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USER DOCUMENTATION

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IDENTIFICATION

PRODUCT CODE: AC-U127A-MC

PRODUCT NAME: CZ:MVAO KMS11-K DIAGNOSTIC

PRODUCT DATE: MARCH 1985

MAINTAINER: COMPUTER SPECIAL SYSTEMS

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

THIS DIAGNOSTIC REPRESENT A FUNCTIONAL TEST FOR THE KMS11-K OPTION. KMS11-K PROVIDES A HIGH SPEED LINK BETWEEN UNIBUS AND RS422 SIGNALS. THE KMS11-K OPTION CONSISTS OF TWO MODULES: THE KMC11-B MICROPROCESS MODULE AND THE M8935 RS422 LINE UNIT MODULE THAT CAN BE ACCESSED ONLY THROUGH KMC11-B BUT NOT THE UNIBUS.

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

PDP-11 TYPE UNIBUS PROCESSOR
MINIMUM OF 16K OF MEMORY
LOAD DEVICE
CONSOLE TERMINAL
KMC11-B MICROPROCESSOR WITH CABLE FOR LINE UNIT
M8935 LINE UNIT WITH OPTIONAL LOOPBACK CABLE

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP+ USER'S MANUAL - CHQUS
KMS11-K FUNCTIONAL SPECIFICATION
EVDIN VAX LEVEL 3 STANDALONE DIAGNOSTIC FROM WHICH THIS
ONE WAS TRANSLATED

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THE DIAGNOSTIC ASSUMES THAT THE MAIN PROCESSOR, MEMORY, LOAD DEVICE AND CONSOLE TERMINAL ARE FUNCTIONAL. THE DIAGNOSTIC DOES NOT FULLY VERIFY THE KMC11-B MODULE, ONLY THE FUNCTIONS RELATED TO THE OPERATION OF THE LINE UNIT ARE TESTED.

1.5 ASSUMPTIONS

2.0 OPERATING INSTRUCTIONS

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

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 TEST 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
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)
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 "DDDDD".

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:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 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
PRINT					
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)
ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
IDR	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST
EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

*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.

UNIT (D) ?

CSR ADDRESS (O) ?

EXTERNAL LOOPBACK (L) N ?

THE FIRST QUESTION REFER TO THE INSTALATION OF THE KMC11-B. THE FIFTH QUESTION REFERS TO THE FACT WHETHER THE DIAGNOSTIC WILL RUN IN EXTERNAL OR INTERNAL LOOPBACK MODE.

2.5 SOFTWARE QUESTIONS

NONE

2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

UNITS (D) ? 8<CR>

UNIT 1

CSR ADDRESS (O) ? 160000<CR>

SUB-DEVICE # (O) ? 0<CR>

```
300 Q-FACTOR (0) 0 ? 1<CR>
301
302 UNIT 2
303 CSR ADDRESS (0) ? 160000<CR>
304 SUB-DEVICE # (0) ? 1<CR>
305 Q-FACTOR (0) 1 ? 0<CR>
306
307 UNIT 3
308 CSR ADDRESS (0) ? 160000<CR>
309 SUB-DEVICE # (0) ? 2<CR>
310 Q-FACTOR (0) 0 ? <CR>
311
312 UNIT 4
313 CSR ADDRESS (0) ? 160000<CR>
314 SUB-DEVICE # (0) ? 3<CR>
315 Q-FACTOR (0) 0 ? <CR>
316
317 UNIT 5
318 CSR ADDRESS (0) ? 160000<CR>
319 SUB-DEVICE # (0) ? 4<CR>
320 Q-FACTOR (0) 0 ? <CR>
321
322 UNIT 6
323 CSR ADDRESS (0) ? 160000<CR>
324 SUB-DEVICE # (0) ? 5<CR>
325 Q-FACTOR (0) 0 ? <CR>
326
327 UNIT 7
328 CSR ADDRESS (0) ? 160000<CR>
329 SUB-DEVICE # (0) ? 6<CR>
330 Q-FACTOR (0) 0 ? 1<CR>
331
332 UNIT 8
333 CSR ADDRESS (0) 160000<CR>
334 SUB-DEVICE # (0) ? 7<CR>
335 Q-FACTOR (0) 1 ? <CR>
336
```

337 NOTICE THAT THE DEFAULT VALUE FOR THE Q FACTOR CHANGES WHEN A
338 NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING
339 MULTIPLE UNITS!

340 AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS
341 DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS
342 NOT VERY EFFICIENT.

343 THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER.
344 LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION
345 FEATURE.

```
346 # UNITS (0) ? 8<CR>
347
```

```
348 UNIT 1
349 CSR ADDRESS (0) ? 160000<CR>
350 SUB-DEVICE # (0) ? 0,1<CR>
351 Q-FACTOR (0) 0 ? 1,0<CR>
352
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353 UNIT 3
354
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356
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357 CSR ADDRESS (0) ? 160000<CR>
 358 SUB-DEVICE # (0) ? 2-5<CR>
 359 Q-FACTOR (0) 0 ? 0<CR>

360
 361 UNIT 7
 362 CSR ADDRESS (0) ? 160000<CR>
 363 SUB-DEVICE # (0) ? 6,7<CR>
 364 Q-FACTOR (0) 0 ? 1<CR>

365
 366 AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL
 367 BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY
 368 ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES
 369 ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE
 370 SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT
 371 WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE
 372 BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE
 373 "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA
 374 FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES
 375 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED
 376 BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST
 377 BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR
 378 THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY
 379 SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE
 380 SPECIFIED IN THE THIRD PASS.

381 THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS
 382 SHOWN BELOW.

383 # UNITS (0) ? 8<CR>
 384
 385 UNIT 1
 386 CSR ADDRESS (0) ? 160000<CR>
 387 SUB-DEVICE # (0) ? 0 7<CR>
 388 Q-FACTOR (0) 0 ? 0,1,0,...,1,1<CR>

389
 390 AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING
 391 A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

392 2.7 QUICK START-UP PROCEDURE (XXDP+)

393 TO START-UP THIS PROGRAM:

- 394 1. BOOT XXDP+
- 395 2. GIVE THE DATE AND ANSWER THE LSI AND 50HZ (IF THERE
396 IS A CLOCK) QUESTIONS
- 397 3. TYPE "R ZKMVA0", WHERE NAME IS THE NAME OF THE BIN OR BIC
398 FILE FOR THIS PROGRAM
- 399 4. TYPE "START"
- 400 5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
- 401 6. ANSWER ALL THE HARDWARE QUESTIONS
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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:

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 "IBE" 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.

3.2 SPECIFIC ERROR MESSAGES

KMC11-B ERROR MESSAGES

KMC11-B NOT PRESENT AT SPECIFIED ADDRESS
CSR REGISTER FAILURE
BRG REGISTER FAILURE
MASTER CLEAR DID NOT INITIALIZE BRG REGISTER
CRAM FAILURE
DATA RAM FAILURE
KMC11 IS HUNG

LINE UNIT ERROR MESSAGES

MASTER CLEAR FAILED TO INITIALIZE REGISTERS
CABLE OK IS NOT SET
INTERNAL LOOPBACK FAILED TO SET
INTERNAL LOOPBACK FAILED TO CLEAR
EXTERNAL LOOPBACK FAILED TO SET
EXTERNAL LOOPBACK FAILED TO CLEAR
DATA PATH ERROR
IRDY FAILED TO SET
IRDY FAILED TO CLEAR

471 RNRD FAILED TO SET
472 RNRD FAILED TO CLEAR
473 DT FAILED TO SET
474 DT FAILED TO CLEAR
475 REGISTER ADDRESS UNIQUENESS FAILURE
476
477 4.0 PERFORMANCE AND PROGRESS REPORTS
478
479 AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE
480 TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED.
481 THE "EOP" SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END
482 OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.
483
484
485 5.0 DEVICE INFORMATION TABLES
486
487 P TABLE CONTAINS CSR ADDRESS AND MODE OF OPERATION FLAG
488 (EXTERNAL OR INTERNAL LOOPBACK).
489
490
491 6.0 TEST SUMMARIES
492
493
494 6.1 TEST 1
495
496 SUBTEST 1
497
498 THIS SUBTEST IS USED TO CHECK WHETHER THE UNIBUS CAN
499 BE RESET AND THE UNIBUS STATUS REGISTER CLEARED.
500
501
502 ERRORS:
503
504 KMC11 NOT PRESENT AT SPECIFIED ADDRESS
505
506
507 SUBTEST 2
508
509 VERIFY THAT CSR'S CAN BE WRITTEN WITH
510 FLOATING 1 PATTERN
511
512 ERRORS:
513
514 CSR REGISTER FAILURE
515
516
517 6.2 TEST 2
518
519 SUBTEST 1
520
521 THIS SUBTEST VERIFIES CRAM ON KMC11 B BY WRITING AND READING
522 EVERY LOCATION WITH FLOATING 0'S PATTERN
523
524 ERRORS:
525
526 CRAM ERROR
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SUBTEST 2

THIS SUBTEST VERIFIES THAT BRG CAN BE LOADED
WITH A UNIQUE DATA PATTERN AND THAT MASTER
CLEAR CLEARS BRG.

ERRORS:

BRG ERROR

SUBTEST 3

THIS SUBTEST VERIFIES KMC11-B DATA MEMORY.
MEMORY IS TESTED WITH FLOATING 0 PATTERN.

ERRORS:

DATA RAM ERROR

6.3 TEST 3

THIS CHECKS VALIDATES THAT ALL REGISTERS ARE ZERO AFTER
MASTER CLEAR EXCEPT FOR MAINT REGISTER BIT 2 WHICH IS
CABLE OK BIT.

SUBTEST 1

THIS TEST VERIFIES THAT MAINT REGISTER IS ZERO
AFTER ISSUING MASTER CLEAR EXCEPT FOR CABLE OK BIT

SUBTEST STEPS:

1. ISSUE MASTER CLEAR
2. VERIFY MAINT TO BE A ZERO EXCEPT FOR CABLE OK BIT

ERRORS:

CABLE OK IS CLEAR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 2

THIS SUBTEST VERIFIES THAT THE MODULE CAN BE PUT IN
LOOPBACK MODES.

SUBTEST STEPS:

1. WRITE MAINT REGISTER WITH BITS 3,4 SET
2. VERIFY ITS PRESENSE
3. VERIFY THAT MASTER CLEAR CLEARS BITS 3,4

ERRORS:

INTERNAL LOOPBACK FAILED TO SET
INTERNAL LOOPBACK FAILED TO CLEAR

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EXTERNAL LOOPBACK FAILED TO SET
EXTERNAL LOOPBACK FAILED TO CLEAR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 3

THIS TEST VERIFIES THAT DATA_LO BYTE REGISTER IS ZERO
AFTER ISSUING MASTER CLEAR.

SUBTEST STEPS:

1. ISSUE MASTER CLEAR
2. SET UP MAINTENANCE MODE ACCORDING TO EVENT FLAG
3. VERIFY DATA_LO TO BE A ZERO

ERRORS:

MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 4

THIS TEST VERIFIES THAT DIN_HI BYTE REGISTER IS ZERO
AFTER ISSUING MASTER CLEAR.

SUBTEST STEPS:

1. ISSUE MASTER CLEAR
2. SET UP MAINTENANCE MODE ACCORDING TO EVENT FLAG
3. VERIFY DIN_HI TO BE A ZERO

ERRORS:

MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 5

THIS TEST VERIFIES THAT CONTROL REGISTER IS ZERO
AFTER ISSUING MASTER CLEAR.

SUBTEST STEPS:

1. ISSUE MASTER CLEAR
2. SET UP MAINTENANCE MODE ACCORDING TO EVENT FLAG
3. VERIFY CONTROL TO BE A ZERO

ERRORS:

MASTER CLEAR FAILED TO INITIALIZE REGISTERS

6.4 TEST 4

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THIS TEST VERIFIES THAT THE MODULE UNDER TEST CAN
SEND AND RECEIVED DATA IN INTERNAL LOOPBACK PROPERLY.

ALL SUBTESTS WILL RUN IN EITHER INTERNAL OR EXTERNAL
LOOPBACK MODE DEPENDING ON WHETHER THE EVENT FLAG IS
SET.

SUBTEST 1

THIS SUBTEST VERIFIES THAT THE MODULE THE DATA_LO BYTE REGISTER
CAN BE WRITTEN TO AND READ FROM IN LOOPBACK MODE.

SUBTEST STEPS:

1. SET UP LOOPBACK MODE ACCORDING TO EVENT FLAG
2. WRITE/VERIFY FLOATING 0 PATTERN IN DATA_LO REGISTER
3. VERIFY THAT MASTER CLEAR CLEARS DATA_LO

ERRORS:

DATA PATH ERROR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 2

THIS SUBTEST VERIFIES THAT THE MODULE THE DATA_HI BITS 5 THROUGH 0
CAN BE WRITTEN TO AND READ FROM IN A LOOPBACK MODE.

SUBTEST STEPS:

1. SET LOOPBACK MODE ACCORDING TO EVENT FLAG 3
2. WRITE/VERIFY FLOATING 0 PATTERN IN DATA_HI<5-0> REGISTER
3. VERIFY THAT MASTER CLEAR CLEARS DATA_HI

ERRORS:

DATA PATH ERROR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 3

THIS SUBTEST VERIFIES THAT THE MODULE THE DATA_HI<7,6> BYTE REGISTER
CAN BE WRITTEN TO AND READ FROM CONTROL REGISTER IN A
LOOPBACK MODE.

SUBTEST STEPS:

1. SET LOOPBACK MODE ACCORDING TO EVENT FLAG 3
2. WRITE/VERIFY FLOATING 0 PATTERN IN DATA_HI<7,6> BY READING
THEM BACK THROUGH CONTROL REGISTER BITS 0 AND 1
3. VERIFY THAT MASTER CLEAR CLEARS CONTROL REGISTER

ERRORS:

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DATA PATH ERROR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 4

THIS SUBTEST VERIFIES THAT THE MODULE THE DATA_HI REGISTER
BITS 7 AND 6 CAN BE READ FROM BY WRITING TO EXTRA REGISTER
IN A LOOPBACK MODE.

SUBTEST STEPS:

1. SET LOOPBACK MODE ACCORDING TO EVENT FLAG 3
2. WRITE/VERIFY FLOATING 0 PATTERN IN DATA_HI<7,6> BY WRITING
THEM THROUGH EXTRA REGISTER
3. VERIFY THAT MASTER CLEAR CLEARS DATA_HI

ERRORS:

DATA PATH ERROR
MASTER CLEAR FAILED TO INITIALIZE REGISTERS

SUBTEST 5

THIS SUBTEST VERIFIES ADDRESS UNIQUENESS BETWEEN ALL THE REGISTERS.
EACH ONE IS WRITTEN WITH A UNIQUE PATTERN AND READ BACK AGAINST
EVERY OTHER ONE.

SUBTEST STEPS:

1. SET LOOPBACK MODE ACCORDING TO EVENT FLAG 3
2. WRITE REGISTER 10 AND 11 WITH ALL ONE'S
3. READ BACK AND COMPARE WITH ALL THE REGISTERS

ERRORS:

DATA PATH ERROR
REGISTER ADDRESS UNIQUENESS ERROR

6.5 TEST 5

THIS TEST CHECKS .25 MICROSECOND IRDY SIGNAL AFTER WRITING
REGISTER 2. THIS IS ACCOMPLISHED BY LOADING FIRMWARE IN
INTERNAL LOOPBACK MODE AND CHECKING SIGNALS THROUGH
FIRMWARE.

TEST STEPS:

1. INITIALIZE THE MODULE UNDER TEST
2. SET LOOPBACK MODE ACCORDING TO EVENT FLAG
3. LOAD FIRMWARE TO WRITE TO XREG2 TO GET STROBE AND READ
THE REGISTER INTO KMC11-B MEMORY
4. WAIT FOR DONE BIT IN SEL2<BIT07> FOR 10MSEC

5. READ KMC11-B MEMORY TO VERIFY THE PULSE

ERRORS:

KMC11-B ERROR
IRDY FAILED TO SET
IRDY FAILED TO CLEAR

6.6 TEST 6

THIS TEST CHECKS RNDR DET SIGNAL AFTER WRITING
REGISTER 2. THIS IS ACCOMPLISHED BY LOADING FIRMWARE IN
A LOOPBACK MODE.

TEST STEPS:

1. INITIALIZE THE MODULE UNDER TEST
2. SET LOOPBACK MODE ACCORDING TO EVENT FLAG
3. LOAD FIRMWARE TO WRITE TO XREG2 TO GET STROBE AND READ
THE REGISTER 7 INTO KMC11-B MEMORY
4. WAIT FOR DONE BIT IN SEL0<BIT07> FOR 10MSEC
5. READ KMC11-B MEMORY TO VERIFY THE PULSE

ERRORS:

KMC11-B ERROR
RNDR FAILED TO SET
RNDR FAILED TO CLEAR

6.7 TEST 7

THIS TEST CHECKS DT DET SIGNAL GENERATED AFTER READING
REGISTER 5. THIS IS ACCOMPLISHED BY LOADING FIRMWARE IN
A LOOPBACK MODE.

TEST STEPS:

1. INITIALIZE THE MODULE UNDER TEST
2. SET LOOPBACK MODE ACCORDING TO EVENT FLAG
3. LOAD FIRMWARE TO WRITE TO XREG2 TO GET STROBE AND READ
THE REGISTER INTO KMC11-B MEMORY
4. WAIT FOR DONE BIT IN SEL0<BIT07> FOR 10MSEC
5. READ KMC11-B MEMORY TO VERIFY THE PULSE

ERRORS:

KMC11-B ERROR
DT DET FAILED TO SET
DT DET FAILED TO CLEAR

6.8 TEST 8

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TEST DESCRIPTION:

THIS TEST TURNS ON AND OFF ON-BOARD LED'S THAT CORRESPOND TO THE FOLLOWING BITS: INTERNAL LOOPBACK AND EXTERNAL LOOPBACK. THE ONLY WAY TO VERIFY IT IS VISUALLY.

TEST STEPS:

1. WRITE ZEROES TO BITS 3 AND 4 OF MAINTENANCE REGISTER TO TURN ON CORRESPONDING LED'S
2. REPEAT 5 TIMES STEP 1

6.9 TEST 9

THIS TEST VERIFIES DATA TRANSFER OF 256 BYTES THROUGH LINE UNIT. FIRMWARE IS LOADED INTO KMC11 TO COPY A DATA BUFFER FROM MEMORY, SEND EACH BYTE IN A LOOPBACK MODE, AND DUMP RECEIVED CHARACTERS BACK INTO MAIN MEMORY.

TEST STEPS:

1. INITIALIZE THE MODULE UNDER TEST
2. SET LOOPBACK MODE ACCORDING TO EVENT FLAG
3. WRITE TRANSMIT BUFFER WITH A DATA PATTERN
4. LOAD FIRMWARE TO TRANSMIT A DATA BUFFER THROUGH THE LINE UNIT UNDER TEST
5. WAIT FOR DONE BIT IN SELO<BIT7>
6. VERIFY THAT RECEIVED BUFFER IS THE SAME ONE AS TRANSMITTED

ERRORS:

KMC11-B ERROR
DATA PATH ERROR

7.0 MAINTENANCE HISTORY

```

868          .TITLE PROGRAM HEADER AND TABLES
869          .SBTTL  PROGRAM HEADER
873
874          .MCALL  SVC
875 000000    SVC                                ; INITIALIZE SUPERVISOR MACROS
876
877
878          000001    SVCINS= 1      ; LIST INSTRUCTIONS, SHIFTED RIGHT
879          000001    SVCTST= 1     ; LIST TEST TAGS, SHIFTED RIGHT
880          000001    SVCSUB= 1     ; LIST SUBTEST TAGS, SHIFTED RIGHT
881          000001    SVCGBL= 1     ; LIST GLOBAL TAGS, SHIFTED RIGHT
882          000001    SVCTAG= 1     ; LIST OTHER TAGS, SHIFTED RIGHT
883
887
889 000000    .ENABL  ABS,AMA
890          002000    =          2000
892
893
894          ;++
895          ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
896          ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
897          ;--
898
899 002000    POINTER BGNRPT,BGNSW,BGSFT,BGNAU,BGNDU,ERRTBL
900
901 002000    HEADER  CZKMV,A,0,10,0
          002000
          002000      103
          002001      132
          002002      113
          002003      115
          002004      126
          002005      000
          002006      000
          002007      000
          002010
          002010      101
          002011
          002011      060
          002012
          002012    000000
          002014
          002014    000010
          002016
          002016    012604
          002020
          002020    000000
          002022
          002022    002150
          002024
          002024    002156
          002026
          002026    012710
          002030
          002030    000000
          002032
          002032    000000

```

```

L$NAME::
          .ASCII  /C/
          .ASCII  /Z/
          .ASCII  /K/
          .ASCII  /M/
          .ASCII  /V/
          .BYTE   0
          .BYTE   0
          .BYTE   0
L$REV::
          .ASCII  /A/
L$DEPO::
          .ASCII  /O/
L$UNIT::
          .WORD   0
L$TIML::
          .WORD   10
L$HPCP::
          .WORD   L$HARD
L$SPCP::
          .WORD   0
L$HPTP::
          .WORD   L$HW
L$SPTP::
          .WORD   L$SW
L$LADP::
          .WORD   L$LAST
L$STA::
          .WORD   0
L$CO::
          .WORD   0

```

PROGRAM HEADER AND TABLES
PROGRAM HEADER

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SEQ 0018

002034
 002034 000000
 002036
 002036 000000
 002040
 002040 002124
 002042
 002042 000000
 002044
 002044 000000
 002046
 002046 000000
 002050
 002050 003
 002051 003
 002052
 002052 000000
 002054 000000
 002056
 002056 000000
 002060
 002060 003224
 002062
 002062 006144
 002064
 002064 000000
 002066
 002066 000000
 002070
 002070 006316
 002072
 002072 006310
 002074
 002074 000000
 002076
 002076 003234
 002100
 002100 104035
 002102
 002102 002156
 002104
 002104 006160
 002106
 002106 006302
 002110
 002110 006300
 002112
 002112 006152
 002114
 002114 000000
 002116
 002116 000000
 002120
 002120 000000

L\$DTYP:: .WORD 0
 L\$APT:: .WORD 0
 L\$DTP:: .WORD L\$DISPATCH
 L\$PRIO:: .WORD 0
 L\$ENVI:: .WORD 0
 L\$EXP1:: .WORD 0
 L\$MREV:: .WORD 0
 .BYTE C\$REVISION
 .BYTE C\$EDIT
 L\$EF:: .WORD 0
 .WORD 0
 L\$SPC:: .WORD 0
 L\$DEVP:: .WORD L\$DVTYP
 L\$REPP:: .WORD L\$RPT
 L\$EXP4:: .WORD 0
 L\$EXP5:: .WORD 0
 L\$AUT:: .WORD L\$AU
 L\$DUT:: .WORD L\$DU
 L\$LUN:: .WORD 0
 L\$DESP:: .WORD L\$DESC
 L\$LOAD:: EMT E\$LOAD
 L\$ETP:: .WORD L\$ERRTBL
 L\$ICP:: .WORD L\$INIT
 L\$CCP:: .WORD L\$CLEAN
 L\$ACP:: .WORD L\$AUTO
 L\$PRT:: .WORD L\$PROT
 L\$TEST:: .WORD 0
 L\$DLY:: .WORD 0
 L\$HIME:: .WORD 0

PROGRAM HEADER AND TABLES
DISPATCH TABLE

MACRO M1200 15-MAR 85 16:13 PAGE 7

SEQ 0019

904 .SBTTL DISPATCH TABLE

905

906

907

908

909

910

911 002122

002122 000011

002124

002124 006324

002126 006464

002130 007050

002132 007762

002134 011324

002136 011550

002140 011774

002142 012220

002144 012334

912

DISPATCH 9

.WORD	9
L\$DISPATCH: :	
.WORD	T1
.WORD	T2
.WORD	T3
.WORD	T4
.WORD	T5
.WORD	T6
.WORD	T7
.WORD	T8
.WORD	T9

PROGRAM HEADER AND TABLES
DEFAULT HARDWARE P-TABLE

MACRO M1200 15-MAR-85 16:13 PAGE 8

SEQ 0020

```
914          .SBTTL  DEFAULT HARDWARE P-TABLE
915
916          ;++
917          ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
918          ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
919          ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
920          ; AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
921          ;--
922
923 002146      BGNHW  DFPTBL
          002146 000002
          002150
          002150
          L$HW:: .WORD  L10000-L$HW/2
          DFPTBL::
924
925 002150      .WORD  0          ; NO DEFAULT FOR ADDRESS
926 002152      .WORD  0          ; INTERNAL LOOPBACK
927 002154      ENDPHW
          002154
          L10000:
```

PROGRAM HEADER AND TABLES
SOFTWARE P-TABLE

MACRO M1200 15-MAR-85 16:13 PAGE 9

SEQ 0021

929 .SBTTL SOFTWARE P-TABLE

930

931

932

933

934

935

936

937

938 002154

002154 000000

002156

002156

939

940

941 002156

002156

942

;++

; THE SOFTWARE TABLE CONTAINS VARIOUS DATA USED BY THE
; PROGRAM AS OPERATIONAL PARAMETERS. THESE PARAMETERS ARE
; SET UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR
; AT RUN TIME.

!--

BGNSW SFPTBL

.WORD L10001-L\$SW/2

L\$SW::
SFPTBL::

ENDSW

L10001:

```

945 .TITLE GLOBAL AREAS
946 .SBTTL GLOBAL EQUATES SECTION
947
948
949 ;**
950 ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
951 ; ARE USED IN MORE THAN ONE TEST.
952 ;--
953
954 002156
          EQUALS
          ;
          ; BIT DIFINITIONS
          ;
          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
          ;
          001000 BIT9== BIT09
          000400 BIT8== BIT08
          000200 BIT7== BIT07
          000100 BIT6== BIT06
          000040 BIT5== BIT05
          000020 BIT4== BIT04
          000010 BIT3== BIT03
          000004 BIT2== BIT02
          000002 BIT1== BIT01
          000001 BIT0== BIT00
          ;
          ; EVENT FLAG DEFINITIONS
          ; EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
          ;
          ;
          000040 EF.START== 32. ; BIT POSITION IN SECOND STATUS WORD
          000037 EF.RESTART== 31. ; (100000) START COMMAND WAS ISSUED
          000036 EF.CONTINUE== 30. ; (040000) RESTART COMMAND WAS ISSUED
          000035 EF.NEW== 29. ; (020000) CONTINUE COMMAND WAS ISSUED
          000034 EF.PWR== 28. ; (010000) A NEW PASS HAS BEEN STARTED
          ; ; (004000) A POWER-FAIL/POWER UP OCCURRED
          ;
          ; PRIORITY LEVEL DEFINITIONS
          ;
          000340 PRI07== 340
          000300 PRI06== 300
          000240 PRI05== 240

```

GLOBAL AREAS MACRO M1200 15-MAR-85 16:13 PAGE 10-1
GLOBAL EQUATES SECTION

SEQ 0023

000200	PRI04==	200
000140	PRI03==	140
000100	PRI02==	100
000040	PRI01==	40
000000	PRI00==	0
	;	
	OPERATOR FLAG BITS	
	;	
000004	EVL==	4
000010	LOT==	10
000020	ADR==	20
000040	IDU==	40
000100	ISR==	100
000200	UAM==	200
000400	BOE==	400
001000	PNT==	1000
002000	PRI==	2000
004000	IXE==	4000
010000	IBE==	10000
020000	IER==	20000
040000	LOE==	40000
100000	HOE==	100000


```
956
957      ;*
958      ; BIT DEFINITIONS FOR CSR REGISTER OF KMC11 B
959      ;*
960      000400      STEP      ==      400      ; MICROSTEP
961      001000      RAMI      ==      1000      ; RAMI (FOR SINGLE STEP)
962      002000      RAMO      ==      2000      ; RAMO (FOR LOADING FIRWARE)
963      020000      CRAMW     ==      20000     ; WRITE
964      040000      MCLR      ==      40000     ; MASTER CLEAR
965      100000      RUN       ==      100000    ; START EXECUTING
966
967      ;*
968      ; DATA INTERFACE REGISTERS
969      ;*
970      000010      DLO       ==      10      ; DATA LOW BYTE
971      000011      DOHI      ==      11      ; DATA HIGH BYTE (WRITE ONLY)
972      000015      DIHI      ==      15      ; DATA HIGH BYTE (READ ONLY)
973
974      000012      STRB       ==      12      ; STROBE (WRITE ONLY)
975      000016      CNTRL      ==      16      ; CONTROL (READ ONLY)
976      000016      EXTR       ==      16      ; EXTRA (WRITE ONLY)
977      000017      MAINT      ==      17      ; MAINTENANCE
```

GLOBAL AREAS MACRO M1200 15 MAR-85 16:13 PAGE 12
GLOBAL DATA SECTION

SEQ 0025

```

979          .SBTTL  GLOBAL DATA SECTION
980
981          ;..
982          ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
983          ; IN MORE THAN ONE TEST.
984          ;..
985
986
987 002156          ERRTABL
          002156          L$ERRTABL::
          002156 000000          ERRTP::          .WORD  0
          002160 000000          ERRNBR::          .WORD  0
          002162 000000          ERRMSG::          .WORD  0
          002164 000000          ERRBLK::          .WORD  0
988 002166 000000          KCSR::          .WORD  0          ; CSR ADDRESS
989 002170 000000          LOGUNT::          .WORD  0          ; UNIT NUMBER
990 002172 000000          MTMODE::          .WORD  0          ; LOOPBACK MODE
991 002174 0000C0          TEMP::          .WORD  0
992 002176 000000          TEMP1::          .WORD  0
993 002200          .BLKW  10
994 002220          377      077      003  RPNT::          .BYTE  377,77,3,0          ; READ PATTERN FOR ADDRESS
          002223          000
995
996 002224          TRBUF::          .BLKB  256.          ; UNIQUENESS SUBTEST
997 002624          RCBUF::          .BLKB  256.          ; TRANSMIT BUFFER
          ; RECEIVE BUFFER

```

GLOBAL AREAS MACRO M1200 15-MAR 85 16:13 PAGE 13
GLOBAL TEXT SECTION

SEQ 0026

```

999          .SBTTL GLOBAL TEXT SECTION
1000
1001          ;
1002          ; THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
1003          ; MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
1004          ; MORE THAN ONE TEST.
1005          ;
1006
1007          ;
1008          ; NAMES OF DEVICES SUPPORTED BY PROGRAM
1009          ;
1010          DEVTYP <KMS11-K>
1011
1012          L$DVTYP::
1013              .ASCIZ  "KMS11-K"
1014
1015              .EVEN
1016
1017          ; TEST DESCRIPTION
1018          ;
1019          DESCRIPT <KMS11-K DIAGNOSTIC>
1020
1021          L$DESC::
1022              .ASCIZ  "/KMS11-K DIAGNOSTIC/"
1023
1024              .EVEN
1025
1026          003224      113      115      123
1027          003224      061      061      055
1028          003227      113      000
1029
1030          003234      113      115      123
1031          003234      061      061      055
1032          003237      113      040      104
1033          003242      111      101      107
1034          003245      116      117      123
1035          003250      124      111      103
1036          003253      000
1037
1038          1016

```

```

1018      .SBTTL  GLOBAL ERROR MESSAGES
1019
1020      ;*
1021      ; KMC11-B ERROR MESSAGES
1022      ;*
1023
1024 003260      113      115      103  KMC1:: .ASCIZ  /KMC11-B NOT PRESENT AT SPECIFIED ADDRESS/
      003263      061      061      055
      003266      102      040      116
      003271      117      124      040
      003274      120      122      105
      003277      123      105      116
      003302      124      040      101
      003305      124      040      123
      003310      120      105      103
      003313      111      106      111
      003316      105      104      040
      003321      101      104      104
      003324      122      105      123
      003327      123      000
1025 003331      103      123      122  KMC2:: .ASCIZ  /CSR REGISTER FAILURE/
      003334      040      122      105
      003337      107      111      123
      003342      124      105      122
      003345      040      106      101
      003350      111      114      125
      003353      122      105      000
1026 003356      102      122      107  KMC3:: .ASCIZ  /BRG REGISTER FAILURE/
      003361      040      122      105
      003364      107      111      123
      003367      124      105      122
      003372      040      106      101
      003375      111      114      125
      003400      122      105      000
1027 003403      115      101      123  KMC4:: .ASCIZ  /MASTER CLEAR DID NO INITIALIZE BRG REGISTER/
      003406      124      105      122
      003411      040      103      114
      003414      105      101      122
      003417      040      104      111
      003422      104      040      116
      003425      117      124      040
      003430      111      116      111
      003433      124      111      101
      003436      114      111      132
      003441      105      040      102
      003444      122      107      040
      003447      122      105      107
      003452      111      123      124
      003455      105      122      000
1028 003460      103      122      101  KMC5:: .ASCIZ  /CRAM FAILURE/
      003463      115      040      106
      003466      101      111      114
      003471      125      122      105
      003474      000
1029 003475      104      101      124  KMC6:: .ASCIZ  /DATA RAM FAILURE/
      003500      101      040      122
      003503      101      115      040

```

	003506	106	101	111	
	003511	114	125	122	
	003514	105	000		
1030	003516	113	115	103	KMC7:: .ASCIZ /KMC11 IS HUNG/
	003521	061	061	040	
	003524	111	123	040	
	003527	110	125	116	
	003532	107	000		
1031					
1032					
1033					;* ; LINE UNIT ERROR MESSAGES ;*
1034					
1035					
1036	003534	115	101	123	EM1:: .ASCIZ /MASTER CLEAR FAILED TO INITIALIZE REGISTERS/
	003537	124	105	122	
	003542	040	103	114	
	003545	105	101	122	
	003550	040	106	101	
	003553	111	114	105	
	003556	104	040	124	
	003561	117	040	111	
	003564	116	124	111	
	003567	101	114	111	
	003572	132	105	040	
	003575	122	105	107	
	003600	111	123	124	
	003603	105	122	123	
	003606	000			
1037	003607	103	101	102	EM2:: .ASCIZ /CABLE OK IS NOT SET/
	003612	114	105	040	
	003615	117	113	040	
	003620	111	123	040	
	003623	116	117	124	
	003626	040	123	105	
	003631	124	000		
1038	003633	111	116	124	EM3:: .ASCIZ /INTERNAL LOOPBACK FAILED TO SET/
	003636	105	122	116	
	003641	101	114	040	
	003644	114	117	117	
	003647	120	102	101	
	003652	103	113	040	
	003655	106	101	111	
	003660	114	105	104	
	003663	040	124	117	
	003666	040	123	105	
	003671	124	000		
1039	003673	111	116	124	EM4:: .ASCIZ /INTERNAL LOOPBACK FAILED TO CLEAR/
	003676	105	122	116	
	003701	101	114	040	
	003704	114	117	117	
	003707	120	102	101	
	003712	103	113	040	
	003715	106	101	111	
	003720	114	105	104	
	003723	040	124	117	
	003726	040	103	114	
	003731	105	101	122	

	003734	000			
1040	003735	105	130	124	EM5:: .ASCIZ /EXTERNAL LOOPBACK FAILED TO SET/
	003740	105	122	116	
	003743	101	114	040	
	003746	114	117	117	
	003751	120	102	101	
	003754	103	113	040	
	003757	106	101	111	
	003762	114	105	104	
	003765	040	124	117	
	003770	040	123	105	
	003773	124	000		
1041	003775	105	130	124	EM6:: .ASCIZ /EXTERNAL LOOPBACK FAILED TO CLEAR/
	004000	105	122	116	
	004003	101	114	040	
	004006	114	117	117	
	004011	120	102	101	
	004014	103	113	040	
	004017	106	101	111	
	004022	114	105	104	
	004025	040	124	117	
	004030	040	103	114	
	004033	105	101	122	
	004036	000			
1042	004037	104	101	124	EM7:: .ASCIZ /DATA PATH ERROR/
	004042	101	040	120	
	004045	101	124	110	
	004050	040	105	122	
	004053	122	117	122	
	004056	000			
1043	004057	111	122	104	EM8:: .ASCIZ /IRDY FAILED TO SET/
	004062	131	040	106	
	004065	101	111	114	
	004070	105	104	040	
	004073	124	117	040	
	004076	123	105	124	
	004101	000			
1044	004102	111	122	104	EM9:: .ASCIZ /IRDY FAILED TO CLEAR/
	004105	131	040	106	
	004110	101	111	114	
	004113	105	104	040	
	004116	124	117	040	
	004121	103	114	105	
	004124	101	122	000	
1045	004127	122	116	104	EM10:: .ASCIZ /RNDR FAILED TO SET/
	004132	122	040	106	
	004135	101	111	114	
	004140	105	104	040	
	004143	124	117	040	
	004146	123	105	124	
	004151	000			
1046	004152	122	116	104	EM11:: .ASCIZ /RNDR FAILED TO CLEAR/
	004155	122	040	106	
	004160	101	111	114	
	004163	105	104	040	
	004166	124	117	040	
	004171	103	114	105	

E3

GLOBAL AREAS MACRO M1200 15-MAR-85 16:13 PAGE 14-3
GLOBAL ERROR MESSAGES

SEQ 0030

	004174	101	122	000	
1047	004177	104	124	040	EM12:: .ASCIZ /DT FAILED TO SET/
	004202	106	101	111	
	004205	114	105	104	
	004210	040	124	117	
	004213	040	123	105	
	004216	124	000		
1048	004220	104	124	040	EM13:: .ASCIZ /DT FAILED TO CLEAR/
	004223	106	101	111	
	004226	114	105	104	
	004231	040	124	117	
	004234	040	103	114	
	004237	105	101	122	
	004242	000			
1049	004243	122	105	107	EM14:: .ASCIZ /REGISTER ADDRESS UNIQUENESS FAILURE/
	004246	111	123	124	
	004251	105	122	040	
	004254	101	104	104	
	004257	122	105	123	
	004262	123	040	125	
	004265	116	111	121	
	004270	125	105	116	
	004273	105	123	123	
	004276	040	106	101	
	004301	111	114	125	
	004304	122	105	000	

1050
1051

.EVEN

```

1053          .SBTTL  TEST MICROCODE FOR KMC11-B
1054
1055 004310          IRDTST:
1056 004310 002012 036740 036740          .WORD  2012, 36740,36740,36740          ; OUT IMM,0,XREG2
      004316 036740
1057 004320 036740 036740 036740          .WORD  36740,36740,36740,36740          ; MEM IBUS,XREG6,INCMAR
      004326 036740
1058 004330 036740 036740 036740          .WORD  36740,36740,36740,36740          ;      16 TIMES
      004336 036740
1059 004340 036740 036740 036740          .WORD  36740,36740,36740,36740          ;
      004346 036740
1060 004350 036740 001200 100400          .WORD  36740,1200, 100400          ; OUT IMM,200,0INCON
1061                                          ; ALWAYS 0
1062
1063 004356          NDRTST:
1064 004356 002012 036760 036760          .WORD  2012, 36760,36760,36760          ; OUT IMM,0,XREG2
      004364 036760
1065 004366 036760 036760 036760          .WORD  36760,36760,36760,36760          ; MEM IBUS,XREG7,INCMAR
      004374 036760
1066 004376 036760 036760 036760          .WORD  36760,36760,36760,36760          ;      22 TIMES
      004404 036760
1067 004406 036760 036760 036760          .WORD  36760,36760,36760,36760          ;
      004414 036760
1068 004416 036760 036760 036760          .WORD  36760,36760,36760,36760          ;
      004424 036760
1069 004426 036760 036760 036760          .WORD  36760,36760,36760,20660          ; BRWRTE IBUS,XRE3
      004434 020660
1070 004436 036760 001200 100400          .WORD  36760,1200, 100400          ; OUT IMM,200,0ICON
1071                                          ; ALWAYS 0
1072
1073 004444          DTTST:
1074 004444 022720 036760 036760          .WORD  22720,36760,36760,36760          ; MEM IBUS,XREG5
      004452 036760
1075 004454 036760 036760 036760          .WORD  36760,36760,36760,36760          ; MEM IBUS,XREG7,INCMAR
      004462 036760
1076 004464 036760 036760 036760          .WORD  36760,36760,36760,36760          ;      22 TIMES
      004472 036760
1077 004474 036760 036760 036760          .WORD  36760,36760,36760,36760          ;
      004502 036760
1078 004504 036760 036760 036760          .WORD  36760,36760,36760,36760          ;
      004512 036760
1079 004514 036760 036760 036760          .WORD  36760,36760,36760,20660          ; BRWRTE IBUS,XREG3
      004522 020660
1080 004524 036760 001200 100400          .WORD  36760,1200, 100400          ; OUT IMM,200,0ICON
1081                                          ; ALWAYS 0
1082
1083 004532          DTST:
1084          ;      8      000000          OUT      IBUS,INCON,0XREG7          ; SE
T UP LOOPBACK
1085 004532 122017          .WORD      122017
1086          ;      9      000002          OUT      IMM,0,0INCON          ; CL
EAR THE REST
1087 004534 001000          .WORD      001000
1088          ;      10     000004          14: OUT      IBUS,PORT1,IBA1          ; AD
DRESS LOW BYTE
1089 004536 122104          .WORD      122104
1090          ;      11     000006          OUT      IBUS,PORT2,IBA2          ; AD
DRESS HIGH BYTE
1091 004540 122125          .WORD      122125
1092          ;      12     000010          SP      IBUS,INCON,SPO          ; AD
DRESS 17, 16 TO SP
1093 004542 123000          .WORD      123000

```


G3

102036

		13	000012	OUT	BR, INCA, ONPR	SEQ 0032	DO
1094	TRANSFER	:					
1095	004544 061070	:	.WORD	10\$:	BRWRTE IBUS, NPR		ST
1096	ORE NPR	:	14				
1097	004546 120600	:	.WORD		BRO 10\$		IF
1098	SET, SIT AND WAIT	:	15				
1099	004550 102006	:	.WORD				
1100		:	16				
1101		:	17				
1102		:	18				
1103		:	19				
1104	004552 036400	:	.WORD				
1105		:	20				
1106	004554 036420	:	.WORD				
1107		:	21				
1108	004556 120600	:	.WORD				
1109		:	22				
1110	004560 001400	:	.WORD				
1111		:	23				
1112	004562 103025	:	.WORD				
1113		:	24				
1114	004564 123100	:	.WORD				
1115		:	25				
1116	004566 063460	:	.WORD				
1117		:	26				
1118	004570 061064	:	.WORD				
1119		:	27				
1120	004572 101022	:	.WORD				
1121		:	28				
1122	004574 100402	:	.WORD				
1123		:	29				
1124	004576 123120	:	.WORD				
1125		:	30				
1126	004600 061065	:	.WORD				
1127		:	31				
1128	004602 100402	:	.WORD				
1129		:	32				
1130		:	33				
1131		:	34				
1132		:	35				
1133	004604 010000	:	.WORD				
1134		:	36				
1135	004606 004000	:	.WORD				
1136		:	37				
1137	004610 056230	:	.WORD				
1138		:	38				
1139	004612 042231	:	.WORD				
1140		:	39				
1141	004614 056236	:	.WORD				
1142		:	40				

BTTS <7,6>

DATA TRANSFER
1143 004616 002012
1144
1145
INTO MEMORY
1146
1147
AD MAINT.
1148 004620 020760
1149

		.WORD	002012		
:	41				
:	42			H3	: CHECK DATA TRANSFER AND DUMP RECEIVED DATA
:	43				
:	44	000066		30\$:	BRWRT IBUS,XREG7 : R
:	45	.WORD	020760		
		000070		BR0 40\$: .

GLOBAL AREAS MACRO M1200 15-MAR-85 16:13 PAGE 15-2
TEST MICROCODE FOR KMC11-B

				SEQ 0033	
1151	:	46	000072	ALWAYS 30\$: OT
HERWISE, SIT AND WAIT					
1152 004624 100433		.WORD	100433		
1153	:	47	000074	40\$: BRWRTE IBUS,XREG3	
1154 004626 020660		.WORD	020660		
1155	:	48	000076	OUT IBUS,PORT3,OBA1	: AD
DRESS LOW BYTE					
1156 004630 122146		.WORD	122146		
1157	:	49	000100	OUT IBUS,PORT4,OBA2	: AD
DRESS LOW BYTE					
1158 004632 122167		.WORD	122167		
1159	:	50	000102	OUT IBUS,XREG0,OUTDA1	: DA
TA LOI'					
1160 004634 022202		.WORD	022202		
1161	:	51	000104	OUT IBUS,XREG5,OUTDA2	: AN
D HIGH BYTE					
1162 004636 022323		.WORD	022323		
1163	:	52	000106	OUT IBUS,INCON,OBR	: BI
TS 17,16					
1164 004640 121011		.WORD	121011		
1165	:	53	000110	BRWRTE IMM,21	: OU
T NPR					
1166 004642 000421		.WORD	000421		
1167	:	54	000112	OUT BR,SELB,ONPR	: DO
TRANSFER					
1168 004644 061230		.WORD	061230		
1169	:	55	000114	41\$: BRWRTE IBUS,NPR	: RE
AD NPR, PAGE OVERF.					
1170 004646 120600		.WORD	120600		
1171	:	56	000116	BR0 41\$: IF
NOT DONE, WAIT					
1172 004650 102046		.WORD	102046		
1173	:	57	000120	BRSHFT IMM,0	: GE
T OVERF. FROM 5 TO 4					
1174 004652 001400		.WORD	001400		
1175	:	58	000122	BR4 100\$: IF
SET, GET OUT					
1176 004654 103062		.WORD	103062		
1177	:	59	000124	SP IBUS,PORT3,SPO	: GE
T ADDRESS TO INCREMENT					
1178 004656 123140		.WORD	123140		
1179	:	60	000126	SPBR BR,INCA,SPO	: WO
RD TRANSFER					
1180 004660 063460		.WORD	063460		
1181	:	61	000130	OUT BR,INCA,OPORT3	: PU
T IT IN CSR4					
1182 004662 061066		.WORD	061066		
1183	:	62	000132	C 45\$	
1184 004664 101057		.WORD	101057		
1185	:	63	000134	ALWAYS 25\$: CO
NTINUE					
1186 004666 100427		.WORD	100427		
1187	:	64	000136	45\$: SP IBUS,PORT4,SPO	
1188 004670 123160		.WORD	123160		
1189	:	65	000140	OUT BR,INCA,OPORT4	
1190 004672 061067		.WORD	061067		
1191	:	66	000142	ALWAYS 25\$	
1192 004674 100427		.WORD	100427		
1193	:	67	000144	100\$: OUT IMM,200,OINCON	: BI
T 7 SET					
1194 004676 001200		.WORD	001200		
1195	:	68	000146	200\$: ALWAYS 200\$: SI
T AND WAIT					
1196 004700 100463		.WORD	100463		
1197					

```

1199          .SBTTL  GLOBAL ERROR REPORT SECTION
1200
1201          ;++
1202          ; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
1203          ; USED BY MORE THAN TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.  PRINTB
1204          ; (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
1205          ;--
1206
1207
1208 004702          BGNMSG  PNTD
1209 004702          PNTD::
1210 004702 010546    MOV     R5,-(SP)          ; STORE REGISTER 5
1211 004704 010446    MOV     R4,-(SP)          ; STORE REGISTER 4
1212 004706 010346    MOV     R3,-(SP)          ; STORE REGISTER 3
1213 004710 042705 177400 BIC     #177400,R5      ; CLEAR HIGH BYTE FOR PRINTOUT
1214 004714 042704 177400 BIC     #177400,R4      ; CLEAR HIGH BYTE FOR PRINTOUT
1215 004720 042737 177770 002174 BIC     #177770,TEMP    ; LEAVE JUST 3 LAST BITS
1216 004726          PRINTB  #ERR0,R5,R4,TEMP
1217 004726 013746 002174          MOV     TEMP,-(SP)
1218 004732 010446          MOV     R4,-(SP)
1219 004734 010546          MOV     R5,-(SP)
1220 004736 012746 005126          MOV     #ERR0,-(SP)
1221 004742 012746 000004          MOV     #4,-(SP)
1222 004746 010600          MOV     SP,R0
1223 004750 104414          TRAP    C$PNTB
1224 004752 062706 000012          ADD     #12,SP
1225 10$:
1226 004756 012705 002200    MOV     #TEMP1+2,R5      ; POINTER FOR STORAGE
1227 004762 012703 000010    MOV     #DLO,R3          ; START WITH DATA LOW
1228 004766 010300          MOV     R3,R0          ; STORE REGISTER TO READ
1229 004770 004737 005760    JSR     PC,READ          ; READ A REGISTER
1230 004774 010415          MOV     R4,(R5)          ; AND STORE IT
1231 004776 042725 177400    BIC     #177400,(R5)+    ; CLEAR HIGH BYTE FOR PRINTOUT
1232 005002 005203          INC     R3              ; GET NEXT
1233 005004 122703 000020    CMPB   #20,R3          ; ALL DONE?
1234 005010 001366          BNE     10$             ; IF NOT, BRANCH
1235
1236 005012 012705 002200    MOV     #TEMP1+2,R5      ; POINTER FOR STORAGE
1237 005016          PRINTX  #ERR01,(R5),2(R5),4(R5)
1238 005016 016546 000004          MOV     4(R5),-(SP)
1239 005022 016546 000002          MOV     2(R5),-(SP)
1240 005026 011546          MOV     (R5),-(SP)
1241 005030 012746 005207          MOV     #ERR01,-(SP)
1242 005034 012746 000004          MOV     #4,-(SP)
1243 005040 010600          MOV     SP,R0
1244 005042 104415          TRAP    C$PNTX
1245 005044 062706 000012          ADD     #12,SP
1246 1228 005050          PRINTX  #ERR02,6(R5),10(R5),12(R5),14(R5),16(R5)
1247 005050 016546 000016          MOV     16(R5),-(SP)
1248 005054 016546 000014          MOV     14(R5),-(SP)
1249 005060 016546 000012          MOV     12(R5),-(SP)
1250 005064 016546 000010          MOV     10(R5),-(SP)
1251 005070 016546 000006          MOV     6(R5),-(SP)
1252 005074 012746 005270          MOV     #ERR02,-(SP)
1253 005100 012746 000006          MOV     #6,-(SP)
1254 005104 010600          MOV     SP,R0
1255 005106 104415          TRAP    C$PNTX
1256 005110 062706 000016          ADD     #16,SP

```



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1240
1241 005340          BGNMSG  PNTRAM
                                PNTRAM::
1242 005340 010546      MOV      R5,-(SP)          ; STORE REGISTER 5
1243 005342 042705 177400 BIC      #177400,R5      ; CLEAR HIGH BYTE FOR PRINTOUT
1244 005346          PRINTB  #ERR1,R5,R4,R3
                                MOV      R3,-(SP)
                                MOV      R4,(SP)
                                MOV      R5,-(SP)
                                MOV      #ERR1,-(SP)
                                MOV      #4,-(SP)
                                MOV      SP,R0
                                TRAP     C$PNTB
                                ADD      #12,SP
1245 005374 012605      MOV      (SP)+,R5          ; RESTORE REGISTER 5
1246 005376          EXIT      MSG
                                .WORD    J$JMP
                                .WORD    L10003 2 .
1247 005402          045      116      045  ERR1:  .ASCIZ  /#N#AEXPECTED #03#A RECEIVED #03#A ADDRESS #06#N/
1248 005405          101      105      130
1249 005410          120      105      103
1250 005413          124      105      104
1251 005416          040      045      117
1252 005421          063      045      101
1253 005424          040      122      105
1254 005427          103      105      111
1255 005432          126      105      104
1256 005435          040      045      117
1257 005440          063      045      101
1258 005443          040      101      104
1259 005446          104      122      105
1260 005451          123      123      040
1261 005454          045      117      066
1262 005457          045      116      000
1263          .EVEN
1264          ENDMSG
                                L10003:
                                TRAP     C$MSG
1265
1266 005462          BGNMSG  PNTREG
                                PNTREG::
1267 005464          PRINTB  #ERR2,R5,R1,R3
                                MOV      R3,(SP)
                                MOV      R1,-(SP)
                                MOV      R5,(SP)
                                MOV      #ERR2,(SP)
                                MOV      #4,(SP)
                                MOV      SP,R0
                                TRAP     C$PNTB
                                ADD      #12,SP
1268 005466 010346
1269 005466 010146
1270 005470 010546
1271 005472 012746 005516
1272 005476 012746 000004
1273 005502 010600
1274 005504 104414
1275 005506 062706 000012
1276 005512          EXIT      MSG
                                .WORD    J$JMP
                                .WORD    L10004 2 .
1277 005512 000167
1278 005514 000060
1279 005516 045      116      045  ERR2:  .ASCIZ  /#N#AEXPECTED #06#A RECEIVED #06#A ADDRESS #06#N/
1280 005521 101      105      130
1281 005524 120      105      103
1282 005527 124      105      104

```

GLOBAL AREAS MACRO M1200 15 MAR 85 16:13 PAGE 16-3
GLOBAL ERROR REPORT SECTION

SEQ 0037

005532	040	045	117	
005535	066	045	101	
005540	040	122	105	
005543	103	105	111	
005546	126	105	104	
005551	040	045	117	
005554	066	045	101	
005557	040	101	104	
005562	104	122	105	
005565	123	123	040	
005570	045	117	066	
005573	045	116	000	
1255				.EVEN
1256	005576			ENDMSG
	005576			
	005576	104423		
1257				
1258	005600			BGNMSG ERPNT
	005600			
1259	005600			PRINTB @ERR3, (R4), (R5)
	005600	014546		
	005602	014446		
	005604	012746	005634	
	005610	012746	000003	
	005614	010600		
	005616	104414		
	005620	062706	000010	
1260	005624	005724		TST (R4).
1261	005626	005725		TST (R5).
1262	005630			EXIT MSG
	005630	000167		
	005632	000042		
1263	005634	045	116	045 ERR3: .ASCIZ /#N#AEXPECTED #06#A RECEIVED #06#N/
	005637	101	105	130
	005642	120	105	103
	005645	124	105	104
	005650	040	045	117
	005653	066	045	101
	005656	040	122	105
	005661	103	105	111
	005664	126	105	104
	005667	040	045	117
	005672	066	045	116
	005675	000		
1264				.EVEN
1265	005676			ENDMSG
	005676			
	005676	104423		

L10004:	TRAP	C#MSG
ERPNT::		
	MOV	-(R5), (SP)
	MOV	(R4), (SP)
	MOV	@ERR3, (SP)
	MOV	#3, (SP)
	MOV	SP, R0
	TRAP	C#PNTB
	ADD	#10, SP
	.WORD	J\$JMP
	.WORD	L10005 2 .
L10005:	TRAP	C#MSG

GLOBAL AREAS MACRO M1200 15 MAR 85 16:13 PAGE 17
GLOBAL SUBROUTINES SECTION

SEQ 0038

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1267 .SBTTL GLOBAL SUBROUTINES SECTION
1268
1269 ;..
1270 ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
1271 ; THAT ARE USED IN MORE THAN ONE TEST.
1272 ;..
1273
1274 ;..
1275 ; FUNCTIONAL DESCRIPTION:
1276 ;
1277 ; SUBROUTINE TO INITIALIZE KMC11 B UNDER TEST
1278 ;
1279 ; IMPLICIT INPUTS:
1280 ;
1281 ; KCSR POINTS TO DEVICE CSR
1282 ;
1283 ; CALLING SEQUENCE:
1284 ;
1285 ; JSR PC,MSCLR ; GO TO INITIALIZE ROUTINE
1286 ;
1287 ;..
1288
1289
1290 005700 MSCLR::
1291 005700 013702 002166 MOV KCSR,R2 ; STORE POINTER TO 1ST REGISTER
1292 005704 005012 CLR (R2) ; CLEAR RUN BIT JUST IN CASE
1293 005706 012712 040000 MOV #MCLR,(R2) ; SET MASTER CLEAR BIT
1294 005712 005012 CLR (R2) ; CLEAR ALL CSR REGISTERS
1295 005714 005062 000002 CLR 2(R2) ;
1296 005720 005062 000004 CLR 4(R2) ;
1297 005724 005062 000006 CLR 6(R2) ;
1298 005730 000207 RTS PC
1299

```



```

1301      ;**
1302      ; FUNCTIONAL DESCRIPTION:
1303      ;
1304      ;   SUBROUTINE EXECUTE AN INSTRUCTION IN MAINTENANCE MODE
1305      ;
1306      ; INPUTS:
1307      ;
1308      ;   R0           CONTAINS INSTRUCTION TO EXECUTE
1309      ;
1310      ; IMPLICIT INPUTS:
1311      ;
1312      ;   KCSR        POINTS TO DEVICE CSR
1313      ;
1314      ; CALLING SEQUENCE:
1315      ;
1316      ;   MOV      #INTSTR,R0           ; LOAD INSTRUCTION INTO R0
1317      ;   JSR      PC,ROMCLK           ; GO EXECUTE IT
1318      ;
1319      ;--
1320
1321 005732      ROMCLK::
1322 005732      013702      002166      MOV      KCSR,R2           ; STORE POINTER TO CSR
1323 005736      012712      001000      MOV      #RAMI,(R2)       ; CLEAR RUN
1324 005742      010062      000006      MOV      R0,6(R2)         ; STORE INSTRUCTION INTO REG.6
1325 005746      012712      000400      MOV      #STEP,(R2)       ; EXECUTE ONE INTSTRUCTION
1326 005752      042712      000400      BIC      #STEP,(R2)       ; CLEAR STEP BIT
1327 005756      000207      RTS      PC           ; RETURN

```

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1329
1330      ;**
1331      ; FUNCTIONAL DESCRIPTION:
1332      ;
1333      ;   SUBROUTINE TO READ DATA INTERFACE REGISTER OR KMC11-B MEMORY
1334      ;
1335      ; INPUTS:
1336      ;
1337      ;   R0      CONTAINS REGISTER TO BE READ OR 377 TO READ
1338      ;              DATA MEMORY
1339      ;              (FOR REGISTER READ ONLY 10,15,16,17 IN OCTAL
1340      ;              IS VALID)
1341      ;
1342      ; IMPLICIT INPUTS:
1343      ;
1344      ;   KCSR     POINTS TO DEVICE CSR
1345      ;   R2       POINTS TO DEVICE CSR AFTER RETURN FROM ROMCLK SUBROUTINE
1346      ;
1347      ; OUTPUTS:
1348      ;
1349      ;   R4       CONTAINS RESULT OF THE READ OPERATION
1350      ;
1351      ; SUBORDINATE ROUTINES USED:
1352      ;
1353      ;   ROMCLK   SUBROUTINE IS USED TO EXECUTE READ OPERATION FROM
1354      ;              KMC11
1355      ;
1356      ; CALLING SEQUENCE:
1357      ;
1358      ;   MOV      #DLO,R0      ; REGISTER NUMBER TO BE READ
1359      ;   JSR      PC,READ      ; GO READ IT
1360      ;
1361      ; --
1362      ; READ::
1363      ;
1364      ;   MOV      R0,TEMP      ; STORE WHAT TO BE READ
1365      ;   CMPB     #377,R0      ; MEMORY READ?
1366      ;   BNE      10$          ; IF NOT, BRANCH
1367      ;
1368      ;**
1369      ; TO READ MEMORY
1370      ;
1371      ;   MOV      #55226,R0    ; OUT SELB,XREG6,INCMAR
1372      ;   BR       20$          ; GO EXECUTE WHAT IN R0
1373      ;
1374      ;**
1375      ; TO READ A DATA INTERFACE REGISTER
1376      ;
1377      ;   10$:     ROL      R0      ; ROTATE LEFT 4 TIMES
1378      ;           ROL      R0      ; TO GET BITS <7 4>
1379      ;           ROL      R0      ; FROM BITS <3 0>
1380      ;           ROL      R0      ;
1381      ;           BIC      #177417,R0 ; CLEAR ALL BUT <7 4>
1382      ;           BIS      #21006,R0 ; OUT INBUS,REG N,XREG6
1383      ;           JSR      PC,ROMCLK ; NOW EXECUTE WHAT IN R0
1384      ;           CLR      R4      ; CLEAR R4
1385      ;           MOV      6(R2),R4 ; STORE RESULT
1386      ;           RTS      PC

```

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1413 006034
1414 006034 013702 002166
1415 006040 042700 177760
1416 006044 052700 122100
1417 006050 010562 000004
1418 006054 004737 005732
1419 006060 000207

```

```

; **
; FUNCTIONAL DESCRIPTION:
;
; SUBROUTINE TO WRITE TO A DATA INTERFACE REGISTER
;
; INPUTS:
;
; R0      REGISTER TO BE WRITTEN
; R5      PATTERN TO BE WRITTEN
;
; IMPLICIT INPUTS:
;
; KCSR    POINTS TO DEVICE CSR
;
; SUBORDINATE ROUTINES USED:
;
; ROMCLK  SUBROUTINE IS USED TO EXECUTE WRITE OPERATION FROM
;          KMC11
;
; CALLING SEQUENCE:
;
; MOV     #DLO,R0      ; REGISTER TO WRITE TO
; MOV     #5252,R5     ; PATTERN TO WRITE
; JSR     PC,WRITE     ; GO WRITE TO REGISTER
;
; --
;
WRITE::
MOV      KCSR,R2      ; STORE POINTER TO CSR
BIC      #177760,R0   ; CLEAR ALL BUT <3-0>
BIS      #122100,R0   ; OUT IBUS,XREG4,REG N
MOV      R5,4(R2)     ; PATTERN TO 4TH CSR
JSR      PC,ROMCLK    ; EXECUTE IT
RTS      PC           ; AND RETURN

```

```

1421      ;**
1422      ; FUNCTIONAL DESCRIPTION:
1423      ;
1424      ;   SUBROUTINE TO LOAD FIRMWARE INTO KMC11-B
1425      ;
1426      ; INPUTS:
1427      ;
1428      ;   R0      SIZE OF FIRMWARE IN WORDS
1429      ;   R5      ADDRESS OF THE ROUTINE TO LOAD
1430      ;
1431      ; IMPLICIT INPUTS:
1432      ;
1433      ;   R2      POINTS TO DEVICE CSR
1434      ;
1435      ; OUTPUTS:
1436      ;
1437      ;   R0      SUCCESS CODE ( 0 INDICATES SUCCESS)
1438      ;              ( 1 INDICATES FAILURE)
1439      ;
1440      ; CALLING SEQUENCE:
1441      ;
1442      ;   MOV      #19,R0      ; ROUTINE SIZE
1443      ;   MOV      #IRDTST,R5 ; STARTING ADDRESS
1444      ;   JSR      PC,LOAD    ; GO WRITE TO REGISTER
1445      ;
1446      ;--
1447
1448 006062 LOAD:
1449 006062 005003      CLR      R3      ; STARTING ADDRESS OF CRAM
1450 006064 012712 002000 10$:  MOV      #RAM0,(R2) ; ENABLE WRITE
1451 006070 010362 000004      MOV      R3,4(R2) ; LOAD ADDRESS TO WRITE TO
1452 006074 011562 000006      MOV      (R5),6(R2) ; LOAD DATA
1453 006100 052712 020000      BIS      #CRAMW,(R2) ; WRITE TO CRAM
1454
1455      ;+
1456      ; COMPARE DATA JUST WRITTEN
1457      ;-
1457 006104 005012      CLR      (R2)      ; CLEAR TO DO NEXT CYCLE
1458 006106 005062 000004      CLR      4(R2) ; CLEAR ADDRESS
1459 006112 005062 000006      CLR      6(R2) ; AND DATA
1460 006116 012712 002000      MOV      #RAM0,(R2) ; ENABLE CRAM
1461 006122 010362 000004      MOV      R3,4(R2) ; MOVE ADDRESS
1462 006126 021562 000006      CMP      (R5),6(R2) ; WAS DATA OK?
1463 006132 001003      BNE      20$      ; NO, BRANCH
1464 006134 005725      TST      (R5)+    ; GET NEXT WORD TO LOAD
1465 006136 005203      INC      R3      ; TO THE NEXT ADDRESS
1466 006140 077027      SOB      R0,10$   ; LOOP UNTIL DONE
1467 006142      20$:
1468 006142 000207      RTS      PC      ; AND RETURN
1469

```

GLOBAL AREAS MACRO M1200 15-MAR-85 16:13 PAGE 22
GLOBAL SUBROUTINES SECTION

SEQ 0043

1472
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1474
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1476
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1478
1479
1480
1481

.TITLE MISCELLANEOUS SECTIONS
.SBTTL REPORT CODING SECTION

;++
; THE REPORT CODING SECTION CONTAINS THE
; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
;--

1482 006144
006144

BGNRPT

L\$RPT::

1483
1484 006144
006144 000167
006146 000000

EXIT RPT

.WORD J\$JMP
.WORD L10006 2-.

1485
1486
1487
1488

.EVEN

1489 006150
006150
006150 104425

ENDRPT

L10006:
TRAP C\$RPT

```
1491 .SBTTL PROTECTION TABLE
1492
1493 ;++
1494 ; THIS TABLE IS USED BY THE RUNTIME SERVICES
1495 ; TO PROTECT THE LOAD MEDIA.
1496 ;--
1497
1498 006152 BGNPROT
1499 006152 L$PROT::
1500 006152 177777 -1 ;OFFSET INTO P TABLE FOR CSR ADDRESS
1501 006154 177777 -1 ;OFFSET INTO P TABLE FOR MASSBUS ADDRESS
1502 006156 177777 -1 ;OFFSET INTO P-TABLE FOR DRIVE NUMBER
1503
1504 006160 ENDPROT
1505
```

```

1507 .SBTTL INITIALIZE SECTION
1508
1509
1510 ;**
1511 ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
1512 ; AT THE BEGINNING OF EACH PASS.
1513 ;--
1514 006160 BGNINIT
1515 006160 L$INIT::
1516
1517 ;*****
1518 ; THE INITIALIZE CODE IS EXECUTED UNDER FIVE CONDITIONS. THERE
1519 ; ARE SUPERVISOR EVENT FLAGS THAT ARE USED TO LET THE
1520 ; DIAGNOSTIC KNOW UNDER WHICH CONDITION THE EXECUTION IS TAKING
1521 ; PLACE. THE EVENT FLAGS ARE READ USING THE "READEF" MACRO.
1522 ; THE CONDITIONS UNDER WHICH THE INIT CODE IS EXECUTED AND THE
1523 ; CORRESPONDING EVENT FLAGS ARE:
1524 ; START COMMAND EF.START
1525 ; RESTART COMMAND EF.RESTART
1526 ; CONTINUE COMMAND EF.CONTINUE
1527 ; POWERDOWN/POWERUP EF.PWR
1528 ; NEW PASS EF.NEW
1529 ; EXAMPLE OF EVENT FLAG USE:
1530 ; READEF #EF.START
1531 ; BCOMPLETE STARTCODE
1532 ; DURING THE INIT CODE, USE THE "GP HARD" MACRO TO OBTAIN P-TABLE
1533 ; INFORMATION FOR DEVICE TESTING. GET ONE UNIT'S INFORMATION IF
1534 ; THIS IS A SEQUENTIAL DIAGNOSTIC. GET INFORMATION ON ALL
1535 ; UNITS AVAILABLE FOR TESTING IF THIS IS AN EXERCISER. THE NUMBER
1536 ; OF UNITS AVAILABLE IS IN A HEADER LOCATION: "L$UNIT".
1537 ;*****
1538
1539
1540 006160 READEF #EF.CONTINUE ; IF CONTINUE FLAG
1541 006160 012700 000036 MOV #EF.CONTINUE,R0
1542 006164 104447 TRAP C$REFG
1543 006166 BCOMPLETE ENDIN ; DON'T DO ANYTHING
1544 006166 103443 BCS ENDIN
1545 006170 READEF #EF.START ; IF START
1546 006170 012700 000040 MOV #EF.START,R0
1547 006174 104447 TRAP C$REFG
1548 006176 BCOMPLETE START ; START WITH 1ST UNIT
1549 006176 103415 BCS START
1550 006200 READEF #EF.NEW ; IF A NEW PASS
1551 006200 012700 000035 MOV #EF.NEW,R0
1552 006204 104447 TRAP C$REFG
1553 006206 BCOMPLETE START ; START WITH 1ST UNIT
1554 006206 103411 BCS START
1555 006210 READEF #EF.RESTART ; IF RESTART
1556 006210 012700 000037 MOV #EF.RESTART,R0
1557 006214 104447 TRAP C$REFG
1558 006216 BCOMPLETE START ; START WITH 1ST UNIT
1559 006216 103405 BCS START
1560 006220 READEF #EF.PWR ; IF POWER UP
1561 006220 012700 000034 MOV #EF.PWR,R0
1562 006224 104447 TRAP C$REFG
1563 006226 BCOMPLETE ENDIN ; TRY TO CONTINUE
1564 006226 103423 BCS ENDIN

```

MISCELLANEOUS SECTIONS MACRO M1200 15-MAR-85 16:13 PAGE 24-1
INITIALIZE SECTION

SEQ 0046

```

1550 006230 000403          BR          NEXT          ; IF NONE OF THE ABOV, GET NEXT UNIT
1551
1552          ; IF START OR ANY OTHER COMMAND, START WITH UNIT 0
1553
1554 006232 012737 177777 002170 START: MOV    #-1,LOGUNT          ; START WITH UNIT 0
1555 006240 005237 002170      NEXT: INC    LOGUNT              ; GET NEXT UNIT
1556 006244 023737 002170 002012      CMP    LOGUNT,L$UNIT        ; REACHED THE MAX?
1557 006252 001767          BEQ    START          ; IF YES, START ALL OVER
1558 006254          GPHARD LOGUNT,R1          ; GET HARDWARE TABLE
      006254 013700 002170
      006260 104442
      006262 010001
1559 006264          BNCOMPLETE      NEXT          ; IF UNAVAILBALE, TRY ANOTHER
      006264 103365
1560 006266 012137 002166      MOV    (R1)+,KCSR          ; GET CSR ADDRESS
1561 006272 011137 002172      MOV    (R1),MTMODE        ; GET LOOPBACK MODE
1562          .EVEN
1563 006276          ENDIN:
1564 006276          ENDINIT
      006276 104411

```

L10010: TRAP C\$INIT


```
1566 .SBTTL AUTODROP SECTION
1567
1568 ;**
1569 ; THIS CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE CODE IF
1570 ; THE "ADR" FLAG WAS SET. THE UNIT(S) UNDER TEST ARE CHECKED TO
1571 ; SEE IF THEY WILL RESPOND. THOSE THAT DON'T ARE IMMEDIATELY
1572 ; DROPPED FROM TESTING.
1573 ;--
1574
1575 006300 BGNAUTO
1576 006300 L$AUTO::
1577
1578 006300 ENDAUTO
1579 006300 L10011:
1580 006300 TRAP C$AUTO
1581 104461
```

1580

1581

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1585

1586

1587 006302

006302

1588

1589

1590 006302

006302

006304 000002

1591

1592

1593

1594

1595 006306

006306

006306 104412

MISCELLANEOUS SECTIONS MACRO M1200 15-MAR-85 16:13 PAGE 27
 DROP UNIT SECTION

SEQ 0049

```

1597      .SBTTL  DROP UNIT SECTION
1598
1599      ;**
1600      ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
1601      ; TO NO LONGER BE TESTED.
1602      ;
1603
1604 006310      BGNDU
1605      006310      L$DU::
1607      ;*****
1608      ;      INSERT DROP CODE HERE.  THIS CODE WILL PF EXECUTED AFTER
1609      ;      A "DROP" COMMAND OR A "DODU" MACRO EXECUTION.  THE PURPOSE
1610      ;      OF THIS CODE IS TO DO ANY NECESSARY HOUSEKEEPING AFTER A
1611      ;      UNIT HAS BEEN DROPPED.  THIS SECTION IS OPTIONAL.
1612      ;*****
1614
1615 006310      EXIT  DU
1616      006310      000167      .WORD  J$JMP
1617      006312      000000      .WORD  L10013-2 .
1618
1619      ;*****
1620      ;      INSERT LOCAL STORAGE THAT IS USED ONLY
1621      ;      DURING THE DROP-UNIT SECTION.
1622      ;*****
1623
1624      ;*****
1625      ;      INSERT MESSAGES THAT ARE USED ONLY
1626      ;      DURING THE DROP-UNIT SECTION.
1627      ;*****
1628
1629      .EVEN
1630
1631 006314      ENDDU
1632      006314      104453      L10013:  TRAP  C$DU

```

MISCELLANEOUS SECTIONS MACRO M1200 15 MAR 85 16:13 PAGE 28
ADD UNIT SECTION

SEQ 0050

```

1633 .SBTTL ADD UNIT SECTION
1634
1635
1636 ;..
1637 ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
1638 ; TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
1639 ; TO THE TEST CYCLE.
1640 ;..
1641 006316          BGNAU
1642 006316
1643
1644 ;*****
1645 ;      INSERT ADD CODE HERE.  THIS CODE WILL BE EXECUTED AFTER
1646 ;      AN "ADD" COMMAND.  THE PURPOSE OF THIS CODE IS TO DO ANY
1647 ;      HOUSEKEEPING THAT MAY BE NECESSARY AFTER A UNIT HAS BEEN ADDED.
1648 ;      THIS SECTION IS OPTIONAL.
1649 ;*****
1651
1652 006316          EXIT    AU
1653 006316 000167
1654 006320 000000
1655
1656 ;*****
1657 ;      INSERT LOCAL STORAGE THAT IS USED ONLY
1658 ;      DURING THE ADD UNIT SECTION.
1659 ;*****
1660
1661 ;*****
1662 ;      INSERT MESSAGES THAT ARE USED ONLY
1663 ;      DURING THE ADD-UNIT SECTION.
1664 ;*****
1665
1666 .EVEN
1667
1668 006322          ENDAU
1669 006322
1670 006322 104452

```

L10014: .WORD J1JMP
 .LWORD L10014-2 .

L10014: TRAP C1AU

MISCELLANEOUS SECTIONS MACRO M1200 15 MAR 85 16:13 PAGE 30
TEST 1: REGISTER TEST

SEQ 0051

```

1674          .SBTTL TEST 1: REGISTER TEST
1675
1676 006324          BGNTEST
1677 006324
1678
1679          ;...
1680          ;
1681          ; SUBTEST TO VERIFY THAT ALL SELECTED UNITS CAN BE ACCESSED THROUGH
1682          ; UNIBUS.
1683          ;
1684          ; -
1685          BGNSUB
1686
1687          T1.1:
1688          TRAP C$BSUB
1689          ; DO FOR ALL 4 REGISTERS
1690          ; GET ADDRESS OF FIRST
1691          ; STORE NXM VECTOR
1692          ; POINT NEW ONE TO THE PROGRAM
1693          ; CHECK WHETHER RESPONDED
1694          ; DO FOR ALL REGISTERS
1695          ; EXIT TEST
1696
1697          ;*
1698          ; TIMEOUT ROUTINE
1699          ;
1700          2$:
1701          ADD #4,SP
1702          ERRHRD 1,KMC1
1703          ; ADJUST STACK
1704          ; NOTHING AT THAT ADDRESS
1705          TRAP C$ERHRD
1706          .WORD 1
1707          .WORD KMC1
1708          .WORD 0
1709
1710          3$:
1711          MOV TEMP,#4
1712          ENDSUB
1713          ; RESTORE NXM VECTOR
1714
1715          L10016:
1716          TRAP C$ESUB

```

```

1701
1702
1703
1704
1705
1706
1707 006404
      006404
      006404 104402
1708 006406 013703 002166
1709 006412 005723
1710 006414 012704 000003
1711 006420 012705 100000
1712 006424 010513
1713 006426 011301
1714 006430 020501
1715 006432 001404
1716 006434
      006434 104456
      006436 000002
      006440 003331
      006442 005464
1717
1718
1719
1720
1721 006444
      006444 104406
1722 006446 000241
1723 006450 006005
1724 006452 001364
1725 006454 005723
1726 006456 077420
1727 006460
      006460
      006460 104403
1728
1729 006462
      006462
      006462 104401
1730

```

; **
 ;
 ; SUBTEST TO VERIFY FLOATING 1 THROUGH ALL CSR REGISTERS
 ;
 ; --
 ; BGNSUB
 ;
 ; T1.2:
 ; GET ADDRESS OF FIRST TRAP C\$BSUB
 ; GET NEXT ONE
 ; DO FOR ALL 7
 ; START WITH 1
 ; WRITE PATTERN
 ; READ IT BACK
 ; WAS IT WRITTEN?
 ; IF OK, BRANCH
 ; REGISTER ERROR
 ;
 ; TRAP C\$ERHRD
 ; .WORD 2
 ; .WORD KMC2
 ; .WORD PNTREG
 ;
 ; *
 ; CHANGE THE PATTERN
 ;
 ; 3\$:
 ; CKLOOP
 ; LOOP ON ERROR
 ; CLEAR CARRY TRAP C\$CLP1
 ; CHANGE TO A DIFFERENT BIT
 ; KEEP DOING UNTIL 0
 ; GET NEXT CSR
 ; DO FOR ALL 3 REGISTERS
 ;
 ; L10017:
 ; TRAP C\$ESUB
 ;
 ; L10015:
 ; TRAP C\$ETST
 ;
 ; ENDTST

MISCELLANEOUS SECTIONS MACRO M1200 15-MAR 85 16:13 PAGE 32
 TEST 2: KMC11-B TEST

SEQ 0053

```

1732 .SBTTL TEST 2: KMC11 B TEST
1733 006464 BGNTST
1734 006464
1734 ;**
1735 ;
1736 ; TEST TO VERIFY THAT ALL FUNCTIONS OF THE KMC11-B NEED FOR FURTHER
1737 ; TESTING ARE WORKING
1738 ;
1739 ;--
1740 006464 BGNSUB
1740 006464
1740 006464 104402
1741 ;**
1742 ;
1743 ; SUBTEST TO VERIFY CRAM WITH FLOATING 1 PATTERN
1744 ;
1745 ;--
1746 006466 005003 CLR R3 ; FIRST ADDRESS
1747 006470 013702 002166 MOV KCSR,R2 ; GET CSR ADDRESS
1748 006474 012705 100000 10$: MOV #100000,R5 ; INITIAL PATTERN
1749 ;*
1750 ; WRITE TO A LOCATION
1751 ;-
1752 006500 012712 002000 20$: MOV #RAM0,(R2) ; SET RAM0 IN SEL0
1753 006504 010362 000004 MOV R3,4(R2) ; ADDRESS TO SEL4
1754 006510 010562 000006 MOV R5,6(R2) ; DATA TO SEL6
1755 006514 052712 020000 BIS #CRAMW,(R2) ; SET WRITE BIT IN SEL0
1756 006520 042712 020000 BIC #CRAMW,(R2) ; CLEAR WRITE BIT
1757 ;*
1758 ; READ A LOCATION BACK
1759 ;-
1760 006524 016237 000004 002174 MOV 4(R2),TEMP ; READ THE ADDRESS
1761 006532 016201 000006 MOV 6(R2),R1 ; AND DATA
1762 006536 020501 CMP R5,R1 ; DATA OK?
1763 006540 001404 BEQ 30$ ; IF SO, BRANCH
1764 006542 ERRHRD 3,KMC5,PNTREG ; CRAM ERROR
1764 006542 104456 TRAP C$ERHRD
1764 006544 000003 .WORD 3
1764 006546 003460 .WORD KMC5
1764 006550 005464 .WORD PNTREG
1765 006552 042712 002000 30$: BIC #RAM0,(R2) ; CLEAR RAM0 BIT
1766 006556 000241 CLC ; CLEAR CARRY
1767 006560 006005 ROR R5 ; GET NEXT PATTERN
1768 006562 005705 TST R5 ; ALL DONE?
1769 006564 001345 BNE 20$ ; IF NOT, BRANCH
1770 ;*
1771 ; GET NEXT ADDRESS
1772 ;
1773 006566 005203 INC R3 ; GET NEXT ADDRESS
1774 006570 022703 010000 CMP #4096.,R3 ; ALL LOCATIONS?
1775 006574 003337 BGT 10$ ; IF NOT, BRANCH
1776 006576 ENDSUB
1776 006576
1776 006576 104403 L10021: TRAP C$ESUB

```

```

1778
1779
1780
1781
1782
1783
1784 006600
      006600
      006600 104402
1785 006602 013702 002166
1786 006606 012705 177577
1787 006612 005004
1788
1789
1790
1791 006614 010562 000004
1792 006620 012700 120500
1793 006624 004737 005732
1794 006630 012700 061225
1795 006634 004737 005732
1796 006640 116204 000005
1797 006644 120504
1798 006646 001404
1799 006650
      006650 104456
      006652 000004
      006654 003356
      006656 000000
1800 006660 006005
1801 006662 122705 000177
1802 006666 001352
1803
1804
1805
1806 006670 004737 005700
1807 006674 012700 061225
1808 006700 004737 005732
1809 006704 105762 000005
1810 006710 001404
1811 006712
      006712 104456
      006714 000005
      006716 003403
      006720 000000
1812 006722
1813 006722
      006722
      006722 104403

      ;**
      ;
      ; SUBTEST TO VERIFY THAT BRG REGISTER CAN BE LOADED WITH A
      ; UNIQUE DATA PATTERN AND THAT MASTER CLEAR CLEARS BRG.
      ;
      ;
      ; BGNSUB
      ;
      ; T2.2: TRAP C$BSUB
      MOV KCSR,R2 ; STORE CSR POINTER
      MOV #177577,R5 ; LOW BYTE ALL 1'S
      CLR R4 ; INITIALIZE RECEIVE PATTERN
      ;
      ; *
      ; WRITE AND READ BACK PATTERN FROM BRG
      ; -
      10$: MOV R5,4(R2) ; PATTERN TO CSR 4
      MOV #120500,R0 ; CSR4 TO BRG INSTRUCTION
      JSR PC,ROMCLK ; EXECUTE IT
      MOV #61225,R0 ; BRG TO CSR4(HIGH BYTE)
      JSR PC,ROMCLK ; EXECUTE IT
      MOVB 5(R2),R4 ; READ BACK A PATTERN
      CMPB R5,R4 ; WAS IT PATTERN WRITTEN?
      BEQ 20$ ; IF SO, BRANCH
      ERRHRD 4,KMC3 ; BRG ERROR
      ;
      ; TRAP C$ERHRD
      ; .WORD 4
      ; .WORD KMC3
      ; .WORD 0
      20$: ROR R5 ; ROTATE RIGHT
      CMPB #177,R5 ; ALL 1'S AGAIN?
      BNE 10$ ; IF NOT, DO NEXT PATTERN
      ;
      ; *
      ; CHECK THAT MASTER CLEAR CLEARS BRG REGISTER
      ; -
      JSR PC,MSCLR ; RESET KMC11
      MOV #61225,R0 ; BRG TO CSR4(HIGH BYTE)
      JSR PC,ROMCLK ; READ BRG
      TSTB 5(R2) ; WAS IT CLEARED?
      BEQ 30$ ; IF SO, BRANCH
      ERRHRD 5,KMC4 ; MASTER RESET DID NOT CLEAR BRG
      ;
      ; TRAP C$ERHRD
      ; .WORD 5
      ; .WORD KMC4
      ; .WORD 0
      30$: ENDSUB
      ;
      ; L10022: TRAP C$ESUB

```



```

1855          .SBTTL  TEST 3:  RESET TEST
1856 007050      BGNTST
1857          ;
1858          ;
1859          ;
1860          ;
1861          ;
1862          ;
1863 007050      BGNSUB
1864 007050      104402
1865 007052      013702 002166      MOV      KCSR,R2          ; STORE POINTER TO CSR
1866 007056      004737 005700      JSR      PC,MSCLR        ; CLEAR THE WORLD
1867 007062      012700 000017      MOV      #MAINT,R0       ; READ MAINT REG.
1868 007066      004737 005760      JSR      PC,READ         ; READ REGISTER
1869 007072      132704 000350      BITB     #350,R4         ; 7,6,5,3 CLEARED?
1870 007076      001405              BEQ      10$            ; YES, BRANCH
1871 007100      005005              CLR      R5              ; CLEAR EXPECTED PATTERN
1872 007102      104456              ERRHRD  7,EM1,PNTD      ; MASTER CLEAR DID NOT
1873 007104      000007              TRAP     C$ERHRD
1874 007106      003534              .WORD   7
1875 007110      004702              .WORD   EM1
1876 007112      104406              .WORD   PNTD
1877 007114      132704 000004      10$:  CKLOOP              ; LOOP ON ERROR
1878 007120      001007              BITB     #4,R4           ; CABLE OK STILL SET?
1879 007122      005737 002172      BNE      20$            ; YES, BRANCH
1880 007126      001404              TST      MTMODE          ; INTERNAL MODE?
1881 007130      104456              BEQ      20$            ; IF SO, IGNORE
1882 007132      000010              ERRHRD  8,EM2           ; CABLE OK NOT SET
1883 007134      003607              TRAP     C$ERHRD
1884 007136      000000              .WORD   8
1885 007140              .WORD   EM2
1886 007140              .WORD   0
1887 007140              20$:  E... 3
1888 007140      104403              L10025:
1889 007140              TRAP     C$ESUB

```

```

1881
1882
1883
1884
1885
1886
1887 007142
      007142
      007142 104402
1888
1889
1890
1891 007144 012705 000010
1892 007150 012700 000017
1893 007154 004737 006034
1894 007160 012700 000017
1895 007164 004737 005760
1896 007170 032704 000010
1897 007174 001004
1898 007176
      007176 104456
      007200 000011
      007202 003633
      007204 000000
1899 007206
      007206 104406
1900 007210 005005
1901 007212 012700 000017
1902 007216 004737 006034
1903 007222 012700 000017
1904 007226 004737 005760
1905 007232 032704 000010
1906 007236 001404
1907 007240
      007240 104456
      007242 000012
      007244 003673
      007246 000000
1908
1909
1910
1911 007250
      007250 104406
1912 007252 012705 000030
1913 007256 012700 000017
1914 007262 004737 006034
1915 007266 012700 000017
1916 007272 004737 005760
1917 007276 032704 000020
1918 007302 001004
1919 007304
      007304 104456
      007306 000013
      007310 003735
      007312 000000
1920 007314
      007314 104406

      ;+
      ;
      ; SUBTEST TO VERIFY THAT LOOPBACK MODE BITS 3 AND 4
      ; CAN BE SET AND CLEARED IN MAINTENANCE REGISTER
      ;
      ;--
      BGNSUB

      T3.2:
      TRAP C$BSUB

      ;+
      ; CHECK INTERNAL LOOPBACK MODE BIT
      ;
      ;--
      MOV #10,R5 ; INTERNAL LOOPBACK BIT
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,WRITE ; WRITE TO MAINTENANCE
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,READ ; READ IT BACK
      BIT #10,R4 ; WAS IT WRITTEN OK?
      BNE 10$ ; IF YES, BRANCH
      ERRHRD 9,EM3 ; COULD NOT SET INTERNAL LOOP
      TRAP C$ERHRD
      .WORD 9
      .WORD EM3
      .WORD 0

10$: CKLOOP ; LOOP ON ERROR
      TRAP C$CLP1
      CLR R5 ; TRY TO CLEAR THAT BIT NOW
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,WRITE ; WRITE 0
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,READ ; AND READ IT BACK
      BIT #10,R4 ; WAS IT CLEARED?
      BEQ 20$ ; IF SO, BRANCH
      ERRHRD 10,EM4 ; INTERNAL LOOPBACK NOT CLEARED
      TRAP C$ERHRD
      .WORD 10
      .WORD EM4
      .WORD 0

      ;+
      ; CHECK EXTERNAL LOOPBACK MODE BIT
      ;
      ;--
      20$: CKLOOP ; LOOP ON ERROR
      TRAP C$CLP1
      MOV #30,R5 ; EXTERNAL LOOPBACK BIT
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,WRITE ; WRITE TO MAINTENANCE
      MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,READ ; READ IT BACK
      BIT #20,R4 ; WAS IT WRITTEN OK?
      BNE 30$ ; IF YES, BRANCH
      ERRHRD 11,EM5 ; COULD NOT SET EXTERNAL LOOP
      TRAP C$ERHRD
      .WORD 11
      .WORD EM5
      .WORD 0

      30$: CKLOOP ; LOOP ON ERROR
      TRAP C$CLP1

```

```

1921 007316 012705 000010      MOV      #10,R5      ; TRY TO CLEAR THAT BIT NOW
1922 007322 012700 000017      MOV      #MAINT,R0    ; MAINTENANCE REGISTER
1923 007326 004737 006034      JSR      PC,WRITE    ; WRITE 0
1924 007332 012700 000017      MOV      #MAINT,R0    ; MAINTENANCE REGISTER
1925 007336 004737 005760      JSR      PC,READ     ; AND READ IT BACK
1926 007342 032704 000020      BIT      #20,R4      ; WAS IT CLEARED?
1927 007346 001404      BEQ      40$              ; IF SO, BRANCH
1928 007350      ERRHRD 12,EM6      ; EXTERNAL LOOPBACK NOT CLEARED
      007350 104456
      007352 000014
      007354 003775
      007356 000000
      TRAP      C$ERHRD
      .WORD     12
      .WORD     EM6
      .WORD     0

1929
1930      ;+
1931      ; VERIFY THAT MASTER CLEAR CLEARS BOTH BITS
1932      ; -
      40$:      CKLOOP              ; LOOP ON ERROR
      TRAP      C$CLP1
      MOV      #30,R5              ; PATTERN = BOTH SET
      MOV      #MAINT,R0          ; MAINTENANCE REGISTER
      JSR      PC,WRITE          ; TO WRITE
      JSR      PC,MSCLR          ; DO MASTER CLEAR
      TST      MTMODE            ; INTERNAL MODE?
      BNE      41$              ; IF NOT BRANCH
      MOV      #10,R5            ; SET INTERNAL LOOPBACK
      MOV      #14,R1            ; EXPECTED PATTERN
      BR       42$              ; CONTINUE
      41$:      MOV      #20,R5    ; SET EXTERNAL LOOPBACK
      MOV      #24,R1            ; EXPECTED PATTERN
      42$:      MOV      #MAINT,R0 ; MAINTENANCE REGISTER
      JSR      PC,WRITE          ; WRITE TO THAT REGISTER
      MOV      #MAINT,R0          ; READ MAINT. REG
      JSR      PC,READ           ; BACK
      BITB     #4,R4             ; CABLE OK SET ?
      BNE      50$              ; YES, BRANCH
      TST      MTMODE            ; INTERNAL MODE?
      BEQ      50$              ; IF SO BRANCH
      MOV      R1,R5             ; SAVE FOR PRINT OUT
      ERRHRD 13,EM2,PNTD        ; ERROR
      TRAP      C$ERHRD
      .WORD     13
      .WORD     EM2
      .WORD     PNTD

1953 007470 104456
      007472 000015
      007474 003607
      007476 004702
      TRAP      C$ESUB
      .WORD     L10026:
      .WORD     TRAP
      .WORD     C$ESUB

1954 007500      50$:      ENDSUB
      007500
      007500 104403

```

SEQ 0059

```

1956                                     ;**
1957                                     ;
1958                                     ; SUBTEST TO VERIFY THAT DATA LOW BYTE REGISTER IS CLEAR
1959                                     ; BY MASTER CLEAR
1960                                     ;
1961                                     ;--
1962 007502                               BGNSUB
      007502                               T3.3:
      007502 104402                               TRAP C$BSUB
1963 007504 013702 002166                MOV KCSR,R2      ; STORE POINTER TO CSR
1964 007510 004737 005700                JSR PC,MSCLR     ; CLEAR THE WORLD
1965 007514 005737 002172                TST MTMODE      ; INTERNAL MODE?
1966 007520 001003                       BNE 1$          ; IF NOT BRANCH
1967 007522 012705 000010                MOV #10,R5      ; SET INTERNAL LOOPBACK
1968 007526 000402                       BR 2$           ; CONTINUE
1969 007530 012705 000020                1$: MOV #20,R5   ; SET EXTERNAL LOOPBACK
1970 007534 012700 000017                2$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
1971 007540 004737 006034                JSR PC,WRITE     ; WRITE TO THAT REGISTER
1972 007544 012700 000010                MOV #DLO,R0     ; READ DATA LOW BYTE REG.
1973 007550 004737 005760                JSR PC,READ      ; READ REGISTER
1974 007554 105704                       TSTB R4         ; REALLY CLEARED?
1975 007556 001405                       BEQ 10$         ; YES, BRANCH
1976 007560 005005                       CLR R5          ; CLEAR EXPECTED PATTERN
1977 007562                               ERRHRD 14,EM1,PNTD ; MASTER CLEAR DID NOT
      007562 104456                               TRAP C$ERHRD
      007564 000016                               .WORD 14
      007566 003534                               .WORD EM1
      007570 004702                               .WORD PNTD
1978 007572                               10$:
1979 007572                               ENDSUB
      007572                               L10027:
      007572 104403                               TRAP C$ESUB

```

```

1981      ;**
1982      ;
1983      ;      SUBTEST TO VERIFY THAT DATA HIGH BYTE REGISTER IS CLEAR
1984      ;      BY MASTER CLEAR
1985      ;
1986      ;--
1987 007574      BGNSUB
      007574
      007574      104402
1988 007576      013702      002166      MOV      KCSR,R2      ; STORE POINTER TO CSR
1989 007602      004737      005700      JSR      PC,MSCLR      ; CLEAR THE WORLD
1990 007606      005737      002172      TST      MTMODE      ; INTERNAL MODE?
1991 007612      001003      BNE      1$      ; IF NOT BRANCH
1992 007614      012705      000010      MOV      #10,R5      ; SET INTERNAL LOOPBACK
1993 007620      000402      BR      2$      ; CONTINUE
1994 007622      012705      000020      1$: MOV      #20,R5      ; SET EXTERNAL LOOPBACK
1995 007626      012700      000017      2$: MOV      #MAINT,R0      ; MAINTENANCE REGISTER
1996 007632      004737      006034      JSR      PC,WRITE      ; WRITE TO THAT REGISTER
1997 007636      012700      000011      MOV      #DOHI,R0      ; READ DATA HIGH BYTE REG.
1998 007642      004737      005760      JSR      PC,READ      ; READ REGISTER
1999 007646      105704      TSTB      R4      ; REALLY CLEARED?
2000 007650      001405      BEQ      10$      ; YES, BRANCH
2001 007652      005005      CLR      R5      ; CLEAR EXPECTED PATTERN
2002 007654      ERRHRD      15,EM1,PNTD      ; MASTER CLEAR DID NOT
      007654      104456
      007656      000017
      007660      003534
      007662      004702
2003 007664      10$:
2004 007664      ENDSUB
      007664
      007664      104403
      L10030:
      TRAP      C$ESUB
      TRAP      C$ERHRD
      .WORD      15
      .WORD      EM1
      .WORD      PNTD

```

```

2006      ;++
2007      ;
2008      ;   SUBTEST TO VEIRFY THAT CONTROL REGISTER IS CLEAR
2009      ;   BY MASTER CLEAR
2010      ;
2011      ;--
2012 007666      BGNSUB
          007666      T3.5:
          007666 104402      TRAP      C$BSUB
2013 007670 013702 002166      MOV      KCSR,R2      ; STORE POINTER TO CSR
2014 007674 004737 005700      JSR      PC,MSCLR      ; CLEAR THE WORLD
2015 007700 005737 002172      TST      MTMODE      ; INTERNAL MODE?
2016 007704 001003      BNE      1$      ; IF NOT BRANCH
2017 007706 012705 000010      MOV      #10,R5      ; SET INTERNAL LOOPBACK
2018 007712 000402      BR      2$      ; CONTINUE
2019 007714 012705 000020      1$: MOV      #20,R5      ; SET EXTERNAL LOOPBACK
2020 007720 012700 000017      2$: MOV      #MAINT,R0      ; MAINTENANCE REGISTER
2021 007724 004737 006034      JSR      PC,WRITE      ; WRITE TO THAT REGISTER
2022 007730 012700 000016      MOV      #CNTRL,R0      ; READ CONTROL REG.
2023 007734 004737 005760      JSR      PC,READ      ; READ REGISTER
2024 007740 105704      TSTB      R4      ; REALLY CLEARED?
2025 007742 001405      BEQ      10$      ; YES, BRANCH
2026 007744 005005      CLR      R5      ; CLEAR EXPECTED PATTERN
2027 007746      ERRHRD 16,EM1,PNTD      ; MASTER CLEAR DID NOT
          007746 104456      TRAP      C$ERHRD
          007750 000020      .WORD    16
          007752 003534      .WORD    EM1
          007754 004702      .WORD    PNTD
2028 007756      10$:
2029 007756      ENDSUB
          007756 104403      L10031:
          007756      TRAP      C$ESUB
2030 007760      ENDTST
          007760      L10024:
          007760 104401      TRAP      C$ETST

```

```

2032          .SBTTL TEST 4: DATA PATH TEST
2033 007762    BGNTST
2034          T4::
2035          ;**
2036          ;
2037          ; SUBTEST TO VERIFY THAT DATA LOW BYTE REGISTER CAN BE WRITTEN
2038          ; TO AND READ BACK WITH A FLOATING 0 DATA PATTERN.
2039          ;
2040          ;--
2041 007762    BGNSUB
2042          ;
2043          ;
2044          ;
2045          ;
2046 007770    005737 002172
2047 007774    001003
2048 007776    012705 000010
2049 010002    000402
2050          ;
2051 010004    012705 000020
2052 010010    012700 000017
2053 010014    004737 006034
2054          ;
2055          ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2056          ;
2057 010020    012705 177577
2058 010024    012700 000010
2059 010030    004737 006034
2060 010034    012700 000010
2061 010040    004737 005760
2062 010044    120405
2063 010046    001404
2064 010050
2065          ;
2066          ;
2067          ;
2068          ;
2069          ;
2070          ;
2071          ;
2072 010072    004737 005700
2073 010076    005737 002172
2074 010102    001003
2075 010104    012705 000010
2076 010110    000402
2077 010112    012705 000020
2078 010116    012700 000017
2079 010122    004737 006034
2080 010126    012700 000010

```

MOV KCSR,R2 ; STORE POINTER TO CSR
 ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
 TST MTMODE ; INTERNAL MODE?
 BNE 10\$; IF NOT BRANCH
 MOV #10,R5 ; SET INTERNAL LOOPBACK
 BR 20\$; CONTINUE
 10\$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
 20\$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
 JSR PC,WRITE ; WRITE TO THAT REGISTER
 ; WRITE TO DATA LOW BYTE REGISTER
 ;
 MOV #177577,R5 ; START WITH 1'S IN LOW BYTE
 30\$: MOV #DLO,R0 ; SELECT REGISTER
 JSR PC,WRITE ; AND WRITE TO IT
 MOV #DLO,R0 ; NOW READ IT
 JSR PC,READ ;
 CMPB R4,R5 ; BACK
 BEQ 40\$; DATA OK?
 ERRHRD 17,EM7,PNTD ; IF YES, BRANCH
 ; DATA PATH ERROR
 TRAP C\$ERHRD
 .WORD 17
 .WORD EM7
 .WORD PNTD
 40\$: CKLOOP ; ON ERROR LOOP
 TRAP C\$CLP1
 ROR R5 ; CHANGE THE PATTERN
 CMPB #177,R5 ; ALL DONE?
 BNE 30\$; IF NOT, BRANCH
 ;
 ; VERIFY THAT MASTER CLEAR CLEARS DATA LOW BYTE REGISTER
 ;
 JSR PC,MSCLR ; DO MASTER CLEAR
 TST MTMODE ; INTERNAL MODE?
 BNE 50\$; IF NOT BRANCH
 MOV #10,R5 ; SET INTERNAL LOOPBACK
 BR 60\$; CONTINUE
 50\$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
 60\$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
 JSR PC,WRITE ; WRITE TO THAT REGISTER
 MOV #DLO,R0 ; READ DATA LOW

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TEST 4: DATA PATH TEST

SEQ 0063

2081	010132	004737	005760	JSR	PC,READ	:	BYTE REGISTER	
2082	010136	005005		CLR	R5	:	CLEAR EXPECTED PATTERN	
2083	010140	105704		TSTB	R4	:	WAS IT CLEAR?	
2084	010142	001404		BEQ	70:	:	IF SO, BRANCH	
2085	010144			ERRHRD	18,EM1,PNTD	:	DATA LOW BYTE DIDN'T CLEAR	
	010144	104456					TRAP	C\$ERRHRD
	010146	000022					.WORD	18
	010150	003534					.WORD	EM1
	010152	004702					.WORD	PNTD
2086	010154							
2087	010154		70:	ENDSUB				
	010154							
	010154	104403				L10033:	TRAP	C\$ESUB

```

2089
2090
2091
2092
2093
2094
2095 010156
      010156
      010156 104402
2096 010160 013702 002166
2097
2098
2099
2100 010164 005737 002172
2101 010170 001003
2102 010172 012705 000010
2103 010176 000402
2104
2105 010200 012705 000020
2106 010204 012700 000017
2107 010210 004737 006034
2108
2109
2110
2111 010214 012705 177677
2112 010220 012700 000011
2113 010224 004737 006034
2114 010230 012700 000015
2115 010234 004737 005760
2116 010240 010502
2117 010242 042702 177700
2118 010246 120402
2119 010250 001407
2120 010252 010503
2121 010254 010205
2122 010256
      010256 104456
      010260 000023
      010262 004037
      010264 004702
2123 010266 010305
2124 010270
      010270 104406
2125 010272 000241
2126 010274 006005
2127 010276 122705 000377
2128 010302 001346
2129
2130
2131
2132 010304 004737 005700
2133 010310 005737 002172
2134 010314 001003
2135 010316 012705 000010
2136 010322 000402
2137 010324 012705 000020
2138 010330 012700 000017

;...
;
; SUBTEST TO VERIFY THAT DATA HIGH BYTE REGISTER CAN BE WRITTEN
; TO AND READ BACK WITH A FLOATING 0 DATA PATTERN.
;
;
; BGNSUB
;
; T4.2:
; TRAP C1BSUB
;
; MOV KCSR,R2 ; STORE POINTER TO CSR
;
; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
;
; TST MTMODE ; INTERNAL MODE?
; BNE 10$ ; IF NOT BRANCH
; MOV #10,R5 ; SET INTERNAL LOOPBACK
; BR 20$ ; CONTINUE
;
; 10$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
; 20$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
; JSR PC,WRITE ; WRITE TO THAT REGISTER
;
; WRITE TO DATA HIGH BYTE REGISTER
;
; MOV #177677,R5 ; START WITH 1'S IN LOW BYTE
; 30$: MOV #DOHI,R0 ; SELECT REGISTER
; JSR PC,WRITE ; AND WRITE TO IT
; MOV #DIHI,R0 ; NOW READ IT
; JSR PC,READ ; BACK
; MOV R5,R2 ; STORE PATTERN
; BIC #177700,R2 ; LEAVE JUST BITS 5 0
; CMPB R4,R2 ; DATA OK?
; BEQ 40$ ; IF YES, BRANCH
; MOV R5,R3 ; STORE
; MOV R2,R5 ; FOR PRINTOUT
; ERRHRD 19,EM7,PNTD ; DATA PATH ERROR
;
; TRAP C1ERHRD
; .WORD 19
; .WORD EM7
; .WORD PNTD
;
; MOV R3,R5 ; RESTORE
; 40$: CKLOOP ; ON ERROR LOOP
;
; TRAP C1CLP1
;
; CLC ; CLEAR CARRY
; ROR R5 ; CHANGE THE PATTERN
; CMPB #377,R5 ; ALL DONE?
; BNE 30$ ; IF NOT, BRANCH
;
; VERIFY THAT MASTER CLEAR CLEARS DATA HIGH BYTE REGISTER
;
; JSR PC,MSCLR ; DO MASTER CLEAR
; TST MTMODE ; INTERNAL MODE?
; BNE 50$ ; IF NOT BRANCH
; MOV #10,R5 ; SET INTERNAL LOOPBACK
; BR 60$ ; CONTINUE
;
; 50$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
; 60$: MOV #MAINT,R0 ; MAINTENANCE REGISTER

```

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 TEST 4: DATA PATH TEST

SEQ 0065

2139	010334	004737	006034	JSR	PC,WRITE	; WRITE TO THAT REGISTER	
2140	010340	012700	000015	MOV	#DIHI,R0	; READ DATA HIGH	
2141	010344	004737	005760	JSR	PC,READ	; BYTE REGISTER	
2142	010350	005005		CLR	R5	; EXPECTED PATTERN	
2143	010352	105704		TSTB	R4	; WAS IT CLEAR?	
2144	010354	001404		BEQ	70\$; IF SO, BRANCH	
2145	010356			ERRHRD	20,EM1,PNTD	; DATA HIGH BYTE DIDN'T CLEAR	
	010356	104456				TRAP	C\$ERHRD
	010360	000024				.WORD	20
	010362	003534				.WORD	EM1
	010364	004702				.WORD	PNTD
2146	010366						
2147	010366			70\$:	ENDSUB		
	010366						
	010366	104403				L10034:	
						TRAP	C\$ESUB

```

2149      ;**
2150      ;
2151      ;   SUBTEST TO VERIFY THAT DATA HIGH BYTE REGISTER BITS 7,6 CAN
2152      ;   BE READ FROM BY WRITING TO EXTRA REGISTER BITS 7,6
2153      ;
2154      ;--
2155 010370      BGNSUB
                T4.3:
                TRAP      C$BSUB
2156 010370 104402 013702 002166      MOV      KCSR,R2      ; STORE POINTER TO CSR
2157      ;*
2158      ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2159      ;-
2160 010376 005737 002172      TST      MTMODE      ; INTERNAL MODE?
2161 010402 001003      BNE      10$      ; IF NOT BRANCH
2162 010404 012705 000010      MOV      #10,R5      ; SET INTERNAL LOOPBACK
2163 010410 000402      BR      20$      ; CONTINUE
2164
2165 010412 012705 000020      10$: MOV      #20,R5      ; SET EXTERNAL LOOPBACK
2166 010416 012700 000017      20$: MOV      #MAINT,R0      ; MAINTENANCE REGISTER
2167 010422 004737 006034      JSR      PC,WRITE      ; WRITE TO THAT REGISTER
2168      ;*
2169      ; WRITE TO EXTRA REGISTER AND READ BACK FROM DATA HIGH BYTE
2170      ;-
2171 010426 012705 177377      MOV      #177377,R5      ; START WITH 1'S IN LOW BYTE
2172 010432 012700 000016      30$: MOV      #EXTR,R0      ; SELECT REGISTER
2173 010436 004737 006034      JSR      PC,WRITE      ; AND WRITE TO IT
2174 010442 012700 000015      MOV      #DIHI,R0      ; NOW READ HIGH BYTE
2175 010446 004737 005760      JSR      PC,READ      ;
2176 010452 010502      MOV      R5,R2      ; STORE PATTERN
2177 010454 042702 177477      BIC      #177477,R2      ; LEAVE JUST BITS 7,6
2178 010460 120402      CMPB      R4,R2      ; DATA OK?
2179 010462 001407      BEQ      40$      ; IF YES, BRANCH
2180 010464 010503      MOV      R5,R3      ; STORE
2181 010466 010205      MOV      R2,R5      ; FOR PRINTOUT
2182 010470      ERRHRD      21,EM7,PNTD      ; DATA PATH ERROR
                TRAP      C$ERHRD
                .WORD      21
                .WORD      EM7
                .WORD      PNTD
2183 010500 104456 010305      MOV      R3,R5      ; RESTORE
2184 010502 010502 104406      40$: CKLOOP      ; ON ERROR LOOP
                TRAP      C$CLP1
2185 010504 000241      CLC      ; CLEAR CARRY
2186 010506 006005      ROR      R5      ; CHANGE THE PATTERN
2187 010510 122705 000337      CMPB      #337,R5      ; ALL DONE?
2188 010514 001346      BNE      30$      ; IF NOT, BRANCH
2189      ;*
2190      ; VERIFY THAT MASTER CLEAR CLEARS DATA HIGH BYTE REGISTER
2191      ;-
2192 010516 004737 005700      JSR      PC,MSCLR      ; DO MASTER CLEAR
2193 010522 005737 002172      TST      MTMODE      ; INTERNAL MODE?
2194 010526 001003      BNE      50$      ; IF NOT BRANCH
2195 010530 012705 000010      MOV      #10,R5      ; SET INTERNAL LOOPBACK
2196 010534 000402      BR      60$      ; CONTINUE
2197 010536 012705 000020      50$: MOV      #20,R5      ; SET EXTERNAL LOOPBACK
2198 010542 012700 000017      60$: MOV      #MAINT,R0      ; MAINTENANCE REGISTER

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TEST 4: DATA PATH TEST

SEQ 0067

2199	010546	004737	006034	JSR	PC,WRITE	; WRITE TO THAT REGISTER	
2200	010552	012700	000015	MOV	#DIHI,R0	; READ DATA HIGH	
2201	010556	004737	005760	JSR	PC,READ	; BYTE REGISTER	
2202	010562	005005		CLR	R5	; EXPECTED PATTERN	
2203	010564	105704		TSTB	R4	; WAS IT CLEAR?	
2204	010566	001404		BEQ	70\$; IF SO, BRANCH	
2205	010570			ERRHRD	22,EM1,PNTD	; DATA HIGH BYTE DIDN'T CLEAR	
	010570	104456				TRAP	C\$ERHRD
	010572	000026				.WORD	22
	010574	003534				.WORD	EM1
	010576	004702				.WORD	PNTD
2206	010600						
2207	010600						
	010600						
	010600	104403					

70\$: ENDSUB

L10C35: TRAP C\$ESUB

```

2209
2210
2211
2212
2213
2214
2215 010602
      010602
      010602 104402
2216 010604 013702 002166
2217
2218
2219
2220 010610 005737 002172
2221 010614 001003
2222 010616 012705 000010
2223 010622 000402
2224
2225 010624 012705 000020
2226 010630 012700 000017
2227 010634 004737 006034
2228
2229
2230
2231
2232 010640 012705 177377
2233 010644 012700 000011
2234 010650 004737 006034
2235 010654 012700 000016
2236 010660 004737 005760
2237
2238
2239
2240 010664 010502
2241 010666 012703 000005
2242 010672 006002
2243 010674 077302
2244 010676 105705
2245 010700 100403
2246 010702 042702 000001
2247 010706 000402
2248 010710 052702 000001
2249 010714 042702 177774
2250 010720 120204
2251 010722 001407
2252 010724 010503
2253 010726 010205
2254 010730
      010730 104456
      010732 000027
      010734 004037
      010736 004702
2255 010740 010305
2256
2257
2258
2259 010742

```

```

; **
;
; SUBTEST TO VERIFY THAT BITS 7 AND 6 OF DATA HIGH BYTE REGISTER
; CAN BE WRITTEN TO AND READ FROM BITS 0 AND 1 OF CONTROL IN REGISTER
;
; --
      BGNSUB
;
; T4.4:
; TRAP C$BSUB
      MOV KCSR,R2 ; STORE POINTER TO CSR
;
; *
; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
;
; -
      TST MTMODE ; INTERNAL MODE?
      BNE 10$ ; IF NOT BRANCH
      MOV #10,R5 ; SET INTERNAL LOOPBACK
      BR 20$ ; CONTINUE
;
10$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
20$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
      JSR PC,WRITE ; WRITE TO THAT REGISTER
;
; *
; WRITE TO DATA HIGH BYTE REGISTER <7,6> AND READ FROM CONTROL IN
; REGISTER <0,1> (BITS ARE REVERSED)
;
; -
      MOV #177377,R5 ; START WITH BITH BITS 1'S
30$: MOV #DOHI,R0 ; WRITE TO DATA HIGH BYTE
      JSR PC,WRITE ; GO WRITE
      MOV #CNTRL,R0 ; READ FROM CONTROL IN REGISTER
      JSR PC,READ ; GO READ
;
; *
; CHANGE FORMAT OF THE PATTERN TO TRANSLATE BITS 7,6 TO 0,1
;
      MOV R5,R2 ; STORE PATTERN WRITTEN
      MOV #5,R3 ; PREPARE TO SHIFT 5 TIMES
40$: ROR R2 ; UNTILL BIT6->BIT1
      SOB R3,40$ ; DO FOR ALL 5 TIMES
      TSTB R5 ; WAS BIT 7 = 1?
      BMI 50$ ; IF YES, BRANCH
      BIC #1,R2 ; OTHERWISE CLEAR 0
      BR 60$
;
50$: BIS #1,R2 ; IF 7=1, BIT 0 =1 TOO
60$: BIC #177774,R2 ; CLEAR ALL BITS BUT 1,0
      CMPB R2,R4 ; IS IT THE SAME AS READ?
      BEQ 70$ ; IF YES, BRANCH
      MOV R5,R3 ; STORE FOR PRINTOUT
      MOV R2,R5
      ERRHRD 23,EM7,PNTD ; DATA PATH ERROR
;
; TRAP C$ERHRD
; .WORD 23
; .WORD EM7
; .WORD PNTD
      MOV R3,R5 ; RESTORE
;
; *
; CHANGE THE PATTERN WRITTEN INTO REGISTER
;
70$: CKLOOP ; ON ERROR LOOP

```

Address	Op-Code	Register	Value	Label	Comment	Trap	Trap Value	Seq
010742	104406							SEQ 0069
2260	010744	000241				TRAP	C\$CLP1	
2261	010746	006005			CLC			
2262	010750	122705	000337		ROR R5			
2263	010754	001333			CMPB #337,R5			
2264					BNE 30\$			
2265					; * VERIFY THAT MASTER CLEAR CLEARS CONTROL IN REGISTER			
2266					; -			
2267	010756	004737	005700		JSR PC,MSCLR			
2268	010762	005737	002172		TST MTMODE			
2269	010766	001003			BNE 150\$			
2270	010770	012705	000010		MOV #10,R5			
2271	010774	000402			BR 160\$			
2272	010776	012705	000020	150\$:	MOV #20,R5			
2273	011002	012700	000017	160\$:	MOV #MAINT,R0			
2274	011006	004737	006034		JSR PC,WRITE			
2275	011012	012700	000016		MOV #CNTRL,R0			
2276	011016	004737	005760		JSR PC,READ			
2277	011022	005005			CLR R5			
2278	011024	105704			TSTB R4			
2279	011026	001404			BEQ 170\$			
2280	011030				ERRHRD 24,EM1,PNTD			
	011030	104456						
	011032	000030				TRAP	C\$ERHRD	
	011034	003534				.WORD	24	
	011036	004702				.WORD	EM1	
2281	011040			170\$:	ENDSUB			
	011040							
	011040	104403				L10036:		
2282						TRAP	C\$ESUB	

```

2284
2285
2286
2287
2288
2289
2290
2291
2292 011042          BGNSUB
      011042
      011042 104402          T4.5:
2293 011044 013702 002166      MOV      KCSR,R2          ; STORE POINTER TO CSR      TRAP      C$BSUB
2294
2295      ;+
2296      ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2297 011050 012703 002220      MOV      #RPNT,R3          ; POINTER TO READ PATTERN
2298 011054 005737 002172      TST      MTMODE          ; INTERNAL MODE?
2299 011060 001006          BNE      10$          ; IF NOT BRANCH
2300 011062 012705 000010      MOV      #10,R5          ; SET INTERNAL LOOPBACK
2301 011066 112763 000014 000003      MOV      #14,3(R3)          ; STORE WHAT'S WRITTEN TO MAINTEN.
2302 011074 000405          BR      20$          ; CONTINUE
2303
2304 011076 012705 000020      MOV      #20,R5          ; SET EXTERNAL LOOPBACK
2305 011102 112763 000024 000003      MOV      #24,3(R3)          ; STORE WHAT'S WRITTEN TO MAINTEN.
2306 011110 012700 000017      MOV      #MAINT,R0          ; MAINTENANCE REGISTER
2307 011114 004737 006034      JSR      PC,WRITE          ; WRITE TO THAT REGISTER
2308
2309      ;+
2310      ; WRITE ALL ONE'S TO BOTH DATA REGISTERS
2311 011120 012705 000377      MOV      #377,R5          ; WRITE ALL ONE'S
2312 011124 012700 000010      MOV      #DLO,R0          ; TO DATA LOW BYTE REGISTER
2313 011130 004737 006034      JSR      PC,WRITE          ; GO WRITE
2314 011134 012705 000377      MOV      #377,R5          ; WRITE ALL ONE'S
2315 011140 012700 000011      MOV      #DOHI,R0          ; TO DATA HIGH BYTE REGISTER
2316 011144 004737 006034      JSR      PC,WRITE          ; GO WRITE
2317
2318      ;+
2319      ; READ BACK ALL THE REGISTERS
2320 011150 012737 000010 002176      MOV      #DLO,TEMP1          ; REGISTER TO READ FIRST
2321 011156 012701 000010      30$: MOV      #DLO,R1          ; START CHECKING
2322 011162 010100      40$: MOV      R1,R0          ; PREPARE TO
2323 011164 004737 005760      JSR      PC,READ          ; READ A REGISTER
2324 011170 120137 002176      CMPB     R1,TEMP1          ; WAS IT A REGISTER WRITTEN?
2325 011174 001015          BNE      50$          ; IF NOT, BRANCH
2326 011176 111305          MOV      (R3),R5          ; STORE EXPECTED PATTERN
2327 011200 120504          CMPB     R5,R4          ; IS IT WHAT WAS WRITTEN?
2328 011202 001421          BEQ      60$          ; IF SO, BRANCH
2329 011204 022701 000017      CMP      #MAINT,R1          ; WAS IT MAINTENANCE REG?
2330 011210 001002          BNE      45$          ; IF NOT, BRANCH
2331 011212 030504          BIT      R5,R4          ; IGNORE TIMING PULSES
2332 011214 001014          BNE      60$          ; IF AT LEAST SOMETHING SET, BRANCH
2333 011216          45$: ERRHRD 25,EM7,PNTD          ; DATA PATH ERROR
      011216 104456
      011220 000031          TRAP      C$ERHRD
      011222 004037          .WORD    25
      011224 004702          .WORD    EM7
2334 011226 000407          .WORD    PNTD
      BR      60$

```



```

2335 011230 121304      50$:  CMPB  (R3),R4      ; IS IT WHAT WAS WRITTEN?
2336 011232 001005      BNE    60$           ; IF NOT, BRANCH
2337 011234 005005      CLR    R5           ; CLEAR EXPECTED PATTERN
2338 011236      ERRHRD  26,EM14,PNTD      ; ADDRESS UNIQUENESS ERROR
      011236 104456      TRAP    C$ERHRD
      011240 000032      .WORD  26
      011242 004243      .WORD  EM14
      011244 004702      .WORD  PNTD
2339
2340      ;*
2341      ; CHANGE REGISTER TO NEXT FOR COMPARISON
2342 011246 005201      60$:  INC    R1           ; GET NEXT REGISTER
2343 011250 122701 000020  CMPB  #20,R1      ; ALL DONE (10 TO 17)?
2344 011254 001342      BNE    40$           ; IF NOT, BRANCH
2345 011256 105723      TSTB  (R3)+        ; GET TO NEXT EXPECTED READ
2346 011260 122737 000010 002176  CMPB  #DLO,TEMP1  ; STILL FIRST REGISTER?
2347 011266 001004      BNE    70$           ; IF NOT, BRANCH
2348 011270 012737 000015 002176  MOV   #DIHI,TEMP1  ; GET TO REGISTER 15
2349 011276 000727      BR     30$           ; GO READ NEXT REGISTER
2350 011300 005237 002176      70$:  INC    TEMP1      ; GET TO NEXT REGISTER
2351 011304 122737 000020 002176  CMPB  #20,TEMP1  ; ALL DONE (10,15 TO 17)?
2352 011312 001321      BNE    30$           ; IF NOT, BRANCH
2353 011314 004737 005700      JSR    PC, MSCLR    ; CLEAR THE WORLD BEFORE LEAVING
2354 011320      ENDSUB
      011320
      011320 104403      L10037:  TRAP    C$ESUB
2355 011322      ENDTST
      011322
      011322 104401      L10032:  TRAP    C$ETST
2356

```

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TEST 5: IRDY TEST

SEQ 0072

```

2358 .SBTTL TEST 5: IRDY TEST
2359 ;**
2360 ;
2361 ; TEST TO VERIFY THAT IRDY SIGNAL GOES HIGH AFTER WRITING
2362 ; TO REGISTER 2 FOR ABOUT .25 MICROSECOND. THIS IS DONE BY
2363 ; LOADING A FIRMWARE ROUTINE "IRDTST" INTO KMC11-B.
2364 ;
2365 ;--
2366 011324 BGNTST
      011324 TS::
2367
2368 011324 013702 002166 MOV KCSR,R2 ; STORE REGISTER POINTER
2369 011330 004737 005700 JSR PC,MSCLR ; CLEAR THE WORLD
2370
2371 ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2372 ;-
2373 011334 005737 002172 TST MTMODE ; INTERNAL MODE?
2374 011340 001003 BNE 10$ ; IF NOT BRANCH
2375 011342 012705 000010 MOV #10,R5 ; SET INTERNAL LOOPBACK
2376 011346 000402 BR 20$ ; CONTINUE
2377
2378 011350 012705 000020 10$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
2379 011354 012700 000017 20$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
2380 011360 004737 006034 JSR PC,WRITE ; WRITE TO THAT REGISTER
2381
2382 ; LOAD TEST MICROCODE
2383 ;-
2384 011364 012700 000023 MOV #19.,R0 ; SIZE
2385 011370 012705 004310 MOV #IRDTST,R5 ; STARTING ADDRESS OF ROUTINE
2386 011374 004737 006062 JSR PC,LOAD ; GO LOAD
2387 011400 005700 TST R0 ; ANY EPRORS LOADING
2388 011402 001406 BEQ 30$ ; IF NO, BRANCH
2389 011404 ERRHRD 27,KMC5 ; CRAM FAILURE
      011404 104456 TRAP C$ERHRD
      011406 000033 .WORD 27
      011410 003460 .WORD KMC5
      011412 000000 .WORD 0
2390 011414 ESCAPE TST
      011414 104410 TRAP C$ESCAPE
      011416 000130 .WORD L10040-.
2391 011420 012712 100000 30$: MOV #RUN,(R2) ; SET RUN BIT
2392 011424 012703 177777 MOV #177777,R3 ; SET UP DELAY
2393 011430 105712 35$: TSTB (R2) ; DONE BIT SET?
2394 011432 100407 BMI 40$ ; IF YES, BRANCH
2395 011434 077303 SOB R3,35$ ; WAIT A WHILE
2396 011436 ERRHRD 28,KMC7 ; KMC HUNG
      011436 104456 TRAP C$ERHRD
      011440 000034 .WORD 28
      011442 003516 .WORD KMC7
      011444 000000 .WORD 0
2397 011446 ESCAPE TST
      011446 104410 TRAP C$ESCAPE
      011450 000076 .WORD L10040 .
2398
2399 ; CHECK TIMING SIGNALS BY READING DATA MEMORY
2400 ;
2401 011452 004737 005700 40$: JSR PC,MSCLR ; CLEAR THE WORLD

```

2402	011456	012703	000020
2403	011462	012700	000377
2404	011466	004737	005760
2405	011472	032704	000004

50\$:

```
MOV      #16.,R3
MOV      #377,R0
JSR      PC,READ
BIT      #4,R4
BNE      60$
SOB      R3,50$
ERRHRD   29,EM8
```

```
; SETUP FOR 16 READS
; READ MEMORY
; GO DO IT
; IRDY SET?
; IF YES, GET OUT
; CONTINUE READING
; IRDY NEVER SET
```

SEQ 0073

011502	104456
011504	000035
011506	004057
011510	000000

```
TRAP      C$ERHRD
.WORD     29
.WORD     EM8
.WORD     0
```

2409	011512	
	011512	104410
	011514	000032

ESCAPE TST

```
TRAP      C$ESCAPE
.WORD     L10040 .
```

2410	011516	012700	000377
2411	011522	004737	005760
2412	011526	032704	000004

60\$:

```
MOV      #377,R0
JSR      PC,READ
BIT      #4,R4
BEQ      70$
SOB      R3,60$
ERRHRD   30,EM9
```

```

; READ MEMORY
; GO DO IT
; IRDY CLEAR?
; IF YES, GET OUT
; CONTINUE READING
; IRDY NEVER CLEARED

```

2412	011528	032104
2413	011532	001405
2414	011534	077310

2415	011536	
	011536	104456
	011540	000036
	011542	004102
	011544	000000

```
TRAP      C$ERHRD
.WORD     30
.WORD     EM9
.WORD     0
```

2416 011546
011546
011546 104401

70\$:

ENDTST

L10040:

TRAP C\$ETST

```

2418 .SBTTL TEST 6: RNDR TEST
2419 ;**
2420 ;
2421 ; TEST TO VERIFY THAT AFTER WRITING TO REGISTER 2 RNDR GOES
2422 ; HIGH. THIS IS DONE BY LOADING FIRMWARE ROUTINE "NDRTST"
2423 ; INTO KMC11 B.
2424 ;
2425 ;--
2426
2427 011550 BGNTST
      011550
2428
2429 011550 013702 002166 MOV KCSR,R2 ; STORE REGISTER POINTER
2430 011554 004737 005700 JSR PC,MSCLR ; CLEAR THE WORLD
2431
2432 ;*
2433 ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2434 011560 005737 002172 TST MTMODE ; INTERNAL MODE?
2435 011564 001003 BNE 10$ ; IF NOT BRANCH
2436 011566 012705 000010 MOV #10,R5 ; SET INTERNAL LOOPBACK
2437 011572 000402 BR 20$ ; CONTINUE
2438
2439 011574 012705 000020 10$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
2440 011600 012700 000017 20$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
2441 011604 004737 006034 JSR PC,WRITE ; WRITE TO THAT REGISTER
2442
2443 ;*
2444 ; LOAD TEST MICROCODE
2445 011610 012700 000033 MOV #27,R0 ; SIZE
2446 011614 012705 004356 MOV #NDRTST,R5 ; STARTING ADDRESS OF ROUTINE
2447 011620 004737 006062 JSR PC,LOAD ; GO LOAD
2448 011624 005700 TST R0 ; ANY ERRORS LOADING
2449 011626 001406 BEQ 30$ ; IF NO, BRANCH
2450 011630 ERRHRD 31,KMC5 ; CRAM FAILURE
      011630 104456 TRAP C$ERHRD
      011632 000037 .WORD 31
      011634 003460 .WORD KMC5
      011636 000000 .WORD 0
2451 011640 ESCAPE TST
      011640 104410 TRAP C$ESCAPE
      011642 000130 .WORD L10041-.
2452 011644 012712 100000 30$: MOV #RUN,(R2) ; SET RUN BIT
2453 011650 012703 177777 MOV #177777,R3 ; SET UP DELAY
2454 011654 105712 35$: TSTB (R2) ; DONE BIT SET?
2455 011656 100407 BMI 40$ ; IF YES, BRANCH
2456 011660 077303 SOB R3,35$ ; WAIT A WHILE
2457 011662 ERRHRD 32,KMC7 ; KMC HUNG
      011662 104456 TRAP C$ERHRD
      011664 000040 .WORD 32
      011666 003516 .WORD KMC7
      011670 000000 .WORD 0
2458 011672 ESCAPE TST
      011672 104410 TRAP C$ESCAPE
      011674 000076 .WORD L10041 .
2459
2460 ;*
2461 ; CHECK TIMING SIGNALS BY READING DATA MEMORY
      ;

```

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TEST 6: RNDR TEST

SEQ 0075

2462	011676	004737	005700	40\$:	JSR	PC,MSCLR		; CLEAR THE WORLD		
2463	011702	012703	000027		MOV	#23.,R3		; SETUP FOR 23 READS		
2464	011706	012700	000377	50\$:	MOV	#377,R0		; READ MEMORY		
2465	011712	004737	005760		JSR	PC,READ		; GO DO IT		
2466	011716	032704	000001		BIT	#1,R4		; RNDR SET?		
2467	011722	001007			BNE	60\$; IF YES, GET OUT		
2468	011724	077310			SOB	R3,50\$; CONTINUE READING		
2469	011726				ERRHRD	33,EM10		; RNDR NEVER SET		
	011726	104456							TRAP	C\$ERHRD
	011730	000041							.WORD	33
	011732	004127							.WORD	EM10
	011734	000000							.WORD	0
2470	011736				ESCAPE	TST				
	011736	104410							TRAP	C\$ESCAPE
	011740	000032							.WORD	L10041 .
2471										
2472	011742	012700	000377	60\$:	MOV	#377,R0		; READ MEMORY		
2473	011746	004737	005760		JSR	PC,READ		; GO DO IT		
2474	011752	032704	000001		BIT	#1,R4		; RNDR CLEAR?		
2475	011756	001405			BEQ	70\$; IF YES, GET OUT		
2476	011760	077310			SOB	R3,60\$; CONTINUE READING		
2477	011762				ERRHRD	34,EM11		; NEVER CLEARED		
	011762	104456							TRAP	C\$ERHRD
	011764	000042							.WORD	34
	011766	004152							.WORD	EM11
	011770	000000							.WORD	0
2478	011772			70\$:	ENDTST					
	011772								L10041:	
	011772	104401							TRAP	C\$ETST

```

2480 .SBTTL TEST 7: DT DETECT TEST
2481 ;**
2482 ;
2483 ; TEST TO VERIFY THE EXISTENCE OF DT DETECT PULSE AFTER
2484 ; READING REGISTER 5 (DOHI). THIS IS DONE BY LOADING
2485 ; FIRMWARE ROUTINE "DTTST" INTO KMC11 8.
2486 ;
2487 ;
2488 ;
2489 011774 BGNTST
2490 011774
2491 011774 013702 002166 MOV KCSR,R2 ; STORE REGISTER POINTER
2492 012000 004737 005700 JSR PC,MSCLR ; CLEAR THE WORLD
2493 ;
2494 ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2495 ;
2496 012004 005737 002172 TST MTMODE ; INTERNAL MODE?
2497 012010 001003 BNE 10$ ; IF NOT BRANCH
2498 012012 012705 000010 MOV #10,R5 ; SET INTERNAL LOOPBACK
2499 012016 000402 BR 20$ ; CONTINUE
2500
2501 012020 012705 000020 10$: MOV #20,R5 ; SET EXTERNAL LOOPBACK
2502 012024 012700 000017 20$: MOV #MAINT,R0 ; MAINTENANCE REGISTER
2503 012030 004737 006034 JSR PC,WRITE ; WRITE TO THAT REGISTER
2504 ;
2505 ; LOAD TEST MICROCODE
2506 ;
2507 012034 012700 000033 MOV #27,R0 ; SIZE
2508 012040 012705 004444 MOV #DTTST,R5 ; STARTING ADDRESS OF ROUTINE
2509 012044 004737 006062 JSR PC,LOAD ; GO LOAD
2510 012050 005700 TST R0 ; ANY ERRORS LOADING
2511 012052 001406 BEQ 30$ ; IF NO, BRANCH
2512 012054 ERRHRD 35,KMC5 ; CRAM FAILURE
2513 012054 104456 TRAP C$ERRHRD
2514 012056 000043 .WORD 35
2515 012060 003460 .WORD KMC5
2516 012062 000000 .WORD 0
2517 012064 ESCAPE TST
2518 012064 104410 TRAP C$ESCAPE
2519 012066 000130 .WORD L10042
2520 012070 012712 100000 30$: MOV #RUN,(R2) ; SET RUN BIT
2521 012074 012703 177777 MOV #177777,R3 ; SET UP DELAY
2522 012100 105712 35$: TSTB (R2) ; DONE BIT SET?
2523 012102 100407 BMI 40$ ; IF YES, BRANCH
2524 012104 077303 SOB R3,35$ ; WAIT A WHILE
2525 012106 ERRHRD 36,KMC7 ; KMC HUNG
2526 012106 104456 TRAP C$ERRHRD
2527 012110 000044 .WORD 36
2528 012112 003516 .WORD KMC7
2529 012114 000000 .WORD 0
2530 012116 ESCAPE TST
2531 012116 104410 TRAP C$ESCAPE
2532 012120 000076 .WORD L10042
2533 ;
2534 ; CHECK TIMING SIGNALS BY READING DATA MEMOR
2535 ;

```

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 TEST 7: DT DETECT TEST

SEQ 0077

2524	012122	004737	005700	40:	JSR	PC,MSCLR	; CLEAR THE WORLD		
2525	012126	012703	000027		MOV	#23,R3	; SETUP FOR 23 READS		
2526	012132	012700	000377	50:	MOV	#377,R0	; READ MEMORY		
2527	012136	004737	005760		JSR	PC,READ	; GO DO IT		
2528	012142	032704	000002		BIT	#2,R4	; DT DETECT SET?		
2529	012146	001007			BNL	60:	; IF YES, GET OUT		
2530	012150	077310			SOB	R3,50:	; CONTINUE READING		
2531	012152				ERRHRD	37,EM12	; DT NEVER SET		
	012152	104456						TRAP	C\$ERHRD
	012154	000045						.WORD	37
	012156	004177						.WORD	EM12
	012160	000000						.WORD	0
2532	012162				ESCAPE	TST			
	012162	104410						TRAP	C\$ESCAPE
	012164	000032						.WORD	L10042
2533									
2534	012166	012700	000377	60:	MOV	#377,R0	; READ MEMORY		
2535	012172	004737	005760		JSR	PC,READ	; GO DO IT		
2536	012176	032704	000002		BIT	#2,R4	; DT DETECT CLEAR?		
2537	012202	001405			BEQ	70:	; IF YES, GET OUT		
2538	012204	077310			SOB	R3,60:	; CONTINUE READING		
2539	012206				ERRHRD	38,EM13	; DT NEVER CLEARED		
	012206	104456						TRAP	C\$ERHRD
	012210	000046						.WORD	38
	012212	004220						.WORD	EM13
	012214	000000						.WORD	0
2540	012216			70:	ENDTST				
	012216							L10042:	
	012216	104401						TRAP	C\$ETST

```

2542 .SBTTL TEST 8: LED TEST
2543 ;**
2544 ;
2545 ; TEST TO TURN ON AND OFF EACH OF THE ON-BOARD LED'S:
2546 ; INTERNAL MAINTENANCE, EXTERNAL MAINTENANCE.
2547 ;
2548 ;--
2549 B'NTST
2550 012220 012220
2551 012220 013702 002166
2552 012224 012701 000005
2553 10$:
2554 ;*
2555 ; TURN ON CABLE OK LED
2556 ;-
2556 012230 012703 000002
2557 012234 012704 177777
2558 012240 077401
2559 012242 077304
2560 ;*
2561 ; TURN ON INTERNAL MAINTENANCE LED
2562 ;-
2563 012244 012705 000010
2564 012250 012700 000017
2565 012254 004737 006034
2566 012260 012703 000002
2567 012264 012704 177777
2568 012270 077401
2569 012272 077304
2570 ;*
2571 ; TURN ON EXTERNAL MAINTENANCE LED
2572 ;
2573 012274 012705 000020
2574 012300 012700 000017
2575 012304 004737 006034
2576 012310 012703 000002
2577 012314 012704 177777
2578 012320 077401
2579 012322 077304
2580 ;*
2581 ; REPEAT THE PATTERN 5 TIMES
2582 ;
2583 012324 077137
2584 012326 004737 005700
2585 012332
2586 012332 104401
2587 012332 104401

      MOV      KCSR,R2          ; STORE POINTER TO CSR
      MOV      #5,R1           ; REPEAT 5 TIMES

10$:
;*
; TURN ON CABLE OK LED
;-
      MOV      #2,R3           ; ONE DELAY
120$: MOV      #177777,R4      ; SECOND DELAY
130$: SOB      R4,130$        ; WAIT A
      SOB      R3,120$        ; WHILE

;*
; TURN ON INTERNAL MAINTENANCE LED
;-
      MOV      #10,R5          ; INTERNAL MAINTENANCE BIT
      MOV      #MAINT,R0       ; MAINTENANCE REGISTER
      JSR      PC,WRITE        ; WRITE TO SELECTED REGISTER
      MOV      #2,R3           ; ONE DELAY
220$: MOV      #177777,R4      ; SECOND DELAY
230$: SOB      R4,230$        ; WAIT A
      SOB      R3,220$        ; WHILE

;*
; TURN ON EXTERNAL MAINTENANCE LED
;
      MOV      #20,R5          ; EXTERNAL MAINTENANCE BIT
      MOV      #MAINT,R0       ; MAINTENANCE REGISTER
      JSR      PC,WRITE        ; WRITE TO SELECTED REGISTER
      MOV      #2,R3           ; ONE DELAY
320$: MOV      #177777,R4      ; SECOND DELAY
330$: SOB      R4,330$        ; WAIT A
      SOB      R3,320$        ; WHILE

;*
; REPEAT THE PATTERN 5 TIMES
;
      SOB      R1,10$          ; REPEAT LOOP
      JSR      PC,MSCLR        ; CLEAR BEFORE LEAVING
      ENDTST

L10043: TRAP      C$ETST

```



```

2587 .SBTTL TEST 9: DATA TRANSFER TEST
2588 ;**
2589 ;
2590 ; TEST TO SEND 256 BYTES OF DATA THOUGH LINE UNIT DOING
2591 ; NPR'S TO GET THE DATA FROM UNIBUS
2592 ;--
2593
2594 012334 BGNTST
    012334
2595
2596 012334 013702 002166 MOV KCSR,R2 ; STORE REGISTER POINTER
2597 012340 004737 005700 JSR PC,MSCLR ; CLEAR THE WORLD
2598
2599 ;*
2600 ; LOAD TEST MICROCODE
2601 ;-
2601 012344 012700 000064 MOV #64,R0 ; SIZE
2602 012350 012705 004532 MOV #DTST,R5 ; STARTING ADDRESS OF ROUTINE
2603 012354 004737 006062 JSR PC,LOAD ; GO LOAD
2604 012360 005700 TST R0 ; ANY ERRORS LOADING
2605 012362 001406 BEQ 25$ ; IF NO, BRANCH
2606 012364 ERRHRD 39,KMC5 ; CRAM FAILURE
    012364 104456
    012366 000047 TRAP C$ERHRD
    012370 003460 .WORD 39
    012372 000000 .WORD KMC5
2607 012374 ESCAPE TST .WORD 0
    012374 104410 TRAP C$ESCAPE
    012376 000202 .WORD L10044-.
2608
2609 ;*
2610 ; CLEAR RECEIVE BUFFER
2611 ;
2611 012400 012703 000377 25$: MOV #255.,R3 ; COUNTER
2612 012404 012705 002624 MOV #RCBUF,R5 ; START OF THE BUFFER
2613 012410 105025 26$: CLRB (R5)+ ; CLEAR EACH BYTE
2614 012412 077302 SOB R3,26$ ; DO FOR THE WHOLE BUFFER
2615
2616 ;*
2617 ; LOAD TRANSMIT BUFFER WITH A PATTERN
2618 ;-
2618 012414 012703 000377 MOV #255.,R3 ; LAST PATTERN
2619 012420 012705 002624 MOV #RCBUF,R5 ; END OF THE BUFFER
2620 012424 110345 27$: MOV R3,(R5) ; LOAD WITH A PATTERN
2621 012426 077302 SOB R3,27$ ; DO FOR THE WHOLE BUFFER
2622
2623 ;*
2624 ; SET UP MAINTENANCE MODE ACCORDING TO SELECTION
2625 ;
2625 012430 005737 002172 TST MTMODE ; INTERNAL MODE?
2626 012434 001003 BNE 28$ ; IF NOT BRANCH
2627 012436 012712 000010 MOV #10,(R2) ; SET INTERNAL LOOPBACK
2628 012442 000402 BR 29$ ; CONTINUE
2629 012444 012712 000020 28$: MOV #20,(R2) ; SET EXTERNAL LOOPBACK
2630 012450 012762 002224 000004 29$: MOV #TRBUF,4(R2) ; SETUP ADDRESSES
2631 012456 012762 002624 000006 MOV #RCBUF,6(R2) ; IN CSR'S
2632 012464 052712 040000 BIS #MCLR,(R2) ; CLEAR THE WORLD
2633 012470 042712 040000 BIC #MCLR,(R2) ; CLEAR BIT
2634 012474 052712 100000 BIS #RUN,(R2) ; SET RUN BIT
2635 012500 012703 000001 MOV #1,R3 ; SET UP DELAY
2636 012504 012704 000001 32$: MOV #1,R4 ;

```

Address	Hex	Dec	Label	Op	Op1	Op2	Op3	Op4	Op5	Op6	Op7	Op8	Op9	Op10	Op11	Op12	Op13	Op14	Op15	Op16	Op17	Op18	Op19	Op20	Op21	Op22	Op23	Op24	Op25	Op26	Op27	Op28	Op29	Op30	Op31	Op32	Op33	Op34	Op35	Op36	Op37	Op38	Op39	Op40	Op41	Op42	Op43	Op44	Op45	Op46	Op47	Op48	Op49	Op50	Op51	Op52	Op53	Op54	Op55	Op56	Op57	Op58	Op59	Op60	Op61	Op62	Op63	Op64	Op65	Op66	Op67	Op68	Op69	Op70	Op71	Op72	Op73	Op74	Op75	Op76	Op77	Op78	Op79	Op80	Op81	Op82	Op83	Op84	Op85	Op86	Op87	Op88	Op89	Op90	Op91	Op92	Op93	Op94	Op95	Op96	Op97	Op98	Op99	Op100	Op101	Op102	Op103	Op104	Op105	Op106	Op107	Op108	Op109	Op110	Op111	Op112	Op113	Op114	Op115	Op116	Op117	Op118	Op119	Op120	Op121	Op122	Op123	Op124	Op125	Op126	Op127	Op128	Op129	Op130	Op131	Op132	Op133	Op134	Op135	Op136	Op137	Op138	Op139	Op140	Op141	Op142	Op143	Op144	Op145	Op146	Op147	Op148	Op149	Op150	Op151	Op152	Op153	Op154	Op155	Op156	Op157	Op158	Op159	Op160	Op161	Op162	Op163	Op164	Op165	Op166	Op167	Op168	Op169	Op170	Op171	Op172	Op173	Op174	Op175	Op176	Op177	Op178	Op179	Op180	Op181	Op182	Op183	Op184	Op185	Op186	Op187	Op188	Op189	Op190	Op191	Op192	Op193	Op194	Op195	Op196	Op197	Op198	Op199	Op200	Op201	Op202	Op203	Op204	Op205	Op206	Op207	Op208	Op209	Op210	Op211	Op212	Op213	Op214	Op215	Op216	Op217	Op218	Op219	Op220	Op221	Op222	Op223	Op224	Op225	Op226	Op227	Op228	Op229	Op230	Op231	Op232	Op233	Op234	Op235	Op236	Op237	Op238	Op239	Op240	Op241	Op242	Op243	Op244	Op245	Op246	Op247	Op248	Op249	Op250	Op251	Op252	Op253	Op254	Op255	Op256	Op257	Op258	Op259	Op260	Op261	Op262	Op263	Op264	Op265	Op266	Op267	Op268	Op269	Op270	Op271	Op272	Op273	Op274	Op275	Op276	Op277	Op278	Op279	Op280	Op281	Op282	Op283	Op284	Op285	Op286	Op287	Op288	Op289	Op290	Op291	Op292	Op293	Op294	Op295	Op296	Op297	Op298	Op299	Op300	Op301	Op302	Op303	Op304	Op305	Op306	Op307	Op308	Op309	Op310	Op311	Op312	Op313	Op314	Op315	Op316	Op317	Op318	Op319	Op320	Op321	Op322	Op323	Op324	Op325	Op326	Op327	Op328	Op329	Op330	Op331	Op332	Op333	Op334	Op335	Op336	Op337	Op338	Op339	Op340	Op341	Op342	Op343	Op344	Op345	Op346	Op347	Op348	Op349	Op350	Op351	Op352	Op353	Op354	Op355	Op356	Op357	Op358	Op359	Op360	Op361	Op362	Op363	Op364	Op365	Op366	Op367	Op368	Op369	Op370	Op371	Op372	Op373	Op374	Op375	Op376	Op377	Op378	Op379	Op380	Op381	Op382	Op383	Op384	Op385	Op386	Op387	Op388	Op389	Op390	Op391	Op392	Op393	Op394	Op395	Op396	Op397	Op398	Op399	Op400	Op401	Op402	Op403	Op404	Op405	Op406	Op407	Op408	Op409	Op410	Op411	Op412	Op413	Op414	Op415	Op416</
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2658      .TITLE PARAMETER CODING
2659
2660      .SBTTL  HARDWARE PARAMETER CODING SECTION
2661
2662
2663      ;**
2664      ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
2665      ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
2666      ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
2667      ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
2668      ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
2669      ; WITH THE OPERATOR.
2670      ;--
2671
2672      012602      BGNHRD
2673      012602      000007
2674      012604      GPRMA  HD2,0,0,160000,177770,NO      ; CSR ADDRESS
2675      012604      000021
2676      012606      012622
2677      012610      160000
2678      012612      177770
2679      012614      GPRML  HD5,2,-1,YES      ; LOOPBACK, INTERNAL DEFAULT
2680      012614      001130
2681      012616      012637
2682      012620      177777
2683
2684      012622      ENDHRD
2685
2686      012622      .EVEN
2687      L10045:
2688      012622      103      123      122      HD2:  .ASCIZ  /CSR ADDRESS?/
2689      012625      040      101      104
2690      012630      104      122      105
2691      012633      123      123      077
2692      012636      000
2693      012637      105      130      124      HD5:  .ASCIZ  /EXTERNAL LOOPBACK?/
2694      012642      105      122      116
2695      012645      101      114      040
2696      012650      114      117      117
2697      012653      120      102      101
2698      012656      103      113      077
2699      012661      000
2700
2701      .EVEN
2702
2703
2704

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2685      .SBTTL  SOFTWARE PARAMETER CODING SECTION
2686
2687      ;**
2688      ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
2689      ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
2690      ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
2691      ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
2692      ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
2693      ; WITH THE OPERATOR.
2694      ;--
2695
2696      BGNSFT
2697      012662
2698      012662 000000
2699      012664
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2705      012664
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2708      012704
2709      012704 000000
2710      012706 000000
2711      012710
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2713      000001
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PARAMETER CODING
SYMBOL TABLE

MACRO M1200 15-MAR 85 16:13 PAGE 51-1

SEQ 0083

ADR = 000020 G	C\$GETB= 000026	ERRNBR 002160 G	IDU = 000040 G	L\$ERRT 002156 G
ASSEMB= 000010	C\$GETW= 000027	ERRTYP 002156 G	IER = 020000 G	L\$ETP 002102 G
BIT0 = 000001 G	C\$GMAN= 000043	ERR0 005126	IRDTST 004310	L\$EXP1 002046 G
BIT00 = 000001 G	C\$GPHR= 000042	ERR01 005207	ISR = 000100 G	L\$EXP4 002064 G
BIT01 = 000002 G	C\$GPL0= 000030	ERR02 005270	IXE = 004000 G	L\$EXP5 002066 G
BIT02 = 000004 G	C\$GPRI= 000040	ERR1 005402	I\$AU = 000041	L\$HARD 012604 G
BIT03 = 000010 G	C\$INIT= 000011	ERR2 005516	I\$AUTO= 000041	L\$HIME 002120 G
BIT04 = 000020 G	C\$INLP= 000020	ERR3 005634	I\$CLN = 000041	L\$HPCP 002016 G
BIT05 = 000040 G	C\$MANI= 000050	EVL = 000004 G	I\$DU = 000041	L\$HPTP 002022 G
BIT06 = 000100 G	C\$MEM = 000031	EXTR = 000016 G	I\$HRD = 000041	L\$HW 002150 G
BIT07 = 000200 G	C\$MSG = 000023	E\$END = 002100	I\$INIT= 000041	L\$ICP 002104 G
BIT08 = 000400 G	C\$OPEN= 000034	E\$LOAD= 000035	I\$MOD = 000041	L\$INIT 006160 G
BIT09 = 001000 G	C\$PNTB= 000014	F\$AU = 000015	I\$MSG = 000041	L\$LADP 002026 G
BIT1 = 000002 G	C\$PNTF= 000017	F\$AUTO= 000020	I\$PROT= 000040	L\$LAST 012710 G
BIT10 = 002000 G	C\$PNTS= 000016	F\$BGN = 000040	I\$PTAB= 000041	L\$LOAD 002100 G
BIT11 = 004000 G	C\$PNTX= 000015	F\$CLEA= 000007	I\$PWR = 000041	L\$LUN 002074 G
BIT12 = 010000 G	C\$QIO = 000377	F\$DU = 000016	I\$RPT = 000041	L\$MREV 002050 G
BIT13 = 020000 G	C\$RDBU= 000007	F\$END = 000041	I\$SEG = 000041	L\$NAME 002000 G
BIT14 = 040000 G	C\$REFG= 000047	F\$HARD= 000004	I\$SETU= 000041	L\$PRIO 002042 G
BIT15 = 100000 G	C\$RESE= 000033	F\$HW = 000013	I\$SFT = 000041	L\$PROT 006152 G
BIT2 = 000004 G	C\$REVI= 000003	F\$INIT= 000006	I\$SRV = 000041	L\$PRT 002112 G
BIT3 = 000010 G	C\$RFLA= 000021	F\$JMP = 000050	I\$SUB = 000041	L\$REPP 002062 G
BIT4 = 000020 G	C\$RPT = 000025	F\$MOD = 000000	I\$TST = 000041	L\$REV 002010 G
BIT5 = 000040 G	C\$SEFG= 000046	F\$MSG = 000011	J\$JMP = 000167	L\$RPT 006144 G
BIT6 = 000100 G	C\$SPRI= 000041	F\$PROT= 000021	KCSR 002166 G	L\$SOFT 012664 G
BIT7 = 000200 G	C\$SVEC= 000037	F\$PWR = 000017	KMC1 003260 G	L\$SPC 002056 G
BIT8 = 000400 G	C\$TPRI= 000013	F\$RPT = 000012	KMC2 003331 G	L\$SPCP 002020 G
BIT9 = 001000 G	DFPTBL 002150 G	F\$SEG = 000003	KMC3 003356 G	L\$SPTP 002024 G
BOE = 000400 G	DIAGMC= 000000	F\$SOFT= 000005	KMC4 003403 G	L\$STA 002030 G
CNTRL = 000016 G	DIHI = 000015 G	F\$SRV = 000010	KMC5 003460 G	L\$SW 002156 G
CRAMW = 020000 G	DLO = 000010 G	F\$SUB = 000002	KMC6 003475 G	L\$TEST 002114 G
C\$AU = 000052	DOHI = 000011 G	F\$SW = 000014	KMC7 003516 G	L\$TIML 002014 G
C\$AUTO= 000061	DTST 004532	F\$TEST= 000001	LOAD 006062	L\$UNIT 002012 G
C\$BRK = 000022	DTTST 004444	G\$CNT0= 000200	LOE = 040000 G	L10000 002154
C\$BSEG= 000004	EF.CON= 000036 G	G\$DELM= 000372	LOGUNT 002170 G	L10001 002156
C\$BSUB= 000002	EF.NEW= 000035 G	G\$DISP= 000003	LOT = 000010 G	L10002 005336
C\$CEFG= 000045	EF.PWR= 000034 G	G\$EXCP= 000400	L\$ACP 002110 G	L10003 005462
C\$CLCK= 000062	EF.RES= 000037 G	G\$HILI= 000002	L\$APT 002036 G	L10004 005576
C\$CLEA= 000012	EF.STA= 000040 G	G\$LOLI= 000001	L\$AU 006316 G	L10005 005676
C\$CLOS= 000035	EM1 003534 G	G\$NO = 000000	L\$AUT 002070 G	L10006 006150
C\$CLP1= 000006	EM10 004127 G	G\$OFFS= 000400	L\$AUTO 006300 G	L10010 006276
C\$CVEC= 000036	EM11 004152 G	G\$OFISI= 000376	L\$CCP 002106 G	L10011 006300
C\$DCLN= 000044	EM12 004177 G	G\$PRMA= 000001	L\$CLEA 006302 G	L10012 006306
C\$DODU= 000051	EM13 004220 G	G\$PRMD= 000002	L\$CO 002032 G	L10013 006314
C\$DRPT= 000024	EM14 004243 G	G\$PRML= 000000	L\$DEPO 002011 G	L10014 006322
C\$DU = 000053	EM2 003607 G	G\$RADA= 000140	L\$DESC 003234 G	L10015 006462
C\$EDIT= 000003	EM3 003633 G	G\$RADB= 000000	L\$DESP 002076 G	L10016 006402
C\$ERDF= 000055	EM4 003673 G	G\$RADD= 000040	L\$DEVP 002060 G	L10017 006460
C\$ERHR= 000056	EM5 003735 G	G\$RADL= 000120	L\$DISP 002124 G	L10020 007046
C\$ERRO= 000060	EM6 003775 G	G\$RADO= 000020	L\$DLY 002116 G	L10021 006576
C\$ERSF= 000054	EM7 004037 G	G\$XFER= 000004	L\$DTP 002040 G	L10022 006722
C\$ERSO= 000057	EM8 004057 G	G\$YES = 000010	L\$DTYP 002034 G	L10023 007044
C\$ESCA= 000010	EM9 004102 G	HD2 012622	L\$DU 006310 G	L10024 007760
C\$ESEG= 000005	ENDIN 006276	HD5 012637	L\$DUT 002072 G	L10025 007140
C\$ESUB= 000003	ERPNT 005600 G	HELP = 000001	L\$DVTY 003224 G	L10026 007500
C\$ETST= 000001	ERRBLK 002164 G	HOE = 100000 G	L\$EF 002052 G	L10027 007572
C\$EXIT= 000032	ERRMSG 002162 G	IBE = 010000 G	L\$ENVI 002044 G	L10030 007664

PARAMETER CODING
SYMBOL TABLE

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SEQ 0084

L10031 007756	O\$GNSW= 000001	SVCGBL= 000000	T\$SUBN= 000000	T2.2 006600
L10032 011322	O\$POIN= 000001	SVCINS= 000001	T\$TAGL= 177777	T2.3 006724
L10033 010154	O\$SETU= 000000	SVCSUB= 000001	T\$TAGN= 010047	T3 007050 G
L10034 010366	PNT = 001000 G	SVCTAG= 000001	T\$TEMP= 000005	T3.1 007050
L10035 010600	PNTD 004702 G	SVCTST= 000001	T\$TEST= 000011	T3.2 007142
L10036 011040	PNTRAM 005340 G	S\$LSYM= 010000	T\$TSTM= 177777	T3.3 007502
L10037 011320	PNTREG 005464 G	TEMP 002174 G	T\$TSTS= 000001	T3.4 007574
L10040 011546	PRI = 002000 G	TEMP1 002176 G	T\$\$AU = 010014	T3.5 007666
L10041 011772	PRI00 = 000000 G	TRBUF 002224 G	T\$\$AUT= 010011	T4 007762 G
L10042 012216	PRI01 = 000040 G	T\$ARGC= 000003	T\$\$CLE= 010012	T4.1 007762
L10043 012332	PRI02 = 000100 G	T\$CODE= 001130	T\$\$DU = 010013	T4.2 010156
L10044 012600	PRI03 = 000140 G	T\$ERRN= 000051	T\$\$HAR= 010045	T4.3 010370
L10045 012622	PRI04 = 000200 G	T\$EXCP= 000000	T\$\$HW = 010000	T4.4 010602
L10046 012664	PRI05 = 000240 G	T\$FLAG= 000040	T\$\$INI= 010010	T4.5 011042
MAINT = 000017 G	PRI06 = 000300 G	T\$GMAN= 000000	T\$\$MSG= 010005	T5 011324 G
MCLR = 040000 G	PRI07 = 000340 G	T\$HILI= 177770	T\$\$PRO= 010007	T6 011550 G
MSCLR 005700 G	RAMI = 001000 G	T\$LAST= 000001	T\$\$RPT= 010006	T7 011774 G
MTMODE 002172 G	RAMO = 002000 G	T\$LOLI= 160000	T\$\$SQF= 010046	T8 012220 G
NDRTST 004356	RCBUF 002624 G	T\$LSYM= 010000	T\$\$SUB= 010037	T9 012334 G
NEXT 006240	READ 005760 G	T\$LTNO= 000011	T\$\$SW = 010001	UAM = 000200 G
ONEFIL= 000001	ROMCLK 005732 G	T\$NEST= 177777	T\$\$TES= 010044	WRITE 006034 G
O\$APTS= 000000	RPNT 002220 G	T\$NS0 = 000005	T1 006324 G	X\$ALWA= 000000
O\$AU = 000001	RUN = 100000 G	T\$NS1 = 000002	T1.1 006324	X\$FALS= 000040
O\$BGNR= 000001	SFPTBL 002156 G	T\$PTNU= 000000	T1.2 006404	X\$OFFS= 000400
O\$BGNS= 000000	START 006232	T\$SAVL= 177777	T2 006464 G	X\$TRUE= 000020
O\$DU = 000001	STEP = 000400 G	T\$SEGL= 177777	T2.1 006464	\$PATCH 012664 G
O\$ERRT= 000001	STRB = 000012 G			

. ABS. 012710 000
000000 001
ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 28476 WORDS (112 PAGES)
DYNAMIC MEMORY: 19748 WORDS (75 PAGES)
ELAPSED TIME: 00:03:07
CZKMVA,CZKMVA/CR/NL:TOC=SVC\$4/ML,CZKMVA.MAC/DS:GBL

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0085

SYMBOL	VALUE	REFERENCES
ADR	= 000020 G	#10-954
ASSEMB	= 000010	6-875 6-875
BIT0	= 000001 G	#10-954
BIT00	= 000001 G	#10-954 10-954
BIT01	= 000002 G	#10-954 10-954
BIT02	= 000004 G	#10-954 10-954
BIT03	= 000010 G	#10-954 10-954
BIT04	= 000020 G	#10-954 10-954
BIT05	= 000040 G	#10-954 10-954
BIT06	= 000100 G	#10-954 10-954
BIT07	= 000200 G	#10-954 10-954
BIT08	= 000400 G	#10-954 10-954
BIT09	= 001000 G	#10-954 10-954
BIT1	= 000002 G	#10-954
BIT10	= 002000 G	#10-954
BIT11	= 004000 G	#10-954
BIT12	= 010000 G	#10-954
BIT13	= 020000 G	#10-954
BIT14	= 040000 G	#10-954
BIT15	= 100000 G	#10-954
BIT2	= 000004 G	#10-954
BIT3	= 000010 G	#10-954
BIT4	= 000020 G	#10-954
BIT5	= 000040 G	#10-954
BIT6	= 000100 G	#10-954
BIT7	= 000200 G	#10-954
BIT8	= 000400 G	#10-954
BIT9	= 001000 G	#10-954
BOE	= 000400 G	#10-954
CNTRL	= 000016 G	#11-974 39-2022 43-2235 43-2275
CRAMW	= 020000 G	#11-962 21-1453 32-1755 32-1756
C\$AU	= 000052	#6-875 28-1668
C\$AUTO	= 000061	#6-875 25-1578
C\$BRK	= 000022	#6-875
C\$BSEG	= 000004	#6-875
C\$BSUB	= 000002	#6-875 30-1683 31-1707 32-1740 33-1784 34-1821 35-1863 36-1887 37-1962
		38-1987 39-2012 40-2041 41-2095 42-2155 43-2215 44-2292
C\$CEFG	= 000045	#6-875
C\$CLCK	= 000062	#6-875
C\$CLEA	= 000012	#6-875 26-1595
C\$CLOS	= 000035	#6-875
C\$CLP1	= 000006	#6-875 31-1721 35-1872 36-1899 36-1911 36-1920 36-1932 40-2065 41-2124
		42-2184 43-2259
C\$CVEC	= 000036	#6-875
C\$DCLN	= 000044	#6-875
C\$DODU	= 000051	#6-875
C\$DRPT	= 000024	#6-875
C\$DU	= 000053	#6-875 27-1631
C\$EDIT	= 000003	#6-875 6-901
C\$ERDF	= 000055	#6-875
C\$ERHR	= 000056	#6-875 30-1696 31-1716 32-1764 33-1799 33-1811 34-1838 35-1871 35-1877
		36-1898 36-1907 36-1919 36-1928 36-1953 37-1977 38-2002 39-2027 40-2064

J7

SYMBOL CROSS REFERENCE CREF V02

SEQ 0086

SYMBOL	VALUE	REFERENCES								
		40-2085	41 2122	41-2145	42-2182	42-2205	43-2254	43-2280	44-2333	44-2338
		45-2389	45 2396	45-2408	45-2415	46 2450	46-2457	46-2469	46-2477	47-2512
		47-2519	47-2531	47-2539	49-2606	49-2643	49-2652			
C\$ERRO	= 000060	#6-875								
C\$ERSF	= 000054	#6-875								
C\$ERSO	= 000057	#6-875								
C\$ESCA	= 000010	#6-875	45-2390	45-2397	45-2409	46-2451	46-2458	46 2470	47-2513	47-2520
		47-2532	49-2607	49-2644						
C\$ESEG	= 000005	#6-875								
C\$ESUB	= 000003	#6-875	30-1699	31-1727	32-1776	33-1813	34 1851	35-1879	36-1954	37-1979
		38-2004	39-2029	40-2087	41-2147	42-2207	43-2281	44 2354		
C\$ETST	= 000001	#6-875	31-1729	34-1853	39-2030	44-2355	45-2416	46-2478	47-2540	48-2585
		49-2656								
C\$EXIT	= 000032	#6-875	26-1590							
C\$GETB	= 000026	#6-875								
C\$GETW	= 000027	#6-875								
C\$GMAN	= 000043	#6-875								
C\$GPHR	= 000042	#6-875	24-1558							
C\$GPLO	= 000030	#6-875								
C\$GPRI	= 000040	#6-875								
C\$INIT	= 000011	#6-875	24-1564							
C\$INLP	= 000020	#6-875								
C\$MANI	= 000050	#6-875								
C\$MEM	= 000031	#6-875								
C\$MSG	= 000023	#6-875	16-1239	16-1249	16-1256	16-1265				
C\$OPEN	= 000034	#6-875								
C\$PNTB	= 000014	#6-875	16-1215	16 1244	16-1252	16-1259				
C\$PNTF	= 000017	#6-875								
C\$PNTS	= 000016	#6-875								
C\$PNTX	= 000015	#6-875	16-1227	16-1228						
C\$QIO	= 000377	#6-875								
C\$RDBU	= 000007	#6-875								
C\$REFG	= 000047	#6-875	24-1540	24-1542	24-1544	24-1546	24 1548			
C\$RESE	= 000033	#6-875	#6-875							
C\$REVI	= 000003	#6-875	6-901							
C\$RFLA	= 000021	#6-875								
C\$RPT	= 000025	#6-875	22-1489							
C\$SEFG	= 000046	#6-875								
C\$SPRI	= 000041	#6-875								
C\$SVEC	= 000037	#6-875								
C\$TPRI	= 000013	#6-875								
DFPTBL	002150 G	#8-923								
DIAGMC	= 000000	6-875	6-875							
DIHI	= 000015 G	#11-971	41-2114	41-2140	42-2174	42-2200	44-2348			
DLO	= 000010 G	#11-969	16-1217	37-1972	40-2058	40-2060	40-2080	44 2312	44 2320	44-2321
		44-2346								
DOHI	= 000011 G	#11-970	38-1997	41-2112	43-2233	44-2315				
DTST	004532	#15-1083	49-2602							
DTTST	004444	#15-1073	47-2508							
EF.CON	= 000036 G	#10-954	24-1540							
EF.NEW	= 000035 G	#10-954	24-1544							
EF.PWR	= 000034 G	#10 954	24-1548							

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0087

SYMBOL	VALUE	REFERENCES
EF.RES	= 000037 G	#10-954 24-1546
EF.STA	= 000040 G	#10-954 24-1542
EM1	003534 G	#14-1036 35-1871 37-1977 38-2002 39-2027 40-2085 41-2145 42-2205 43 2280
EM10	004127 G	#14-1045 46-2469
EM11	004152 G	#14-1046 46-2477
EM12	004177 G	#14-1047 47-2531
EM13	004220 G	#14-1048 47-2539
EM14	004243 G	#14-1049 44-2338
EM2	003607 G	#14-1037 35-1877 36-1953
EM3	003633 G	#14-1038 36-1898
EM4	003673 G	#14-1039 36-1907
EM5	003735 G	#14-1040 36-1919
EM6	003775 G	#14-1041 36-1928
EM7	004037 G	#14-1042 40-2064 41-2122 42-2182 43 2254 44 2333 49-2652
EM8	004057 G	#14-1043 45-2408
EM9	004102 G	#14-1044 45 2415
ENDIN	006276	24-1541 24-1549 #24-1563
ERPNT	005600 G	#16-1258 49-2652
ERRBLK	002164 G	#12-987
ERRMSG	002162 G	#12-987
ERRNBR	002160 G	#12-987
ERRTYP	002156 G	#12-987
ERR0	005126	16-1215 #16-1233
ERR01	005207	16-1227 #16-1234
ERR02	005270	16-1228 #16-1236
ERR1	005402	16-1244 #16-1247
ERR2	005516	16-1252 #16-1254
ERR3	005634	16-1259 #16-1263
EVL	= 000004 G	#10-954
EXTR	= 000016 G	#11-975 42-2172
E\$END	= 002100	#6-875
E\$LOAD	= 000035	#6-875 6-901
F\$AU	= 000015	#6-875 26-1641 28-1668
F\$AUTO	= 000020	#6-875 25-1575 25-1578
F\$BGN	= 000040	#6-875 16-1208 16-1241 16-1251 16-1258 22 1482 23-1498 24 1514 25 1575
		26-1587 26-1590 27-1604 28-1641 30-1676 30-1683 30-1683 30-1699 31-1707
		31-1707 31-1727 31-1729 32-1733 32-1740 32-1740 32-1776 33-1784 33-1784
		33-1813 34-1821 34-1821 34-1851 34-1853 35-1856 35-1863 35 1863 35-1879
		36-1887 36-1887 36-1954 37 1962 37-1962 37 1979 38-1987 38-1987 38-2004
		39-2012 39-2012 39-2029 39-2030 40-2033 40-2041 40-2041 40-2087 41-2095
		41-2095 41-2147 42-2155 42-2155 42-2207 43-2215 43-2215 43-2281 44-2292
		44-2292 44-2354 44-2355 45-2366 45-2390 45-2397 45-2409 45-2416 46-2427
		46-2451 46-2458 46-2470 46-2478 47-2489 47-2513 47-2520 47 2532 47-2540
		48-2549 48-2585 49-2594 49-2607 49-2644 49-2656 50-2672 51-2696
F\$CLEA	= 000007	#6-875 26-1587 26-1595
F\$DU	= 000016	#6-875 27-1604 27-1631
F\$END	= 000041	#6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875
		6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875 6-875
		16-1239 16-1246 16-1249 16-1253 16-1256 16-1262 16-1265 22-1484 22-1489
		24-1564 25-1578 26-1590 26-1595 27-1615 27-1631 28-1652 28-1668 30 1676
		30-1676 30-1676 30-1683 30-1683 30-1699 30-1699 31 1707 31-1707 31-1727
		31-1727 31-1729 31 1729 32-1733 32 1733 32-1733 32 1740 32 1740 32 1776

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0088

SYMBOL	VALUE	REFERENCES									
		32-1776	33-1784	33-1784	33-1813	33-1813	34-1821	34-1821	34-1851	34-1851	
		34-1853	34-1853	35-1856	35-1856	35-1856	35-1863	35-1863	35-1879	35-1879	
		36-1887	36-1887	36-1954	36-1954	37-1962	37-1962	37-1979	37-1979	38-1987	
		38-1987	38-2004	38-2004	39-2012	39-2012	39-2029	39-2029	39-2030	39-2030	
		40-2033	40-2033	40-2033	40-2041	40-2041	40-2087	40-2087	41-2095	41-2095	
		41-2147	41-2147	42-2155	42-2155	42-2207	42-2207	43-2215	43-2215	43-2281	
		43-2281	44-2292	44-2292	44-2354	44-2354	44-2355	44-2355	45-2366	45-2366	
		45-2366	45-2390	45-2397	45-2409	45-2416	45-2416	46-2427	46-2427	46-2427	
		46-2451	46-2458	46-2470	46-2478	46-2478	47-2489	47-2489	47-2489	47-2513	
		47-2520	47-2532	47-2540	47-2540	48-2549	48-2549	48-2549	48-2585	48-2585	
		49-2594	49-2594	49-2594	49-2607	49-2644	49-2656	49-2656	50-2677	51-2700	
F\$HARD	= 000004	#6-875	50-2672	50-2677							
F\$HW	= 000013	#6-875	8-923	8-927							
F\$INIT	= 000006	#6-875	24-1514	24-1564							
F\$JMP	= 000050	#6-875	16-1232	16-1232	16-1246	16-1246	16-1253	16-1253	16-1262	16-1262	
		22-1484	22-1484	26-1590	27-1615	27-1615	28-1652	28-1652			
F\$MOD	= 000000	#6-875									
F\$MSG	= 000011	#6-875	16-1208	16-1239	16-1241	16-1249	16-1251	16-1256	16-1258	16-1265	
F\$PROT	= 000021	#6-875	23-1498	23-1504							
F\$PWR	= 000017	#6-875									
F\$RPT	= 000012	#6-875	22-1482	22-1489							
F\$SEG	= 000003	#6-875									
F\$SOFT	= 000005	#6-875	51-2696	51-2700							
F\$SRV	= 000010	#6-875									
F\$SUB	= 000002	#6-875	30-1683	30-1699	31-1707	31-1727	32-1740	32-1776	33-1784	33-1813	
		34-1821	34-1851	35-1863	35-1879	36-1887	36-1954	37-1962	37-1979	38-1987	
		38-2004	39-2012	39-2029	40-2041	40-2087	41-2095	41-2147	42-2155	42-2207	
		43-2215	43-2281	44-2292	44-2354						
F\$SW	= 000014	#6-875	9-938	9-941							
F\$TEST	= 000001	#6-875	30-1676	31-1729	32-1733	34-1853	35-1856	39-2030	40-2033	44-2355	
		45-2366	45-2416	46-2427	46-2478	47-2489	47-2540	48-2549	48-2585	49-2594	
		49-2656									
G\$CNTD	= 000200	#6-875									
G\$DELM	= 000372	#6-875									
G\$DISP	= 000003	#6-875									
G\$EXCP	= 000400	#6-875									
G\$HILI	= 000002	#6-875									
G\$LOLI	= 000001	#6-875									
G\$NO	= 000000	#6-875	50-2674								
G\$OFFS	= 000400	#6-875	50-2674	50-2675							
G\$OFSI	= 000376	#6-875	50-2674	50-2675							
G\$PRMA	= 000001	#6-875	50-2674								
G\$PRMD	= 000002	#6-875									
G\$PRML	= 000000	#6-875	50-2675								
G\$RADA	= 000140	#6-875									
G\$RADB	= 000000	#6-875									
G\$RADD	= 000040	#6-875									
G\$RADL	= 000120	#6-875	50-2675								
G\$RADO	= 000020	#6-875	50-2674								
G\$XFER	= 000004	#6-875									
G\$YES	= 000010	#6-875	50-2675								
MD2	012622	50-2674	#50-2679								

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0089

SYMBOL	VALUE	REFERENCES
HDS	012637	50-2675 #50-2680
HELP	• 000001	#6 860 6-870 6-884 24-1516 27-1606 27-1617 28-1643 28-1654
HOE	• 100000 G	#10-954
IBE	• 010000 G	#10-954
IDU	• 000040 G	#10-954
IER	• 020000 G	#10-954
IRDTST	004310	#15-1055 45-2385
ISR	• 000100 G	#10-954
IXE	• 004000 G	#10-954
I\$AU	• 000041	#6-875 #28-1641 #28-1668
I\$AUTO	• 000041	#6-875 #25-1575 #25-1578
I\$CLN	• 000041	#6-875 #26-1587 26-1590 #26 1595
I\$DU	• 000041	#6-875 #27-1604 #27-1631
I\$HRD	• 000041	#50-2672 #50-2677
I\$INIT	• 000041	#6-875 #24-1514 #24-1564
I\$MOD	• 000041	#6-875
I\$MSG	• 000041	#6-875 #16-1208 #16-1239 #16 1241 #16-1249 #16 1251 #16-1256 #16 1258 #16 1265
I\$PROT	• 000040	#6-875 #23-1498
I\$PTAB	• 000041	#6-875
I\$PWR	• 000041	#6-875
I\$RPT	• 000041	#6-875 #22-1482 #22-1489
I\$SEG	• 000041	#6-875 30-1676 30-1683 31-1707 32-1733 32-1740 33 1784 34 1821 35 1856
		35-1863 36-1887 37-1962 38 1987 39-2012 40-2033 40-2041 41 2095 42 2155
		43 2215 44-2292 45-2366 46-2427 47-2489 48-2549 49-2594
I\$SETU	• 000041	#6-875
I\$SFT	• 000041	#51-2696 #51-2700
I\$SRV	• 000041	#6-875
I\$SUB	• 000041	#6-875 30-1676 30-1683 #30-1683 30 1699 #30-1699 #30-1699 31 1707 #31-1707
		31 1727 #31-1727 #31-1727 32-1733 32-1740 #32-1740 32-1776 #32 1776 #32 1776
		33 1784 #33-1784 33-1813 #33-1813 #33-1813 34-1821 #34-1821 34-1851 #34-1851
		#34-1851 35-1856 35-1863 #35-1863 35-1879 #35-1879 #35-1879 36-1887 #36-1887
		36-1954 #36-1954 #36-1954 37 1962 #37-1962 37-1979 #37-1979 #37-1979 38 1987
		#38-1987 38-2004 #38-2004 #38-2004 39-2012 #39-2012 39-2029 #39-2029 #39 2029
		40-2033 40-2041 #40-2041 40-2087 #40-2087 #40-2087 41-2095 #41 2095 41 2147
		#41-2147 #41-2147 42-2155 #42-2155 42-2207 #42-2207 #42-2207 43 2215 #43 2215
		43-2281 #43-2281 #43-2281 44-2292 #44-2292 44-2354 #44-2354 #44 2354 45 2366
		46-2427 47-2489 48-2549 49-2594
I\$TST	• 000041	#6-875 30-1676 #30-1676 30-1683 31-1707 31-1729 #31-1729 #31 1729 32-1733
		#32-1733 32-1740 33-1784 34-1821 34-1853 #34-1853 #34-1853 35-1856 #35-1856
		35-1863 36-1887 37-1962 38-1987 39-2012 39-2030 #39-2030 #39-2030 40-2033
		#40-2033 40-2041 41-2095 42-2155 43-2215 44-2292 44-2355 #44-2355 #44-2355
		45-2366 #45-2366 45-2390 45-2397 45-2409 45-2416 #45-2416 #45-2416 46-2427
		#46-2427 46-2451 46-2458 46-2470 46-2478 #46-2478 #46-2478 47-2489 #47-2489
		47-2513 47-2520 47-2532 47-2540 #47-2540 #47-2540 48-2549 #48-2549 48-2585
		#48-2585 #48-2585 49-2594 #49-2594 49-2607 49-2644 49-2656 #49-2656 #49-2656
J\$JMP	• 000167	#6-875 16-1232 16-1246 16-1253 16-1262 22-1484 27 1615 28-1652
KCSR	002166 G	#12-988 17-1291 18-1322 20-1414 #24-1560 30-1685 31 1708 32 1747 33 1785
		34-1822 35-1864 37 1963 38 1988 39-2013 40-2042 41 2096 42-2156 43 2216
		44 2293 45-2368 46 2429 47-2491 48-2550 49 2596
KMC1	003260 G	#14-1024 30-1696
KMC2	003331 G	#14 1025 31 1716
KMC3	003356 G	#14 1026 33 1799

CZKMVA CREATED BY MACRO ON 15-MAR-85 AT 16:15 PAGE 6

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0090

SYMBOL	VALUE	REFERENCES
KMC4	003403 G	#14-1027 33-1811
KMC5	003460 G	#14-1028 32-1764 45-2389 46-2450 47-2512 49 2606
KMC6	003475 G	#14-1029 34-1838
KMC7	003516 G	#14-1030 45-2396 46-2457 47-2519 49-2643
LOAD	006062	#21-1448 45-2386 46-2447 47-2509 49-2603
LOE	- 040000 G	#10-954
LOGUNT	002170 G	#12-989 *24-1554 *24-1555 24-1556 24 1558
LOT	- 000010 G	#10-954
L\$ACP	002110 G	#6-901
L\$APT	002036 G	#6-901
L\$AU	006316 G	6-901 #28-1641
L\$AUT	002070 G	#6-901
L\$AUTO	006300 G	6-901 #25-1575
L\$CCP	002106 G	#6-901
L\$CLEA	006302 G	6-901 #26-1587
L\$CO	002032 G	#6-901
L\$DEPO	002011 G	#6-901
L\$DESC	003234 G	6-901 #13 1015
L\$DESP	002076 G	#6-901
L\$DEVP	002060 G	#6-901
L\$DISP	002124 G	6-901 #7-911
L\$DLY	002116 G	#6-901
L\$DTP	002040 G	#6-901
L\$DTYP	002034 G	#6-901
L\$DU	006310 G	6-901 #27-1604
L\$DUT	002072 G	#6-901
L\$DVTY	003224 G	6-901 #13 1010
L\$EF	002052 G	#6-901
L\$ENVI	002044 G	#6-901
L\$ERRT	002156 G	6-901 #12-987
L\$ETP	002102 G	#6-901
L\$EXP1	002046 G	#6-901
L\$EXP4	002064 G	#6-901
L\$EXP5	002066 G	#6-901
L\$HARD	012604 G	6-901 50-2672 #50-2672
L\$HIME	002120 G	#6-901
L\$HPCP	002016 G	#6-901
L\$HPTP	002022 G	#6-901
L\$HW	002150 G	6-901 8-923 #8-923
L\$ICP	002104 G	#6 901
L\$INIT	006160 G	6 901 #24-1514
L\$LADP	002026 G	#6-901
L\$LAST	012710 G	6-901 #51-2708
L\$LOAD	002100 G	#6-901
L\$LUN	002074 G	#6-901
L\$MREV	002050 G	#6-901
L\$NAME	002000 G	#6-901
L\$PRIO	002042 G	#6-901
L\$PROT	006152 G	6-901 #23-1498
L\$PRT	002112 G	#6-901
L\$REPP	002062 G	#6-901
L\$REV	002010 G	#6-901

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SYMBOL CROSS REFERENCE

CREF V02

SEQ 0091

SYMBOL	VALUE	REFERENCES
L#RPT	006144 G	6-901 #22-1482
L#SOFT	012664 G	51-2696 #51-2696
L#SPC	002056 G	#6-901
L#SPCP	002020 G	#6-901
L#SPTP	002024 G	#6-901
L#STA	002030 G	#6-901
L#SW	002156 G	6-901 9-938 #9-938
L#TEST	002114 G	#6-901
L#TIML	002014 G	#6-901
L#UNIT	002012 G	#6-901 24-1556
L10000	002154	8-923 #8-927
L10001	002156	9-938 #9-941
L10002	005336	16-1232 #16-1239
L10003	005462	16-1246 #16-1249
L10004	005576	16-1253 #16-1256
L10005	005676	16-1262 #16-1265
L10006	006150	22-1484 #22-1489
L10010	006276	#24-1564
L10011	006300	#25-1578
L10012	006306	26-1590 #26-1595
L10013	006314	27-1615 #27-1631
L10014	006322	28-1652 #28-1668
L10015	006462	#31-1729
L10016	006402	#30-1699
L10017	006460	#31-1727
L10020	007046	#34-1853
L10021	006576	#32-1776
L10022	006722	#33-1813
L10023	007044	#34-1851
L10024	007760	#39-2030
L10025	007140	#35-1879
L10026	007500	#36-1954
L10027	007572	#37-1979
L10030	007664	#38-2004
L10031	007756	#39-2029
L10032	011322	#44-2355
L10033	010154	#40-2087
L10034	010366	#41-2147
L10035	010600	#42-2207
L10036	011040	#43-2281
L10037	011320	#44-2354
L10040	011546	45-2390 45-2397 45-2409 #45-2416
L10041	011772	46-2451 46-2458 46-2470 #46-2478
L10042	012216	47-2513 47-2520 47-2532 #47-2540
L10043	012332	#48-2585
L10044	012600	49-2607 49-2644 #49-2656
L10045	012622	50-2672 #50-2677
L10046	012664	51-2696 #51-2700
MAINT	= 000017 G	#11-976 35-1866 36-1892 36-1894 36 1901 36 1903 36-1913 36 1915 36-1922 36-1924 36-1934 36-1944 36-1946 37-1970 38 1995 39-2020 40 2052 40-2078 41-2106 41-2138 42-2166 42-2198 43 2226 43 2273 44 2306 44 2329 45-2379 46-2440 47-2502 48 2564 48-2574

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0092

SYMBOL	VALUE	REFERENCES
MCLR	= 040000 G	#11-963 17-1293 49-2632 49-2633
MSCLR	005700 G	#17-1290 33-1806 35-1865 36-1936 37-1964 38-1989 39-2014 40-2072 41-2132
		42-2192 43-2267 44-2353 45-2369 45-2401 46-2430 46-2462 47-2492 47-2524
		48-2584 49-2597 49-2655
MTMODE	002172 G	*12-530 *24-1561 35-1875 36-1937 36-1950 37-1965 38-1990 39-2015 40-2046
		40-2073 41-2100 41-2133 42-2160 42-2193 43-2220 43-2268 44-2298 45-2373
		46-2434 47-2496 49-2625
NDPCT	004356	#15-1063 46-2446
NEXT	006240	24-1550 #24-1555 24-1559
ONEFIL	= 000001	#6-864 6-888 9-943 10-944 21-1470 22-1471 28-1671 29-1672
O\$APTS	= 000000	#6-875 6-901
O\$AU	= 000001	#6-875 #6-899 6-901
O\$BGNR	= 000001	#6-875 #6-899 6-901
O\$BGNS	= 000000	#6-875 6-901
O\$DU	= 000001	#6-875 #6-899 6-901
O\$ERRT	= 000001	#6-875 #6-899 6-901
O\$GNSW	= 000001	#6-875 #6-899 6-901
O\$POIN	= 000001	#6-875 #6-899 #6-899 #6-899 #6-899 #6-899 6-899 6 901
O\$SETU	= 000000	#6-875 6-901 51-2708
PNT	= 001000 G	#10-954
PNTD	004702 G	#16-1208 35-1871 36-1953 37-1977 38-2002 39-2027 40 2064 40-2085 41-2122
		41-2145 42-2182 42-2205 43-2254 43-2280 44-2333 44 2338
PNTRAM	005340 G	#16-1241 34-1838
PNTREG	005464 G	#16-1251 31-1716 32-1764
PRI	= 002000 G	#10-954
PRI00	= 000000 G	#10-954
PRI01	= 000040 G	#10-954
PRI02	= 000100 G	#10-954
PRI03	= 000140 G	#10-954
PRI04	= 000200 G	#10-954
PRI05	= 000240 G	#10-954
PRI06	= 000300 G	#10-954
PRI07	= 000340 G	#10-954
RAMI	= 001000 G	#11-960 18-1323
RAMO	= 002000 G	#11-961 21-1450 21-1460 32-1752 32-1765
RCBUF	002624 G	#12-997 49-2612 49-2619 49-2631 49-2649 49-2653
READ	005760 G	16-1219 #19-1362 35-1867 36-1895 36-1904 36-1916 36-1925 36-1947 37-1973
		38-1998 39-2023 40-2061 40-2081 41-2115 41-2141 42-2175 42-2201 43-2236
		43-2276 44-2323 45-2404 45-2411 46-2465 46-2473 47-2527 47-2535
ROMCLK	005732 G	#18-1321 19-1380 20-1418 33-1793 33 1795 33-1808 34-1831 34-1834 34-1847
RPNT	002220 G	#12-994 44-2297
RUN	= 100000 G	#11-964 45-2391 46-2452 47-2514 49-2634
SFPTBL	002156 G	#9-938
START	006232	24-1543 24-1545 24-1547 #24-1554 24-1557
STEP	= 000400 G	#11-959 18-1325 18-1326
STRB	= 000012 G	#11-973
SVCGBL	= 000000	#6-875 #6-881 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901
		6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901
		6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901
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		6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901 6-901
		12-987 13-1010 13-1015 16-1208 16-1241 16-1251 16 1256 22 1482 23-1498

SYMBOL	VALUE	REFERENCES
26-1590	26-1590	26-1595
27-1615	27-1615	27-1631
28-1652	28-1652	28-1668
30-1696	30-1696	30-1696
30-1696	30-1696	30-1699
31-1716	31-1716	31-1716
31-1716	31-1716	31-1721
31-1729	31-1729	32-1740
32-1764	32-1764	32-1764
32-1776	32-1776	33-1784
33-1799	33-1799	33-1799
33-1811	33-1811	33-1811
33-1811	33-1811	33-1813
34-1838	34-1838	34-1838
34-1838	34-1838	34-1851
35-1863	35-1863	35-1871
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36-1919	36-1919	36-1919
36-1928	36-1928	36-1928
36-1928	36-1928	36-1932
36-1953	36-1953	36-1953
36-1954	36-1954	37-1962
37-1977	37-1977	37-1977
37-1979	37-1979	38-1987
38-2002	38-2002	38-2002
38-2004	38-2004	39-2012
39-2027	39-2027	39-2027
39-2029	39-2029	39-2030
40-2064	40-2064	40-2064
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40-2085	40-2085	40-2085
40-2087	40-2087	41-2095
41-2122	41-2122	41-2122
41-2124	41-2124	41-2145
41-2145	41-2145	41-2145
42-2155	42-2155	42-2182
42-2182	42-2182	42-2182
42-2205	42-2205	42-2205
42-2205	42-2205	42-2207
43-2254	43-2254	43-2254
43-2254	43-2254	43-2259
43-2280	43-2280	43-2280
43-2281	43-2281	44-2292
44-2333	44-2333	44-2333
44-2338	44-2338	44-2338
44-2338	44-2338	44-2354
26-1595	26-1595	26-1595
27-1631	27-1631	27-1631
28-1668	28-1668	28-1668
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36-1898	36-1898	36-1898
36-1898	36-1898	36-1899
36-1907	36-1907	36-1907
36-1919	36-1919	36-1919
36-1919	36-1919	36-1919
36-1928	36-1928	36-1928
36-1932	36-1932	36-1932
36-1953	36-1953	36-1953
37-1962	37-1962	37-1962
37-1977	37-1977	37-1977
38-1987	38-1987	38-1987
38-2002	38-2002	38-2002
39-2012	39-2012	39-2012
39-2027	39-2027	39-2027
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40-2064	40-2064	40-2064
40-2065	40-2065	40-2065
40-2085	40-2085	40-2085
41-2095	41-2095	41-2095
41-2122	41-2122	41-2122
41-2145	41-2145	41-2145
41-2145	41-2145	41-2145
42-2182	42-2182	42-2182
42-2182	42-2182	42-2182
42-2205	42-2205	42-2205
42-2207	42-2207	42-2207
43-2254	43-2254	43-2254
43-2259	43-2259	43-22

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0095

SYMBOL VALUE REFERENCES

			45-2389	45-2389	45-2389	45-2389	45-2389	45-2389	45-2389
			45-2389	45-2389	45-2390	45-2390	45-2390	45-2390	45-2396
			45-2396	45-2396	45-2396	45-2396	45-2396	45-2396	45-2396
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			45-2408	45-2408	45-2408	45-2408	45-2408	45-2408	45-2408
			45-2408	45-2408	45-2409	45-2409	45-2409	45-2409	45-2415
			45-2415	45-2415	45-2415	45-2415	45-2415	45-2415	45-2415
			45-2415	45-2415	45-2416	45-2416	45-2416	45-2416	45-2415
			46-2450	46-2450	46-2450	46-2450	46-2450	46-2450	46-2450
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			46-2457	46-2457	46-2457	46-2457	46-2457	46-2457	46-2457
			46-2458	46-2458	46-2458	46-2458	46-2458	46-2458	46-2458
			46-2469	46-2469	46-2469	46-2469	46-2469	46-2469	46-2469
			46-2470	46-2470	46-2470	46-2470	46-2470	46-2470	46-2470
			46-2477	46-2477	46-2477	46-2477	46-2477	46-2477	46-2477
			46-2478	46-2478	46-2478	46-2478	46-2478	46-2478	46-2478
			47-2512	47-2512	47-2512	47-2512	47-2512	47-2512	47-2512
			47-2513	47-2513	47-2513	47-2513	47-2513	47-2513	47-2513
			47-2519	47-2519	47-2519	47-2519	47-2519	47-2519	47-2519
			47-2520	47-2520	47-2520	47-2520	47-2520	47-2520	47-2520
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			49-2607	49-2607	49-2607	49-2607	49-2607	49-2607	49-2607
			49-2643	49-2643	49-2643	49-2643	49-2643	49-2643	49-2643
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			49-2652	49-2652	49-2652	49-2652	49-2652	49-2652	49-2652
			49-2652	49-2652	49-2652	49-2652	49-2652	49-2652	49-2652
			50-2672	50-2672	50-2672	50-2672	50-2672	50-2672	50-2672
			50-2674	50-2674	50-2674	50-2674	50-2674	50-2674	50-2674
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			51-2696	51-2696	51-2700	51-2700	51-2700	51-2700	51-2696
			51-2708	51-2708	51-2708	51-2708	51-2708	51-2708	51-2708
SVCSUB	= 000001		#6-875	#6-880	30-1683	31-1707	32-1740	33-1784	34-1821
			37-1962	38-1987	39-2012	40-2041	41-2095	42-2155	43-2215
SVCTAG	= 000001		#6-875	#6-882	8-927	9-941	16-1239	16-1249	16-1256
			24-1564	25-1578	26-1595	27-1631	28-1668	30-1699	31-1727
			33-1813	34-1851	34-1853	35-1879	36-1954	37-1979	38-2004
			40-2087	41-2147	42-2207	43-2281	44-2354	44-2355	45-2416
			48-2585	49-2656	50-2677	51-2700			46-2478
SVCTST	= 000001		#6-875	#6-879	30-1676	32-1733	35-1856	40-2033	45-2366
			48-2549	49-2594					46-2427
S\$LSYM	= 010000		#6-875	#8-927	#9-941	#16-1239	#16-1249	#16-1256	#16-1265
			#25-1578	#26-1595	#27-1631	#28-1668	#30-1699	#31-1727	#31-1729
			#34-1851	#34-1853	#35-1879	#36-1954	#37-1979	#38-2004	#39-2029
			#41-2147	#42-2207	#43-2281	#44-2354	#44-2355	#45-2416	#46-2478
			#49-2656	#50-2677	#51-2700				#47-2540
TEMP	002174	G	#12-991	*16-1214	16-1215	*19-1363	*30-1686	30-1698	*32-1760
TEMP1	002176	G	#12-992	16-1216	16-1226	*44-2320	44-2324	44-2346	*44-2348
TRBUF	002224	G	#12-996	49-2630	49-2648				*44-2350
T\$ARGC	= 000003		#6-901	6-901	#6-901	6-901	6-901	#6-901	6-901

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0096

SYMBOL	VALUE	REFERENCES									
		6-901	6-901	#6-901	6-901	6-901	#6-901	6-901	6-901	#16-1215	
		16-1215	#16-1215	16-1215	#16-1215	16-1215	#16-1215	16-1215	16-1215	#16-1227	
		16-1227	#16-1227	16-1227	#16-1227	16-1227	#16-1227	16-1227	16-1227	#16-1228	
		16-1228	#16-1228	16-1228	#16-1228	16-1228	#16-1228	16-1228	#16-1228	16-1228	
		#16-1228	16-1228	16-1228	#16-1244	16-1244	#16-1244	16-1244	#16-1244	16-1244	
		#16-1244	16-1244	16-1244	#16-1252	16-1252	#16-1252	16-1252	#16-1252	16-1252	
		#16-1252	16-1252	16-1252	#16-1259	16-1259	#16-1259	16-1259	#16-1259	16-1259	
		16-1259									
T\$CODE	= 001130	#50-2674	50-2674	#50-2674	50-2674	#50-2674	50-2674	#50-2675	50-2675	#50-2675	
		50-2675	#50-2675	50-2675							
T\$ERRN	= 000051	#6-875	#30-1696	30-1696	#31-1716	31-1716	#32-1764	32-1764	#33-1799	33-1799	
		#33-1811	33-1811	#34-1838	34-1838	#35-1871	35-1871	#35-1877	35-1877	#36-1898	
		36-1898	#36-1907	36-1907	#36-1919	36-1919	#36-1928	36-1928	#36-1953	36-1953	
		#37-1977	37-1977	#38-2002	38-2002	#39-2027	39-2027	#40-2064	40-2064	#40-2085	
		40-2085	#41-2122	41-2122	#41-2145	41-2145	#42-2182	42-2182	#42-2205	42-2205	
		#43-2254	43-2254	#43-2280	43-2280	#44-2333	44-2333	#44-2338	44-2338	#45-2389	
		45-2389	#45-2396	45-2396	#45-2408	45-2408	#45-2415	45-2415	#46-2450	46-2450	
		#46-2457	46-2457	#46-2469	46-2469	#46-2477	46-2477	#47-2512	47-2512	#47-2519	
		47-2519	#47-2531	47-2531	#47-2539	47-2539	#49-2606	49-2606	#49-2643	49-2643	
		#49-2652	49-2652								
T\$EXCP	= 000000	#50-2674	50-2674								
T\$FLAG	= 000040	#16-1232	#16-1232	16-1232	#16-1246	#16-1246	16-1246	#16-1253	#16-1253	16-1253	
		#16-1262	#16-1262	16-1262	#22-1484	#22-1484	22-1484	#26-1590	#26-1590	26-1590	
		26-1590	#27-1615	#27-1615	27-1615	#28-1652	#28-1652	28-1652	#45-2390	#45-2390	
		45-2390	#45-2397	#45-2397	45-2397	#45-2409	#45-2409	45-2409	#46-2451	#46-2451	
		46-2451	#46-2458	#46-2458	46-2458	#46-2470	#46-2470	46-2470	#47-2513	#47-2513	
		47-2513	#47-2520	#47-2520	47-2520	#47-2532	#47-2532	47-2532	#49-2607	#49-2607	
		49-2607	#49-2644	#49-2644	49-2644						
T\$GMAN	= 000000	#6-875									
T\$HILI	= 177770	#50-2674	50-2674								
T\$LAST	= 000001	#6-875	#51-2708								
T\$LOLI	= 160000	#50-2674	50-2674								
T\$LSYM	= 010000	#6-875	6-875	8-927	9-941	16-1239	16-1249	16-1256	16-1265	22-1489	
		24-1564	25-1578	26-1595	27-1631	28-1668	30-1699	31-1727	31-1729	32-1776	
		33-1813	34-1851	34-1853	35-1879	36-1954	37-1979	38-2004	39-2029	39-2030	
		40-2087	41-2147	42-2207	43-2281	44-2354	44-2355	45-2416	46-2478	47-2540	
		48-2585	49-2656	50-2677	51-2700						
T\$LTNO	= 000011	#51-2708									
T\$NEST	= 177777	#6-875	8-923	#8-923	8-923	8-927	8-927	8-927	#8-927	9-938	
		#9-938	9-938	9-941	9-941	9-941	#9-941	16-1208	#16-1208	16-1208	
		16-1239	16-1239	16-1239	#16-1239	16-1241	#16-1241	16-1241	16-1249	16-1249	
		16-1249	#16-1249	16-1251	#16-1251	16-1251	16-1256	16-1256	16-1256	#16-1256	
		16-1258	#16-1258	16-1258	16-1265	16-1265	16-1265	#16-1265	22-1482	#22-1482	
		22-1482	22-1489	22-1489	22-1489	#22-1489	23-1498	#23-1498	23-1498	23-1504	
		23-1504	23-1504	#23-1504	24-1514	#24-1514	24-1514	24-1564	24-1564	24-1564	
		#24-1564	25-1575	#25-1575	25-1575	25-1578	25-1578	25-1578	#25-1578	26-1587	
		#26-1587	26-1587	26-1595	26-1595	26-1595	#26-1595	27-1604	#27-1604	27-1604	
		27-1631	27-1631	27-1631	#27-1631	28-1641	#28-1641	28-1641	28-1668	28-1668	
		28-1668	#28-1668	30-1676	#30-1676	30-1676	30-1683	#30-1683	30-1683	30-1699	
		30-1699	30-1699	#30-1699	31-1707	#31-1707	31-1707	31-1727	31-1727	31-1727	
		#31-1727	31-1729	31-1729	31-1729	#31-1729	32-1733	#32-1733	32-1733	32-1740	
		#32-1740	32-1740	32-1776	32-1776	32-1776	#32-1776	33-1784	#33-1784	33-1784	

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0097

SYMBOL	VALUE	REFERENCES							
		33-1813	33-1813	33-1813	#33-1813	34-1821	#34-1821	34-1821	34-1851
		34-1851	#34-1851	34-1853	34-1853	34-1853	#34-1853	35-1856	#35-1856
		35-1863	#35-1863	35-1863	35-1879	35-1879	35-1879	#35-1879	36-1887
		36-1887	36-1954	36-1954	36-1954	#36-1954	37-1962	#37-1962	37-1979
		37-1979	37-1979	#37-1979	38-1987	#38-1987	38-1987	38-2004	38-2004
		#38-2004	39-2012	#39-2012	39-2012	39-2029	39-2029	39-2029	#39-2029
		39-2030	39-2030	#39-2030	40-2033	#40-2033	40-2033	40-2041	#40-2041
		40-2087	40-2087	40-2087	#40-2087	41-2095	#41-2095	41-2095	41-2147
		41-2147	#41-2147	42-2155	#42-2155	42-2155	42-2207	42-2207	#42-2207
		43-2215	#43-2215	43-2215	43-2281	43-2281	#43-2281	44-2292	#44-2292
		44-2292	44-2354	44-2354	44-2354	#44-2354	44-2355	44-2355	#44-2355
		45-2366	#45-2366	45-2366	45-2416	45-2416	#45-2416	46-2427	#46-2427
		46-2427	46-2478	46-2478	46-2478	#46-2478	47-2489	#47-2489	47-2540
		47-2540	47-2540	#47-2540	48-2549	#48-2549	48-2549	48-2585	48-2585
		#48-2585	49-2594	#49-2594	49-2594	49-2656	49-2656	49-2656	#49-2656
		#50-2672	50-2672	50-2677	50-2677	50-2677	#50-2677	51-2696	#51-2696
		51-2700	51-2700	51-2700	#51-2700				
T\$NSO	= 000005	#8-923	8-927	#9-938	9-941	#16-1208	16-1239	#16-1241	16-1249
		16-1256	#16-1258	16-1265	#22-1482	22-1489	#23-1496	23-1504	#24-1514
		#25-1575	25-1578	#26-1587	26-1595	#27-1604	27-1631	#28-1641	28-1668
		31-1729	#32-1733	34-1853	#35-1856	39-2030	#40-2033	44-2355	#45-2366
		#46-2427	46-2478	#47-2489	47-2540	#48-2549	48-2585	#49-2594	49-2656
		50-2677	#51-2696	51-2700					
T\$NS1	= 000002	#30-1683	30-1699	#31-1707	31-1727	#32-1740	32-1776	#33-1784	33-1813
		34-1851	#35-1863	35-1879	#36-1887	36-1954	#37-1962	37-1979	#38-1987
		#39-2012	39-2029	#40-2041	40-2087	#41-2095	41-2147	#42-2155	42-2207
		43-2281	#44-2292	44-2354					
T\$PTNU	= 000000	#6-875							
T\$SAVL	= 177777	#6-875							
T\$SEGL	= 177777	#6-875							
T\$SUBN	= 000000	#6-875	#30-1676	30-1683	#30-1683	30-1683	31-1707	#31-1707	31-1707
		32-1740	#32-1740	32-1740	33-1784	#33-1784	33-1784	34-1821	#34-1821
		#35-1856	35-1863	#35-1863	35-1863	36-1887	#36-1887	36-1887	37-1962
		37-1962	38-1987	#38-1987	38-1987	39-2012	#39-2012	39-2012	#40-2033
		#40-2041	40-2041	41-2095	#41-2095	41-2095	42-2155	#42-2155	42-2155
		#43-2215	43-2215	44-2292	#44-2292	44-2292	#45-2366	#46-2427	#47-2489
		#49-2594							
T\$TAGL	= 177777	#6-875							
T\$TAGN	= 010047	#6-875	8-923	8-923	#8-923	9-938	9-938	#9-938	16-1208
		#16-1208	16-1241	16-1241	#16-1241	16-1251	16-1251	#16-1251	16-1258
		#16-1258	22-1482	22-1482	#22-1482	23-1498	23-1498	#23-1498	24-1514
		#24-1514	25-1575	25-1575	#25-1575	26-1587	26-1587	#26-1587	27-1604
		#27-1604	28-1641	28-1641	#28-1641	30-1676	30-1676	#30-1676	30-1683
		#30-1683	31-1707	31-1707	#31-1707	32-1733	32-1733	#32-1733	32-1740
		#32-1740	33-1784	33-1784	#33-1784	34-1821	34-1821	#34-1821	35-1856
		#35-1856	35-1863	35-1863	#35-1863	36-1887	36-1887	#36-1887	37-1962
		#37-1962	38-1987	38-1987	#38-1987	39-2012	39-2012	#39-2012	40-2033
		#40-2033	40-2041	40-2041	#40-2041	41-2095	41-2095	#41-2095	42-2155
		#42-2155	43-2215	43-2215	#43-2215	44-2292	44-2292	#44-2292	45-2366
		#45-2366	46-2427	46-2427	#46-2427	47-2489	47-2489	#47-2489	48-2549
		#48-2549	49-2594	49-2594	#49-2594	50-2672	50-2672	#50-2672	51-2696
		#51-2696							

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0098

SYMBOL	VALUE	REFERENCES									
T\$TEMP	= 000005	#7-911	7-911	7-911	#7-911	7-911	7-911	#7-911	7-911	7-911	
		#7-911	7-911	7-911	#7-911	7-911	7-911	#7-911	7-911	7-911	
		#7-911	7-911	7-911	#7-911	7-911	7-911	#7-911	7-911	7-911	
		#7-911	#8-927	8-927	#9-941	9-941	#16-1232	16-1232	#16-1239	16-1239	
		#16-1246	16-1246	#16-1249	16-1249	#16-1253	16-1253	#16-1256	16-1256	#16-1262	
		16-1262	#16-1265	16-1265	#22-1484	22-1484	#22-1489	22-1489	#23-1504	23-1504	
		#24-1564	24-1564	#25-1578	25-1578	#26-1590	26-1590	#26-1595	26-1595	#27-1615	
		27-1615	#27-1631	27-1631	#28-1652	28-1652	#28-1668	28-1668	#30-1699	30-1699	
		#31-1727	31-1727	#31-1729	31-1729	#32-1776	32-1776	#33-1813	33-1813	#34-1851	
		34-1851	#34-1853	34-1853	#35-1879	35-1879	#36-1954	36-1954	#37-1979	37-1979	
		#38-2004	38-2004	#39-2029	39-2029	#39-2030	39-2030	#40-2087	40-2087	#41-2147	
		41-2147	#42-2207	42-2207	#43-2281	43-2281	#44-2354	44-2354	#44-2355	44-2355	
		#45-2390	45-2390	#45-2397	45-2397	#45-2409	45-2409	#45-2416	45-2416	#46-2451	
		46-2451	#46-2458	46-2458	#46-2470	46-2470	#46-2478	46-2478	#47-2513	47-2513	
		#47-2520	47-2520	#47-2532	47-2532	#47-2540	47-2540	#48-2585	48-2585	#49-2607	
		49-2607	#49-2644	49-2644	#49-2656	49-2656	#50-2674	50-2674	#50-2674	50-2674	
		#50-2674	50-2674	#50-2675	50-2675	#50-2675	50-2675	#50-2675	50-2675	#50-2677	
		50-2677	#51-2700	51-2700							
T\$TEST	= 000011	#6-875	30-1676	#30-1676	30-1676	30-1683	31-1707	32-1733	#32-1733	32-1733	
		32-1740	33-1784	34-1821	35-1856	#35-1856	35-1856	35-1863	36-1887	37-1962	
		38-1987	39-2012	40-2033	#40-2033	40-2033	40-2041	41-2095	42-2155	43-2215	
		44-2292	45-2366	#45-2366	45-2366	46-2427	#46-2427	46-2427	47-2489	#47-2489	
		47-2489	48-2549	#48-2549	48-2549	49-2594	#49-2594	49-2594	51-2708		
T\$TSTM	= 177777	#6-875	16-1215	16-1227	16-1228	16-1239	16-1244	16-1249	16-1252	16-1256	
		16-1259	16-1265	22-1489	24-1540	24-1542	24-1544	24-1546	24-1548	24-1558	
		24-1564	25-1578	26-1590	26-1595	27-1631	28-1668	30-1683	30-1696	30-1699	
		31-1707	31-1716	31-1721	31-1727	31-1729	32-1740	32-1764	32-1776	33-1784	
		33-1799	33-1811	33-1813	34-1821	34-1838	34-1851	34-1853	35-1863	35-1871	
		35-1872	35-1877	35-1879	36-1887	36-1898	36-1899	36-1907	36-1911	36-1919	
		36-1920	36-1928	36-1932	36-1953	36-1954	37-1962	37-1977	37-1979	38-1987	
		38-2002	38-2004	39-2012	39-2027	39-2029	39-2030	40-2041	40-2064	40-2065	
		40-2085	40-2087	41-2095	41-2122	41-2124	41-2145	41-2147	42-2155	42-2182	
		42-2184	42-2205	42-2207	43-2215	43-2254	43-2259	43-2280	43-2281	44-2292	
		44-2333	44-2338	44-2354	44-2355	45-2389	45-2390	45-2396	45-2397	45-2408	
		45-2409	45-2415	45-2416	46-2450	46-2451	46-2457	46-2458	46-2469	46-2470	
		46-2477	46-2478	47-2512	47-2513	47-2519	47-2520	47-2531	47-2532	47-2539	
		47-2540	48-2585	49-2606	49-2607	49-2643	49-2644	49-2652	49-2656		
T\$TSTS	= 000001	#6-875	#30-1676	#32-1733	#35-1856	#40-2033	#45-2366	#46-2427	#47-2489	#48-2549	
		#49-2594									
T\$AU	= 010014	#28-1641	28-1652	28-1668							
T\$AUT	= 010011	#25-1575	25-1578								
T\$CLE	= 010012	#26-1587	26-1590	26-1595							
T\$DU	= 010013	#27-1604	27-1615	27-1631							
T\$HAR	= 010045	#50-2672	50-2672	50-2677							
T\$HW	= 010000	#8-923	8-923	8-927							
T\$INI	= 010010	#24-1514	24-1564								
T\$MSG	= 010005	#16-1208	16-1232	16-1239	#16-1241	16-1246	16-1249	#16-1251	16-1253	16-1256	
		#16-1258	16-1262	16-1265							
T\$PRO	= 010007	#23-1498									
T\$RPT	= 010006	#22-1482	22-1484	22-1489							
T\$SOF	= 010046	#51-2696	51-2696	51-2700							
T\$SUB	= 010037	#30-1683	30-1699	#31-1707	31-1727	#32-1740	32-1776	#33-1784	33-1813	#34-1821	

SYMBOL CROSS REFERENCE

CREF V02

SEQ 0099

SYMBOL	VALUE	REFERENCES
T##SW	= 010001	34-1851 #35-1863 35-1879 #36 1887 36-1954 #37-1962 37-1979 #38-1987 38-2004
T##TES	= 010044	#39-2012 39-2029 #40-2041 40-2087 #41-2095 41-2147 #42-2155 42-2207 #43-2215
		43-2281 #44-2292 44-2354
		#9-938 9-938 9-941
		#30-1676 31-1729 #32-1733 34-1853 #35-1856 39-2030 #40-2033 44-2355 #45-2366
		45-2390 45 2397 45-2409 45-2416 #46-2427 46-2451 46-2458 46-2470 46-2478
		#47-2489 47-2513 47-2520 47-2532 47-2540 #48-2549 48-2585 #49-2594 49-2607
		49-2644 49-2656
T1	006324 G	7-911 #30-1676
T1.1	006324	#30-1683
T1.2	006404	#31-1707
T2	006464 G	7-911 #32-1733
T2.1	006464	#32-1740
T2.2	006600	#33-1784
T2.3	006724	#34-1821
T3	007050 G	7-911 #35-1856
T3.1	007050	#35-1863
T3.2	007142	#36-1887
T3.3	007502	#37-1962
T3.4	007574	#38-1987
T3.5	007666	#39-2012
T4	007762 G	7-911 #40-2033
T4.1	007762	#40-2041
T4.2	010156	#41-2095
T4.3	010370	#42-2155
T4.4	010602	#43-2215
T4.5	011042	#44-2292
T5	011324 G	7-911 #45-2366
T6	011550 G	7-911 #46-2427
T7	011774 G	7-911 #47-2489
T8	012220 G	7-911 #48-2549
T9	012334 G	7-911 #49-2594
UAM	= 000200 G	#10-954
WRITE	006034 G	#20-1413 36-1893 36-1902 36-1914 36-1923 36 1935 36-1945 37-1971 38-1996
		39-2021 40-2053 40-2059 40-2079 41-2107 41-2113 41 2139 42-2167 42 2173
		42-2199 43-2227 43-2234 43-2274 44-2307 44-2313 44-2316 45-2380 46 2441
		47-2503 48-2565 48-2575
X\$ALWA	= 000000	#6-875
X\$FALS	= 000040	#6-875
X\$OFFS	= 000400	#6-875
X\$TRUE	= 000020	#6-875
\$PATCH	012664 G	#51-2704

MACRO CROSS REFERENCE

CREF V02

SEQ 0100

MACRO NAME	REFERENCES									
B COMPL	24-1541	24-1543	24-1545	24-1547	24-1549					
B GNAU	28-1641									
B GNAUT	2-1575									
B GNCLN	26-1587									
B GNDU	27-1604									
B GNHRD	50-2672									
B GNHW	8-923									
B GNINI	24-1514									
B GNMSG	16-1208	16-1241	16-1251	16-1258						
B GNPRO	23-1498									
B GNRPT	22-1482									
B GNSFT	51-2696									
B GNSUB	30-1683	31-1707	32-1740	33-1784	34-1821	35-1863	36-1887	37-1962	38-1987	39-2012
	40-2041	41-2095	42-2155	43-2215	44-2292					
B GNSW	9-938									
B GNTST	30-1676	32-1733	35-1856	40-2033	45-2366	46-2427	47-2489	48-2549	49-2594	
B NCOMP	24-1559									
C KLOOP	31-1721	35-1872	36-1899	36-1911	36-1920	36-1932	40-2065	41-2124	42-2184	43-2259
D ESCRI	13-1015									
D EVTYP	13-1010									
D ISPAT	7-911									
E NDAU	28-1668									
E NDAUT	25-1578									
E NDCLN	26-1595									
E NDDU	27-1631									
E NDHRD	50-2677									
E NDHW	8-927									
E NDINI	24-1564									
E NDMSG	16-1239	16-1249	16-1256	16-1265						
E NDPRO	23-1504									
E NDRPT	22-1489									
E NDSFT	51-2700									
E NDSUB	30-1699	31-1727	32-1776	33-1813	34-1851	35-1879	36-1954	37-1979	38-2004	39-2029
	40-2087	41-2147	42-2207	43-2281	44-2354					
E NDSW	9-941									
E NDTST	31-1729	34-1853	39-2030	44-2355	45-2416	46-2478	47-2540	48-2585	49-2656	
E QUALS	10-954									
E RRHRD	30-1696	31-1716	32-1764	33-1799	33-1811	34-1838	35-1871	35-1877	36-1898	36-1907
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	49-2652									
E RRTBL	12-987									
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	49-2644									
E XIT	16-1232	16-1246	16-1253	16-1262	22-1484	26-1590	27-1615	28-1652		
G PHARD	24-1558									
G PRMA	50-2674									
G PRML	50-2675									
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MACRO CROSS REFERENCE

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MACRO CROSS REFERENCE

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MACRO CROSS REFERENCE

CREF V02

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	33-1813	#34-1821	34-1821	#34-1838	#34-1838	34-1838	#34-1851	34-1851	#34-1853	34-1853
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MACRO CROSS REFERENCE

CREF V02

SEQ 0107

MACRO NAME REFERENCES

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