEST

MICROB: :MTPS #PRI07 ;DISABLE INTERRUPTS
MOV #0,#CMDREG ;TURN OFF THE LINK
MOV #STACK,SP ;SETUP STACK
MOV #INMON,PCSR1 ;TELL HOST WE ARE IN MICROMONITOR
MOV PCSR1,#IPCSR1
MOV #DNI,#IPCSRO ;TELL HOST THE LOAD AND START FINISHED
MOV PC,RO ;GET ADDRESS OF UNEXPECTED ERROR...
ADD #ERRINT-.,RO ;HANDLER
CLR R1 ;FILL ALL UNUSED VECTORS WITH TRAP...
10S: MOV RO,(R1)+ ;HANDLER
MOV #PRI07,(R1)+
CMP R1,#1000
BLT 10S

MOV PC,RO ;SETUP PARITY TRAP VECTOR
ADD #PARINT-.,RO
MOV RO,#PARVEC
MOV #PRI07,#PARVEC+2

MOV PC,RO ;SETUP DMA INTERRUPT VECTOR
ADD #DMAINT-.,RO
MOV RO,#DMAVEC
MOV #PRI07,#DMAVEC+2

MOV PC,RO ;SETUP CSR WRITE VECTOR
ADD #CSRWRT-.,RO
MOV RO,#CSRVEC
MOV #PRI04,#CSRVEC+2

MOV PC,RO ;SETUP SANTITY TIMER VECTOR
ADD #TIMINT-.,RO
MOV RO,#SANVEC
MOV #PRI05,#SANVEC+2

MOV #PCSRW,RO ;GET SWITCH PACK BITS
BIS #176000,RO ;MAP THEM INTO HOST I/O PAGE
ASL RO ;SHIFT OVER TO POSITION CORRECTLY
ASL RO
ASL RO
ADD #4,RO ;PCSR2 IS PCSRO+4
MOV RO,IPCSR2 ;SAVE PCSR2 ADDRESS
MOV #3,IPCSR2+2 ;HIGH ORDER BITS 17:16
CLR FLG2 ;INITIALIZE FLAG WORD
15S: MTPS #PRI00 ;ALLOW INTERRUPTS

76MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 5
B_MODULE MICROCODE

162											
163	000230'	005767	000274		20\$:	TST	FLG2				:WAIT FOR A COMMAND FROM HOST
164	000234'	001775				BEG	20\$				
165											
166	000236'	106427	000340			MTPS	#PR107				:RAISE CPU PRIORITY TO SERVICE COMMAND
167	000242'	032767	000001	000260		BIT	#CSRFLG,FLG2				:DID HOST GIVE US A COMMAND?
168	000250'	001001				BNE	30\$:YES
169	000252'	000777				BR	.				:NO, ERROR SO JUST SIT HERE...
170											:FOR LACK OF ANYTHING BETTER TO DO
171											
172	000254'	013700	021000		30\$:	MOV	@#IPCSRO,R0				:GET WHAT HOST WROTE TO PCSRO
173	000260'	042700	177760			BIC	#177760,R0				:STRIP ALL BUT COMMAND BITS
174	000264'	001004				BNE	35\$:WAS IT THE CLEAR FUNCTION?
175	000266'	012737	000001	021020		MOV	#INMON,@#IPCSR1				:YES, CLEAR SELF TEST BITS
176	000274'	000432				BR	50\$				
177	000276'	022700	000017		35\$:	CMP	#17,R0				:RETURN TO OPERATIONAL MICROCODE?
178	000302'	001432				BEG	60\$:YES
179	000304'	162700	000001			SUB	#1,R0				:WILL FORM A TABLE INDEX WITH THIS
180	000310'	010701				MOV	PC,R1				:GET ADDRESS OF OUR COMMAND TABLE
181	000312'	062701	000214			ADD	#TBLB-.,R1				
182	000316'	006300				ASL	R0				:MAKE COMMAND A BYTE OFFSET
183	000320'	060001				ADD	R0,R1				:USE IT TO INDEX INTO COMMAND TABLE
184	000322'	061101				ADD	(R1),R1				:R1 NOW HAS COMMAND ROUTINE ADDRESS
185	000324'	004711				JSR	PC,(R1)				:EXECUTE AS COMMANDED FROM HOST
186	000326'	103404				BCS	40\$:ERROR OCCURRED
187	000330'	112767	000001	000176		MOVB	#INMON,PCSR1				:INDICATE TO HOST WE ARE BACK IN...
188	000336'	000403				BR	45\$:MICROMONITR
189	000340'	112767	000003	000166	40\$:	MOVB	#INERR,PCSR1				:INDICATE TO HOST ERROR OCCURRED
190	000346'	016737	000162	021020	45\$:	MOV	PCSR1,@#IPCSR1				
191	000354'	012737	004000	021000		MOV	#DNI,@#IPCSRO				:TELL HOST THIS MICROTTEST FINISHED
192	000362'	005067	000142		50\$:	CLR	FLG2				:RESET FLAG WORD
193	000366'	000716				BR	15\$:GO WAIT FOR ANOTHER COMMAND
194											
195	000370'	005000			60\$:	CLR	R0				:FAKE SUCCESSFULL SELF TEST DONE
196	000372'	000137	040006			JMP	@#40006				:START OPERATIONAL MICROCODE
197											
198	000376'	052767	000001	000124	CSRWRT:	BIS	#CSRFLG,FLG2				:INDICATE A CSR WRITE INTERRUPT OCCURED
199	000404'	000002				RTI					
200											
201	000406'	052767	000002	000114	ERRINT:	BIS	#ERRFLG,FLG2				:INDICATE A UNEXPECTED INTERRUPT OCCURED
202	000414'	012737	020000	021000		MOV	#UNIERR,@#IPCSRO				:TELL HOST AN UNEXPECTED INTERRUPT
203											:HAPPENED
204	000422'	000777				BR	.				:JUST SIT HERE AND SPIN WHEELS
205											
206	000424'	005267	000102		TIMINT:	INC	SANTIM				:COUNT TICKS AS THEY OCCUR
207	000430'	000002				RTI					
208											
209	000432'	013767	021002	000106	DMAINT:	MOV	@#DMACSR,DMDONE				:GET DMA STATUS
210	000440'	032767	040000	000100		BIT	#BIT14,DMDONE				:DID A NON-EXISTANT MEMORY INTERRUPT OCCUR?
211	000446'	001404				BEG	10\$:NO
212	000450'	012737	040000	021000		MOV	#NXMERR,@#IPCSRO				:YES, TELL HOST A NON-EXISTANT MEMORY
213											:LOCATION WAS ADDRESSED
214	000456'	000407				BR	20\$				
215	000460'	032767	100000	000060	10\$:	BIT	#BIT15,DMDONE				:DID A NPR TIMEOUT OCCUR?
216	000466'	001407				BEG	30\$:NO
217	000470'	012737	100000	021000		MOV	#NPRERR,@#IPCSRO				:TELL HOST NPR TIMEOUT HAPPENED

76MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 7
B_MODULE MICROCODE

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254
255
256 000552' 112767 000002 177754 MICB1:  MOVB  #INTST,PCSR1      ;TELL HOST WE ARE TESTING
257 000560' 016737 177750 021020      MOV   PCSR1,#IPCSR1
258 000566' 005067 000320              CLR   BOTH                ;START TESTING BOTTOM HALF FIRST
259 000572' 012767 001000 000304      MOV   #1000,LOWLIM        ;SET LOW LIMIT JUST ABOVE VECTORS
260 000600' 012767 010000 000300      MOV   #WCSSIZ/2,HILIM     ;HIGH LIMIT IS HALF WAY INTO WCS
261
262 000606' 010700              5$:   MOV   PC,R0            ;GET ADDRESS OF SUBTEST LIST
263 000610' 062700 000256              ADD   #B1STBL-.,R0
264
265 000614' 005067 177710              10$:  CLR   FLG2                ;CLEAR THE FLAG WORD
266 000620' 011001              MOV   (R0),R1             ;GET OFFSET FROM ENTRY TO SUBTEST
267 000622' 001437              BEQ   30$                 ;NO MORE ENTRIES
268 000624' 060001              ADD   R0,R1               ;CALC SUBTEST ADDRESS
269 000626' 004711              JSR   PC,(R1)             ;GO EXECUTE SUBTEST
270 000630' 103403              BCS   20$                 ;ERROR OCCURRED IN SUBTEST
271 000632' 062700 000002              ADD   #2,R0               ;POINT TO NEXT SUBTEST IN LIST
272 000636' 000766              BR    10$
273
274 000640' 016737 177672 021010      20$:  MOV   IPCSR2,#MDMA0       ;GET CONTENTS OF HOST'S PCRS2 AND PCRS3
275 000646' 016737 177666 021012      MOV   IPCSR2+2,#MDMA1
276 000654' 013700 021014              MOV   @MDMA0,R0           ;R0=CONTENTS OF PCRS2
277 000660' 013702 021014              MOV   @MDMA0,R2           ;R2=CONTENTS OF PCRS3
278 000664' 010037 021010              MOV   R0,#MDMA0          ;POINT TO PCBB+0
279 000670' 010237 021012              MOV   R2,#MDMA1
280 000674' 016737 000210 021026      MOV   SUBNUM,#MDMA0
281
282 000702' 010137 021026              MOV   R1,#MDMA0
283 000706' 010337 021026              MOV   R3,#MDMA0
284 000712' 010437 021026              MOV   R4,#MDMA0
285 000716' 000261              SEC
286 000720' 000434              BR    45$
287
288 000722' 005767 000164              30$:  TST   BOTH                ;HAVE WE DONE BOTH HALVES YET?
289 000726' 001030              BNE   40$                 ;YES
290 000730' 005267 000156              INC   BOTH                ;NO, WE ARE ABOUT TO DO OTHER HALF
291 000734' 012767 010000 000142      MOV   #WCSSIZ/2,LOWLIM    ;SET LOW LIMIT AT BOTTOM OF UPPER HALF
292 000742' 012767 020000 000136      MOV   #WCSSIZ,HILIM      ;HIGH LIMIT IS TOP OF UPPER HALF

```


76MICR06 - MICROCODE MODULE B
 MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 9
 MODULE B, MICROTEST #1, MICROSUBTEST A

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334 .SBTTL MODULE B, MICROTEST #1, MICROSUBTEST A
335
336 ;*****
337 ;
338 ;THIS IS AN ACCESS TEST OF WCS MEMORY. IT WRITES ONES
339 ;IN MEMORY BETWEEN LOWLIM AND HILIM AND VERIFIES SAME. IT THEN WRITES
340 ;ZEROS AND VERIFIES SAME. IT ALSO CHECKS FOR BOGUS PARITY ERRORS.
341 ;
342 ;*****
343
344 001114' 010046 MICB1A: MOV R0,-(SP) ;SAVE R0
345 001116' 112767 000001 177764 MOVB #1,SUBNUM ;TELL WE ARE IN SUBTEST A
346 001124' 106427 000300 MTPS #PRI06 ;ALLOW PARITY ERRORS
347 001130' 012703 177777 MOV #177777,R3 ;GOOD DATA = ALL ONES
348 001134' 016700 177744 5S: MOV LOWLIM,R0 ;GET BASE ADDRESS OF MEMORY
349 001140' 010320 10S: MOV R3,(R0)+ ;WRITE ALL OVER MEMORY
350 001142' 020067 177740 CMP R0,HILIM
351 001146' 103774 BLO 10S
352
353 001150' 016701 177730 MOV LOWLIM,R1 ;POINT BACK TO BASE
354 001154' 011104 12S: MOV (R1),R4 ;READ DATA
355 001156' 032767 000004 177344 BIT #PARFLG,FLG2 ;DID A PARITY ERROR OCCUR?
356 001164' 001407 BEQ 15S ;NO
357 001166' 020304 CMP R3,R4 ;YES, WAS DATA READ GOOD?
358 001170' 001007 BNE 20S ;NO, DATA ERROR
359 001172' 112767 010000 177711 MOVB #PARERR,ERRTYP ;TELL MICROMONITOR TYPE OF ERROR
360 001200' 000261 SEC ;TELL MICROMONITOR ERROR OCCURRED
361 001202' 000421 BR 40S ;LEAVE
362
363 001204' 020304 15S: CMP R3,R4 ;WAS DATA GOOD?
364 001206' 001405 BEQ 30S ;YES
365 001210' 112767 000000 177673 20S: MOVB #DATERR,ERRTYP ;TELL MICROMONITOR TYPE OF ERROR
366 001216' 000261 SEC ;TELL MICROMONITOR ERROR OCCURRED
367 001220' 000412 BR 40S
368
369 001222' 062701 000002 30S: ADD #2,R1 ;POINT TO NEXT MEMORY ADDRESS
370 001226' 020167 177654 CMP R1,HILIM ;DONE ALL MEMORY?
371 001232' 001350 BNE 12S ;NOT YET
372 001234' 005703 TST R3 ;DONE BOTH DATA TYPES?
373 001236' 001402 BEQ 35S ;YES
374 001240' 005103 COM R3 ;NO, WRITE ONES NOW
375 001242' 000734 BR 5S
376
377 001244' 000241 35S: CLC ;INDICATE SUCCESS
378 001246' 012600 40S: MOV (SP)+,R0 ;RESTORE R0
379 001250' 000207 RTS PC
380
    
```

77MICROB - MICROCODE MODULE B
 MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 10
 MODULE B, MICROTTEST #1, MICROSUBTEST B

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.SBTTL MODULE B, MICROTTEST #1, MICROSUBTEST B

.....

:ADDRESS SHIFT TEST

:THIS TEST ASSUMES ALL MEMORY BETWEEN LOWLIM AND HILIM IS ZEROS
 :IT CHECKS FOR PROPER BANK SELECTION BY WRITING 1'S IN A LOCATION
 :AND CHECKING FOR 1'S IN THE SAME LOCATION OF OTHER 4K BANKS (ADDRESS ERROR).
 :IT ALSO CHECKS FOR DATA ERRORS I.E. NON-ZERO DATA IN LOCATIONS NOT
 :WRITTEN WITH 1'S AND MAKES SURE LOCATIONS WRITTEN WITH 1'S HAVE 1'S IN THEM

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MICB1B: MOV    RO,-(SP)           ;SAVE RO
          MOVB   #2,SUBNUM        ;TELL HIM WE ARE IN THE SECOND SUBTEST

10$:    MOV    LOWLIM,RO          ;SET 'WRITTEN TO' ADDRESS
          MOV    LOWLIM,R1        ;SET 'READ FROM' ADDRESS
          MOV    #177777,(RO)     ;WRITE DATA INTO LOCATION AT BASE

20$:    MOV    (R1),R4            ;READ DATA FROM MEMORY WHICH IS AN EVEN
          ;INCREMENT AWAY
          CMP    RO,R1            ;IS 'READ FROM AND 'WRITTEN TO'
          ;ADDRESSES THE SAME?
          BEQ    70$              ;YES, SO DATA IN BOTH SHOULD BE THE SAME
          CLR    R3               ;GOOD DATA IS ZEROS
          TST   R4                ;DATA IN 'READ FROM' MUST BE 0'S
          BEQ    50$              ;OK GO CHANGE 'READ FROM' ADDRESS
          ;ERROR OCCURRED BUT WE DON'T KNOW IF...
          ;IT IS A DATA ERROR OR AN ADDRESS ERROR
          CMP    #177777,R4       ;WAS DATA READ ALL 1'S?
          BNE   40$              ;NO, SO IT WAS A DATA ERROR
          MOVB   #ADRERR,ERRTYP   ;YES, IT WAS AN ADDRESS ERROR
          SEC    ;INDICATE FAILURE
          BR     60$              ;LEAVE THIS SUBTEST

70$:    CMP    #177777,R4        ;DATA READ MUST BE ALL 1'S
          BEQ    50$              ;IT IS GOOD
          MOV    #177777,R3       ;GOOD DATA IS ONES
          MOVB   #DATERR,ERRTYP   ;IT WAS A DATA ERROR
          SEC    ;INDICATE FAILURE
          BR     60$              ;LEAVE THIS SUBTEST

40$:    ADD    #1000,R1           ;CHANGE 'READ FROM' ADDRESS BY .25K
          CMP    R1,HILIM         ;WE GO PAST BOUNDARY?
          BLO   20$              ;NO CONTINUE WITH SAME 'WRITTEN TO'
          CLR    (RO)             ;CLEAR OLD 'WRITTEN TO' ADDRESS
          ADD    #1000,RO         ;CHANGE 'WRITTEN TO' ADDRESS BY .25K
          CMP    RO,HILIM        ;WE PAST BOUNDARY?
          BLO   10$              ;NO CONTINUE THIS SUBTEST
          CLC    ;INDICATE SUCCESS OF THIS SUBTEST
          MOV    (SP)+,RO         ;RESTORE RO
          RTS    PC
    
```


77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 11
MODULE B, MICROTEST #1, MICROSUBTEST C

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001412' 010046
001414' 112767 000003 177466
001422' 016701 177456
001426' 012700 000001
001432' 010002
001434' 010011
001436' 011104
001440' 020004
001442' 001406
001444' 112767 000000 177437
001452' 010003
001454' 000261
001456' 000421
001460' 005702
001462' 001406
001464' 006300
001466' 103362
001470' 005002
001472' 012700 177776
001476' 000756
001500' 000261
001502' 006100
001504' 103753
001506' 062701 001000
001512' 020167 177370
001516' 103743
001520' 000241
001522' 012600
001524' 000207

.SBTTL MODULE B, MICROTEST #1, MICROSUBTEST C

:DATA LATCH TEST
:AT THE FIRST LOCATION OF EACH BANK A '1' IS SHIFTED THROUGH EACH
:BIT POSITION AND CHECKED FROM LSB TO MSB.
:THEN IN THE SAME LOCATION A '0' IS SHIFTED THROUGH EACH BIT POSITION
:AND CHECKED.

MICB1C: MOV R0,-(SP)
MOVB #3,SUBNUM
MOV LOWLIM,R1
1\$: MOV #1,R0
MOV R0,R2
2\$: MOV R0,(R1)
MOV (R1),R4
3\$: CMP R0,R4
BEQ 4\$
MOVB #DATERR,ERRTYP
MOV R0,R3
SEC
BR 6\$
4\$: TST R2
BEQ 5\$
ASL R0
BCC 2\$
CLR R2
MOV #177776,R0
BR 2\$
5\$: SEC
ROL R0
BCS 2\$
ADD #1000,R1
CMP R1,HILIM
BLO 1\$
CLC
6\$: MOV (SP)+,R0
RTS PC

:SAVE R0
:TELL WEA ARE IN SUBTEST 'C'
:GET BASE ADDRESS OF MEMORY
:DATA = 1 IN LEAST SIGNIFICANT BIT
:INDICATE WE ARE SHIFTING A '1'
:WRITE LOCATION WITH GOOD DATA
:READ DATA FROM SAME LOCATION
:IS DATA THE SAME AS WRITTEN?
:YES, OK
:ERROR IS DATA ERROR
:GOOD DATA
:INDICATE THIS SUBTEST FAILED
:LEAVE THIS SUBTEST
:ARE WE SHIFTING A 1 OR A 0?
:ZERO
:SHIFT THE ONE OVER
:IF THE '1' HAS NOT BEEN SHIFTED...
:THRU THE 16 POSITIONS CONTINUE WITH 1
:ELSE START SHIFTING A '0'
:START WITH LSB = 0 ALL OTHERS 1'S
:CONTINUE WITH SHIFTING A 0
:MOVE '0' OVER ONE BIT POSITION
:HAS '0' BEEN IN ALL POSITIONS?
:NO CONTINUE WITH SHIFTING A 0
:CONTINUE TEST AT NEXT BOUNDARY
:DONE ALL OF MEMORY?
:NO
:INDICATE THIS SUBTEST SUCCESSFUL
:RESTORE R0

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 12
MODULE B, MICROTEST #1, MICROSUBTEST D

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001526' 010046
001530' 112767 000004 177352
001536' 012757 000377 177004
001544' 005003
001546' 016700 177332
001552' 016720 176772
001556' 020067 177324
001562' 103773
001564' 016700 176760

001570' 005002
001572' 050302
001574' 020267 177304
001600' 103450
001602' 020267 177300
001606' 103061
001610' 000312
001612' 005001
001614' 050301
001616' 020167 177262
001622' 103426
001624' 020167 177256
001630' 103333
001632' 011104
001634' 020102
001636' 001414
001640' 020004
001642' 001416

001644' 112767 000001 177237
001652' 010003
001654' 000261
001656' 000441
001660' 020067 176664
001664' 001405
001666' 000403

001670' 000300
001672' 020004
001674' 001363
001676' 000300

```
.SBTTL MODULE B, MICROTEST #1, MICROSUBTEST D
:*****
:ADDRESS BIT SHIFT #1
:THIS TEST CHECKS FOR DUAL ADDRESS PROBLEMS BY FIRST WRITING A BACKGROUND
:PATTERN THROUGHOUT MEMORY.
:THEN STARTING AT THE LOWEST LOCATION IN A BANK IT WRITES THE COMPLEMENT
:OF THE BACKGROUND PATTERN. THEN READS THE MEMORY FOR CORRECT CONTENTS
:IT THEN SHIFTS A '1' THROUGH THE ADDRESS POINTER AND REPEATS THE ABOVE.
:IT DOES THIS FOR EACH BANK.
:*****
MICB1D: MOV R0, -(SP) ;SAVE R0
MOV #4, SUBNUM ;TELL WE ARE IN SUBTEST 4
MOV #377, BAKPAT ;LOAD BAKPAT CONSTANT
1$: CLR R3 ;CONTAINS BANK ADDRESS
2$: MOV LOWLIM, R0 ;WRITE LINK MEMORY WITH BACKGROUND...
3$: MOV BAKPAT, (R0)+ ;PATTERN
CMP R0, HILIM
BLO 3$
MOV BAKPAT, R0 ;R0 CONTAINS GOOD DATA

4$: CLR R2 ;R2 WILL BE OUR 'WRITTEN TO' ADDRESS
6$: BIS R3, R2 ;INDEX INTO THIS BANK
CMP R2, LOWLIM ;IS RESULT LESS THAN MEM BASE?
BLO 16$ ;YES, DON'T USE THIS ADDRESS
CMP R2, HILIM ;IS RESULT LARGER THAN MEM TOP?
BHIS 20$ ;YES, DON'T USE THIS ADDRESS EITHER
SWAB (R2) ;WRITE COMPLEMENT OF PATTERN
CLR R1 ;R1 WILL BE OUR 'READ FROM' ADDRESS
7$: BIS R3, R1 ;INDEX INTO THIS BANK
CMP R1, LOWLIM ;IS RESULT LESS THAN MEM BASE?
BLO 12$ ;YES, DON'T USE THIS ADDRESS
CMP R1, HILIM ;IS RESULT LARGER THAN MEM TOP?
BHIS 15$ ;YES, DON'T USE THIS ADDRESS EITHER
MOV (R1), R4 ;READ DATA
CMP R1, R2 ;IS 'READ FROM' AND 'WRITTEN TO' SAME?
BEQ 10$ ;YES, GO CHECK DATA
CMP R0, R4 ;NO, DATA READ SHOULD BE SAME AS BAKPAT
BEQ 12$ ;IF SO CONTINUE WITH NEW INDEX

8$: MOV #ADRERR, ERRYP ;INDICATE ADDRESS ERROR
MOV R0, R3 ;GET GOOD DATA
SEC ;INDICATE THIS SUBTEST FAILED
BR 25$ ;LEAVE THIS SUBTEST
CMP R0, BAKPAT ;DOES R0 CONTAIN SWAPPED DATA?
BEQ 12$ ;NO
BR 11$ ;YES

10$: SWAB R0 ;MAKE GOOD DATA LIKE SWAPPED BAKPAT
CMP R0, R4 ;IS DATA READ SAME AS DATA WRITTEN?
BNE 8$ ;NO, ERROR
11$: SWAB R0 ;RESTORE GOOD DATA TO BAKPAT
```

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 13
MODULE B, MICROTEST #1, MICROSUBTEST D

536	001700'	040301		12S:	BIC	R3,R1	:REMOVE BANK SELECT FROM 'READ FROM'
537	001702'	005701			TST	R1	:DID AN INDEX EXIST?
538	001704'	001001			BNE	13S	:YES
539	001706'	005201			INC	R1	:NO, MAKE ONE
540	001710'	006101		13S:	ROL	R1	:SHIFT INDEX OVER
541	001712'	020127	001000		CMP	R1,#1000	:IS IT LESS THAN .25K
542	001716'	103736			BLO	7S	:YES, CONTINUE CHECKING FOR BOGUS DATA
543							:IN THIS BANK
544	001720'	000312		15S:	SWAB	(R2)	:RESTORE CONTENTS OF 'WRITTEN TO'
545	001722'	040302		16S:	BIC	R3,R2	:REMOVE BANK SELECT FROM 'WRITTEN TO'
546	001724'	005702			TST	R2	:DOES 'WRITTEN TO' CONTAIN AN ADDRESS?
547	001726'	001001			BNE	18S	:YES
548	001730'	005202			INC	R2	:NO, MAKE ONE
549	001732'	006102		18S:	ROL	R2	:SHIFT 'WRITTEN TO' ADDRESS
550	001734'	020227	001000		CMP	R2,#1000	:IS 'WRITTEN TO' LARGER THAN .25K?
551	001740'	103714			BLO	6S	:NO
552	001742'	060203			ADD	R2,R3	:MAKE 'WRITTEN TO' POINT TO NEXT .25K
553	001744'	020367	177136		CMP	R3,HILIM	:IS RESULT LARGER THAN MEM TOP?
554	001750'	103707			BLO	4S	:NO CONTINUE TESTING
555	001752'	000367	176572	20S:	SWAB	BAKPAT	:REPEAT TEST WITH COMPLEMENTED PATTERN
556	001756'	001672			BEQ	1S	
557	001760'	000241			CLC		:INDICATE THIS SUBTEST SUCCESS
558	001762'	012600		25S:	MOV	(SP)+,R0	:RESTORE R0
559	001764'	000207			RTS	PC	
560							

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 14
MODULE B, MICROTEST #1, MICROSUBTEST E

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561      .SBTTL  MODULE B, MICROTEST #1, MICROSUBTEST E
562
563      ;*****
564      ;
565      ;ADDRESS BIT SHIFT #2
566      ;
567      ;THIS TEST CHECKS FOR DUAL ADDRESSING PROBLEMS BY WRITING EACH LOCATION
568      ;OF MEMORY WITH ITS ADDRESS AND THEN VERIFYING EACH LOCATION.
569      ;IT THEN DOES THE SAME THING BUT USES THE COMPLEMENT OF THE ADDRESS
570      ;AS DATA.
571      ;
572      ;*****
573
574 001766' 010046      MICB1E: MOV      R0,-(SP)      ;SAVE R0
575 001770' 112767      000005 177112  MOVB     #5,SUBNUM    ;TELL WHICH SUBTEST WE ARE IN
576 001776' 005003      CLR      R3          ;FLAG INDICATING ADDRESS IS COMPLEMENTED
577 002000' 016701      177100      MOV      LOWLIM,R1    ;GET STARTING ADDRESS OF MEMORY
578 002004' 010100      1$:      MOV      R1,R0      ;GET ADDRESS TO WORK WITH
579 002006' 005703      TST      R3          ;SHOULD WE COMPLEMENT THE DATA TO STORE?
580 002010' 001401      BEQ      2$          ;NO STORE AS IS
581 002012' 005100      COM      R0          ;COMPLEMENT DATA
582 002014' 010021      2$:      MOV      R0,(R1)+    ;WRITE DATA
583 002016' 020167      177064      CMP      R1,HILIM    ;IS NEW ADDRESS LARGER THAN MEM?
584 002022' 103770      BLO      1$          ;NO, KEEP FILLING MEMORY
585
586 002024' 014104      3$:      MOV      -(R1),R4    ;READ DATA STORED
587 002026' 020004      CMP      R0,R4      ;IS DATA READ SAME AS WRITTEN?
588 002030' 001406      BEQ      4$          ;YES
589 002032' 112767      000001 177051  MOVB     #ADRERR,ERRTYP ;INDICATE ADDRESS ERROR
590 002040' 010003      MOV      R0,R3      ;GET GOOD DATA
591 002042' 000261      SEC          ;INDICATE FAILURE
592 002044' 000414      BR      10$         ;LEAVE THIS SUBTEST
593 002046' 010100      4$:      MOV      R1,R0      ;CALC GOOD DATA FOR NEXT LOCATION
594 002050' 162700      000002      SUB      #2,R0
595 002054' 005703      TST      R3
596 002056' 001401      BEQ      5$
597 002060' 005100      COM      R0
598 002062' 020167      177016      5$:      CMP      R1,LOWLIM    ;HAVE WE CHECKED ALL LOCATIONS
599 002066' 101356      BHI      3$          ;NOT YET
600 002070' 005103      COM      R3          ;HAVE WE DONE IT COMPLEMENTED?
601 002072' 001344      BNE      1$          ;NO, REPEAT WITH COMPLEMENT
602 002074' 000241      CLC          ;INDICATE SUCCESS
603 002076' 012600      10$:     MOV      (SP)+,R0    ;RESTORE R0
604 002100' 000207      RTS      PC
605

```

77MICROB - MICRCCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 15
MODULE B, MICROTEST #1, MICROSUBTEST F

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606      .SBTTL  MODULE B, MICROTEST #1, MICROSUBTEST F
607
608      :*****
609
610      :MARCH TEST
611
612      :THIS TEST WRITES A BACKGROUND PATTERN IN ALL OF MEMORY
613
614      :1-READ EVERY LOCATION FOR CORRECT DATA, SWAPS BYTES AT EACH LOCATION
615      :AND PROCEED IN MAX TO MIN DIRECTION
616      :2-READ EVERY LOCATION FOR SWAPPED DATA, WRITES ORIGINAL PATTERN IN EACH
617      :LOCATION AND PROCEEDS IN MIN TO MAX DIRECTION
618      :3-REPEAT 1 GOING IN MIN TO MAX DIRECTION
619      :4-REPEAT 2 GOING IN MAX TO MIN DIRECTION
620
621      :*****
622
623      002102' 010046      MICB1F: MOV      R0,-(SP)      ;SAVE R0
624      002104' 112767      000006 176776      MOVB     #6,SUBNUM    ;TELL WHICH SUBTEST WE ARE IN
625      002112' 005003      CLR      R3           ;ADDRESS DIRECTION FLAG 0 = MIN.->MAX
626      002114' 016701      176764      10$:    MOV      LOWLIM,R1 ;FILL MEMORY WITH BACKGROUND PATTERN
627      002120' 012700      000377      MOV      #377,R0     ;BACKGROUND PATTERN=LOW BYTE ALL 1'S
628      002124' 010021      12$:    MOV      R0,(R1)+
629      002126' 020167      176754      CMP      R1,HILIM
630      002132' 103774      BLO
631
632      002134' 014104      20$:    MOV      -(R1),R4
633      002136' 020004      CMP      R0,R4
634      002140' 001406      BEQ      30$
635      002142' 112767      000000 176741      MOVB     #DATERR,ERRTYP ;SiARTING FROM THE TOP, READ DATA
636      002150' 010003      MOV      R0,R3       ;R0 = GOOD DATA, R4 = DATA READ
637      002152' 000261      SEC      ;IF SAME OK
638      002154' 000454      BR       200$        ;INDICATE DATA ERROR
639      002156' 000300      30$:    SWAB     R0         ;GET GOOD DATA
640      002160' 010011      MOV      R0,(R1)     ;INDICATE FAILURE
641      002162' 011104      MOV      (R1),R4     ;LEAVE THIS SUBTEST
642      002164' 020400      CMP      R4,R0       ;NEW GOOD DATA PATTERN
643      002166' 001403      BEQ      40$        ;STORE AT SAME PLACE
644      002170' 112717      000000 176713      MOVB     #DATERR,ERRTYP ;READ IT BACK
645      002176' 010003      MOV      R0,R3       ;R0=GOOD DATA, R4=DATA READ
646      002200' 000261      SEC      ;IF SAME OK
647      002202' 000441      BR       200$        ;INDICATE DATA ERROR
648      002204' 000300      40$:    SWAB     R0         ;GET GOOD DATA
649      002206' 001027      BNE     90$         ;FAILURE
650
651
652
653
654      002210' 005703      50$:    TST      R3
655      002212' 001027      BNE     100$        ;LEAVE THIS SUBTEST
656      002214' 062701      000002 176662      60$:    ADD      #2,R1
657      002220' 020167      176662      CMP      R1,HILIM
658      002224' 103012      BHIS    80$
659      002226' 011104      70$:    MOV      (R1),R4
660      002230' 020004      CMP      R0,R4
661      002232' 001751      BEQ     30$

```

```

;WE ARE GOING MIN->MAX SO ADJUST POINTER
;WE AT MAX?
;YES
;READ DATA
;R0=GOOD DATA, R4=DATA READ
;OK IF SAME

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MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 16
MODULE B, MICROTTEST #1, MICROSUBTEST F

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662 002234' 112767 000000 176647      MOVB  #DATERR,ERRTYP      ;INDICATE DATA ERROR
663 002242' 010003      MOV   R0,R3              ;GET GOOD DATA
664 002244' 000261      SEC                               ;INDICATE FAILURE
665 002246' 000417      BR    200$              ;LEAVE THIS SUBTEST
666 002250' 000742      BR    30$              ;
667 002252' 000300      80$: SWAB R0              ;SWITCH GOOD DATA
668 002254' 001727      BEQ   20$              ;IF LOW BYTE = ALL 0'S GO IN MAX->MIN
669 002256' 005103      COM   R3                ;ELSE GO IN MIN->MAX DIRECTION
670 002260' 016701 176620      MOV   LOWLIM,R1        ;SET ADDRESS POINTER TO MIN
671 002264' 000760      BR    70$              ;
672
673 002266' 005703      90$: TST R3              ;ARE WE GOING MIN->MAX?
674 002270' 001347      BNE   50$              ;YES
675
676 002272' 020167 176606      100$: CMP R1,LOWLIM     ;NO, CHECK TO SEE IF WE ARE AT MIN
677 002276' 101316      BHI   20$              ;NOT YET
678 002300' 000300      SWAB R0                ;WE ARE AT MIN SO SWITCH GOOD DATA
679 002302' 001751      BEQ   70$              ;IF LOW BYTE = ALL 0'S ELSE WE ARE DONE
680 002304' 000241      CLC                               ;INDICATE SUCCESS
681 002306' 012600      200$: MOV (SP)+,R0      ;RESTORE R0
682 002310' 000207      RTS    PC              ;
683
684 002312' 002314      MICBSZ:MICBSZ-MICROB+2 ;SIZE OF MICROCODE MODULE B
685 002314' 000001      .END

```

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 18
CROSS REFERENCE TABLE -- USER SYMBOLS

ADDREG=	177774		103#																	
ADRERR=	000001		101#	414	524	589														
BAKPAT	000550R	002	235#	497*	500	503	528	555*												
BIT0 =	000001		51#	81																
BIT1 =	000002		50#	82																
BIT10 =	002000		41#	53	70															
BIT11 =	004000		40#	69																
BIT12 =	010000		39#	53	68	89														
BIT13 =	020000		38#	67	88															
BIT14 =	040000		37#	66	87	210														
BIT15 =	100000		36#	65	86	215	218													
BIT2 =	000004		49#	83																
BIT3 =	000010		48#	84																
BIT4 =	000020		47#	85																
BIT5 =	000040		46#																	
BIT6 =	000100		45#																	
BIT7 =	000200		44#																	
BIT8 =	000400		43#	53	71															
BIT9 =	001000		42#																	
BOTH	001112R	002	258*	288	290*	306	332#													
B1STBL	001066R	002	263	320#																
CLRFIF=	021034		22#																	
CMDREG=	177776		104#	119*																
CSRFLG=	000001		81#	167	198															
CSRVEC=	000064		74#	144*	145*															
CSRVRT	000376R	002	143	198#																
DATERR=	000000		100#	365	420	459	635	644	662											
DMACSR=	021002		9#	209	218*															
DMAF =	021022		17#																	
DMAINT	000432R	002	138	209#																
DMATO =	021004		10#																	
DMAT1 =	021006		11#																	
DMAVEC=	000114		75#	139*	140*															
DMAVC =	021024		18#																	
DMDONE	000546R	002	209*	210	215	234#														
DNI =	004000		69#	123	191															
ERRFLG=	000002		82#	201																
ERRINT	000406R	002	125	201#																
ERRTYP	001111R	002	331#	359*	365*	414*	420*	459*	524*	589*	635*	644*	662*							
FATI =	000400		71#																	
FLG2	000530R	002	160*	163	167	192*	198*	201*	222*	229#	265*	355								
HILIM	001106R	002	260*	292*	329#	350	370	425	429	475	501	509	516	553	583					
			629	657																
INERR =	000003		80#	189																
INMON =	000001		78#	121	175	187														
INTST =	000002		79#	256																
IQADR =	020000		97#	98																
IOSIZ =	020000		93#	98																
IPCSRO=	021000		8#	123*	172	191*	202*	212*	217*	223*										
IPCSRI=	021020		16#	122*	175*	190*	257*	317*												
IPCSR2	000536R	002	158*	159*	232#	274	275													
LASFTP=	012400		53#																	
LFRBUF=	021032		21#																	
LINADR=	100000		99#	102																
LINSIZ=	077774		95#	102																
LOWLIM	001104R	002	259*	291*	328#	348	353	398	399	452	499	507	514	577	598					

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 20
CROSS REFERENCE TABLE -- USER SYMBOLS

SUBNUM	001110R	002	280	330#	345*	396*	451*	496*	575*	624*							
TBLB	000526R	002	181	227#													
TIMINT	000424R	002	148	206#													
TXI	= 010000		68#														
UNIERR	= 0200G0		88#	202													
WCSADR	= 000000		96#	97													
WCSSIZ	= 020000		92#	97	260	291	292	302	311								
.	= 002314R	002	125	133	138	143	148	169	181	204	219	225	227	263	294		
			301	309	320	321	322	323	324	325							

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 22
CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	1#
BERROR	1#
BGAU	1#
BGAUT	1#
BGNCLN	1#
BGNDU	1#
BGNHRD	1#
BGNHW	1#
BGNINI	1#
BGNMOD	1#
BGNMSG	1#
BGNPRO	1#
BGNPTA	1#
BGNRPT	1#
BGNSEG	1#
BGNSET	1#
BGNSFT	1#
BGNSRV	1#
BGNSUB	1#
BGNSW	1#
BGNTST	1#
BNCOMP	1#
BNERRO	1#
BREAK	1#
BRESET	1#
CKLOOP	1#
CLOCK	1#
CLOSE	1#
CLVEC	1#
COMEN	1#
DELAY	1#
DESCR	1#
DEVTYP	1#
DISPAT	1#
DISPLA	1#
DOCLN	1#
DODU	1#
DORPT	1#
ENDAU	1#
ENDAUT	1#
ENDCLN	1#
ENDCOM	1#
ENDDU	1#
ENDHRD	1#
ENDHW	1#
ENDINI	1#
ENDMOD	1#
ENDMSG	1#
ENDPRO	1#
ENDPTA	1#
ENDRPT	1#
ENDSEG	1#
ENDSET	1#
ENDSFT	1#
ENDSRV	1#
ENDSUB	1#

77MICROB - MICROCODE MODULE B
MICROB.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 23
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	10
ENDTST	10
EQUALS	10
ERRDF	10
ERRHRD	10
ERROR	10
ERRSF	10
ERRSOF	10
ERRTBL	10
ESCAPE	10
EXIT	10
FEQUAL	10
GETBYT	10
GETPRI	10
GETWOR	10
GMANIA	10
GMANID	10
GMANIL	10
GPHARD	10
GPRMA	10
GPRPD	10
GPRPL	10
HEADER	10
INLOOP	10
IOSETU	10
IOSTAR	10
KT11	10
LASTAD	10
MANUAL	10
MEMORY	10
MSBYTE	10
MSCHEC	10
MSCNTO	10
MSCOUN	10
MSDATA	10
MSDECR	10
MSDEFA	10
MSENDE	10
MSERRI	10
MSESCA	10
MSESCS	10
MSXCP	10
MSEXIT	10
MSXSE	10
MSXTJ	10
MSGEN	10
MSGEND	10
MSGETS	10
MSGETT	10
MSGNGD	10
MSGNIN	10
MSGNLS	10
MSGNSU	10
MSGNTA	10
MSGNTE	10
MSHAPT	10

77MICROB - MICROCODE MODULE B MACY11 30A(1052) 07-APR-83 16:49 PAGE 24
 MICROB.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- MACRO NAMES

MSHMAP 1#
 MSINCR 1#
 MSIOSE 1#
 MSLDRO 1#
 MSMASK 1#
 MSPCHI 1#
 MSRCLO 1#
 MSRSK1 1#
 MSPOF 1#
 MSPRIN 1#
 MSPUSH 1#
 MSPUT 1#
 MSPUT1 1#
 MSRAD! 1#
 MSRBRO 1#
 MSRNRO 1#
 MSSETS 1#
 MSSTAR 1#
 MSSVC 1#
 MSTLAB 1#
 MSTSTL 1#
 MSWORD 1#
 MSXFER 1#
 OPEN 1#
 POINTE 1#
 PRINTB 1#
 PRINTF 1#
 PRINTS 1#
 PRINTX 1#
 READBU 1#
 REDEF 1#
 RFLAGS 1#
 SETPRI 1#
 SETVEC 1#
 SLASH 1#
 STARS 1#
 SVC 1#
 XFER 1#
 XFERF 1#
 XFERT 1#

. ABS. 000000 000
 000000 001
 MICROB 002314 002

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

MICROB.OBJ,MICROB.LST/CR/SOL/NL:TOC=SVC34R.P11,MICROB.MAC
 RUN-TIME: 2 3 .3 SECONDS
 RUN-TIME RATIO: 36/6=6.0
 CORE USED: 31K (61 PAGES)

68SVC.MLB SOURCE FILE MACY11 30A(1052) 07-APR-83 16:49 PAGE 2
 MICROC.MAC 07-APR-83 16:06

```

1
2
3      .TITLE  MICROC - MICROCODE MODULE C
4      000000'
5      .CSECT MICRC
6      .SBTTL  REGISTER DEFINITIONS USED BY THE T11
7
8      021000  IPCSRO  =      21000  :INTERNAL PCSRO ADDRESS
9      021002  DMACSR  =      21002  :DMA ENGINE CONTROL STATUS REGISTER
10     021004  DMATO   =      21004  :DMA ENGINE TO ADDRESS REGISTER #0
11     021006  DMAT1   =      21006  :DMA ENGINE TO ADDRESS REGISTER #1
12     021010  MDMA0   =      21010  :MICROCPU DMA TO ADDRESS REGISTER #0
13     021012  MDMA1   =      21012  :MICROCPU DMA TO ADDRESS REGISTER #1
14     021014  MDMA0R  =      21014  :MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
15     021016  MDMA1R  =      21016  :MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
16     021020  IPCSR1  =      21020  :INTERNAL PCSR1 ADDRESS
17     021022  DMAF    =      21022  :DMA ENGINE FROM ADDRESS REGISTER
18     021024  DMAWC   =      21024  :DMA ENGINE WORD COUNT REGISTER
19     021026  MDMAW0  =      21026  :MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
20     021030  LTAC    =      21030  :LINK TRANSMIT ADDRESS COUNTER REGISTER
21     021032  LFRBUF  =      21032  :LINK RECIEVE BUFFER ADDRESS FIFO
22     021034  CLRIF   =      21034  :CLEAR FIFO
23     021036  MDMAW1  =      21036  :MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
24     021040  PCSRSW  =      21040  :SWITCH PACK REGISTER
25     021042  MDMSR   =      21042  :MICROCPU DMA STATUS REGISTER
26     021044  LRBUF   =      21044  :LINK RECIEVE BUFFER COMPLETED
27     021060  PHYAD0  =      21060  :PHYSICAL ADDRESS ROM BYTE 0
28     021062  PHYAD1  =      21062  :PHYSICAL ADDRESS ROM BYTE 1
29     021064  PHYAD2  =      21064  :PHYSICAL ADDRESS ROM BYTE 2
30     021066  PHYAD3  =      21066  :PHYSICAL ADDRESS ROM BYTE 3
31     021070  PHYAD4  =      21070  :PHYSICAL ADDRESS ROM BYTE 4
32     021072  PHYAD5  =      21072  :PHYSICAL ADDRESS ROM BYTE 5
33
34     .SBTTL  OTHER DEFINITIONS USED BY THE MICROCODE
35
36     100000  BIT15   =      100000
37     040000  BIT14   =      40000
38     020000  BIT13   =      20000
39     010000  BIT12   =      10000
40     004000  BIT11   =      4000
41     002000  BIT10   =      2000
42     001000  BIT9    =      1000
43     000400  BIT8    =      400
44     000200  BIT7    =      200
45     000100  BIT6    =      100
46     000040  BIT5    =      40
47     000020  BIT4    =      20
48     000010  BIT3    =      10
49     000004  BIT2    =      4
50     000002  BIT1    =      2
51     000001  BIT0    =      1
52
53     012400  LASFTP  =      BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN
54     000340  PRI07   =      340
55     000300  PRI06   =      300
56     000240  PRI05   =      240
    
```

77 MICROCODE - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 3
 MICROCODE.MAC 07-APR-83 10:06 OTHER DEFINITIONS USED BY THE MICROCODE

57	000200	PRI04 =	200	
58	000140	PRI03 =	140	
59	000100	PRI02 =	100	
60	000040	PRI01 =	40	
61	000000	PRI00 =	0	
62		.		
63		:PCSRO - PORT CONTROL STATUS REGISTER 0		
64		.		
65	100000	SERI =	BIT15	
66	040000	PCEI =	BIT14	
67	020000	RXI =	BIT13	
68	010000	TXI =	BIT12	
69	004000	DNI =	BIT11	
70	002000	RCEI =	BIT10	
71	000400	FATI =	BIT8	
72		.		
73	000134	SANVEC=	134	:VECTOR ADDRESS FOR THE SANITY TIMER
74	000064	CSRVEC=	64	:VECTOR ADDRESS FOR CSR WRITE INTERRUPT
75	000114	DMAVEC=	114	:VECTOR ADDRESS FOR DMA DONE INTERRUPT
76	000140	PARVEC=	140	:VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
77	001000	STACK=	1000	:STACK LOCATION
78	000001	INMON=	1	:IN MICROMONITOR STATE
79	000002	INTST=	2	:IN A TEST STATE
80	000003	INERR=	3	:IN ERROR STATE
81	000001	CSRFLG=	BIT0	:CSR WRITE INTERRUPT OCCURED
82	000002	ERRFLG=	BIT1	:UNEXPECTED ERROR OCCURED
83	000004	PARFLG=	BIT2	:PARITY ERROR OCCURED
84	000010	NXMFLG=	BIT3	:NON-EXISTANT MEMORY ERROR OCCURED
85	000020	NPRFLG=	BIT4	:NPR TIMEOUT ERROR OCCURED
86	100000	NPRERR=	BIT15	:PCSRO FLAG INDICATING NPR ERROR OCCURED
87	040000	NXMERR=	BIT14	:PCSRO FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURED
88	020000	UNIERR=	BIT13	:PCSRO FLAG INDICATING UNEXPECTED INTERRUPT OCCURED
89	010000	PARERR=	BIT12	:PCSRO FLAG INDICATING LINK MEMORY PARITY ERROR OCCURED
90	020000	SIZ4K=	20000	:4K WORDS
91	040000	SIZ8K=	SIZ4K*2	:8K WORDS
92	020000	WCSSIZ=	SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
93	020000	IOSIZ=	SIZ4K	:SIZE OF I/O PAGE
94	040000	ROMSIZ=	SIZ8K	:SIZE OF ROM
95	077774	LINSIZ=	SIZ8K*2-4	:SIZE OF LINK MEMORY
96	000000	WCSADR=	0	:BASE ADDRESS OF WCS
97	020000	IOADR=	WCSADR+WCSSIZ	:BASE ADDRESS OF I/O PAGE
98	040000	ROMADR=	IOADR+IOSIZ	:BASE ADDRESS OF ROM
99	100000	LINADR=	ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
100	000000	DATERR=	0	:FLAG INDICATING DATA ERROR OCCURED
101	000001	ADRERR=	1	:FLAG INDICATING ADDRESS ERROR OCCURED
102	177774	MODREG=	LINADR+LINSIZ	:LINK MODE REGISTER
103	177774	ADDREG=	MODREG	:LINK STATION ADDRESS RAM REGISTER
104	177776	CMDREG=	MODREG+2	:LINK COMMAND REGISTER
105				

77 MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 4
MICROC.MAC 07-APR-83 16:06 OTHER DEFINITIONS USED BY THE MICROCODE

106
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.SBTTL C_MODULE MICROCODE

:THIS MODULE CONTAINS A MICROMONITOR AND MICROCODE FOR:
:1-CLEAR INSTRUCTION
:2-PCSR0 INTERRUPT BIT TEST
:3-SANITY TIMER TEST
:4-COMPREHENSIVE LINK MEMORY TEST
:5-DMA 'TO' ADDRESS REGISTER TEST
:6-DMA 'FROM' ADDRESS REGISTER TEST
:7-DMA BLOCK TRANSFER TEST

MICROC::MTPS #PRI07 ;DISABLE INTERRUPTS
MOV #0,#PCMDREG ;TURN OFF THE LINK
MOV #STACK,SP ;SETUP STACK
MOV #INMON,PCSR1 ;TELL HOST WE ARE IN MICROMONITOR
MOV PCSR1,#IPCSR1
MOV PC,RO ;GET ADDRESS OF UNEXPECTED ERROR...
ADD #ERRINT--,RO ;HANDLER
CLR R1 ;FILL ALL UNUSED VECTORS WITH TRAP...
10\$: MOV RO,(R1)+ ;HANDLER
MOV #PRI07,(R1)+
CMP R1,#1000
BLT 10\$
MOV PC,RO ;SETUP PARITY TRAP VECTOR
ADD #PARINT--,RO
MOV RO,#PARVEC
MOV #PRI07,#PARVEC+2
MOV PC,RO ;SETUP DMA INTERRUPT VECTOR
ADD #DMAINT--,RO
MOV RO,#DMAVEC
MOV #PRI06,#DMAVEC+2
MOV PC,RO ;SETUP CSR WRITE VECTOR
ADD #CSRWRIT--,RO
MOV RO,#CSRVEC
MOV #PRI04,#CSRVEC+2
MOV PC,RO ;SETUP SANITY TIMER VECTOR
ADD #T,INT--,RO
MOV RO,#SANVEC
MOV #PRI05,#SANVEC+2
MOV #PCSRSM,RO ;GET SWITCH PACK BITS
BIS #176000,RO ;MAP THEM INTO HOST I/O PAGE
ASL RO ;SHIFT OVER TO POSITION CORRECTLY
ASL RO
ASL RO

77 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 5
 MICROC.MAC 07-APR-83 16:06 C_MODULE MICROCODE

162	000174'	062700	000004			ADD	#4,R0	:PCSR2 IS PCSR0+4
163	000200'	010067	000324			MOV	R0,IPCSR2	:SAVE PCSR2 ADDRESS
164	000204'	012767	000003	000320		MOV	#3,IPCSR2+2	:HIGH ORDER BITS 17:16
165	000212'	005067	000304			CLR	FLG3	:INITIALIZE FLAG WORD
166	000216'	012737	004000	021000		MOV	#DN1,#IPCSRO	:TELL HOST THE LOAD AND START FINISHED
167	000224'	106427	000000		15\$:	MTPS	#PRI00	:ALLOW INTERRUPTS
168								
169	000230'	005767	000266		20\$:	TST	FLG3	:WAIT FOR AN INTERRUPT
170	000234'	001775				BEQ	20\$	
171								
172	000236'	106427	000340			MTPS	#PRI07	:RAISE CPU PRIORITY
173	000242'	032767	000001	000252		BIT	#CSRFLG,FLG3	:DID HOST GIVE US A COMMAND?
174	000250'	001001				BNE	30\$:YES
175	000252'	000777				BR	.	:NO, ERROR SO JUST SIT HERE...
176								:FOR LACK OF ANYTHING BETTER TO DO
177								
178	000254'	113700	021000		30\$:	MOVB	#IPCSRO,R0	:GET WHAT HOST WROTE TO PCSRO
179	000260'	042700	177760			BIC	#177760,R0	:STRIP ALL BUT COMMAND BITS
180	000264'	022700	000017			CMP	#17,R0	:RETURN TO OPERATIONAL MICROCODE?
181	000270'	001425				BEQ	60\$:YES
182	000272'	010701				MOV	PC,R1	:GET ADDRESS OF OUR COMMAND TABLE
183	000274'	062701	000206			ADD	#TBLC-.,R1	
184	000300'	006300				ASL	R0	:MAKE COMMAND A BYTE OFFSET
185	000302'	060001				ADD	R0,R1	:USE IT TO INDEX INTO COMMAND TABLE
186	000304'	061101				ADD	(R1),R1	:R1 NOW HAS COMMAND ROUTINE ADDRESS
187	000306'	004711				JSR	PC,(R1)	:EXECUTE AS COMMANDED FROM HOST
188	000310'	103404				BCS	40\$:ERROR OCCURRED
189	000312'	112767	000001	000206		MOVB	#INON,PCSR1	:INDICATE TO HOST WE ARE BACK IN...
190	000320'	000403				BR	45\$:MICROMONITR
191	000322'	112767	000003	000176	40\$:	MOVB	#INERR,PCSR1	:INDICATE TO HOST ERROR OCCURRED
192	000330'	016737	000172	021020	45\$:	MOV	PCSR1,#IPCSR1	
193	000336'	005067	000160			CLR	FLG3	:RESET FLAG WORD
194	000342'	000730				BR	15\$:GO WAIT FOR ANOTHER COMMAND
195								
196	000344'	005000			60\$:	CLR	R0	:FAKE SUCCESSFUL SELF TEST RESULTS
197	000346'	000137	040006			JMP	#40006	:START OPERATIONAL MICROCODE
198								
199	000352'	052767	000001	000142	CSRWRT:	BIS	#CSRFLG,FLG3	:INDICATE A CSR WRITE INTERRUPT OCCURED
200	000360'	000002				RTI		
201								
202	000362'	052767	000002	000132	ERRINT:	BIS	#ERRFLG,FLG3	:INDICATE A UNEXPECTED INTERRUPT OCCURED
203	000370'	012737	020000	021000		MOV	#UNIERR,#IPCSRO	:TELL HOST AN UNEXPECTED INTERRUPT
204								:HAPPENED
205	000376'	000777				BR	.	:JUST SIT HERE AND SPIN WHEELS
206								:COUNT ON THE HOST TO TIMEOUT WAITING
207								
208	000400'	005267	000:20		TIMINT:	INC	SANTIM	:COUNT TICKS AS THEY OCCUR
209	000404'	000002				RTI		
210								
211	000406'	013767	021002	000124	DMAINT:	MOV	#DMACSR,DMDONE	:GET DMA STATUS
212	000414'	032767	040000	000116		BIT	#BIT14,DMDONE	:DID A NON-EXISTANT MEMORY INTERRUPT OCCUR?
213	000422'	001404				BEQ	10\$:NO
214	000424'	012737	040000	021000		MOV	#NXPERR,#IPCSRO	:YES, TELL HOST A NON-EXISTANT MEMORY
215								:LOCATION WAS ADDRESSED
216	000432'	000407				BR	20\$	
217	000434'	032767	100000	000076	10\$:	BIT	#BIT15,DMDONE	:DID A NPR TIMEOUT OCCUR?

77 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 6
 MICROC.MAC 07-APR-83 16:06 C_MODULE MICROCODE

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218 000442' 001407          BEQ      30$          ;NO
219 000444' 012737 100000 021000      MOV      #NPRERR,#IPCSRO ;TELL HOST NPR TIMEOUT HAPPENED
220 000452' 012737 100000 021002 20$:  MOV      #BIT15,#DRACSR ;CLEAR THE INTERRUPT IN THE DMA ENGINE
221 000460' 000777          BR          .          ;SIT HERE AND SPIN WHEELS
222 000462' 000002          30$:  RTI
223
224
225 000464' 052767 000004 000030  PARINT: BIS      #PARFLG,FLG3 ;SET PARITY ERROR OCCURRED
226 000472' 012737 010000 021000      MOV      #PARERR,#IPCSRO ;TELL HOST A LINK MEMORY PARITY ERROR
227                                     ;OCCURRED
228 000500' 000002          RTI
229
230 000502' 000042          TBLC:  .WORD  CLRC-      ;CLEAR COMMAND
231 000504' 000050          .WORD  MICC1-     ;PCSR0 INTERRUPT BIT TEST
232 000506' 000136          .WORD  MICC2-     ;SANITY TIMER TEST
233 000510' 000222          .WORD  MICC3-     ;COMPREHENSIVE LINK MEMORY TEST
234 000512' 001662          .WORD  MICC4-     ;DMA 'TO' ADDRESS REGISTER TEST
235 000514' 001772          .WORD  MICC5-     ;DMA 'FROM' ADDRESS REGISTER TEST
236 000516' 002166          .WORD  MICC6-     ;DMA BLOCK TRANSFER TEST
237 000520' 002346          .WORD  MICC7-     ;RIPPLE TEST
238
239 000522' 000000          FLG3:  .WORD  0      ;FLAG WORD
240 000524' 000000          SANTIM: .WORD  0    ;COUNT FOR SANITY TIMER
241 000526' 000000          PCSR1: .WORD  0    ;COPY OF WHAT GOES TO IPCSR1
242 000530' 000000 000000          IPCSR2: .WORD  0,0  ;ADDRESS IN HOST MEMORY FOR PCSR2
243 000534' 000000 000000          PCBADR: .WORD  0,0  ;ADDRESS IN HOST MEMORY FOR PCB
244 000540' 000000          DMDONE: .WORD  0    ;DMA INTERRUPT HAPPENED
245 000542' 000377          BAKPAT: .WORD  377  ;BACKGROUND PATTERN FOR MEMORY TESTS
246

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77 MICROCODE - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 7
MICROC.MAC 07-APR-83 16:06 C_MODULE MICROCODE

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252
253

000544' 105067 177757
000550' 000241
000552' 000207

.SBTTL MODULE C, MICRO CLEAR FUNCTION

CLRC: CLR B PCS_n+1
CLC
RTS PC

;CLEAR THE SELF TEST FIELD

77 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 8
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #1

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254 .SBTTL MODULE C, MICROTEST #1
255
256 000554' 112767 000002 177744 MICC1: MOVB #INTST,PCSR1
257 000562' 016737 177740 021020      MOV  PCSR1,@#IPCSR1
258 000570' 016737 177734 021010      MOV  IPCSR2,@#MDMA0 ;PICK UP ADDRESS OF PCBB
259 000576' 016737 177730 021012      MOV  IPCSR2+2,@#MDMA1
260 000604' 013700 021014      MOV  @#MDMAR0,R0 ;R0 HAS CONTENTS OF HOST'S PCSR2
261 000610' 013701 021014      MOV  @#MDMAR0,R1 ;R1 HAS CONTENTS OF HOST'S PCSR3
262 000614' 010037 021010      MOV  R0,@#MDMA0 ;FETCH CONTENTS OF PCBB+0
263 000620' 010137 021012      MOV  R1,@#MDMA1
264
265 ;AT THIS POINT MDMAR0 WILL CONTAIN THE INTERRUPT BIT THAT WE ARE TO SET
266
267 000624' 013737 021014 021000      MOV  @#MDMAR0,@#IPCSR0 ;SET CORRESPONDING INTERRUPT BIT
268 000632' 112767 000001 177667      MOVB #1,PCSR1+1 ;TELL HOST WHAT TEST WE JUST FINISHED
269 000640' 000241
270 000642' 000207      CLC ;SUCCESS
      RTS PC
    
```

77 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 9
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #2

.SBTTL MODULE C, MICROTEST #2

271									
272									
273									
274	000644'	112767	000002	177654	MICC2:	MOVB	#!NTST,PCSR1		:TELL HOST WE ARE TESTING
275	000652'	016737	177650	021020		MOV	PCSR1,#IPCSR1		
276	000660'	005067	177640			CLR	SANTIM		:CLEAR TIMER COUNT
277	000664'	106427	000200			MTPS	#PRI04		:LOWER PRIORITY TO ALLOW TIMER INTERRUPT
278	000670'	026727	177630	000012	10\$:	CMP	SANTIM,#10.		:WAIT FOR TEN TICKS OF THE TIMER
279	000676'	002774				BLT	10\$		
280	000700'	106427	000340			MTPS	#PRI07		:RAISE PRIORITY TO STOP TIMER
281	000704'	112767	000002	177615		MOVB	#2,PCSR1+1		:TELL HOST WHAT TEST WE JUST FINISHED
282	000712'	016737	177610	021020		MOV	PCSR1,#IPCSR1		
283	000720'	012737	004000	021000		MOV	#DNI,#IPCSRO		:TELL HOST WE ARE DONE
284	000726'	000241				CLC			
285	000730'	000207				RTS	PC		

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 10
MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #3

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.SBTTL MODULE C, MICROTEST #3

*****8
:THIS MICROTEST CHECKS THE LINK MEMORY. IT DOES SO BY RUNNING A SERIES
:OF MICROSUBTESTS ON THE MEMORY BETWEEN 16K AND 32K (10000-17776).
:THE SUBTESTS ARE:
:A-ACCESS TEST
:B-ADDRESS SHIFT TEST
:C-DATA LATCH TEST
:D-ADDRESS BIT SHIFT #1
:E-ADDRESS BIT SHIFT #2
:F-MARCH TEST
*****8

MICC3: MOV #INTST,PCSR1 ;TELL HOST WE ARE TESTING
MOV PCSR1,@#IPCSR1
MOV PC,R0 ;GET ADDRESS OF SUBTEST LIST
ADD #C3STBL--,R0

10\$: MOV (R0),R1 ;GET OFFSET FROM ENTRY TO SUBTEST
BEQ 30\$;NO MORE ENTRIES
ADD R0,R1 ;CALC ACTUAL SUBTEST ADDRESS
JSR PC,(R1) ;GO EXECUTE SUBTEST
BCS 20\$;ERROR OCCURRED IN SUBTEST
ADD #2,R0 ;POINT TO NEXT SUBTEST IN LIST
BR 10\$

20\$: MOV IPCSR2,@#MDMA0 ;GET CONTENTS OF HOST'S PCSR2 AND PCSR3
MOV IPCSR2+2,@#MDMA1
MOV @#MDMAR0,R0 ;R0=CONTENTS OF PCSR2
MOV @#MDMAR0,R2 ;R2=CONTENTS OF PCSR3
MOV R0,@#DMA0 ;POINT TO PCBB+0
MOV R2,@#DMA1
MOV SUBNUM,@#DMAW0 ;LOAD PCBB+0 WITH SUBTEST #...
;AND PCBB+1 WITH ERROR TYPE
MOV R1,@#DMAW0 ;LOAD PCBB+2 WITH FAILING ADDRESS
MOV R3,@#DMAW0 ;LOAD PCBB+4 WITH GOOD DATA
MOV R4,@#DMAW0 ;LOAD PCBB+6 WITH BAD DATA
SEC ;TELL MICROMONITOR THIS TEST FAILED
BR 40\$

30\$: CLC ;TELL MICROMONITOR THIS TEST WAS SUCCESSFUL
40\$: MOV #3,PCSR1+1 ;TELL HOST WHICH TEST THIS WAS
MOV PCSR1,@#IPCSR1
MOV #DNI,@#IPCSRO
RTS PC ;TELL HOST THIS MICROTEST IS FINISHED

C3STBL: MICC3A-
MICC3B-
MICC3C-
MICC3D-
MICC3E-
MICC3F-
.WCRD 0 ;END OF LIST

MICROC - MICROCODE MODULE C
MICROC.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 11
MODULE 1, MICROTTEST #3

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001122' 000
001123' 000

SUBNUM: .BYTE 0
ERRTYP: .BYTE 0

:CURRENT SUBTEST # BEING EXECUTED
:TYPE OF ERROR, DATA =0, ADDRESS=1

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 12
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #3, MICROSUBTEST A

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346      .SBTTL  MODULE C, MICROTEST #3, MICROSUBTEST A
347
348      ;*****
349      ;
350      ;THIS IS AN ACCESS TEST OF LINK MEMORY. IT WRITES DATA
351      ;ALL THROUGH 16K TO 32K(10000,17772) AND VERIFIES SAME. IT THEN WRITES
352      ;ZEROS . IT ALSO CHECKS FOR PARITY ERRORS.
353      ;
354      ;*****
355
356 001124' 010046      MICC3A: MOV      R0,-(SP)      ;SAVE R0
357 001126' 112767      000001 177766      MOVB     #1,SUBNUM    ;TELL WE ARE IN SUBTEST A
358 001134' 106427      000300      MTPS     #PRIO6      ;ALLOW PARITY ERRORS
359
360 001140' 010600      MOV      SP,R0      ;SAVE THE STACK POINTER FOR A MOMENT
361 001142' 012706      177774      MOV      #LINADR+LINSIZ,SP ;POINT STACK TO TOP OF LINK MEMORY
362 001146' 012705      037776      MOV      #LINSIZ/2,R5   ;NUMBER OF WORDS IN LINK MEMORY
363 001152' 004767      000000      5$:     JSR      PC,10$   ;WRITE ADDRESS OF NEXT INSTUCTION
364 001156' 077503      10$:     SOB      R5,5$     ;ALL OVER LINK MEMORY
365
366 001160' 010006      MOV      R0,SP      ;RESTORE STACK
367 001162' 010703      MOV      PC,R3      ;GET DATA THAT WAS WRITTEN TO LINK MEMORY
368 001164' 062703      177772      ADD      #10$-.,R3
369
370 001170' 012701      100000      MOV      #LINADR,R1   ;POINT TO BASE OF LINK MEMORY
371 001174' 011104      12$:     MOV      (R1),R4     ;READ DATA
372 001176' 032767      000004 177316      BIT      #PARFLG,FLG3 ;DID A PARITY ERROR OCCUR?
373 001204' 001002      BNE      20$        ;YES
374
375 001206' 020304      15$:     CMP      R3,R4      ;NO, WAS DATA GOOD?
376 001210' 001410      BEQ      30$        ;YES
377 001212' 112767      000003 177306      20$:     MOVB     #INERR,PCSR1 ;TELL HOST THIS SUBTEST FAILED
378 001220' 112767      000000 177675      MOVB     #DATERR,ERRTYP ;TELL MICROMONITOR TYPE OF ERROR
379 001226' 000261      SEC      ;TELL MICROMONITOR ERROR OCCURRED
380 001230' 000414      BR      40$
381
382 001232' 062701      000002      30$:     ADD      #2,R1      ;POINT TO NEXT ADDRESS
383 001236' 020127      177774      CMP      R1,#LINADR+LINSIZ ;DONE ALL OF LINK MEMORY?
384 001242' 001354      BNE      12$        ;NOT YET
385
386 001244' 012701      100000      MOV      #LINADR,R1   ;OK NOW FILL WITH ZEROES
387 001250' 005021      32$:     CLR      (R1)+
388 001252' 020127      177774      CMP      R1,#LINADR+LINSIZ
389 001256' 001374      BNE      32$
390
391 001260' 000241      35$:     CLC      ;INDICATE SUCCESS
392 001262' 012600      40$:     MOV      (SP)+,R0    ;RESTORE R0
393 001264' 000207      RTS      PC
394

```

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 13
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #3, MICROSUBTEST B

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.SBTTL MODULE C, MICROTEST #3, MICROSUBTEST B

:ADDRESS SHIFT TEST

:THIS TEST ASSUMES ALL MEMORY BETWEEN 100000 AND 177776 IS ZEROS
 :IT CHECKS FOR PROPER BANK SELECTION BY WRITING 1'S IN A LOCATION
 :AND CHECKING FOR 1'S IN THE SAME LOCATION OF OTHER 4K BANKS (ADDRESS ERROR).
 :IT ALSO CHECKS FOR DATA ERRORS I.E. NON-ZERO DATA IN LOCATIONS NOT
 :WRITTEN WITH 1'S AND MAKES SURE LOCATIONS WRITTEN WITH 1'S HAVE 1'S IN THEM

```

MICC3B: MOV    R0,-(SP)           :SAVE R0
        MOVB   #2,SUBNUM        :TELL HIM WE ARE IN THE SECOND SUBTEST

10$:   MOV    #LINADR,R0        :SET 'WRITTEN TO' ADDRESS
        MOV    #LINADR,R1       :SET 'READ FROM' ADDRESS
        MOV    #177777,(R0)     :WRITE DATA INTO LOCATION AT BASE...
                                           :OF A 4K BOUNDARY
20$:   MOV    (R1),R4          :READ DATA FROM MEMORY ADDRESS WHICH...
                                           :IS AN EVEN 4K INCREMENT AWAY
        CMP    R0,R1           :IS 'READ FROM' AND 'WRITTEN TO'
                                           :ADDRESSES THE SAME?
        BEQ    70$             :YES, SO DATA IN BOTH SHOULD BE THE SAME
        CLR    R3              :GOOD DATA IS ZEROS
        TST    R4              :DATA IN 'READ FROM' MUST BE 0'S
        BEQ    50$             :OK GO CHANGE 'READ FROM' ADDRESS
                                           :ERROR OCCURRED BUT WE DON'T KNOW IF...
                                           :IT IS A DATA ERROR OR AN ADDRESS ERROR
        CMP    #177777,R4      :WAS DATA READ ALL 1'S?
        BNE    40$            :NO, SO IT WAS A DATA ERROR
        MOVB   #ADRERR,ERRTYP  :YES, IT WAS AN ADDRESS ERROR
        MOVB   #INERR,PCSR1   :TELL HOST THIS TEST FAILED
        SEC    :INDICATE FAILURE
        BR     60$            :LEAVE THIS SUBTEST
70$:   CMP    #177777,R4      :DATA READ MUST BE ALL 1'S
        BEQ    50$            :IT IS GOOD
        MOV    #177777,R3      :GOOD DATA IS ONES
40$:   MOVB   #DATERR,ERRTYP  :IT WAS A DATA ERROR
        MOVB   #INERR,PCSR1   :TELL HOST THIS TEST FAILED
        SEC    :INDICATE FAILURE
        BR     60$            :LEAVE THIS SUBTEST
50$:   ADD    #20000,R1        :CHANGE 'READ FROM' ADDRESS BY 4K
        BCC    20$            :CONTINUE SAME 'WRITTEN TO' IF NOT PAST 32K
        CLR    (R0)           :CLEAR OLD 'WRITTEN TO' ADDRESS
        ADD    #20000,R0       :CHANGE 'WRITTEN TO' ADDRESS BY 4K
        BCC    10$            :CONTINUE IF NOT PAST 32K
        CLC    :INDICATE SUCCESS OF THIS SUBTEST
60$:   MOV    (SP)+,R0        :RESTORE R0
        RTS    PC
    
```


78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 14
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #3, MICROSUBTEST C

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450      .SBTTL  MODULE C, MICROTEST #3, MICROSUBTEST C
451
452      :*****
453      :
454      :DATA LATCH TEST
455      :
456      :AT THE FIRST LOCATION OF EACH 4K BANK A '1' IS SHIFTED THROUGH EACH
457      :BIT POSITION AND CHECKED FROM LSB TO MSB.
458      :THEN IN THE SAME LOCATION A '0' IS SHIFTED THROUGH EACH BIT POSITION
459      :AND CHECKED.
460      :
461      :*****
462
463
464 001432' 010046      MICC3C: MOV      R0,-(SP)      ;SAVE R0
465 001434' 112767 000003 177460      MOVB     #3,SUBNUM      ;TELL WEA ARE IN SUBTEST 'C'
466 001442' 012701 100000      MOV      #LINADR,R1     ;GET BASE ADDRESS OF LINK MEMORY
467 001446' 012700 000001      1$:     MOV      #1,R0      ;DATA = 1 IN LEAST SIGNIFICANT BIT
468 001452' 010002      MOV      R0,R2         ;INDICATE WE ARE SHIFTING A '1'
469 001454' 010011      2$:     MOV      R0,(R1)    ;WRITE LOCATION WITH GOOD DATA
470 001456' 011104      MOV      (R1),R4       ;READ DATA FROM SAME LOCATION
471 001460' 020004      3$:     CMP      R0,R4         ;IS DATA THE SAME AS WRITTEN?
472 001462' 001411      BEQ      4$            ;YES, OK
473 001464' 112767 000000 177431      MOVB     #DATERR,ERRTYP ;ERROR IS DATA ERROR
474 001472' 010003      MOV      R0,R3         ;GOOD DATA
475 001474' 112767 000003 177024      MOVB     #INERR,PCSR1   ;TELL HOST THIS TEST FAILED
476 001502' 000261      SEC                     ;INDICATE THIS SUBTEST FAILED
477 001504' 000417      BR      6$            ;LEAVE THIS SUBTEST
478 001506' 005702      4$:     TST      R2         ;ARE WE SHIFTING A 1 OR A 0?
479 001510' 001406      BEQ      5$            ;ZERO
480 001512' 006300      ASL      R0            ;SHIFT THE ONE OVER
481 001514' 103357      BCC      2$            ;IF THE '1' HAS NOT BEEN SHIFTED...
482
483 001516' 005002      CLR      R2            ;THRU THE 16 POSITIONS CONTINUE WITH 1
484 001520' 012700 177776      MOV      #177776,R0    ;ELSE START SHIFTING A '0'
485 001524' 000753      BR      2$            ;START WITH LSB = 0 ALL OTHERS 1'S
486 001526' 000261      5$:     SEC                     ;CONTINUE WITH SHIFTING A 0
487 001530' 006100      ROL      R0            ;MOVE '0' OVER ONE BIT POSITION
488 001532' 103750      BCS      2$            ;HAS '0' BEEN IN ALL POSITIONS?
489 001534' 062701 020000      ADD      #SI24K,R1     ;NO CONTINUE WITH SHIFTING A 0
490 001540' 103342      BCC      1$            ;CONTINUE TEST AT NEXT 4K BOUNDARY...
491 001542' 000241      CLC                     ;IF NOT PAST 32K
492 001544' 012600      6$:     MOV      (SP)+,R0   ;INDICATE THIS SUBTEST SUCCESSFUL
493 001546' 000207      RTS      PC           ;RESTORE R0

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78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 15
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #2, MICROSUBTEST D

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494 .SBTTL MODULE C, MICROTEST #2, MICROSUBTEST D
495
496 :*****
497 :
498 :ADDRESS BIT SHIFT #1
499 :
500 :THIS TEST CHECKS FOR DUAL ADDRESS PROBLEMS BY FIRST WRITING A BACKGROUND
501 :PATTERN THROUGHOUT LINK MEMORY.
502 :THEN STARTING AT THE LOWEST LOCATION IN A BANK IT WRITES THE COMPLEMENT
503 :OF THE BACKGROUND PATTERN. THEN READS THE MEMORY FOR CORRECT CONTENTS
504 :IT THEN SHIFTS A '1' THROUGH THE ADDRESS POINTER AND REPEATS THE ABOVE.
505 :IT DOES THIS FOR EACH 4K BANK.
506 :*****
507
508
509 001550' 010046 MICC3D: MOV R0,-(SP) ;SAVE R0
510 001552' 112767 000004 177342 MOVB #4,SUBNUM ;TELL WE ARE IN SUBTEST 4
511 001560' 012767 000377 176'54 MOV #377,BAKPAT ;LOAD BAKPAT CONSTANT
512 001566' 005003 1S: CLR R3 ;CONTAINS 4K BANK ADDRESS
513 001570' 012700 100000 2S: MOV #LINADR,R0 ;WRITE LINK MEMORY WITH BACKGROUND...
514 001574' 016720 176742 3S: MOV BAKPAT,(R0)+ ;PATTERN
515 001600' 020027 177774 CMP R0,#LINADR+LINSIZ
516 001604' 103773 BLO 3S
517 001606' 016700 176730 MOV BAKPAT,R0 ;R0 CONTAINS GOOD DATA
518
519 001612' 005002 4S: CLR R2 ;R2 WILL BE OUR 'WRITTEN TO' ADDRESS
520 001614' 050302 6S: BIS R3,R2 ;INDEX INTO THIS 4K BANK
521 001616' 020227 100000 CMP R2,#LINADR ;IS RESULT LESS THAN LINK MEM BASE?
522 001622' 103453 BLO 16S ;YES, DON'T USE THIS ADDRESS
523 001624' 020227 177774 CMP R2,#LINADR+LINSIZ ;IS RESULT LARGER THAN LINK MEM TOP?
524 001630' 103065 BHIS 20S ;YES, DON'T USE THIS ADDRESS EITHER
525 001632' 000312 SWAB (R2) ;WRITE COMPLEMENT OF PATTERN
526 001634' 005001 CLR R1 ;R1 WILL BE OUR 'READ FROM' ADDRESS
527 001636' 050301 7S: BIS R3,R1 ;INDEX INTO THIS 4K BANK
528 001640' 020127 100000 CMP R1,#LINADR ;IS RESULT LESS THAN LINK MEM BASE?
529 001644' 103431 BLO 12S ;YES, DON'T USE THIS ADDRESS
530 001646' 020127 177774 CMP R1,#LINADR+LINSIZ ;IS RESULT LARGER THAN LINK MEM TOP?
531 001652' 103036 BHIS 15S ;YES, DON'T USE THIS ADDRESS EITHER
532 001654' 011104 MOV (R1),R4 ;READ DATA
533 001656' 020102 CMP R1,R2 ;IS 'READ FROM' AND 'WRITTEN TO' SAME?
534 001660' 001417 BEQ 10S ;YES, GO CHECK DATA
535 001662' 020004 CMP R0,R4 ;NO, DATA READ SHOULD BE SAME AS BAKPAT
536 001664' 001421 BEQ 12S ;IF SO CONTINUE WITH NEW INDEX
537
538 001666' 112767 000001 177227 8S: MOVB #ADRERR,ERRTYP ;INDICATE ADDRESS ERROR
539 001674' 010003 MOV R0,R3 ;GET GOOD DATA
540 001676' 000261 SEC ;INDICATE THIS SUBTEST FAILED
541 001700' 112767 000003 176620 MOVB #INERR,PCSR1 ;TELL HOST THIS TEST FAILED
542 001706' 000442 BR 25S ;LEAVE THIS SUBTEST
543 001710' 020067 176626 CMP R0,BAKPAT ;DOES R0 CONTAIN SWAPPED DATA?
544 001714' 001405 BEQ 12S ;NO
545 001715' 000403 BR 11S ;YES
546
547 001720' 000300 10S: SWAB R0 ;MAKE GOOD DATA LIKE SWAPPED BAKPAT
548 001722' 020004 CMP R0,R4 ;IS DATA READ SAME AS DATA WRITTEN?
549 001724' 001360 BNE 8S ;NO, ERROR
    
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78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 17
MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #3, MICROSUBTEST E

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.SBTTL MODULE C, MICROTEST #3, MICROSUBTEST E

:ADDRESS BIT SHIFT #2
:THIS TEST CHECKS FOR DUAL ADDRESSING PROBLEMS BY WRITING EACH LOCATION
:OF LINK MEMORY WITH ITS ADDRESS AND THEN VERIFYING EACH LOCATION.
:IT THEN DOES THE SAME THING BUT USES THE COMPLEMENT OF THE ADDRESS
:AS DATA.

```

590 002020' 010046          MIC3E: MOV      R0,-(SP)          ;SAVE R0
591 002022' 112767 000005 177072  MOVB     #5,SUBNUM      ;TELL WHICH SUBTEST WE ARE IN
592 002030' 005003          CLR      R3            ;FLAG INDICATING ADDRESS IS COMPLEMENTED
593 002032' 012701 100000          MOV     #LINADR,R1     ;GET STARTING ADDRESS OF LINK MEMORY
594 002036' 010100          1$:  MOV     R1,R0          ;GET ADDRESS TO WORK WITH
595 002040' 005703          TST     R3            ;SHOULD WE COMPLEMENT THE DATA TO STORE?
596 002042' 001401          BEQ     2$            ;NO STORE AS IS
597 002044' 005100          COM     R0           ;COMPLEMENT DATA
598 002046' 010021          2$:  MOV     R0,(R1)+      ;WRITE DATA
599 002050' 020127 177774          CMP     R1,#LINADR+LINSIZ ;IS NEW ADDRESS LARGER THAN LINK MEM?
600 002054' 103770          BLO     1$           ;NO, KEEP FILLING LINK MEMORY

602 002056' 014104          3$:  MOV     -(R1),R4      ;READ DATA STORED
603 002060' 020004          CMP     R0,R4        ;IS DATA READ SAME AS WRITTEN?
604 002062' 001411          BEQ     4$           ;YES
605 002064' 112767 000001 177031  MOVB    #ADRERR,ERRTYP ;INDICATE ADDRESS ERROR
606 002072' 010003          MOV     R0,R3        ;GET GOOD DATA
607 002074' 000261          SEC           ;INDICATE FAILURE
608 002076' 112767 000003 176422  MOVB    #INERR,PCSR1  ;TELL HOST THIS TEST FAILED
609 002104' 000414          BR     10$          ;LEAVE THIS SUBTEST
610 002106' 010100          4$:  MOV     R1,R0          ;CALC GOOD DATA FOR NEXT LOCATION
611 002110' 162700 000002          SUB     #2,R0
612 002114' 005703          TST     R3
613 002116' 001401          BEQ     5$
614 002120' 005100          COM     R0
615 002122' 020127 100000          5$:  CMP     R1,#LINADR     ;HAVE WE CHECKED ALL LOCATIONS
616 002126' 101353          BHI     3$          ;NOT YET
617 002130' 005103          COM     R3          ;HAVE WE DONE IT COMPLEMENTED?
618 002132' 001341          BNE     1$          ;NO, REPEAT WITH COMPLEMENT
619 002134' 000241          CLC           ;INDICATE SUCCESS
620 002136' 012600          10$: MOV     (SP)+,R0     ;RESTORE R0
621 002140' 000207          RTS     PC

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MICROC - MICROCODE MODULE C
MICROC.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:49 PAGE 18
MODULE C, MICROTEST #3, MICROSUBTEST F

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002142' 010046
002144' 112767 000006 176750
002152' 005003
002154' 012701 100000
002160' 012700 000377
002164' 010021
002166' 020127 177774
002172' 103774

002174' 014104
002176' 020004
002200' 001411
002202' 112767 000000 176713
002210' 010003
002212' 000261
002214' 112767 000003 176304
002222' 000462
002224' 000300
002226' 010011
002230' 011104
002232' 020400
002234' 001411
002236' 112767 000000 176657
002244' 010003
002246' 000261
002250' 112767 000003 176250
002256' 000444
002260' 000300
002262' 001032

002264' 005703
002266' 001032
002270' 062701 000002
002274' 020127 177774
002300' 103015
002302' 011104

.SBTTL MODULE C, MICROTEST #3, MICROSUBTEST F

:MARCH TEST
:THIS TEST WRITES A BACKGROUND PATTERN IN ALL OF LINK MEMORY
:1-READ EVERY LOCATION FOR CORRECT DATA, SWAPS BYTES AT EACH LOCATION
:AND PROCEED IN MAX TO MIN DIRECTION
:2-READ EVERY LOCATION FOR SWAPPED DATA, WRITES ORIGINAL PATTERN IN EACH
:LOCATION AND PROCEEDS IN MIN TO MAX DIRECTION
:3-REPEAT 1 GOING IN MIN TO MAX DIRECTION
:4-REPEAT 2 GOING IN MAX TO MIN DIRECTION

MICCF: MOV R0,-(SP) ;SAVE R0
MOV #6,SUBNUM ;TELL WHICH SUBTEST WE ARE IN
CLR R3 ;ADDRESS DIRECTION FLAG 0 = MIN.->MAX
10\$: MOV #LINADR,R1 ;FILL LINK MEMORY WITH BACKGROUND PATTERN
MOV #377,R0 ;BACKGROUND PATTERN=LOW BYTE ALL 1'S
12\$: MOV R0,(R1)+
CMP R1,#LINADR+LINSIZ
BLO 12\$

20\$: MOV -(R1),R4 ;STARTING FROM THE TOP, READ DATA
CMP R0,R4 ;R0 = GOOD DATA, R4 = DATA READ
BEQ 30\$;IF SAME OK
MOV #DATERR,ERRTYP ;INDICATE DATA ERROR
MOV R0,R3 ;GET GOOD DATA
SEC ;INDICATE FAILURE
MOV #INERR,PCSR1 ;TELL HOST THIS TEST FAILED
BR 200\$;LEAVE THIS SUBTEST
30\$: SWAB R0 ;NEW GOOD DATA PATTERN
MOV R0,(R1) ;STORE AT SAME PLACE
MOV (R1),R4 ;READ IT BACK
CMP R4,R0 ;R0=GOOD DATA, R4=DATA READ
BEQ 40\$;IF SAME OK
MOV #DATERR,ERRTYP ;INDICATE DATA ERROR
MOV R0,R3 ;GET GOOD DATA
SEC ;FAILURE
MOV #INERR,PCSR1 ;TELL HOST THIS TEST FAILED
BR 200\$;LEAVE THIS SUBTEST
40\$: SWAB R0 ;SWITCH GOOD DATA AGAIN
BNE 90\$;IF ORIGINAL PATTERN THEN WE ARE...
;READING THE MEMORY TO CONTAIN A...
;BACKGROUND OF LOW BYTE = ALL 1'S...
;AND WRITING IT BACK SWAPPED AND...
;VERIFYING SWAPPED DATA

50\$: TST R3
BNE 100\$
60\$: ADD #2,R1 ;WE ARE GOING MIN->MAX SO ADJUST POINTER
CMP R1,#LINADR+LINSIZ ;WE AT MAX?
BHS 80\$;YES
70\$: MOV (R1),R4 ;READ DATA

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 20
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #4

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704          .SBTTL  MODULE C, MICROTEST #4
705
706 002374' 112767 000002 176124 MICC4:  MOVB  #INTST,PCSR1      ;TELL HOST WE ARE TESTING
707 002402' 016737 176120 021020      MOV   PCSR1,@#IPCSR1
708 002410' 016737 176114 021010      MOV   IPCSR2,@#DMA0      ;GET PCBB ADDRESS THROUGH HOST'S PCSR2
709 002416' 016737 176110 021012      MOV   IPCSR2+2,@#DMA1
710 002424' 013700 021014              MOV   @#DMAR0,R0        ;R0 HAS CONTENTS OF HOST'S PCSR2
711 002430' 013701 021014              MOV   @#DMAR0,R1        ;R1 HAS CONTENTS OF HOST'S PCSR3
712 002434' 010037 021010              MOV   R0,@#DMA0        ;SETUP TO READ PCBB+0
713 002440' 010137 021012              MOV   R1,@#DMA1
714 002444' 013737 021014 021004      MOV   @#DMAR0,@#DMATO   ;GET DATA PATTERN AND WRITE IT TO...
715                                     ;DMA 'TO' ADDRESS REGISTER
716 002452' 013737 021004 021026      MOV   @#DMATO,@#DMAW0   ;READ DATA PATTERN BACK AND WRITE...
717                                     ;BACK INTO HOST MEMORY
718 002460' 112767 000004 176041      MOVB  #4,PCSR1+1        ;TELL HOST WHAT TEST WE JUST FINISHED
719 002466' 016737 176034 021020      MOV   PCSR1,@#IPCSR1
720 002474' 012737 004000 021000      MOV   #DNI,@#IPCSRO
721 002502' 000241              CLC
722 002504' 000207              RTS   PC
723

```

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 21
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #5

```

724          .SBTTL  MODULE C, MICROTEST #5
725
726
727 002506' 112767 000002 176012 MICCS:  MOVB  #!NTST,PCSR1      ;TELL HOST WE ARE TESTING
728 002514' 016737 176006 021020      MOV   PCSR1,@#IPCSR1
729 002522' 012700 100000              MOV   #LINADR,R0      ;BASE ADDRESS OF LINK MEMORY
730 002526' 012701 037776              MOV   #LINSIZ/2,R1    ;NUMBER OF WORDS IN LINK MEMORY
731 002532' 010010          10$:  MOV   R0,(R0)          ;FILL LINK MEMORY WITH THE ADDRESS
732 002534' 005720              TST   (R0)+
733 002536' 005301              DEC   R1              ;OF EACH LOCATION
734 002540' 001374              BNE   10$
735 002542' 016737 175762 021010      MOV   IPCSR2,@#MDMA0  ;GET PCBB THROUGH HOST'S PCSR2
736 002550' 016737 175756 021012      MOV   IPCSR2+2,@#MDMA1
737 002556' 013700 021014              MOV   @#MDMAR0,R0    ;R0 HAS CONTENTS OF HOST'S PCSR2
738 002562' 013701 021014              MOV   @#MDMAR0,R1    ;R1 HAS CONTENTS OF HOST'S PCSR3
739 002566' 010037 021010              MOV   R0,@#MDMA0     ;R0 HAS ADDRESS OF PCBB+0
740 002572' 010137 021012              MOV   R1,@#MDMA1     ;R1 HAS ITS HIGH ORDER BITS
741 002576' 013737 021014 021022      MOV   @#MDMAR0,@#DMAF ;LOAD DMA 'FROM' ADDRESS REGISTER
742                                     ;WITH ADDRESS SUPPLIED FROM HOST
743 002604' 062700 000002              ADD   #2,R0          ;LOAD DMA 'TO' ADDRESS REGISTER
744 002610' 005501              ADC   R1              ;WITH PCBB+2 ADDRESS
745 002612' 010037 021004              MOV   R0,@#DMAT0
746 002616' 010137 021006              MOV   R1,@#DMAT1
747 002622' 012737 000002 021024      MOV   #2,@#DMAWC     ;LOAD WORD COUNT TO TRANSFER 1 WORD
748 002630' 005067 175704              CLR   DM DONE        ;CLEAR DMA DONE FLAG
749 002634' 005237 021002              INC   @#DMACSR       ;START DMA ENGINE
750 002640' 106427 000240              MTPS  #PRI05         ;LOWER CPU PRIORITY
751 002644' 005767 175670          20$:  TST   DM DONE        ;IS THE TRANSFER COMPLETE?
752 002650' 001775              BEQ   20$            ;NO, WAIT FOR THE INTERRUPT
753 002652' 106427 000340              MTPS  #PRI07
754 002656' 112767 000005 175643      MOVB  #5,PCSR1+1     ;TELL HOST WHAT TEST WE JUST FINISHED
755 002664' 016737 175636 021020      MOV   PCSR1,@#IPCSR1
756 002672' 012737 004000 021000      MOV   #DNI,@#IPCSRO ;TELL HOST WE ARE DONE
757 002700' 000241              CLC
758 002702' 000207              RTS   PC
    
```


78 MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 23
 MICROC.MAC 07-APR-83 16:06 MODULE C, MICROTEST #6

```

789
790      .SBTTL <DMA "TO" REGISTER RIPPLE TEST>
791
792
793      003066' 112767 000002 175432 MICC7:: MOVB  #INIST,PCSR1
794      003074' 016737 175426 021020      MOV   PCSR1,@#IPCSR1
795
796
797
798      003102' 012700 100004      MOV   #LINADR+4,RO
799      003106' 012720 052525      MOV   #052525,(RO)+
800      003112' 012710 031463      MOV   #031463,(RO)
801
802
803      003116' 016737 175406 021010      MOV   IPCSR2,@#MDMA0
804      003124' 016737 175402 021012      MOV   IPCSR2+2,@#DMA1
805      003132' 013700 021014      MOV   @#MDMAR0,RO
806      003136' 013701 021014      MOV   @#MDMAR0,R1
807
808
809      003142' 010037 021004      MOV   RO,@#DMAT0
810      003146' 012737 100004 021022      MOV   #LINADR+4,@#DMAF
811      003154' 012737 000004 021024      MOV   #4,@#DMAWC
812      003162' 010700      MOV   PC,RO
813      003164' 062700 175222      ADD   #DMAINT-.,RO
814      003170' 010037 000114      MOV   RO,@#DMAVEC
815      003174' 012737 000300 000116      MOV   #PRI06,@#DMAVEC+2
816      003202' 005067 175332      CLR   DMDCNE
817      003206' 005237 021002      INC   @#DMACSR
818      003212' 106427 000240      MTPS  #PRI05
819      003216' 005767 175316      20$: TST   DMDCNE
820      003222' 001775      BEQ   20$
821
822
823      003224' 112767 000007 175275      MOVB  #7,PCSR1+1
824      003232' 016737 175270 021020      MOV   PCSR1,@#IPCSR1
825      003240' 012737 004000 021000      MOV   #DNI,@#IPCSRO
826      003246' 000241      CLC
827      003250' 000207      RTS   PC
828      003252' 003254      MICCSZ::MICCSZ-MICROC+2      ;SIZE OF MICROCODE MODULE C
829
830      000001      .END
    
```

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 25
 MICROC.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- USER SYMBOLS

ADDRG=	177774		103#																			
ADRERR=	000001		101#	428	538	605																
BAKPAT	000542R	002	245#	511*	514	517	543	571*														
BIT0 =	000001		51#	81																		
BIT1 =	000002		50#	82																		
BIT10 =	002000		41#	53	70																	
BIT11 =	004000		40#	69																		
BIT12 =	010000		39#	53	68	89																
BIT13 =	020000		38#	67	88																	
BIT14 =	040000		37#	66	87	212																
BIT15 =	100000		36#	65	86	217	220															
BIT2 =	000004		49#	83																		
BIT3 =	000010		48#	84																		
BIT4 =	000020		47#	85																		
BIT5 =	000040		46#																			
BIT6 =	000100		45#																			
BIT7 =	000200		44#																			
BIT8 =	000400		43#	53	71																	
BIT9 =	001000		42#																			
CLRC	000544R	002	230	251#																		
CLRFIF=	021034		22#																			
CMOREG=	177776		104#	125*																		
CSRFLG=	000001		81#	173	199																	
CSRVEC=	000064		74#	149*	150*																	
CSMRT	000352R	002	148	199#																		
C3STBL	001104R	002	305	335#																		
DATERR=	000000		100#	378	435	473	652	662	681													
DMACSR=	021002		9#	211	220*	749*	780*	816*														
DMAF =	021022		17#	741*	777*	809*																
DMAINT	000406R	002	143	211#	812																	
DMATO =	021004		10#	714*	716	745*	776*	808*														
DMAT1 =	021006		11#	746*																		
DMAVEC=	000114		75#	144*	145*	813*	814*															
DMAVC =	021024		18#	747*	778*	810*																
DMDONE	000540R	002	211*	212	217	244#	748*	751	779*	782	815*	818										
DNI =	004000		69#	166	283	332	720	756	786	824												
ERRFLG=	000002		82#	202																		
ERRINT	000362R	002	130	202#																		
ERRTYP	001123R	002	344#	378*	428*	435*	473*	538*	605*	652*	662*	681*										
FAT1 =	000400		71#																			
FLG3	000522R	002	165*	169	173	193*	199*	202*	225*	239#	372											
INERR =	000003		80#	191	377	429	436	475	541	608	655	665	684									
INRON =	000001		78#	127	189																	
INTST =	000002		79#	256	274	302	706	727	762	793												
IQADR =	020000		97#	98																		
IOSIZ =	020000		93#	98																		
IPCSRO=	021000		8#	166*	178	203*	214*	219*	226*	267*	283*	332*	720*	756*	786*							
			824*																			
IPCSR1=	021020		16#	128*	192*	257*	275*	282*	303*	331*	707*	719*	728*	755*	763*							
			785*	794*	823*																	
IPCSR2	000530R	002	163*	164*	242#	258	259	315	316	708	709	735	736	770	771							
			802	803																		
LASFTP=	012400		53#																			
LFRBUF=	021032		21#																			
LINADR=	100000		99#	102	361	370	383	386	388	412	413	466	513	515	521							
			523	528	530	569	593	599	615	643	646	676	690	696	729							

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 27
 MICROC.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- USER SYMBOLS

PRI06 = 000300		55#	145	358*	814														
PRI07 = 000340		54#	124*	133	140	172*	280*	753*											
RCE1 = 002000		70#																	
ROMADR= 040000		98#	99																
ROMSIZ= 040000		94#	99																
RXI = 020000		67#																	
SANTIM 000524R	002	208*	240#	276*	278														
SAWVEC= 000134		73#	154*	155*															
SERI = 100000		65#																	
SIZ4K = 020000		90#	91	92	93	489	556	565											
SIZ8K = 040000		91#	94	95															
STACK = 001000		77#	126																
SUBNUM 001122R	002	321	343#	357*	410*	465*	510*	591*	641*										
TBLC 000502R	002	183	230#																
TIMINT 000400R	002	153	208#																
TXI = 010000		68#																	
UNIERR= 020000		88#	203																
WCSADR= 000000		96#	97																
WCSSIZ= 020000		92#	97																
. = 003254R	002	130	138	143	148	153	175	183	205	221	230	231	232	233					
		234	235	236	237	305	335	336	337	338	339	340	368	812					

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 29
 MICROC.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	1#
BERROR	1#
BGNAU	1#
BGNAUT	1#
BGNCLN	1#
BGNDU	1#
BGNHRD	1#
BGNHW	1#
BGINI	1#
BGNMOD	1#
BGNMSG	1#
BGNPRO	1#
BGNPTA	1#
BGNRPT	1#
BGNSEG	1#
BGNSET	1#
BGNSFT	1#
BGNSRV	1#
BGNSUB	1#
BGNSU	1#
BGNTST	1#
BNCOMP	1#
BNERRO	1#
BREAK	1#
BRESET	1#
CKLOOP	1#
CLOCK	1#
CLOSE	1#
CLRVEC	1#
COMMEN	1#
DELAY	1#
DESCRI	1#
DEVTYP	1#
DISPAT	1#
DISPLA	1#
DOCLN	1#
DODU	1#
DORPT	1#
ENDAU	1#
ENDAUT	1#
ENDCLN	1#
ENDCOM	1#
ENDDU	1#
ENDHRD	1#
ENDHW	1#
ENDINI	1#
ENDMOD	1#
ENDMSG	1#
ENDPRO	1#
ENDPTA	1#
ENDRPT	1#
ENDSEG	1#
ENDSET	1#
ENDSFT	1#
ENDSRV	1#
ENDSUB	1#

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 30
MICROC.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	1#
ENDTST	1#
EQUALS	1#
ERRDF	1#
ERRHRD	1#
ERROR	1#
ERRSF	1#
ERRSOF	1#
ERRTBL	1#
ESCAPE	1#
EXIT	1#
FEQUAL	1#
GETBYT	1#
GETPRI	1#
GETWOR	1#
GPIAIA	1#
GPIAID	1#
GPIAIL	1#
GPHARD	1#
GPRMA	1#
GPRMD	1#
GPRML	1#
HEADER	1#
INLOOP	1#
IOSETU	1#
IOSTAR	1#
KT11	1#
LASTAD	1#
MANUAL	1#
MEMORY	1#
MSBYTE	1#
MSCHEC	1#
MSCNTO	1#
MSCOUN	1#
MSDATA	1#
MSDEC	1#
MSDEFA	1#
MSENDE	1#
MSERRI	1#
MSESCA	1#
MSESCS	1#
MSXCP	1#
MSEXIT	1#
MSXSE	1#
MSXTJ	1#
MSGEN	1#
MSGENB	1#
MSGETS	1#
MSGETT	1#
MSGNGB	1#
MSGNIN	1#
MSGNLS	1#
MSGNSU	1#
MSGNTA	1#
MSGNTE	1#
MSHAPT	1#

78 MICROC - MICROCODE MODULE C MACY11 30A(1052) 07-APR-83 16:49 PAGE 31
 MICROC.MAC 07-APR-83 16:06 CROSS REFERENCE TABLE -- MACRO NAMES

MSHAP 1#
 MSINCR 1#
 MSIOSE 1#
 MSLDRO 1#
 MSMASK 1#
 MSACHI 1#
 MSACLO 1#
 MSMSK1 1#
 MSPOP 1#
 MSPRIN 1#
 MSPUSH 1#
 MSPUT 1#
 MSPUT1 1#
 MSRADI 1#
 MSRBRO 1#
 MSRNRO 1#
 MSSETS 1#
 MSSTAR 1#
 MSSVC 1#
 MSTLAB 1#
 MSTSTL 1#
 MSWORD 1#
 MSXFER 1#
 OPEN 1#
 POINTE 1#
 PRINTB 1#
 PRINTF 1#
 PRINTS 1#
 PRINTX 1#
 READBU 1#
 READEF 1#
 RFLAGS 1#
 SETPRI 1#
 SETVEC 1#
 SLASH 1#
 STARS 1#
 SVC 1#
 XFER 1#
 XFERF 1#
 XFERT 1#

. ABS. 000000 000
 000000 001
 MICRC 003254 002

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

MICROC.OBJ, MICROC.LST/CR/SOL/NL:TOC=SVC34R.P11, MICROC.MAC
 RUN-TIME: 2 3 .4 SECONDS
 RUN-TIME RATIO: 39/6=5.9
 CORE USED: 31K (61 PAGES)

68SVC.MLB SOURCE FILE MACY11 30A(1052) 07-APR-83 16:50 PAGE 2
 MICROD.MAC 07-APR-83 16:06

```

1
2
3
4      000000'
5
6
7
8      021000      IPCSR0 =      21000      ;INTERNAL PCSRO ADDRESS
9      021002      DMACSR =      21002      ;DMA ENGINE CONTROL STATUS REGISTER
10     021004      DMATO  =      21004      ;DMA ENGINE TO ADDRESS REGISTER #0
11     021006      DMAT1  =      21006      ;DMA ENGINE TO ADDRESS REGISTER #1
12     021010      MDMA0  =      21010      ;MICROCPU DMA TO ADDRESS REGISTER #0
13     021012      MDMA1  =      21012      ;MICROCPU DMA TO ADDRESS REGISTER #1
14     021014      MDMAR0 =      21014      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
15     021016      MDMAR1 =      21016      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
16     021020      IPCSR1 =      21020      ;INTERNAL PCSR1 ADDRESS
17     021022      DMAF   =      21022      ;DMA ENGINE FROM ADDRESS REGISTER
18     021024      DMAWC  =      21024      ;DMA ENGINE WORD COUNT REGISTER
19     021026      MDMAW0 =      21026      ;MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
20     021030      LTAC   =      21030      ;LINK TRANSMIT ADDRESS COUNTER REGISTER
21     021032      LFRBUF =      21032      ;LINK RECIEVE BUFFER ADDRESS FIFO
22     021034      CLRFIF =      21034      ;CLEAR FIFO
23     021036      MDMAW1 =      21036      ;MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
24     021040      PCSRSW =      21040      ;SWITCH PACK REGISTER
25     021042      MDMSR  =      21042      ;MICROCPU DMA STATUS REGISTER
26     021044      LRBUF  =      21044      ;LINK RECIEVE BUFFER COMPLETED
27     021060      PHYAD0 =      21060      ;PHYSICAL ADDRESS ROM BYTE 0
28     021062      PHYAD1 =      21062      ;PHYSICAL ADDRESS ROM BYTE 1
29     021064      PHYAD2 =      21064      ;PHYSICAL ADDRESS ROM BYTE 2
30     021066      PHYAD3 =      21066      ;PHYSICAL ADDRESS ROM BYTE 3
31     021070      PHYAD4 =      21070      ;PHYSICAL ADDRESS ROM BYTE 4
32     021072      PHYAD5 =      21072      ;PHYSICAL ADDRESS ROM BYTE 5
33     177774      MODREG =      177774     ;LINK MODE REGISTER
34     177774      ADDRREG =      177774     ;LINK STATION ADDRESS RAM REGISTER
35     177776      CMDREG =      177776     ;LINK COMMAND REGISTER
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56     012400      LASFTP =      BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN
    
```

76MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

```

57      000340      PRI07 = 340
58      000300      PRI06 = 300
59      000240      PRI05 = 240
60      000200      PRI04 = 200
61      000140      PRI03 = 140
62      000100      PRI02 = 100
63      000040      PRI01 = 40
64      000000      PRI00 = 0
65      :
66      :PCSR0 - PORT CONTROL STATUS REGISTER 0
67      :
68      100000      SERI = BIT15
69      040000      PCEI = BIT14
70      020000      RXI = BIT13
71      010000      TXI = BIT12
72      004000      DNI = BIT11
73      002000      RCEI = BIT10
74      000400      FATI = BIT8
75      :
76      :LINK COMMAND REGISTER
77      :
78      100000      ENABLE = BIT15 ;ENABLE LINK MODULE
79      000200      MODE = BIT7 ;ENABLE MODE REGISTER
80      000100      ARAM = BIT6 ;ENABLE STATION ADDRESS RAM
81      :
82      :LINK MODE REGISTER
83      :
84      100000      PROM = BIT15 ;PROMISCUIOUS MODE
85      040000      ENAL = BIT14 ;ENABLE MULTICAST
86      004000      ENCR = BIT11 ;ENABLE COLLISION TEST
87      002000      ACLO = BIT10 ;ENABLE ACLO
88      000040      DRTY = BIT5 ;DISABLE RETRY LOGIC
89      000020      COLL = BIT4 ;SIMULATE A COLLISION
90      000010      DTCR = BIT3 ;DISABLE TRANSMIT CRC LOGIC
91      000004      LOOP = BIT2 ;ENABLE LOOPBACK
92      :
93      000070      TRNVEC= 70 ;VECTOR ADDRESS FOR THE TRANSMITTER
94      000120      RCVVEC= 120 ;VECTOR ADDRESS FOR THE RECEIVER
95      000134      SANVEC= 134 ;VECTOR ADDRESS FOR THE SANITY TIMER
96      000064      CSRVEC= 64 ;VECTOR ADDRESS FOR CSR WRITE INTERRUPT
97      000114      DMAVEC= 114 ;VECTOR ADDRESS FOR DMA DONE INTERRUPT
98      000140      PARVEC= 140 ;VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
99      001000      STACK= 1000 ;STACK LOCATION
100     000001      INMON= 1 ;IN MICROMONITOR STATE
101     000002      INTST= 2 ;IN A TEST STATE
102     000003      INERR= 3 ;IN ERROR STATE
103     000001      CSRFLG= BIT0 ;CSR WRITE INTERRUPT OCCURED
104     000002      ERRFLG= BIT1 ;UNEXPECTED ERROR OCCURED
105     000004      PARFLG= BIT2 ;PARITY ERROR OCCURED
106     000010      NXMFLG= BIT3 ;NON-EXISTANT MEMORY ERROR OCCURRED
107     000020      NPRFLG= BIT4 ;NPR TIMEOUT OCCURRED
108     000040      TRNFLG= BIT5 ;TRANSMITTER INTERRUPT OCCURRED
109     000100      RCVFLG= BIT6 ;RECEIVER INTERRUPT OCCURRED
110     100000      NPRERR= BIT15 ;PCSR0 FLAG INDICATING NPR ERROR ERROR OCCURRED
111     040000      NXMERR= BIT14 ;PCSR0 FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURRED
112     020000      UNIERR= BIT13 ;PCSR0 FLAG INDICATING UNEXPECTED INTERRUPT OCCURRED

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76MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 4
OTHER DEFINITIONS USED BY THE MICROCODE

113	010000	PARERR= BIT12	:PCSRO FLAG INDICATING LINK MEMORY PARITY ERROR OCCURRED
114	004000	SIZ1K= 4000	:1K WORDS
115	010000	SIZ2K= SIZ1K*2	:2K WORDS
116	014000	SIZ3K= SIZ1K*3	:3K WORDS
117	020000	SIZ4K= SIZ2K*2	:4K WORDS
118	040000	SIZ8K= SIZ4K*2	:8K WORDS
119	020000	WCSSIZ= SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
120	020000	IOSIZ= SIZ4K	:SIZE OF I/O PAGE
121	040000	ROMSIZ= SIZ8K	:SIZE OF ROM
122	077774	LINSIZ= SIZ8K*2-4	:SIZE OF LINK MEMORY
123	000000	WCSADR= 0	:BASE ADDRESS OF WCS
124	020000	IOADR= WCSADR+WCSSIZ	:BASE ADDRESS OF I/O PAGE
125	040000	ROMADR= IOADR+IOSIZ	:BASE ADDRESS OF ROM
126	100000	LINADR= ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
127	002756	MAXBC= 1518.	:MAXIMUM # OF BYTES IN A TRANSMIT BUFFER
128	007777	MXMTBC= 7777	: MAXIMUM COUNT IN LINK XMIT BYTE COUNT FIELD
129	007777	MRECBC= 7777	: MAXIMUM COUNT IN LINK RECEIVE 'MLEN' FIELD
130	000004	CRCSIZ= 4	:NUMBER OF BYTES IN THE CRC
131	000000	DATERR= 0	:FLAG INDICATING DATA ERROR OCCURRED
132	000001	ADRERR= 1	:FLAG INDICATING ADDRESS ERROR OCCURRED
133			

76MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 5
OTHER DEFINITIONS USED BY THE MICROCODE

```

134
135
136
137 000000' 106427 000340          MICROD::MTPS      #PRI07          ;DISABLE INTERRUPTS
138 000004' 012737 000000 177776  MOV      #0,#PCMDREG ;TURN OFF THE LINK
139 000012' 012706 001000          MOV      #STACK,SP ;SETUP STACK
140 000016' 112767 000001 000620  MOV     #INMON,PCSR1 ;TELL HOST WE ARE IN MICROMONITOR
141 000024' 016737 000614 021020  MOV     PCSR1,#IPCSR1
142 000032' 012737 004000 021000  MOV     #DNI,#IPCSRO ;TELL HOST THE LOAD AND START FINISHED
143 000040' 010700          MOV     PC,RO      ;GET ADDRESS OF UNEXPECTED ERROR...
144 000042' 062700 000404          ADD     #ERRINT-.,RO ;HANDLER
145 000046' 005001          CLR     R1         ;FILL ALL UNUSED VECTORS WITH TRAP...
146 000050' 010021          108:  MOV    RO,(R1)+   ;HANDLER
147 000052' 012721 000340          MOV    #PRI07,(R1)+
148 000056' 020127 001000          CMP    R1,#1000
149 000062' 002772          BLT    108
150
151 000064' 010700          MOV    PC,RO      ;SETUP PARITY TRAP VECTOR
152 000066' 062700 000462          ADD    #PARINT-.,RO
153 000072' 010037 000140          MOV    RO,#PARVEC
154 000076' 012737 000340 000142  MOV    #PRI07,#PARVEC+2
155
156 000104' 010700          MOV    PC,RO      ;SETUP DMA INTERRUPT VECTOR
157 000106' 062700 000364          ADD    #DMAINT-.,RO
158 000112' 010037 000114          MOV    RO,#DMAVEC
159 000116' 012737 000340 000116  MOV    #PRI07,#DMAVEC+2
160
161 000124' 010700          MOV    PC,RO      ;SETUP CSR WRITE VECTOR
162 000126' 062700 000310          ADD    #CSRWRT-.,RO
163 000132' 010037 000064          MOV    RO,#CSRVEC
164 000136' 012737 000200 000066  MOV    #PRI04,#CSRVEC+2
165
166 000144' 010700          MOV    PC,RO      ;SETUP SANTITY TIMER VECTOR
167 000146' 062700 000316          ADD    #TIMINT-.,RO
168 000152' 010037 000134          MOV    RO,#SANVEC
169 000156' 012737 000240 000136  MOV    #PRI05,#SANVEC+2
170
171 000164' 010700          MOV    PC,RO      ;SETUP TRANSMITTER VECTOR
172 000166' 062700 000414          ADD    #TRNINT-.,RO
173 000172' 010037 000070          MOV    RO,#TRNVEC
174 000176' 012737 000200 000072  MOV    #PRI04,#TRNVEC+2
175
176 000204' 010700          MOV    PC,RO      ;SETUP RECEIVER VECTOR
177 000206' 062700 000360          ADD    #RCVINT-.,RO
178 000212' 010037 000120          MOV    RO,#RCVVEC
179 000216' 012737 000240 000122  MOV    #PRI05,#RCVVEC+2
180
181 000224' 013700 021040          MOV    #PCRSW,RO  ;GET SWITCH PACK BITS
182 000230' 052700 176000          BIS    #176000,RO ;MAP THEM INTO HOST I/O PAGE
183 000234' 006300          ASL    RO         ;SHIFT OVER TO POSITION CORRECTLY
184 000236' 006300          ASL    RO
185 000240' 006300          ASL    RO
186 000242' 062700 000004          ADD    #4,RO      ;PCSR2 IS PCSRO+4
187 000246' 010067 000374          MOV    RO,IPCSR2 ;SAVE PCSR2 ADDRESS
188 000252' 012767 000003 000370  MOV    #3,IPCSR2+2 ;HIGH ORDER BITS 17:16
189 000260' 005067 000354          CLR    FLG4       ;INITIALIZE FLAG WORD

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75
76MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 6
MICROD.MAC 07-APR-83 16:06 D_MODULE MICROCODE

190	000264'	106427	000000		15\$:	MTPS	#PRI00		:ALLOW INTERRUPTS
191									
192	000270'	005767	000344		20\$:	TST	FLG4		:WAIT FOR A COMMAND FROM HOST
193	000274'	001775				BEQ	20\$		
194									
195	000276'	106427	000340			MTPS	#PRI07		:RAISE CPU PRIORITY TO SERVICE COMMAND
196	000302'	032767	000001	000330		BIT	#CSRFLG,FLG4		:DID HOST GIVE US A COMMAND?
197	000310'	001001				BNE	30\$:YES
198	000312'	000777				BR	.		:NO, ERROR SO JUST SIT HERE...
199									:FOR LACK OF ANYTHING BETTER TO DO
200									
201	000314'	113700	021000		30\$:	MOVB	@#IPCSRO,R0		:GET WHAT HOST WROTE TO PCSRO
202	000320'	042700	177760			BIC	#177760,R0		:STRIP ALL BUT COMMAND BITS
203	000324'	001004				BNE	35\$:WAS IT THE CLEAR FUNCTION?
204	000326'	012737	000001	021020		MOV	#INMON,@#IPCSR1		:YES, CLEAR OUT THE TEST # BITS
205	000334'	000432				BR	50\$		
206	000336'	022700	000017		35\$:	CMP	#17,R0		:START OPERATIONAL MICROCODE?
207	000342'	001432				BEQ	60\$		
208	000344'	162700	000001			SUB	#1,R0		
209	000350'	010701				MOV	PC,R1		:GET ADDRESS OF OUR COMMAND TABLE
210	000352'	062701	000240			ADD	#TBLD-.,R1		
211	000356'	006300				ASL	R0		:MAKE COMMAND A BYTE OFFSET
212	000360'	060001				ADD	R0,R1		:USE IT TO INDEX INTO COMMAND TABLE
213	000362'	061101				ADD	(R1),R1		:R1 NOW HAS COMMAND ROUTINE ADDRESS
214	000364'	004711				JSR	PC,(R1)		:EXECUTE AS COMMANDED FROM HOST
215	000366'	103404				BCS	40\$:ERROR OCCURRED
216	000370'	112767	000001	000246		MOVB	#INMON,PCSR1		:INDICATE TO HOST WE ARE BACK IN...
217	000376'	000403				BR	45\$:MICROMONITR
218	000400'	112767	000003	000236	40\$:	MOVB	#INERR,PCSR1		:INDICATE TO HOST ERROR OCCURRED
219	000406'	016737	000232	021020	45\$:	MOV	PCSR1,@#IPCSR1		
220	000414'	012737	004000	021000		MOV	#DNI,@#IPCSRO		:TELL HOST THIS MICROTEST FINISHED
221	000422'	005067	000212		50\$:	CLR	FLG4		:RESET FLAG WORD
222	000426'	000716				BR	15\$:GO WAIT FOR ANOTHER COMMAND
223									
224	000430'	005000			60\$:	CLR	R0		:FAKE SELF TEST RESULTS
225	000432'	000137	040006			JMP	@#40006		:START OPERATIONAL MICROCODE
226									
227	000436'	052767	000001	000174	CSRWRT:	BIS	#CSRFLG,FLG4		:INDICATE A CSR WRITE INTERRUPT OCCURED
228	000444'	000002				RTI			
229									
230	000446'	052767	000002	000164	ERRINT:	BIS	#ERRFLG,FLG4		:INDICATE A UNEXPECTED INTERRUPT OCCURED
231	000454'	012737	020000	021000		MOV	#UNIERR,@#IPCSRO		:TELL HOST AN UNEXPECTED INTERRUPT
232									:HAPPENED
233	000462'	000777				BR	.		:JUST SIT HERE AND SPIN WHEELS
234									:COUNT ON HOST TO TIME OUT
235									
236	000464'	005267	000152		TIMINT:	INC	SANTIM		:COUNT TICKS AS THEY OCCUR
237	000470'	000002				RTI			
238									
239	000472'	013767	021002	000156	DMAINT:	MOV	@#DMACSR,DMDONE		:GET DMA STATUS
240	000500'	032767	040000	000150		BIT	#BIT14,DMDONE		:DID A NON-EXISTANT MEMORY INTERRUPT OCCUR?
241	000506'	001404				BEQ	10\$:NO
242	000510'	012737	040000	021000		MOV	#NXMERR,@#IPCSRO		:YES, TELL HOST A NON-EXISTANT MEMORY
243									:LOCATION WAS ADDRESSED
244	000516'	000407				BR	20\$		
245	000520'	032767	100000	000130	10\$:	BIT	#BIT15,DMDONE		:DID A NPR TIMEOUT OCCUR?

76MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 7
 MICROD.MAC 07-APR-83 16:06 D_MODULE MICROCODE

```

246 000526' 001407          BEQ      30$          :NO
247 000530' 012737 100000 021000      MOV      #NPRERR,@#IPCSRO :TELL HOST NPR TIMEOUT HAPPENED
248 000536' 012737 100000 021002 20$:  MOV      #BIT15,@#DMACSR :CLEAR THE INTERRUPT IN THE DMA ENGINE
249 000544' 000777          BR          .           :SIT HERE AND SPIN WHEELS
250 000546' 000002          30$:  RTI
251
252
253 000550' 052767 000004 000062 PARINT: BIS      #PARFLG,FLG4 :SET PARITY ERROR OCCURRED
254 000556' 012737 010000 021000      MOV      #PARERR,@#IPCSRO :TELL HOST A LINK MEMORY PARITY ERROR
255                                     :OCCURRED
256 000564' 000777          BR          .           :SIT HERE AND SPIN WHEELS
257
258 000566' 005737 021044          RCVINT: TST     @#LRBUF :READ BUFFER DONE REGISTER...
259                                     :WHICH CLEARS THE INTERRUPT
260 000572' 052767 000100 000040          BIS      #RCVFLG,FLG4 :SET RECEIVER INTERRUPT OCCURRED
261 000600' 000002          RTI
262
263 000602' 052767 000040 000030 TRNINT: BIS      #TRNFLG,FLG4 :SET TRANSMITTER INTERRUPT OCCURRED
264 000610' 000002          RTI
265
266 000612' 000056          TBLD:  .WORD  MICD1-. :TRANSMITTER DONE TEST
267 000614' 000236          .WORD  MICD2-. :RECEIVER DONE TESTS
268 000616' 000432          .WORD  MICD3-. : DATA BYTE FRAMING TEST
269 000620' 000734          .WORD  MICD4-. : DATA WORD FRAMING TEST
270 000622' 001244          .WORD  MICD5-. : DATA PATH PATTERN
271 000624' 001604          .WORD  MICD6-. : STATUS MUX TEST
272 000626' 002046          .WORD  MICD7-. : LINK BYTE COUNT TEST
273 000630' 002354          .WORD  MICD8-. :LINK MEMORY ARBITRATION TEST
274 000632' 003014          .WORD  MICD9-. :LINK BYTE COUNTER MAXIMUM TEST
275 000634' 003206          .WORD  MICD10-. :FIFO TEST
276 000636' 003460          .WORD  MICD11-. :LINK MEMORY ADDRESS TEST
277
278 000640' 000000          FLG4:  .WORD  0 :FLAG WORD
279 000642' 000000          SANTIM: .WORD 0 :COUNT FOR SANITY TIMER
280 000644' 000000          PCSR1: .WORD 0 :COPY OF WHAT GOES TO PCSR1
281 000646' 000000 000000          IPCSR2: .WORD 0,0 :ADDRESS IN HOST MEMORY FOR PCSR2
282 000652' 000000 000000          PCBADR: .WORD 0,0 :ADDRESS IN HOST MEMORY FOR PCB
283 000656' 000000          DMDONE: .WORD 0
284 000660' 000000          RBUF:  .WORD 0 :POINTER TO RECIEVE BUFFER
285 000662' 000000          TBUF:  .WORD 0 :POINTER TO XMIT BUFFER
286 000664' 000000          DBUF:  .WORD 0 :POINTER TO DMA ENGINE BUFFER
287 000666' 000000          MBUF:  .WORD 0 :POINTER TO MICROCPU DMA BUFFER
288

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76MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 8
D_MODULE MICROCODE

```

289 000670' 112767 000002 177746 MICD1: MOVB #INTST,PCSR1 ;TELL HOST WE ARE TESTING
290 000676' 016737 177742 021020 MOV PCSR1,@#IPCSR1
291 000704' 012703 177777 MOV #177777,R3 ;FILL RECIEVE BUFFER WITH 1'S
292 000710' 012700 100000 MOV #!INADR,R0 ;RECIEVE BUFFER STARTS HERE
293 000714' 010067 177740 MOV R0,RBUF
294 000720' 010320 10$: MOV R3,(R0)+
295 000722' 020027 104000 CMP R0,#LINADR+SIZ1K ;FILL ENTIRE BUFFER
296 000726' 103774 BLO 10$
297 000730' 005003 CLR R3 ;FILL XMIT BUFFER WITH 0'S
298 000732' 010067 177724 MOV R0,TBUF ;XMIT BUFFER STARTS 1K AWAY FROM RECIEVE
299 000736' 010320 20$: MOV R3,(R0)+
300 000740' 020027 110000 CMP R0,#LINADR+SIZ2K
301 000744' 103774 BLO 20$
302
303 000746' 012737 100200 177776 MOV #MODE!ENABLE,@#CMDREG ;ENABLE LINK MODULE AND SELECT MODE REG
304 000754' 012737 100004 177774 MOV #PROM!LOOP,@#MODREG ;SET PROMISCUIOUS MODE AND ENABLE LOOPBACK
305
306 000762' 016701 177674 MOV TBUF,R1 ;POINT TO XMIT BUFFER
307 000766' 005021 CLR (R1)+ ;CLEAR OUT STATUS WORD
308 000770' 012721 002752 MOV #MAXBC-CRCSIZ,(R1)+ ;SET BYTE COUNT TO MAXIMUM ALLOWED
309 000774' 005037 021034 CLR @#CLRIF ;CLEAR THE FIFO
310 001000' 005067 177634 CLR FLG4 ;CLEAR THE INTERRUPT FLAG
311 001004' 016737 177650 021032 MOV RBUF,@#LFRBUF ;TELL LINK WHERE RECIEVE BUFF IS
312 001012' 016737 177644 021030 MOV TBUF,@#LTAC ;TELL LINK WHERE TRANSMIT BUFF IS...
313 ;WHICH WILL START A XMIT OPERATION
314 001020' 106427 000140 MTPS #PRI03 ;ALLOW XMITTER TO INTERRUPT
315 001024' 032767 000040 177606 30$: BIT #TRNFLG,FLG4 ;WAIT FOR XMIT INTERRUPT
316 001032' 001774 BEQ 30$
317 001034' 106427 000340 MTPS #PRI07 ;DISABLE INTERRUPTS
318 001040' 112767 000001 177577 MOVB #1,PCSR1+1 ;TELL HOST THIS IS TEST #1
319 001046' 000241 CLC
320 001050' 000207 RTS PC
321

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76MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 9
 MICROD.MAC 07-APR-83 16:06 D_MODULE MICROCODE

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322 001052' 112767 000002 177564 MICD2: MOV B #INTST,PCSR1 ;TELL HOST WE ARE TEST #2
323 001060' 016737 177560 021020 MOV PCSR1,@#IPCSR1
324 001066' 012703 177777 MOV #177777,R3 ;FILL RECIEVE BUFFER WITH 1'S
325 001072' 012700 100000 MOV #LINADR,R0 ;RECIEVE BUFFER STARTS HERE
326 001076' 010067 177556 MOV R0,R0BUF
327 001102' 010320 10$: MOV R3,(R0)+
328 001104' 020027 104000 CMP R0,#LINADR+SIZ1K ;FILL ENTIRE BUFFER
329 001110' 103774 BLO 10$
330 001112' 005003 CLR R3 ;FILL XMIT BUFFER WITH 0'S
331 001114' 010067 177542 MOV R0,TBUF ;XMIT BUFFER STARTS 1K AWAY FROM RECIEVE
332 001120' 010320 20$: MOV R3,(R0)+
333 001122' 020027 110000 CMP R0,#LINADR+SIZ2K
334 001126' 103774 BLO 20$
335
336 001130' 012737 100200 177776 MOV #MODE!ENABLE,@#CMDREG ;ENABLE LINK MODULE AND SELECT MODE REG
337 001136' 012737 100004 177774 MOV #PROM!LOOP,@#MODREG ;SET PROMISCUIOUS MODE AND ENABLE LOOPBACK
338
339 001144' 016701 177512 MOV TBUF,R1 ;POINT TO XMIT BUFFER
340 001150' 005021 CLR (R1)+ ;CLEAR OUT STATUS WORD
341 001152' 012721 002752 MOV #MAXBC-CRCSIZ,(R1)+ ;SET BYTE COUNT TO MAXIMUM ALLOWED
342 001156' 005037 021034 CLR @#CLRFIF ;CLEAR THE FIFO
343 001162' 005067 177452 CLR FLG4 ;CLEAR THE INTERRUPT FLAG
344 001166' 016737 177466 021032 MOV RBUF,@#LFRBUF ;TELL LINK WHERE RECIEVE BUFF IS
345 001174' 016737 177462 021030 MOV TBUF,@#LTAC ;TELL LINK WHERE TRANSMIT BUFF IS...
346 ;WHICH WILL START A XMIT OPERATION
347 001202' 106427 000200 MTPS #PRI04 ;ALLOW RECEIVER TO INTERRUPT
348 001206' 032767 000100 177424 30$: BIT #RCVFLG,FLG4 ;WAIT FOR RECEIVE INTERRUPT
349 001214' 001774 BEQ 30$
350
351 001216' 106427 000140 MTPS #PRI03 ; ALLOW XMTR TO INTERRUPT
352 001222' 032767 000040 177410 40$: BIT #TRNFLG,FLG4 ; WAIT FOR XMIT INTERRUPT
353 001230' 001774 BEQ 40$
354
355 001232' 106427 000340 MTPS #PRI07 ;DISABLE INTERRUPTS
356 001236' 112767 000002 177401 MOV B #2,PCSR1+1 ;TELL HOST THIS IS TEST #2
357 001244' 000241 CLC
358 001246' 000207 RTS PC

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 10
D_MODULE MICROCODE

```

359
360      ; DATA BYTE FRAMING TEST
361      ;
362      ; THIS IS 'MICROCODE' FOR DATA BYTE FRAMING TEST. FILLS XMIT BUFFER
363      ; WITH PATTERN 000000011111111 (BINARY) AND TRANSMITS OVER LOOPBACK.
364      ; CHECKS RECEIVE BUFFER FOR SAME PATTERN. REPORTS ERRENT PATTERN,
365      ; OFFSET FROM FRONT OF BUFFER, AND RECEIVE BUFFER STATUS WORD TO
366      ; HOST
367      ;
368      ;SBTTL  MODULE D, MICROTST #3
369      ;
370 001250' 112767 000002 177366 MICD3:  MOVB  #INTST,PCSR1      ; TELL HOST WE ARE TESTING
371 001256' 016737 177362 021020      MOV   PCSR1,@#IPCSR1
372
373      ; *****
374      ; ***** FILL THE RECEIVE BUFFER WITH BACKGROUND *****
375      ; *****
376
377 001264' 012700 100000      MOV   #LINADR,R0      ; RECEIVE BUFFER STARTS HERE
378 001270' 010067 177364      MOV   R0,RBUF
379 001274' 005020      10$:  CLR   (R0)+      ; FILL RECEIVE BUFFER WITH ZEROS
380 001276' 020027 104000      CMP   R0,#LINADR+SIZ1K ; FILL ENTIRE BUFFER
381 001302' 103774      BLO  10$
382
383
384      ; *****
385      ; ***** FILL TRANSMIT BUFFER WITH TEST PATiERN *****
386      ; *****
387
388 001304' 012703 000377      MOV   #0377,R3      ; WORST CASE FOR CLOCKING
389 001310' 010067 177346      MOV   R0,TBUF
390 001314' 010320      20$:  MOV   R3,(R0)+      ; FILL XMIT BUFFER WITH PATTERN
391 001316' 020027 110000      CMP   R0,#LINADR+SIZ2K ; STOP AT TOP
392 001322' 103774      BLO  20$
393
394
395      ; *****
396      ; ***** SET UP LINK FOR DATAGRAM LOOPBACK OPERATION *****
397      ; *****
398
399 001324' 012737 100200 177776      MOV   #MODE!ENABLE,@#CMDREG ; ENABLE LINK, SELECT MODE REG
400 001332' 012737 100004 177774      MOV   #PROM!LOOP,@#MODREG  ; PROM MODE AND LOOPBACK
401
402 001340' 016701 177316      MOV   TBUF,R1      ; POINT AT XMIT BUFFER
403 001344' 005021      CLR   (R1)+      ; CLEAR OUT STATUS WORD
404 001346' 012721 002752      MOV   #MAXBC-CRCSIZ,(R1)+ ; SET BYTE COUNT TO MAX ALLOWED
405 001352' 005037 021034      CLR   @#CLRFIF      ; CLEAR THE FIFO
406 001356' 005067 177256      CLR   FLG4      ; CLEAR INTERRUPT FLAG
407 001362' 016737 177272 021032      MOV   RBUF,@#LFRBUF      ; TELL UNA WHERE RECEIVE BUFF IS
408 001370' 016737 177266 021030      MOV   TBUF,@#LTAC      ; TELL UNA WHERE XMIT BUFF IS
409
410 001376' 106427 000140      MTPS  #PRI03      ; ALLOW XMITTER AND RECEIVER TO INTERRUPT
411 001402' 032767 000100 177230 30$:  BIT   #RCVFLG,FLG4      ; WAIT FOR RECEIVER INTERRUPT
412 001410' 001774      BEQ  30$
413
414 001412' 032767 000040 177220 35$:  BIT   #TRNFLG,FLG4      ;WAIT FOR TRANSMIT INTERRUPT TOO

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 11
MODULE D, MICROTEST #3

```

415 001420' 001774          BEQ      358
416
417 001422' 106427 000340  MTPS   #PRI07          : DISABLE INTERRUPTS
418
419
420
421 : *****
422 : ***** VERIFY PATTERN IN RECEIVE BUFFER *****
423 : *****
424 001426' 012700 100000    MOV     #LINADR,R0      : VERIFY RECEIVE BUFFER CONTENT
425 001432' 012005          MOV     (R0)+,R5        : SAVE STATUS IN CASE ERROR
426 001434' 005004          CLR     R4              : TRACK OFFSET IN CASE ERROR
427 001436' 062700 000002    ADD     #2,R0           : DON'T NEED 'LENGTH' IN BUFFER
428
429 001442' 011001          40S:  MOV     (R0),R1      : READ THE BUFFER
430 001444' 020103          CMP     R1,R3          : R3 CONTAINS ORIGINAL PATTERN
431 001446' 001012          BNE    70S            : GO TO ERROR EXIT
432 001450' 005200          INC     R0             : COULDN'T BUMP TILL AFTER TEST
433 001452' 005204          INC     R4             : TRACK OFFSET FROM BUFFER START
434 001454' 022704 002752    CMP     #MAXBC-CRCSIZ,R4 : COMPARE ALL BUFFER ENTRIES
435 001460' 001370          BNE    40S
436 001462' 000241          CLC                    : TELL MICROMONITOR SUCCESS
437
438 : *****
439 : ***** EXIT POINT FOR NO ERROR CONDITION *****
440 : *****
441
442 001464' 112767 000003 177153 50S:  MOVB   #3,PCSR1+1      : TELL HOST TEST 3 DONE
443 001472' 000207          RTS     PC              : RETURN TO SENDER
444
445
446 : *****
447 : ***** EXIT POINT FOR ERROR CONDITION *****
448 : *****
449
450 001474' 016737 177146 021010 70S:  MOV     IPCSR2,@#DMA0    : PICK UP ADDRESS OF PCBB
451 001502' 016737 177142 021012    MOV     IPCSR2+2,@#DMA1
452 001510' 013700 021014          MOV     @#DMA0,R0      : R0=CONTENTS OF PCSR2
453 001514' 013702 021014          MOV     @#DMA0,R2      : R2=CONTENTS OF PCSR3
454 001520' 010037 021010          MOV     R0,@#DMA0     : POINT TO PCBB+0
455 001524' 010237 021012          MOV     R2,@#DMA1
456
457 001530' 010537 021026          MOV     R5,@#DMAW0     : WRITE STATUS WORD TO HOST
458 001534' 010337 021026          MOV     R3,@#DMAW0     : WRITE ORIGINAL PATTERN BACK
459 001540' 010137 021026          MOV     R1,@#DMAW0     : WRITE ERRENT PATTERN TO HOST
460 001544' 010437 021026          MOV     R4,@#DMAW0     : WRITE ERROR OFFSET TO HOST
461
462 001550' 000261          SEC                    : TELL MICROMONITOR ERROR OCCURRED
463 001552' 000744          BR     50S             : GO EXIT THROUGH NORMAL
464

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 12
MODULE D, MICROTEST #3

```

465
466      ; DATA WORD FRAMING TEST
467
468      ; THIS IS 'MICROCODE' FOR DATA WORD FRAMING TEST. FILLS XMIT BUFFER
469      ; WITH PATTERN 00000000000000001111111111111111 (BINARY) AND TRANSMITS
470      ; OVER THE LOOPBACK.
471
472      ; CHECKS RECEIVE BUFFER FOR SAME PATTERN. REPORTS ERRENT PATTERN,
473      ; OFFSET FROM FRONT OF BUFFER, AND RECEIVE BUFFER STATUS WORD TO
474      ; HOST
475
476      .SBTTL  MODULE D,MICROTEST #4
477
478      ; *****
479      ; ***** TELL HOST WE ARE BUSY *****
480      ; *****
481
482 001554' 112767 000002 177062 MICD4:  MOVB  #INTST,PCSR1      ; TELL HOST WE ARE TESTING
483 001562' 016737 177056 021020      MOV   PCSR1,#IPCSR1
484
485
486      ; *****
487      ; ***** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN *****
488      ; *****
489
490 001570' 012700 100000      MOV   #LINADR,R0      ; RECEIVE BUFFER STARTS HERE
491 001574' 010067 177060      MOV   R0,RBUF
492 001600' 005020      10$:  CLR   (R0)+      ; FILL RECEIVE BUFFER WITH ZEROS
493 001602' 020027 104000      CMP   R0,#LINADR+SIZ1K ; FILL ENTIRE BUFFER
494 001606' 103774      BLO   10$
495
496
497      ; *****
498      ; ***** FILL XMIT BUFFER WITH TEST PATTERN *****
499      ; *****
500
501 001610' 012703 177777      MOV   #177777,R3      ; WORST CASE FOR CLOCKING
502 001614' 010067 177042      MOV   R0,TBUF         ; SAVE COPY OF ADDRESS
503 001620' 010320      20$:  MOV   R3,(R0)+      ; FILL XMIT BUFFER WITH PATTERN
504 001622' 005103      COM   R3              ; FLIP IT OVER
505 001624' 020027 110000      CMP   R0,#LINADR+SIZ2K ; STOP AT TOP
506 001630' 103773      BLO   20$
507
508
509      ; *****
510      ; ***** SET UP LINK FOR DATAGRAM LOOPBACK *****
511      ; *****
512
513 001632' 012737 100200 177776      MOV   #MODE!ENABLE,#CMDREG ; ENABLE LINK, SELECT MODE REG
514 001640' 012737 100004 177774      MOV   #PROM!LOOP,#MODREG  ; PROM MODE AND LOOPBACK
515
516 001646' 016701 177010      MOV   TBUF,R1         ; POINT AT XMIT BUFFER
517 001652' 005021      CLR   (R1)+          ; CLEAR OUT STATUS WORD
518 001654' 012721 002752      MOV   #MAXBC-CRCSIZ,(R1)+ ; SET BYTE COUNT TO MAX ALLOWED
519 001660' 005037 021034      CLR   @CLRIF         ; CLEAR THE FIFO
520 001664' 005067 176750      CLR   FLG4          ; CLEAR INTERRUPT FLAG

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77MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 13
 MICROD.MAC 07-APR-83 16:06 MODULE D.MICROTEST #4

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521 001670' 016737 176764 021032      MOV      RBUF, @#LFRBUF      : TELL UNA WHERE RECEIVE BUFF IS
522 001676' 016737 176760 021030      MOV      TBUF, @#LTAC       : TELL UNA WHERE XMIT BUFF IS
523
524 001704' 106427 000140                MTPS     #PRI03             : ALLOW XMITTER AND RECEIVER TO INTERRUPT
525 001710' 032767 000100 176722 30S:  BIT      #RCVFLG, FLG4      : WAIT FOR RECEIVER INTERRUPT
526 001716' 001774                BEQ      30S
527
528 001720' 032767 000040 176712 35S:  BIT      #TRNFLG, FLG4      : WAIT FOR XMIT INTERRUPT TOO
529 001726' 001774                BEQ      35S
530
531 001730' 106427 000340                MTPS     #PRI07             : DISABLE INTERRUPTS
532
533
534 : *****
535 : ***** VERIFY THE CONTENTS OF RECEIVE BUFFER *****
536 : *****
537
538 001734' 012700 100000                MOV      #LINADR, R0        : VERIFY RECEIVE BUFFER CONTENT
539 001740' 012005                MOV      (R0)+, R5         : SAVE STATUS IN CASE ERROR
540 001742' 005004                CLR      R4                : TRACK OFFSET IN CASE ERROR
541 001744' 062700 000002                ADD      #2, R0            : DON'T NEED 'LENGTH' IN BUFFER
542
543 001750' 005003                CLR      R3                : NEED A ZERO
544 001752' 005103 40S:  COM      R3                : FLIP IT OVER
545 001754' 011001                MOV      (R0), R1         : READ DATA BACK
546 001756' 020103                CMP      R1, R3           :
547 001760' 001012                BNE      70S              : GO TO ERROR EXIT
548 001762' 005200                INC      R0                : NEW ADDRESS AFTER TESTING
549 001764' 005204                INC      R4                : NEXT OFFSET
550 001766' 022704 002752                CMP      #MAXBC-CRCSIZ, R4
551 001772' 103767                BLO      40S              : END OF LOOP
552 001774' 000241                CLC                        : TELL MICROMONITOR SUCCESS
553
554 : *****
555 : ***** FALLTHROUGH EXIT IF NO ERROR *****
556 : *****
557
558 001776' 112767 000004 176641 50S:  MOVB    #4, PCSR1+1       : TELL HIM TEST FINISHED
559 002004' 000207                RTS      PC                : RETURN TO SENDER
560
561 : *****
562 : ***** ERROR EXIT *****
563 : *****
564
565 002006' 016737 176634 021010 70S:  MOV      IPCSR2, @#DMA0     : PICK UP ADDRESS OF PCBB
566 002014' 016737 176630 021012      MOV      IPCSR2+2, @#DMA1
567 002022' 013700 021014                MOV      @#DMA0, R0        : R0=CONTENTS OF PCSR2
568 002026' 013702 021014                MOV      @#DMA0, R2        : R2=CONTENTS OF PCSR3
569 002032' 010037 021010                MOV      R0, @#DMA0        : POINT TO PCBB+0
570 002036' 010237 021012                MOV      R2, @#DMA1
571
572 002042' 010537 021026                MOV      R5, @#DMA0        : WRITE STATUS WORD TO HOST
573 002046' 010337 021026                MOV      R3, @#DMA0        : WRITE ORIGINAL TO HOST
574 002052' 010137 021026                MOV      R1, @#DMA0        : WRITE ERRENT PATTERN TO HOST
575 002056' 010437 021026                MOV      R4, @#DMA0        : WRITE ERROR OFFSET TO HOST
576

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 14
MODULE D.MICROTEST #4

577 002062' 000261
578 002064' 000744
579

SEC
BR 508

:TELL MICROMONITOR ERROR OCCURRED
: GO EXIT THROUGH NORMAL

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 15
MODULE D,MICROTEST #4

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635

: DATA PATH PATTERN TEST
: THIS IS 'MICROCODE' FOR DATA PATH PATTERN TEST. RETRIEVES DATA PATTERN
: FROM HOST MEMORY. FILLS XMIT BUFFER WITH PATTERN AND SENDS DATAGRAM
: OVER THE LOOPBACK.
: CHECKS RECEIVE BUFFER FOR SAME PATTERN. REPORTS ERRENT PATTERN,
: OFFSET FROM FRONT OF BUFFER, AND RECEIVE BUFFER STATUS WORD TO
: HOST

.SBTTL MODULE D,MICROTEST #5

: *****
: ***** TELL HOST WE ARE BUSY *****
: *****

002066' 112767 000002 176550 MICD5: MOVB #INTST,PCSR1 ; TELL HOST WE ARE TESTING
002074' 016737 176544 021020 MOV PCSR1,@#IPCSR1

: *****
: ***** RETRIEVE PATTERN FROM HOST MEMORY *****
: *****

002102' 016737 176540 021010 MOV IPCSR2,@#MDMA0 ; SET TO GET HOST PCBB ADDRESS
002110' 016737 176534 021012 MOV IPCSR2+2,@#MDMA1
002116' 013700 021014 MOV @#MDMAR0,R0 ; R0 NOW CONTAINS PCBB LOW
002122' 013701 021014 MOV @#MDMAR0,R1 ; R1 NOW CONTAINS PCBB HIGH
002126' 010037 021010 MOV R0,@#MDMA0 ; POINT AT PCBB
002132' 010137 021012 MOV R1,@#MDMA1
002136' 013703 021014 MOV @#MDMAR0,R3 ; R3 NOW HOLDS DATA PATTERN

: *****
: ***** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN *****
: *****

002142' 012700 100000 MOV #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
002146' 010067 176506 MOV R0,RBUFP
002152' 005020 104000 10\$: CLR (R0)+ ; FILL RECEIVE BUFFER WITH ZEROS
002154' 020027 104000 CMP R0,#LINADR+SIZ1K ; FILL ENTIRE BUFFER
002160' 103774 BLO 10\$

: *****
: ***** FILL XMIT BUFFER WITH TEST PATTERN *****
: *****

002162' 010067 176474 20\$: MOV R0,TBUFP ; SAVE COPY OF ADDRESS
002166' 010320 110000 MOV R3,(R0)+ ; FILL XMIT BUFFER WITH PATTERN
002170' 020027 110000 CMP R0,#LINADR+SIZ2K ; STOP AT TOP
002174' 103774 BLO 20\$

: *****
: ***** SET UP LINK FOR DATAGRAM LOOPBACK *****

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 16
MODULE D,MICROTEST #5

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636 ; *****
637
638 002176' 012737 100200 177776      MOV      #MODE!ENABLE,@#CMDREG      ; ENABLE LINK, SELECT MODE REG
639 002204' 012737 100004 177774      MOV      #PROM!LOOP,@#MODREG      ; PROM MODE AND LOOPBACK
640
641 002212' 016701 176444      MOV      TBUF,R1                  ; POINT AT XMIT BUFFER
642 002216' 005021      CLR      (R1)+                    ; CLEAR OUT STATUS WORD
643 002220' 012721 002752      MOV      #MAXBC-CRCSIZ,(R1)+      ; SET BYTE COUNT TO MAX ALLOWED
644 002224' 005037 021034      CLR      @#CLRFIF                ; CLEAR THE FIFO
645 002230' 005067 176404      CLR      FLG4                    ; CLEAR INTERRUPT FLAG
646 002234' 016737 176420 021032      MOV      RBUF,@#LFRBUF            ; TELL UNA WHERE RECEIVE BUFF IS
647 002242' 016737 176414 021030      MOV      TBUF,@#LTAC              ; TELL UNA WHERE XMIT BUFF IS
648
649 002250' 106427 000140      MTPS    #PRI03                   ; ALLOW XMITTER AND RECEIVER TO INTERRUPT
650 002254' 032767 000100 176356 30$:  BIT      #RCVFLG,FLG4             ; WAIT FOR RECEIVER INTERRUPT
651 002262' 001774      BEQ
652
653 002264' 032767 000040 176346 35$:  BIT      #TRNFLG,FLG4             ;WAIT FOR XMIT INTERRUPT TOO
654 002272' 001774      BEQ      35$
655
656 002274' 106427 000340      MTPS    #PRI07                   ; DISABLE INTERRUPTS
657
658
659 ; *****
660 ; ***** VERIFY THE CONTENTS OF RECEIVE BUFFER *****
661 ; *****
662
663 002300' 012700 100000      MOV      #LINADR,R0              ; VERIFY RECEIVE BUFFER CONTENT
664 002304' 012002      MOV      (R0)+,R2                ; SAVE STATUS IN CASE ERROR
665 002306' 005004      CLR      R4                      ; TRACK OFFSET IN CASE ERROR
666 002310' 062700 000002      ADD     #2,R0                    ; DON'T NEED 'LENGTH' IN BUFFER
667
668 002314' 011005 40$:  MOV      (R0),R5                  ; READ DATA BACK
669 002316' 020503      CMP     R5,R3                    ; R3 HOLDS ORIGINAL PATTERN
670 002320' 001012      BNE     70$                      ; GO TO ERROR EXIT
671 002322' 005200      INC     R0                      ; NEW ADDRESS AFTER TESTING
672 002324' 005204      INC     R4                      ; NEXT OFFSET
673 002326' 022704 002752      CMP     #MAXBC-CRCSIZ,R4
674 002332' 103770      BLO     40$                      ; END OF LOOP
675 002334' 000241      CLC      ;TELL MICROMONITOR SUCCESS
676
677 ; *****
678 ; ***** FALLTHROUGH EXIT IF NO ERROR *****
679 ; *****
680
681 002336' 112767 000005 176301 50$:  MOVB    #5,PCSR1+1              ; EXIT HERE IF NO ERROR
682 002344' 000207      RTS     PC                      ; RETURN TO SENDER
683
684
685 ; *****
686 ; ***** ERROR EXIT *****
687 ; *****
688
689 002346' 016737 176274 021010 70$:  MOV     IPCSR2,@#MDMA0           ; SET TO GET HOST PCBB ADDRESS
690 002354' 016737 176270 021012      MOV     IPCSR2+2,@#MDMA1
691 002362' 013700 021014      MOV     @#MDMAR0,R0              ; R0 NOW CONTAINS PCBB LOW

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 17
MODULE D,MICROTEST #5

692	002366'	013701	021014	MOV	@#MDMAR0,R1	: R1 NOW CONTAINS PCBB HIGH
693						
694	002372'	062700	000002	ADD	#2,R0	: INDEX DOWN TO PCBB+2
695	002376'	005501		ADC	R1	
696						
697	002400'	010037	021010	MOV	R0,@#MDMA0	: POINT TO PCBB+0
698	002404'	010137	021012	MOV	R1,@#DMA1	
699						
700	002410'	010237	021026	MOV	R2,@#MDMA0	: WRITE STATUS WORD TO HOST
701	002414'	010537	021026	MOV	R5,@#MDMA0	: WRITE ERRENT PATTERN TO HOST
702	002420'	010437	021026	MOV	R4,@#MDMA0	: WRITE ERROR OFFSET TO HOST
703						
704	002424'	000261		SEC		: TELL MICROMONITOR ERROR OCCURRED
705	002426'	000743		BR	50\$: GO EXIT THROUGH NORMAL
706						

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 18
MODULE D,MICROTEST #5

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707
708      : STATUS MUX VERIFICATION TEST
709      :
710      : THIS TEST INSURES THAT THE STATUS MULTIPLEXER WRITES INTO THE FIRST
711      : TWO LOCATIONS TO THE LINK TRANSMIT BUFFER. THE DEUNA PROCESSOR WILL
712      : FILL A TRANSMIT BUFFER AND A RECEIVE BUFFER AND WILL TRANSMIT A
713      : DATAGRAM OVER THE LOOPBACK. THE FIRST TWO WORDS OF THE RECEIVE BUFFER
714      : WILL BE COPIED TO HOST MEMORY FOR VERIFICATION.
715      :
716      : HOST WILL VERIFY THAT PREDETERMINED BITS OF THE STATUS WORD ARE ZERO.
717
718
719      : *****
720      : ***** TELL HOST WE ARE BUSY *****
721      : *****
722
723 002430' 112767 000002 176206 MICD6:  MOVB  #INTST,PCSR1  ; TELL HOST WE ARE TESTING
724 002436' 016737 176202 021020      MOV   PCSR1,@#IPCSR1
725
726
727      : *****
728      : ***** FILL RECEIVE BUFFER *****
729      : *****
730
731 002444' 012703 177777      MOV   #177777,R3  ; FILL RECEIVE BUFFER WITH ONES
732 002450' 012700 100000      MOV   #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
733 002454' 010067 176200      MOV   R0,RBUF    ; SAVE A COPY
734
735 002460' 010320 104000 10$:  MOV   R3,(R0)+    ; FILL THE BUFFER
736 002462' 020027      CMP   R0,#LINADR+SIZ1K
737 002466' 103774      BLO  10$
738
739      : *****
740      : ***** FILL TRANSMIT BUFFER WITH ZERO *****
741      : *****
742
743 002470' 010067 176166      MOV   R0,TBUF    ; SAVE A COPY OF TRANSMIT ADDRESS
744 002474' 005003      CLR   R3         ; NEED A ZERO
745 002476' 010320 110000 20$:  MOV   R3,(R0)+    ; XMIT BUFFER STARTS 1K FROM RECEIVE
746 002500' 020027      CMP   R0,#LINADR+SIZ2K
747 002504' 103774      BLO  20$
748
749
750      : *****
751      : ***** FILL DATAGRAM FOR DATAGRAM LOOPBACK *****
752      : *****
753
754 002506' 012737 100200 177776      MOV   #MODE!ENABLE,@#CMDREG ; ENABLE LINK MODE, SEL MODE REG
755 002514' 012737 100004 177774      MOV   #PROM!LOOP,@#MODREG  ; PROMIS, ENABLE LOOPBACK
756
757 002522' 016701 176134      MOV   TBUF,R1    ; POINT TO XMIT BUFFER
758 002526' 005103      COM   R3         ; NEED SOME 1'S
759 002530' 010321      MOV   R3,(R1)+   ; BACKGROUND- SHOW STATUS OVRLAY
760 002532' 012721 002752      MOV   #MAXBC-CRCSIZ,(R1)+ ; SET BYTE COUNT TO MAX ALLOWED
761 002536' 005037 021034      CLR   @#CLRFIF   ; CLEAR THE INTERRUPT FLAG
762 002542' 005067 176072      CLR   FLG4      ; CLEAR THE INTERRUPT FLAG

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77MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 19
MICROD.MAC 07-APR-83 16:06 MODULE D.MICROTEST #5

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763 002546' 016737 176106 021032      MOV      RBUF, @#LFRBUF      ; TELL LINK WHERE RECEIVE IS
764 002554' 016737 176102 021030      MOV      TBUF, @#LTAC       ; TELL LINK WHERE XMIT IS
765 002562' 106427 000140                MTPS     #PRIOS             ; WAIT FOR AN INTERRUPT
766 002566' 032767 000040 176044 308:    BIT      #TRNFLG, FLG4      ; WAIT FOR XMIT INTERRUPT
767 002574' 001774                BEQ      308
768 002576' 032767 000100 176034 358:    BIT      #RCVFLG, FLG4      ; WAIT FOR RECEIVER BEFORE GOING ANY FURTHER
769 002604' 001774                BEQ      358

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: *****
: ***** GET STATUS WORDS FROM TRANSMIT BUFFER *****
: *****

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```

MOV      TBUF, R0      ; POINT AT XMIT BUFFER
MOV      (R0)+, R3     ; R5 NOW HOLDS TX0 STATUS WORD
MOV      (R0), R4      ; R6 NOW HOLDS TX1 STATUS WORD

```

```

: *****
: ***** GET HOST MEMORY ADDRESS AND WRITE STATUS WORDS *****
: *****

```

```

MOV      IPCSR2, @#MDMA0 ; PICK UP ADDRESS OF PCBB
MOV      IPCSR2+2, @#DMA1
MOV      @#MDMAR0, R0    ; R0=CONTENTS OF PCSR2
MOV      @#MDMAR0, R2    ; R2=CONTENTS OF PCSR3
MOV      R0, @#DMA0      ; POINT AT PCBB+0
MOV      R2, @#DMA1
MOV      R3, @#DMAW0     ; WRITE TX0 TO HOST MEMORY
MOV      R4, @#DMAW0     ; WRITE TX1 TO HOST MEMORY

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MOVB     #6, PCSR1+1
CLC
RTS      PC

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77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 20
MODULE D,MICROTEST #5

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: LINK BYTE COUNTER TEST

: THIS IS 'MICROCODE' FOR THE LINK BYTE COUNTER TEST.
: GETS A BYTE COUNT FROM THE HOST MEMORY. LOOPS BACK A DATAGRAM
: WITH THE BYTE COUNT TO THE RECEIVE BUFFER. VERIFIES THE RECEIVE
: BUFFER TO:

1. MAKE SURE RECEIVE BYTE COUNT IS THE SAME AS THAT DESIGNATED
BY THE TRANSMIT BUFFER BYTE COUNT ENTRY

2. MAKE SURE RECEIVE BUFFER WAS ACTUALLY OVERWRITTEN WITH THE
BYTE COUNT WRITTEN IN THE TRANSMIT BYTE COUNT BUFFER
ENTRY.

: WRITES THE VALUE OF THE RECEIVE BUFFER BYTE COUNT TO HOST MEMORY.

.SBTTL LINK BYTE COUNTER TEST

: *****
: ***** TELL HOST WE ARE BUSY *****
: *****

002674' 112767 000002 175742 MICD7: MOVB #INTST,PCSR1 ; TELL HOST WE ARE TESTING
002702' 016737 175736 021020 MOV PCSR1,@#IPCSR1

: *****
: ***** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN *****
: *****

002710' 012700 100000 MOV #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
002714' 012703 177777 MOV #177777,R3 ; GET ALL ONES
002720' 010067 175734 MOV R0,RBUF ; SAVE ADDRESS OF RECV BUFFER

10\$: MOV R3,(R0)+ ; FILL UP THE BUFFER
CMP R0,#LINADR+SIZ1K ; OVERFILL- SHOW RECV OVERLAY
BLO 10\$

: *****
: ***** FILL TRANSMIT BUFFER WITH TEST PATTERN *****
: *****

002734' 010067 175722 MOV R0,TBUF ; SAVE ADDRESS XMIT BUFFER
002740' 005020 20\$: CLR (R0)+ ; ZEROS FOR OVERLAY
002742' 020027 110000 CMP R0,#LINADR+SIZ2K ; FILL XMIT BUFFER WITH PATTERN
002746' 103774 BLO 20\$; STOP AT THE TOP

: *****
: ***** RETRIEVE BYTE COUNT FROM HOST MEMORY *****
: *****

002750' 016737 175672 021010 MOV IPCSR2,@#MDMA0 ; SET TO GET HOST PCBB ADDRESS
002756' 016737 175666 021012 MOV IPCSR2+2,@#MDMA1

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 21
LINK BYTE COUNTER TEST

```

857 002764' 013700 021014      MOV      @#MDMAR0,R0      ; R0 NOW CONTAINS PCBB LO
858 002770' 013701 021014      MOV      @#MDMAR0,R1      ; R1 NOW CONTAINS PCBB HI
859 002774' 010037 021010      MOV      R0,@#MDMA0      ; POINT AT PCBB
860 003000' 010137 021012      MOV      R1,@#MDMA1
861 003004' 013703 021014      MOV      @#MDMAR0,R3      ; R3 NOW CONTAINS BYTE COUNT
862
863
864
865      ; *****
866      ; ***** SET UP LINK FOR DATAGRAM LOOPBACK *****
867      ; *****
868 003010' 012737 100200 177776      MOV      #MODE!ENABLE,@#CMDREG      ; ENABLE LINK, SELECT MODE REG
869 003016' 012737 100014 177774      MOV      #PROM!LOOP!DTCR,@#MODREG      ; PROM MODE AND LOOPBACK
870
871 003024' 016704 175632      MOV      TBUF,R4      ; POINT AT XMIT BUFFER
872 003030' 005024      CLR      (R4)+      ; CLEAR OUT STATUS WORD
873 003032' 010324      MOV      R3,(R4)+      ; WRITE PASSED BYTE COUNT
874 003034' 005037 021034      CLR      @#CLRFIF      ; CLEAR THE FIFO
875 003040' 005067 175574      CLR      FLG4      ; CLEAR INTERRUPT FLAG
876 003044' 016737 175610 021032      MOV      RBUF,@#LFRBUF      ; TELL UNA WHERE RECIEVE BUFF IS
877 003052' 016737 175604 021030      MOV      TBUF,@#LTAC      ; TELL UNA WHERE XMIT BUFF IS
878
879 003060' 106427 000140      MTPS     #PRI03      ; ALLOW XMITTER TO INTERRUPT
880 003064' 032767 000040 175546 30$      BIT      #TRNFLG,FLG4      ; WAIT FOR INTERRUPT
881 003072' 001774      BEQ      30$
882 003074' 032767 000100 175536 35$      BIT      #RCVFLG,FLG4      ;WAIT FOR RECEIVER INTERRUPT TOO
883 003102' 001774      BEQ      35$
884
885
886 003104' 106427 000340      MTPS     #PRI07      ; DISABLE INTERRUPTS
887
888
889      ; *****
890      ; ***** COUNT ZEROS IN RECEIVE BUFFER *****
891      ; *****
892
893 003110' 016704 175544      MOV      RBUF,R4      ; VERIFY RECEIVE BUFFER CONTENTS
894 003114' 062704 000002      DD      #2,R4      ; && COULD REPORT STATUS &&
895 003120' 012402      MOV      (R4)+,R2      ; SAVE 'MLN' BUFFER LENGTH
896 003122' 005005      CLR      R5      ; COUNT DATA WORDS TRANSFERRED
897
898 003124' 112403      40$:     MOV      (R4),R3      ; READ DATA BACK
899 003126' 122703 000000      CMPB     #0,R3      ; IS IT ZERO?
900 003132' 001004      BNE      45$      ; EXIT IF AT THE EDGE
901 003134' 005205      INC      R5      ; BUMP THE TALLY
902 003136' 020527 002756      CMP      R5,#MAXBC      ; DONE YET?
903 003142' 103770      BLO      40$      ; IF NOT, KEEP GOING
904
905 003144' 062700 000002      45$:     ADD      #2,R0      ; INDEX DOWN TO PCBB+2
906 003150' 005501      ADC      R1
907
908 003152' 010037 021010      MOV      R0,@#MDMA0      ; POINT TO PCBB+2
909 003156' 010137 021012      MOV      R1,@#MDMA1
910
911 003162' 010237 021026      MOV      R2,@#MDMA0      ; WRITE RECEIVE BYTE COUNT
912 003166' 010537 021026      MOV      R5,@#MDMA0      ; WRITE BUFFER BYTE COUNT

```

77MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 22
MICROD.MAC 07-APR-83 16:06 LINK BYTE COUNTER TEST

913

914 003172' 112767 000007 175445

915 003200' 000241

916 003202' 000207

MOVB #7,PCSR1+1
CLC
RTS P'

: TELL HIM WHAT TEST IT IS

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 23
LINK BYTE COUNTER TEST

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: LINK MEMORY ARBITRATION TEST

.SBTTL LINK MEMORY ARBITRATION TEST

: THIS IS MICROCODE FOR THE LINK ARBITRATION TEST.
: THIS MICROCODE WILL HAVE THE DMA ENGINE, THE T-11, AND BOTH STATE
: MACHINES ATTEMPTING TO ACCESS LINK MEMORY AT THE SAME TIME.

: EACH PROCESS OPERATES ON DATA THAT IS UNIQUE FOR IDENTIFICATION.

: *****
: ***** TELL HOST WE ARE TESTING *****
: *****

003204' 112737 000002 021020 MICDB: MOVB #INTST,@#IPCSR1 ; TELL HOST WE ARE TESTING
003212' 016737 175426 021020 MOV PCSR1,@#IPCSR1

: *****
: ***** RETRIEVE HOST MEMORY FROM PCBB *****
: *****

003220' 016737 175422 021010 MOV IPCSR2,@#DMA0 ; SET TO GET HOST PCBB ADDRESS
003226' 016737 175416 021012 MOV IPCSR2+2,@#DMA1
003234' 013704 021014 MOV @#DMA0,R4 ; R4 NOW HOLDS PCBB LOW
003240' 013705 021014 MOV @#DMA0,R5 ; R5 NOW HOLDS PCBB HIGH

: *****
: ***** FILL RECEIVE BUFFER WITH ZEROS *****
: *****

003244' 012700 100000 MOV #LINADR,R0 ; FILL RECEIVE BUFFER
003250' 010067 175404 MOV R0,RBUF ; SAVE A COPY OF POINTER
10\$: CLR (R0)+ ; CLEAR IT OUT
003254' 005020 CMP R0,#LINADR+SIZ1K
003256' 020027 104000 BLO 10\$

: *****
: ***** FILL TRANSMIT BUFFER WITH 33 HEX **
: ***** THATS 31463 OCTAL *****
: *****

003264' 010067 175372 MOV R0,TBUF ; FILL TRANSMIT BUFFER
003270' 012720 031463 20\$: MOV #31463,(R0)+ ; 31463 = 3333 HEX (THE REAL THING)
003274' 020027 110000 CMP R0,#LINADR+SIZ2K
003300' 103773 BLO 20\$

: *****
: ***** FILL DMA BUFFER WITH OF HEX ***

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 24
LINK MEMORY ARBITRATION TEST

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973      ; ***** THATS 7417 OCTAL *****
974      ; *****
975
976 003302' 010067 175356      MOV      R0,DBUFP      ; SAVE COPY OF POINTER
977 003306' 012720 007417 308:  MOV      #7417,(R0)+
978 003312' 020027 114000      CMP      R0,#LINADR+SIZ3K
979 003316' 103773      BLO      308
980
981
982      ; *****
983      ; ***** FILL BUFFER WITH FF HEX ***
984      ; ***** THATS 177777 OCTAL *****
985      ; *****
986
987 003320' 010067 175342      MOV      R0,MBUFP      ; T-11 BUFFER POINTER
988 003324' 012720 177777 408:  MOV      #177777,(R0)+
989 003330' 020027 120000      CMP      R0,#LINADR+SIZ4K
990 003334' 103773      BLO      408
991
992
993      ; *****
994      ; ***** GET DMA ENGINE READY TO GO *****
995      ; *****
996
997 003336' 010402      MOV      R4,R2      ; GET HOST ADDRESS OF PCBB
998 003340' 010503      MOV      R5,R3
999
1000 003342' 062702 000006      ADD      #6,R2      ; DUMP BUFFER AFTER ERROR CODES
1001 003346' 005503      ADC      R3
1002
1003 003350' 010237 021004      MOV      R2,@DMATO      ; 'TO' REGISTERS INCREMENTS
1004 003354' 010337 021006      MOV      R3,@DMAT1
1005 003360' 016737 175300 021022  MOV      DBUFP,@DMAF      ; WHERE 'FROM' REG IS LOCATED
1006 003366' 012737 003774 021024  MOV      #3774,@DMAWC      ; WILL XFER 1K-2 WORDS
1007
1008 003374' 010700      MOV      PC,R0      ; CALCULATE THE INTERRUPT VECTOR
1009 003376' 062700 175074      ADD      #DMAINT-.,R0      ; THROW IN THE OFFSET
1010 003402' 010037 000114      MOV      R0,@DMAVEC
1011 003406' 012737 000300 000116  MOV      #PRIO6,@DMAVEC+2      ;PRIORITY OF INTERRUPT SERVICE ROUTINE
1012 003414' 005067 175236      CLR      DMONE      ; FLAG
1013
1014      ; *****
1015      ; ***** SET UP THE STATE MACHINES *****
1016      ; *****
1017
1018 003420' 012737 100200 177776  MOV      #MODE!ENABLE,@CMDREG
1019 003426' 012737 100004 177774  MOV      #PROM!LOOP,@MODREG
1020
1021 003434' 016701 175222      MOV      TBUFP,R1      ; GET ADDRESS OF XMIT BUFFER
1022 003440' 062701 000002      ADD      #2,R1      ; SKIP TO BYTE COUNT
1023 003444' 012721 002752      MOV      #MAXBC-CRCSIZ,(R1)+      ; SET BYTE COUNT TO MAX ALLOWED
1024 003450' 005037 021034      CLR      @CLRFIF      ; CLEAR INTERRUPT FLAG
1025 003454' 005067 175160      CLR      FLG4      ; CLEAR INTERRUPT FLAG
1026 003460' 016737 175174 021032  MOV      RBUFP,@LFRBUF      ; TELL LINK WHERE RECEIVE BUF IS
1027 003466' 016700 175174      MOV      MBUFP,R0      ;POINT TO MICROCPU BUFFER
1028 003472' 012702 002000      MOV      #SIZ1K/2,R2      ;WORD COUNT FOR MICROCPU LOOP

```

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 25
LINK MEMORY ARBITRATION TEST

```

1029 003476' 012701 125252          MOV      #125252,R1          ;DATA FOR MICROCPU LOOP
1030
1031          : *****
1032          : ***** STATE THE MACHINES *****
1033          : *****
1034
1035          : IS EVERYBODY READY?
1036 003502' 016737 175154 021030    MOV      TBUF, @#LTAC      ; THIS STARTS THE STATE MACHINES
1037
1038 003510' 005237 021002          INC      @#DMACSR        ; THIS STARTS DMA ENGINE
1039
1040 003514' 106427 000140          MTPS    #PRI03          ; ALLOW INTERRUPTS
1041
1042 003520' 010120          50$:    MOV      R1, (R0)+    ;START FILLING LINK MEMORY...
1043 003522' 077202          SOB      R2, 50$        ;WITH MICROCPU
1044
1045          :THE MICROCPU IS DONE
1046
1047 003524' 032767 000100 175106 60$: BIT      #RCVFLG, FLG4    ;IS THE RECEIVE DONE?
1048 003532' 001774          BEQ      60$            ;NOT YET
1049
1050 003534' 032767 000040 175076 70$: BIT      #TRNFLG, FLG4    ;IS THE TRANSMIT DONE?
1051 003542' 001774          BEQ      70$            ;NOT YET
1052
1053 003544' 005767 175106          80$:    TST      DM DONE    ;IS THE DMA ENGINE DONE?
1054 003550' 001775          BEQ      80$            ;NOT YET
1055
1056          :EVERYBODY IS DONE, SO NOW CHECK THE...
1057          :DATA
1058
1059 003552' 016700 175102          MOV      RBUF, R0        ;POINT TO RECEIVE BUFFER
1060 003556' 062700 000004          ADD      #4, R0          ;INDEX DOWN TO DATA PART
1061 003562' 012702 001365          MOV      #<MAXBC-CRCSIZ>/2, R2 ;AMOUNT OF DATA TO CHECK
1062 003566' 022710 031463          90$:    CMP      #31463, (R0)   ;IS THE DATA CORRECT?
1063 003572' 001005          BNE      100$           ;NO
1064 003574' 062700 000002          ADD      #2, R0          ;YES, POINT TO NEXT WORD OF DATA
1065 003600' 077206          SOB      R2, 90$        ;CONTINUE CHECKING DATA UNTIL DONE
1066 003602' 0002'1          CLC
1067 003604' 000414          BR      110$           ;TELL HOST THIS TEST SUCCESS
1068
1069 003606' 010437 021010          100$:   MOV      R4, @#DMA0      ;POINT TO HOST PCBB
1070 003612' 010537 021012          MOV      R5, @#DMA1
1071 003616' 012737 031463 021026    MOV      #31463, @#DMA0  ;GIVE HOST EXPECTED PATTERN IN PCBB
1072 003624' 011037 021026          MOV      (R0), @#DMA0    ;GIVE HOST ACTUAL PATTERN IN PCBB+2
1073 003630' 010037 021026          MOV      R0, @#DMA0      ;GIVE HOST LINK MEMORY ADDRESS
1074 003634' 000261          SEC                    ;TELL MICROMONITOR ERROR OCCURRED
1075
1076 003636' 112767 000010 175001 110$: MOVB     #8., PC SR1+1    ;TELL HOST WHAT TEST THIS IS
1077 003644' 000207          RTS      PC              ;RETURN TO MICROMONITOR
1078

```


77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 26
LINK MEMORY ARBITRATION TEST

```

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1085
1086 003646' 012767 000002 174770
1087 003654' 016737 174764 021020
1088
1089
1090
1091
1092
1093
1094 003662' 012700 100000
1095 003666' 010067 174766
1096 003672' 012700 004000
1097 003676' 010067 174760
1098
1099
1100
1101
1102
1103
1104 003702' 012737 100200 177776
1105 003710' 012737 100004 177774
1106
1107 003716' 016704 174740
1108 003722' 005024
1109 003724' 012724 007777
1110 003730' 005037 021034
1111 003734' 005067 174700
1112 003740' 016737 174714 021032
1113 003746' 016737 174710 021030
1114
1115
1116
1117
1118
1119
1120 003754' 106427 000100
1121 003760' 032767 000040 174652
1122 003766' 001774
1123
1124 003770' 032767 000100 174642
1125 003776' 001774
1126
1127 004000' 106427 000340
1128
1129
1130
1131
1132
1133
1134 004004' 016704 174650

```

.SBTTL LINK BYTE COUNTER MAXIMUM TEST

```

*****
***** TELL THE HOST WE ARE TESTING *****
*****

```

```

PICD9: MOV #INTST,PCSR1 ; TELL HOST WE ARE TESTING
        MOV PCSR1,&#IPCSR1

```

```

*****
***** CALCULATE BUFFER ADDRESS POINTERS *****
*****

```

```

        MOV #LINADR,R0 ; RELATIVE TO LINK MEMORY
        MOV R0,RBUFP
        ADD #SIZ1K,R0
        MOV R0,TBUFP

```

```

*****
***** SET UP LINK FOR A LOOPBACK *****
*****

```

```

        MOV #MODE!ENABLE,&#CMDREG
        MOV #PROM!LOOP,&#MODREG
:
        MOV TBUFP,R4 ; SET UP XMIT BUFFER
        CLR (R4)+
        MOV #MXMTBC,(R4)+
        CLR &#CLRFIF
        CLR FLG4
        MOV RBUFP,&#LFRBUF
        MOV TBUFP,&#LTAC

```

```

*****
***** WAIT FOR INTERRUPTS *****
*****

```

```

:
        MTPS #PRI02
10$: BIT #TRNFLG,FLG4
        BEQ 10$
:
        MTPS #PRI07
20$: BIT #RCVFLG,FLG4
        BEQ 20$
:
        MTPS #PRI07

```

```

*****
***** CHECK RECEIVE BUFFER BYTE COUNT *****
*****

```

```

        MOV RBUFP,R4

```

MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 27
LINK BYTE COUNTER MAXIMUM TEST

1135	004010'	062704	000002			ADD	#2,R4		; POINT AT MLEN
1136	004014'	012402				MOV	(R4)+,R2		
1137	004016'	022702	007777			CMP	#MRECBC,R2		
1138	004022'	001005				BNE	40\$		
1139	004024'	000241				CLC			
1140	004026'	112767	000011	174611	30\$:	MOVB	#9.,PCSR1+1		
1141	004034'	000207				RTS	PC		
1142									
1143	004036'	000261			40\$:	SEC			; ERROR EXIT
1144	004040'	000772				BR	30\$		

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 28
MODULE D, MICROTST #10 - FIFO TEST

```

1145      .SBTTL  MODULE D, MICROTST #10 - FIFO TEST
1146
1147      ;*****
1148      ;THIS IS THE MICROCODE FOR THE FIFO TEST.
1149      ;IT TRANSMITS A PACKET FROM BUFFER 0, SETS UP THE RECEIVER TO RECEIVE TO
1150      ;THE BUFFER SPECIFIED BY THE HOST IN PCBB+0. AFTER THE INTERRUPT THE BUFFER
1151      ;DONE FIFO CONTENTS ARE READ AND PASSED TO THE HOST IN PCBB+2.
1152      ;*****
1153
1154
1155
1156 004042' 112767 000002 174574 MICD10: MOV      #INTST,PCSR1      ;TELL HOST WE ARE TESTING
1157 004050' 016737 174570 021020      MOV      PCSR1,@#IPCSR1
1158
1159      ;GET RECEIVE BUFFER ADDRESS FROM HOST MEMORY
1160
1161 004056' 016737 174564 021010      MOV      IPCSR2,@#MDMA0      ;GET CONTENTS OF HOST'S PCSR2+3
1162 004064' 016737 174560 021012      MOV      IPCSR2+2,@#MDMA1
1163 004072' 013700 021014      MOV      @#MDMAR0,R0      ;R0 = CONTENTS OF HOST'S PCSR2
1164 004076' 013701 021014      MOV      @#MDMAR0,R1      ;R1 = CONTENTS OF HOST'S PCSR3
1165 004102' 010037 021010      MOV      R0,@#MDMA0      ;POINT TO PCBB+0
1166 004106' 010137 021012      MOV      R1,@#MDMA1
1167 004112' 013767 021014 174540      MOV      @#MDMAR0,RBUF      ;GET RECEIVE BUFFER ADDRESS
1168
1169      ;CLEAR ALL OF LINK MEMORY
1170
1171 004120' 012702 100000      MOV      #LINADR,R2
1172 004124' 005022 100000      10$: CLR      (R2)+
1173 004126' 020227 177774      CMP      R2,#LINADR+LINSIZ
1174 004132' 103774 100000      BLO     10$
1175
1176      ;FILL THE TRANSMIT BUFFER WITH 1'S
1177
1178 004134' 012702 100000      MOV      #LINADR,R2      ;USE BUFFER 0 FOR TRANSMIT
1179 004140' 010267 174516      MOV      R2,TBUF      ;SAVE IT
1180 004144' 012722 177777      20$: MOV      #177777,(R2)+
1181 004150' 020227 104000      CMP      R2,#LINADR+SIZ1K
1182 004154' 103773 100000      BLO     20$
1183
1184      ;SET UP LINK FOR PROMISCUOUS MODE AND INTERNAL LOOPBACK. TRANSMIT THE MAX
1185      ;SIZE PACKET. CLEAR THE FIFO AND GIVE THE LINK A RECEIVER BUFFER AND A TRANSMIT
1186      ;BUFFER TO START THE OPERATION.
1187
1188 004156' 012737 100200 177776      MOV      #MODE!ENABLE,@#CMDREG      ;TURN ON THE LINK AND SELECT MODE REG
1189 004164' 012737 100004 177774      MOV      #PROM!LOOP,@#MODREG      ;SET PROMISCUOUS MODE AND LOOPBACK
1190 004172' 016702 174464      MOV      TBUF,R2      ;GET TRANSMIT BUFFER
1191 004176' 005022      CLR      (R2)+      ;CLEAR THE STATUS WORD
1192 004200' 012712 002752      MOV      #MAXBC-CRCSIZ,(R2)      ;SET TO MAX BYTE COUNT
1193 004204' 005037 021034      CLR      @#CLRIF      ;CLEAR THE FIFO
1194 004210' 005067 174424      CLR      FLG4      ;CLEAR THE INTERRUPT FLAG
1195 004214' 016737 174440 021032      MOV      RBUF,@#LFRBUF      ;LOAD THE FIFO WITH A RECEIVE BUFFER
1196 004222' 016737 174434 021030      MOV      TBUF,@#LTAC      ;GIVE TRANSMIT BUFFER TO START TRANSMIT
1197
1198      ;LOWER THE PROCESSOR PRIORITY AND WAIT FOR THE INTERRUPTS
1199
1200 004230' 106427 000140      MTPS   #PRI03      ;ALLOW BOTH TRANSMIT AND RECEIVER INTERRUPT

```

MICROD - MICROCODE MODULE D MACY11 30A(1052) 07-APR-83 16:50 PAGE 29
 MICROD.MAC 07-APR-83 16:06 MODULE D, MICROTTEST #10 - FIFO TEST

```

1201 004234' 032767 000100 174376 30$: BIT #RCVFLG,FLG4 ;WAIT FOR RECEIVER FIRST
1202 004242' 001774 BEQ 30$
1203
1204 004244' 032767 000040 174366 40$: BIT #TRNFLG,FLG4 ;THEN THE TRANSMITTER
1205 004252' 001774 BEQ 40$
1206
1207 004254' 106427 000340 MTPS #PRI07 ;DISABLE FURTHER INTERRUPTS
1208
1209 ;READ RECEEVER BUFFER DONE FIFO AND PASS BACK TO HOST IN PCBB+2
1210 ;
1211 004260' 062700 000002 ADD #2,R0 ;POINT TO PCBB+2
1212 004264' 005501 ADC R1
1213 004266' 010037 021010 MOV RO,@#MDMA0
1214 004272' 010137 021012 MOV R1,@#MDMA1
1215 004276' 013737 021044 021026 MOV @#LRBUF,@#MDMAW0 ;PASS BUFFER DONE DATA TO HOST
1216
1217 004304' 112767 000012 174333 MOVB #10.,PCSR1+1 ;INDICATE WHAT TEST WE JUST FINISHED
1218 004312' 000241 CLC ;INDICATE SUCCESS
1219 004314' 000207 RTS PC
1220

```

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 30
MODULE D, MICROTST #11 - LINK ADDRESS TEST

.SBTTL MODULE D, MICROTST #11 - LINK ADDRESS TEST

: THIS THE MICROCODE FOR THE RECEIVER AND TRANSMITTER LINK MEMORY ADDRESS TESTS.
: IT FILLS ALL OF LINK MEMORY WITH 0'S THEN FILLS THE TRANSMIT BUFFER OBTAINED
: FROM THE HOST'S PCBB+2 WITH 1'S. IT SETS UP THE RECEIVER TO RECEIVE A PACKET
: INTO THE BUFFER OBTAINED FROM THE HOST'S PCBB+0. THE PACKET OF 1'S IS
: TRANSMITTED WITH LOOPBACK ENABLED IN PROMISCUIOUS MODE. AFTER THE INTERRUPT
: ALL LINK MEMORY OUTSIDE OF THE TRANSMIT AND RECEIVE BUFFERS IS CHECKED
: TO SEE IF AND DATA WAS WRITTEN TO AN INCORRECT ADDRESS. IF SO THE FAULTY
: ADDRESS IS PASSED BACK TO THE HOST IN PCBB+4 AND THE GOOD DATA IN PCBB+6 AND
: THE BAD DATA IN PCBB+10.

1221
1222
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1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236

MICD11: MOV #INTST,PCSR1 ; TELL HOST WE ARE TESTING
MOV PCSR1,@#IPCSR1

1237 004316' 112767 000002 174320
1238 004324' 016737 174314 021020
1239
1240

: GET THE RECEIVER BUFFER FROM THE HOST'S PCBB+0 AND THE TRANSMIT BUFFER FROM
: THE HOST'S PCBB+2

1241
1242
1243
1244 004332' 016737 174310 021010
1245 004340' 016737 174304 021012
1246 004346' 013700 021014
1247 004352' 013701 021014
1248 004356' 010037 021010
1249 004362' 010137 021012
1250 004366' 013767 021014 174264
1251 004374' 013767 021014 174260
1252

MOV IPCSR2,@#MDMA0 ; GET CONTENTS OF HOST'S PCSR2+3
MOV IPCSR2+2,@#MDMA1
MOV @#MDMAR0,R0 ; R0 = CONTENTS OF HOST'S PCSR2
MOV @#MDMAR0,R1 ; R1 = CONTENTS OF HOST'S PCSR3
MOV R0,@#MDMA0 ; POINT TO PCBB+0
MOV R1,@#MDMA1
MOV @#MDMAR0,RBUF ; GET RECEIVER BUFFER FROM PCBB+0
MOV @#MDMAR0,TBUF ; GET TRANSMIT BUFFER FROM PCBB+2

: FILL ALL OF LINK MEMORY WITH 0'S

1253
1254
1255 004402' 012702 100000
1256 004406' 005022
1257 004410' 020227 177774
1258 004414' 103774
1259

MOV #LINADR,R2
10\$: CLR (R2)+
CMP R2,#LINADR+LINSIZ
BLO 10\$

1260 004416' 016702 174240
1261 004422' 005022
1262 004424' 012722 002756
1263

MOV TBUF,R2 ; POINT TO BASE OF TRANSMIT BUFFER
CLR (R2)+ ; CLEAR STATUS WORD
MOV #MAXBC,(R2)+ ; PUT IN BYTE COUNT

: FILL TRANSMIT BUFFER WITH 1'S

1264
1265
1266 004430' 012701 002756
1267 004434' 006201
1268 004436' 012722 177777
1269 004442' 005301
1270 004444' 001374
1271

MOV #MAXBC,R1
ASR R1
20\$: MOV #177777,(R2)+
DEC R1
BNE 20\$

: SET UP LINK FOR PROMISCUIOUS MODE AND INTERNAL LOOPBACK. TRANSMIT THE PACKET

1272
1273
1274
1275 004446' 012737 000200 177776
1276 004454' 012737 100014 177774

MOV #MODE,@#CMDREG ; SELECT THE MODE REGISTER
MOV #PROM!LOOP!DTCR,@#MODREG ; ENABLE PROMISCUIOUS MODE AND LOOPBACK

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 31
MODULE D, MICROTEST #11 - LINK ADDRESS TEST

```

1277
1278 004462' 012737 100000 177776      MOV    #ENABLE,#CMDREG      ;AND DISABLE TRANSMIT CRC
1279 004470' 005037 021034              CLR    #CLRFLIF            ;TURN ON THE LINK
1280 004474' 005067 174140              CLR    FLG4                ;CLEAR THE FIFO
1281 004500' 016737 174154 021032      MOV    RBUF,#LFRBUF        ;CLEAR THE INTERRUPT WORD
1282 004506' 016737 174150 021030      MOV    TBUF,#LTAC         ;GIVE THE LINK A RECEIVE BUFFER
1283                                     ;GIVE THE LINK A TRANSMIT BUFFER
1284                                     ;TO START THE OPERATION
1285                                     ;LOWER THE PROCESSOR PRIORITY AND WAIT FOR THE INTERRUPT
1286
1287 004514' 106427 000140              MTPS   #PRI03              ;ALLOW BOTH TRANSMIT AND RECEIVE INTERRUPT
1288 004520' 032767 000100 174112 30$:  BIT    #RCVFLG,FLG4        ;WAIT FOR THE RECEIVE INTERRUPT
1289 004526' 001774                      BEQ
1290 004530' 032767 000040 174102 40$:  BIT    #TRNFLG,FLG4
1291 004536' 001774                      BEQ    40$
1292
1293 004540' 106427 000340              MTPS   #PRI07              ;DISABLE FURTHER INTERRUPTS
1294
1295                                     ;CHECK RECEIVE BUFFER TO MAKE SURE IT RECEIVED NON-ZERO DATA
1296
1297 004544' 012703 177777              MOV    #177777,R3          ;PASS THIS NON-ZERO DATA IF FAILURE
1298 004550' 016702 174104              MOV    RBUF,R2            ;GET POINTER TO RECEIVER BUFFER
1299 004554' 062702 000004              ADD    #4,R2              ;SKIP STATUS AND BYTE COUNT
1300 004560' 012701 002756              MOV    #MAXBC,R1          ;NUMBER OF BYTES WE SENT
1301 004564' 006201                      ASR    R1                  ;MAKE IT WORDS
1302 004566' 005712 45$:  TST    (R2)                ;IS THERE NON-ZERO DATA HERE?
1303 004570' 001432                      BEQ    90$                 ;NO, ERROR!
1304 004572' 062702 000002              ADD    #2,R2              ;POINT TO NEXT WORD IN RECEIVER BUFFER
1305 004576' 005301                      DEC    R1
1306 004600' 001372                      BNE    45$
1307
1308                                     ;CHECK ALL LINK MEMORY EXCEPT THE TRANSMIT AND RECEIVE BUFFERS FOR ANY NON-ZERO
1309                                     ;DATA
1310
1311 004602' 005003                      CLR    R3                  ;PASS THIS ZERO DATA IF FAILURE
1312 004604' 012702 100000              MOV    #LINADR,R2         ;START AT BASE OF LINK MEMORY
1313 004610' 020267 174046 50$:  CMP    R2,TBUF            ;ARE WE AT THE TRANSMIT BUFFER?
1314 004614' 001002                      BNE    60$                 ;NO
1315 004616' 062702 002762              ADD    #MAXBC+4,R2        ;YES, SKIP OVER THE HEADER AND THE DATA
1316 004622' 020267 174032 60$:  CMP    R2,RBUF            ;ARE WE AT THE RECEIVE BUFFER?
1317 004626' 001002                      BNE    70$                 ;NO
1318 004630' 062702 002762              ADD    #MAXBC+4,R2        ;YES, SKIP OVER THE HEADER AND THE DATA
1319 004634' 005712 70$:  TST    (R2)                ;IS ANY NON-ZERO DATA IN HERE?
1320 004636' 001007                      BNE    90$                 ;YES, ERROR!
1321 004640' 062702 000002              ADD    #2,R2              ;POINT TO NEXT WORD IN LINK MEMORY
1322 004644' 020227 177774              CMP    R2,#LINADR+LINSIZ  ;HAVE WE CHECKED ALL OF LINK MEMORY?
1323 004650' 103757                      BLO    50$                 ;NOT YET
1324
1325                                     ;TEST WAS SUCESSFULL
1326
1327 004652' 000241                      CLC                          ;INDICATE SUCCESS
1328 004654' 000407                      BR     100$                ;LEAVE
1329
1330                                     ;PASS THE ADDRESS BACK TO THE HOST IN PCBB+4 AND THE DATA IN PCBB+6
1331
1332 004656' 010237 021026 90$:  MOV    R2,#MDMAW0         ;PASS ADDRESS TO PCBB+4

```

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 32
MODULE D, MICROTTEST #11 - LINK ADDRESS TEST

1333 004662' 010337 021026
1334 004666' 011237 021026
1335 004672' 000261
1336
1337 004674' 112767 000013 173743 1008:
1338 004702' 000207
1339
1340
1341 004704' 004706
1342 000001

MOV R3,@#MDMAWO
MOV (R2),@#MDMAWO
SEC
MOVB #11.,PCSR1+1
RTS PC

:PASS GOOD DATA TO PCBB+6
:PASS DATA TO PCBB+10
:INDICATE FAILURE
:TELL HOST WHAT TEST JUST FINISHED

MICDSZ::MICDSZ-MICROD+2
.END

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 36
CROSS REFERENCE TABLE -- USER SYMBOLS

PCSR1	000644R	002	140*	141	216*	218*	219	280#	289*	290	318*	322*	323	356*	370*
			371	442*	482*	483	558*	597*	598	681*	723*	724	796*	824*	825
			914*	936	1076*	1086*	1087	1140*	1156*	1157	1217*	1237*	1238	1337*	
PHYAD0=	021060		27#												
PHYAD1=	021062		28#												
PHYAD2=	021064		29#												
PHYAD3=	021066		30#												
PHYAD4=	021070		31#												
PHYAD5=	021072		32#												
PRI00 =	000000		64#	190*											
PRI01 =	000040		63#												
PRI02 =	000100		62#	1120*											
PRI03 =	000140		61#	314*	351*	410*	524*	649*	765*	879*	1040*	1200*	1287*		
PRI04 =	000200		60#	164	174	347*									
PRI05 =	000240		59#	169	179										
PRI06 =	000300		58#	1011											
PRI07 =	000340		57#	137*	147	154	159	195*	317*	355*	417*	531*	656*	886*	1127*
			1207*	1293*											
PROM =	100000		84#	304	337	400	514	639	755	869	1019	1105	1189	1276	
RBUF	000660R	002	284#	293*	311	326*	344	378*	407	491*	521	618*	646	733*	763
			834*	876	893	954*	1026	1059	1095*	1112	1134	1167*	1195	1250*	1281
			1298	1316											
RCEI =	002000		73#												
RCVFLG=	000100		109#	260	348	411	525	650	768	882	1047	1124	1201	1288	
RCVINT	000566R	002	177	258#											
RCVVEC=	000120		94#	178*	179*										
ROMADR=	040000		125#	126											
ROMSIZ=	040000		121#	126											
RXI =	020000		70#												
SANTIM	000642R	002	236*	279#											
SANVEC=	000134		95#	168*	169*										
SERI =	100000		68#												
SIZ1K =	004000		114#	115	116	295	328	380	493	620	736	837	956	1028	1096
			1181												
SIZ2K =	010000		115#	117	300	333	391	505	630	746	847	967			
SIZ3K =	014000		116#	978											
SIZ4K =	020000		117#	118	119	120	989								
SIZ8K =	040000		118#	121	122										
STACK =	001000		99#	139											
TBLD	000612R	002	210	266#											
TBUF	000662R	002	285#	298*	306	312	331*	339	345	389*	402	408	502*	516	522
			628*	641	647	743*	757	764	777	845*	871	877	965*	1021	1036
			1097*	1107	1113	1179*	1190	1196	1251*	1260	1282	1313			
TIMINT	000464R	002	167	236#											
TRNFLG=	000040		108#	263	315	352	414	528	653	766	880	1050	1121	1204	1290
TRNINT	000602R	002	172	263#											
TRNVEC=	000070		93#	173*	174*										
TXI =	010000		71#												
UNIERR=	020000		112#	231											
WCSADR=	000000		123#	124											
WCSSIZ=	020000		119#	124											
.	004706R	002	144	152	157	162	167	172	177	198	210	233	249	256	266
			267	268	269	270	271	272	273	274	275	276	1009		

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 38
CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	1#
BERROR	1#
BGNAU	1#
BGNAUT	1#
BGNCLN	1#
BGNDU	1#
BGNHRD	1#
BGNHW	1#
BGNINI	1#
BGNMOD	1#
BGNMSG	1#
BGNPRO	1#
BGNPTA	1#
BGNRPT	1#
BGNSEG	1#
BGNSET	1#
BGNSFT	1#
BGNSRV	1#
BGNSUB	1#
BGNSW	1#
BGNTST	1#
BNCOMP	1#
BNERRO	1#
BREAK	1#
BRESET	1#
CKLOOP	1#
CLOCK	1#
CLOSE	1#
CLVEC	1#
COMMEN	1#
DELAY	1#
DESCRI	1#
DEVTYP	1#
DISPAT	1#
DISPLA	1#
DOCLN	1#
DODU	1#
DORPT	1#
ENDAU	1#
ENDAUT	1#
ENDCLN	1#
ENDCOM	1#
ENDDU	1#
ENDHRD	1#
ENDHW	1#
ENDINI	1#
ENDMOD	1#
ENDMSG	1#
ENDPRO	1#
ENDPTA	1#
ENDRPT	1#
ENDSEG	1#
ENDSET	1#
ENDSFT	1#
ENDSRV	1#
ENDSUB	1#

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 39
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	1#
ENDTST	1#
EQUALS	1#
ERRDF	1#
ERRHRD	1#
ERROR	1#
ERRSF	1#
ERRSOF	1#
ERRTBL	1#
ESCAPE	1#
EXIT	1#
FEQUAL	1#
GETBYT	1#
GETPRI	1#
GETWOR	1#
GMANIA	1#
GMANID	1#
GMANIL	1#
GPHARD	1#
GPRMA	1#
GPRMD	1#
GPRML	1#
HEADER	1#
INLOOP	1#
IOSETU	1#
IOSTAR	1#
KT11	1#
LASTAD	1#
MANUAL	1#
MEMORY	1#
MSBYTE	1#
MSCHEC	1#
MSCNTO	1#
MSCOUN	1#
MSDATA	1#
MSDECR	1#
MSDEFA	1#
MSENDE	1#
MSERRI	1#
MSESCA	1#
MSESCS	1#
MSEXCP	1#
MSEXIT	1#
MSXSE	1#
MSXTJ	1#
MSGEN	1#
MSGENB	1#
MSGETS	1#
MSGETT	1#
MSGNGB	1#
MSGNIN	1#
MSGNLS	1#
MSGNSU	1#
MSGNTA	1#
MSGNTE	1#
MSHAPT	1#

77MICROD - MICROCODE MODULE D
MICROD.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:50 PAGE 40
CROSS REFERENCE TABLE -- MACRO NAMES

- MSHNAP 1#
- MSINCR 1#
- MSIOSE 1#
- MSLDRO 1#
- MSMASK 1#
- MSMCHI 1#
- MSMCLO 1#
- MSMSK1 1#
- MSPOP 1#
- MSPRIN 1#
- MSPUSH 1#
- MSPUT 1#
- MSPUT1 1#
- MSRADI 1#
- MSRBRO 1#
- MSRNRO 1#
- MSSETS 1#
- MSSTAR 1#
- MS SVC 1#
- MS TLAB 1#
- MS STL 1#
- MS WORD 1#
- MS XFER 1#
- OPEN 1#
- POINTE 1#
- PRINTB 1#
- PRINTF 1#
- PRINTS 1#
- PRINTX 1#
- READBU 1#
- REDEF 1#
- RFLAGS 1#
- SETPRI 1#
- SETVEC 1#
- SLASH 1#
- STARS 1#
- SVC 1#
- XFER 1#
- XFERF 1#
- XFERT 1#

. ABS.	000000	000
	000000	001
MICRD	004706	002

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

MICROD.OBJ, MICROD.LST/CR/SOL/NL:TOC=SVC34R.P11, MICROD.MAC
RUN-TIME: 3 4 .4 SECONDS
RUN-TIME RATIO: 39/7=5.0
CORE USED: 31K (61 PAGES)

76MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 2

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.TITLE MICROE - MICROCODE MODULE E
; 88 DEDICATED THE CRC CIRCUITRY TO THE RECEIVE SIDE OF THE LINK

000000'

.CSECT MICRE

.SBTTL REGISTER DEFINITIONS USED BY THE T11

021060	IPCSRO	=	21000	:INTERNAL PCSRO ADDRESS
021002	DMACSR	=	21002	:DMA ENGINE CONTROL STATUS REGISTER
021004	DMATO	=	21004	:DMA ENGINE TO ADDRESS REGISTER #0
021006	DMAT1	=	21006	:DMA ENGINE TO ADDRESS REGISTER #1
021010	MDMA0	=	21010	:MICROCPU DMA TO ADDRESS REGISTER #0
021012	MDMA1	=	21012	:MICROCPU DMA TO ADDRESS REGISTER #1
021014	MDMAR0	=	21014	:MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
021016	MDMAR1	=	21016	:MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
021020	IPCSRI	=	21020	:INTERNAL PCSRI ADDRESS
021022	DMAF	=	21022	:DMA ENGINE FROM ADDRESS REGISTER
021024	DMAWC	=	21024	:DMA ENGINE WORD COUNT REGISTER
021026	MDMAW0	=	21026	:MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
021030	LTAC	=	21030	:LINK TRANSMIT ADDRESS COUNTER REGISTER
021032	LFRBUF	=	21032	:LINK RECIEVE BUFFER ADDRESS FIFO
021034	CLRFIF	=	21034	:CLEAR FIFO
021036	MDMAW1	=	21036	:MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
021040	PCSRSW	=	21040	:SWITCH PACK REGISTER
021042	MDMSR	=	21042	:MICROCPU DMA STATUS REGISTER
021044	LRBUF	=	21044	:LINK RECIEVE BUFFER COMPLETED
021060	PHYAD0	=	21060	:PHYSICAL ADDRESS ROM BYTE 0
021062	PHYAD1	=	21062	:PHYSICAL ADDRESS ROM BYTE 1
021064	PHYAD2	=	21064	:PHYSICAL ADDRESS ROM BYTE 2
021066	PHYAD3	=	21066	:PHYSICAL ADDRESS ROM BYTE 3
021070	PHYAD4	=	21070	:PHYSICAL ADDRESS ROM BYTE 4
021072	PHYAD5	=	21072	:PHYSICAL ADDRESS ROM BYTE 5
177774	MODREG	=	177774	:LINK MODE REGISTER
177774	ADRREG	=	177774	:LINK STATION ADDRESS RAM REGISTER
177776	CMREG	=	177776	:LINK COMMAND REGISTER

.SBTTL OTHER DEFINITIONS USED BY THE MICROCODE

100000	BIT15	=	100000
040000	BIT14	=	40000
020000	BIT13	=	20000
010000	BIT12	=	10000
004000	BIT11	=	4000
002000	BIT10	=	2000
001000	BIT9	=	1000
000400	BIT8	=	400
000200	BIT7	=	200
000100	BIT6	=	100
000040	BIT5	=	40
000020	BIT4	=	20
000010	BIT3	=	10
000004	BIT2	=	4
000002	BIT1	=	2
000001	BIT0	=	1
012400	LASFTP	=	BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN

76MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

57	000340	PRI07 =	340	
58	000300	PRI06 =	300	
59	000240	PRI05 =	240	
60	000200	PRI04 =	200	
61	000140	PRI03 =	140	
62	000100	PRI02 =	100	
63	000040	PRI01 =	40	
64	000000	PRI00 =	0	
65		:		
66		:PCSR0 - PORT CONTROL STATUS REGISTER 0		
67		:		
68	100000	SERI =	BIT15	
69	040000	PCEI =	BIT14	
70	020000	RXI =	BIT13	
71	010000	TXI =	BIT12	
72	004000	DNI =	BIT11	
73	002000	RCEI =	BIT10	
74	000400	FATI =	BIT8	
75		:		
76		:LINK COMMAND REGISTER		
77		:		
78	100000	ENABLE =	BIT15	:ENABLE LINK MODULE
79	000200	MODE =	BIT7	:ENABLE MODE REGISTER
80	000100	ARAM =	BIT6	:ENABLE STATION ADDRESS RAM
81		:		
82		:LINK MODE REGISTER		
83		:		
84	100000	PROM =	BIT15	:PROMISCUOUS MODE
85	040000	ENAL =	BIT14	:ENABLE MULTICAST
86	004000	ENCR =	BIT11	:ENABLE COLLISION TEST
87	002000	ACLO =	BIT10	:ENABLE ACLO
88	000040	DRTY =	BIT5	:DISABLE RETRY LOGIC
89	000020	COLL =	BIT4	:SIMULATE A COLLISION
90	000010	DTCR =	BIT3	:DISABLE TRANSMIT CRC LOGIC
91	000004	LOOP =	BIT2	:ENABLE LOOPBACK
92				
93	000070	TRNVEC=	70	:VECTOR ADDRESS FOR THE TRANSMITTER
94	000120	RCVVEC=	120	:VECTOR ADDRESS FOR THE RECEIVER
95	000134	SANVEC=	134	:VECTOR ADDRESS FOR THE SANITY TIMER
96	000064	CSRVEC=	64	:VECTOR ADDRESS FOR CSR WRITE INTERRUPT
97	000114	DMAVEC=	114	:VECTOR ADDRESS FOR DMA DONE INTERRUPT
98	000140	PARVEC=	140	:VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
99	001000	STACK=	1000	:STACK LOCATION
100	000001	INMON=	1	:IN MICROMONITOR STATE
101	000002	INTST=	2	:IN A TEST STATE
102	000003	INERR=	3	:IN ERROR STATE
103	000001	CSRFLG=	BIT0	:CSR WRITE INTERRUPT OCCURED
104	000002	ERRFLG=	BIT1	:UNEXPECTED ERROR OCCURED
105	000004	PARFLG=	BIT2	:PARITY ERROR OCCURED
106	000010	NXMFLG=	BIT3	:NON-EXISTANT MEMORY ERROR OCCURED
107	000020	NPRFLG=	BIT4	:NPR TIMEOUT OCCURED
108	000040	TRNFLG=	BIT5	:TRANSMITTER INTERRUPT OCCURED
109	000100	RCVFLG=	BIT6	:RECEIVER INTERRUPT OCCURED
110	100000	NPRERR=	BIT15	:PCSR0 FLAG INDICATING NPR ERROR OCCURED
111	040000	NXMERR=	BIT14	:PCSR0 FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURED
112	020000	UNIERR=	BIT13	:PCSR0 FLAG INDICATING UNEXPECTED INTERRUPT OCCURED

76MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 4
OTHER DEFINITIONS USED BY THE MICROCODE

113	010000	PARERR= BIT12	:PCSR0 FLAG INDICATING LINK MEMORY PARITY ERROR OCCURRED
114	020000	MTCH= BIT13	:MATCH BIT
115	004000	SIZ1K= 4000	:1K WORDS
116	010000	SIZ2K= SIZ1K*2	:2K WORDS
117	020000	SIZ4K= SIZ2K*2	:4K WORDS
118	040000	SIZ8K= SIZ4K*2	:8K WORDS
119	020000	WCSSIZ= SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
120	020000	IOSIZ= SIZ4K	:SIZE OF I/O PAGE
121	040000	ROMSIZ= SIZ8K	:SIZE OF ROM
122	077774	LINSIZ= SIZ8K*2-4	:SIZE OF LINK MEMORY
123	000000	WCSADR= 0	:BASE ADDRESS OF WCS
124	020000	IOADR= WCSADR+WCSSIZ	:BASE ADDRESS OF I/O PAGE
125	040000	ROMADR= IOADR+IOSIZ	:BASE ADDRESS OF ROM
126	100000	LINADR= ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
127	000100	MINBC= 64.	: 64 BYTES
128	002752	MAXBC= 1518.-4.	:MAXIMUM # OF BYTES IN A TRANSMIT BUFFER
129	000000	DATERR= 0	:FLAG INDICATING DATA ERROR OCCURRED
130	000001	ADRERR= 1	:FLAG INDICATING ADDRESS ERROR OCCURRED
131			

76MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 5
OTHER DEFINITIONS USED BY THE MICROCODE

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132
133      .SBTTL E_MODULE MICROCODE
134
135 000000' 106427 000340      MICROE::MTPS      #PRI07      ;DISABLE INTERRUPTS
136 000004' 012737 000000 177776      MOV      #0,#CMDREG      ;TURN OFF THE LINK
137 000012' 012706 001000      MOV      #STACK,SP      ;SETUP STACK
138 000016' 112767 000001 000602      MOV      #INMON,PCSR1    ;TELL HOST WE ARE IN MICROMONITOR
139 000024' 016737 000576 021020      MOV      PCSR1,#IPCSR1
140 000032' 012737 004000 021000      MOV      #DNI,#IPCSRO    ;TELL HOST THE LOAD AND START FINISHED
141 000040' 010700      MOV      PC,RO      ;GET ADDRESS OF UNEXPECTED ERROR...
142 000042' 062700 000404      ADD      #ERRINT-.,RO    ;HANDLER
143 000046' 005001      CLR      R1      ;FILL ALL UNUSED VECTORS WITH TRAP...
144 000050' 010021      10$: MOV      RO,(R1)+      ;HANDLER
145 000052' 012721 000340      MOV      #PRI07,(R1)+
146 000056' 020127 001000      CMP      R1,#1000
147 000062' 002772      BLT      10$
148
149 000064' 010700      MOV      PC,RO      ;SETUP PARITY TRAP VECTOR
150 000066' 062700 000462      ADD      #PARINT-.,RO
151 000072' 010037 000140      MOV      RO,#PARVEC
152 000076' 012737 000340 000142      MOV      #PRI07,#PARVEC+2
153
154 000104' 010700      MOV      PC,RO      ;SETUP DMA INTERRUPT VECTOR
155 000106' 062700 000364      ADD      #DMAINT-.,RO
156 000112' 010037 000114      MOV      RO,#DMAVEC
157 000116' 012737 000340 000116      MOV      #PRI07,#DMAVEC+2
158
159 000124' 010700      MOV      PC,RO      ;SETUP CSR WRITE VECTOR
160 000126' 062700 000310      ADD      #CSRWRT-.,RO
161 000132' 010037 000064      MOV      RO,#CSRVEC
162 000136' 012737 000200 000066      MOV      #PRI04,#CSRVEC+2
163
164 000144' 010700      MOV      PC,RO      ;SETUP SANTITY TIMER VECTOR
165 000146' 062700 000316      ADD      #TIMINT-.,RO
166 000152' 010037 000134      MOV      RO,#SANVEC
167 000156' 012737 000240 000136      MOV      #PRI05,#SANVEC+2
168
169 000164' 010700      MOV      PC,RO      ;SETUP TRANSMITTER VECTOR
170 000166' 062700 000414      ADD      #TRNINT-.,RO
171 000172' 010037 000070      MOV      RO,#TRNVEC
172 000176' 012737 000200 000072      MOV      #PRI04,#TRNVEC+2
173
174 000204' 010700      MOV      PC,RO      ;SETUP RECEIVER VECTOR
175 000206' 062700 000360      ADD      #RCVINT-.,RO
176 000212' 010037 000120      MOV      RO,#RCVVEC
177 000216' 012737 000240 000122      MOV      #PRI05,#RCVVEC+2
178
179 000224' 013700 021040      MOV      #PCSRW,RO      ;GET SWITCH PACK BITS
180 000230' 052700 176000      BIS      #176000,RO      ;MAP THEM INTO HOST I/O PAGE
181 000234' 006300      ASL      RO -      ;SHIFT OVER TO POSITION CORRECTLY
182 000236' 006300      ASL      RO
183 000240' 006300      ASL      RO
184 000242' 062700 000004      ADD      #4,RO      ;PCSR2 IS PCSR0+4
185 000246' 010067 000356      MOV      RO,IPCSR2      ;SAVE PCSR2 ADDRESS
186 000252' 012767 000003 000352      MOV      #3,IPCSR2+2    ;HIGH ORDER BITS 17:16
187 000260' 005067 000336      CLR      FLG5      ;INITIALIZE FLAG WORD

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76MICROE - MICROCODE MODULE E MACY11 30A(1052) 07-APR-83 16:51 PAGE 6
 MICROE.MAC 07-APR-83 16:06 E_MODULE MICROCODE

188	000264'	106427	000000		15\$:	MTPS	#PRI00		:ALLOW INTERRUPTS
189									
190	000270'	005767	000326		20\$:	TST	FLG5		:WAIT FOR A COMMAND FROM HOST
191	000274'	001775				BEQ	20\$		
192									
193	000276'	106427	000340			MTPS	#PRI07		:RAISE CPU PRIORITY TO SERVICE COMMAND
194	000302'	032767	000001	000312		BIT	#CSRFLG,FLG5		:DID HOST GIVE US A COMMAND?
195	000310'	001001				BNE	30\$:YES
196	000312'	000777				BR	.		:NO, ERROR SO JUST SIT HERE...
197									:FOR LACK OF ANYTHING BETTER TO DO
198									
199	000314'	113700	021000		30\$:	MOVB	@#IPCSRO,R0		:GET WHAT HOST WROTE TO PCSRO
200	000320'	042700	177760			BIC	#177760,R0		:STRIP ALL BUT COMMAND BITS
201	000324'	001004				BNE	35\$:WAS IT THE CLEAR FUNCTION?
202	000326'	012737	000001	021020		MOV	#INMON,@#IPCSR1		:YES, CLEAR OUT THE TEST # BITS
203	000334'	000432				BR	50\$		
204	000336'	022700	000017		35\$:	CMP	#17,R0		:RESTART OPERATIONAL MICROCODE?
205	000342'	001432				BEQ	60\$:YES
206	000344'	162700	000001			SUB	#1,R0		
207	000350'	010701				MOV	PC,R1		:GET ADDRESS OF OUR COMMAND TABLE
208	000352'	062701	000240			ADD	#TBLD-.,R1		
209	000356'	006300				ASL	R0		:MAKE COMMAND A BYTE OFFSET
210	000360'	060001				ADD	R0,R1		:USE IT TO INDEX INTO COMMAND TABLE
211	000362'	061101				ADD	(R1),R1		:R1 NOW HAS COMMAND ROUTINE ADDRESS
212	000364'	004711				JSR	PC,(R1)		:EXECUTE AS COMMANDED FROM HOST
213	000366'	103404				BCS	40\$:ERROR OCCURRED
214	000370'	112767	000001	000230		MOVB	#INMON,PCSR1		:INDICATE TO HOST WE ARE BACK IN...
215	000376'	000403				BR	45\$:MICROMONITR
216	000400'	112767	000003	000220	40\$:	MOVB	#INERR,PCSR1		:INDICATE TO HOST ERROR OCCURRED
217	000406'	016737	000214	021020	45\$:	MOV	PCSR1,@#IPCSR1		
218	000414'	012737	004000	021000		MOV	#DMI,@#IPCSRO		:TELL HOST THIS MICROTEST FINISHED
219	000422'	005067	000174		50\$:	CLR	FLG5		:RESET FLAG WORD
220	000426'	000716				BR	15\$:GO WAIT FOR ANOTHER COMMAND
221									
222	000430'	005000			60\$:	CLR	R0		:FAKE SUCCESSFUL SELF TEST RESULTS
223	000432'	000137	040006			JMP	@#40006		:START OPERATIONAL MICROCODE
224									
225	000436'	052767	000001	000156	CSRWRT:	BIS	#CSRFLG,FLG5		:INDICATE A CSR WRITE INTERRUPT OCCURED
226	000444'	000002				RTI			
227									
228	000446'	052767	000002	000146	ERRINT:	BIS	#ERRFLG,FLG5		:INDICATE A UNEXPECTED INTERRUPT OCCURED
229	000454'	012737	020000	021000		MOV	#UNIERR,@#IPCSRO		:TELL HOST AN UNEXPECTED INTERRUPT
230									:HAPPENED
231	000462'	000777				BR	.		:JUST SIT HERE AND SPIN WHEELS
232									:COUNT ON HOST TO TIMEOUT
233									
234	000464'	005267	000134		TIMINT:	INC	SANTIM		:COUNT TICKS AS THEY OCCUR
235	000470'	000002				RTI			
236									
237	000472'	013767	021002	000140	DMAINT:	MOV	@#DMACSR,DMDONE		:GET DMA STATUS
238	000500'	032767	040000	000132		BIT	#BIT14,DMDONE		:DID A NON-EXISTANT MEMORY INTERRUPT OCCUR?
239	000506'	001404				BEQ	10\$:NO
240	000510'	012737	040000	021000		MOV	#NXMERR,@#IPCSRO		:YES, TELL HOST A NON-EXISTANT MEMORY
241									:LOCATION WAS ADDRESSED
242	000516'	000407				BR	20\$		
243	000520'	032767	100000	000112	10\$:	EIT	#BIT15,DMDONE		:DID A NPR TIMEOUT OCCUR?

MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 8
E_MODULE MICROCODE

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291 000646' 112767 000002 177752
292 000654' 016737 177746 021020
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299 000662' 016737 177742 021010
300 000670' 016737 177736 021012
301 000676' 013700 021014
302 000702' 013701 021014
303
304 000706' 010037 021010
305 000712' 010137 021012
306
307 000716' 013702 021014
308
309 000722' 062700 000002
310 000726' 005501
311
312 000730' 013703 021014
313
314 000734' 062700 000002
315 000740' 005501
316
317 000742' 013704 021014
318
319 000746' 010446
320 000750' 010344
321 000752' 010246
322
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325
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328 000754' 010700
329 000756' 062700 000342
330
331 000762' 012705 000014
332 000766' 010220

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SBTTL STATION ADDRESS PATTERN TEST

MICROCODE FOR STATION ADDRESS PATTERN TEST. GETS A 'PATTERN' TO BE USED AS A STATION ADDRESS FOR TESTING THE STATION ADDRESS RAM AND DETECTION CIRCUITRY. FILLS THE STATION ADDRESS RAM. LOOPS A DATAGRAM WITH A STATION ADDRESS IDENTICAL TO THE ADDRESS FILLING STATION ADDRESS RAM. IF ALL IS WORKING, DATAGRAM SHOULD BE RECEIVED OK.

***** TELL HIM WE ARE TESTING *****

MICE1: MOV #INTST,PCSR1 ; TELL HOST WE ARE TESTING
MOV PCSR1,@#IPCSR1

***** PICK UP HOST ADDRESS OF PCBB *****

```

MOV IPCSR2,@#MDMA0 ; PICK UP ADDRESS OF PCBB
MOV IPCSR2+2,@#DMA1
MOV @#MDMAR0,R0 ; R0=CONTENTS OF PCSR2
MOV @#MDMAR0,R1 ; R1=CONTENTS OF PCSR3
:
MOV R0,@#MDMA0 ; POINT TO HOST PCBB
MOV R1,@#DMA1
:
MOV @#MDMAR0,R2 ; R2 NOW HOLDS LS ADDRESS WORD
:
ADD #2,R0 ; INDEX TO NEXT HOST WORD
ADC R1
:
MOV @#MDMAR0,R3 ; R3 NOW HOLDS MIDDLE PATTERN
:
ADD #2,R0 ; INDEX TO NEXT HOST WORD
ADC R1
:
MOV @#MDMAR0,R4 ; R4 NOW HOLDS MS PATTERN WORD
:
MOV R4,-(SP) ; SAVE THEM FOR LATER
MOV R3,-(SP)
MOV R2,-(SP)

```

***** MAKE A STATION ADDRESS FILE FROM THE PASSED PATTERN *****

```

MOV PC,R0 ; POINT AT SA FILE
ADD #AFIL-.,R0
:
:
MOV #12.,R5 ; NEED TOTAL OF 12 ENTRIES
108: MOV R2,(R0)+ ; LS WORD OF PATTERN

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76MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 9
STATION ADDRESS PATTERN TEST

```

333 000770' 010320      MOV      R3,(R0)+      ; MIDDLE WORD OF PATTERN
334 000772' 010420      MOV      R4,(R0)+      ; MS WORD OF PATTERN
335 000774' 005305      DEC      R5            ; END OF LOOP
336 000776' 001373      BNE     108
337
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342
343 001000' 012737 000200 177776      MOV      #MODE,#CMDREG      ; SET LOOPBACK BEFORE LOADING
344 001006' 012737 000004 177774      MOV      #LOOP,#MODREG
345
346 001014' 010701      MOV      PC,R1          ; FORM POS/IND POINTER
347 001016' 062701 000302      ADD      #AFIL-.,R1
348
349 001022' 005000      CLR      R0            ; THIS WILL CLEAR HIGH BITS
350
351 001024' 012746 000120      MOV      #ARAM+20,-(SP)    ; SA RAM STARTS AT +20 LOCATIONS
352
353 001030' 012702 000003      MOV      #3,R2          ; 3 WORDS PER ADDRESS/PATTERN
354 001034' 012704 000020 20$:      MOV      #16.,R4         ; SIXTEEN BITS PER WORD
355 001040' 012705 000014 30$:      MOV      #12.,R5         ; 12 POSITIONS IN SA RAM
356
357 001044' 010103      MOV      R1,R3          ; COPY THE POINTER
358
359 001046' 006013 40$:      ROR      (R3)           ; GET LSB OF ALL 12 ADDRESSES
360 001050' 006100      ROL      R0            ; R0 WILL HOLD ORTHOGONAL WORD
361 001052' 062703 000006      ADD      #6,R3          ; 6 BYTES PER ADDRESS/PATTERN
362 001056' 077505      SOB     R5,40$         ; GO TILL DONE
363
364 001060' 011637 177776      MOV      (SP),#CMDREG    ; SET MODE TO WRITE SA RAM
365 001064' 010037 177774      MOV      R0,#ADRREG     ; ORTHOGONAL WORD TO SA RAM
366 001070' 005216      INC      (SP)           ; BUMP STATION ADDRESS
367 001072' 077416      SOB     R4,30$         ; DO ANOTHER ONE
368
369 001074' 062701 000002      ADD      #2,R1          ; ADVANCE TO NEXT WORD
370 001100' 077223      SOB     R2,20$         ; LOOP TILL DONE
371
372 001102' 012600      MOV      (SP)+,R0       ; R0 IS A JUNK REGISTER
373
374
375
376
377
378
379 001104' 012700 100000      MOV      #LINADR,R0     ; RECEIVE BUFFER STARTS HERE
380 001110' 010067 177526      MOV      R0,RBUF
381 001114' 005020 50$:      CLR      (R0)+         ; FILL RECEIVE BUFFER WITH ZEROS
382 001116' 020027 104000      CMP     R0,#LINADR+SIZ1K ; FILL THE BUFFER
383 001122' 103774      BLO     50$            ; FILL ENTIRE BUFFER
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77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 10
STATION ADDRESS PATTERN TEST

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389      :
390 001124' 012703 000377      :      MOV      #0377,R3      : WORST CASE FOR CLOCKING
391 001130' 010067 177510      :      MOV      R0,TBUF      :
392 001134' 010320      :      MOV      R3,(R0)+      : FILL XMIT BUFFER WITH PATTERN
393 001136' 020027 110000      :      CMP      R0,#LINADR+SIZ2K      : STOP AT TOP
394 001142' 103774      :      BLO      60$
395      :
396      :
397      :
398      : ***** SET UP LINK FOR DATAGRAM LOOPBACK OPERATION *****
399      : *****
400      :
401 001144' 012737 100020 177776      :      MOV      #ENABLE+20,#CMDREG      : LEAVE 20 IN COMMAND REGISTER
402      :
403 001152' 016701 177466      :      MOV      TBUF,R1      : POINT AT XMIT BUFFER
404 001156' 005021      :      CLR      (R1)+      : CLEAR OUT STATUS WORD
405 001160' 012721 000100      :      MOV      #MINBC,(R1)+      : SET BYTE COUNT TO MIN ALLOWED
406      :
407 001164' 012621      :      MOV      (SP)+,(R1)+      : GET BACK HIGH ADDRESS PATTERN
408 001166' 012621      :      MOV      (SP)+,(R1)+      :
409 001170' 012621      :      MOV      (SP)+,(R1)+      : GET BACK LOW ADDRESS PATTERN
410      :
411 001172' 005037 021034      :      CLR      #CLRFIF      : CLEAR THE FIFO
412 001176' 005067 177420      :      CLR      FLG5      : CLEAR INTERRUPT FLAG
413 001202' 016737 177434 021032      :      MOV      RBUF,#LFRBUF      : TELL UNA WHERE RECEIVE BUF IS
414 001210' 016737 177430 021030      :      MOV      TBUF,#LTAC      : TELL UNA WHERE XMIT BUF IS
415      :
416 001216' 106427 000140      :      MTPS     #PRI03      : ALLOW XMIT AND REC TO INTER
417 001222' 112767 000003 177376      :      MOV      #INERR,PCSR1      : TELL HOST IN CASE OF FAILURE
418 001230' 016737 177372 021020      :      MOV      PCSR1,#IPCSR1
419      :
420 001236' 016701 177402      :      MOV      TBUF,R1      : WAIT FOR MATCH BIT FIRST
421 001242' 011102      :      MOV      (R1),R2
422 001244' 032702 020000      :      BIT      #MATCH,R2
423 001250' 001774      :      BEQ      65$
424      :
425 001252' 112767 000002 177346      :      MOV      #INTST,PCSR1      : TELL HOST WE GOT BY IT
426 001260' 016737 177342 021020      :      MOV      PCSR1,#IPCSR1
427      :
428 001266' 032767 000100 177326      :      BIT      #RCVFLG,FLG5      : WAIT FOR RECEIVE INTER
429 001274' 001774      :      BEQ      70$
430      :
431 001276' 032767 000040 177316      :      BIT      #TRNFLG,FLG5      : WAIT FOR XMIT INT TOO!
432 001304' 001774      :      BEQ      80$
433      :
434 001306' 112767 000001 177313      :      MOV      #1,PCSR1+1      : TELL HOST WE ARE DONE
435 001314' 000241      :      CLC
436 001316' 000207      :      RTS      PC
437      :
438      :
439 001320' 000000 000000 000000      : AFIL: .WORD 0,0,0      : WORD #1
440 001326' 000000 000000 000000      :      .WORD 0,0,0
441 001334' 000000 000000 000000      :      .WORD 0,0,0
442 001342' 000000 000000 000000      :      .WORD 0,0,0
443 001350' 000000 000000 000000      :      .WORD 0,0,0
444 001356' 000000 000000 000000      :      .WORD 0,0,0

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77MICROE - MICROCODE MODULE E MACY11 30A(1052) 07-APR-83 16:51 PAGE 11
MICROE.MAC 07-APR-83 16:06 STATION ADDRESS PATTERN TEST

445	001364'	000000	000000	000000	.WORD	0,0,0
446	001372'	000000	000000	000000	.WORD	0,0,0
447	001400'	000000	000000	000000	.WORD	0,0,0
448	001406'	000000	000000	000000	.WORD	0,0,0
449	001414'	000000	000000	000000	.WORD	0,0,0
450	001422'	000000	000000	000000	.WORD	0,0,0

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 12
STATION ADDRESS PATTERN TEST

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SBTTL STATION ADDRESS REJECTION TEST

THIS TEST WILL VERIFY THAT THE STATION ADDRESS LOGIC WILL NOT
ACCEPT A STATION ADDRESS IF THAT STATION ADDRESS IS NOT PRESENT
IN THE STATION ADDRESS RAM. STATION ADDRESS RAM WILL BE FILLED
WITH AN ADDRESS. DIFFERENT ADDRESS WILL BE PUT IN DATAGRAM FIELD
AND LOOPED BACK. LINK SHOULD NOT RECOGNIZE THE DATAGRAM.

***** TELL HIM WE ARE TESTING *****

001430' 112767 000002 177170
001436' 016737 177164 021020

NICE2: MOV #INTST,PCSR1 ; TELL HOST WE ARE TESTING
MOV PCSR1,#IPCSR1
: CLR SANTIM ; CLEAR FLAG FOR TIMER

***** FILL STATION ADDRESS RAM WITH KNOWN (PHONEY) ADDRESS *****

001450' 012737 000200 177776
001456' 012737 000004 177774

MOV #MODE,#CMDREG ; SET LOOP TO LOAD SA RAM
MOV #LOOP,#MODREG
: MOV #48.,R4 ; COUNTER
CLR R0
: MOV #ARAM+20,R1 ; STATION ADDRESS STARTS AT +20
10\$: MOV R1,#CMDREG ; SELECT STATION ADDRESS RAM
MOV R0,#ADRREG ; PARK IN RAM
INC R1 ; NEXT LOCATION
SOB R4,10\$; DO THEM ALL

***** FILL THE RECEIVE BUFFER WITH BACKGROUND *****

001512' 012700 100000
001516' 010067 177120
001522' 005020
001524' 020027 104000
001530' 103774

MOV #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
MOV R0,RBUF
20\$: CLR (R0)+ ; FILL RECEIVE BUFFER WITH ZEROS
CMP R0,#LINADR+SIZ1K ; FILL THE BUFFER
BLO 20\$; FILL ENTIRE BUFFER

***** FILL TRANSMIT BUFFER WITH TEST PATTERN *****

001532' 012703 000377
001536' 010067 177102
001542' 010320
001544' 020027 110000
001550' 103774

MOV #0377,R3 ; WORST CASE FOR CLOCKING
MOV R0,TBUF
30\$: MOV R3,(R0)+ ; FILL XMIT BUFFER WITH PATTERN
CMP R0,#LINADR+SIZ2K ; STOP AT TOP
BLO 30\$

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 13
STATION ADDRESS REJECTION TEST

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512
513 001552' 012737 100020 177776      MOV      #ENABLE+20,#CMDREG      ; POINTER TO FRONT OF RAM
514
515 001560' 016701 177060      MOV      TBUF,R1                ; POINT AT XMIT BUFFER
516 001564' 005021                CLR      (R1)+                  ; CLEAR OUT STATUS WORD
517 001566' 012721 000100      MOV      #MINBC,(R1)+          ; SET BYTE COUNT TO MIN ALLOWED
518
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523
524 001572' 012700 177777      MOV      #177777,R0            ; BB STAND-IN FOR PHYSICAL ADDR
525 001576' 010021                MOV      R0,(R1)+
526 001600' 010021                MOV      R0,(R1)+
527 001602' 010021                MOV      R0,(R1)+
528
529
530 001604' 005037 021034      CLR      @CLRFIF                ; CLEAR THE FIFO
531 001610' 005067 177006      CLR      FLG5                  ; CLEAR INTERRUPT FLAG
532 001614' 016737 177022 021032  MOV      RBUF,@LFRBUF          ; TELL UNA WHERE RECEIVE BUF IS
533 001622' 016737 177016 021030  MOV      TBUF,@LTAC           ; TELL UNA WHERE XMIT BUF IS
534
535 001630' 106427 000140      MTPS    #PRI03                ; ALLOW XMIT AND REC TO INTER
536 001634' 026727 176764 000002 40S:  CMP      SNTIM,#2             ; WAIT FOR 2 SECONDS
537 001642' 002012                BGE     50S                    ; EXIT NORMALLY IF TIMER DONE
538 001644' 032767 000100 176750  BIT      #RCVFLG,FLG5         ; WAIT FOR RECEIVER INTERRUPT
539 001652' 001770                BEQ     40S                    ; IF NONE, WE'RE OK
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545
546 001654' 032767 000040 176740 45S:  BIT      #TRNFLG,FLG5         ; WAIT FOR XMIT INT TOO!
547 001662' 001774                BEQ     45S
548
549 001664' 000261                SEC
550 001666' 000401                BR      60S                    ;INDICATE ERROR
551
552
553
554
555
556
557 001670' 000241                50S:  CLC
558 001672' 112767 000002 176727 60S:  MOVB    #2,PCSR1+1          ; INDICATE SUCCESS
559 001700' 000207                RTS     PC                    ; TELL HOST WE ARE DONE
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77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 14
STATION ADDRESS REJECTION TEST

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SBTTL STATION ADDRESS RAM POSITION TEST

THIS TEST WILL CHECK THAT A STATION ADDRESS IS RECOGNIZED
REGARDLESS OF WHICH OF THE 12 RAM POSITIONS THE ADDRESS
RESIDES. THE PHYSICAL ADDRESS WILL BE WRITTEN TO EACH OF THE 12
STATION ADDRESS RAM POSITIONS WITH THE REST OF THE POSITIONS
FILLED WITH KNOWN DATA. A DATAGRAM WITH THE PHYSICAL ADDRESS
WILL BE LOOPED AROUND. THE TEST WILL VERIFY THE DATAGRAM IS
RECEIVED.

***** TELL HIM WE ARE TESTING *****

```
NICE3:  MOVB  #INTST,PCSR1      ; TELL HOST WE ARE TESTING
        MOV   PCSR1,#IPCSR1
        CLR   SANTIM          ; CLEAR THE FLAG
```

***** PICK UP HOST ADDRESS OF PCBB *****

```
        MOV   IPCSR2,#MDMA0    ; PICK UP ADDRESS OF PCBB
        MOV   IPCSR2+2,#MDMA1
        MOV   #MDMA0,R0        ; R0=CONTENTS OF PCSR2
        MOV   #MDMA0,R1        ; R1=CONTENTS OF PCSR3
        MOV   R0,#MDMA0        ; POINT TO HOST PCBB
        MOV   R1,#MDMA1
        MOV   #MDMA0,R2        ; R2 NOW HOLDS SA RAM POSITION
```

***** FILL THE BUFFER WITH PHONEY STATION ADDRESSES *****

```
        MOV   PC,R0           ; CALCULATE POS/IND ADDRESS
        ADD   #BFILE-.,R0
        MOV   #36.,R5         ; THERE ARE 12 ADDRESSES
10$:    CLR   (R0)+           ; FILL WITH ZERO (ADDRESS)
        DEC   R5
        BNE  10$
```

***** PUT PHYSICAL ADDRESS IN RAM POSITION *****

```
        MOV   PC,R0           ; CALCULATE POS/IND ADDRESS
        ADD   #BFILE-.,R0
```

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 15
STATION ADDRESS RAM POSITION TEST

```

618
619 002010' 005302
620 002012' 001403
621 002014' 062700 000006
622 002020' 000773
623
624 002022' 012701 177777
625 002026' 010120
626 002030' 010120
627 002032' 010120
628
629
630
631
632
633
634 002034' 012737 000200 177776
635 002042' 012737 000004 177774
636
637 002050' 010701
638 002052' 062701 000256
639
640 002056' 005000
641
642 002060' 012746 000120
643
644 002064' 012702 000003
645 002070' 012704 000020
646 002074' 012705 000014
647
648 002100' 010103
649
650 002102' 006013
651 002104' 006100
652 002106' 062703 000006
653 002112' 077505
654
655 002114' 011637 177776
656 002120' 010037 177774
657 002124' 005216
658 002126' 077416
659
660 002130' 062701 000002
661 002134' 077223
662
663 002136' 012600
664
665
666
667
668
669
670 002140' 012700 100000
671 002144' 010067 176472
672 002150' 005020
673 002152' 020027 104000

```

```

:
20$: DEC R2 ; PARAMTER IS NEVER > 1
      BEQ 30$ ; GO TO WORK
      ADD #4,R0
      BR 20$ ; GO ROUND
:
30$: MOV #177777,R1 ; && STAND-IN FOR PHSICAL ADDR
      MOV R1,(R0)+
      MOV R1,(R0)+
      MOV R1,(R0)+
:
:
: *****
: ***** LOAD THE STATION ADDRESS RAM *****
: *****
:
      MOV #MODE,&#CMDREG ; SET LOOP TO LOAD SA RAM
      MOV #LOOP,&#MODREG
:
      MOV PC,R1 ; FORM A POS/IND ADDRESS
      ADD #BFILE-.,R1 ; ADD THE GFFSET
:
      CLR R0 ; THIS CLEARS HIGH BITS
:
      MOV #ARAM+20,-(SP) ; FOR MODE REG/NEED A REGISTER
:
      MOV #3,R2 ; 3 WORDS PER ADDRESS/PATTERN
40$: MOV #16.,R4 ; SIXTEEN BITS PER WORD
50$: MOV #12.,R5 ; 12 POSITIONS IN SA RAM
:
      MOV R1,R3 ; COPY THE POINTER
:
60$: ROR (R3) ; GET LSD OF ALL 12 ADDRESSES
      ROL R0 ; R0 WILL HOLD ORTHOGONAL WORD
      ADD #6,R3 ; 6 BYTES PER ADDRESS/PATTERN
      SOB R5,60$ ; GO TILL DONE
:
      MOV (SP),&#CMDREG ; SET MODE TO WRITE SA RAM
      MOV R0,&#ADRREG ; ORTHOGONAL WORD TO SA RAM
      INC (SP) ; BUMP STATION ADDRESS
      SOB R4,50$ ; DO ANOTHER ONE
:
      ADD #2,R1 ; ADVANCE TO NEXT WORD
      SOB R2,40$ ; LOOP TILL DONE
:
      MOV (SP)+,R0 ; POP TO BYTE BUCKET
:
: *****
: ***** FILL THE RECEIVE BUFFER WITH BACKGROUND *****
: *****
:
70$: MOV #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
      MOV R0,RBUF
      CLR (R0)+ ; FILL RECEIVE BUFFER WITH ZEROS
      CMP R0,#LINADR+SIZ1K ; FILL THE BUFFER

```

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 16
STATION ADDRESS RAM POSITION TEST

```

674 002156' 103774          BLO      70$          ; FILL ENTIRE BUFFER
675
676
677
678          :
679          : *****
680          : ***** FILL TRANSMIT BUFFER WITH TEST PATTERN *****
681          : *****
681 002160' 012703 000377    MOV      #0377,R3          ; WORST CASE FOR CLOCKING
682 002164' 010067 176454    MOV      RO,TBUF          ;
683 002170' 010320          80$:    MOV      R3,(R0)+        ; FILL XMIT BUFFER WITH PATTERN
684 002172' 020027 110000    CMP      RO,#LINADR+SIZ2K ; STOP AT TOP
685 002176' 103774          BLO      80$
686
687          :
688          : *****
689          : ***** SET UP LINK FOR DATAGRAM LOOPBACK OPERATION *****
690          : *****
691
692 002200' 012737 100020 177776  MOV      #ENABLE+20,#CMDREG ; ENABLE LINK
693          :
694 002206' 016701 176432    MOV      TBUF,R1          ; POINT AT XMIT BUFFER
695 002212' 005021          CLR      (R1)+            ; CLEAR OUT STATUS WORD
696 002214' 012721 000100    MOV      #MINBC,(R1)+    ; SET BYTE COUNT TO MIN ALLOWED
697          :
698 002220' 012700 177777    MOV      #177777,RO       ; && STAND IN PHYSICAL ADDRESS
699 002224' 010021          MOV      RO,(R1)+
700 002226' 010021          MOV      RO,(R1)+
701 002230' 010021          MOV      RO,(R1)+
702          :
703 002232' 005037 021034    CLR      @CLRFIF         ; CLEAR THE FIFO
704 002236' 005067 176360    CLR      FLG5            ; CLEAR INTERRUPT FLAG
705 002242' 016737 176374 021032  MOV      RBUF,@LFRBUF    ; TELL UNA WHERE RECEIVE BUF IS
706 002250' 016737 176370 021030  MOV      TBUF,@LTAC      ; TELL UNA WHERE XMIT BUF IS
707          :
708 002256' 106427 000140          MTPS     #PRI03          ; ALLOW XMIT AND REC TO INTER
709 002262' 026727 176336 000002 90$:    CMP      SANTI,#2        ; WAIT FOR COUNTS TO ACCUMULATE
710 002270' 002015          BGE     120$
711 002272' 032767 000100 176322  BIT      #RCVFLG,FLG5    ; THIS SETS IF DATAGRAM LOOPS
712 002300' 001770          BEQ     90$
713          :
714 002302' 032767 000040 176312 100$:   BIT      #TRNFLG,FLG5    ; WAIT FOR XMIT TOO
715 002310' 001774          BEQ     100$
716          :
717 002312' 000241          CLC
718 002314' 112767 000003 176305 110$:   MOVB    #3,PCSR1+1      ; TELL HIM WHAT TEST WE'RE IN
719 002322' 000207          RTS      PC
720          :
721          :
722 002324' 000261          120$:   SEC
723 002326' 000772          BR      110$           ; INDICATE ERROR
724          :
725          :
726 002330' 000000 000000 000000 000000  BFILE:: .WORD 0,0,0
727 002336' 000000 000000 000000 000000  .WORD 0,0,0
728 002344' 000000 000000 000000 000000  .WORD 0,0,0
729 002352' 000000 000000 000000 000000  .WORD 0,0,0

```

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 17
STATION ADDRESS RAM POSITION TEST

730	002360'	000000	000000	000000	.WORD	0.0.0
731	002366'	000000	000000	000000	.WORD	0.0.0
732	002374'	000000	000000	000000	.WORD	0.0.0
733	002402'	000000	000000	000000	.WORD	0.0.0
734	002410'	000000	000000	000000	.WORD	0.0.0
735	002416'	000000	000000	000000	.WORD	0.0.0
736	002424'	000000	000000	000000	.WORD	0.0.0
737	002432'	000000	000000	000000	.WORD	0.0.0

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 18
STATION ADDRESS RAM POSITION TEST

```

738
739
740
741
742
743
744
745 002440' 112767 000002 176160
746 002446' 016737 176154 021020
747
748 002454' 005067 176144
749
750
751
752
753
754
755 002460' 012737 000200 177776
756 002466' 012737 000004 177774
757
758 002474' 012704 000060
759 002500' 005000
760
761 002502' 012701 000120
762 002506' 010137 177776
763 002512' 010037 177774
764 002516' 005201
765 002520' 077406
766
767
768
769
770
771
772 002522' 012700 100000
773 002526' 010067 176110
774 002532' 005020
775 002534' 020027 104000
776 002540' 103774
777
778
779
780
781
782
783 002542' 012703 000377
784 002546' 010067 176072
785 002552' 010320
786 002554' 020027 110000
787 002560' 103774
788
789
790
791
792
793

```

```

:SBTTL MULTICAST ADDRESS TEST
:
:*****
:***** TELL HIM WE ARE TESTING *****
:*****
MICE4: MOV #INTST,PCSR1 ; TELL HOST WE ARE TESTING
      MOV PCSR1,#IPCSR1
:
      CLR SANTIM ; CLEAR FLAG FOR TIMER
:
:*****
:***** FILL STATION ADDRESS RAM WITH KNOWN (PHONEY) ADDRESS *****
:*****
      MOV #MODE,#CMDREG ; SET LOOP TO LOAD SA RAM
      MOV #LOOP,#MODREG
:
      MOV #48.,R4 ; COUNTER
      CLR R0
:
10$: MOV #ARAM+20,R1 ; STATION ADDRESS STARTS AT +20
     MOV R1,#CMDREG ; SELECT STATION ADDRESS RAM
     MOV R0,#ADRREG ; PARK IN RAM
     INC R1 ; NEXT LOCATION
     SOB R4,10$ ; DO THEM ALL
:
:*****
:***** FILL THE RECEIVE BUFFER WITH BACKGROUND *****
:*****
20$: MOV #LINADR,R0 ; RECEIVE BUFFER STARTS HERE
     MOV R0,RBUF
     CLR (R0)+ ; FILL RECEIVE BUFFER WITH ZEROS
     CMP R0,#LINADR+SIZ1K ; FILL THE BUFFER
     BLO 20$ ; FILL ENTIRE BUFFER
:
:*****
:***** FILL TRANSMIT BUFFER WITH TEST PATTERN *****
:*****
30$: MOV #0377,R3 ; WORST CASE FOR CLOCKING
     MOV R0,TBUF
     MOV R3,(R0)+ ; FILL XMIT BUFFER WITH PATTERN
     CMP R0,#LINADR+SIZ2K ; STOP AT TOP
     BLO 30$
:
:*****
:***** SET UP LINK FOR DATAGRAM LOOPBACK OPERATION *****
:*****

```

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 19
MULTICAST ADDRESS TEST

```

794 002562' 012737 000200 177776      MOV    #MODE,@#CMDREG      ; ENABLE LINK, SELECT MODE
795 002570' 012737 040004 177774      MOV    #ENAL!LOOP,@#MODREG ; ENABLE LOOPBACK
796 002576' 012737 100020 177776      MOV    #ENABLE+20,@#CMDREG ; POINTER TO FRONT OF RAM
797                                     ;
798 002604' 016701 176034      MOV    TBUF,P,R1          ; POINT AT XMIT BUFFER
799 002610' 005021              CLR    (R1)+              ; CLEAR OUT STATUS WORD
800 002612' 012721 000100      MOV    #MINBC,(R1)+      ; SET BYTE COUNT TO MIN ALLOWED
801                                     ;
802                                     ;
803                                     ; *****
804                                     ; ***** GET PHYSICAL ADDRESS INTO DATAGRAM *****
805                                     ; *****
806                                     ;
807 002616' 012700 177777      MOV    #177777,R0        ; && STAND-IN FOR PHYSICAL ADDR
808 002622' 010011              MOV    R0,(R1)           ;
809 002624' 052721 000001      BIS    #01,(R1)+        ; SET MULTICAST ADDRESS BIT
810 002630' 010021              MOV    R0,(R1)+        ;
811 002632' 010021              MOV    R0,(R1)+        ;
812                                     ;
813                                     ;
814 002634' 005037 021034      CLR    @#CLRFIF         ; CLEAR THE FIFO
815 002640' 005067 175756      CLR    FLG5             ; CLEAR INTERRUPT FLAG
816 002644' 016737 175772 021032  MOV    RBUF,P,@#LFRBUF   ; TELL UNA WHERE RECEIVE BUF IS
817 002652' 016737 175766 021030  MOV    TBUF,P,@#LTAC     ; TELL UNA WHERE XMIT BUF IS
818                                     ;
819 002660' 106427 000140      MTPS   #PRI03           ; ALLOW XMIT AND REC TO INTER
820 002664' 026727 175734 000002 40$ :  CMP    SANTIM,#2       ; && LEAVE IT 2 SECONDS
821 002672' 002015              BGE    60$              ; EXIT IF TIMER DONE
822 002674' 032767 000100 175720  BIT    #RCVFLG,FLG5     ; WAIT FOR RECEIVER INTERRUPT
823 002702' 001770              BEQ    40$              ;
824                                     ;
825 002704' 032767 000040 175710 45$ :  BIT    #TRNFLG,FLG5    ; WAIT FOR XMIT INT TOO!
826 002712' 001774              BEQ    45$              ;
827                                     ;
828 002714' 000241              CLC                               ; INDICATE SUCCESS
829 002716' 112767 000004 175703 50$ :  MOVB  #4,PCSR1+1      ; TELL HOST WE ARE DONE
830 002724' 000207              RTS    PC                ;
831                                     ;
832                                     ;
833 002726' 000261              SEC                               ; INDICATE ERROR
834 002730' 000772              BR    50$              ; RETURN TO MICROMONITOR
835                                     ;
836                                     ;

```

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 20
MULTICAST ADDRESS TEST

837
838 002732' 002734
839
840 000001

·
·MICESZ::MICESZ-MICROE+2
·
·END

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 24
CROSS REFERENCE TABLE -- USER SYMBOLS

RCVFLG=	000100		109#	257	428	538	711	822							
RCVINT	000566R	002	175	255#											
RCVVEC=	000120		94#	176*	177*										
ROMADR=	040000		125#	126											
ROMSIZ=	040000		121#	126											
RXI =	020000		70#												
SANTIM	000624R	002	234*	269#	467*	536	580*	709	748*	820					
SANVEC=	000134		95#	166*	167*										
SERI =	100000		68#												
SIZ1K =	004000		115#	116	382	494	673	775							
SIZ2K =	010000		116#	117	393	505	684	786							
SIZ4K =	020000		117#	118	119	120									
SIZ8K =	040000		118#	121	122										
STACK =	001000		99#	137											
TBLD	000612R	002	208	263#											
TBUF	000644R	002	275#	391*	403	414	420	503*	515	533	682*	694	706	784*	798
			817												
TIMINT	000464R	002	165	234#											
TRNFLG=	000040		108#	260	431	546	714	825							
TRNINT	000602R	002	170	260#											
TRNVEC=	000070		93#	171*	172*										
TXI =	010000		71#												
UNIERR=	020000		112#	229											
WCSADR=	000000		123#	124											
WCSSIZ=	020000		119#	124											
.	= 002734R	002	142	150	155	160	165	170	175	196	208	231	247	253	263
			264	265	266	329	347	603	616	638					

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 26
CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	1#
BERROR	1#
BGNAU	1#
BGNAUT	1#
BGNCLN	1#
BGNDU	1#
BGNHRD	1#
BGNHW	1#
BGNINI	1#
BGNMOD	1#
BGNMSG	1#
BGNPRO	1#
BGNPTA	1#
BGNRPT	1#
BGNSEG	1#
BGNSET	1#
BGNSFT	1#
BGNSRV	1#
BGNSUB	1#
BGNSU	1#
BGNTST	1#
BNCOMP	1#
BNERRO	1#
BREAK	1#
BRESET	1#
CKLOOP	1#
CLOCK	1#
CLOSE	1#
CLVEC	1#
COMMEN	1#
DELAY	1#
DESCRI	1#
DEVTYP	1#
DISPAT	1#
DISPLA	1#
DOCLN	1#
DODU	1#
DORPT	1#
ENDAU	1#
ENDAUT	1#
ENDCLN	1#
ENDCOM	1#
ENDDU	1#
ENDHRD	1#
ENDHW	1#
ENDINI	1#
ENDMOD	1#
ENDMSG	1#
ENDPRO	1#
ENDPTA	1#
ENDRPT	1#
ENDSEG	1#
ENDSET	1#
ENDSFT	1#
ENDSRV	1#
ENDSUB	1#

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 27
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	1#
ENDTST	1#
EQUALS	1#
ERRDF	1#
ERRHRD	1#
ERROR	1#
ERRSF	1#
ERRSOF	1#
ERRTBL	1#
ESCAPE	1#
EXIT	1#
FEQUAL	1#
GETBYT	1#
GETPRI	1#
GETWOR	1#
GMANIA	1#
GMANID	1#
GMANIL	1#
GPHARD	1#
GPRMA	1#
GPRMD	1#
GPRML	1#
HEADER	1#
INLOOP	1#
IOSETU	1#
IOSTAR	1#
KT11	1#
LASTAD	1#
MANUAL	1#
MEMORY	1#
MSBYTE	1#
MSCHEC	1#
MSCNTO	1#
MSCOUN	1#
MSDATA	1#
MSDECR	1#
MSDEFA	1#
MSENDE	1#
MSERRI	1#
MSESCA	1#
MSESCS	1#
MSEXCP	1#
MSEXIT	1#
MSXSE	1#
MSXTJ	1#
MSGEN	1#
MSGENB	1#
MSGETS	1#
MSGETT	1#
MSGNGB	1#
MSGNIN	1#
MSGNLS	1#
MSGNSU	1#
MSGNTA	1#
MSGNTE	1#
MSHAPT	1#

77MICROE - MICROCODE MODULE E
MICROE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 28
CROSS REFERENCE TABLE -- MACRO NAMES

MSHMAP	1#
MSINCR	1#
MSIOSE	1#
MSLDRO	1#
MSMASK	1#
MSMCHI	1#
MSXCLO	1#
MSMSK!	1#
MSPOP	1#
MSPRIN	1#
MSPUSH	1#
MSPUT	1#
MSPUT1	1#
MSRADI	1#
MSRBRO	1#
MSRNRO	1#
MSSETS	1#
MSSTAR	1#
MSVC	1#
MSTLAB	1#
MSSTL	1#
MSWORD	1#
MSXFER	1#
OPEN	1#
POINTE	1#
PRINTB	1#
PRINTF	1#
PRINTS	1#
PRINTX	1#
READBU	1#
REDEF	1#
RFLAGS	1#
SETPRI	1#
SETVEC	1#
SLASH	1#
STARS	1#
SVC	1#
XFER	1#
XFERF	1#
XFERT	1#

. ABS.	000000	000
	000000	001
MICRE	002734	002

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

MICROE.OBJ,MICROE.LST/CR/SOL/NL:TOC=SVC34R.P11,MICROE.MAC
RUN-TIME: 2 3 .4 SECONDS
RUN-TIME RATIO: 33/6=5.1
CORE USED: 31K (61 PAGES)

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.TITLE MICROF - MICROCODE MODULE F
: && DEDICATED THE CRC CIRCUITRY TO THE RECEIVE SIDE OF THE LINK

.CSECT MICRF

.SBTTL REGISTER DEFINITIONS USED BY THE T11

021000	IPCSRO	=	21000	:INTERNAL PCSRO ADDRESS
021002	DMACSR	=	21002	:DMA ENGINE CONTROL STATUS REGISTER
021004	DMATO	=	21004	:DMA ENGINE TO ADDRESS REGISTER #0
021006	DMAT1	=	21006	:DMA ENGINE TO ADDRESS REGISTER #1
021010	MDMA0	=	21010	:MICROCPU DMA TO ADDRESS REGISTER #0
021012	MDMA1	=	21012	:MICROCPU DMA TO ADDRESS REGISTER #1
021014	MDMAR0	=	21014	:MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
021016	MDMAR1	=	21016	:MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
021020	IPCSR1	=	21020	:INTERNAL PCSR1 ADDRESS
021022	DMAF	=	21022	:DMA ENGINE FROM ADDRESS REGISTER
021024	DMAWC	=	21024	:DMA ENGINE WORD COUNT REGISTER
021026	MDMAW0	=	21026	:MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
021030	LTAC	=	21030	:LINK TRANSMIT ADDRESS COUNTER REGISTER
021032	LFRBUF	=	21032	:LINK RECIEVE BUFFER ADDRESS FIFO
021034	CLRFIF	=	21034	:CLEAR FIFO
021036	MDMAW1	=	21036	:MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
021040	PCSRSW	=	21040	:SWITCH PACK REGISTER
021042	MDMSR	=	21042	:MICROCPU DMA STATUS REGISTER
021044	LRBUF	=	21044	:LINK RECIEVE BUFFER COMPLETED
021060	PHYAD0	=	21060	:PHYSICAL ADDRESS ROM BYTE 0
021062	PHYAD1	=	21062	:PHYSICAL ADDRESS ROM BYTE 1
021064	PHYAD2	=	21064	:PHYSICAL ADDRESS ROM BYTE 2
021066	PHYAD3	=	21066	:PHYSICAL ADDRESS ROM BYTE 3
021070	PHYAD4	=	21070	:PHYSICAL ADDRESS ROM BYTE 4
021072	PHYAD5	=	21072	:PHYSICAL ADDRESS ROM BYTE 5
177774	MODREG	=	177774	:LINK MODE REGISTER
177774	ADRREG	=	177774	:LINK STATION ADDRESS RAM REGISTER
177776	CMDREG	=	177776	:LINK COMMAND REGISTER

.SBTTL OTHER DEFINITIONS USED BY THE MICROCODE

100000	BIT15	=	100000
040000	BIT14	=	40000
020000	BIT13	=	20000
010000	BIT12	=	10000
004000	BIT11	=	4000
002000	BIT10	=	2000
001000	BIT9	=	1000
000400	BIT8	=	400
000200	BIT7	=	200
000100	BIT6	=	100
000040	BIT5	=	40
000020	BIT4	=	20
000010	BIT3	=	10
000004	BIT2	=	4
000002	BIT1	=	2
000001	BIT0	=	1
012400	LASFTP	=	BIT8!BIT10!BIT12 ;LOAD AND START FUNCTION TEST PATTERN

76MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

57	000340	PRI07 =	340	
58	000300	PRI06 =	300	
59	000240	PRI05 =	240	
60	000200	PRI04 =	200	
61	000140	PRI03 =	140	
62	000100	PRI02 =	100	
63	000040	PRI01 =	40	
64	000000	PRI00 =	0	
65		:		
66		:PCSR0 - PORT CONTROL STATUS REGISTER 0		
67		:		
68	100000	SERI =	BIT15	
69	040000	PCEI =	BIT14	
70	020000	RXI =	BIT13	
71	010000	TXI =	BIT12	
72	004000	DNI =	BIT11	
73	002000	RCEI =	BIT10	
74	000400	FATI =	BIT8	
75		:		
76		:LINK COMMAND REGISTER		
77		:		
78	100000	ENABLE =	BIT15	:ENABLE LINK MODULE
79	000200	MODE =	BIT7	:ENABLE MODE REGISTER
80	000100	ARAM =	BIT6	:ENABLE STATION ADDRESS RAM
81		:		
82		:LINK MODE REGISTER		
83		:		
84	100000	PROM =	BIT15	:PROMISCUOUS MODE
85	040000	ENAL =	BIT14	:ENABLE MULTICAST
86	004000	ENCR =	BIT11	:ENABLE COLLISION TEST
87	002000	ACLO =	BIT10	:ENABLE ACLO
88	000040	DRTY =	BIT5	:DISABLE RETRY LOGIC
89	000020	COLL =	BIT4	:SIMULATE A COLLISION
90	000010	DTCR =	BIT3	:DISABLE TRANSMIT CRC LOGIC
91	000004	LOOP =	BIT2	:ENABLE LOOPBACK
92	000001	HDX =	BIT0	:HALF DUPLEX BIT
93		:		
94	000070	TRNVEC=	70	:VECTOR ADDRESS FOR THE TRANSMITTER
95	000120	RCVVEC=	120	:VECTOR ADDRESS FOR THE RECEIVER
96	000134	SANVEC=	134	:VECTOR ADDRESS FOR THE SANITY TIMER
97	000064	CSRVEC=	64	:VECTOR ADDRESS FOR CSR WRITE INTERRUPT
98	000114	DMAVEC=	114	:VECTOR ADDRESS FOR DMA DONE INTERRUPT
99	000140	PARVEC=	140	:VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
100	001000	STACK=	1000	:STACK LOCATION
101	000001	INMON=	1	:IN MICROMONITOR STATE
102	000002	INTST=	2	:IN A TEST STATE
103	000003	INERR=	3	:IN ERROR STATE
104	000001	CSRFLG=	BIT0	:CSR WRITE INTERRUPT OCCURED
105	000002	ERRFLG=	BIT1	:UNEXPECTED ERROR OCCURED
106	000004	PARFLG=	BIT2	:PARITY ERROR OCCURED
107	000010	NXMFLG=	BIT3	:NON-EXISTANT MEMORY ERROR OCCURED
108	000020	NPRFLG=	BIT4	:NPR TIMEOUT OCCURED
109	000040	TRNFLG=	BIT5	:TRANSMITTER INTERRUPT OCCURED
110	000100	RCVFLG=	BIT6	:RECEIVER INTERRUPT OCCURED
111	100000	NPRERR=	BIT15	:PCSR0 FLAG INDICATING NPR ERROR OCCURED
112	040000	NXMERR=	BIT14	:PCSR0 FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURED

76MICROF - MICROCODE MODULE F
 MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 4
 OTHER DEFINITIONS USED BY THE MICROCODE

113	020000	UNIERR= BIT13	:PCSR0 FLAG INDICATING UNEXPECTED INTERRUPT OCCURRED
114	010000	PARERR= BIT12	:PCSR0 FLAG INDICATING LINK MEMORY PARITY ERROR OCCURRED
115	004000	SIZ1K= 4000	:1K WORDS
116	010000	SIZ2K= SIZ1K*2	:2K WORDS
117	020000	SIZ4K= SIZ2K*2	:4K WORDS
118	040000	SIZ8K= SIZ4K*2	:8K WORDS
119	020000	WCSSIZ= SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
120	020000	IOSIZ= SIZ4K	:SIZE OF I/O PAGE
121	040000	ROMSIZ= SIZ8K	:SIZE OF ROM
122	077774	LINSIZ= SIZ8K*2-4	:SIZE OF LINK MEMORY
123	000000	WCSADR= 0	:BASE ADDRESS OF WCS
124	020000	IOADR= WCSADR+WCSSIZ	:BASE ADDRESS OF I/O PAGE
125	040000	ROMADR= IOADR+IOSIZ	:BASE ADDRESS OF ROM
126	100000	LINADR= ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
127	000100	MINBC= 64.	: 64 BYTES
128	002752	MAXBC= 1518.-4.	:MAXIMUM # OF BYTES IN A TRANSMIT BUFFER
129	000000	DATERR= 0	:FLAG INDICATING DATA ERROR OCCURRED
130	000001	ADRERR= 1	:FLAG INDICATING ADDRESS ERROR OCCURRED
131		:	
132	177777	INITH = -1	: MINUS ONE (INITIAL CRC VALUE)
133	177777	INITL = -1	
134	166670	POLYH = 166670	: FUNCTION POLYNOMIAL HIGH WORD
135	101440	POLYL = 101440	: FUNCTION POLYNOMIAL LOW WORD
136	157273	EXCRCH = 157273	: EXPECTED CRC HIGH
137	020343	EXCRCL = 020343	: EXPECTED CRC LOW

76MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 5
OTHER DEFINITIONS USED BY THE MICROCODE

```

138
139
140          .SBTTL F_MODULE MICROCODE
141 000000' 106427 000340          MICROF::MTPS          #PRI07          ;DISABLE INTERRUPTS
142 000004' 012737 000000 177776          MOV          #0,#CMDREG          ;TURN OFF THE LINK
143 000012' 012706 001000          MOV          #STACK,SP          ;SETUP STACK
144 000016' 112767 000001 000604          MOVB         #INMON,PCSR1          ;TELL HOST WE ARE IN MICROMONITOR
145 000024' 016737 000600 021020          MOV          PCSR1,@#IPCSR1
146 000032' 012737 004000 021000          MOV          #DNI,@#IPCSRO
147 000040' 010700          MOV          PC,RO          ;TELL HOST THE LOAD AND START FINISHED
148 000042' 062700 000404          ADD          #ERRINT-.,RO          ;GET ADDRESS OF UNEXPECTED ERROR...
149 000046' 005001          CLR          R1          ;HANDLER
150 000050' 010021          10$: MOV          RO,(R1)+          ;FILL ALL UNUSED VECTORS WITH TRAP...
151 000052' 012721 000340          MOV          #PRI07,(R1)+          ;HANDLER
152 000056' 020127 001000          CMP          R1,#1000
153 000062' 002772          BLT          10$
154
155 000064' 010700          MOV          PC,RO          ;SETUP PARITY TRAP VECTOR
156 000066' 062700 000462          ADD          #PARINT-.,RO
157 000072' 010037 000140          MOV          RO,@#PARVEC
158 000076' 012737 000340 000142          MOV          #PRI07,@#PARVEC+2
159
160 000104' 010700          MOV          PC,RO          ;SETUP DMA INTERRUPT VECTOR
161 000106' 062700 000364          ADD          #DMAINT-.,RO
162 000112' 010037 000114          MOV          RO,@#DMAVEC
163 000116' 012737 000340 000116          MOV          #PRI07,@#DMAVEC+2
164
165 000124' 010700          MOV          PC,RO          ;SETUP CSR WRITE VECTOR
166 000126' 062700 000310          ADD          #CSRWRT-.,RO
167 000132' 010037 000064          MOV          RO,@#CSRVEC
168 000136' 012737 000200 000066          MOV          #PRI04,@#CSRVEC+2
169
170 000144' 010700          MOV          PC,RO          ;SETUP SANITY TIMER VECTOR
171 000146' 062700 000316          ADD          #TIMINT-.,RO
172 000152' 010037 000134          MOV          RO,@#SANVEC
173 000156' 012737 000240 000136          MOV          #PRI05,@#SANVEC+2
174
175 000164' 010700          MOV          PC,RO          ;SETUP TRANSMITTER VECTOR
176 000166' 062700 000414          ADD          #TRNINT-.,RO
177 000172' 010037 000070          MOV          RO,@#TRNVEC
178 000176' 012737 000200 000072          MOV          #PRI04,@#TRNVEC+2
179
180 000204' 010700          MOV          PC,RO          ;SETUP RECEIVER VECTOR
181 000206' 062700 000360          ADD          #RCVINT-.,RO
182 000212' 010037 000120          MOV          RO,@#RCVVEC
183 000216' 012737 000240 000122          MOV          #PRI05,@#RCVVEC+2
184
185 000224' 013700 021040          MOV          @#PCSRW,RO          ;GET SWITCH PACK BITS
186 000230' 052700 176000          BIS          #176000,RO          ;MAP THEM INTO HOST I/O PAGE
187 000234' 006300          ASL          RO          ;SHIFT OVER TO POSITION CORRECTLY
188 000236' 006300          ASL          RO
189 000240' 006300          ASL          RO
190 000242' 062700 000004          ADD          #4,RO          ;PCSR2 IS PCSR0+4
191 000246' 010067 000360          MOV          RO,IPCSR2          ;SAVE PCSR2 ADDRESS
192 000252' 012767 000003 000354          MOV          #3,IPCSR2+2          ;HIGH ORDER BITS 17:16
193 000260' 005067 000340          CLR          FLG6          ;INITIALIZE FLAG WORD

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76MICROF - MICROCODE MODULE F MACY11 30A(1052) 07-APR-83 16:51 PAGE 6
 MICROF.MAC 07-APR-83 16:06 F_MODULE MICROCODE

194	000264'	106427	000000		15\$:	MTPS	#PRI00		:ALLOW INTERRUPTS
195									
196	000270'	005767	000330		20\$:	TST	FLG6		:WAIT FOR A COMMAND FROM HOST
197	000274'	001775				BEQ	20\$		
198									
199	000276'	106427	000340			MTPS	#PRI07		:RAISE CPU PRIORITY TO SERVICE COMMAND
200	000302'	032767	000001	000314		BIT	#CSRFLG,FLG6		:DID HOST GIVE US A COMMAND?
201	000310'	001001				BNE	30\$:YES
202	000312'	000777				BR	.		:NO, ERROR SO JUST SIT HERE...
203									:FOR LACK OF ANYTHING BETTER TO DO
204									
205	000314'	113700	021000		30\$:	MOVB	#IPCSRO,RO		:GET WHAT HOST WROTE TO PCSRO
206	000320'	042700	177760			BIC	#177760,RO		:STRIP ALL BUT COMMAND BITS
207	000324'	001004				BNE	35\$:WAS IT THE CLEAR FUNCTION?
208	000326'	012737	000001	021020		MOV	#INMON,#IPCSR1		:YES, CLEAR OUT THE TEST # BITS
209	000334'	000432				BR	50\$		
210	000336'	022700	000017		35\$:	CMP	#17,RO		:RESTART OPERATIONAL MICROCODE?
211	000342'	001432				BEQ	60\$:YES
212	000344'	162700	000001			SUB	#1,RO		
213	000350'	010701				MOV	PC,R1		:GET ADDRESS OF OUR COMMAND TABLE
214	000352'	062701	000240			ADD	#TBLD-.,R1		
215	000356'	006300				ASL	RO		:MAKE COMMAND A BYTE OFFSET
216	000360'	060001				ADD	RO,R1		:USE IT TO INDEX INTO COMMAND TABLE
217	000362'	061101				ADD	(R1),R1		:R1 NOW HAS COMMAND ROUTINE ADDRESS
218	000364'	004711				JSR	PC,(R1)		:EXECUTE AS COMMANDED FROM HOST
219	000366'	103404				BCS	40\$:ERROR OCCURRED
220	000370'	112767	000001	000232		MOVB	#INMON,PCSR1		:INDICATE TO HOST WE ARE BACK IN...
221	000376'	000403				BR	45\$:MICROMONITR
222	000400'	112767	000003	000222	40\$:	MOVB	#INERR,PCSR1		:INDICATE TO HOST ERROR OCCURRED
223	000406'	016737	000216	021020	45\$:	MOV	PCSR1,#IPCSR1		
224	000414'	012737	004000	021000		MOV	#DNI,#IPCSRO		:TELL HOST THIS MICROTTEST FINISHED
225	000422'	005067	000176		50\$:	CLR	FLG6		:RESET FLAG WORD
226	000426'	000716				BR	15\$:GO WAIT FOR ANOTHER COMMAND
227									
228	000430'	005000			60\$:	CLR	RO		:FAKE SUCCESSFUL SELF TEST RESULTS
229	000432'	000137	040006			JMP	#40006		:START OPEKATIONAL MICROCODE
230									
231	000436'	052767	000001	000160	CSRWRT:	BIS	#CSRFLG,FLG6		:INDICATE A CSR WRITE INTERRUPT OCCURED
232	000444'	000002				RTI			
233									
234	000446'	052767	000002	000150	ERRINT:	BIS	#ERRFLG,FLG6		:INDICATE A UNEXPECTED INTERRUPT OCCURED
235	000454'	012737	020000	021000		MOV	#UNIERR,#IPCSRO		:TELL HOST AN UNEXPECTED INTERRUPT
236									:HAPPENED
237									:JUST SIT HERE AND SPIN WHEELS
238	000462'	000777				BR	.		:COUNT ON HOST TO TIMEOUT
239									
240	000464'	005267	000136		TIMINT:	INC	SANTIM		:COUNT TICKS AS THEY OCCUR
241	000470'	000002				RTI			
242									
243	000472'	013767	021002	000142	DMAINT:	MOV	#DMACSR,DMDONE		:GET DMA STATUS
244	000500'	032767	040000	000134		BIT	#BIT14,DMDONE		:DID A NON-EXISTANT MEMORY INTERRUPT OCCUR?
245	000506'	001404				BEQ	10\$:NO
246	000510'	012737	040000	021000		MOV	#NXMERR,#IPCSRO		:YES, TELL HOST A NON-EXISTANT MEMORY
247									:LOCATION WAS ADDRESSED
248	000516'	000407				BR	20\$		
249	000520'	032767	100000	000114	10\$:	BIT	#BIT15,DMDONE		:DID A NPR TIMEOUT OCCUR?

76MICROF - MICROCODE MODULE F MACY11 30A(1052) 07-APR-83 16:51 PAGE 7
 MICROF.MAC 07-APR-83 16:06 F_MODULE MICROCODE

```

250 000526' 001407          BEQ      30$          ;NO
251 000530' 012737 100000 021000  MOV     #NPRERR,@#IPCSRO ;TELL HOST NPR TIMEOUT HAPPENED
252 000536' 012737 100000 021002 20$:  MOV     #BIT15,@#DMACSR ;CLEAR THE INTERRUPT IN THE DMA ENGINE
253 000544' 000777          BR       .           ;SIT HERE AND SPIN WHEELS
254 000546' 000002          30$:  RTI
255
256 000550' 052767 000004 000046 PARINT: BIS     #PARFLG,FLG6 ;SET PARITY ERROR OCCURRED
257 000556' 012737 010000 021000  MOV     #PARERR,@#IPCSRO ;TELL HOST A LINK MEMORY PARITY ERROR
258                                BR       .           ;OCCURRED
259 000564' 000777          ;JUST SIT HERE AND SPIN WHEELS
260                                ;COUNT ON HOST TO TIMEOUT
261
262 000566' 005737 021044          RCVINT: TST    @#LRBUF ;READ BUFFER DONE REGISTER...
263                                ;WHICH CLEARS THE INTERRUPT
264 000572' 052767 000100 000024          BIS     #RCVFLG,FLG6 ;SET RECEIVER INTERRUPT OCCURRED
265 000600' 000002          RTI
266
267 000602' 052767 000040 000014 TRNINT: BIS     #TRNFLG,FLG6 ;SET TRANSMITTER INTERRUPT OCCURRED
268 000610' 000002          RTI
269
270 000612' 000170          TBLD:  .WORD  MICF1-. ; CRC DATA PATTERN
271 000614' 000460          .WORD  MICF2-. ; CRC ERROR TEST
272 000616' 001032          .WORD  MICF3-. ; CRC PATTERN LENGTH
273 000620' 001544          .WORD  MICF4-. ; BUFFER RECOVERY TEST
274 000622' 002222          .WORD  MICF5-. ; HALF-DUPLEX TEST
275
276 000624' 000000          FLG6:  .WORD  0 ;FLAG WORD
277 000626' 000000          SANTIM: .WORD  0 ;COUNT FOR SANITY TIMER
278 000630' 000000          PCSR1: .WORD  0 ;COPY OF WHAT GOES TO PCSR1
279 000632' 000000 000000  IPCSR2: .WORD  0,0 ;ADDRESS IN HOST MEMORY FOR PCSR2
280 000636' 000000 000000  PCBADR: .WORD  0,0 ;ADDRESS IN HOST MEMORY FOR PCB
281 000642' 000000          DMDONE: .WORD  0
282 000644' 000000          RBUF:  .WORD  0 ;POINTER TO RECIEVE BUFFER
283 000646' 000000          TBUF:  .WORD  0 ;POINTER TO XMIT BUFFER
284 000650' 000000          CRC1:  .WORD  0 ;HOLDS LAST DATA BYTE AND 1ST CRC BYTE
285 000652' 000000          CRC2:  .WORD  0 ;HOLDS 2ND AND 3RD CRC BYTES
286 000654' 000000          CRC4:  .WORD  0 ;HOLDS 4TH CRC BYTE
287
    
```

76MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 8
F_MODULE MICROCODE

```

288
289
290
291
292
293
294
295 000656' 106746
296 000660' 010046
297 000662' 010146
298 000664' 010246
299 000666' 012704 177777
300 000672' 012705 177777
301 000676' 112001
302 000700' 004767 000014
303 000704' 077204
304 000706' 012602
305 000710' 012601
306 000712' 012600
307 000714' 106426
308 000716' 000207
309
310
311 000720' 106746
312 000722' 010146
313 000724' 010246
314 000726' 010346
315 000730' 042701 177400
316 000734' 074105
317 000736' 012702 166670
318 000742' 012703 101440
319 000746' 012701 000010
320 000752' 000241
321 000754' 006004
322 000756' 006005
323 000760' 103002
324 000762' 074204
325 000764' 074305
326 000766' 077107
327 000770' 012603
328 000772' 012602
329 000774' 012601
330 000776' 106426
331 001000' 000207
332
333

```

```

:
: *****
: ***** SUBROUTINES *****
: *****
:
BLKCRC: MFPS      -(SP)          : SAVE PSW
          MOV      R0,-(SP)       : SAVE R0
          MOV      R1,-(SP)
          MOV      R2,-(SP)
          MOV      #INITH,R4      : INITIAL CRC HIGH WORD
          MOV      #INITL,R5      : INITIAL CRC LOW WORD
10$:     MOV      (R0)+,R1         : GET NEXT BYTE
          JSR      PC,GETCRC       : CALCULATE CRC
20$:     SOB      R2,10$          : LOOP TILL DONE
          MOV      (SP)+,R2
          MOV      (SP)+,R1
          MOV      (SP)+,R0
          MTPS     (SP)+
          RTS      PC
:
:
GETCRC: MFPS      -(SP)          : SAVE REGISTERS
          MOV      R1,-(SP)
          MOV      R2,-(SP)
          MOV      R3,-(SP)
          BIC      #^C377,R1      : CLEAR HIGH BYTE
          XOR      R1,R5          : MERGE NEW BYTE WITH OLD CRC
          MOV      #POLYH,R2      : GET POLYNOMIAL HIGH WORD
          MOV      #POLYL,R3      : GET CRC POLYNOMIAL LOW WORD
          MOV      #8.,R1         : LOOP COUNT
10$:     CLC
          ROR      R4
          ROR      R5
          BCC      20$           : SKIP IF BIT 0 NOT SET
          XOR      R2,R4          : EXCLUSIVE OR IN THE POLY
          XOR      R3,R5          : BOTH HIGH AND LOW WORDS
20$:     SOB      R1,10$         : AND LOOP ON ALL 8 BITS
          MOV      (SP)+,R3       : RESTORE REGISTERS
          MOV      (SP)+,R2
          MOV      (SP)+,R1
          MTPS     (SP)+
          RTS      PC
:
:

```

76MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 9
F_MODULE MICROCODE

```

334      :
335      :SBTTL  CRC DATA PATTERN TEST
336      :
337      :*****
338      :***** TELL HIM WE ARE TESTING *****
339      :*****
340      :
341 001002' 112767 000002 177620 MICF1: MOV  #INTST,PCSR1      ; TELL HOST WE ARE TESTING
342 001010' 016737 177614 021020      MOV  PCSR1,#IPCSR1
343      :
344      :*****
345      :***** RETRIEVE PATTERN FROM HOST MEMORY *****
346      :*****
347      :
348 001016' 016737 177610 021010      MOV  IPCSR2,#MDMA0      ; SET TO GET HOST PCBB ADDRESS
349 001024' 016737 177604 021012      MOV  IPCSR2+2,#MDMA1
350 001032' 013700 021014              MOV  #MDMAR0,R0        ; R5 NOW CONTAINS PCBB LOW
351 001036' 013701 021014              MOV  #MDMAR0,R1        ; R1 NOW CONTAINS PCBB HIGH
352 001042' 010037 021010              MOV  R0,#MDMA0        ; POINT AT PCBB
353 001046' 010137 021012              MOV  R1,#MDMA1
354 001052' 013703 021014              MOV  #MDMAR0,R3        ; R3 NOW HOLDS DATA PATTERN
355      :
356      :*****
357      :***** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN *****
358      :*****
359      :
360      :
361 001056' 012700 100000              MOV  #LINADR,R0        ; RECEIVE BUFFER STARTS HERE
362 001062' 010067 177556              MOV  R0,RBUF
363 001066' 005020 104000 10$:      CLR  (R0)+              ; FILL RECEIVE BUFFER WITH ZEROS
364 001070' 020027 104000              CMP  R0,#LINADR+SIZ1K ; STOP AT THE TOP
365 001074' 103774
366      :
367      :
368      :*****
369      :***** FILL XMIT BUFFER WITH TEST PATTERN *****
370      :*****
371      :
372 001076' 010067 177544              MOV  R0,TBUF          ; SAVE COPY OF ADDRESS
373 001102' 010320 110000 20$:      MOV  R3,(R0)+          ; FILL XMIT BUFFER WITH PATTERN
374 001104' 020027 110000              CMP  R0,#LINADR+SIZ2K
375 001110' 103774              BLO  20$
376      :
377      :
378      :*****
379      :***** SET UP LINK FOR DATAGRAM LOOPBACK *****
380      :*****
381      :
382 001112' 012737 000200 177776      MOV  #MODE,#CMDREG    ; ENABLE LINK, SELECT MODE REG
383 001120' 012737 100004 177774      MOV  #PROM!LOOP,#MODREG ; PROM MODE AND LOOPBACK
384 001126' 012737 100000 177776      MOV  #ENABLE,#CMDREG  ; ENABLE IT
385      :
386 001134' 016701 177506              MOV  TBUF,R1          ; POINT AT XMIT BUFFER
387 001140' 005021              CLR  (R1)+            ; CLEAR OUT STATUS WORD
388 001142' 012721 002752              MOV  #MAXBC,(R1)+    ; CLEAR OUT THE FIFO
389 001146' 005037 021034              CLR  #CLRFIF         ; CLEAR THE FIFO

```

77MICROF - MICROCODE MODULE F MACY11 30A(1052) 07-APR-83 16:51 PAGE 10
MICROF.MAC 07-APR-83 16:06 CRC DATA PATTERN TEST

```

390 001152' 005067 177446          CLR      FLG6
391 001156' 016737 177462 021032  MOV     RBUF, @#LFRBUF      : TELL DEUNA RECEIVE BUF LOC
392 001164' 016737 177456 021030  MOV     TBUF, @#LTAC        : TELL DEUNA WHERE XMIT BUF IS
393                                     :
394 001172' 106427 000140          MTPS    #PRI03              : ALLOW INTERRUPTS
395 001176' 032767 000100 177420 30S:  BIT     #RCVFLG, FLG6      : WAIT FOR RECEIVER INTERRUPT
396 001204' 001774          BEQ     30S
397                                     :
398 001206' 032767 000040 177410 40S:  BIT     #TRNFLG, FLG6      : WAIT FOR XMIT INTERRUPT TOO
399 001214' 001774          BEQ     40S
400                                     :
401 001216' 106427 000340          MTPS    #PRI07              : DISABLE INTERRUPTS
402                                     :
403                                     :
404                                     : *****
405                                     : ***** CALCULATE THE CRC ON THE RECEIVER BUFFER CONTENTS *****
406                                     : *****
407                                     :
408 001222' 016700 177416          MOV     RBUF, R0            : POINT AT RECEIVE BUFFER
409 001226' 062700 000004          ADD     #4, R0              : BY-PASS THE STATUS AND BC
410 001232' 012702 002756          MOV     #MAXBC+4, R2       : INCLUDE CRC BYTES
411 001236' 004767 177414          JSR    PC, BLKCRC
412 001242' 020427 157273          CMP     R4, #EXCRCH
413 001246' 001010          BNE    50S                 : ERROR IF NOT
414 001250' 020527 020343          CMP     R5, #EXCRCL
415 001254' 001005          BNE    50S
416 001256' 000241          CLC
417 001260' 112767 000001 177343 45S:  MOVB   #1, PCSR1+1
418 001266' 000207          RTS     PC                 : INDICATE SUCCESS
419                                     :
420                                     :
421                                     : *****
422                                     : ***** ERROR EXIT *****
423                                     : *****
424                                     :
425 001270' 000261          50S:   SEC
426 001272' 000772          BR     45S                 : TELL HIM WE MADE ERROR
427                                     : LEAVE

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 11
CRC DATA PATTERN TEST

```

428
429
430
431
432
433
434
435 001274' 112767 000002 177326
436 001302' 016737 177322 021020
437
438
439
440
441
442
443 001310' 016737 177316 021010
444 001316' 016737 177312 021012
445 001324' 013704 021014
446 001330' 013705 021014
447 001334' 010437 021010
448 001340' 010537 021012
449 001344' 013703 021014
450
451
452
453
454
455
456 001350' 012700 100000
457 001354' 010067 177264
458 001360' 005020
459 001362' 020027 104000
460 001366' 103774
461
462
463
464
465
466
467 001370' 010067 177252
468 001374' 010320
469 001376' 020027 110000
470 001402' 103774
471
472
473
474
475
476
477 001404' 016700 177236
478 001410' 062700 000004
479 001414' 012702 002746
480 001420' 004767 177232
481 001424' 016700 177216
482 001430' 062700 000004
483 001434' 062700 002746

```

SBTTL CRC ERROR TEST

```

*****
***** TELL HIM WE ARE TESTING *****
*****

```

```

MICF2:  MOVB  #INTST,PCSR1      ; TELL HOST WE ARE TESTING
        MOV   PCSR1,#IPCSR1

```

```

*****
***** RETRIEVE PATTERN FROM HOST MEMORY *****
*****

```

```

        MOV   IPCSR2,#MDMA0      ; SET TO GET HOST PCBB ADDRESS
        MOV   IPCSR2+2,#MDMA1
        MOV   #MDMA0,R4          ; R4 NOW CONTAINS PCBB LOW
        MOV   #MDMA0,R5          ; R5 NOW CONTAINS PCBB HIGH
        MOV   R4,#MDMA0         ; POINT AT PCBB
        MOV   R5,#MDMA1
        MOV   #MDMA0,R3          ; R3 NOW HOLDS DATA PATTERN

```

```

*****
***** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN *****
*****

```

```

        MOV   #LINADR,R0          ; RECEIVE BUFFER STARTS HERE
        MOV   R0,RBUF
10$:    CLR   (R0)+                ; FILL RECEIVE BUFFER WITH ZEROS
        CMP   R0,#LINADR+SIZ1K    ; STOP AT THE TOP
        BLO

```

```

*****
***** FILL XMIT BUFFER WITH TEST PATTERN *****
*****

```

```

        MOV   R0,TBUF             ; SAVE COPY OF ADDRESS
        MOV   R3,(R0)+            ; FILL XMIT BUFFER WITH PATTERN
20$:    CMP   R0,#LINADR+SIZ2K
        BLO  20$

```

```

*****
***** CALCULATE CRC ON TRANSMIT BUFFER *****
*****

```

```

        MOV   TBUF,R0             ; POINT AT RECEIVE BUFFER
        ADD   #4,R0               ; SKIP 1ST WORD AND BYTE COUNT
        MOV   #MAXBC-4,R2         ; DO A BUNCH
        JSR   PC,BLKCRC
        MOV   TBUF,R0
        ADD   #4,R0
        ADD   #MAXBC-4,R0

```


77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 12
CRC ERROR TEST

```

484 001440' 005104          COM      R4          ; MUST SEND THE COMPLEMENT
485 001442' 005105          COM      R5
486 001444' 005205          INC      R5          ; INTRODUCE AN ERROR IN CRC!
487 001446' 010520          MOV      R5,(R0)+    ; APPEND THE CRC WORD
488 001450' 010420          MOV      R4,(R0)+    ; APPEND THE OTHER CRC WORD
489
490
491
492
493
494
495 001452' 012737 000200 177776      MOV      #MODE,&#CHDREG      ; ENABLE, SELECT MODE
496 001460' 012737 100014 177774      MOV      #PROM!LOOP!DTCR,&#MODREG ; PROM MODE AND LOOPBACK
497 001466' 012737 100000 177776      MOV      #ENABLE,&#CHDREG    ; ENABLE THE XMITR
498
499 001474' 016701 177146          MOV      TBUF,R1        ; POINT AT XMIT BUFFER
500 001500' 005021          CLR      (R1)+          ; CLEAR OUT STATUS WORD
501 001502' 012721 002752          MOV      #MAXBC,(R1)+   ; CLEAR OUT THE FIFO
502 001506' 005037 021034          CLR      &#CLRFIF       ; CLEAR THE FIFO
503 001512' 005067 177106          CLR      FLG6
504 001516' 016737 177122 021032      MOV      RBUF,&#LFRBUF    ; TELL DEUNA RECEIVE BUF LOC
505 001524' 016737 177116 021030      MOV      TBUF,&#LTAC     ; TELL DEUNA WHERE XMIT BUF IS
506
507 001532' 106427 000140          MTPS     #PRI03         ; ALLOW INTERRUPTS
508 001536' 032767 000100 177060 30S: BIT      #RCVFLG,FLG6     ; WAIT FOR RECEIVER INTERRUPT
509 001544' 001774          BEQ
510
511 001546' 032767 000040 177050 40S: BIT      #TRNFLG,FLG6     ; WAIT FOR XMIT INTERRUPT TOO
512 001554' 001774          BEQ
513
514 001556' 106427 000340          MTPS     #PRI07         ; DISABLE INTERRUPTS
515
516
517
518
519
520
521 001562' 012700 100000          MOV      #LINADR,R0     ; GET RECEIVE STATUS WORD
522 001566' 011003          MOV      (R0),R3       ; GET STATUS WORD
523
524 001570' 016737 177036 021010      MOV      IPCSR2,&#NDMA0   ; SET TO GET HOST PCBB
525 001576' 016737 177032 021012      MOV      IPCSR2+2,&#NDMA1
526 001604' 013700 021014          MOV      &#NDMAR0,R0   ; R0 NOW CONTAINS PCBB LOW
527 001610' 013701 021014          MOV      &#NDMAR0,R1   ; R1 NOW CONTAINS PCBB HI
528 001614' 062700 000002          ADD      #2,R0         ; BUMP TO NEXT HOST WORD
529 001620' 005501          ADC      R1
530 001622' 010037 021010          MOV      R0,&#NDMA0     ; POINT TO PCBB
531 001626' 010137 021012          MOV      R1,&#NDMA1
532 001632' 010337 021026          MOV      R3,&#NDMA0     ; WRITE STATUS WORD TO HOST
533
534
535 001636' 112767 000002 176765      MOVB     #2,PCSR1+1     ; TELL HIM WHICH TEST IT IS
536 001644' 000241          CLC
537 001646' 000207          RTS      PC

```

***** SET UP LINK FOR DATAGRAM LOOPBACK *****

***** WRITE STATUS REGISTER TO HOST MEMORY *****

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 13
CRC ERROR TEST

```

538
539
540
541
542
543
544
545 001650' 112767 000002 176752
546 001656' 016737 176746 021020
547
548
549
550
551
552
553 001664' 016737 176742 021010
554 001672' 016737 176736 021012
555 001700' 013704 021014
556 001704' 013705 021014
557 001710' 010437 021010
558 001714' 010537 021012
559 001720' 013703 021014
560
561
562
563
564
565
566 001724' 012700 100000
567 001730' 010067 176710
568 001734' 005020
569 001736' 020027 104000
570 001742' 103774
571
572
573
574
575
576
577 001744' 010067 176676
578 001750' 010320
579 001752' 020027 110000
580 001756' 103774
581
582
583
584
585
586
587 001760' 016737 176646 021010
588 001766' 016737 176642 021012
589 001774' 013704 021014
590 002000' 013705 021014
591 002004' 062704 000002
592 002010' 005505
593 002012' 010437 021010

```

```

:SBTTL  CRC PATTERN LENGTH TEST
:*****
:**** TELL HIM WE ARE TESTING ****
:*****
MICF3:  MOVB  #INTST,PCSR1          ; TELL HOST WE ARE TESTING
        MOV   PCSR1,B#IPCSR1
:*****
:**** RETRIEVE PATTERN FROM HOST MEMORY ****
:*****
        MOV   IPCSR2,B#MDMA0      ; SET TO GET HOST PCBB ADDRESS
        MOV   IPCSR2+2,B#MDMA1
        MOV   B#MDMA0,R4          ; R4 NOW CONTAINS PCBB LOW
        MOV   B#MDMA0,R5          ; R5 NOW CONTAINS PCBB HIGH
        MOV   R4,B#MDMA0         ; POINT AT PCBB
        MOV   R5,B#MDMA1
        MOV   B#MDMA0,R3          ; R3 NOW HOLDS DATA PATTERN
:*****
:**** FILL RECEIVE BUFFER WITH BACKGROUND PATTERN ****
:*****
        MOV   #LINADR,R0          ; RECEIVE BUFFER STARTS HERE
        MOV   R0,RBUF
10S:    CLR   (R0)+
        CMP   R0,#LINADR+SIZ1K   ; FILL RECEIVE BUFFER WITH ZEROS
        BLO  10S                 ; STOP AT THE TOP
:*****
:**** FILL XMIT BUFFER WITH TEST PATTERN ****
:*****
20S:    MOV   R0,TBUF             ; SAVE COPY OF ADDRESS
        MOV   R3,(R0)+           ; FILL XMIT BUFFER WITH PATTERN
        CMP   R0,#LINADR+SIZ2K
        BLO  20S
:*****
:**** RETRIEVE BYTE COUNT FROM HOST MEMORY ****
:*****
        MOV   IPCSR2,B#MDMA0      ; SET TO GET HOST PCBB
        MOV   IPCSR2+2,B#MDMA1
        MOV   B#MDMA0,R4          ; R4 NOW CONTAINS PCBB LO
        MOV   B#MDMA0,R5          ; R5 NOW CONTAINS PCBB HI
        ADD   #2,R4              ; BUMP LOW BY TWO
        ADC   R5
        MOV   R4,B#MDMA0         ; POINT AT PCBB

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 14
CRC PATTERN LENGTH TEST

594 002016' 010537 021012
595 002022' 013703 021014
596
597
598
599
600
601
602 002026' 016700 176614
603 002032' 062700 000004
604 002036' 010302
605 002040' 004767 176612
606 002044' 016700 176576
607 002050' 062700 000004
608 002054' 060300
609 002056' 005104
610 002060' 005105
611 002062' 032700 000001
612 002066' 001427
613
614 002070' 162700 000001
615 002074' 011067 176550
616 002100' 110567 176545
617 002104' 000305
618 002106' 110567 176540
619 002112' 110467 176535
620 002116' 000304
621 002120' 110467 176530
622 002124' 105067 176525
623 002130' 016720 176514
624 002134' 016720 176512
625 002140' 016710 176510
626 002144' 000402
627
628 002146' 010520
629 002150' 010420
630 002152'
631
632
633
634
635
636
637 002152' 012737 000200 177776
638 002160' 012737 100014 177774
639 002166' 012737 100000 177776
640
641 002174' 016701 176446
642 002200' 005021
643 002202' 062703 000004
644 002206' 010321
645 002210' 005037 021034
646 002214' 005067 176404
647 002220' 016737 176420 021032
648 002226' 016737 176414 021030
649

```

MOV R5,B#MDMA1
MOV B#MDMAR0,R3 ; R3 NOW HOLDS BYTE COUNT
:
*****
***** CALCULATE CRC ON TRANSMIT BUFFER *****
*****
MOV TBUF,R0 ; POINT AT RECEIVE BUFFER
ADD #4,R0 ; BY-PASS STATUS AND BC
MOV R3,R2 ; R3 CONTAINS BYTE COUNT
JSR PC,BLKCR0
MOV TBUF,R0 ; POINT AT XMIT BUFFER
ADD #4,R0 ; BY-PASS STATUS AND BC
ADD R3,R0 ; ADD BUFFER BYTE COUNT
COM R4 ; COMPLEMENT BEFORE SENDING
COM R5
BIT #1,R0 ;ARE WE LOOKING AT AN ODD BOUNDARY?
BEQ 25$ ;NO, GOOD IT MAKES THINGS EASIER
:
SUB #1,R0 ;POINT BACK TO EVEN BOUNDARY
MOV (R0),CRC1 ;GET DATA BYTE AND JUNK
MOVB R5,CRC1+1 ;REPLACE JUNK WITH 1ST CRC BYTE
SWAB R5 ;POSITION 2ND CRC BYTE
MOVB R5,CRC23 ;GET 2ND CRC BYTE
MOVB R4,CRC23+1 ;GET 3RD CRC BYTE
SWAB R4 ;POSITION 4TH CRC BYTE
MOVB R4,CRC4 ;GET 4TH CRC BYTE
CLRB CRC4+1 ;CLEAR JUNK FOR THE HELL OF IT
MOV CRC1,(R0)+ ;STORE DATA AND 1ST CRC BYTE IN BUFFER
MOV CRC23,(R0)+ ;STORE 2ND AND 3RD CRC BYTES IN BUFFER
MOV CRC4,(R0) ;STORE 4TH CRC BYTE IN BUFFER
BR 26$ ;CARRY ON
25$: MOV R5,(R0)+ ; APPEND THE CRC WORD
MOV R4,(R0)+ ; APPEND THE OTHER CRC WORD
26$:
:
*****
***** SET UP LINK FOR DATAGRAM LOOPBACK *****
*****
MOV #MODE,B#CMDREG ; ENABLE, SELECT MODE
MOV #PROM!LOOP!DTCR,B#MODREG ; PROM MODE AND LOOPBACK
MOV #ENABLE,B#CMDREG ; LET HER GO!
:
MOV TBUF,R1 ; POINT AT XMIT BUFFER
CLR (R1)+ ; CLEAR OUT STATUS WORD
ADD #4,R3 ; ACCOUNT FOR CRC BYTES
MOV R3,(R1)+ ; WRITE THE BYTE COUNT
CLR B#CLRFIF ; CLEAR THE FIFO
CLR FLG6
MOV RBUF,B#LFRBUF ; TELL DEUNA RECEIVE BUF LOC
MOV TBUF,B#LTAC ; TELL DEUNA WHERE XMIT BUF IS

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 15
CRC PATTERN LENGTH TEST

```

650 002234' 106427 000140      MTPS      #PRI03      : ALLOW INTERRUPTS
651 002240' 032767 000100 176356 308: BIT      #RCVFLG,FLG6 : WAIT FOR RECEIVER INTERRUPT
652 002246' 001774      BEQ      308
653
654 002250' 032767 000040 176346 408: BIT      #TRNFLG,FLG6 : WAIT FOR XMIT INTERRUPT TOO
655 002256' 001774      BEQ      408
656
657 002260' 106427 000340      MTPS      #PRI07      : DISABLE INTERRUPTS
658
659
660
661
662
663
664 002264' 016700 176354      MOV      RBUF,R0      : GET RECEIVE STATUS WORD
665 002270' 011003      MOV      (R0),R3      : GET STATUS WORD
666
667 002272' 016737 176334 021010  MOV      IPCSR2,B#DMA0 : SET TO GET HOST PCBB
668 002300' 016737 176330 021012  MOV      IPCSR2+2,B#DMA1
669 002306' 013700 021014      MOV      B#DMA0,R0      : R0 NOW CONTAINS PCBB LOW
670 002312' 013701 021014      MOV      B#DMA0,R1      : R1 NOW CONTAINS PCBB HI
671 002316' 062700 000004      ADD      #4,R0          : BUMP TO NEXT HOST WORD
672 002322' 005501      ADC      R1
673 002324' 010037 021010      MOV      R0,B#DMA0      : POINT TO PCBB
674 002330' 010137 021012      MOV      R1,B#DMA1
675 002334' 010337 021026      MOV      R3,B#DMA0      : WRITE STATUS WORD TO HOST
676
677
678 002340' 016702 176302      MOV      TBUF,R2      : GET XMIT BUFFER STATUS
679 002344' 011203      MOV      (R2),R3
680 002346' 010337 021026      MOV      R3,B#DMA0      : WRITE XMIT STATUS TO HOST
681 002352' 112767 000003 176251  MOVB     #3,PCSR1+1    : TELL HIM WHICH TEST IT IS
682 002360' 000241      CLC
683 002362' 000207      RTS      PC

```

```

*****
***** WRITE STATUS REGISTER TO HOST MEMORY *****
*****

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 16
CRC PATTERN LENGTH TEST

```

684
685
686
687
688
689
690
691 002364' 112767 000002 176236
692 002372' 016737 176232 021020
693
694 002400' 005067 176222
695
696
697
698
699
700
701 002404' 012700 100000
702 002410' 010067 176230
703 002414' 005020
704 002416' 020027 104000
705 002422' 103774
706
707
708
709
710
711
712 002424' 010067 176216
713 002430' 012720 125252
714 002434' 020027 110000
715 002440' 103773
716
717
718
719
720
721
722 002442' 016737 176164 021010
723 002450' 016737 176160 021012
724 002456' 013700 021014
725 002462' 013701 021014
726 002466' 010037 021010
727 002472' 010137 021012
728 002476' 013703 021014
729
730
731
732
733
734
735 002502' 012737 000200 177776
736 002510' 012737 100014 177774
737 002516' 012737 100000 177776
738
739 002524' 016704 176116

```

```

:SBTTL RECEIVE BUFFER RECOVERY - RUNT TEST
:*****
:***** TELL HIM WE ARE TESTING *****
:*****
MICF4: MOVB #INTST,PCSR1 ; TELL HOST WE ARE TESTING
      MOV PCSR1,&IPCSR1
:
      CLR SANTIM ; CLEAR FLAG FOR TIMER
:*****
:***** CLEAR THE RECEIVE BUFFER *****
:*****
      MOV #LINADR,R0 ; RECEIVER BUFFER STARTS HERE
      MOV R0,RBUF
10S: CLR (R0)+ ; FILL BUFFER WITH ZEROS
      CMP R0,#LINADR+SIZ1K ; STOP AT THE TOP
      BLO 10S
:*****
:***** FILL XMIT WITH RUNT MARKER *****
:*****
20S: MOV R0,TBUF ; SAVE COPY OF THE ADDRESS
      MOV #125252,(R0)+
      CMP R0,#LINADR+SIZ2K
      BLO 20S
:*****
:***** RETRIEVE BYTE COUNT FROM HOST MEMORY *****
:*****
      MOV IPCSR2,&INDR0 ; SET TO GET HOST PCBB ADDRESS
      MOV IPCSR2+2,&INDR1
      MOV &INDR0,R0 ; R4 NOW CONTAINS PCBB LOW
      MOV &INDR0,R1 ; R5 NOW CONTAINS PCBB HIGH
      MOV R0,&INDR0 ; POINT AT PCBB
      MOV R1,&INDR1
      MOV &INDR0,R3 ; R3 NOW HOLDS BYTE COUNT
:*****
:***** SET UP LINK FOR RUNT DATAGRAM LOOPBACK *****
:*****
      MOV #MODE,&CMDREG ; DISABLE XMIT CRC - TRUE BC
      MOV #PROM!LOOP!DTCR,&MODREG
      MOV #ENABLE,&CMDREG
:
      MOV TBUF,R4 ; POINT AT XMIT BUFFER

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 17
RECEIVE BUFFER RECOVERY - RUNT TEST

```

740 002530' 005024          CLR      (R4)+          ; CLEAR OUT STATUS WORD
741 002532' 010324          MOV      R3,(R4)+      ; WRITE PASSED BYTE COUNT
742                          ;
743 002534' 005037 021034   CLR      @CLRFIF        ; CLEAR THE FIFO
744 002540' 005067 176060   CLR      FLG6          ; CLEAR THE INTERRUPT FLAG
745 002544' 016737 176074 021032  MOV     RBUF,@LFRBUF    ; TELL UNA WHERE RECEIVE BUF IS
746 002552' 016737 176070 021030  MOV     TBUF,@LTAC     ; TELL UNA WHERE XMIT BUF IS
747                          ;
748 002560' 106427 000140   MTPS    #PRI03         ; ALLOW XMITTER TO INTERRUPT
749 002564' 026727 176036 000002 30$:  CMP     SANTIM,#2      ; WAIT AT MOST 2 SECONDS
750 002572' 002012          BGE     50$           ; EXIT NORMALLY IF TIMER DONE
751 002574' 032767 000100 176022  BIT     #RCVFLG,FLG6   ; WAIT FOR RECEIVER INTERRUPT
752 002602' 001770          BEQ     30$           ; IF NONE, WERE OK
753                          ;
754                          ;
755                          ; *****
756                          ; ***** ERROR FALLTHROUGH *****
757                          ; *****
758                          ;
759 002604' 032767 000040 176012 40$:  BIT     #TRNFLG,FLG6   ; WAIT FOR XMIT INT TOO!
760 002612' 001774          BEQ     40$
761                          ;
762 002614' 000261          SEC
763 002616' 000506          BR      90$           ; TELL HOST UNA SCREWED UP!
764                          ;
765                          ;
766                          ; *****
767                          ; ***** NOW TRY LEGITIMATE BUFFER SIZE *****
768                          ; *****
769                          ;
770 002620' 016700 176022 50$:  MOV     TBUF,R0          ; GET TRANSMIT BUFFER POINTER
771 002624' 012720 052525 60$:  MOV     #52525,(R0)+
772 002630' 020027 110000   CMP     R0,#LINADR+SIZ2K
773 002634' 103773          BLO     60$
774                          ;
775                          ;
776                          ; *****
777                          ; ***** SET UP LINK FOR MINIMUM DATAGRAM MESSAGE *****
778                          ; *****
779                          ;
780 002636' 012737 000200 177776   MOV     #MODE,@CMDREG  ; ENABLE LINK, SEL MODE REG
781 002644' 012737 100004 177774   MOV     #PRON!LOOP,@MODREG
782 002652' 012737 100000 177776   MOV     #ENABLE,@CMDREG
783                          ;
784 002660' 016704 175762          MOV     TBUF,R4        ; POINT AT XMIT BUFFER
785 002664' 005024          CLR     (R4)+          ; CLEAR STATUS WORD
786 002666' 012724 000100          MOV     #MINBC,(R4)+   ; SEND SMALL DATAGRAM
787                          ;
788 002672' 005067 175726          CLR     FLG6          ;
789 002676' 016737 175742 021032  MOV     RBUF,@LFRBUF    ; TELL UNA WHERE RECEIVE BUF IS
790 002704' 016737 175736 021030  MOV     TBUF,@LTAC     ; TELL UNA WHERE XMIT BUF IS
791                          ;
792 002712' 106427 000140   MTPS    #PRI03         ; ALLOW XMITR TO INTERRUPT
793 002716' 032767 000100 175700 70$:  BIT     #RCVFLG,FLG6   ; WAIT FOR RECEIVER INTERRUPT
794 002724' 001774          BEQ     70$
795                          ;

```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 18
RECEIVE BUFFER RECOVERY - RUNT TEST

```

796 002726' 032767 000040 175670 80S: BIT #TRNFLG,FLG6 ; WAIT FOR XMIT INT TOO!
797 002734' 001774 BEQ 80S
798 :
799 002736' 106427 000340 MTPS #PRI07 ; DISABLE INTERRUPTS
800 :
801 :
802 : *****
803 : ***** WRITE PARAMETERS TO HOST PCBB *****
804 : *****
805 :
806 002742' 013703 021044 MOV @RLRBUF,R3 ; GET LINK POINTER
807 :
808 002746' 016700 175672 MOV RBUF,R0 ; POINT AT RECEIVER BUFFER
809 002752' 062700 000004 ADD #4,R0
810 002756' 011004 MOV (R0),R4 ; GET PATTERN WORD
811 :
812 :
813 002760' 016737 175646 021010 MOV IPCSR2,@MDMA0 ; SET TO GET HOST PCBB
814 002766' 016737 175642 021012 MOV IPCSR2+2,@MDMA1
815 002774' 013700 021014 MOV @MDMAR0,R0 ; R0 NOW CONTAINS PCBB LO
816 003000' 013701 021014 MOV @MDMAR0,R1 ; R1 NOW CONTAINS PCBB HI
817 003004' 062700 000002 ADD #2,R0
818 003010' 005501 ADC R1
819 003012' 010037 021010 MOV R0,@MDMA0 ; POINT AT PCBB+2
820 003016' 010137 021012 MOV R1,@MDMA1
821 :
822 003022' 010337 021026 MOV R3,@MDMAW0 ; WRITE LINK POINTER
823 003026' 010437 021026 MOV R4,@MDMAW0 ; WRITE DATA BYTE
824 :
825 :
826 003032' 000241 CLC
827 003034' 112767 000004 175567 90S: MOVB #4,PCSR1+1 ; TELL HOST WE ARE DONE
828 003042' 000207 RTS PC
    
```

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 19
HALF-DUPLEX TEST

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.SBTTL HALF-DUPLEX TEST

***** TELL HIM WE ARE TESTING *****

MICF5: MOVB #INTST,PCSR1 ; TELL HOST WE ARE TESTING
MOV PCSR1,#IPCSR1
:
CLR SANTIM ; CLEAR FLAG FOR TIMER

***** CLEAR THE RECEIVE BUFFER *****

MOV #LINADR,R0 ; RECEIVER BUFFER STARTS HERE
MOV R0,RBUF
10\$: CLR (R0)+ ; FILL BUFFER WITH ZEROS
CMP R0,#LINADR+SIZ1K ; STOP AT THE TOP
BLO 10\$

***** FILL XMIT WITH RUNT MARKER *****

MOV R0,TBUF ; SAVE COPY OF THE ADDRESS
20\$: MOV #125252,(R0)+
CMP R0,#LINADR+SIZ2K
BLO 20\$

***** SET UP LINK FOR RUNT DATAGRAM LOOPBACK *****

MOV #MODE,#CMDREG ; DISABLE XMIT CRC - TRUE BC
MOV #PROM!LOOP!HDX,#MODREG
MOV #ENABLE,#CMDREG

MOV TBUF,R4 ; POINT AT XMIT BUFFER
CLR (R4)+ ; CLEAR OUT STATUS WORD
MOV R3,(R4)+ ; WRITE PASSED BYTE COUNT

CLR @#CLRIF ; CLEAR THE FIFO
CLR FLG6 ; CLEAR THE INTERRUPT FLAG
MOV RBUF,@#LFRBUF ; TELL UNA WHERE RECEIVE BUF IS
MOV TBUF,@#LTAC ; TELL UNA WHERE XMIT BUF IS

MTPS #PRI03 ; ALLOW XMITTER TO INTERRUPT
30\$: CMP SANTIM,#2 ; WAIT AT MOST 2 SECONDS
BGE 50\$; EXIT NORMALLY IF TIMER DONE
BIT #RCVFLG,FLG6 ; WAIT FOR RECEIVER INTERRUPT
BEQ 30\$; IF NONE, WERE OK

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 20
HALF-DUPLEX TEST

```

885
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889
890 003224' 032767 000040 175372 40$: BIT #TRNFLG,FLG6 ; WAIT FOR XMIT INT TOO!
891 003232' 001774 BEQ 40$
892
893 003234' 000261 SEC ; TELL HOST UNA SCREWED UP!
894 003236' 000503 BR 90$ ; EXIT WITHOUT WRITING PTR
895
896
897
898
899
900
901 003240' 016700 175402 50$: MOV TBUF,R0 ; GET TRANSMIT BUFFER POINTER
902 003244' 012720 052525 60$: MOV #52525,(R0)+
903 003250' 020027 110000 CMP RO,#LINADR+SIZ2K
904 003254' 103773 BLO 60$
905
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910
911 003256' 012737 000200 177776 MOV #MODE,#CMDREG ; ENABLE LINK, SEL MODE REG
912 003264' 012737 100004 177774 MOV #PROM!LOOP,#MODREG
913 003272' 012737 100000 177776 MOV #ENABLE,#CMDREG
914
915 003300' 016704 175342 MOV TBUF,R4 ; POINT AT XMIT BUFFER
916 003304' 005024 CLR (R4)+ ; CLEAR STATUS WORD
917 003306' 012724 000100 MOV #MINBC,(R4)+ ; SEND SMALL DATAGRAM
918
919 003312' 005067 175306 CLR FLG6
920 003316' 016737 175322 021032 MOV RBUF,#LFRBUF ; TELL UNA WHERE RECEIVE BUF IS
921 003324' 016737 175316 021030 MOV TBUF,#LTAC ; TELL UNA WHERE XMIT BUF IS
922
923 003332' 106427 000140 MTPS #PRI03 ; ALLOW XMITR TO INTERRUPT
924 003336' 032767 000100 175260 70$: BIT #RCVFLG,FLG6 ; WAIT FOR RECEIVER INTERRUPT
925 003344' 001774 BEQ 70$
926
927 003346' 032767 000040 175250 80$: BIT #TRNFLG,FLG6 ; WAIT FOR XMIT INT TOO!
928 003354' 001774 BEQ 80$
929
930 003356' 106427 000340 MTPS #PRI07 ; DISABLE INTERRUPTS
931
932
933
934
935
936
937 003362' 013703 021044 MOV #LRFBUF,R3 ; GET LINK POINTER
938
939 003366' 016700 175252 MOV RBUF,R0 ; POINT AT RECEIVER BUFFER
940 003372' 062700 000004 ADD #4,R0

```

***** ERROR FALLTHROUGH *****

***** NOW SEE IF BUFFER RECOVERS *****

***** SET UP LINK FOR MINIMUM DATAGRAM MESSAGE *****

***** WRITE PARAMETERS TO HOST PCBB *****

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 27
CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	10
BERROR	10
BGNAU	10
BGNAUT	10
BGNCLN	10
BGNDOU	10
BGNHRD	10
BGNHW	10
BGNINI	10
BGNMOD	10
BGNMSG	10
BGNPRO	10
BGNPTA	10
BGNRPT	10
BGNSEG	10
BGNSET	10
BGNSFT	10
BGNSRV	10
BGNSUB	10
BGNSW	10
BGNTST	10
BNCOMP	10
BNERRO	10
BREAK	10
BRESET	10
CKLOOP	10
CLOCK	10
CLOSE	10
CLVEC	10
COMMEN	10
DELAY	10
DESCRI	10
DEVTYP	10
DISPAT	10
DISPLA	10
DOCLN	10
DODU	10
DORPT	10
ENDAU	10
ENDAUT	10
ENDCLN	10
ENDCOM	10
ENDDU	10
ENDHRD	10
ENDHW	10
ENDINI	10
ENDMOD	10
ENDMSG	10
ENDPRO	10
ENDPTA	10
ENDRPT	10
ENDSEG	10
ENDSET	10
ENDSFT	10
ENDSRV	10
ENDSUB	10

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 28
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	10
ENDTST	10
EQUALS	10
ERRDF	10
ERRHRD	10
ERROR	10
ERRSF	10
ERRSOF	10
ERRTBL	10
ESCAPE	10
EXIT	10
FEQUAL	10
GETBYT	10
GETPRI	10
GETWOR	10
GMANIA	10
GMANID	10
GMANIL	10
GPHARD	10
GPRRA	10
GPRRD	10
GPRRL	10
HEADER	10
INLOOP	10
IOSETU	10
IOSTAR	10
KT11	10
LASTAD	10
MANUAL	10
MEMORY	10
MSBYTE	10
MSCHEC	10
MSCNTO	10
MSCOUN	10
MSDATA	10
MSDECR	10
MSDEFA	10
MSENDE	10
MSERRI	10
MSESCA	10
MSESCS	10
MSEXCP	10
MSEXIT	10
MSXSE	10
MSXTJ	10
MSGEN	10
MSGENB	10
MSGETS	10
MSGETT	10
MSGNGB	10
MSGNIN	10
MSGNLS	10
MSGNSU	10
MSGNTA	10
MSGNTB	10
MSHAPT	10

77MICROF - MICROCODE MODULE F
MICROF.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:51 PAGE 29
CROSS REFERENCE TABLE -- MACRO NAMES

MSHAP	1#
MSINCR	1#
MSIOSE	1#
MSLDRO	1#
MSMASK	1#
MSMCHI	1#
MSMCLO	1#
MSMSK1	1#
MSPOP	1#
MSPRIN	1#
MSPUSH	1#
MSPUT	1#
MSPUT1	1#
MSRADI	1#
MSRBRO	1#
MSRNRO	1#
MSSETS	1#
MSSTAR	1#
MSVC	1#
MSTLAB	1#
MSSTL	1#
MSWORD	1#
MSXFER	1#
OPEN	1#
POINTE	1#
PRINTB	1#
PRINTF	1#
PRINTS	1#
PRINTX	1#
READBU	1#
REDEF	1#
RFLAGS	1#
SETPRI	1#
SETVEC	1#
SLASH	1#
STARS	1#
SVC	1#
XFER	1#
XFERF	1#
XFERT	1#

. ABS.	000000	000
	000000	001
MICRF	003460	002

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

MICROF.OBJ,MICROF.LST/CR/SOL/NL:TOC=SVC34R.P11,MICROF.MAC
RUN-TIME: 2 3 .4 SECONDS
RUN-TIME RATIO: 40/6=6.0
CODE USED: 31K (61 PAGES)

68SVC.MLB SOURCE FILE MACY11 30A(1052) 07-APR-83 16:52 PAGE 2
 MICROG.MAC 07-APR-83 16:06

```

1
2
3
4      000000'
5
6
7
8      021000      IPCSRO      =      21000      :INTERNAL PCSRO ADDRESS
9      021002      DMACSR      =      21002      :DMA ENGINE CONTROL STATUS REGISTER
10     021004      DMATO       =      21004      :DMA ENGINE TO ADDRESS REGISTER #0
11     021006      DMAT1       =      21006      :DMA ENGINE TO ADDRESS REGISTER #1
12     021010      MDMA0       =      21010      :MICROCPU DMA TO ADDRESS REGISTER #0
13     021012      MDMA1       =      21012      :MICROCPU DMA TO ADDRESS REGISTER #1
14     021014      MDMA0R      =      21014      :MICROCPU DMA DATA REGISTER - AUTO INCREMENT R/O
15     021016      MDMA1R      =      21016      :MICROCPU DMA DATA REGISTER - AUTO DECREMENT R/O
16     021020      IPCSR1      =      21020      :INTERNAL PCSR1 ADDRESS
17     021022      DMAF        =      21022      :DMA ENGINE FROM ADDRESS REGISTER
18     021024      DMAWC       =      21024      :DMA ENGINE WORD COUNT REGISTER
19     021026      MDMAW0      =      21026      :MICROCPU DMA DATA REGISTER - AUTO INCREMENT W/O
20     021030      LTAC        =      21030      :LINK TRANSMIT ADDRESS COUNTER REGISTER
21     021032      LFRBUF      =      21032      :LINK RECIEVE BUFFER ADDRESS FIFO
22     021034      CLRFIF      =      21034      :CLEAR FIFO
23     021036      MDMAW1      =      21036      :MICROCPU DMA DATA REGISTER - AUTO DECREMENT W/O
24     021040      PCSRSW      =      21040      :SWITCH PACK REGISTER
25     021042      MDMSR      =      21042      :MICROCPU DMA STATUS REGISTER
26     021044      LRBUF       =      21044      :LINK RECIEVE BUFFER COMPLETED
27     021060      PHYAD0      =      21060      :PHYSICAL ADDRESS ROM BYTE 0
28     021062      PHYAD1      =      21062      :PHYSICAL ADDRESS ROM BYTE 1
29     021064      PHYAD2      =      21064      :PHYSICAL ADDRESS ROM BYTE 2
30     021066      PHYAD3      =      21066      :PHYSICAL ADDRESS ROM BYTE 3
31     021070      PHYAD4      =      21070      :PHYSICAL ADDRESS ROM BYTE 4
32     021072      PHYAD5      =      21072      :PHYSICAL ADDRESS ROM BYTE 5
33     177774      MODREG      =      177774     :LINK MODE REGISTER
34     177774      ADREG       =      177774     :LINK STATION ADDRESS RAM REGISTER
35     177776      CMDREG      =      177776     :LINK COMMAND REGISTER
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```

.TITLE MICROG - MICROCODE MODULE G

.CSECT MICRG

.SBTTL REGISTER DEFINITIONS USED BY THE T11

.SBTTL OTHER DEFINITIONS USED BY THE MICROCODE

```

100000      BIT15      =      100000
040000      BIT14      =      40000
020000      BIT13      =      20000
010000      BIT12      =      10000
004000      BIT11      =      4000
002000      BIT10      =      2000
001000      BIT9       =      1000
000400      BIT8       =      400
000200      BIT7       =      200
000100      BIT6       =      100
000040      BIT5       =      40
000020      BIT4       =      20
000010      BIT3       =      10
000004      BIT2       =      4
000002      BIT1       =      2
000001      BIT0       =      1
:
LASFTP      =      BIT8!BIT10!BIT12 :LOAD AND START FUNCTION TEST PATTERN

```

76MICROG - MICROCODE MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 3
OTHER DEFINITIONS USED BY THE MICROCODE

57	000340	PRI07 =	340	
58	000300	PRI06 =	300	
59	000240	PRI05 =	240	
60	000200	PRI04 =	200	
61	000140	PRI03 =	140	
62	000100	PRI02 =	100	
63	000040	PRI01 =	40	
64	000000	PRI00 =	0	
65		:		
66		:PCSR0 - PORT CONTROL STATUS REGISTER 0		
67		:		
68	100000	SERI =	BIT15	
69	040000	PCEI =	BIT14	
70	020000	RXI =	BIT13	
71	010000	TXI =	BIT12	
72	004000	DNI =	BIT11	
73	002000	RCEI =	BIT10	
74	000400	FATI =	BIT8	
75		:		
76		:LINK COMMAND REGISTER		
77		:		
78	100000	ENABLE =	BIT15	:ENABLE LINK MODULE
79	000200	MODE =	BIT7	:ENABLE MODE REGISTER
80	000100	ARAM =	BIT6	:ENABLE STATION ADDRESS RAM
81		:		
82		:LINK MODE REGISTER		
83		:		
84	100000	PROM =	BIT15	:PROMISCUIOUS MODE
85	040000	ENAL =	BIT14	:ENABLE MULTICAST
86	004000	ENCR =	BIT11	:ENABLE COLLISION TEST
87	002000	ACLO =	BIT10	:ENABLE ACLO
88	000040	DRTY =	BIT5	:DISABLE RETRY LOGIC
89	000020	COLL =	BIT4	:SIMULATE A COLLISION
90	000010	DTCR =	BIT3	:DISABLE TRANSMIT CRC LOGIC
91	000004	LOOP =	BIT2	:ENABLE LOOPBACK
92		:		
93	000070	TRNVEC=	70	:VECTOR ADDRESS FOR THE TRANSMITTER
94	000120	RCVVEC=	120	:VECTOR ADDRESS FOR THE RECEIVER
95	000134	SANVEC=	134	:VECTOR ADDRESS FOR THE SANITY TIMER
96	000064	CSRVEC=	64	:VECTOR ADDRESS FOR CSR WRITE INTERRUPT
97	000114	DMAVEC=	114	:VECTOR ADDRESS FOR DMA DONE INTERRUPT
98	000140	PARVEC=	140	:VECTOR ADDRESS FOR LINK MEMORY PARITY ERROR
99	001000	STACK=	1000	:STACK LOCATION
100	000001	INMON=	1	:IN MICROMONITOR STATE
101	000002	INTST=	2	:IN A TEST STATE
102	000003	INERR=	3	:IN ERROR STATE
103	000001	CSRFLG=	BIT0	:CSR WRITE INTERRUPT OCCURED
104	000002	ERRFLG=	BIT1	:UNEXPECTED ERROR OCCURED
105	000004	PARFLG=	BIT2	:PARITY ERROR OCCURED
106	000010	NXWFLG=	BIT3	:NON-EXISTANT MEMORY ERROR OCCURED
107	000020	NPRFLG=	BIT4	:NPR TIMEOUT OCCURED
108	000040	TRNFLG=	BIT5	:TRANSMITTER INTERRUPT OCCURED
109	000100	RCVFLG=	BIT6	:RECEIVER INTERRUPT OCCURED
110	100000	NPRERR=	BIT15	:PCSR0 FLAG INDICATING NPR ERROR OCCURED
111	040000	NXWERR=	BIT14	:PCSR0 FLAG INDICATING NON-EXISTANT MEMORY ERROR OCCURED
112	020000	UNIERR=	BIT13	:PCSR0 FLAG INDICATING UNEXPECTED INTERRUPT OCCURED

76MICROG - MICROCODE MODULE G
 MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 4
 OTHER DEFINITIONS USED BY THE MICROCODE

113	010000	PARERR= BIT12	:PCSRO FLAG INDICATING LINK MEMORY PARITY ERROR OCCURRED
114	004000	SIZ1K= 4000	:1K WORDS
115	010000	SIZ2K= SIZ1K*2	:2K WORDS
116	014000	SIZ3K= SIZ1K*3	:3K WORDS
117	020000	SIZ4K= SIZ2K*2	:4K WORDS
118	040000	SIZ8K= SIZ4K*2	:8K WORDS
119	020000	WCSSIZ= SIZ4K	:SIZE OF WRITEABLE CONTROL STORE
120	020000	IOSIZ= SIZ4K	:SIZE OF I/O PAGE
121	040000	ROMSIZ= SIZ8K	:SIZE OF ROM
122	077774	LINSIZ= SIZ8K*2-4	:SIZE OF LINK MEMORY
123	000000	WCSADR= 0	:BASE ADDRESS OF WCS
124	020000	IOADR= WCSADR+WCSSIZ	:BASE ADDRESS OF I/O PAGE
125	040000	ROMADR= IOADR+IOSIZ	:BASE ADDRESS OF ROM
126	100000	LINADR= ROMADR+ROMSIZ	:BASE ADDRESS OF LINK MEMORY
127	002756	MAXBC= 1518.	:MAXIMUM # OF BYTES IN A TRANSMIT BUFFER
128	000000	DATERR= 0	:FLAG INDICATING DATA ERROR OCCURRED
129	000004	CRCsiz= 4	:NUMBER OF BYTES IN A CRC
130	000001	ADRERR= 1	:FLAG INDICATING ADDRESS ERROR OCCURRED
131			

76MICROG - MICROCODE MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 5
OTHER DEFINITIONS USED BY THE MICROCODE

```

132
133      .SBTTL  G_MODULE MICROCODE
134
135 000000' 106427 000340      MICROG: MTPS      #PRI07      ;DISABLE INTERRUPTS
136 000004' 012706 001000      MOV      #STACK,SP ;SETUP STACK
137 000010' 112767 000001 000600 MOVB     #INMON,PCSR1 ;TELL HOST WE ARE IN MICROMONITOR
138 000016' 016737 000574 021020 MOV      PCSR1,#IPCSR1
139 000024' 012737 004000 021000 MOV      #DNI,#IPCSRO ;TELL HOST THE LOAD AND START FINISHED
140 000032' 010700      MOV      PC,RO      ;GET ADDRESS OF UNEXPECTED ERROR...
141 000034' 062700 000404      ADD      #ERRINT-.,RO ;HANDLER
142 000040' 005001      CLR      R1          ;FILL ALL UNUSED VECTORS WITH TRAP...
143 000042' 010021      10$: MOV      RO,(R1)+   ;HANDLER
144 000044' 012721 000340      MOV      #PRI07,(R1)+
145 000050' 020127 001000      CMP      R1,#1000
146 000054' 002772      BLT      10$
147
148 000056' 010700      MOV      PC,RO      ;SETUP PARITY TRAP VECTOR
149 000060' 062700 000462      ADD      #PARINT-.,RO
150 000064' 010037 000140      MOV      RO,#PARVEC
151 000070' 012737 000340 000142      MOV      #PRI07,#PARVEC+2
152
153 000076' 010700      MOV      PC,RO      ;SETUP DMA INTERRUPT VECTOR
154 000100' 062700 000364      ADD      #DMAINT-.,RO
155 000104' 010037 000114      MOV      RO,#DMAVEC
156 000110' 012737 000340 000116      MOV      #PRI07,#DMAVEC+2
157
158 000116' 010700      MOV      PC,RO      ;SETUP CSR WRITE VECTOR
159 000120' 062700 000310      ADD      #CSRWRT-.,RO
160 000124' 010037 000064      MOV      RO,#CSRVEC
161 000130' 012737 000200 000066      MOV      #PRI04,#CSRVEC+2
162
163 000136' 010700      MOV      PC,RO      ;SETUP SANITY TIMER VECTOR
164 000140' 062700 000316      ADD      #TIMINT-.,RO
165 000144' 010037 000134      MOV      RO,#SANVEC
166 000150' 012737 000240 000136      MOV      #PRI05,#SANVEC+2
167
168 000156' 010700      MOV      PC,RO      ;SETUP TRANSMITTER VECTOR
169 000160' 062700 000414      ADD      #TRNINT-.,RO
170 000164' 010037 000070      MOV      RO,#TRNVEC
171 000170' 012737 000200 000072      MOV      #PRI04,#TRNVEC+2
172
173 000176' 010700      MOV      PC,RO      ;SETUP RECEIVER VECTOR
174 000200' 062700 000360      ADD      #RCVINT-.,RO
175 000204' 010037 000120      MOV      RO,#RCVVEC
176 000210' 012737 000240 000122      MOV      #PRI05,#RCVVEC+2
177
178 000216' 013700 021040      MOV      @#PCSRW,RO ;GET SWITCH PACK BITS
179 000222' 052700 176000      BIS      #176000,RO ;MAP THEM INTO HOST I/O PAGE
180 000226' 006300      ASL      RO          ;SHIFT OVER TO POSITION CORRECTLY
181 000230' 006300      ASL      RO
182 000232' 006300      ASL      RO
183 000234' 062700 000004      ADD      #4,RO      ;PCSR2 IS PCSR0+4
184 000240' 010067 000354      MOV      RO,IPCSR2 ;SAVE PCSR2 ADDRESS
185 000244' 012767 000003 000350      MOV      #3,IPCSR2+2 ;HIGH ORDER BITS 17:16
186 000252' 005067 000334      CLR      FLG7       ;INITIALIZE FLAG WORD
187 000256' 106427 000000      15$: MTPS      #PRI00 ;ALLOW INTERRUPTS

```


76MICROG - MICROCODE MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 8
G_MODULE MICROCODE

```

279 000642' 112767 000002 177746 MICG1: MOVB #INTST,PCSR1 ;TELL HOST WE ARE IN A TEST
280 000650' 016737 177742 021020 MOV PCSR1,@#IPCSR1
281
282 000656' 012700 100000 MOV #LINADR,R0 ;FILL RECEIVE BUFFER WITH ZEROS
283 000662' 010067 177744 MOV R0,#BUF
284 000666' 005020 10S: CLR (R0)+
285 000670' 020027 104000 CMP R0,#LINADR+SIZ1K
286 000674' 103774 BLO 10S
287
288 000676' 010067 177732 MOV R0,TBUF ;FILL TRANSMIT BUFFER WITH 1'S
289 000702' 012720 177777 20S: MOV #177777,(R0)+
290 000706' 020027 110000 CMP R0,#LINADR+SIZ2K
291 000712' 103773 BLO 20S
292
293 000714' 016737 177700 021010 MOV IPCSR2,@#DMA0 ;GET HOST'S PCBB ADDRESS
294 000722' 016737 177674 021012 MOV IPCSR2+2,@#DMA1
295 000730' 013704 021014 MOV @#DMA0,R4 ;R4 HOLDS PCBB LOW ADDRESS
296 000734' 013705 021014 MOV @#DMA0,R5 ;R5 HOLDS PCBB HIGH ADDRESS
297 000740' 010437 021010 MOV R4,@#DMA0 ;POINT TO PCBB+0
298 000744' 010537 021010 MOV R5,@#DMA1
299 000750' 013703 021014 MOV @#DMA0,R3 ;GET WHAT HOST WANTS TO GO INTO LINK
300 ;MODE REGISTER
301
302 000754' 012737 100200 177776 MOV #MODE!ENABLE,@#CMDREG ;ENABLE LINK MODULE AND SELECT MODE REG
303 000762' 010337 177774 MOV R3,@#MODREG ;LOAD MODE REGISTER WITH HOST'S VALUE
304
305 000766' 016702 177642 MOV TBUF,R2 ;GET BEGINNING OF TRANSMIT BUFFER
306 000772' 005722 TST (R2)+ ;SKIP FIRST WORD
307 000774' 012722 002752 MOV #MAXBC-CRCSIZ,(R2)+ ;SET TO TRANSMIT MAX LENGTH PACKET
308 001000' 005037 021034 CLR @#CLRFIF ;CLEAR THE FIFO
309 001004' 005067 177602 CLR FLG7 ;CLEAR OUT THE FLAG WORD
310 001010' 016737 177616 021032 MOV RBUF,@#LFRBUF ;TELL UNA WHERE RECEIVE BUFF IS
311 001016' 016737 177612 021030 MOV TBUF,@#LTAC ;TELL UNA WHERE TRANSMIT BUFF IS
312 ;START TRANSMIT OPERATION
313
314 001024' 106427 000140 MTPS #PRI03 ;ALLOW INTERRUPTS
315 001030' 032767 000040 177554 30S: BIT #TRNFLG,FLG7 ;WAIT FOR TRANSMIT DONE
316 001036' 001774 BEQ 30S
317
318 001040' 106427 000340 MTPS #PRI07 ;DISABLE ANY MORE INTERRUPTS
319
320 001044' 016700 177564 MOV TBUF,R0 ;POINT TO TRANSMIT BUFFER
321 001050' 012001 MOV (R0)+,R1 ;GET FIRST TRANSMIT STATUS WORD
322 001052' 012002 MOV (R0)+,R2 ;GET SECOND TRANSMIT STATUS WORD
323
324 001054' 062704 000002 ADD #2,R4 ;POINT TO HOSTS PCBB+2
325 001060' 005505 ADC R5
326 001062' 010437 021010 MOV R4,@#DMA0
327 001066' 010537 021012 MOV R5,@#DMA1
328 001072' 010137 021026 MOV R1,@#DMA0 ;DUMP FIRST STATUS WORD TO PCBB+2
329 001076' 010237 021026 MOV R2,@#DMA0 ;DUMP SECOND STATUS WORD TO PCBB+4
330
331 001102' 112767 000001 177507 MOVB #1,PCSR1+1 ;TELL HOST WHAT TEST JUST FINISHED
332 001110' 000241 CLC
333 001112' 000207 RTS PC
334

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76MICROG - MICROCODE MODULE G MACY11 30A(1052) 07-APR-83 16:52 PAGE 9
 MICROG.MAC 07-APR-83 16:06 G_MODULE MICROCODE

```

335 001114' 112767 000002 177474 MICG2: MOVB #INTST,PCSR1 ;TELL HOST THAT WE ARE IN A TEST
336 001122' 016737 177470 021020 MOV PCSR1,@IPCSR1
337
338 001130' 012700 100000 MOV #LINADR,R0 ;FILL RECEIVE BUFFER WITH ALL 1'S
339 001134' 010067 177472 MOV R0,R2BUF
340 001140' 012720 177777 10$: MOV #177777,(R0)+
341 001144' 020027 104000 CMP R0,#LINADR+SIZ1K
342 001150' 103773 BLO 10$
343
344 001152' 010067 177456 20$: MOV R0,TBUF ;FILL TRANSMIT BUFFER WITH ALL 0'S
345 001156' 005020 CLR (R0)+
346 001160' 020027 110000 CMP R0,#LINADR+SIZ2K
347 001164' 103774 BLO 20$
348
349 001166' 016737 177426 021010 MOV IPCSR2,@MDMA0 ;GET HOST'S PCBB ADDRESS
350 001174' 016737 177422 021012 MOV IPCSR2+2,@MDMA1
351 001202' 013700 021014 MOV @MDMAR0,R0 ;R0 HOLDS HOST'S PCBB LOW ADDRESS
352 001206' 013701 021014 MOV @MDMAR0,R1 ;R1 HOLDS HOST'S PCBB HI ADDRESS
353 001212' 010037 021010 MOV R0,@MDMA0 ;POINT TO PCBB+0
354 001216' 010137 021012 MOV R1,@MDMA1
355 001222' 013703 021014 MOV @MDMAR0,R3 ;GET BYTE COUNT FOR TRANSMIT OPERATION
356
357 001226' 012737 100200 177776 MOV #MODE!ENABLE,@CMDREG ;ENABLE LINK MODULE AND SELECT MODE REG
358 001234' 012737 100004 177774 MOV #PROM!LOOP,@MODREG ;ACCEPT ALL PACKETS IN LOOP BACK
359
360 001242' 016704 177366 MOV TBUF,R4 ;POINT TO TRANSMIT BUFFER
361 001246' 005724 TST (R4)+ ;SKIP FIRST WORD
362 001250' 010324 MOV R3,(R4)+ ;SET BYTE COUNT TO HOST'S VALUE
363 001252' 005037 021034 CLR @CLRFIF ;CLEAR THE FIFO
364 001256' 005067 177330 CLR FLG7 ;CLEAR THE FLAG WORD
365 001262' 016737 177344 021032 MOV RBUF,@LFRBUF ;TELL UNA WHERE RECEIVE BUFF IS
366 001270' 016737 177340 021030 MOV TBUF,@LTAC ;TELL UNA WHERE TRANSMIT BUFF IS AND
367 ;START THE TRANSMIT OPERATION
368
369 001276' 106427 000140 MTPS #PRI03 ;ALLOW INTERRUPTS
370 001302' 032767 000040 177302 30$: BIT #TRNFLG,FLG7 ;WAIT FOR TRANSMIT DONE INTERRUPT
371 001310' 001774 BEQ 30$
372
373 001312' 106427 000340 MTPS #PRI07 ;DISABLE INTERRUPTS
374
375 001316' 016702 177312 MOV TBUF,R2 ;POINT TO TRANSMIT BUFFER
376 001322' 005722 TST (R2)+ ;SKIP FIRST STATUS WORD
377 001324' 012203 MOV (R2)+,R3 ;GET SECOND STATUS WORD
378 001326' 042703 176000 BIC #176000,R3 ;STRIP ALL BUT TDR VALUE BITS
379 001332' 062700 000002 ADD #2,R0 ;POINT TO HOST'S PCBB+2
380 001336' 005501 ADC R1
381 001340' 010037 021010 MOV R0,@MDMA0
382 001344' 010137 021012 MOV R1,@MDMA1
383 001350' 010337 021026 MOV R3,@MDMA0 ;DUMP TDR COUNTER VALUE TO PCBB+2
384
385 001354' 112767 000002 177235 MOVB #2,PCSR1+1 ;TELL HOST WHAT TEST JUST FINISHED
386 001362' 000241 CLC
387 001364' 000207 RTS PC
388
389 001366' 112767 000002 177222 MICG3: MOVB #INTST,PCSR1 ;TELL HOST THAT WE ARE IN A TEST
390 001374' 016737 177216 021020 MOV PCSR1,@IPCSR1

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77MICROG - MICROCODE MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 10
G_MODULE MICROCODE

```

391
392 001402' 012700 100000      MOV      #LINADR,RG      ;FILL RECEIVE BUFFER WITH ALL 1'S
393 001406' 010067 177220      MOV      R0,RBUF
394 001412' 012720 177777      10S:    MOV      #177777,(R0)+
395 001416' 020027 104000      CMP      R0,#LINADR+SIZ1K
396 001422' 103773      BLO
397
398 001424' 010067 177204      20S:    MOV      R0,TBUF        ;FILL TRANSMIT BUFFER WITH ALL 0'S
399 001430' 005020      CLR      (R0)+
400 001432' 020027 110000      CMP      R0,#LINADR+SIZ2K
401 001436' 103774      BLO
402
403 001440' 016737 177154 021010      MOV      IPCSR2,@#DMA0      ;GET HOST'S PCBB ADDRESS
404 001446' 016737 177150 021012      MOV      IPCSR2+2,@#DMA1
405 001454' 013700 021014      MOV      @#DMA0,R0      ;R0 HOLDS HOST'S PCBB LOW ADDRESS
406 001460' 013701 021014      MOV      @#DMA0,R1      ;R1 HOLDS HOST'S PCBB HI ADDRESS
407 001464' 010037 021010      MOV      R0,@#DMA0      ;POINT TO PCBB+0
408 001470' 010137 021012      MOV      R1,@#DMA1
409 001474' 013703 021014      MOV      @#DMA0,R3      ;GET BYTE COUNT FOR TRANSMIT OPERATION
410
411 001500' 012737 100200 177776      MOV      #MODE!ENABLE,@#CMDREG ;ENABLE LINK MODULE AND SELECT MODE REG
412 001506' 012737 100024 177774      MOV      #PROM!LOOP!COLL,@#MODREG ;ACCEPT ALL PACKETS IN LOOP BACK AND
413                                     ;FORCE A COLLISION
414
415 001514' 016704 177114      MOV      TBUF,R4      ;POINT TO TRANSMIT BUFFER
416 001520' 005724      TST      (R4)+      ;SKIP FIRST WORD
417 001522' 010324      MOV      R3,(R4)+      ;SET BYTE COUNT TO HOST'S VALUE
418 001524' 005037 021034      CLR      @#CLRFIF      ;CLEAR THE FIFO
419 001530' 005067 177056      CLR      FLG7      ;CLEAR THE FLAG WORD
420 001534' 016737 177072 021032      MOV      RBUF,@#LFRBUF      ;TELL UNA WHERE RECEIVE BUFF IS
421 001542' 016737 177066 021030      MOV      TBUF,@#LTAC      ;TELL UNA WHERE TRANSMIT BUFF IS AND
422                                     ;START THE TRANSMIT OPERATION
423
424 001550' 005005      CLR      R5      ;CLEAR COUNTER
425 001552' 106427 000140      MTPS     #PRI03      ;ALLOW INTERRUPTS
426 001556' 032767 000040 177026 30S:    BIT      #TRNFLG,FLG7      ;IS TRANSMITTER DONE?
427 001564' 001002      BNE
428 001566' 005205      INC      R5      ;YES
429 001570' 000772      BR      30S      ;NO, COUNT TIME
430 001572' 106427 000340      35S:    MTPS     #PRI07      ;DISABLE INTERRUPTS
431
432 001576' 062700 000002      ADD      #2,R0      ;POINT TO HOST'S PCBB+2
433 001602' 005501      ADC      R1
434 001604' 010037 021010      MOV      R0,@#DMA0
435 001610' 010137 021012      MOV      R1,@#DMA1
436 001614' 010537 021026      MOV      R5,@#DMA0      ;DUMP COUNTER VALUE TO PCBB+2
437
438 001620' 112767 000003 176771      MOVB     #3,PCSR1+1      ;TELL HOST WHAT TEST JUST FINISHED
439 001626' 000241      CLC
440 001630' 000207      RTS      PC
441
442 001632' 001634      MICGSZ: :MICGSZ-MICROG+2
443 000001      .END

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77MICROG - MICROCODE MODULE G
 MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 16
 CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	10
BERROR	10
BGNAU	10
BGNAUT	10
BGNCLN	10
BGNDOU	10
BGNHRD	10
BGNHW	10
BGNINI	10
BGNMOD	10
BGNMSG	10
BGNPRO	10
BGNPTA	10
BGNRPT	10
BGNSEG	10
BGNSET	10
BGNSFT	10
BGNSRV	10
BGNSUB	10
BGNSW	10
BGNTST	10
BNCOMP	10
BNERRR	10
BREAK	10
BRESET	10
CKLOOP	10
CLOCK	10
CLOSE	10
CLVEC	10
COMMEN	10
DELAY	10
DESCRI	10
DEVTYP	10
DISPAT	10
DISPLA	10
DOCLN	10
DODU	10
DORPT	10
ENDAU	10
ENDAUT	10
ENDCLN	10
ENDCOM	10
ENDDU	10
ENDHRD	10
ENDHW	10
ENDINI	10
ENDMOD	10
ENDMSG	10
ENDPRO	10
ENDPTA	10
ENDRPT	10
ENDSEG	10
ENDSET	10
ENDSFT	10
ENDSRV	10
ENDSUB	10

77MICROG - MICROCODE MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 17
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	10
ENDTST	10
EQUALS	10
ERRDF	10
ERRHRD	10
ERROR	10
ERRSF	10
ERRSOF	10
ERRTBL	10
ESCAPE	10
EXIT	10
FEQUAL	10
GETBYT	10
GETPRI	10
GETWOR	10
GMANIA	10
GMANID	10
GMANIL	10
GPHARD	10
GPRFA	10
GPRFD	10
GPRFL	10
HEADER	10
INLOOP	10
IOSETU	10
IOSTAR	10
KT11	10
LASTAD	10
MANUAL	10
MEMORY	10
MSBYTE	10
MSCHEC	10
MSCNTO	10
MSCOUN	10
MSDATA	10
MSDECR	10
MSDEFA	10
MSDEND	10
MSERRI	10
MSESCA	10
MSESCS	10
MSXCP	10
MSEXIT	10
MSXSE	10
MSXTJ	10
MSGEN	10
MSGENB	10
MSGETS	10
MSGETT	10
MSINCB	10
MSININ	10
MSINLS	10
MSINSU	10
MSNTA	10
MSNTE	10
MSNAPT	10

77MICROG - MICROCOD. MODULE G
MICROG.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:52 PAGE 18
CROSS REFERENCE TABLE -- MACRO NAMES

MSHMAP	1#
MSINCR	1#
MSIOSE	1#
MSLDRO	1#
MSMASK	1#
MSMCHI	1#
MSACLO	1#
MSRSK1	1#
MSPOP	1#
MSPRIN	1#
MSPUSH	1#
MSPUT	1#
MSPUT1	1#
MSRADI	1#
MSRBRO	1#
MSRNRO	1#
MSSETS	1#
MSSTAR	1#
MS SVC	1#
MS TLAB	1#
MS STL	1#
MS WORD	1#
MS XFER	1#
OPEN	1#
POINTE	1#
PRINTB	1#
PRINTF	1#
PRINTS	1#
PRINTX	1#
READBU	1#
REDEF	1#
RFLAGS	1#
SETPRI	1#
SETVEC	1#
SLASH	1#
STARS	1#
SVC	1#
XFER	1#
XFERF	1#
XFERT	1#

. ABS.	000000	000
	000000	001
MICRG	001634	002

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

MICROG.OBJ, MICROG.LST/CR/SOL/NL:TOC=SVC34R.P11, MICROG.MAC
RUN-TIME: 2 2 .3 SECONDS
RUN-TIME RATIO: 32/5=6.4
CORE USED: 31K (61 PAGES)

74NO MORE MICROCODE MODULES
NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 2

1		.TITLE NO MORE MICROCODE MODULES
2	000000'	.CSECT NOMORE
3		.MCALL SVC
4	000000'	SVC
5	000000'	LASTAD
6	000004'	LSLAST::
7	000001	.END

74NO MORE MICROCODE MODULES
 NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 4
 CROSS REFERENCE TABLE -- USER SYMBOLS

ASSEMB= 000010	S
CSAU = 000052	SN
CSAUTO= 000061	SN
CSBRK = 000022	SN
CSBSEG= 000004	SN
CSBSUB= 000002	SN
CSCEFG= 000045	SN
CSCLCK= 000062	SN
CSCLEA= 000012	SN
CSCLOS= 000035	SN
CSCLP1= 000006	SN
CSVEC = 000036	SN
CSDCM= 000044	SN
CSDDU= 000051	SN
CSDRPT= 000024	SN
CSDU = 000053	SN
CSEDIT= 000003	SN
CSERDF= 000055	SN
CSERHR= 000056	SN
CSERRO= 000060	SN
CSERSF= 000054	SN
CSERSO= 000057	SN
CSESCA= 000010	SN
CSSEEG= 000005	SN
CSESUB= 000003	SN
CSSTST= 000001	SN
CSEXIT= 000032	SN
CSGETB= 000026	SN
CSGETW= 000027	SN
CSGPAN= 000043	SN
CSGPHR= 000042	SN
CSGPLO= 000030	SN
CSGPRI= 000040	SN
CSINIT= 000011	SN
CSINLP= 000020	SN
CSMANI= 000050	SN
CSMEM = 000031	SN
CSMSG = 000023	SN
CSOPEN= 000034	SN
CSPNTB= 000014	SN
CSPNTF= 000017	SN
CSPNTS= 000016	SN
CSPNTX= 000015	SN
CSQIO = 000377	SN
CSRDBU= 000007	SN
CSREFG= 000047	SN
CSRESE= 000033	SN
CSREVI= 000003	SN
CSRFLA= 000021	SN
CSRPT = 000025	SN
CSSEFG= 000046	SN
CSSPRI= 000041	SN
CSSVEC= 000037	SN
CSYPRI= 000013	SN
DIAGNC= 000000	S
ESEND = 002100	SN

74NO MORE MICROCODE MODULES
 NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 5
 CROSS REFERENCE TABLE -- USER SYMBOLS

ESLOAD= 000035	5#
FSAU = 000015	5#
FSAUTO= 000020	5#
FSBGN = 000040	5#
FSCLEA= 000007	5#
FSDU = 000016	5#
FSEND = 000041	5#
FSHARD= 000004	5#
FSHW = 000013	5#
FSINIT= 000006	5#
FSJMP = 000050	5#
FSMOD = 000000	5#
FSMSG = 000011	5#
FSPROT= 000021	5#
FSPWR = 000017	5#
FSRPT = 000012	5#
FSSEG = 000003	5#
FSSOFT= 000005	5#
FSSRV = 000010	5#
FSSUB = 000002	5#
FSSW = 000014	5#
FSTEST= 000001	5#
GSCNTO= 000200	5#
GBDELM= 000372	5#
GBDISP= 000003	5#
GBEXCP= 000400	5#
GBHILI= 000002	5#
GBLOLI= 000001	5#
GBNO = 000000	5#
GBOFFS= 000400	5#
GBOF SI= 000376	5#
GSPRMA= 000001	5#
GSPRMD= 000002	5#
GSPRML= 000000	5#
GSRADA= 000140	5#
GSRADB= 000000	5#
GSRADD= 000040	5#
GSRADL= 000120	5#
GSRADO= 000020	5#
GSXFER= 000004	5#
GSYES = 000010	5#
ISAU = 000041	5#
ISAUTO= 000041	5#
ISCLN = 000041	5#
ISDU = 000041	5#
ISINIT= 000041	5#
ISMOD = 000041	5#
ISMSG = 000041	5#
ISPROT= 000041	5#
ISPTAB= 000041	5#
ISPR = 000041	5#
ISRPT = 000041	5#
ISSEG = 000041	5#
ISSETU= 000041	5#
ISSRV = 000041	5#
ISSUB = 000041	5#

74NO MORE MICROCODE MODULES
NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 6
CROSS REFERENCE TABLE -- USER SYMBOLS

ISYST = 000041	5#		
JSJMP = 000167	5#		
LSLAST 000004RG 002	6#		
OSAPTS = 000000	5#		
OSAU = 000000	5#		
OSBGR = 000000	5#		
USBGRS = 000000	5#		
OSDU = 000000	5#		
OSERRT = 000000	5#		
OSGNSW = 000000	5#		
OSPOIN = 000000	5#		
OSSETU = 000000	5#	6	
SVCGBL = 000000	5#	6#	7
SVCINS = 177777	5#	6	
SVCSUB = 177777	5#		
SVCTAG = 177777	5#		
SVCTST = 177777	5#		
SLSYM = 010000	5#		
TSERRN = 000000	5#		
TSGMAN = 000000	5#		
TSLAST = 000001	5#	6#	
TLSYM = 010000	5#		
TSLTNO = 000000	7#		
TSNEST = 177777	5#		
TSPTNU = 000000	5#		
TSSAVL = 177777	5#		
TSS EGL = 177777	5#		
TSSUBN = 000000	5#		
TSTAGL = 177777	5#		
TSTAGN = 010000	5#		
TSTEST = 000000	5#	7	
TSTSTM = 177777	5#		
TSTSTS = 000000	5#		
XBALWA = 000000	5#		
XBFALS = 000040	5#		
XBOFFS = 000400	5#		
XSTRUE = 000020	5#		

74NO MORE MICROCODE MODULES
 NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 8
 CROSS REFERENCE TABLE -- MACRO NAMES

BCOMPL	1#	5#
BERROR	1#	5#
BGNAU	1#	5#
BGNAUT	1#	5#
BGNCLN	1#	5#
BGNDU	1#	5#
BGNHRD	1#	5#
BGNHW	1#	5#
BGNINI	1#	5#
BGNMOD	1#	5#
BGNMSG	1#	5#
BGNPRO	1#	5#
BGNPTA	1#	5#
BGNRPT	1#	5#
BGNSEG	1#	5#
BGNSET	1#	5#
BGNSFT	1#	5#
BGNSRV	1#	5#
BGNSUB	1#	5#
BGNSW	1#	5#
BGNTST	1#	5#
BNCOMP	1#	5#
BNERRO	1#	5#
BREAK	1#	5#
BRESET	1#	5#
CKLOOP	1#	5#
CLOCK	1#	5#
CLOSE	1#	5#
CLRVEC	1#	5#
COMMEN	1#	5#
DELAY	1#	5#
DESCRI	1#	5#
DEVTYP	1#	5#
DISPAT	1#	5#
DISPLA	1#	5#
DOCLN	1#	5#
DODU	1#	5#
DORPT	1#	5#
ENDAU	1#	5#
ENDAUT	1#	5#
ENDCLN	1#	5#
ENDCOM	1#	5#
ENDDU	1#	5#
ENDHRD	1#	5#
ENDHW	1#	5#
ENDINI	1#	5#
ENDMOD	1#	5#
ENDMSG	1#	5#
ENDPRO	1#	5#
ENDPTA	1#	5#
ENDRPT	1#	5#
ENDSEG	1#	5#
ENDSET	1#	5#
ENDSFT	1#	5#
ENDSRV	1#	5#
ENDSUB	1#	5#

74NO MORE MICROCODE MODULES
NOMORE.MAC 07-APR-83 16:06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 9
CROSS REFERENCE TABLE -- MACRO NAMES

ENDSW	1#	5#
ENDTST	1#	5#
EQUALS	1#	5#
ERRDF	1#	5#
ERRHRD	1#	5#
ERROR	1#	5#
ERRSF	1#	5#
ERRSOF	1#	5#
ERRTBL	1#	5#
ESCAPE	1#	5#
EXIT	1#	5#
FEQUAL	1#	5#
GETBYT	1#	5#
GETPRI	1#	5#
GETWOR	1#	5#
GMANIA	1#	5#
GMANID	1#	5#
GMANIL	1#	5#
GPHARD	1#	5#
GPRMA	1#	5#
GPRMD	1#	5#
GPRML	1#	5#
HEADER	1#	5#
INLOOP	1#	5#
IOSETU	1#	5#
IOSTAR	1#	5#
KT11	1#	5#
LASTAD	1#	5#
MANUAL	1#	5#
MEMORY	1#	5#
MSBYTE	1#	5#
MSCHEC	1#	5#
MSCNTO	1#	5#
MSCOUN	1#	5#
MSDATA	1#	5#
MSDECR	1#	5#
MSDEFA	1#	5#
MSENDE	1#	5#
MSERRI	1#	5#
MSESCA	1#	5#
MSESCS	1#	5#
MSEXCP	1#	5#
MSEXIT	1#	5#
MSXSE	1#	5#
MSXTJ	1#	5#
MSGEN	1#	5#
MSGENB	1#	5#
MSGETS	1#	5#
MSGETT	1#	5#
MSGNGB	1#	5#
MSGNIN	1#	5#
MSGNLS	1#	5#
MSGNSU	1#	5#
MSGNTA	1#	5#
MSGNTE	1#	5#
MSHAPT	1#	5#

6#

6#

6#

75NO MORE MICROCODE MODULES
 NOMORE.MAC 07-APR-83 16.06

MACY11 30A(1052) 07-APR-83 16:53 PAGE 10
 CROSS REFERENCE TABLE -- MACRC NAMES

MSHMAP	1#	5#
MSINCR	1#	5#
MSIOSE	1#	5#
MSLDRO	1#	5#
MSMASK	1#	5#
MSMCHI	1#	5#
MSMCLO	1#	5#
MSMSKI	1#	5#
MSPOP	1#	5#
MSPRIN	1#	5#
MSPUSH	1#	5#
MSPUT	1#	5#
MSPUT1	1#	5#
MSRADI	1#	5#
MSRBRO	1#	5#
MSRNRO	1#	5#
MSSETS	1#	5#
MSSTAR	1#	5#
MSVC	1#	5#
MSTLAB	1#	5#
MSSTL	1#	5#
MSWORD	1#	5#
MSXFER	1#	5#
OPEN	1#	5#
POINTE	1#	5#
PRINTB	1#	5#
PRINTF	1#	5#
PRINTS	1#	5#
PRINTX	1#	5#
READBU	1#	5#
REDEF	1#	5#
RFLAGS	1#	5#
SETPRI	1#	5#
SETVEC	1#	5#
SLASH	1#	5#
STARS	1#	5#
SVC	1#	3#
XFER	1#	5#
XFERF	1#	5#
XFERT	1#	5#

6

4

. ABS.	000000	000
	000000	001
NOMORE	000004	002

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

NOMORE.OBJ,NOMORE.LST/CR/SOL/ML:TOC=SVC34R.P11,NOMORE.MAC
 RUN-TIME: 2 1 .3 SECONDS
 RUN-TIME RATIO: 42/4=9.1
 CORE USED: 31K (61 PAGES)

LNKX11 V023 7-APR-83 17:20

#CZUAAB.BIC/B:2000,CZUAAB.MAP=CZUAAB,MICROA,MICROB,MICROC,MICROD,MICROE,MICROF,MICROG,NOMORE/E

LOAD MAP

TRANSFER ADDRESS: 000001

LOW LIMIT: 002000

HIGH LIMIT: 100564

MODULE	PARAM	ADDRESS	SIZE
<. ABS.>		000000	000000
	ADR	000020	
	ADRERR	000001	
	BIT0	000001	
	BIT00	000001	
	BIT01	000002	
	BIT02	000004	
	BIT03	000010	
	BIT04	000020	
	BIT05	000040	
	BIT06	000100	
	BIT07	000200	
	BIT08	000400	
	BIT09	001000	
	BIT1	000002	
	BIT10	002000	
	BIT11	004000	
	BIT12	010000	
	BIT13	020000	
	BIT14	040000	
	BIT15	100000	
	BIT2	000004	
	BIT3	000010	
	BIT4	000020	
	BIT5	000040	
	BIT6	000100	
	BIT7	000200	
	BIT8	000400	
	BIT9	001000	
	BOE	000400	
	CLEAR	000000	
	CRCSIZ	000004	
	DATERR	000000	
	DIM	000020	
	DNI	004000	
	DNIB	000010	
	EF.CON	000036	
	EF.NEW	000035	
	EF.PWR	000034	
	EF.RES	000037	
	EF.STA	000040	
	ENP	000400	
	ERRS	040000	
	EVL	000004	
	FATI	000400	

FATIB	000001
GETCMD	000002
GETPCB	000001
MOE	100000
IBE	010000
ICAB	040000
IDU	000040
IE	000100
IER	020000
INITH	177777
INITL	177777
INTE	000100
INTR	000200
LOADR	020000
IOSIZ	020000
ISR	000100
IXE	004000
LASM	000001
LIM	000021
LINADR	100000
LINSIZ	077774
LOE	040000
LOT	000010
MAXBYT	002756
MINBYT	000100
NHLT	000006
NIUNI	000007
NPRERR	100000
NXERR	040000
OWN	100000
PARERR	010000
PCEI	040000
PCEIB	000100
PLIO	000200
PFNOP1	000000
PFNOP2	000003
PNOP	000006
PNT	001000
POLYH	166670
POLYL	101440
POLY16	120001
PRI	002000
PRILD	000001
PRI00	000000
PRI01	000040
PRI02	000100
PRI03	000140
PRI04	000200
PRI05	000240
PRI06	000300
PRI07	000340
PSTATE	000007
RACC	000013
RACPS	000017
RC	000012
RCEI	002000
RCEIB	000004
RDPA	000002
READY	000002
RESET	000000

RLSA	000024	
RMAL	000006	
RMTL	000010	
ROMADR	040000	
ROMSIZ	040000	
RPA	000004	
RPS	000016	
RRF	000010	
RSET	000040	
RSIDP	000022	
RTM	000014	
RUN	000003	
RXI	020000	
RXIB	000040	
SECOND	000077	
SERI	100000	
SERIB	000200	
SET	000001	
SFT	037400	
SFTB0	000400	
SFTB1	001000	
SFTB2	002000	
SFTB3	004000	
SFTB4	010000	
SFTB5	020000	
SIZ1K	004000	
SIZ2K	010000	
SIZ4K	020000	
SIZ8K	040000	
SLFT	000003	
STP	001000	
TXI	010000	
TXIB	000020	
UAM	000200	
UNIERR	020000	
UNIHLT	000005	
WCSADR	000000	
WCSSIZ	020000	
WLSA	000025	
WMAL	000007	
WPA	000005	
WRF	000011	
WSIDP	000023	
WTM	000015	
XPWR	100000	
<UNAREP>	002000	000000
	002000	053566
BITNAM	002310	
BITNUM	002306	
BITSTA	002312	
BNANT0	002360	
BNANT1	002420	
BNANT2	002460	
BTMSG	054556	
BTMSG0	055035	
BTMSG1	055073	
BTMSG2	055126	
BTMSG3	055172	
BTBL	054676	
CMKCN1	021316	

LHKINT	022132
CHKMON	022060
CLKBR	002276
CLKCSR	002274
CLKFRE	002302
CLKSRV	024062
CLKTAB	002274
CLKVEC	002300
CLRDNI	021362
CNTTAB	002626
CON.TST	005753
CPUPRI	002676
CRCDAT	005526
CRCERR	005563
CRCPAT	005611
CRC16	021030
CRC32	020710
CSRNUM	002304
DATALD	003774
DBFRAM	004531
DEFADR	054625
DEFHDR	054562
DFPTBL	002262
DMABLK	004406
DMAFRM	004336
DMATO	004270
DPA	054542
DPPAT	004625
DMFRAM	004567
ERRINT	002670
FIFTST	005073
FORM1	006141
FORM10	006715
FORM11	007001
FORM12	007030
FORM13	007123
FORM15	007174
FORM16	007250
FORM17	007326
FORM18	007411
FORM19	007467
FORM2	006176
FORM20	007544
FORM21	007604
FORM22	007656
FORM23	007736
FORM24	010006
FORM25	010040
FORM26	010113
FORM27	010166
FORM28	010236
FORM29	010243
FORM3	006234
FORM30	010266
FORM31	010316
FORM32	010344
FORM33	010441
FORM34	010477
FORM35	010562
FORM36	010662

FORM37	010720
FORM38	011031
FORM39	011122
FORM4	006303
FORM40	011163
FORM41	011246
FORM42	011314
FORM43	011323
FORM44	011331
FORM45	011410
FORM46	011436
FORM47	011465
FORM48	011514
FORM49	011611
FORM5	006352
FORM50	011665
FORM51	011754
FORM52	012006
FORM53	012044
FORM54	012116
FORM55	012144
FORM56	012215
FORM57	012270
FORM58	012340
FORM59	012416
FORM6	006415
FORM60	012511
FORM61	012576
FORM62	012661
FORM63	012734
FORM64	012773
FORM65	013044
FORM66	013072
FORM67	013157
FORM68	013243
FORM69	013340
FORM7	006473
FORM70	013456
FORM71	013520
FORM72	013562
FORM73	013634
FORM74	013677
FORM75	013754
FORM76	014022
FORM77	014056
FORM78	014132
FORM79	014172
FORM8	006555
FORM80	014241
FORM81	014320
FORM82	014363
FORM83	014453
FORM9	006637
FREMEM	002324
FRESIZ	002322
FRSTIM	002674
MAFDUP	005723
ME XDAT	054560
ME XDPA	021116
ME XH	021200

HEXL	021236
HEXTBL	054651
HEXVAL	054561
INTBIT	004156
INTVEC	004121
LASFT	004026
LNKARB	005241
LNKBYT	004727
LNKMEM	004240
LPRSG	054554
LPRSGO	054740
LPRSGI	054777
LPTBL	054672
LSACP	002110
LSAPT	002036
LSAU	024026
LSAUT	002070
LSAUTO	023652
LSCCP	002106
LSCLEA	023654
LSCO	002032
LSDEPO	002011
LSDESC	002706
LSDESP	002076
LSDEVP	002060
LSDISP	002124
LSDLY	002116
LSDTP	002040
LSDTYP	002034
LSDU	024020
LSDUT	002072
LSDVTY	002700
LSEF	002052
LEENVI	002044
LSETP	002102
LSEXP1	002046
LSEXP4	002064
LSEXP5	002066
LSHARD	055256
LSHIRE	002120
LSHPCP	002016
LSHPTP	002022
LSHW	002262
LSICP	002104
LSINIT	023212
LSLADP	002026
LSLOAD	002100
LSLUN	002074
LSPREV	002050
LSHARE	002000
LSPRIO	002042
LSPROT	023204
LSPHT	002112
LSREPP	002062
LSRE'V	002010
LSRPT	023176
LSSPC	002056
LSSPCP	002020
LSSPTP	002024
LSSTA	002030

LSTEST	002114
LSTIML	002014
LSUNIT	002012
MAXCNT	005027
METER	002332
MICMOD	002320
MICRO	002326
MSG1	014716
MSG10	015360
MSG11	015402
MSG12	015466
MSG13	015512
MSG14	015560
MSG15	015606
MSG16	015636
MSG17	015730
MSG18	016022
MSG19	016052
MSG2	014764
MSG20	016146
MSG21	016236
MSG22	016326
MSG23	016442
MSG24	016464
MSG25	016614
MSG26	017002
MSG27	017046
MSG28	017114
MSG29	017162
MSG3	015030
MSG30	017264
MSG31	017332
MSG32	017476
MSG33	017574
MSG34	017622
MSG35	017672
MSG36	017770
MSG37	020012
MSG38	020034
MSG39	020056
MSG4	015076
MSG40	020100
MSG41	020176
MSG42	020250
MSG43	020420
MSG44	020442
MSG45	020604
MSG46	020666
MSG5	015124
MSG6	015174
MSG7	015262
MSG8	015310
MSG9	015332
MJCAST	005470
ME XMEM	002666
MOCLK	023610
MOPEER	003706
ODDBYT	004765
PATERN	002520
PAT1	002520

PAT2	002522
PAT3	002524
PAT4	002526
PAT5	002530
PAT6	002532
PCBB	002606
PCOMND	002316
PCSRO	002336
PCSROC	002350
PCSROU	002346
PCSR1	002340
PCSR1C	002352
PCSR2	002342
PCSR2C	002354
PCSR3	002344
PCSR3C	002356
PRTPAR	006061
PWHEN	002314
RACERR	003570
RACMG1	014500
RACMG2	014526
RACMG3	014570
RACMG4	014642
RACMG7	014670
RBRRUN	005650
RCVDON	004477
RETLOG	006031
REUNA	022166
RLNKAD	005114
ROMDMP	003747
RREV	054550
RRVER	003646
RSETER	003624
SLFTST	003726
SMSG00	026610
SMSG01	026632
SMSG02	026652
SMSG03	026656
SMSG04	026706
SMSG05	026742
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SMSG07	027030
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SMSG20	027217
SMSG21	027233
SMSG22	027234
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SMSG25	027237
SMSG26	027240
SMSG27	027241
SMSG30	027242
SMSG31	027304

SMSG32	027347
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SMSG34	027450
SMSG35	027512
SMSG36	027546
SMSG37	027610
SMSG40	027644
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SMSG44	030112
SMSG45	030163
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SMSG64	030734
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SMSG66	030752
SMSG67	030764
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SMSG71	031012
SMSG72	031036
SMSG73	031060
SMSG74	031061
SMSG75	031062
SMSG76	031063
SMSG77	031064
SPAT1	002534
SPAT2	002542
SPAT3	002550
SPAT4	002556
SPAT5	002564
SPAT6	002572
SPAT7	002600
STAMUX	004663
STAPAT	005305
STAPOS	005417
STAREJ	005351
STMSG	026406
STTBL	026410
SWADDR	002334
SWHDR	054706
SWPACK	054552
TDRCNT	006001
TIMOFF	021302
TIRON	021264
TINTST	004216
TLNKAD	005165
TRAP4	024034

TRNDON	004445
T1	024076
T10	031124
T11	031540
T12	032326
T13	033006
T14	033424
T15	033714
T16	034422
T17	034740
T18	035406
T19	035764
T2	024310
T20	036344
T21	036672
T22	037202
T23	037512
T24	040072
T25	040452
T26	041046
T27	041610
T28	042206
T29	042610
T3	024642
T30	043130
T31	043520
T32	044104
T33	044470
T34	045130
T35	045460
T36	046000
T37	046350
T38	046670
T39	047230
T4	024754
T40	047620
T41	050202
T42	050634
T43	051240
T44	052330
T45	053052
T46	053466
T5	025072
T6	025560
T7	025642
T8	025740
T9	026162
UDBB	002616
UNACSR	002266
UNAINI	002672
UNAPRI	002272
UNASRV	024044
UNAVEC	002270
UNIT	002330
UNLOD	003517
UNUSED	031112
WCSMEM	004072
\$ADRER	003461
\$AFTER	003342
\$BEFOR	003333

	\$BIT0	003271	
	\$BIT1	003263	
	\$BIT10	003174	
	\$BIT11	003165	
	\$BIT12	003156	
	\$BIT13	003147	
	\$BIT14	003140	
	\$BIT15	003131	
	\$BIT2	003255	
	\$BIT3	003247	
	\$BIT4	003241	
	\$BIT5	003233	
	\$BIT6	003225	
	\$BIT7	003217	
	\$BIT8	003211	
	\$BIT9	003203	
	\$CLR	003325	
	\$DATER	003446	
	\$DNI	003000	
	\$FAT1	003021	
	\$GTCMD	003357	
	\$GTPCB	003350	
	\$ICAB	003076	
	\$INTE	003043	
	\$INTR	003032	
	\$NCLR	003313	
	\$NOP	003405	
	\$NSET	003277	
	\$PARER	003502	
	\$PATCH	055366	
	\$PCEI	002747	
	\$PCTO	003107	
	\$PDNDM	003417	
	\$RCEI	003010	
	\$RESET	003440	
	\$RMTC	003120	
	\$RSET	003054	
	\$RXI	002760	
	\$SERI	002736	
	\$SET	003307	
	\$SLFT	003373	
	\$STOP	003433	
	\$STRT	003411	
	\$TXI	002770	
	\$XPWR	003065	
<MICRA >		055566	000024
	MICASZ	055610	
	MICROA	055566	
<MICRB >		055612	002314
	MICBSZ	060124	
	MICROB	055612	
<MICRC >		060126	003254
	MICCSZ	063400	
	MICC7	063214	
	MICROC	060126	
<MICRD >		063402	004706
	MICDSZ	070306	
	MICROD	063402	
<MICRE >		070310	002734
	BFILE	072640	

	MICESZ	073242	
	MICROE	070310	
<MICRF >		073244	003460
	MICFSZ	076722	
	MICROF	073244	
<MICRG >		076724	001634
	MICGSZ	100556	
	MICROG	076724	
<NOMORE>		100560	000004
	LSLAST	100564	

MODULE MICROA			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROB			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROC			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROD			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROE			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROF			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE MICROG			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

MODULE NO			
SECTION ENTRY	ADDRESS	SIZE	
< >	100564	000000	

RUN-TIME: 5 SECONDS
5K CORE USED