

DH11 DM11

MODEM CTRL MLTPLXR  
CZDHKEO

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AH-8485E-MC  
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FEB 1985  
digital  
Made In USA





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## IDENTIFICATION

PRODUCT CODE: AC-8484E-MC

PRODUCT NAME: CZDMKE0 MODEM CONTROL MULTIPLEXER DIAGNOSTIC

DATE : JULY 1984

MAINTAINER: DIAGNOSTIC GROUP

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1.0 ABSTRACT

THIS PROGRAM IS A TEST OF THE MODEM CONTROL MULTIPLEXER USED WITH THE DM11 OPT1  
THE PROGRAM IS DIVIDED INTO FUNCTIONAL TEST GROUPS AS  
FOLLOWS:

- GROUP 0: ALL LINE SCANNER AND LINE MULTIPLEXER FUNCTIONS ARE  
TESTED. NO TEST CONNECTOR IS NEEDED...  
GROUP 1: A SINGLE LINE IS TESTED USING THE MODEM CABLE AND  
A H315 TEST CONNECTOR  
GROUP 2: CONNECT-DISCONNECT TEST FOR 103A MODEMS  
GROUP 3: CONNECT-DISCONNECT TEST FOR 202C MODEMS

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH AT LEAST 8K OF MEMORY  
WITH OR WITHOUT HARDWARE SWITCH REGISTER  
ASR-33 TELETYPE OR EQUIVALENT  
MODEM CONTROL MODULES

2.1.1 FOR 16 LINE SCANNER TEST

NO ADDITIONAL HARDWARE IS NEEDED. PROGRAM HAS BEEN MODIFIED  
TO RUN WITHOUT H861 TEST CONNECTOR.

2.1.2 FOR SINGLE LINE CABLE TEST

4 CABLES TO CONNECT TO THE DISTRIBUTION PANEL  
H315 TEST CONNECTOR

2.1.3 FOR ON LINE TESTS

4 CABLES TO CONNECT TO THE DISTRIBUTION PANEL  
2 BELL 103A MODEMS (FOR 103A TEST)  
2 BELL 202C MODEMS (FOR 202C TEST)

3.0 LOADING PROCEDURE

THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED.

4.0 STARTING PROCEDURE

4.1 STARTING ADDRESS

THE STARTING ADDRESS FOR ALL TESTS IS 000200.  
RESTART ADDRESS FOR P.L. TESTS IS 000200

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4.2 OPERATOR AND/OR PROGRAM ACTION

4.2.1 INITIAL PROGRAM START

\*\*\*\*\*  
NOTE  
\*\*\*\*\*

IF PROGRAM IS BEING RUN WITH THE "XOR" MODULE TESTER  
LOCATION 1030(8) MUST BE MODIFIED TO CONTAIN A 240(8)  
"NOP" TO ACTIVATE THAT CODE AFFECTING THE "XOR" TESTER.

\*\*\*\*\*  
NOTE  
\*\*\*\*\*

SOFTWARE SWITCH REGISTER IS DEFINED AS LOC. 176  
(REFER TO SECTION 5.1.2 FOR DYNAMIC LOADING INSTRUCTIONS)

4.2.1.1 LOAD ADDRESS 000200

SET SW00 = 1

PRESS START

\*\*\*SOFTWARE SWITCH REGISTER IS LOC. 176

4.2.1.2 PROGRAM WILL TYPE

"DH11-MODEM CONTROL DIAGNOSTIC "(ONCE ONLY)

\*\*\*NOTE: IF USING SOFTWARE SWITCH REGISTER THE FOLLOWING  
WILL BE TYPED BEFORE TITLE:

SMR=XXXXXX NEW= (REFER TO SECTION 5.1.2 FOR OPTIONS)

4.2.1.3 PROGRAM WILL TYPE (WITH SW00 = 1)

VECTOR ADDRESS-" AND WILL WAIT FOR AN INPUT  
FROM THE TELETYPE KEYBOARD.

4.2.1.4 TYPE A THREE DIGIT NUMBER (OCTAL) WHICH IS THE

ADDRESS THAT THE MODEM CONTROL WILL INTERRUPT TO, FOLLOWED BY  
<RETURN>. IF AN INCORRECT ADDRESS IS TYPED, THE PROGRAM WILL  
TYPE "?" AND THEN REPEAT 4.2.1.3.

NOTE: IF THE ADDRESS ENTERED IS ACCEPTIBLE TO THE PROGRAM,  
BUT IS NOT THE INTERRUPT VECTOR ADDRESS OF THE MODEM CONTROL  
UNDER TEST, A HALT WILL OCCUR AT THAT ADDRESS+2. WHEN  
THE MODEM CONTROL INTERRUPTS.

TO RECOVER, PERFORM 4.2.2.1.

4.2.1.5 THE PROGRAM WILL TYPE "CONTROL REGISTER ADDRESS-" AND WAIT FOR  
AN INPUT FROM THE TELETYPE KEYBOARD.

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4.2.1.6 TYPE A 6 DIGIT (OCTAL NUMBER) WHICH IS THE ADDRESS OF THE MODEM CONTROL'S CONTROL REGISTER FOLLOWED BY <RETURN>. IF AN INCORRECT ADDRESS IS TYPED, THE PROGRAM WILL TYPE "?" AND THEN REPEAT 4.2.1.6.

NOTE: IF THE ADDRESS ENTERED IS ACCEPTIBLE TO THE PROGRAM BUT IS A NON-EXISTANT REGISTER, A BUS ERROR TRAP WILL OCCUR WHEN THE PROGRAM ADDRESSES THE REGISTER, AND THE PROGRAM WILL HALT AT LOCATION 6.

TO RECOVER, PERFORM 4.2.2.1.

4.2.1.7 THE PROGRAM WILL TYPE "LINE SELECTION PARAMETER-" AND WAIT FOR INPUT FROM THE TTY KEYBOARD.

4.2.1.8 TYPE AN OCTAL NUMBER TO SPECIFY THE LINES TO BE TESTED USING THE FOLLOWING ENCODING SCHEME:

|           |                    |
|-----------|--------------------|
| BIT00 = 1 | TEST LINE 00       |
| BIT01 = 1 | TEST LINE 01       |
| BIT02 = 0 | DO NOT TEST LINE 2 |

|           |              |
|-----------|--------------|
| "         |              |
| "         |              |
| BIT15 = 1 | TEST LINE 15 |

EG: TYPING 377(8) SELECTS LINES 00 THRU 07  
 TYPING 177777(8) SELECTS ALL 16 LINES

IF THE NO. TYPED IS NOT ACCEPTABLE, THE PROGRAM TYPES A "?" AND ASKS FOR THE LINE SELECT PARAMETER AGAIN.

4.2.1.9 THE PROGRAM WILL TYPE "TEST-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD.

4.2.1.10 TYPE A THREE DIGIT OCTAL NUMBER CORRESPONDING TO THE NUMBER OF THE TEST TO BE RUN FOLLOWED BY <RETURN>. IF AN INCORRECT TEST NUMBER IS TYPED THE PROGRAM WILL TYPE "?" AND THEN REPEAT 4.2.1.7. THE AVAILABLE TESTS TOGETHER WITH THE NUMBER TO BE TYPED ARE GIVEN BELOW.

TEST GROUP 0:  
 OFF LINE TESTS -FIRST TEST=0  
 TEST GROUP 1:  
 OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100  
 TEST GROUP 2:  
 CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200  
 TEST GROUP 3:  
 CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300

4.2.1.11 THE PROGRAM WILL ENTER THE SELECTED TEST GROUP.

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194 4.2.2 PROGRAM RESTART  
195  
196 4.2.2.1 WITH SW00=1  
197  
198 LOAD ADDRESS 200  
199 SET SW00=1 BEFORE PRESSING START.  
200 \*\*\*SOFTWARE SWITCH REGISTER IS LOC 176\*\*\*  
201 PRESS START  
202  
203 PROGRAM WILL PERFORM AS DESCRIBED IN 4.2.1.3 TO 4.2.1.10.  
204  
205 4.2.2.2 WITH SW00=0  
206  
207 LOAD ADDRESS 200  
208 \*\*\*SOFTWARE SWITCH REGISTER IS LOC. 176  
209 PRESS START  
210  
211 PROGRAM WILL PERFORM AS DESCRIBED IN 4.2.1.7 TO 4.2.1.10  
212 5.0 OPERATING PROCEDURE  
213  
214 5.1 TEST GROUP 0 16 LINE SCANNER TEST  
215  
216 5.1.1 TEST INITIALIZATION  
217  
218 NONE REQUIRED, PROGRAM TYPES "16 LINE SCANNER TEST"  
219 AND BEGINS TEST EXECUTION.  
220  
221 5.1.2 OPERATIONAL SWITCH SETTINGS  
222  
223 IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH  
224 REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS  
225 THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER.  
226 IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES  
227 AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH  
228 REGISTER (LOC. 176) IS USED.  
229  
230  
231 CONTROL:  
232  
233 THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH  
234 REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY  
235 DOING THE FOLLOWING:  
236  
237 1) TYPE CONTROL G (<+G>); THIS WILL ALLOW THE TTY TO ENTER DATA INTO  
238 LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.  
239  
240 2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS  
241 OF THE SOFTWARE SWITCH REGISTER.)  
242  
243 3) AFTER THE 'NEW=' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE  
244 OF THE FOLLOWING AT THE TTY:  
245

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A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>.  
(ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS  
WILL BE ALLOWED)  
IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH  
REGISTER CONTENTS WILL NOT BE CHANGED.

B) IF A CONTROL U <U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU  
BACK TO STEP 2.

SW15=1. HALT ON ERROR  
SW14=1. LOOP ON CURRENT TEST  
SW13=1. SUPPRESS ERROR TYPEOUT  
SW11=1. SUPPRESS ITERATIONS  
SW10=1. ESCAPE TO NEXT TEST ON ERROR  
SW09=1. FREEZE DATA

### 5.1.3 PROGRAM AND/OR OPERATOR ACTION

5.1.3.1 WITH ALL SWITCHES DOWN, THE PROGRAM WILL RUN  
ALL TESTS IN THE SELECTED GROUP, SEQUENTIALLY. EACH TEST IS REPEATED  
A FIXED NUMBER OF TIMES (SEE LISTING FOR DETAILS).  
EXCEPT FOR TO WHICH IS EXECUTED ONCE ONLY AFTER START OF TEST. WHEN ALL  
TESTS HAVE BEEN COMPLETED, THE PROGRAM WILL ISSUE A "RESET", RING THE TELETYPE  
BELL, AND RESTART AT THE FIRST TEST OF THE SELECTED GROUP.

IF AN ERROR OCCURS, THE PROGRAM WILL TYPE AN APPROPRIATE  
ERROR MESSAGE AND CONTINUE TESTING.

5.1.3.2 WITH SW15=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT  
A HALT WILL OCCUR AFTER ERROR TYPEOUT.  
NOTE: IF USING THE SOFTWARE SWITCH REGISTER AND AN ERROR  
HALT OCCURS, THE SOFTWARE SWITCH REGISTER CAN BE CHANGED  
BY PRESSING CONTINUE THE PROGRAM WILL RESPOND WITH THE FOLLOWING:  
SWR=XXXXXX NEW=

5.1.3.3 WITH SW13=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT  
NO ERROR TYPEOUT WILL OCCUR. THE PC OF THE TEST THAT FAILED  
WILL BE DISPLAYED IN THE COMPUTER DATA LIGHTS.

5.1.3.4 THIS PROGRAM WILL NO LONGER TRACE TRAP WITH THIS RELEASE

5.1.3.5 WITH SW10=1, PROGRAM ACTION WILL BE AS IN 5.1.3.1 EXCEPT THAT  
AFTER AN ERROR HAS OCCURED, THE PROGRAM WILL IMMEDIATELY  
START THE NEXT TEST IN SEQUENCE.



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292 5.2 TEST GROUP 1 SINGLE LINE CABLE TEST  
293  
294 5.2.1 TEST INITIALIZATION  
295  
296 THE PROGRAM WILL TYPE "SINGLE LINE CABLE TEST  
297 LINE NUMBER-" AND WILL WAIT FOR AN INPUT FROM  
298 THE TELETYPE KEYBOARD.  
299  
300 TYPE A 2 DIGIT OCTAL NUMBER BETWEEN 0 AND 17, CORRESPONDING  
301 TO THE NUMBER OF THE LINE TO BE TESTED, FOLLOWED BY  
302 <RETURN>. THE PROGRAM WILL THEN BEGIN TEST EXECUTION.  
303 IF THE TELETYPE INPUT IS INCORRECT, THE PROGRAM  
304 WILL TYPE "?" AND REPEAT THE MESSAGE.  
305  
306 5.2.2 OPERATIONAL SWITCH SETTINGS  
307  
308 SAME AS 5.1.2  
309  
310 5.2.3 PROGRAM AND/OR OPERATOR ACTION  
311  
312 SAME AS 5.1.3  
313  
314 5.3 TEST GROUP 2 BELL 103A MODEM CONNECT-DISCONNECT TEST  
315  
316 5.3.1 TEST INITIALIZATION  
317  
318 THE PROGRAM WILL TYPE "103A CONNECT-DISCONNECT TEST  
319 ORIGINATE LINE-" AND WAIT FOR AN INPUT FROM THE TELETYPE  
320 KEYBOARD.  
321  
322 TYPE THE NUMBER OF THE LINE THAT WILL ORIGINATE THE  
323 CALL (0-17 OCTAL) FOLLOWED BY RETURN.  
324  
325 THE PROGRAM WILL TYPE "ANSWER LINE-" AND WILL WAIT  
326 FOR AN INPUT FROM THE TELETYPE KEYBOARD.  
327  
328 TYPE THE NUMBER OF THE LINE THAT WILL ANSWER THE CALL  
329 (0-17 OCTAL) FOLLOWED BY <RETURN>.  
330  
331 THE PROGRAM WILL TYPE "DIAL ANSWERING DATA SET"  
332 AND WILL WAIT FOR THE ORIGINATE AND ANSWERING MODEMS  
333 TO GENERATE INTERRUPTS.  
334  
335 5.3.2 OPERATOR ACTION TO MAKE TELEPHONE CONNECTION  
336  
337 AFTER THE MESSAGE "DIAL ANSWERING DATA SET" IS TYPED  
338 THE OPERATOR HAS APPROXIMATELY 5 MINUTES TO ESTABLISH  
339 A CONNECTION BETWEEN THE 2 DATA SETS.  
340  
341 5.3.2.1 PLACE ANSWERING DATA SET IN "AUTO ANSWER" MODE



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5.3.2.2 PLACE ORIGINATING DATA SET IN "TALK" MODE

5.3.2.3 DIAL DIAL ANSWERING DATA SET FROM ORIGINATING  
DATA SET

5.3.2.4 LISTEN FOR TONE IN HANDSET OF ORIGINATING DATA SET.

WHEN TONE IS HEARD, PRESS "DATA" BUTTON ON  
ORIGINATING DATA SET.

"DATA" LIGHT SHOULD ILLUMINATE

5.3.2.5 "DATA" LIGHT ON ANSWERING DATA SET SHOULD BE LIT.

5.3.2.6 THE PROGRAM WILL NOW WAIT FOR  
INTERRUPTS FROM THE MODEM CONTROL.

5.3.2.7 IF THE CONNECTION HAS BEEN PROPERLY ESTABLISHED,  
THE PROGRAM WILL TYPE "TYPE TTY KEY TO DISCONNECT".

WHEN TTY KEY IS STRUCK, THE PROGRAM WILL BEGIN THE  
DISCONNECT SEQUENCE.

5.3.2.8 WHEN THE DISCONNECT SEQUENCE HAS BEEN COMPLETED  
THE PROGRAM WILL TYPE "103A TEST COMPLETE",  
AND WILL REQUEST THE OPERATOR TO SELECT NEW LINES.

5.3.3 PROGRAM ACTION IN CASE OF ERROR

5.3.3.1 RING ON INCORRECT LINE

IF THE PROGRAM DETECTS A RING SIGNAL ON AN INCORRECT  
LINE, OR IF ANY OTHER TRANSITION BESIDES RING IS  
DETECTED BEFORE RING, THE PROGRAM WILL TYPE  
A FATAL ERROR MESSAGE AND REQUEST THE OPERATOR  
TO RESELECT LINES AND REDIAL.

5.3.3.2 OTHER ERRORS

IF ANY ERRORS OCCUR AFTER THE FIRST RING HAS BEEN  
DETECTED, THE PROGRAM WILL TYPE AN APPROPRIATE ERROR  
MESSAGE AND CONTINUE TESTING TO COMPLETION.

THE ONLY EXCEPTION TO THIS IS IF AN INTERRUPT  
OCCURS ON A LINE NOT SELECTED, IN WHICH  
CASE A FATAL ERROR WILL BE REPORTED, AND THE PROGRAM  
WILL PROCEED AS DESCRIBED IN 5.3.3.1

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#### 5.3.4 OPERATION SWITCH SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

##### CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

- 1) TYPE CONTROL G <G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE 'NEW=' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:
  - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)  
IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
  - B) IF A CONTROL U <U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

SW15=1, HALT ON ERROR  
SW13=1, SUPPRESS ERROR TYPEOUT

#### 5.3.5 DATA SET MODE SWITCHING

AFTER THE PROGRAM HAS TYPED THE MESSAGE DESCRIBED IN 5.3.2.7, BUT BEFORE TTY KEY IS STRUCK, THE OPERATOR MAY SWITCH EITHER DATA SET FROM THE MODE THAT IT IS IN TO ANOTHER MODE. ALL TRANSITIONS DETECTED AT THIS TIME WILL BE REPORTED.

NOTE: THE ORIGINATE DATA SET MUST BE RETURNED TO "TALK" MODE AND THE ANSWERING DATA SET TO "AUTO ANSWER" BEFORE DISCONNECT IS STARTED TO PREVENT ERRORS FROM BEING DETECTED THAT ARE CAUSED BY THE FACT THAT THE MODEM IS IN THE INCORRECT STATE.

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442 5.4 TEST GROUP 3 BELL 202C MODEM CONNECT-DISCONNECT TEST  
443  
444 5.4.1 TEST INITIALIZATION  
445  
446 SAME AS 5.3.1 EXCEPT PROGRAM WILL TYPE "202C CONNECT  
447 DISCONNECT TEST".  
448  
449 5.4.2 OPERATOR ACTION TO MAKE TELEPHONE CONNECTION  
450  
451 SAME AS 5.3.2 EXCEPT AT END OF TEST, PROGRAM WILL TYPE  
452 "202C TEST COMPLETE".  
453  
454 5.4.3 PROGRAM ACTION IN CASE OF ERRORS  
455  
456 SAME AS 5.3.3  
457  
458 5.4.4 OPERATIONAL SWITCH SETTINGS  
459  
460 SAME AS 5.3.4  
461  
462 5.4.5 DATA SET MODE SWITCHING  
463  
464 SAME AS 5.3.5  
465 5.5 TEST RESELECTION  
466  
467 TO ESCAPE FROM THE TEST IN PROGRESS, AND SELECT  
468 A NEW TEST, TYPE <CONTROL C>.  
469  
470 THE PROGRAM WILL STOP EXECUTION OF THE TEST IN PROGRESS  
471 AND THEN TYPE "TEST-" AND WAIT FOR AN INPUT FROM  
472 THE TELETYPE KEYBOARD.  
473  
474 PROCEED AS DESCRIBED IN 4.2.1.8  
475  
476 5.5 ADDRESS CHANGE  
477  
478 TO CHANGE THE VECTOR AND REGISTER ADDRESS OF THE MODEM CONTROL  
479 UNDER TEST, TYPE <CONTROL V>. THE PROGRAM WILL  
480 STOP EXECUTION OF THE TEST IN PROGRESS AND PROCEED AS  
481 DESCRIBED IN SECTION 4.2.1, EXCEPT THAT  
482 "MODEM CONTROL DIAGNOSTIC" WILL NOT BE TYPED.  
483  
484 5.6 LINE NUMBER CHANGE  
485  
486 TO CHANGE THE LINE NUMBER(S) UNDER TEST, TYPE  
487 <CONTROL L>. THE PROGRAM WILL SUSPEND THE  
488 TEST IN PROGRESS AND RETURN TO THE INITIALIZATION  
489 STAGE OF THE SELECTED TEST.  
490  
491 WHEN THE LINE NUMBER(S) HAS BEEN CHANGED, THE  
492 PROGRAM WILL RESTART THE SELECTED TEST USING THE NEW  
493 LINE NUMBER(S).  
494

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## 5.7 POWER FAILURE

IF A POWER FAIL TRAP OCCURS DURING TEST EXECUTION  
THE PROGRAM WILL SAVE THE GENERAL REGISTERS OF THE  
PROCESSOR AND HALT.

WHEN POWER UP OCCURS, THE PROGRAM WILL TYPE  
"POWER FAILURE-CURRENT TEST WILL BE RESTARTED".

THE PROGRAM WILL THEN RESUME TEST EXECUTION.

NOTE: IF A TEST IS NOT IN PROGRESS, I.E., IF THE PROGRAM  
IS WAITING FOR AN INPUT FROM THE TELETYPE KEYBOARD,  
THE ERROR MESSAGE WILL BE "POWER FAILURE".  
THE PROGRAM WILL THEN REQUEST THE OPERATOR TO SELECT A TEST.

NOTE: IF MACHINE HAS A SOLID-STATE SWITCH REGISTER, THEN THE CONTENTS WILL BE  
LOST ON A POWER FAIL AND THEREFORE WILL HAVE TO BE RELOADED.

## 6.0 ERRORS

### 6.1 NORMAL OPERATION

IF AN ERROR OCCURS WITH ALL SWITCHES DOWN, THE PROGRAM  
WILL TYPE AN APPROPRIATE ERROR MESSAGE AND THEN  
RESUME TESTING.

THERE ARE SEVERAL ERROR MESSAGE FORMATS, AND  
THE PARTICULAR MESSAGE TYPED DEPENDS UPON THE  
TEST IN PROGRESS.

#### 6.1.1 ERROR MESSAGES

##### 6.1.1.1 UNIQUE ERROR

ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER

AN EXAMPLE OF THIS TYPE OF ERROR IS:

1. AN INTERRUPT OCCURED AT THE WRONG PRIORITY
2. A REGISTER BIT WAS NOT CLEARED BY RESET



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#### 6.1.1.2 TRANSITION DETECTION ERROR

THIS ERROR WILL OCCUR IN ONE OF THE ON-LINE TESTS  
IF AN EXPECTED INTERRUPT DOES NOT OCCUR, OR IF  
AN UNEXPECTED INTERRUPT DOES OCCUR, ON THE LINES  
UNDER TEST.

FORMAT FOR ERROR TYPEOUT IS

XXXXXX TRANSITION ERROR

| EXP | REC | LINE |
|-----|-----|------|
| AA  | BB  | CC   |

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE  
AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER)  
BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)  
CC=LINE ON WHICH ERROR OCCURED

#### 6.1.1.3 SINGLE LINE STATUS ERROR

THIS ERROR WILL OCCUR IN ANY TEST, OFF LINE OR ON-LINE  
WHEN THE EXPECTED AND RECEIVED LINE STATUS ARE NOT  
THE SAME.

FORMAT FOR SINGLE LINE STATUS ERROR IS

XXXX LINE ERROR

| EXP | REC | LINE |
|-----|-----|------|
| AAA | BBB | CC   |

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE  
AAA=EXPECTED LINE STATUS AT TIME OF ERROR  
BBB=RECEIVED LINE STATUS AT TIME OF ERROR  
CC=LINE ON WHICH ERROR OCCURED

#### 6.1.1.4 FATAL TRANSITION ERROR

THIS ERROR WILL OCCUR IN AN ON-LINE TEST IF AN INTERRUPT  
OCCURS ON A LINE NOT SELECTED FOR TESTING.

FORMAT FOR FATAL ERROR TYPEOUT IS

XXXXXX FATAL ERROR

| CSTAT  | LSTAT |
|--------|-------|
| AAAAAA | BBB   |

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE  
AAAAAA=RECEIVED CONTROL STATUS ON LINE THAT INTERRUPTED  
BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED

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#### 6.1.1.4 CONTROL STATUS ERROR

THIS ERROR WILL OCCUR IN A TEST THAT PRIMARILY  
INVOLVES THE LINE SCANNER

FORMAT FOR CONTROL STATUS ERROR IS

XXXXXX STATUS ERROR  
EXP REC  
AAAAAA BBBB88

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE  
AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR  
BBBB88=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR

#### 6.1.1.5 LINE STATUS ERROR

THIS ERROR WILL OCCUR IN THOSE OFF LINE TESTS THAT  
SET ONE LINE TO A PARTICULAR STATE, AND THEN CHECK  
ALL OTHER LINES

FORMAT FOR LINE STATUS ERROR IS

XXXX LINE ERROR  
EXP REC LINE SEL  
AAA DDD CC DD

WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE  
AAA=EXPECTED LINE STATUS AT TIME OF ERROR  
BBB=RECEIVED LINE STATUS AT TIME OF ERROR  
CC=LINE ON WHICH ERROR OCCURED  
DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING

#### 6.1.1.6 TIME OUT ERROR

THIS ERROR WILL OCCUR IF THE LINE UNDER TEST DOES  
NOT INTERRUPT WITHIN A GIVEN TIME FRAME.

FORMAT FOR THIS ERROR IS

XXXXXX TIME OUT WAITING FOR INTERRUPT  
LN CSR LSR  
AAA BBBB88 CCCCCC

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644

WHERE XXXXXX=PC+2 OF ERROR CALL  
AAA=FAILING LINE NUMBER  
BBBBBB=CONTROL STATUS REGISTER  
CCCCC=LINE STATUS REGISTER

4 1.2 REPEATED ERRORS

IF THE SAME ERROR OCCURS REPEATEDLY IN A GIVEN TEST  
ONLY THE DATA RELATING TO THAT ERROR WILL BE TYPED  
IF THE ERROR OCCURS IN THE SAME TEST ON THE SAME PASS

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6.2 SCOPE LOOPS

NOTE: SCOPE LOOPING APPLIES ONLY TO TEST GROUPS 0 AND 1

6.2.1 AFTER ERROR HALT

TO LOOP ON A GIVEN TEST AFTER AN ERROR HALT,  
SET SW15=0 TO RUN WITHOUT STOPPING  
SET SW14=1 TO LOOP ON CURRENT TEST  
SET SW13=1 TO SUPPRESS ERROR TIMEOUT  
SET SW10=0 (IF IT IS 1)  
SET SW09=1 TO LOOP ON SAME DATA (IF REQUIRED)

\*\*\*IF USING SOFTWARE SWITCH REGISTER AND YOU WANT TO CHANGE  
THE SWITCH SETTING TYPE A <+G> BEFORE CONTINUING.  
PRESS CONTINUE

THE PROGRAM WILL LOOP ON THE SAME TEST.

6.2.2 FROM PROGRAM START

6.2.2.1 PROCEED AS DESCRIBED IN 4.2.1.1 TO 4.2.1.4

6.2.2.2 WHEN THE PROGRAM TYPES "TEST-", SET SW14=1 TO LOOP  
ON THE TEST THAT WILL BE SELECTED.

6.2.2.3 TYPE IN THE NUMBER OF THE TEST THAT IS TO BE LOOPED  
ON (SEE LISTING FOR TEST NUMBER REFERENCE DESIGNATIONS)

6.2.2.4 THE PROGRAM WILL LOOP ON THE SELECTED TEST UNTIL  
SW14=0.

6.2.3 AFTER <CONTROL>

SAME AS 6.2.2.2 TO 6.2.2.4

7.0 RESTRICTIONS

7.1 STARTING

7.1.1 FOR 16 LINE SCANNER TEST

NO TEST CONNECTOR IS NEEDED TO RUN THIS TEST....

7.1.2 FOR SINGLE LINE CABLE TEST

H315 TEST CONNECTOR MUST BE INSTALLED ON MODEM CABLE

7.1.3 FOR ON LINE TESTS

NONE

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700 7.2 OPERATING  
701  
702 NONE.  
703  
704  
705 7.3 WHEN ON ACT-11 OR "XOR"  
706 PROGRAM WILL DEFAULT TO 16 LINE SCANNER TEST  
707  
708 7.4 DEFAULT PARAMETERS (INCLUDING ACT-11 & "XOR")  
709  
710 VECTORS  
711 -----  
712 DHPVEC: 300 (AUTOMATICALLY GENERATED  
713 DHPVLV: 302 BY PROGRAM WHEN UNDER ACT-11 OR "XOR")  
714 ADDRESSES  
715 -----  
716 DHPCSR: 170500  
717 DHPLSR: 170502  
718  
719 NOTE: SW00(RESELECT ADDRESSES AND VECTORS BECOMES  
720 INOPERATIVE UNDER ACT-11 OR "XOR".



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721 8.0 EXECUTION TIME  
722  
723 8.1 16 LINE SCANNER TEST  
724 THE TIME FOR 2 PASSES OF THE 16 LINE SCANNER TEST IS  
725 APPROXIMATELY 1.5 MINUTES.  
726  
727 8.2 SINGLE LINE CABLE TEST  
728 THE TIME FOR 12 PASSES OF THE SINGLE LINE CABLE TEST  
729 IS APPROXIMATELY 1 MINUTE.  
730  
731 8.3 103A MODEM CONNECT-DISCONNECT TEST  
732 APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE  
733 TIME THAT THE ANSWERING DATA SET FIRST DETECTS A RING  
734 SIGNAL TO THE TIME THAT THE PROGRAM TYPES  
735 "SET SW01=1 TO DISCONNECT".  
736  
737 APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE TIME  
738 THAT THE PROGRAM TYPES THE ABOVE MESSAGE UNTIL THE  
739 TIME THAT THE PROGRAM TYPES "103A TEST COMPLETE".  
740  
741 8.4 202C MODEM CONNECT-DISCONNECT TEST  
742 APPROXIMATELY 1.5 MINUTES WILL ELAPSE BETWEEN THE TIME  
743 THAT THE ANSWERING DATA SET DETECTS THE FIRST RING SIGNAL  
744 TO THE TIME THAT THE PROGRAM TYPES "SET SW01=1 TO DISCONNECT".  
745  
746 APPROXIMATELY 30 SECONDS WILL ELAPSE BETWEEN THE  
747 TIME THAT THE PROGRAM TYPES THE ABOVE MESSAGE UNTIL  
748 THE PROGRAM TYPES "202C TEST COMPLETE".  
749  
750 9. PROGRAM DESCRIPTION  
751 THIS PROGRAM CONSISTS OF A SERIES OF TEST GROUPS  
752 LINKED BY A SET OF COMMON SERVICE ROUTINES AND A KEYBOARD  
753 MONITOR.  
754  
755 WHEN INITIALLY LOADED AND STARTED ...SW00 MUST BE SET =1. THE PROGRAM WILL  
756 BEGIN A DIALOG WITH THE OPERATOR TO INPUT THE PARAMETERS  
757 REQUIRED BY THE PROGRAM.  
758  
759 WHEN ALL INFORMATION HAS BEEN INPUTTED, THE PROGRAM WILL  
760 REQUEST THE OPERATOR TO SELECT A TEST BY TYPING  
761 THE NUMBER OF THE TEST TO BE RUN. WHEN A CORRECT TEST NUMBER  
762 IS RECEIVED, THE PROGRAM WILL BEGIN EXECUTION OF THE  
763 SELECTED TEST.  
764  
765 AT ANY TIME DURING TEST EXECUTION, THE OPERATOR MAY  
766 CHANGE A TEST PARAMETER BY ENTERING THE APPROPRIATE  
767 COMMAND VIA THE TELETYPE KEYBOARD.  
768  
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9. CONT'D

IF AN OFF LINE TEST HAS BEEN SELECTED, THAT TEST WILL  
BE REPEATED UNTIL THE OPERATOR INTERVENES.

IF AN ON LINE TEST HAS BEEN SELECTED, THE OPERATOR IS  
REQUIRED TO TAKE ACTION EACH TIME THE TEST IS COMPLETED.

AT THE END OF EVERY OFF LINE TEST PASS, THE PROGRAM  
WILL RING THE TELETYPE BELL.

AT THE END OF AN ON LINE TEST, A TEST COMPLETE MESSAGE WILL BE  
TYPED.

10. LISTING

11. MODIFICATION HISTORY:

10-JULY-84 KEN RAUHALA  
ADDED DELAY FOR PDP-11/44 WITH CACHE ON.  
THE "MUXS2" MACRO WAS MODIFIED.

\*

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```

794 .TITLE CZDMK-E
795 .ENABLE ABS,AMA
796 ;SWITCH REGISTER OPTIONS
797
798
799 ;SW15=1. HALT ON ERROR
800 ;SW14=1. LOOP ON CURRENT TEST
801 ;SW13=1. SUPPRESS ERROR TYPEOUT
802 ;SW12=1. SUPPRESS TRACE TRAPPING (THIS IS INOPERATIVE IN THIS RELEASE)
803 ;SW11=1. SUPPRESS ITERATIONS
804 ;SW10=1. ESCAPE TO NEXT TEST ON ERROR
805 ;SW09=1. FREEZE DATA
806 ;SW01=1. START DISCONNECT SEQUENCE
807 ;SW00=1. RESELECT VECTOR AND CONTROL REGISTER ADDRESS
808 ;AFTER PROGRAM RESTART
809
810 ;STARTING ADDRESS FOR ALL TESTS IS 000200
811 ;RESTART ADDRESS=000200
812
813 ;TESTS AVAILABLE
814
815 ;TEST GROUP 0-
816 ;OFF LINE TESTS USING NO TEST CONNECTOR-FIRST TEST=0
817 ;TEST GROUP 1-
818 ;OFF LINE TESTS USING DC11 TEST CONNECTOR AND MODEM CABLE-FIRST TEST=100
819 ;TEST GROUP 2-
820 ;CONNECT/DISCONNECT TEST FOR BELL 103A MODEMS-FIRST TEST=200
821 ;TEST GROUP 3-
822 ;CONNECT/DISCONNECT TEST FOR BELL 202C MODEMS-FIRST TEST=300
823
824 ;SYMBOL DEFINITIONS
825
826 100000 SW15=100000
827 040000 SW14=40000
828 020000 SW13=20000
829 010000 SW12=10000
830 004000 SW11=4000
831 002000 SW10=2000
832 001000 SW09=1000
833 000400 SW08=400
834 000100 SW06=100
835
836 .NLIST MC,MD,CND
837 .LIST ME
838
839

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840
841      ;REGISTER DEFINITIONS
842
843      000000      R0=#0      ;GENERAL REGISTER
844      000001      R1=#1      ;GENERAL REGISTER
845      000002      R2=#2      ;GENERAL REGISTER
846      000003      R3=#3      ;GENERAL REGISTER
847      000004      R4=#4      ;GENERAL REGISTER
848      000005      R5=#5      ;GENERAL REGISTER
849      000006      SP=#6      ;PROCESSOR STACK POINTER
850      000007      PC=#7      ;PROGRAM COUNTER
851
852      ;LOCATION EQUIVALENCIES
853
854      177776      PS=177776   ;PROCESSOR STATUS WORD
855      .EQUIV PS,PSW
856      014376      RADIX=DIVIS  ;CONVERSION FACTOR FOR DECIMAL OUTPUT
857      014372      BINWD=DIVIDL ;WORD TO BE CONVERTED TO OCTAL ASCII
858      014374      DIGIT=DIVIDH ;ASCII OCTAL DIGIT
859
860      ;CONTROL STATUS REGISTER BIT FUNCTIONS
861
862      000020      BUSY=20      ;LINE SCANNER RUNNING
863      000040      SCENEA=40    ;LINE SCANNER ENABLE
864      000100      INTENA=100   ;INTERRUPT ENABLE
865      000200      DONE=200     ;SCANNER DONE
866      000400      STEP=400     ;CAUSES LINE COUNTER TO BE INCREMENTED BY 1 COUNT
867      001000      MAINT=1000   ;FORCES 15 TO INPUT OF SCRATCH PAD MEMORY
868      002000      CLRMUX=2000  ;CLEAR MULTIPLEXER FUNCTION FLIPFLOPS
869      004000      CLRSCN=4000  ;CLEARS SCANNER SCRATCHPAD MEMORY
870      010000      SECRXF=10000 ;SECONDARY RECEIVE TRANSITION WAS DETECTED BY SCANNER
871      020000      CSF=20000    ;CLEAR TO SEND TRANSITION WAS DETECTED BY SCANNER
872      040000      COF=40000    ;CARRIER TRANSITION WAS DETECTED BY SCANNER
873      100000      RINGF=100000 ;RING SIGNAL WAS DETECTED BY SCANNER
874
875      ;LINE REGISTER BIT FUNCTIONS
876
877      000001      LINENA=1      ;=1. RECOGNIZE TRANSITIONS ON THIS LINE
878      000002      TRMRDY=2     ;=1. SEND TERMINAL READY TO MODEM
879      000004      RS=4         ;=1. SEND REQUEST TO SEND TO MODEM
880      000010      SECTX=10     ;=1. SEND SECONDARY TRANSMIT TO MODEM
881      000020      SECRX=20     ;=1. SECONDARY RECEIVE TURNED ON BY MODEM
882      000040      CS=40        ;=1. CLEAR TO SEND TURNED ON BY MODEM
883      000100      CO=100       ;=1. CARRIER TURNED ON BY MODEM
884      000200      RING=200     ;=1. RING TURNED ON BY MODEM
885
886      ;SOFTWARE TRANSITION FLAGS
887
888      000004      XCO=4         ;CARRIER TRANSITION WAS DETECTED
889      000002      XCS=2       ;CLEAR TO SEND TRANSITION WAS DETECTED
890      000001      XSCRX=1      ;SECONDARY RECEIVE TRANSITION WAS DETECTED

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|     |        |                           |                                    |
|-----|--------|---------------------------|------------------------------------|
| 891 |        |                           |                                    |
| 892 |        | ; INSTRUCTION DEFINITIONS |                                    |
| 893 |        |                           |                                    |
| 894 | 005746 | PUSH1SP=5746              | ; DECREMENT PROCESSOR STACK 1 WORD |
| 895 | 005726 | POP1SP=5726               | ; INCREMENT PROCESSOR STACK 1 WORD |
| 896 | 010046 | PUSHRO=10046              | ; SAVE RO ON STACK                 |
| 897 | 012600 | POPRO=12600               | ; RESTORE RO FROM STACK            |
| 898 | 024646 | PUSH2SP=24646             | ; DECREMENT STACK TWICE            |
| 899 | 022626 | POP2SP=22626              | ; INCREMENT STACK TWICE            |

## ; EMT DEFINITION TABLE

|     |        |               |                                    |
|-----|--------|---------------|------------------------------------|
| 900 |        |               |                                    |
| 901 |        |               |                                    |
| 902 |        |               |                                    |
| 903 | 104000 | ERRORC=EMT.X  | ; CONTROL STATUS ERROR SERVICE     |
| 904 | 104001 | ERRORL=EMT.X  | ; LINE STATUS ERROR SERVICE        |
| 905 | 104002 | SCOPE=EMT.X   | ; SCOPE LOOP AND ITERATION SERVICE |
| 906 | 104003 | SCOPEF=EMT.X  | ; DATA FREEZE SERVICE              |
| 907 | 104004 | TYPE=EMT.X    | ; TELETYPE OUTPUT                  |
| 908 | 104005 | SAVOSP=EMT.X  | ; SAVE RO-R5, PC+2 OF CALL         |
| 909 | 104006 | OCTASC=EMT.X  | ; CONVERT DATA TO ASCII AND TYPE   |
| 910 | 104007 | RESOS=EMT.X   | ; RESTORE RO-R5                    |
| 911 | 104010 | CONVERT=EMT.X | ; ASCII CONVERSION ROUTINE         |
| 912 | 104011 | EXTRACT=EMT.X | ; DIGIT EXTRACTION ROUTINE         |
| 913 | 104012 | ERROR=EMT.X   | ; TYPE PC OF FAILING TESTS ONLY    |
| 914 | 104013 | INSTRG=EMT.X  | ; INPUT OCTAL DATA STRING          |
| 915 | 104014 | ERRORT=EMT.X  | ; TRANSITION ERROR                 |
| 916 | 104015 | ERRORS=EMT.X  | ; ON LINE STATUS ERROR             |
| 917 | 104016 | ERRORN=EMT.X  | ; FATAL TRANSITION                 |
| 918 | 104017 | GETLNS=EMT.X  | ; INPUT LINE NUMBERS               |
| 923 | 104024 | WAITS=EMT.X   | ; DELAY FOR TRANSIENTS             |
| 924 | 104025 | CNTLUU=EMT.X  | ; CHANGE SWREG ROUTINE             |
| 925 | 104026 | CKINTT=EMT.X  | ; CHECK FOR INTERRUPTS-FLAG STYLE  |
| 926 | 104027 | KBDIN=EMT.X   | ; FAKE INTERRUPT ENTRY POINT       |

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|     |        |                                     |                                 |
|-----|--------|-------------------------------------|---------------------------------|
| 919 | 104020 | SETUP=EMT.X                         | ;SET UP FOR ON LINE TEST        |
| 920 | 104021 | CKRING=EMT.X                        | ;CHECK FOR RING ON CORRERT LINE |
| 921 | 104022 | WAITRN=EMT.X                        | ;WAIT FOR TRANSITIONS           |
| 922 | 104023 | CKTRAN=EMT.X                        | ;CHECK TRANSITIONS              |
| 927 | 104030 | ERRINT=EMT.X                        | ;TIME OUT ERROR FOR INTERRUPTS  |
| 928 |        |                                     |                                 |
| 929 |        | ;TRAPCATCAER FOR ILLEGAL INTERRUPTS |                                 |
| 930 | 000000 | .=0                                 |                                 |
| 931 | 000200 | .REPT 200                           |                                 |
| 932 |        | .+2                                 |                                 |
| 933 |        | HALT                                |                                 |
| 934 |        | .ENDR                               |                                 |



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935
936                                ;STANDARD INTERRUPT VECTORS
937
938                                .-24
939 000024 015144                PFAIL                ;POWER FAIL HANDLER
940 000026 000340                340                ;SERVICE AT LEVEL 7
941 000030 013004                EMTSRV              ;EMT DISPATCH SERVICE
942 000032 000340                340                ;SERVICE AT LEVEL 7
943
944                                .-46
945 000046 012766                LOGICAL              ;ACT11?
946
947                                .-60
948 000060 001760                KBDINT              ;KEYBOARD MONITOR
949 000062 000340                340                ;SERVICE AT LEVEL 7
950
951                                .-174
952 000174 000000                DISPREG:            0
953 000176 000000                SWREG: 0
954
955                                .-200
956 000200 000200 001100                JMP      START      ;GO TO START OF PROGRAM
957
958
959

```



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```

960
961      001100      .-1100
962      001100      STACK:
963      001100      012737 015144 000024 START: MOV      #PFail,24      ;SET UP POWER FAIL
964                                          ;INTERRUPT SERVICE VECTOR
965      001106      005037 001756      CLR      TIPFLG      ;CLEAR TEST IN PROGRESS FLAG
966      001112      005077 014440      CLR      #TKCSR
967      001116      012706 001100      MOV      #STACK,SP      ;SET UP STACK POINTER
968
969      001122      013746 000006      SUSWR: MOV      @B6,-(SP)      ;SAVE VECTORS
970      001126      013746 000004      MOV      @B4,-(SP)
971      001132      012737 001152 000004      MOV      @B4,B4      ;SET UP FOR TIMEOUT
972      001140      022777 177777 014420      CMP      @-1,BSWR      ;REFERENCE HARDWARE SWITCH REGISTER
973      001146      001402      BEQ      B5
974      001150      000407      BR      B6
975      001152      022626      64:      CMP      (SP),-(SP)      ;ADJUST STACK
976      001154      012737 000176 015566      65:      MOV      #SWREG,SWR      ;POINT TO SOFTWARE SWITCH REG
977      001162      012737 000174 015570      MOV      #DISPREG,DISPLAY      ;POINT TO SOFT DISPLAY REG
978      001170      012637 000004      66:      MOV      (SP),B4      ;RESTORE VECTORS
979      001174      012637 000006      MOV      (SP),B6
980      001200      012777 000100 014350      MOV      #INTENA,#TKCSR      ;ENABLE TELETYPE INTERRUPTS
981      001206      005037 001252      CLR      XFLAG      ;XOR = NO
982
983      ;*****
984      ;REPLACE THE FOLLOWING BRANCH WITH A "NOP" (240) TO ACTIVATE "XOR" CODE
985      ;*****
986      001212      000423      BR      STARTO      ;SKIP XOR STUFF
987      001214      013746 000004      MOV      4,-(SP)      ;SAVE 4
988      001220      012737 001254 000004      MOV      #XORSVC,4      ;SET UP SVC ROUTINE
989      001226      005737 177060      TST      177060      ;GOT AN XOR TESTER OUT THERE ?
990      001232      012637 000004      MOV      (SP),4      ;YES
991      001236      005137 001252      COM      XFLAG      ;XOR = YES
992      001242      004737 015266      JSR      PC,XOR      ;AUTO VECTOR
993      001246      000137 001262      JMP      STARTO      ;RESTORE TRAPCATCHER
994      001252      000000      XFLAG: 0      ;XOR FLAG
995      001254      022626      XORSVC: POP2SP
996      001256      012637 000004      MOV      (SP),4      ;RESTORE 4
997      001262      005737 015656      STARTO: TST      TIFLG      ;TYPED TITLE?
998      001266      001005      BNE      .+14      ;YES
999      001270      104004      TYPE      ;TYPE "MODEM CONTROL DIAGNOSTIC"
1000      001272      016535      HTITLE
1001      001274      012737 000001 015656      MOV      #1,TIFLG      ;SET TITLE TYPED FLAG
1002      001302      005737 001252      TST      XFLAG      ;X OR ?
1003      001306      100422      BMI      VECSTR      ;RESTORE TRAPCATCHER
1004      001310      005737 000042      TST      42      ;ACT 11?
1005      001314      001403      BEQ      START1      ;NO
1006      001316      004737 015266      JSR      PC,XOR      ;YES AUTO VECTOR
1007      001322      000414      BR      VECSTR      ;GET VECTOR AND REGISTER ADDRESS
1008      001324      005737 000042      START1: TST      @B42      ;UNDER MONITOR?
1009      001330      001005      BNE      11
1010      001332      022737 000176 015566      CMP      #SWREG,SWR      ;USING SWREG?
1011      001340      001001      BNE      11
1012      001342      104025      CNTLWU
1013      001344      032777 000001 014214      11:      BIT      #1,BSWR      ;IF SW BIT 0=1, ON PROGRAM RESTART
1014      001352      001510      BEQ      STARTN      ;INPUT VECTOR AND REGISTER ADDRESSES
1015      001354      012706 001100      VECSTR: MOV      #STACK,SP      ;SET UP PROCESSOR STACK POINTER
1016      001360      012737 000300 012712      MOV      #300,DATA1      ;ADDRESS OF FIRST FLOATING VECTOR

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|      |        |        |        |        |         |         |                |            |                                          |
|------|--------|--------|--------|--------|---------|---------|----------------|------------|------------------------------------------|
| 1016 | 001366 | 012737 | 000302 | 012714 |         | MOV     | #302, DATA2    |            | ; ADDRESS OF STATUS WORD                 |
| 1017 | 001374 | 013777 | 012714 | 011310 | VECSTA: | MOV     | DATA2, BDATA1  |            | ; MOVE ADDRESS OF STATUS WORD TO VECTOR  |
| 1018 | 001402 | 005077 | 011306 |        |         | CLR     | BDATA2         |            | ; CLEAR STATUS WORD                      |
| 1019 |        |        |        |        |         |         |                |            | ; (FOR HALT ON ILLEGAL INTERRUPT)        |
| 1020 | 001406 | 062737 | 000004 | 012712 |         | ADD     | #4, DATA1      |            | ; NEXT VECTOR                            |
| 1021 | 001414 | 062737 | 000004 | 012714 |         | ADD     | #4, DATA2      |            | ; NEXT STATUS WORD                       |
| 1022 | 001422 | 023727 | 012712 | 001000 |         | CMP     | DATA1, #1000   |            | ; IS TABLE CLEARED                       |
| 1023 | 001430 | 001361 |        |        |         | BNE     | VECSTA         |            | ; IF NOT, CONTINUE                       |
| 1024 | 001432 | 005737 | 001252 |        |         | TST     | XFLAG          | ; XOR ?    |                                          |
| 1025 | 001436 | 100523 |        |        |         | BMI     | TSTGO          | ; YES      |                                          |
| 1026 | 001440 | 005737 | 000042 |        |         | TST     | 42             | ; ACT 11 ? |                                          |
| 1027 | 001444 | 001120 |        |        |         | BNE     | TSTGO          | ; YES      |                                          |
| 1028 | 001446 | 104013 |        |        |         | INSTRG  |                |            | ; GET VECTOR ADDRESS                     |
| 1029 | 001450 | 016621 |        |        |         | MVECTOR |                |            | ; MESSAGE "VECTOR ADDRESS-"              |
| 1030 | 001452 | 000300 |        |        |         | 300     |                |            | ; LOWER LIMIT FOR ADDRESS                |
| 1031 | 001454 | 000774 |        |        |         | 774     |                |            | ; UPPER LIMIT FOR ADDRESS                |
| 1032 | 001456 | 015546 |        |        |         | DHIVEC  |                |            | ; STORAGE FOR ADDRESS                    |
| 1033 | 001460 | 032737 | 000003 | 015546 | 14:     | BIT     | #3, DHIVEC     |            | ; TEST 2 LSB OF ADDRESS                  |
| 1034 | 001466 | 001404 |        |        |         | BEQ     | VECST1         |            | ; IF 0, CONTINUE                         |
| 1035 | 001470 | 012716 | 001460 |        |         | MOV     | #14, (SP)      |            |                                          |
| 1036 | 001474 | 000137 | 014774 |        |         | JMP     | INSTR          |            | ; INCORRECT ADDRESS, TRY AGAIN           |
| 1037 | 001500 | 013737 | 015546 | 015550 | VECST1: | MOV     | DHIVEC, DHMLVL |            | ; GENERATE ADDRESS OF                    |
| 1038 | 001506 | 062737 | 000002 | 015550 |         | ADD     | #2, DHMLVL     |            | ; INTERRUPT STATUS WORD                  |
| 1039 | 001514 | 104013 |        |        |         | INSTRG  |                |            | ; GET ADDRESS OF CONTROL REGISTER        |
| 1040 | 001516 | 016643 |        |        |         | MREGAD  |                |            | ; MESSAGE "REGISTER ADDRESS"             |
| 1041 | 001520 | 170500 |        |        |         | 170500  |                |            | ; LOWER LIMIT FOR ADDRESS                |
| 1042 | 001522 | 177777 |        |        |         | 177777  |                |            | ; UPPER LIMIT FOR ADDRESS                |
| 1043 | 001524 | 015552 |        |        |         | DHMLSR  |                |            | ; STORAGE FOR ADDRESS                    |
| 1044 | 001526 | 032737 | 000007 | 015552 | 14:     | BIT     | #7, DHMLSR     |            | ; IF 3 LSB ARE NOT 0                     |
| 1045 | 001534 | 001404 |        |        |         | BEQ     | REGST1         |            |                                          |
| 1046 | 001536 | 012716 | 001526 |        |         | MOV     | #14, (SP)      |            |                                          |
| 1047 | 001542 | 000137 | 014774 |        |         | JMP     | INSTR          |            | ; INCORRECT ADDRESS, TRY AGAIN           |
| 1048 | 001546 | 013737 | 015552 | 015554 | REGST1: | MOV     | DHMLSR, DHMLSR |            | ; SET UP ADDRESS OF LINE STATUS REGISTER |
| 1049 | 001554 | 062737 | 000002 | 015554 |         | ADD     | #2, DHMLSR     |            |                                          |
| 1050 | 001562 | 104013 |        |        |         | INSTRG  |                |            | ; GET LINE SELECT PARAMETER              |
| 1051 | 001564 | 016677 |        |        |         | MLINSL  |                |            |                                          |
| 1052 | 001566 | 000000 |        |        |         | 0       |                |            |                                          |
| 1053 | 001570 | 177777 |        |        |         | 177777  |                |            |                                          |
| 1054 | 001572 | 015660 |        |        |         | LINSEL  |                |            |                                          |

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|      |        |        |        |        |         |         |                   |  |  |  |                                   |
|------|--------|--------|--------|--------|---------|---------|-------------------|--|--|--|-----------------------------------|
| 1055 |        |        |        |        |         |         |                   |  |  |  |                                   |
| 1056 | 001574 | 012706 | 001100 |        | STARTN: | MOV     | #STACK,SP         |  |  |  | ;SET UP PROCESSOR STACK           |
| 1057 | 001600 | 104013 |        |        |         | INSTRG  |                   |  |  |  | ;GET TEST NUMBER                  |
| 1058 | 001602 | 016731 |        |        |         | MTEST   |                   |  |  |  | ;MESSAGE "TEST-"                  |
| 1059 | 001604 | 000000 |        |        |         | 0       |                   |  |  |  | ;LOWER LIMIT FOR TEST NUMBER      |
| 1060 | 001606 | 000777 |        |        |         | 777     |                   |  |  |  | ;UPPER LIMIT FOR TEST NUMBER      |
| 1061 | 001610 | 015600 |        |        |         | TSTNO   |                   |  |  |  | ;STORAGE FOR TEST NUMBER          |
| 1062 | 001612 | 013705 | 015600 |        | X1A:    | MOV     | TSTNO,R5          |  |  |  | ;GET TEST NUMBER                  |
| 1063 | 001616 | 042705 | 177077 |        |         | BIC     | #177077,R5        |  |  |  | ;EXTRACT TEST GROUP NUMBER        |
| 1064 | 001622 | 006205 |        |        |         | ASR     | R5                |  |  |  |                                   |
| 1065 | 001624 | 006205 |        |        |         | ASR     | R5                |  |  |  |                                   |
| 1066 | 001626 | 006205 |        |        |         | ASR     | R5                |  |  |  |                                   |
| 1067 | 001630 | 006205 |        |        |         | ASR     | R5                |  |  |  |                                   |
| 1068 | 001632 | 006205 |        |        |         | ASR     | R5                |  |  |  |                                   |
| 1069 | 001634 | 016537 | 017472 | 015634 |         | MOV     | GRO(R5),TSTMAX    |  |  |  | ;GET HIGHEST TEST IN GROUP        |
| 1070 | 001642 | 016537 | 017452 | 015632 |         | MOV     | TSTLST(R5),TSTPNT |  |  |  | ;GET POINTER TO TEST TABLE        |
| 1071 | 001650 | 005737 | 015632 |        |         | TST     | TSTPNT            |  |  |  | ;IF 0, INVALID TEST GROUP         |
| 1072 | 001654 | 001004 |        |        |         | BNE     | STRTOA            |  |  |  |                                   |
| 1073 | 001656 | 012716 | 001612 |        | X1B:    | MOV     | #X1A,(SP)         |  |  |  |                                   |
| 1074 | 001662 | 000137 | 014774 |        |         | JMP     | INSTR             |  |  |  | ;TRY AGAIN                        |
| 1075 | 001666 | 042737 | 177700 | 015600 | STRTOA: | BIC     | #177700,TSTNO     |  |  |  | ;GET NUMBER OF FIRST TEST         |
| 1076 |        |        |        |        |         |         |                   |  |  |  | ;TO BE EXECUTED IN SELECTED GROUP |
| 1077 | 001674 | 023757 | 015600 | 015634 |         | CMP     | TSTNO,TSTMAX      |  |  |  | ;IS NUMBER TOO LARGE              |
| 1078 | 001702 | 003401 |        |        |         | BLE     | TSTGO             |  |  |  |                                   |
| 1079 | 001704 | 000764 |        |        |         | BR      | X1B               |  |  |  |                                   |
| 1080 | 001706 | 012746 | 000340 |        | TSTGO:  | MOV     | #340,-(SP)        |  |  |  | ;SET UP PRIORITY LEVEL            |
| 1081 | 001712 | 005746 |        |        |         | PUSH1SP |                   |  |  |  |                                   |
| 1082 | 001714 | 000005 |        |        |         | RESET   |                   |  |  |  |                                   |
| 1083 | 001716 | 012737 | 002202 | 002204 |         | MOV     | #DMYRTI,KRET      |  |  |  | ;SET UP DUMMY KEYBOARD RETURN     |
| 1084 | 001724 | 005037 | 015636 |        |         | CLR     | LINFLG            |  |  |  | ;CLEAR LINE SELECTED FLAG         |
| 1085 | 001730 | 005037 | 015574 |        |         | CLR     | TRACON            |  |  |  | ;CLEAR TRACE TRAP FLAG            |
| 1086 | 001734 | 005037 | 015576 |        |         | CLR     | PASCN1            |  |  |  | ;CLEAR PASS COUNT                 |
| 1087 | 001740 | 104004 |        |        |         | TYPE    |                   |  |  |  |                                   |
| 1088 | 001742 | 016745 |        |        |         | MCRLF   |                   |  |  |  |                                   |
| 1089 | 001744 | 012737 | 000001 | 001756 | 14:     | MOV     | #1,TIPFLG         |  |  |  | ;SET TEST IN PROGRESS FLAG        |
| 1090 | 001752 | 000137 | 013226 |        |         | JMP     | TSTENT            |  |  |  | ;START TESTING                    |
| 1091 | 001756 | 000000 |        |        | TIPFLG: | 0       |                   |  |  |  |                                   |

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1092
1093
1094
1095 001760 005037 001756          KBDINT: CLR      TIPFLG          ;CLEAR TEST IN PROGRESS FLAG
1096 001764 005037 014222          CLR      TMP1
1097 001770 005037 002206          CLR      SINTFL          ;CLEAR SOFTWARE INTERRUPT FLAG
1098 001774 117737 013560 014222  MOVB     @TKDBR,TMP1
1099 002002 142737 000200 014222  BICB     @200,TMP1
1100 002010 122737 000003 014222  CMPB     @3,TMP1          ;IF <CONTROL C> WAS TYPED
1101 002016 001011          BNE     KBDIN1          ;TYPE "C" AND
1102 002020 104004          TYPE          ;SELECT NEW TEST
1103 002022 017175          MCONTC
1104 002024 022626          POP2SP
1105 002026 005077 013520          CLR      @DMCSR
1106 002032 005077 013520          CLR      @TKCSR
1107 002036 000137 001574          JMP      STARTN
1108 002042 122737 000026 014222  KBDIN1: CMPB     @26,TMP1          ;IF <CONTROL V> WAS TYPED
1109 002050 001011          BNE     KBDIN2          ;TYPE "V" AND GET NEW
1110 002052 104004          TYPE          ;VECTOR AND REGISTER ADDRESS
1111 002054 017200          MCONTV
1112 002056 022626          POP2SP
1113 002060 005077 013466          CLR      @DMCSR
1114 002064 005077 013466          CLR      @TKCSR
1115 002070 000137 001354          JMP      VECSTR
1116 002074 122737 000014 014222  KBDIN2: CMPB     @14,TMP1          ;IF <CONTROL L> WAS TYPED
1117 002102 001015          BNE     KBDIN3          ;TYPE "L" AND GET NEW
1118 002104 104004          TYPE          ;LINE NUMBERS, UNLESS
1119 002106 017203          MCONTL          ;TEST GROUP 0 WAS IN PROGRESS
1120 002110 022737 002202 002204  CMP      @DMYRTI,KRET          ;IF <CONTROL L> WAS TYPED IN TEST
1121 002116 001431          BEQ      DMYRTI          ;GROUP 0, IGNORE
1122 002120 022626          POP2SP
1123 002122 005077 013424          CLR      @DMCSR
1124 002126 005077 013424          CLR      @TKCSR
1125 002132 000177 000046          JMP      @KRET
1126 002136 005737 000042          KBDIN3: TST      @42
1127 002142 001011          BNE     11
1128 002144 022737 000176 015566  CMP      @SWREG,SWR
1129 002152 001005          BNE     11
1130 002154 122737 000007 014222  CMPB     @7,TMP1          ;IS IT <G>
1131 002162 001001          BNE     11
1132 002164 104025          CNTRLU
1133 002166 012737 000001 002206  11:  MOV      @1,SINTFL          ;SET SOFTWARE INTERRUPT FLAG
1134 002174 012737 000001 001756  MOV      @1,TIPFLG          ;SET TEST IN PROGRESS FLAG
1135 002202 000002          DMYRTI: RTI
1136 002204 000000          .EVEN
1137 002206 000000          KRET: 0
1138 002206 000000          SINTFL: 0

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| Address | Op Code | Op 2   | Op 3   | Op 4   | Op 5 | Comments                                               |
|---------|---------|--------|--------|--------|------|--------------------------------------------------------|
| 1139    |         |        |        |        |      | INITIALIZATION CHECK - PERFORMED ONLY AT PROGRAM START |
| 1140    |         |        |        |        |      | VERIFY THAT CONTROL STATUS REGISTER AND LINE STATUS    |
| 1141    |         |        |        |        |      | REGISTER WERE CLEARED BY INITIALIZE                    |
| 1142    |         |        |        |        |      |                                                        |
| 1143    | 002210  |        |        |        |      | TO: REFERENCE DESIGNATION                              |
| 1144    | 002210  | 104004 |        |        |      | TYPE "16 LINE SCANNER TEST"                            |
| 1145    | 002212  | 016502 |        |        |      |                                                        |
| 1146    | 002214  | 005777 | 013332 |        |      | INIT1: TST BDHPCR                                      |
| 1147    | 002220  | 001401 |        |        |      | BEQ .+4                                                |
| 1148    | 002222  | 104012 |        |        |      | ERROR                                                  |
| 1149    | 002224  | 005777 | 013324 |        |      | TST BDHPCR                                             |
| 1150    | 002230  | 001401 |        |        |      | BEQ .+4                                                |
| 1151    | 002232  | 104012 |        |        |      | ERROR                                                  |
| 1152    | 002234  | 104002 |        |        |      | SCOPE                                                  |
| 1153    |         |        |        |        |      |                                                        |
| 1154    |         |        |        |        |      | VERIFY THAT "INTERRUPT ENABLE" CAN BE                  |
| 1155    |         |        |        |        |      | SET AND CLEARED.                                       |
| 1156    |         |        |        |        |      |                                                        |
| 1157    | 002236  |        |        |        |      | T1: REFERENCE DESIGNATION                              |
| 1158    | 002236  | 012777 | 000100 | 013306 |      | CSTR1: MOV #INTENA, BDHPCR                             |
| 1159    | 002244  | 032777 | 000100 | 013300 |      | BIT #INTENA, BDHPCR                                    |
| 1160    | 002252  | 001001 |        |        |      | BNE .+4                                                |
| 1161    | 002254  | 104012 |        |        |      | ERROR                                                  |
| 1162    | 002256  | 042777 | 000100 | 013266 |      | BIC #INTENA, BDHPCR                                    |
| 1163    | 002264  | 032777 | 000100 | 013260 |      | BIT #INTENA, BDHPCR                                    |
| 1164    | 002272  | 001401 |        |        |      | BEQ .+4                                                |
| 1165    | 002274  | 104012 |        |        |      | ERROR                                                  |
| 1166    | 002276  | 104002 |        |        |      | SCOPE                                                  |
| 1167    |         |        |        |        |      |                                                        |
| 1168    |         |        |        |        |      | VERIFY THAT "DONE" CAN BE SET AND CLEARED              |
| 1169    |         |        |        |        |      |                                                        |
| 1170    | 002300  |        |        |        |      | T2: REFERENCE DESIGNATION                              |
| 1171    | 002300  | 012777 | 000200 | 013244 |      | CSTR2: MOV #DONE, BDHPCR                               |
| 1172    | 002306  | 032777 | 000200 | 013236 |      | BIT #DONE, BDHPCR                                      |
| 1173    | 002314  | 001001 |        |        |      | BNE .+4                                                |
| 1174    | 002316  | 104012 |        |        |      | ERROR                                                  |
| 1175    | 002320  | 042777 | 000200 | 013224 |      | BIC #DONE, BDHPCR                                      |
| 1176    | 002326  | 032777 | 000200 | 013216 |      | BIT #DONE, BDHPCR                                      |
| 1177    | 002334  | 001401 |        |        |      | BEQ .+4                                                |
| 1178    | 002336  | 104012 |        |        |      | ERROR                                                  |
| 1179    | 002340  | 104002 |        |        |      | SCOPE                                                  |
| 1180    |         |        |        |        |      |                                                        |
| 1181    |         |        |        |        |      | VERIFY "MAINTENANCE MODE" CAN BE SET AND CLEARED       |
| 1182    |         |        |        |        |      |                                                        |
| 1183    | 002342  |        |        |        |      | T3: REFERENCE DESIGNATION                              |
| 1184    | 002342  | 012777 | 001000 | 013202 |      | CSTR3: MOV #MAINT, BDHPCR                              |
| 1185    | 002350  | 032777 | 001000 | 013174 |      | BIT #MAINT, BDHPCR                                     |
| 1186    | 002356  | 001001 |        |        |      | BNE .+4                                                |
| 1187    | 002360  | 104012 |        |        |      | ERROR                                                  |
| 1188    | 002362  | 042777 | 001000 | 013162 |      | BIC #MAINT, BDHPCR                                     |
| 1189    | 002370  | 032777 | 001000 | 013154 |      | BIT #MAINT, BDHPCR                                     |
| 1190    | 002376  | 001401 |        |        |      | BEQ .+4                                                |
| 1191    | 002400  | 104012 |        |        |      | ERROR                                                  |
| 1192    | 002402  | 104002 |        |        |      | SCOPE                                                  |

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1193
1194
1195
1196 002404
1197 002404 012777 000040 013140 T4:
1198 002412 032777 000040 013132 CSTR4: MOV #SCNENA,BDMCSR ;REFERENCE DESIGNATION
1199 002420 001001 BNE .+4 ;SET SCAN ENABLE
;WAS SCAN ENABLE SET
1200
1201 002422 104012 ERROR ;NO, ERROR
1202 002424 042777 000040 013120 BIC #SCNENA,BDMCSR ;CLEAR SCAN ENABLE
1203 002432 032777 000040 013112 BIT #SCNENA,BDMCSR ;WAS SCAN ENABLE CLEARED
1204 002440 001401 BEQ .+4
1205
1206 002442 104012 ERROR ;NO, ERROR
1207 002444 104002 SCOPE ;CHECK FOR ITERATIONS. LOOP
1208
1209 ;VERIFY THAT "BUSY" IS SET WHEN "SCAN ENABLE" IS SET
1210 ;VERIFY THAT "BUSY" IS CLEARED WHEN "SCAN ENABLE" IS CLEARED
1211
1212 002446
1213 002446 012777 000040 013076 T5:
1214 002454 032777 000020 013070 CSTR5: MOV #SCNENA,BDMCSR ;REFERENCE DESIGNATION
1215 002462 001001 BNE .+4 ;SET SCAN ENABLE
1216 002464 104012 ERROR ;IS BUSY BIT SET
1217 002466 042777 000040 013056 BIC #SCNENA,BDMCSR ;BUSY NOT SET, ERROR
1218 002474 032777 000020 013050 BIT #BUSY,BDMCSR ;CLEAR SCAN ENABLE
1219 002502 001401 BEQ .+4 ;IS BUSY BIT CLEARED
1220 002504 104012 ERROR ;BUSY NOT CLEARED, ERROR
1221 002506 104002 SCOPE ;CHECK FOR LOOP. ITERATIONS
1222
1223 ;VERIFY THAT SETTING "DONE" DOES NOT CCAUSE AN
1224 ;INTERRUPT IF "INTERRUPT ENABLE" IS CLEARED.
1225
1226 002510
1227 002510 052737 000340 177776 T6:
1228 002516 005077 013030 INT1: BIS #340,PS ;REFERENCE DESIGNATION
1229 002522 012777 002556 013016 CLR BDMCSR ;LOCK OUT INTERRUPTS
1230 002530 013777 177776 013012 MOV #INT1A,BDMVEC ;CLEAR CONTROL REGISTER
1231 002536 052777 000200 013006 MOV PS,BDMPLVL ;SET UP INTERRUPT SERVICE ADDRESS
1232 002544 042737 000340 177776 BIS #DONE,BDMCSR ;SET UP INTERRUPT PRIORITY
1233 002552 000240 BIC #340,PS ;SET DONE
1234 002554 000402 NOP ;ALLOW INTERRUPTS
1235 002556 022626 BR INT1B ;DELAY FOR INTERRUPT
1236 002560 104012 INT1A: POP2SP ;NO INTERRUPT, CONTINUE
1237 002562 104002 INT1B: ERROR ;RESTORE STACK, INTERRUPT
;OCCURED, ERROR
;CHECK FOR LOOP. ITERATIONS

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1238
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1241
1242 002564 052737 000340 177776 T7:
1243 002564 052737 012754 INT2: BIS #340,PS ;REFERENCE DESIGNATION
1244 002572 005077 012754 CLR BDHMCSR ;LOCK OUT INTERRUPTS
1245 002576 012777 002632 012742 MOV #INT2A,BDHMVEC ;CLEAR CONTROL REGISTER
1246 002604 013777 177776 012736 MOV PS,BDHMLVL ;SET UP INTERRUPT SERVICE ADDRESS
1247 002612 052777 000100 012732 BIS #INTENA,BDHMCSR ;SET UP INTERRUPT SERVICE LEVEL
1248 002620 042737 000340 177776 BIC #340,PS ;SET INTERRUPT ENABLE
1249 002626 000240 NOP ;ALLOW INTERRUPTS
1250 002630 000402 BR INT2B ;DELAY FOR INTERRUPTS
1251 002632 022626 INT2A: POP2SP ;NO INTERRUPT, CONTINUE
1252 002634 104012 ERROR ;RESTORE STACK
1253 002636 104002 INT2B: SCOPE ;INTERRUPT OCCURED, ERROR
;CHECK FOR ITERATIONS, LOOP
1254
1255 ;VERIFY THAT SETTING "DONE" CAUSES AN INTERRUPT
1256 ;WITH "INTERRUPT ENABLE" SET
1257
1258 002640 T10:
1259 002640 052737 000340 177776 INT3: BIS #340,PS ;REFERENCE DESIGNATION
1260 002646 005077 012700 CLR BDHMCSR ;LOCK OUT INTERRUPTS
1261 002652 012777 002724 012666 MOV #INT3A,BDHMVEC ;CLEAR CONTROL REGISTER
1262 002660 012777 000100 012664 MOV #INTENA,BDHMCSR ;SET UP INTERRUPT SERVICE ADDRESS
1263 002666 013777 177776 012654 MOV PS,BDHMLVL ;SET "INTERRUPT ENABLE"
1264 002674 042737 000340 177776 BIC #340,PS ;SET "INTERRUPT LEVEL"
1265 002702 052777 000200 012642 BIS #DONE,BDHMCSR ;ALLOW INTERRUPTS
1266 002710 000240 NOP ;SET "DONE"
1267 002712 000240 NOP ;DELAY FOR INTERRUPT
1268 002714 005077 012632 CLR BDHMCSR
1269 002720 104012 ERROR ;INTERRUPT OCCURED, ERROR
1270 002722 000401 BR INT3B ;CONTINUE
1271 002724 022626 INT3A: POP2SP ;INTERRUPT OCCURED, RESTOR STACK
1272 002726 104002 INT3B: SCOPE ;CHECK FOR ITERATION, LOOP
1273
1274
1275 ;VERIFY THAT NO INTERRUPT OCCURS WITH
1276 ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 7.
1277
1278 002730 T11:
1279 002730 005077 012616 INT4: CLR BDHMCSR ;REFERENCE DESIGNATION
1280 002734 042737 000340 177776 BIC #340,PS ;CLEAR CONTROL REGISTER
1281 002742 052737 000340 177776 BIS #340,PS ;SET PROCESSOR PRIORITY
1282 002750 012777 003012 012570 MOV #INT4A,BDHMVEC ;TO LEVEL 7.
1283 002756 013777 177776 012564 MOV PS,BDHMLVL ;SET UP INTERRUPT SERVICE ADDRESS
1284 002764 012777 000100 012560 MOV #INTENA,BDHMCSR ;SET UP INTERRUPT SERVICE LEVEL
1285 002772 052777 000200 012552 BIS #DONE,BDHMCSR ;SET INTERRUPT ENABLE
1286 003000 000240 NOP ;GENERATE INTERRUPT
1287 003002 000240 NOP ;DELAY FOR INTERRUPT
1288 003004 005077 012542 CLR BDHMCSR
1289 003010 000402 BR INT4B ;NO INTERRUPT, CONTINUE
1290 003012 022626 INT4A: POP2SP ;RESTORE STACK
1291 003014 104012 ERROR ;INTERRUPT OCCURED, ERROR
1292 003016 104002 INT4B: SCOPE ;CHECK FOR ITERATION, LOOP

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1297 003020
1298 003020 005077 012526
1299 003024 042737 000340 177776
1300 003032 052737 000300 177776
1301 003040 012777 003102 012500
1302 003046 013777 177776 012474
1303 003054 012777 000100 012470
1304 003062 052777 000200 012462
1305 003070 000240
1306 003072 000240
1307 003074 005077 012452
1308 003100 000402
1309 003102 022626
1310 003104 104012
1311 003106 104002
1312
1313
1314
1315
1316 003110
1317 003110 005077 012435
1318 003114 042737 000340 177776
1319 003122 052737 000240 177776
1320 003130 012777 003172 012410
1321 003136 013777 177776 012404
1322 003144 012777 000100 012400
1323 003152 052777 000200 012372
1324 003160 000240
1325 003162 000240
1326 003164 005077 012362
1327 003170 000402
1328 003172 022626
1329 003174 104012
1330 003176 104002
1331
1332
1333
1334
1335 003200
1336 003200 005077 012346
1337 003204 042737 000340 177776
1338 003212 052737 000200 177776
1339 003220 012777 003262 012320
1340 003226 013777 177776 012314

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T12:
 INT5:
 T13:
 INT6:
 T14:
 INT7:

```

CLR      BDHCSR
BIC      #340,PS
BIS      #300,PS
MOV      #INT5A,BDHVEC
MOV      PS,BDHMLVL
MOV      #INT5A,BDHCSR
BIS      #DONE,BDHCSR
NOP
NOP
CLR      BDHCSR
BR        INT5B
POP2SP
ERROR
SCOPE

```

;REFERENCE DESIGNATION  
 ;CLEAR CONTROL REGISTER  
 ;SET PROCESSOR PRIORITY  
 ;TO LEVEL 6.  
 ;SET UP INTERRUPT SERVICE ADDRESS  
 ;SET UP INTERRUPT SERVICE LEVEL  
 ;SET INTERRUPT ENABLE  
 ;GENERATE INTERRUPT  
 ;DELAY FOR INTERRUPT  
 ;NO INTERRUPT, CONTINUE  
 ;RESTORE STACK  
 ;INTERRUPT OCCURED, ERROR  
 ;CHECK FOR ITERATION, LOOP

;VERIFY THAT NO INTERRUPT OCCURS WITH  
 ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 6.

;REFERENCE DESIGNATION  
 ;CLEAR CONTROL REGISTER  
 ;SET PROCESSOR PRIORITY  
 ;TO LEVEL 5.  
 ;SET UP INTERRUPT SERVICE ADDRESS  
 ;SET UP INTERRUPT SERVICE LEVEL  
 ;SET INTERRUPT ENABLE  
 ;GENERATE INTERRUPT  
 ;DELAY FOR INTERRUPT  
 ;NO INTERRUPT, CONTINUE  
 ;RESTORE STACK  
 ;INTERRUPT OCCURED, ERROR  
 ;CHECK FOR ITERATION, LOOP

;VERIFY THAT NO INTERRUPT OCCURS WITH  
 ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 5.

;REFERENCE DESIGNATION  
 ;CLEAR CONTROL REGISTER  
 ;SET PROCESSOR PRIORITY  
 ;TO LEVEL 4.  
 ;SET UP INTERRUPT SERVICE ADDRESS  
 ;SET UP INTERRUPT SERVICE LEVEL

;VERIFY THAT NO INTERRUPT OCCURS WITH  
 ;"INTERRUPT ENABLE" SET AND "DONE" SET AT PRIORITY 4.



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|      |        |        |        |        |        |                |                            |
|------|--------|--------|--------|--------|--------|----------------|----------------------------|
| 1341 | 003234 | 012777 | 000100 | 012310 | MOV    | #INTENA,BDMCSR | ;SET INTERRUPT ENABLE      |
| 1342 | 003242 | 052777 | 000200 | 012302 | BIS    | #DONE,BDMCSR   | ;GENERATE INTERRUPT        |
| 1343 | 003250 | 000240 |        |        | NOP    |                | ;DELAY FOR INTERRUPT       |
| 1344 | 003252 | 000240 |        |        | NOP    |                |                            |
| 1345 | 003264 | 005077 | 012272 |        | CLR    | BDMCSR         |                            |
| 1346 | 003260 | 000402 |        |        | BR     | INT7B          | ;NO INTERRUPT, CONTINUE    |
| 1347 | 003262 | 022626 |        | INT7A: | POP2SP |                | ;RESTORE STACK             |
| 1348 | 003264 | 104012 |        |        | ERROR  |                | ;INTERRUPT OCCURED, ERROR  |
| 1349 | 003266 | 104002 |        | INT7B: | SCOPE  |                | ;CHECK FOR ITERATION, LOOP |

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1350
1351
1352                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1353                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 0.
1354
1355 003270                                T15:                                ;REFERENCE DESIGNATION
1356 003270 005077 012256                INT10: CLR      BDHMCSR                ;CLEAR CONTROL REGISTER
1357 003274 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
1358 003302 012777 003352 012236        MOV      #INT10A,BDHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1359 003310 005077 012234                CLR      BDHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY
1360 003314 052737 000000 177776        BIS      #0,PS                  ;SET PROCESSOR PRIORITY TO LEVEL 0.
1361 003322 012777 000100 012222        MOV      #INTENA,BDHMCSR          ;SET INTERRUPT ENABLE
1362 003330 052777 000200 012214        BIS      #DONE,BDHMCSR          ;GENERATE INTERRUPT
1363 003336 000240                        NOP                               ;WAIT FOR INTERRUPT
1364 003340 000240                        NOP
1365 003342 005077 012204                CLR      BDHMCSR
1366 003346 104012                        ERROR                            ;NO INTERRUPT, ERROR
1367 003350 000401                        BR      INT10B                    ;CONTINUE
1368 003352 022626                INT10A: POP2SP                            ;INTERRUPT OCCURED, RESTORE STACK
1369 003354 104002                INT10B: SCOPE                            ;CHECK FOR INTERATIONS, LOOP.
1370
1371                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1372                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 1.
1373
1374 003356                                T16:                                ;REFERENCE DESIGNATION
1375 003356 005077 012170                INT11: CLR      BDHMCSR                ;CLEAR CONTROL REGISTER
1376 003362 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
1377 003370 012777 003440 012150        MOV      #INT11A,BDHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1378 003376 005077 012146                CLR      BDHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY
1379 003402 052737 000040 177776        BIS      #40,PS                  ;SET PROCESSOR PRIORITY TO LEVEL 1.
1380 003410 012777 000100 012134        MOV      #INTENA,BDHMCSR          ;SET INTERRUPT ENABLE
1381 003416 052777 000200 012126        BIS      #DONE,BDHMCSR          ;GENERATE INTERRUPT
1382 003424 000240                        NOP                               ;WAIT FOR INTERRUPT
1383 003426 000240                        NOP
1384 003430 005077 012116                CLR      BDHMCSR
1385 003434 104012                        ERROR                            ;NO INTERRUPT, ERROR
1386 003436 000401                        BR      INT11B                    ;CONTINUE
1387 003440 022626                INT11A: POP2SP                            ;INTERRUPT OCCURED, RESTORE STACK
1388 003442 104002                INT11B: SCOPE                            ;CHECK FOR INTERATIONS, LOOP.
1389
1390                                     ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT
1391                                     ;ENABLE" SET AND "DONE" SET AT PRIORITY 2.
1392
1393 003444                                T17:                                ;REFERENCE DESIGNATION
1394 003444 005077 012102                INT12: CLR      BDHMCSR                ;CLEAR CONTROL REGISTER
1395 003450 042737 000340 177776        BIC      #340,PS                ;ALLOW INTERRUPTS
1396 003456 012777 003526 012062        MOV      #INT12A,BDHMVEC          ;SET UP INTERRUPT SERVICE ADDRESS
1397 003464 005077 012060                CLR      BDHMLVL                ;SET UP INTERRUPT SERVICE PRIORITY

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|      |        |        |        |        |                |                |                                     |
|------|--------|--------|--------|--------|----------------|----------------|-------------------------------------|
| 1398 | 003470 | 052737 | 000100 | 177776 | BIS            | #100,PS        | ;SET PROCESSOR PRIORITY TO LEVEL 2. |
| 1399 | 003476 | 012777 | 000100 | 012046 | MOV            | #INTENA,BDMCSR | ;SET INTERRUPT ENABLE               |
| 1400 | 003504 | 052777 | 000200 | 012040 | BIS            | #DONE,BDMCSR   | ;GENERATE INTERRUPT                 |
| 1401 | 003512 | 000240 |        |        | NOP            |                | ;WAIT FOR INTERRUPT                 |
| 1402 | 003514 | 000240 |        |        | NOP            |                |                                     |
| 1403 | 003516 | 005077 | 012030 |        | CLR            | BDMCSR         |                                     |
| 1404 | 003522 | 104012 |        |        | ERROR          |                | ;NO INTERRUPT, ERROR                |
| 1405 | 003524 | 000401 |        |        | BR             | INT128         | ;CONTINUE                           |
| 1406 | 003526 | 022626 |        |        | INT12A: POP2SP |                | ;INTERRUPT OCCURED, RESTORE STACK   |
| 1407 | 003530 | 104002 |        |        | INT128: SCOPE  |                | ;CHECK FOR INTERATIONS, LOOP.       |

|      |        |        |        |         |                      |                                                  |
|------|--------|--------|--------|---------|----------------------|--------------------------------------------------|
| 1408 |        |        |        |         |                      | ;VERIFY THAT AN INTERRUPT OCCURS WITH "INTERRUPT |
| 1409 |        |        |        |         |                      | ;ENABLE" SET AND "DONE" SET AT PRIORITY 3.       |
| 1410 |        |        |        |         |                      |                                                  |
| 1411 |        |        |        |         |                      |                                                  |
| 1412 | 003532 |        | T20:   |         |                      | ;REFERENCE DESIGNATION                           |
| 1413 | 003532 | 005077 | 012014 | INT13:  | CLR BDHMC SR         | ;CLEAR CONTROL REGISTER                          |
| 1414 | 003536 | 042737 | 000340 |         | BIC #340,PS          | ;ALLOW INTERRUPTS                                |
| 1415 | 003544 | 012777 | 003614 | 011774  | MOV #INT13A,BDH MVEC | ;SET UP INTERRUPT SERVICE ADDRESS                |
| 1416 | 003552 | 005077 | 011772 |         | CLR BDH MLVL         | ;SET UP INTERRUPT SERVICE PRIORITY               |
| 1417 | 003556 | 052737 | 000140 | 177776  | BIS #140,PS          | ;SET PROCESSOR PRIORITY TO LEVEL 3.              |
| 1418 | 003564 | 012777 | 000100 | 011760  | MOV #INTENA,BDH MCSR | ;SET INTERRUPT ENABLE                            |
| 1419 | 003572 | 052777 | 000200 | 011752  | BIS #DONE,BDH MCSR   | ;GENERATE INTERRUPT                              |
| 1420 | 003600 | 000240 |        |         | NOP                  | ;WAIT FOR INTERRUPT                              |
| 1421 | 003602 | 000240 |        |         | NOP                  |                                                  |
| 1422 | 003604 | 005077 | 011742 |         | CLR BDH MCSR         |                                                  |
| 1423 | 003610 | 104012 |        |         | ERROR                | ;NO INTERRUPT, ERROR                             |
| 1424 | 003612 | 000401 |        |         | BR INT13B            | ;CONTINUE                                        |
| 1425 | 003614 | 022626 |        | INT13A: | POP2SP               | ;INTERRUPT OCCURED, RESTORE STACK                |
| 1426 | 003616 | 104002 |        | INT13B: | SCOPE                | ;CHECK FOR INTERATIONS. LOOP.                    |

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1427
1428
1429
1430
1431 003620
1432 003620 005077 011726
1433 003624 042737 000340 177776
1434 003632 012737 000001 015662
1435 003640 005005
1436 003642 012700 000020
1437 003646 033737 015662 015660
1438 003654 001407
1439 003656 010577 011670
1440 003662 017704 011664
1441 003666 020504
1442 003670 001401
1443 003672 104000
1444 003674 104003
1445 003676 003646
1446 003700 005205
1447 003702 006337 015662
1448 003706 005300
1449 003710 001356
1450 003712 104002
1451
1452
1453
1454
1455 003714
1456 003714 042737 000340 177776
1457 003722 005077 011624
1458 003726 005005
1459 003730 012737 000001 015662
1460 003736 012701 177777
1461 003742 012700 000020
1462 003746 012777 000017 011576
1463 003754 033737 015662 015660
1464 003762 001407
1465 003764 004737 013344
1466 003770 017704 011556
1467 003774 020504
1468 003776 001401
1469 004000 104000
1470 004002 104003
1471 004004 003714
1472 004006 005205
1473 004010 006337 015662
1474 004014 005201
1475 004016 010177 011530
1476 004022 005300
1477 004024 001353
1478 004026 104002

;VERIFY THAT ALL LINE NUMBERS CAN BE WRITTEN INTO AND
;READ BACK FROM LINE COUNTER

T21:
LINT1: CLR BDHCSR
      BIC #340,PS
      MOV #1,SELMSK
      CLR R5
      MOV #16,,R0
LINT1A: BIT SELMSK,LINSEL
      BEQ LINT1B
      MOV R5,BDHCSR
      MOV BDHCSR,R4
      CMP R5,R4
      BEQ LINT1B
      ERRORC
LINT1B: SCOPEF
      LINT1A
      INC R5
      ASL SELMSK
      DEC R0
      BNE LINT1A
      SCOPE

;REFERENCE DESIGNATION
;CLEAR CONTROL STATUS REGISTER
;ENABLE INTERRUPTS
;INIT LINE SELECT MASK
;CLEAR EXPECTED LINE NUMBER
;SET UP TO TEST 16 LINE NUMBERS
;THIS LINE SELECTED ??
;BR IF NOT
;SET LINE NUMBER
;READ BACK LINE NUMBER
;ARE EXPECTED AND RECEIVED
;LINE NUMBERS THE SAME
;LINE NUMBERS DIFFERENT, ERROR
;CHECK FOR DATA FREEZE
;RETURN FOR DATA FREEZE
;UPDATE LINE COUNT
;SELECT NEXT LINE TO TEST
;UPDATE LINE NUMBER
;CONTINUE
;CHECK FOR ITERATION, LOOP

;USING "STEP" MODE, VERIFY THAT THE
;LINE COUNTER CAN BE STEPPED THRU ALL STATES.

T22:
LINT2: BIC #340,PS
      CLR BDHCSR
      CLR R5
      MOV #1,SELMSK
      MOV #-1,R1
      MOV #16,,R0
      MOV #17,BDHCSR
LINT2A: BIT SELMSK,LINSEL
      BEQ LINT2B
      CALL STEPER
      MOV BDHCSR,R4
      CMP R5,R4
      BEQ LINT2B
      ERRORC
LINT2B: SCOPEF
      LINT2
      INC R5
      ASL SELMSK
      INC R1
      MOV R1,BDHCSR
      DEC R0
      BNE LINT2A
      SCOPE

;REFERENCE DESIGNATION
;ENABLE INTERRUPTS
;CLEAR CONTROL STATUS REGISTER
;CLEAR EXPECTED LINE COUNT
;SET UP SELECT MASK
;INIT LINE COUNTER
;SET UP TO TEST 16 VALUES
;FIRST VALUE =0
;THIS LINE SELECTED ??
;BR IF NOT
;STEP LINE COUNTER
;READ LINE COUNTER
;COMPARE EXPECTED AND
;RECEIVED LINE NUMBERS
;LINE COUNTER ERROR
;CHECK FOR DATA FREEZE
;UPDATE EXPECTED LINE NUMBER
;SHIFT SELECT MASK
;GEN NEW LINE NO.
;SET NEW LINE NO. IN CSR
;CHECK FOR ITERATIONS, LOOP

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| Address | Hex    | Hex    | Hex    | Hex    | Label   | Assembly                                     | Comments                        |
|---------|--------|--------|--------|--------|---------|----------------------------------------------|---------------------------------|
| 1479    |        |        |        |        |         | WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS. |                                 |
| 1480    |        |        |        |        |         | VERIFY THAT ALL LOCATIONS HAVE BEEN WRITTEN  |                                 |
| 1481    |        |        |        |        |         | TO 1'S.                                      |                                 |
| 1482    |        |        |        |        |         | VERIFY THAT "CLEAR SCAN" CLEARS ALL SCANNER  |                                 |
| 1483    |        |        |        |        |         | MEMORY LOCATIONS.                            |                                 |
| 1484    |        |        |        |        |         |                                              |                                 |
| 1485    |        |        |        |        |         |                                              |                                 |
| 1486    | 004030 |        |        |        | T23:    |                                              | REFERENCE DESIGNATION           |
| 1487    | 004030 | 012777 | 002000 | 011514 | MENT1:  | MOV #CLRMUX,BDMCSR                           | CLEAR CONTROL STATUS REGISTER   |
| 1488    | 004036 | 042737 | 000340 | 177776 |         | BIC #340,PS                                  | ENABLE INTERRUPTS               |
| 1489    | 004044 | 012700 | 000020 |        |         | MOV #16.,R0                                  | SET UP TO TEST 16 LOCATIONS     |
| 1490    | 004050 | 052777 | 001017 | 011474 |         | BIS #MAINT+17,BDMCSR                         | SET MAINTENANCE MODE            |
| 1491    | 004056 | 004737 | 013344 |        | MENT1A: | CALL STEPER                                  | SET LINE COUNTER THRU ALL       |
| 1492    | 004062 | 005300 |        |        |         | DEC R0                                       | STATES, WRITING 1'S INTO        |
| 1493    | 004064 | 001374 |        |        |         | BNE MENT1A                                   | ALL MEMORY WORDS                |
| 1494    | 004066 | 012700 | 000020 |        |         | MOV #16.,R0                                  | SET UP TO TEST 16 WORDS         |
| 1495    | 004072 | 012705 | 070000 |        |         | MOV #70000,R5                                | SET UP EXPECTED STATUS REGISTER |
| 1496    | 004076 | 012777 | 000017 | 011446 |         | MOV #17,BDMCSR                               | START WITH LINE 0               |
| 1497    | 004104 | 004737 | 013344 |        | MENT1B: | CALL STEPER                                  | ACCESS SCANNER MEMORY           |
| 1498    | 004110 | 017704 | 011436 |        |         | MOV BDMCSR,R4                                | READ DATA                       |
| 1499    | 004114 | 020504 |        |        |         | CMP R5,R4                                    | COMPARE EXPECTED AND RECEIVED   |
| 1500    | 004116 | 001403 |        |        |         | BEQ MENT1C                                   | DATA                            |
| 1501    | 004120 | 104000 |        |        |         | ERRORC                                       | CONTROL STATUS OR MEMORY ERROR  |
| 1502    | 004122 | 104003 |        |        |         | SCOPEF                                       | CHECK FOR DATA FREEZE           |
| 1503    | 004124 | 004030 |        |        |         | MENT1                                        |                                 |
| 1504    | 004126 | 005205 |        |        | MENT1C: | INC R5                                       | UPDATE EXPECTED STATUS          |
| 1505    | 004130 | 005300 |        |        |         | DEC R0                                       | UPDATE LINE COUNT               |
| 1506    | 004132 | 001364 |        |        |         | BNE MENT1B                                   | CONTINUE                        |
| 1507    | 004134 | 012777 | 004000 | 011410 | MENT1D: | MOV #CLRSCN,BDMCSR                           | SET "CLEAR SCAN"                |
| 1508    | 004142 | 032777 | 000020 | 011402 |         | BIT #BUSY,BDMCSR                             | WAIT FOR "CLEAR CYCLES"         |
| 1509    | 004150 | 001374 |        |        |         | BNE .-6                                      |                                 |
| 1510    | 004152 | 012700 | 000020 |        |         | MOV #16.,R0                                  | SET UP TO TEST 16 MEMORY        |
| 1511    | 004156 | 005005 |        |        |         | CLR R5                                       | LOCATIONS                       |
| 1512    | 004160 | 012777 | 000017 | 011364 |         | MOV #17,BDMCSR                               | FIRST TO BE TESTED=0            |
| 1513    | 004166 | 004737 | 013344 |        | MENT1E: | CALL STEPER                                  | ACCESS SCANNER MEMORY           |
| 1514    | 004172 | 017704 | 011354 |        |         | MOV BDMCSR,R4                                | READ DATA                       |
| 1515    | 004176 | 020504 |        |        |         | CMP R5,R4                                    | COMPARE EXPECTED AND RECEIVED   |
| 1516    | 004200 | 001403 |        |        |         | BEQ MENT1F                                   | DATA                            |
| 1517    | 004202 | 104000 |        |        |         | ERRORC                                       | CONTROL STATUS OF MEMORY ERROR  |
| 1518    | 004204 | 104003 |        |        |         | SCOPEFF                                      | CHECK FOR DATA FREEZE           |
| 1519    | 004206 | 004134 |        |        |         | MENT1D                                       |                                 |
| 1520    | 004210 | 005205 |        |        | MENT1F: | INC R5                                       | UPDATE EXPECTED DATA            |
| 1521    | 004212 | 005300 |        |        |         | DEC R0                                       | UPDATE LINE COUNT               |
| 1522    | 004214 | 001364 |        |        |         | BNE MENT1E                                   | CONTINUE                        |
| 1523    | 004216 | 104002 |        |        |         | SCOPE                                        | CHECK FOR ITERATIONS, LOOP      |



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| Address | OpCode | 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 | Op417 | Op418</ |
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| Address | OpCode | 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 | Op417 | Op418</ |
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1599                                     ;VERIFY THAT LINE ENABLE FUNCTION FLIP-FLOP CAN
1600                                     ;BE SET AND CLEARED FOR SELECTED LINE
1601
1602 004534                                T26:                                ;REFERENCE DESIGNATION
1603 004534 005077 011012                MUX1: CLR BDHPCSR                ;CLEAR CONTROL STATUS REGISTER
1604 004540 042737 000340 177776        BIC #340,PS                ;ENABLE INTERRUPTS
1605 004546 012700 000020                MOV #16.,R0                ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1606 004552 012737 000001 015662        MOV #1,SELMSK                ;INIT LINE SELECT MASK
1607 004560 005001                        CLR R1                        ;START AT LINE 0
1608 004562 012777 002000 010762        MUX1A: MOV #CLRMUX,BDHPCSR
1609 004570 012702 000020                MOV #16.,R2
1610 004574 033737 015662 015660        BIT SELMSK,LINSEL                ;IS THIS LINE SELECTED FOR TEST ?
1611 004602 001464                        BEQ MUX1F                    ;OR IF NOT
1612 004604 010177 010742                MOV R1,BDHPCSR                ;SELECT LINE TO BE TESTED
1613 004610 012777 000001 010736        MOV #LINENA,BDHPLSR            ;SET LINE ENABLE FUNCTION FLIP-FLOP
1614 004616 012737 000001 015664        MOV #1,SLMSK                ;INIT ANOTHER SELECT MASK
1615 004624 005077 010722                CLR BDHPCSR
1616 004630 005005                        MUX1B: CLR R5
1617 004632 033737 015664 015660        BIT SLMSK,LINSEL                ;SELECTED ??
1618 004640 001421                        BEQ MUX1D                    ;OR IF NOT
1619 004642 017704 010706                MOV BDHPLSR,R4                ;READ LINE STATUS REGISTER
1620 004646 117703 010700                MOV# BDHPCSR,R3                ;READ CONTROL STATUS REGISTER
1621 004652 042703 177760                BIC #177760,R3                ;CLEAR UNWANTED BITS
1622 004656 020103                        CMP R1,R3                    ;IF LINE NUMBER=SELECTED LINE NUMBER,
1623 004660 001002                        BNE MUX1C                    ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1624 004662 012705 000001                MOV #LINENA,R5                ;TO BE SET
1625
1626 004666                                MUX1C:
1627 004666 042704 000360                BIC #360,R4                ;CLEAR RING.CO.CS.SECRCV
1628                                     ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1629                                     ;CMP EXPECTED AND RECVD
1630                                     ;RESULTS
1631                                     ;LINE STATUS ERROR
1632 004672 020504                        CMP R5,R4
1633 004674 001403                        BEQ MUX1D
1634 004676 104001                        ERRORL
1635 004676 104003                        SCOPEF
1636 004700 104003                        MUX1D:
1637 004702 004704                        CALL STEPER                ;EXAMINE NEXT LINE
1638 004704 004737 013344                ASL SLMSK                ;SHIFT MASK
1639 004710 006337 015664                DEC R2
1640 004714 005302                        BNE MUX1B
1641 004716 001344                        CLR R5
1642 004720 005005                        MUX1E: MOV R1,BDHPCSR
1643 004722 010177 010624                MOV R1,R3                ;SET LINE COUNTER TO SELECTED LINE
1644 004726 010103                        CLR BDHPLSR                ;CLEAR LINE ENABLE FLIP FLOP
1645 004730 005077 010620                INCB #0                ;DELAY FOR CABLE
1646 004734 105227 000000                BNE .-4                ;DITTO
1647 004740 001375                        MOV BDHPLSR,R4                ;READ LINE STATUS REGISTER
1648 004742 017704 010606                TST R4                ;WAS LINE ENABLE FUNCTION FLIP FLOP
1649 004746 005704                        BEQ MUX1F                    ;CLEARED
1650 004750 001401                        ERRORL                ;NO, LINE STATUS ERROR
1651 004752 104001                        SCOPEF                ;CHECK FOR LOOP ON SAME DATA
1652 004754 104003                        MUX1A:
1653 004756 004562                        ASL SELMSK                ;SHIFT SELECT MASK
1654 004760 006337 015662                INC R1                ;SELECT NEXT LINE
1655 004764 005201                        DEC R0                ;DECREMENT LINE COUNT
1656 004766 005300                        BNE MUX1A                ;CONTINU IF NOT DONE
1657 004770 001274                        SCOPE                ;CHECK FOR ITERATIONS, LOOP
1658 004772 104002

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1655                                     ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN
1656                                     ;BE SET AND CLEARED FOR SELECTED LINE
1657
1658 004774                                T27:                                ;REFERENCE DESIGNATION
1659 004774 005077 010552                MUX2: CLR BDHMC SR                ;CLEAR CONTROL STATUS REGISTER
1660 005000 042737 000340 177776        BIC #340,PS                    ;ENABLE INTERRUPTS
1661 005006 012700 000020                MOV #16.,R0                    ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1662 005012 012737 000001 015662        MOV #1,SELMSK                ;INIT LINE SELECT MASK
1663 005020 005001                        CLR R1                        ;START AT LINE 0
1664 005022 012777 002000 010522        MUX2A: MOV #CLRMUX,BDHMC SR
1665 005030 012702 000020                MOV #16.,R2
1666 005034 033737 015662 015660        BIT SELMSK,LINSEL            ;IS THIS LINE SELECTED FOR TEST ?
1667 005042 001462                        BEQ MUX2F                    ;BR IF NOT
1668 005044 010177 010502                MOV R1,BDHMC SR                ;SELECT LINE TO BE TESTED
1669 005050 012777 000002 010476        MOV #TRMRDY,BDHPL SR        ;SET TERMINAL READY FUNCTION FLIP FLOP
1670 005056 012737 000001 015664        MOV #1,SLMSK                ;INIT ANOTHER SELECT MASK
1671 005064 005077 010462                CLR BDHMC SR
1672 005070 005005                        MUX2B: CLR R5
1673 005072 033737 015664 015660        BIT SLMSK,LINSEL            ;SELECTED ??
1674 005100 001417                        BEQ MUX2D                    ;BR IF NOT
1675 005102 017704 010446                MOV BDHPL SR,R4                ;READ LINE STATUS REGISTER
1676 005106 117703 010440                MOV BDHMC SR,R3                ;READ CONTROL STATUS REGISTER
1677 005112 042703 177760                BIC #177760,R3                ;CLEAR UNWANTED BITS
1678 005116 020103                        CMP R1,R3                    ;IF LINE NUMBER=SELECTED LINE NUMBER,
1679 005120 001002                        BNE MUX2C                    ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP
1680 005122 012705 000002                MOV #TRMRDY,R5                ;TO BE SET
1681
1682                                MUX2C:                                ;CMP EXPECTED AND RECVD
1683 005126 020504                        CMP R5,R4                    ;RESULTS
1684 005130 001403                        BEQ MUX2D                    ;LINE STATUS ERROR
1685 005132 104001                        ERRORL
1686 005134 104003                        SCOPEF
1687 005136 005140                        MUX2D
1688 005140 004737 013344                MUX2D: CALL STEPER                ;EXAMINE NEXT LINE
1689 005144 006337 015664                ASL SLMSK                    ;SHIFT MASK
1690 005150 005302                        DEC R2
1691 005152 001346                        BNE MUX2B
1692 005154 005005                        CLR R5
1693 005156 010177 010370                MUX2E: MOV R1,BDHMC SR
1694 005162 010103                        MOV R1,R3
1695 005164 005077 010364                CLR BDHPL SR                ;SET LINE COUNTER TO SELECTED LINE
1696 005170 105227 000000                INCB #0                    ;CLEAR TERMINAL READY FLIP FLOP
1697 005174 001375                        BNE .-4                    ;DELAY FOR CABLE
1698 005176 017704 010352                MOV BDHPL SR,R4                ;DITTO
1699 005202 005704                        TST R4                    ;READ LINE STATUS REGISTER
1700 005204 001401                        BEQ MUX2F                    ;WAS TERMINAL READY FUNCTION FLIP FLOP
1701 005206 104001                        ERRORL                    ;CLEARED
1702 005210 104003                        MUX2F: SCOPEF                ;NO, LINE STATUS ERROR
1703 005212 005022                        MUX2A                    ;CHECK FOR LOOP ON SAME DATA
1704 005214 006337 015662                ASL SELMSK                    ;SHIFT SELECT MASK
1705 005220 005201                        INC R1                    ;SELECT NEXT LINE
1706 005222 005300                        DEC R0                    ;DECREMENT LINE COUNT
1707 005224 001276                        BNE MUX2A                    ;CONTINU IF NOT DONE
1708 005226 104002                        SCOPE                    ;CHECK FOR ITERATIONS, LOOP

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1709                                     ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
1710                                     ;BE SET AND CLEARED FOR SELECTED LINE
1711
1712 005230                                T30:                                ;REFERENCE DESIGNATION
1713 005230 005077 010316                MUX3: CLR BDHMC SR                ;CLEAR CONTROL STATUS REGISTER
1714 005234 042737 000340 177776        BIC #340,PS                    ;ENABLE INTERRUPTS
1715 005242 012700 000020                MOV #16.,R0                    ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1716 005246 012737 000001 015662        MOV #1,SELMSK                  ;INIT LINE SELECT MASK
1717 005254 005001                        CLR R1                          ;START AT LINE 0
1718 005256 012777 002000 010266        MUX3A: MOV @CLRMUX,BDHMC SR      ;
1719 005264 012702 000020                MOV #16.,R2                    ;
1720 005270 033737 015662 015660        BIT SELMSK,LINSEL              ;IS THIS LINE SELECTED FOR TEST ?
1721 005276 001462                        BEQ MUX3F                      ;BR IF NOT
1722 005300 010177 010246                MOV R1,BDHMC SR                ;SELECT LINE TO BE TESTED
1723 005304 012777 000004 010242        MOV #RS,BDHML SR              ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
1724 005312 012737 000001 015664        MOV #1,SLMSK                    ;INIT ANOTHER SELECT MASK
1725 005320 005077 010226                CLR BDHMC SR
1726 005324 005005                        MUX3B: CLR R5
1727 005326 033737 015664 015660        BIT SLMSK,LINSEL                ;SELECTED ??
1728 005334 001417                        BEQ MUX3D                      ;BR IF NOT
1729 005336 017704 010212                MOV BDHML SR,R4                ;READ LINE STATUS REGISTER
1730 005342 117703 010204                MOV BDHMC SR,R3                ;READ CONTROL STATUS REGISTER
1731 005346 042703 177760                BIC #177760,R3                ;CLEAR UNWANTED BITS
1732 005352 020103                        CMP R1,R3                      ;IF LINE NUMBER=SELECTED LINE NUMBER,
1733 005354 001002                        BNE MUX3C                      ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
1734 005356 012705 000004                MOV #RS,R5
1735                                     ;TO BE SET
1736 005362                                MUX3C:
1737 005362 020504                        CMP R5,R4                      ;CMP EXPECTED AND RECVD
1738 005364 001403                        BEQ MUX3D                      ;RESULTS
1739 005366 104001                        ERRORL                          ;LINE STATUS ERROR
1740 005370 104003                        SCOPEF
1741 005372 005374                        MUX3D
1742 005374 004737 013344                MUX3D: CALL STEPER                ;EXAMINE NEXT LINE
1743 005400 006337 015664                ASL SLMSK                      ;SHIFT MASK
1744 005404 005302                        DEC R2
1745 005406 001346                        BNE MUX3B
1746 005410 005005                        CLR R5
1747 005412 010177 010134                MUX3E: MOV R1,BDHMC SR
1748 005416 010103                        MOV R1,R3
1749 005420 005077 010130                CLR BDHML SR
1750 005424 105227 000000                INCB #0
1751 005430 001375                        BNE .-4
1752 005432 017704 010116                MOV BDHML SR,R4
1753 005436 005704                        TST R4
1754 005440 001401                        BEQ MUX3F
1755 005442 104001                        ERRORL
1756 005444 104003                        MUX3F: SCOPEF
1757 005446 005256                        MUX3A
1758 005450 006337 015662                ASL SELMSK
1759 005454 005201                        INC R1
1760 005456 005300                        DEC R0
1761 005460 001276                        BNE MUX3A
1762 005462 104002                        SCOPE

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1763                                     ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
1764                                     ;BE SET AND CLEARED FOR SELECTED LINE
1765
1766 005464                                T31:                                ;REFERENCE DESIGNATION
1767 005464 005077 010062                 MUX4:  CLR      BDHPCR                    ;CLEAR CONTROL STATUS REGISTER
1768 005470 042737 000340 177776         BIC      #340,PS                     ;ENABLE INTERRUPTS
1769 005476 012700 000020                 MOV      #16.,R0                     ;SET UP TO TEST 16 FUNCTION FLIP-FLOP
1770 005502 012737 000001 015662         MOV      #1,SELMSK                    ;INIT LINE SELECT MASK
1771 005510 005001                                     CLR      R1                                ;START AT LINE 0
1772 005512 012777 002000 010032 MUX4A:  MOV      @CLRMUX,BDHPCR                ;
1773 005520 012702 000020                 MOV      #16.,R2
1774 005524 033737 015662 015660         BIT      SELMSK,LINSEL                ;IS THIS LINE SELECTED FOR TEST ?
1775 005532 001462                                     BEQ      MUX4F                            ;BR IF NOT
1776 005534 010177 010012                 MOV      R1,BDHPCR                    ;SELECT LINE TO BE TESTED
1777 005540 012777 000010 010006         MOV      @SECTX,BDHPCR                ;SET SECONDARY TRANSMIT FUNCTION FLIP-FLOP
1778 005546 012737 000001 015664         MOV      #1,SLMSK                    ;INIT ANOTHER SELECT MASK
1779 005554 005077 007772                                     CLR      BDHPCR
1780 005560 005005 MUX4B:  CLR      R5
1781 005562 033737 015664 015660         BIT      SLMSK,LINSEL                ;SELECTED ??
1782 005570 001417                                     BEQ      MUX4D                            ;BR IF NOT
1783 005572 017704 007756                 MOV      BDHPCR,R4                    ;READ LINE STATUS REGISTER
1784 005576 117703 007750                 MOV      BDHPCR,R3                    ;READ CONTROL STATUS REGISTER
1785 005602 042703 177760                 BIC      #177760,R3                    ;CLEAR UNWANTED BITS
1786 005606 020103                 CMP      R1,R3                        ;IF LINE NUMBER=SELECTED LINE NUMBER,
1787 005610 001002                 BNE      MUX4C                            ;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
1788 005612 012705 000010                 MOV      @SECTX,R5
1789                                     ;TO BE SET
1790 MUX4C:  CMP      R5,R4
1791 005616 020504                                     BEQ      MUX4D                            ;CMP EXPECTED AND RECVD
1792 005620 001403                                     ERRORL                                     ;RESULTS
1793 005622 104001                                     SCOPEF                                     ;LINE STATUS ERROR
1794 005624 104003 MUX4D:  CALL     STEPER
1795 005626 005630                                     ASL      SLMSK                            ;EXAMINE NEXT LINE
1796 005630 004737 013344                                     DEC      R2                                ;SHIFT MASK
1797 005634 006337 015664                                     BNE      MUX4B
1798 005640 005302                                     CLR      R5
1799 005642 001346 MUX4E:  MOV      R1,BDHPCR
1800 005644 005005                                     MOV      R1,R3
1801 005646 010177 007700                                     CLR      BDHPCR
1802 005652 010103                                     INCB     #0
1803 005654 005077 007674                                     BNE      .-4
1804 005660 105227 000000                                     MOV      BDHPCR,R4
1805 005664 001375                                     TST      R4
1806 005666 017704 007662                                     BEQ      MUX4F
1807 005672 005704 MUX4F:  ERRORL
1808 005674 001401                                     SCOPEF
1809 005676 104001 MUX4A:  MOV      R1,SELMSK
1810 005700 104003                                     INC      R1
1811 005702 005512                                     DEC      R0
1812 005704 006337 015662                                     BNE      MUX4A
1813 005710 005201                                     SCOPE
1814 005712 005300
1815 005714 001276
1816 005716 104002

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| Address | Hex    | Hex    | Hex    | Hex    | Label  | Assembly             | Comment                                 |
|---------|--------|--------|--------|--------|--------|----------------------|-----------------------------------------|
| 1817    |        |        |        |        |        |                      |                                         |
| 1818    |        |        |        |        |        |                      |                                         |
| 1819    |        |        |        |        |        |                      |                                         |
| 1820    |        |        |        |        |        |                      |                                         |
| 1821    | 005720 |        |        |        | T32:   |                      | ;REFERENCE DESIGNATION                  |
| 1822    | 005720 | 005077 | 007626 |        | MUX8:  | CLR BDHMC SR         | ;CLEAR CONTROL REGISTER                 |
| 1823    | 005724 | 042737 | 000340 | 177776 |        | BIC #340,PS          | ;ENABLE INTERRUPTS                      |
| 1824    | 005732 | 012700 | 000020 |        |        | MOV #16.,R0          | ;SET UP TO TEST 16 LINES                |
| 1825    | 005736 | 012777 | 000017 | 007610 | MUX8A: | MOV #17,BDHMLSR      | ;WRITE 15 INTO ALL MULTIPLEXER          |
| 1826    | 005744 | 004737 | 013344 |        |        | CALL STEPER          | ;FUNCTION FLIPFLOPS                     |
| 1827    | 005750 | 005300 |        |        |        | DEC R0               |                                         |
| 1828    | 005752 | 001371 |        |        |        | BNE MUX8A            |                                         |
| 1829    | 005754 | 012737 | 000001 | 015662 |        | MOV #1,SELMSK        | ;INIT SELECT MASK                       |
| 1830    | 005762 | 005003 |        |        |        | CLR R3               | ;SET UP FOR 16 LINES                    |
| 1831    | 005764 | 012700 | 000020 |        |        | MOV #16.,R0          |                                         |
| 1832    | 005770 | 012777 | 002000 | 007554 | MUX8B: | MOV #CLRMUX,BDHMC SR | ;CLEAR MULTIPLEXER                      |
| 1833    | 005776 | 033737 | 015662 | 015660 | MUX8C: | BIT SELMSK,LINSEL    | ;SELECTED ??                            |
| 1834    | 006004 | 001427 |        |        |        | BEQ MUX8E            | ;BR IF NOT                              |
| 1835    | 006006 | 010377 | 007540 |        |        | MOV R3,BDHMC SR      | ;SELECT LINE                            |
| 1836    | 006012 | 017704 | 007536 |        |        | MOV BDHMLSR,R4       | ;READ LINE STATUS REGISTER              |
| 1837    | 006016 | 005005 |        |        |        | CLR R5               | ;EXPECT 05                              |
| 1838    | 006020 | 005704 |        |        |        | TST R4               | ;WAS LINE STATUS REGISTER CLEARED       |
| 1839    | 006022 | 001403 |        |        |        | BEQ MUX8D            |                                         |
| 1840    | 006024 | 104001 |        |        |        | ERRORL               | ;LINE STATUS ERROR                      |
| 1841    | 006026 | 104003 |        |        |        | SCOPEF               | ;CHECK FOR LOOP ON SAME DATA            |
| 1842    | 006030 | 005770 |        |        |        | MUX8B                |                                         |
| 1843    | 006032 | 005205 |        |        | MUX8D: | INC R5               | ;EXPECT LINE ENABLE                     |
| 1844    | 006034 | 052777 | 000001 | 007512 |        | BIS #LINENA,BDHMLSR  | ;SET LINE ENABLE ON SELECTED LINE       |
| 1845    | 006042 | 017704 | 007506 |        |        | MOV BDHMLSR,R4       | ;READ LINE STATUS REGISTER              |
| 1846    | 006046 | 042704 | 000360 |        |        | BIC #360,R4          | ;CLEAR RING,C0,CS SECRCV-MAY FLOAT HIGH |
| 1847    | 006052 | 020504 |        |        |        | CMP R5,R4            | ;IS ANYTHING BUT LINE ENABLE SET        |
| 1848    | 006054 | 001403 |        |        |        | BEQ MUX8E            |                                         |
| 1849    | 006056 | 104001 |        |        |        | ERRORL               | ;LINE STATUS ERROR                      |
| 1850    | 006060 | 104003 |        |        |        | SCOPEF               | ;CHECK FOR LOOP ON SAME DATA            |
| 1851    | 006062 | 005770 |        |        |        | MUX8B                |                                         |
| 1852    | 006064 | 005203 |        |        | MUX8E: | INC R3               | ;UPDATE LINE NUMBER                     |
| 1853    | 006066 | 005077 | 007462 |        |        | CLR BDHMLSR          | ;CLEAR CURRENT LINE                     |
| 1854    | 006072 | 006337 | 015662 |        |        | ASL SELMSK           | ;SHIFT SELECT MASK                      |
| 1855    | 006076 | 005300 |        |        |        | DEC R0               | ;CONTINUE IF ALL LINES NOT              |
| 1856    | 006100 | 001336 |        |        |        | BNE MUX8C            | ;TESTED                                 |
| 1857    | 006102 | 104002 |        |        |        | SCOPE                | ;CHECK FOR ITERATIONS, LOOP             |

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1858
1859
1860      ;WRITE 1'S INTO ALL SCANNER MEMORY LOCATIONS
1861      ;SET "LINE ENABLE FOR ALL LINES
1862      ;VERIFY THAT AN INTERRUPT OCCURS FOR EACH LINE
1863      ;THIS TEST WILL FAIL ON ANY LINE THAT DOES
1864      ;NOT HAVE A LEVEL CONVERTER--CO,CS,RING,SECRV WILL FLOAT
1865      ;HIGH,HENCE MAINT. MODE CANNOT TOGGLE THESE SIGNALS TO
1866      ;CAUSE A TRANSITION.A PROGRAM TIME OUT WILL OCCUR.....
1867
1868 006104      T33:      ;REFERENCE DESIGNATION
1869 006104 012777 002000 007440 SCNT1: MOV    @CLRMUX,BDMCSR      ;CLEAR ALL MULTIPLEXER FLIPFLOPS
1870 006112 005077 007434      CLR    BDMCSR          ;CLEAR CONTROL REGISTER
1871 006116 042737 000340 177776      BIC    #340,PS        ;ENABLE INTERRUPTS
1872 006124 012700 000020      MOV    #16.,R0          ;SET UP TO WRITE 1'S INTO
1873 006130 012777 001017 007414      MOV    @MAINT+17,BDMCSR      ;ALL SCANNER MEMORY LOCATION
1874 006136 012737 000001 015662      MOV    #1,SELMSK        ;INIT SELECT MASK
1875 006144 004737 013344      SCNT1A: CALL   STEPER          ;WRITE A LOCATION
1876 006150 012777 000001 007376      MOV    @LINENA,BDMLSR      ;LET "LINE ENABLE"
1877 006156 005300      DEC    R0
1878 006160 001371      BNE    SCNT1A
1879 006162 012701 177777      MOV    #-1,R1          ;INIT LINE NO. GEN.
1880 006166 012705 070300      MOV    #70300,R5          ;EXPECT "DONE","COF","CSF","SECRXF"
1881 006172 012777 006344 007346      MOV    @SCNT1C,BDMVEC      ;SET UP LOCAL INTERRUPT SERVICE
1882 006200 013777 177776 007342      MOV    PS,BDMPLVL      ;SERVICE AT LEVEL 7
1883 006206 012700 000020      MOV    #16.,R0
1884 006212 012777 000117 007332      MOV    @INTENA+17,BDMCSR      ;SET INTERRUPT ENABLE
1885 006220 033737 015662 015660 SCNT1B: BIT    SELMSK,LINSEL      ;SELECTED ??
1886 006226 001456      BEQ    SCNT1D          ;BR IF NOT
1887 006230 052737 000340 177776      BIS    #340,PS        ;LOCK OUT INTERRUPTS
1888 006236 004.37 013344      CALL   STEPER          ;HIT THE SCANNER ONCE
1889 006242 005003      CLR    R3              ;CLEAR DELAY
1890 006244 042737 000340 177776      BIC    #340,PS        ;ENABLE INTERRUPTS
1891 006252 005303 14:      DEC    R3              ;WAIT LONG ENOUGH?
1892 006254 001404      BEQ    24              ;WE HAVE AN ERROR
1893 006256 105777 007270      TSTB    BDMCSR          ;DID DONE SET
1894 006262 100373      BPL    14              ;NOT YET
1895 006264 100416      BMI    34              ;SET BUT NO INTERRUPT
1896 006266 052737 000340 177776 24:      BIS    #340,PS
1897 006274 017704 007252      MOV    BDMCSR,R4          ;GET FAILING LINE
1898 006300 010402      MOV    R4,R2              ;GET CSR
1899 006302 017703 007246      MOV    BDMPLSR,R3         ;GET LSR
1900 006306 042704 177760      BIC    #177760,R4
1901 006312 104030      ERRINT      ;REPORT ERROR HAS OCCURED
1902 006314 104003      SCOPEF
1903 006316 006104      SCNT1
1904 006320 000421      BR      SCNT1D
1905 006322 052737 000340 177776 34:      BIS    #340,PS
1906 006330 017704 007216      MOV    BDMCSR,R4          ;CONTINUE THE TEST
1907 006334 104000      ERRORC      ;INTERRUPT DID NOT OCCUR
1908 006336 104003      SCOPEF      ;ERROR
1909 006340 006104      SCNT1      ;CONTROL STATUS ERROR
1910 006342 000410      BR      SCNT1D      ;CHECK FOR LOOP ON SAME DATA
1911 006344 022626      SCNT1C: POP2SP      ;INTERRUPT OCCURED, REPOSITION STACK
1912 006346 017704 007200      MOV    BDMCSR,R4          ;READ CONTROL STATUS
1913 006352 020504      CMP     R5,R4          ;ARE EXPECTED AND RECEIVED

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| ADDRESS | HEX    | ASCII  | OPERATION                 | COMMENT                           |
|---------|--------|--------|---------------------------|-----------------------------------|
| 1914    | 006354 | 001403 | BEQ                       | SCNT1D                            |
| 1915    | 006356 | 104000 | ERRORC                    | ;REGISTERS THE SAME               |
| 1916    | 006360 | 104003 | SCOPEF                    | ;NO. LINE STATUS ERROR            |
| 1917    | 006362 | 006104 | SCNT1                     | ;CHECK FOR LOOP WITH CURRENT DATA |
| 1918    | 006364 | 042777 | 000217 007160 SCNT1D: BIC | ;CLEAR D DONE                     |
| 1919    | 006372 | 005201 | INC                       | R1                                |
| 1920    | 006374 | 150177 | 007152 BISB               | R1,SDHMCSSR                       |
| 1921    | 006400 | 006337 | 015662 ASL                | SELMSK                            |
| 1922    | 006404 | 005205 | INC                       | R5                                |
| 1923    | 006406 | 005300 | DEC                       | R0                                |
| 1924    | 006410 | 001303 | BNE                       | SCNT1B                            |
| 1925    | 006412 | 104002 | SCOPE                     | ;CHECK FOR ITERATIONS. LOOP       |

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1926
1927
1928          ;SINGLE LINE CABLE TEST
1929          ;FOR USE WITH MODEM CABLE AND DC11 TEST CONNECTOR
1930
1931          ;NOTE: MODEM CONTROL MULTIPLEXER INPUTS SHOULD BE CONNECTED
1932          ;TO DISTRIBUTION PANEL VIA DM11-DC
1933
1934
1935 006414      T100:          ;REFERENCE DESIGNATION
1936 006414 012737 006434 002204 STRLIN: MOV      #STRLNA,KRET      ;SET UP FOR NEW LINE SELECTION
1937 006422 042737 000340 177776      BIC      #340,PS          ;ENABLE INTERRUPTS
1938 006430 104004          TYPE          ;TYPE "SINGLE LINE CABLE TEST"
1939 006432 016750          MLINE
1940 006434 104013      STRLNA: INSTRG      ;GET LINE NUMBER
1941 006436 017003          MLINEI
1942 006440 000000          0
1943 006442 000017          17
1944 006444 015640          LINE
1945 006446 104004          TYPE
1946 006450 016745      MCRLF
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1947
1948
1949
1950
1951 006452          T101:
1952 006452 005077 007074 MUX11: CLR BDHMCSR          ;REFERENCE DESIGNATION
1953 006456 042737 000340 177776 BIC #340,PS          ;CLEAR CONTROL STATUS REGISTER
1954 006464 013701 015640          MOV LINE,R1          ;ENABLE INTERRUPTS
1955 006470 012777 002000 007054 MUX11A: MOV #CLRMUX,BDHMCSR
1956 006476 012702 000020          MOV #16.,R2
1957 006502 010177 007044          MOV R1,BDHMCSR          ;SELECT LINE TO BE TESTED
1958 006506 012777 000001 007040 MOV #LINENA,BDHMLSR          ;SET LINE ENABLE FUNCTION FLIP-FLOP
1959 006514 005077 007032          CLR BDHMCSR
1960 006520 005005          MUX11B: CLR R5
1961 006522 017704 007026          MOV BDHMLSR,R4          ;READ LINE STATUS REGISTER
1962 006526 117703 007020          MOV BDHMCSR,R3          ;READ CONTROL STATUS REGISTER
1963 006532 042703 177760          BIC #177760,R3          ;CLEAR UNWANTED BITS
1964 006536 020103          CMP R1,R3          ;IF LINE NUMBER=SELECTED LINE NUMBER,
1965 006540 001002          BNE MUX11C          ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
1966 006542 012705 000001          MOV #LINENA,R5
1967
1968          MUX11C:
1969 006546 042704 000360          BIC #360,R4          ;TO BE SET
1970
1971          CMP R5,R4          ;CLEAR RING,CO,CS,SECRV
1972 006554 001403          BEQ MUX11D          ;IF NO LEVEL CONVERTER THESE BITS FLOAT
1973 006556 104001          ERRORL          ;CMP EXPECTED AND RECVD
1974 006560 104003          SCOPEF          ;RESULTS
1975 006562 006564          MUX11D:
1976 006564 004737 013344          CALL STEPER          ;LINE STATUS ERROR
1977 006570 705302          DEC R2
1978 006572 001352          BNE MUX11B
1979 006574 005005          CLR R5
1980 006576 010177 006750          MUX11E: MOV R1,BDHMCSR
1981 006602 010103          MOV R1,R3          ;SET LINE COUNTER TO SELECTED LINE
1982 006604 005077 006744          CLR BDHMLSR          ;CLEAR LINE ENABLE FLIP FLOP
1983 006610 105227 000000          INCB #0          ;DELAY FOR CABLE
1984 006614 001375          BNE .-4          ;DITTO
1985 006616 017704 006732          MOV BDHMLSR,R4          ;READ LINE STATUS REGISTER
1986 006622 005704          TST R4          ;WAS LINE ENABLE FUNCTION FLIP FLOP
1987 006624 001401          BEQ MUX11F          ;CLEARED
1988 006626 104001          ERRORL          ;NO, LINE STATUS ERROR
1989 006630 104002          MUX11F: SCOPE          ;CHECK FOR ITERATIONS, LOOP

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| 1990 |        |        |        |        | ;VERIFY THAT TERMINAL READY FUNCTION FLIP-FLOP CAN |        |                                           |
|------|--------|--------|--------|--------|----------------------------------------------------|--------|-------------------------------------------|
| 1991 |        |        |        |        | ;BE SET AND CLEARED FOR SELECTED LINE              |        |                                           |
| 1992 |        |        |        |        |                                                    |        |                                           |
| 1993 | 006632 |        |        |        | T102:                                              |        | ;REFERENCE DESIGNATION                    |
| 1994 | 006632 | 005077 | 006714 |        | MUX12:                                             | CLR    | ;CLEAR CONTROL STATUS REGISTER            |
| 1995 | 006636 | 042737 | 000340 | 177776 |                                                    | BIC    |                                           |
| 1996 | 006644 | 013701 | 015640 |        |                                                    | MOV    | ;ENABLE INTERRUPTS                        |
| 1997 | 006650 | 012777 | 002000 | 006674 | MUX12A:                                            | MOV    |                                           |
| 1998 | 006656 | 012702 | 000020 |        |                                                    | MOV    |                                           |
| 1999 | 006662 | 010177 | 006664 |        |                                                    | MOV    | ;SELECT LINE TO BE TESTED                 |
| 2000 | 006666 | 012777 | 000002 | 006660 |                                                    | MOV    | ;SET TERMINAL READY FUNCTION FLIP-FLOP    |
| 2001 | 006674 | 005077 | 006652 |        |                                                    | CLR    |                                           |
| 2002 | 006700 | 005005 |        |        | MUX12B:                                            | CLR    |                                           |
| 2003 | 006702 | 017704 | 006646 |        |                                                    | MOV    | ;READ LINE STATUS REGISTER                |
| 2004 | 006706 | 117703 | 006640 |        |                                                    | MOV    | ;READ CONTROL STATUS REGISTER             |
| 2005 | 006712 | 042703 | 177760 |        |                                                    | BIC    | ;CLEAR UNWANTED BITS                      |
| 2006 | 006716 | 020103 |        |        |                                                    | CMF    | ;IF LINE NUMBER=SELECTED LINE NUMBER,     |
| 2007 | 006720 | 001002 |        |        |                                                    | BNE    | ;EXCEPT TERMINAL READY FUNCTION FLIP FLOP |
| 2008 | 006722 | 012705 | 000002 |        |                                                    | MOV    |                                           |
| 2009 |        |        |        |        |                                                    |        | ;TO BE SET                                |
| 2010 | 006726 |        |        |        | MUX12C:                                            |        |                                           |
| 2011 | 006726 | 020504 |        |        |                                                    | CMF    | ;CMP EXPECTED AND RECVD                   |
| 2012 | 006730 | 001403 |        |        |                                                    | BEQ    | ;RESULTS                                  |
| 2013 | 006732 | 104001 |        |        |                                                    | ERRORL | ;LINE STATUS ERROR                        |
| 2014 | 006734 | 104003 |        |        |                                                    | SCOPEF |                                           |
| 2015 | 006736 | 006740 |        |        |                                                    | MUX12D |                                           |
| 2016 | 006740 | 004737 | 013344 |        | MUX12D:                                            | CALL   | ;EXAMINE NEXT LINE                        |
| 2017 | 006744 | 005302 |        |        |                                                    | DEC    |                                           |
| 2018 | 006746 | 001354 |        |        |                                                    | BNE    |                                           |
| 2019 | 006750 | 005005 |        |        |                                                    | CLR    |                                           |
| 2020 | 006752 | 010177 | 006574 |        | MUX12E:                                            | MOV    |                                           |
| 2021 | 006756 | 010103 |        |        |                                                    | MOV    | ;SET LINE COUNTER TO SELECTED LINE        |
| 2022 | 006760 | 005077 | 006570 |        |                                                    | CLR    | ;CLEAR TERMINAL READY FLIP FLOP           |
| 2023 | 006764 | 005227 | 000000 |        |                                                    | INCB   | ;DELAY FOR CABLE                          |
| 2024 | 006770 | 001375 |        |        |                                                    | BNE    | ;DITTO                                    |
| 2025 | 006772 | 017704 | 006556 |        |                                                    | MOV    | ;READ LINE STATUS REGISTER                |
| 2026 | 006776 | 005704 |        |        |                                                    | TST    | ;WAS TERMINAL READY FUNCTION FLIP FLOP    |
| 2027 | 007000 | 001401 |        |        |                                                    | BEQ    | ;CLEARED                                  |
| 2028 | 007002 | 104001 |        |        |                                                    | ERRORL | ;NO, LINE STATUS ERROR                    |
| 2029 | 007004 | 104002 |        |        | MUX12F:                                            | SCOPE  | ;CHECK FOR ITERATIONS, LOOP               |

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2030                                     ;VERIFY THAT REQUEST TO SEND FUNCTION FLIP-FLOP CAN
2031                                     ;BE SET AND CLEARED FOR SELECTED LINE
2032
2033 007006 T103:                                     ;REFERENCE DESIGNATION
2034 007006 005077 006540 MUX13: CLR BDHMCSR          ;CLEAR CONTROL STATUS REGISTER
2035 007012 042737 000340 177776 BIC #340,PS        ;ENABLE INTERRUPTS
2036 007020 013701 015640 MOV LINE,R1
2037 007024 012777 002000 006520 MUX13A: MOV @CLRMUX,BDHMC SR
2038 007032 012702 000020 MOV #16.,R2
2039 007036 010177 006510 MOV R1,BDHMC SR          ;SELECT LINE TO BE TESTED
2040 007042 012777 000004 006504 MOV #RS,BDHMLSR    ;SET REQUEST TO SEND FUNCTION FLIP-FLOP
2041 007050 005077 006476 CLR BDHMCSR
2042 007054 005005 MUX13B: CLR R5
2043 007056 017704 006472 MOV BDHMLSR,R4          ;READ LINE STATUS REGISTER
2044 007062 117703 006464 MOV BDHMCSR,R3          ;READ CONTROL STATUS REGISTER
2045 007066 042703 177760 BIC #177760,R3          ;CLEAR UNWANTED BITS
2046 007072 020103 CMP R1,R3                      ;IF LINE NUMBER=SELECTED LINE NUMBER,
2047 007074 001002 BNE MUX13C                      ;EXCEPT REQUEST TO SEND FUNCTION FLIP FLOP
2048 007076 012705 000004 MOV #RS,R5
2049                                     ;TO BE SET
2050 MUX13C:
2051 007102 020504 CMP R5,R4                      ;CMP EXPECTED AND RECVD
2052 007104 001403 BEQ MUX13D                      ;RESULTS
2053 007106 104001 ERRORL                          ;LINE STATUS ERROR
2054 007110 104003 SCOPEF
2055 007112 007114 MUX13D
2056 007114 004737 013344 MUX13D: CALL STEPER
2057 007120 005302 DEC R2
2058 007122 001354 BNE MUX13B
2059 007124 005005 CLR R5
2060 007126 010177 006420 MUX13E: MOV R1,BDHMC SR
2061 007132 010103 MOV R1,R3                      ;SET LINE COUNTER TO SELECTED LINE
2062 007134 005077 006414 CLR BDHMLSR            ;CLEAR REQUEST TO SEND FLIP FLOP
2063 007140 105227 000000 INCB #0                 ;DELAY FOR CABLE
2064 007144 001375 BNE .-4                         ;DITTO
2065 007146 017704 006402 MOV BDHMLSR,R4          ;READ LINE STATUS REGISTER
2066 007152 005704 TST R4                          ;WAS REQUEST TO SEND FUNCTION FLIP FLOP
2067 007154 001401 BEQ MUX13F                      ;CLEARED
2068 007156 104001 ERRORL                          ;NO, LINE STATUS ERROR
2069 007160 104002 MUX13F: SCOPE                  ;CHECK FOR ITERATIONS, LOOP

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2070                                     ;VERIFY THAT SECONDARY TRANSMIT FUNCTION FLIP-FLOP CAN
2071                                     ;BE SET AND CLEARED FOR SELECTED LINE
2072
2073 007162                                T104:                                ;REFERENCE DESIGNATION
2074 007162 005077 006364                MUX14: CLR BDHMCSR                    ;CLEAR CONTROL STATUS REGISTER
2075 007166 042737 000340 177776        BIC #340,PS                        ;ENABLE INTERRUPTS
2076 007174 013701 015640                MOV LINE,R1
2077 007200 012777 002000 006344        MUX14A: MOV #CLRMUX,BDHMCSSR
2078 007206 012702 000020                MOV #16,R2
2079 007212 010177 006334                MOV R1,BDHMCSSR
2080 007216 012777 000010 006330        MOV #SECTX,BDHMLSR
2081 007224 005077 006322                CLR BDHMCSR
2082 007230 005005                        MUX14B: CLR R5
2083 007232 017704 006316                MOV BDHMLSR,R4
2084 007236 117703 006310                MOV BDHMCSR,R3
2085 007242 042703 177760                BIC #177760,R3
2086 007246 020103                        CMP R1,R3
2087 007250 001002                        BNE MUX14C
2088 007252 012705 000010                MOV #SECTX,R5
2089
2090                                MUX14C:
2091 007256 020504                        CMP R5,R4
2092 007260 001403                        BEQ MUX14D
2093 007262 104001                        ERRORL
2094 007264 104003                        SCOPEF
2095 007266 007270                        MUX14D
2096 007270 004737 013344                MUX14D: CALL STEPER
2097 007274 005302                        DEC R2
2098 007276 001354                        BNE MUX14B
2099 007300 005005                        CLR R5
2100 007302 010177 006244                MUX14E: MOV R1,BDHMCSSR
2101 007306 010103                        MOV R1,R3
2102 007310 005077 006240                CLR BDHMLSR
2103 007314 105227 000000                INCB #0
2104 007320 001375                        BNE .-4
2105 007322 017704 006226                MOV BDHMLSR,R4
2106 007326 005704                        TST R4
2107 007330 001401                        BEQ MUX14F
2108 007332 104001                        ERRORL
2109 007334 104002                        MUX14F: SCOPE

;READ LINE STATUS REGISTER
;READ CONTROL STATUS REGISTER
;CLEAR UNWANTED BITS
;IF LINE NUMBER=SELECTED LINE NUMBER,
;EXCEPT SECONDARY TRANSMIT FUNCTION FLIP FLOP
;TO BE SET
;CMP EXPECTED AND RECVD
;RESULTS
;LINE STATUS ERROR

;EXAMINE NEXT LINE

;SET LINE COUNTER TO SELECTED LINE
;CLEAR SECONDARY TRANSMIT FLIP FLOP
;DELAY FOR CABLE
;DITTO
;READ LINE STATUS REGISTER
;WAS SECONDARY TRANSMIT FUNCTION FLIP FLOP
;CLEARED
;NO. LINE STATUS ERROR
;CHECK FOR ITERATIONS. LOOP

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2110
2111
2112
2113
2114 007336
2115 007336 005077 006210
2116 007342 042737 000340 177776
2117 007350 013701 015640
2118 007354 012702 000020
2119 007360 010177 006166
2120 007364 012777 000003 006162
2121
2122
2123
2124 007372 000240
2125 007374 000240
2126
2127 007376 005077 006150
2128 007402 005005
2129 007404 017704 006144
2130 007410 117703 006136
2131 007414 042703 177760
2132 007420 020103
2133 007422 001002
2134 007424 012705 000143
2135
2136 007430 020405
2137 007432 001403
2138 007434 104001
2139 007436 104003
2140 007440 007442
2141 007442 004737 013344
2142 007446 005302
2143 007450 001354
2144 007452 012705 000001
2145 007456 010103
2146 007460 010177 006066
2147 007464 042777 000002 006062
2148 007472 105227 000000
2149 007476 001375
2150 007500 017704 006050
2151 007504 020504
2152 007506 001401
2153 007510 104001
2154 007512 104002

;VERIFY THAT CLEAR TO SEND AND CARRIER ARE SET IF "LINE ENABLE"
;AND TERMINAL ARE SET FOR SELECTED LINE.

T105:
MUX15: CLR BDHMCs? ;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
BIC #340,PS ;ENABLE INTERRUPTS
MOV LINE,R1
MUX15A: MOV #16.,R2 ;16 LINES
MOV R1,BDHMCSR ;SELECT A LINE
MOV #LINENA+TRMRDY,BDHMLSR ;SET LINE ENABLE +TRMRL

;THESE TWO NOP'S ADDED FOR SOME DELAY FOR PDP-11/44
;WITH CACHE MEMORY TURNED ON.
NOP ;KR 10-JULY-84 REV E
NOP ;KR 10-JULY-84 REV E

MUX15B: CLR BDHMCsR ;CLEAR CONTROL REGISTER
CLR R5 ;CLEAR EXPECTED RESULT
MOV BDHMLSR,R4 ;READ LINE STATUS
MOVB BDHMCsR,R3 ;READ LINE NUMBER
BIC #177760,R3 ;CLEAR UNWANTED BITS
CMP R1,R3 ;IF RECEIVED LINE=SELECTED LINE
BNE MUX15C ;EXPECT LINE ENABLE AND
MOV #LINENA+TRMRDY+CO+CS,R5 ;CLEAR TO SEND AND CARRIER ARE SET

MUX15C: CMP R4,R5 ;COMPARE EXPECTED AND
BEQ MUX15D ;RECEIVED RESULTS
ERRORL ;LINE STATUS ERROR
SCOPEF
MUX15D: CALL STEPER ;UPDATE LINE COUNTER
DEC R2 ;CONTINUE IF ALL CHECKS
BNE MUX15B ;ARE NOT DONE FOR THIS LINE
MOV #LINENA,R5 ;EXPECT LINE ENABLE
MUX15E: MOV R1,R3 ;ON SELECTED LINE
MOV R1,BDHMCSR ;SELECT LINE
BIC #TRMRDY,BDHMLSR ;CLEAR TERMINAL
INCB #0 ;DELAY FOR CABLE
BNE .-4 ;DITTO
MOV BDHMLSR,R4 ;READ LINE STATUS REGISTER
CMP R5,R4 ;ONLY LINE ENABLE SHOULD BE
BEQ MUX15F ;SET ON THIS LINE
ERRORL ;LINE STATUS ERROR
MUX15F: SCOPE ;CHECK FOR ITERATIONS, LOOP

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2155
2156
2157
2158
2159 007514
2160 007514 005077 006032
2161 007520 042737 000340 177776
2162 007526 013701 015640
2163 007532 012702 000020
2164 007536 010177 006010
2165 007542 012777 000005 006004
2166
2167
2168
2169 007550 000240
2170 007552 000240
2171
2172 007554 005077 005772
2173 007560 005005
2174 007562 017704 005766
2175 007566 117703 005760
2176 007572 042703 177760
2177 007576 020103
2178 007600 001002
2179 007602 012705 000205
2180
2181 007606 020405
2182 007610 001403
2183 007612 104001
2184 007614 104003
2185 007616 007620
2186 007620 004737 013344
2187 007624 005302
2188 007626 001354
2189 007630 012705 000001
2190 007634 010103
2191 007636 010177 005710
2192 007642 042777 000004 005704
2193 007650 105227 000000
2194 007654 001375
2195 007656 017704 005672
2196 007662 020504
2197 007664 001401
2198 007666 104001
2199 007670 104002

;VERIFY THAT RING IS SET IF "LINE ENABLE"
;AND REQUEST TO SEND ARE SET FOR SELECTED LINE.

T106:
MUX16: CLR BDHMC SR ;REFERENCE DESIGNATION
;CLEAR CONTROL REGISTER
BIC #340,PS ;ENABLE INTERRUPTS
MOV LINE,R1
MUX16A: MOV #16,R2 ;16 LINES
MOV R1,BDHMC SR ;SELECT A LINE
MOV @LINEA+RS,BDHML SR ;SET LINE ENABLE +RS

;THESE TWO NOP'S ADDED FOR SOME DELAY FOR PDP-11/44
;WITH CACHE MEMORY TURNED ON.
NOP
NOP
;KR 10-JULY-84 REV E
;KR 10-JULY-84 REV E

MUX16B: CLR BDHMC SR ;CLEAR CONTROL REGISTER
CLR RS ;CLEAR EXPECTED RESULT
MOV BDHML SR,R4 ;READ LINE STATUS
MOVB BDHMC SR,R3 ;READ LINE NUMBER
BIC #177760,R3 ;CLEAR UNWANTED BITS
CMP R1,R3 ;IF RECEIVED LINE=SELECTED LINE
BNE MUX16C ;EXPECT LINE ENABLE AND
MOV @LINEA+RS+RING,RS ;RING IS SET
;COMPARE EXPECTED AND
MUX16C: CMP R4,RS ;RECEIVED RESULTS
BEQ MUX16D ;LINE STATUS ERROR
ERRORL
SCOPEF
MUX16D: CALL STEPER ;UPDATE LINE COUNTER
DEC R2 ;CONTINUE IF ALL CHECKS
BNE MUX16B ;ARE NOT DONE FOR THIS LINE
MOV @LINEA+RS ;EXPECT LINE ENABLE
MUX16E: MOV R1,R3 ;ON SELECTED LINE
MOV R1,BDHMC SR ;SELECT LINE
BIC @RS,BDHML SR ;CLEAR REQUEST TO SEND
INCB #0 ;DELAY FOR CABLE
BNE .-4 ;DITTO
MOV BDHML SR,R4 ;READ LINE STATUS REGISTER
CMP R5,R4 ;ONLY LINE ENABLE SHOULD BE
BEQ MUX16F ;SET ON THIS LINE
ERRORL ;LINE STATUS ERROR
MUX16F: SCOPE ;CHECK FOR ITERATIONS, LOOP

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| Address | Hex    | Hex    | Hex    | Label   | Assembly                   | Comment                                               |
|---------|--------|--------|--------|---------|----------------------------|-------------------------------------------------------|
| 2200    |        |        |        |         |                            | VERIFY THAT SECONDARY RECEIVE IS SET IF "LINE ENABLE" |
| 2201    |        |        |        |         |                            | AND SECONDARY TRANSMIT ARE SET FOR SELECTED LINE.     |
| 2202    |        |        |        |         |                            |                                                       |
| 2203    |        |        |        |         |                            |                                                       |
| 2204    | 007672 |        |        | T107:   |                            | REFERENCE DESIGNATION                                 |
| 2205    | 007672 | 005077 | 005654 | MUX17:  | CLR BDHPCSR                | CLEAR CONTROL REGISTER                                |
| 2206    | 007676 | 042737 | 000340 |         | BIC #340,PS                | ENABLE INTERRUPTS                                     |
| 2207    | 007704 | 013701 | 015640 |         | MOV LINE,R1                |                                                       |
| 2208    | 007710 | 012702 | 000020 | MUX17A: | MOV #16.,R2                | 16 LINES                                              |
| 2209    | 007714 | 010177 | 005632 |         | MOV R1,BDHPCSR             | SELECT A LINE                                         |
| 2210    | 007720 | 012777 | 000011 |         | MOV @LINENA+SECTX,BDHPLSR  | SET LINE ENABLE +SLCTX                                |
| 2211    |        |        |        |         |                            |                                                       |
| 2212    |        |        |        |         |                            | THESE TWO NOP'S ADDED FOR SOME DELAY FOR POP-11/44    |
| 2213    |        |        |        |         |                            | WITH CACHE MEMORY TURNED ON.                          |
| 2214    | 007726 | 000240 |        |         | NOP                        | KR 10-JULY-84 REV E                                   |
| 2215    | 007730 | 000240 |        |         | NOP                        | KR 10-JULY-84 REV E                                   |
| 2216    |        |        |        |         |                            |                                                       |
| 2217    | 007732 | 005077 | 005614 |         | CLR BDHPCSR                | CLEAR CONTROL REGISTER                                |
| 2218    | 007736 | 005005 |        | MUX17B: | CLR R5                     | CLEAR EXPECTED RESULT                                 |
| 2219    | 007740 | 017704 | 005610 |         | MOV BDHPLSR,R4             | READ LINE STATUS                                      |
| 2220    | 007744 | 117703 | 005602 |         | MOVB BDHPCSR,R3            | READ LINE NUMBER                                      |
| 2221    | 007750 | 042703 | 177760 |         | BIC #177760,R3             | CLEAR UNWANTED BITS                                   |
| 2222    | 007754 | 020103 |        |         | CMF R1,R3                  | IF RECEIVED LINE=SELECTED LINE                        |
| 2223    | 007756 | 001002 |        |         | BNE MUX17C                 | EXPECT LINE ENABLE AND                                |
| 2224    | 007760 | 012705 | 000031 |         | MOV @LINENA+SECTX+SECRX,R5 |                                                       |
| 2225    |        |        |        |         |                            | SECONDARY RECEIVE IS SET                              |
| 2226    | 007764 | 020405 |        | MUX17C: | CMF R4,R5                  | COMPARE EXPECTED AND                                  |
| 2227    | 007766 | 001403 |        |         | BEQ MUX17D                 | RECEIVED RESULTS                                      |
| 2228    | 007770 | 104001 |        |         | ERRORL                     | LINE STATUS ERROR                                     |
| 2229    | 007772 | 104003 |        |         | SCOPEF                     |                                                       |
| 2230    | 007774 | 007776 |        |         | MUX17D                     |                                                       |
| 2231    | 007776 | 004737 | 013344 | MUX17D: | CALL STEPER                | UPDATE LINE COUNTER                                   |
| 2232    | 010002 | 005302 |        |         | DEC R2                     | CONTINUE IF ALL CHECKS                                |
| 2233    | 010004 | 001354 |        |         | BNE MUX17B                 | ARE NOT DONE FOR THIS LINE                            |
| 2234    | 010006 | 012705 | 000001 |         | MOV @LINENA,R5             | EXPECT LINE ENABLE                                    |
| 2235    | 010012 | 010103 |        | MUX17E: | MOV R1,R3                  | ON SELECTED LINE                                      |
| 2236    | 010014 | 010177 | 005532 |         | MOV R1,BDHPCSR             | SELECT LINE                                           |
| 2237    | 010020 | 042777 | 000010 |         | BIC #SECTX,BDHPLSR         | CLEAR SECONDARY TRANSMIT                              |
| 2238    | 010026 | 105227 | 000000 |         | INCB #0                    | DELAY FOR CABLE                                       |
| 2239    | 010032 | 001375 |        |         | BNE .-4                    | DITTO                                                 |
| 2240    | 010034 | 017704 | 005514 |         | MOV BDHPLSR,R4             | READ LINE STATUS REGISTER                             |
| 2241    | 010040 | 020504 |        |         | CMF R5,R4                  | ONLY LINE ENABLE SHOULD BE                            |
| 2242    | 010042 | 001401 |        |         | BEQ MUX17F                 | SET ON THIS LINE                                      |
| 2243    | 010044 | 104001 |        |         | ERRORL                     | LINE STATUS ERROR                                     |
| 2244    | 010046 | 104002 |        | MUX17F: | SCOPE                      | CHECK FOR ITERATIONS, LOOP                            |

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2245
2246      ;MODEM CONTROL ON LINE TEST USING 103A TYPE MODEMS
2247      ;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
2248      ;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
2249      ;USING THE MODEM CONTROL TO CONTROL 103A TYPE MODEMS
2250
2251      ;NOTE: IF THE DM11-AA IS NOT CONNECTED TO THE
2252      ;DISTRIBUTION PANEL, AN M974 DM11 MAINTENANCE JUMPER
2253      ;SHOULD BE INSTALLED IN SLOT B1 OR B3 OF THE DISTRIBUTION
2254      ;PANEL TO PREVENT A POSSIBLE LONG SPACE
2255      ;DISCONNECT FROM HANGING UP THE MODEM
2256
2257
2258      010050      T200:      ;REFERENCE DESIGNATION
2259      010050      ST103A: RESET      ;INITIALIZE INTERFACE
2260      010052      012737      000340 177776      MOV      #340,PS      ;DISABLE ALL INTERRUPTS
2261      010060      104004      TYPE      ;TYPE "103A MODEM CONNECT-
2262      010062      016167      MT103T      ;DISCONNECT TEST"
2263      010064      022737      000176 015566      CMP      #SMREG,SWR
2264      010072      001001      BNE      11
2265      010074      104025      CNTLWU
2266      010076      012737      010114 011704      11:      MOV      #T103A,FATRET      ;SET UP FOR FATAL ERROR
2267      010104      012737      010112 007204      MOV      #ST103B,KRET      ;SET UP FOR LINE CHANGE
2268      010112      104017      ST103B: GETLNS      ;INPUT ORIGINATE AND
2269      ;AND ANSWER LINE NUMBERS
2270      010114      104020      T103A: SETUP      ;SET UP TO RECEIVE INTERRUPTS
2271      ;WAIT FOR RING
2272      010116      010126      T103B      ;GO HERE IF RING OK
2273      010120      010122      T103A1      ;GO HERE IF NO RING
2274      010122      104012      T103A1: ERROR      ;NO RING WITHIN 5 MINUTES
2275      010124      000772      BR      ST103B      ;SELECT NEW LINES AND REDIAL
2276
2277      ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
2278      ;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
2279      ;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
2280      ;WILL BE REQUESTED TO RESELECT LINES AND REDIAL
2281
2282      010126      104021      T103B: CKRING      ;CHECK FOR RING INTERRUPT
2283      ;ONLY ON ANSWER LINE
2284      ;AND NO TRANSITIONS ON
2285      ;ORIGINATE LINE
2286      010130      010146      T103C      ;GO HERE IF TRANSITIONS
2287      ;ARE CORRECT
2288      010132      010136      T103B1      ;GO HERE IF INCORRECT
2289      ;TRANSITION ON ANSWER LINE
2290      010134      010142      T103B2      ;GO HERE IF INCORRECT TRANSITION
2291      ;ON ORIGINATE LINE
2292      010136      104014      T103B1: ERROR      ;TRANSITION ERROR ON ANSWER LINE
2293      010140      000207      RTS      PC      ;CONTINUE CHECKING
2294      010142      104014      T103B2: ERROR      ;TRANSITION ERROR ON ORIGINATE LINE
2295      010144      000762      BR      ST103B      ;RESELECT LINES AND REDIAL

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|      |        |        |        |        |        |                    |                |  |  |
|------|--------|--------|--------|--------|--------|--------------------|----------------|--|--|
| 2296 |        |        |        |        |        |                    |                |  |  |
| 2297 |        |        |        |        |        |                    |                |  |  |
| 2298 |        |        |        |        |        |                    |                |  |  |
| 2299 |        |        |        |        |        |                    |                |  |  |
| 2300 | 010146 | 013777 | 015644 | 005376 | T103C: | MOV                | LINANS,BDMCSR  |  |  |
| 2301 |        |        |        |        |        |                    |                |  |  |
| 2302 | 010154 | 052777 | 000002 | 005372 |        | BIS                | @TRMDY,BDMPLSR |  |  |
| 2303 |        |        |        |        |        |                    |                |  |  |
| 2304 | 010162 | 104026 |        |        |        | CKINTT             |                |  |  |
| 2305 | 010164 | 104022 |        |        |        | WAITRM             |                |  |  |
| 2306 |        |        |        |        |        |                    |                |  |  |
| 2307 |        |        |        |        |        |                    |                |  |  |
| 2308 |        |        |        |        |        |                    |                |  |  |
| 2309 |        |        |        |        |        |                    |                |  |  |
| 2310 | 010166 | 104023 |        |        |        | CKTRAN             |                |  |  |
| 2311 |        |        |        |        |        |                    |                |  |  |
| 2312 |        |        |        |        |        |                    |                |  |  |
| 2313 | 010170 | 000143 |        |        |        | CU*CS*LINENA*TRMDY |                |  |  |
| 2314 |        |        |        |        |        |                    |                |  |  |
| 2315 |        |        |        |        |        |                    |                |  |  |
| 2316 |        |        |        |        |        |                    |                |  |  |
| 2317 | 010172 | 000143 |        |        |        | CO*CS*LINENA*TRMDY |                |  |  |
| 2318 |        |        |        |        |        |                    |                |  |  |
| 2319 |        |        |        |        |        |                    |                |  |  |
| 2320 |        |        |        |        |        |                    |                |  |  |
| 2321 | 010174 | 100006 |        |        |        | RINGF*XCO*XCS      |                |  |  |
| 2322 |        |        |        |        |        |                    |                |  |  |
| 2323 |        |        |        |        |        |                    |                |  |  |
| 2324 | 010176 | 000006 |        |        |        | XCO*XCS            |                |  |  |
| 2325 |        |        |        |        |        |                    |                |  |  |
| 2326 |        |        |        |        |        |                    |                |  |  |
| 2327 | 010200 | 010212 |        |        |        | T103D1             |                |  |  |
| 2328 |        |        |        |        |        |                    |                |  |  |
| 2329 | 010202 | 010216 |        |        |        | T103D2             |                |  |  |
| 2330 | 010204 | 010222 |        |        |        | T103D3             |                |  |  |
| 2331 | 010206 | 010226 |        |        |        | T103D4             |                |  |  |
| 2332 | 010210 | 010232 |        |        |        | T103E              |                |  |  |
| 2333 | 010212 | 104015 |        |        |        | T103D1: ERRORS     |                |  |  |
| 2334 | 010214 | 000207 |        |        |        | RTS                | PC             |  |  |
| 2335 | 010216 | 104015 |        |        |        | T103D2: ERRORS     |                |  |  |
| 2336 | 010220 | 000207 |        |        |        | RTS                | PC             |  |  |
| 2337 | 010222 | 104014 |        |        |        | T103D3: ERROR      |                |  |  |
| 2338 | 010224 | 000207 |        |        |        | RTS                | PC             |  |  |
| 2339 | 010226 | 104014 |        |        |        | T103D4: ERROR      |                |  |  |
| 2340 | 010230 | 000207 |        |        |        | RTS                | PC             |  |  |

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2351 010232 104004
2352 010234 016432
2353 010236 012737 000340 177776
2354 010244 012777 011726 005274
2355
2356 010252 012737 010272 015672
2357
2358 010260 012777 000140 005264
2359 010266 005037 177776
2360 010272 005077 005262
2361 010276 105777 005254
2362 010302 100375
2363 010304 005777 005250
2364 010310 012737 000340 177776
2365 010316 005077 005230
2366 010322 013777 015642 005222
2367 010330 042777 000002 005216
2368 010336 104026
2369 010340 104022

;SET UP TO TEST DISCONNECT SEQUENCE
;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
;TO INITIATE THE DISCONNECT SEQUENCE
;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
;DATA TO TALK MODE AS MANY TIMES AS DESIRED
;BEFORE THE SWITCH SEETIN IS MADE
;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
;REPORTED BY TYPEOUT

T103E: TYPE
MDISC
MOV #340,PS
MOV #TRNTYP,BDMHVEC ;SET UP
MOV #T103ES,RNGRET
MOV #SCNENA+INTENA,BDMCSR
CLR PS
T103ES: CLR #TKDBR
14: TSTB #TKCSR
BPL 14
TST #TKDBR
MOV #340,PS
CLR BDMCSR
MOV LINORG,BDMCSR
BIC #TRMRDY,BDMHLSR
CKINTT
WAITRN

;TYPE "STRIKE ANY TTY KEY
;TEST DISCONNECT"
;LOCK OUT INTERRUPTS
;TO DETECT TRANSITIONS
;BEFORE DISCONNECT SEQUENCE STARTS
;SET UP DUMMY RETURN FOR
;RING INTERRUPT
;SET SCAN ENABLE AND INTERRUPT ENABLE
;ALLOW INTERRUPTS

;WAIT FOR TTY TO HIT

;START DISCONNECT SEQUENCE
;CLEAR CONTROL REGISTER
;SET LINE COUNTER TO SELECTED ORIGINATE LINE
;SET TERMINAL READY ON SELECTED LINE

;WAIT FOR TRANSITIONS TO OCCUR

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|      |        |        |         |               |        |                                                       |
|------|--------|--------|---------|---------------|--------|-------------------------------------------------------|
| 2370 |        |        |         |               |        | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED |
| 2371 |        |        |         |               |        | ;ORIGINATE AND ANSWER LINES                           |
| 2372 |        |        |         |               |        |                                                       |
| 2373 |        |        |         |               |        |                                                       |
| 2374 | 010342 | 104023 |         | CKTRAN        |        | ;CHECK TRANSITIONS AND                                |
| 2375 |        |        |         |               |        | ;STATUS ON SELECTED                                   |
| 2376 |        |        |         |               |        | ;ANSWER AND ORIGINATE LINES                           |
| 2377 | 010344 | 000003 |         | LINENA+TRMPDY |        | ;EXPECT LINE ENABLE AND                               |
| 2378 |        |        |         |               |        | ;TERMINAL READY STATUS BITS                           |
| 2379 |        |        |         |               |        | ;SET ON ANSWER LINE                                   |
| 2380 | 010346 | 000001 |         | LINENA        |        | ;EXPECT LINE ENABLE STATUS BIT                        |
| 2381 |        |        |         |               |        | ;SET ON ORIGINATE LINE                                |
| 2382 | 010350 | 000006 |         | XCO+XCS       |        | ;EXPECT CARRIER AND CLEAR                             |
| 2383 |        |        |         |               |        | ;TO SEND TRANSITIONS ON                               |
| 2384 |        |        |         |               |        | ;ANSWER LINE                                          |
| 2385 | 010352 | 000006 |         | XCO+XCS       |        | ;EXPECT CARRIER AND CLEAR                             |
| 2386 |        |        |         |               |        | ;TO SEND TRANSITIONS ON                               |
| 2387 |        |        |         |               |        | ;ORIGINATE LINE                                       |
| 2388 | 010354 | 010366 |         | T103E1        |        | ;GO HERE ON ANSWER LINE STATUS ERROR                  |
| 2389 |        |        |         |               |        |                                                       |
| 2390 | 010356 | 010372 |         | T103E2        |        | ;GO HERE ON ORIGINATE LINE STATUS ERROR               |
| 2391 | 010360 | 010376 |         | T103E3        |        | ;GO HERE ON ANSWER LINE TRANSITION ERROR              |
| 2392 | 010362 | 010402 |         | T103E4        |        | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR           |
| 2393 | 010364 | 010406 |         | T103EN        |        | ;GO TO NEXT TEST IF NO ERRORS                         |
| 2394 | 010366 | 104015 | T103E1: | ERRORS        |        | ;ANSWER LINE STATUS ERROR                             |
| 2395 | 010370 | 000207 |         | RTS           | PC     | ;CONTINUE CHECKING                                    |
| 2396 | 010372 | 104015 | T103E2: | ERRORS        |        | ;ORIGINATE LINE STATUS ERROR                          |
| 2397 | 010374 | 000207 |         | RTS           | PC     | ;CONTINUE CHECKING                                    |
| 2398 | 010376 | 104014 | T103E3: | ERRORT        |        | ;ANSWER LINE TRANSITION ERROR                         |
| 2399 | 010400 | 000207 |         | RTS           | PC     | ;CONTINUE CHECKING                                    |
| 2400 | 010402 | 104014 | T103E4: | ERRORT        |        | ;ORIGINATE LINE TRANSITION ERROR                      |
| 2401 | 010404 | 000207 |         | RTS           | PC     | ;CONTINUE CHECKING                                    |
| 2402 |        |        |         |               |        |                                                       |
| 2403 | 010406 |        | T201:   |               |        | ;REFERENCE DESIGNATION                                |
| 2404 | 010406 | 104004 | T103EN: | TYPE          |        | ;TYPE " 103A TEST COMPLETE"                           |
| 2405 | 010410 | 016354 |         | MT103A        |        |                                                       |
| 2406 | 010412 | 005037 |         | CLR           | TSTNO  | ;CLEAR TEST NUMBER FOR LOOPING                        |
| 2407 | 010416 | 104026 |         | CKINTT        |        |                                                       |
| 2408 | 010420 | 000137 |         | JMP           | ST103B | ;SELECT NEW LINE NUMBERS AND                          |
| 2409 |        |        |         |               |        | ;RESTART TEST                                         |

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241.
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2419 010424
2420 010424 000005
2421 010426 012737 000340 177776
2422 010434 104004
2423 010436 016240
2424 010440 022737 000176 015566
2425 010446 001001
2426 010450 104025
2427 010452 012737 010470 011704
2428 010460 012737 010466 002204
2429 010466 104017
2430
2431 010470 104020
2432
2433 010472 010502
2434 010474 010476
2435 010476 104012
2436 010500 000772
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2438
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2443 010502 104021
2444
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2447 010504 010522
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2449 010506 010512
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2451 010510 010516
2452
2453 010512 104014
2454 010514 000207
2455 010516 104014
2456 010520 000762

;MODEM CONTROL ON LINE TEST USING 202C TYPE MODEMS
;ANSWER STATION TO BE OPERATED IN AUTO-ANSWER MODE
;THIS TEST VERIFIES THE CONNECT AND DISCONNECT SEQUENCES
;USING THE MODEM CONTROL TO CONTROL 202C TYPE MODEMS

;ALSO TESTED ARE LINE TURN-AROUND AND
;SECONDARY TRANSMIT-SECONDARY RECEIVE

T300:
ST202A: RESET
MOV #340,PS
TYPE
MT202T
CMP #SWREG,SWR
PNE 11
CNTRLU
11: MOV #T202A,FATREY
MOV #ST202B,KRET
ST202B: GETLNS
T202A: SETUP
T202B
T202A1
T202A1: ERROR
BR ST202B

;REFERENCE DESIGNATION
;INITIALIZE INTERFACE
;DISABLE ALL INTERRUPTS
;TYPE "202C MODEM CONNECT-
;DISCONNECT TEST"

;SET UP FOR FATAL ERROR
;SET UP FOR LINE CHANGE
;INPUT ORIGINATE AND
;ANSWER LINE NUMBERS
;SET UP TO RECEIVE INTERRUPTS
;WAIT FOR RING
;GO HERE IF RING OK
;GO HERE IF NO RING
;NO RING WITHIN 5 MINUTES
;SELECT NEW LINES AND REDIAL

;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE
;IF AN INCORRECT TRANSITION OCCURS, THE PROGRAM
;WILL TYPE AN ERROR MESSAGE, AND THE OPERATOR
;WILL BE REQUESTED TO RESELECT LINES AND REDIAL

T202B: CKRING
T202C
T202B1
T202B2
T202B1: ERROR
RTS PC
T202B2: ERROR
BR ST202B

;CHECK FOR RING INTERRUPT
;ONLY ON ANSWER LINE
;AND NO TRANSITIONS ON
;ORIGINATE LINE
;GO HERE IF TRANSITIONS
;ARE CORRECT
;GO HERE IF INCORRECT
;TRANSITION ON ANSWER LINE
;GO HERE IF INCORRECT
;TRANSITION ON ORIGINATE LINE
;ANSWER LINE TRANSITION ERROR
;CONTINUE CHECKING
;ORIGINATE LINE TRANSITION ERROR
;RESELECT LINES AND REDIAL

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| Address | Op Code | Op 1 | Op 2 | Op 3 | Op 4 | Op 5 | Op 6 | Op 7 | Op 8 | Op 9 | Op 10 | Op 11 | Op 12 | Op 13 | Op 14 | Op 15 | Op 16 | Op 17 | Op 18 | Op 19 | Op 20 | Op 21 | Op 22 | Op 23 | Op 24 | Op 25 | Op 26 | Op 27 | Op 28 | Op 29 | Op 30 | Op 31 | Op 32 | Op 33 | Op 34 | Op 35 | Op 36 | Op 37 | Op 38 | Op 39 | Op 40 | Op 41 | Op 42 | Op 43 | Op 44 | Op 45 | Op 46 | Op 47 | Op 48 | Op 49 | Op 50 | Op 51 | Op 52 | Op 53 | Op 54 | Op 55 | Op 56 | Op 57 | Op 58 | Op 59 | Op 60 | Op 61 | Op 62 | Op 63 | Op 64 | Op 65 | Op 66 | Op 67 | Op 68 | Op 69 | Op 70 | Op 71 | Op 72 | Op 73 | Op 74 | Op 75 | Op 76 | Op 77 | Op 78 | Op 79 | Op 80 | Op 81 | Op 82 | Op 83 | Op 84 | Op 85 | Op 86 | Op 87 | Op 88 | Op 89 | Op 90 | Op 91 | Op 92 | Op 93 | Op 94 | Op 95 | Op 96 | Op 97 | Op 98 | Op 99 | Op 100 | Op 101 | Op 102 | Op 103 | Op 104 | Op 105 | Op 106 | Op 107 | Op 108 | Op 109 | Op 110 | Op 111 | Op 112 | Op 113 | Op 114 | Op 115 | Op 116 | Op 117 | Op 118 | Op 119 | Op 120 | Op 121 | Op 122 | Op 123 | Op 124 | Op 125 | Op 126 | Op 127 | Op 128 | Op 129 | Op 130 | Op 131 | Op 132 | Op 133 | Op 134 | Op 135 | Op 136 | Op 137 | Op 138 | Op 139 | Op 140 | Op 141 | Op 142 | Op 143 | Op 144 | Op 145 | Op 146 | Op 147 | Op 148 | Op 149 | Op 150 | Op 151 | Op 152 | Op 153 | Op 154 | Op 155 | Op 156 | Op 157 | Op 158 | Op 159 | Op 160 | Op 161 | Op 162 | Op 163 | Op 164 | Op 165 | Op 166 | Op 167 | Op 168 | Op 169 | Op 170 | Op 171 | Op 172 | Op 173 | Op 174 | Op 175 | Op 176 | Op 177 | Op 178 | Op 179 | Op 180 | Op 181 | Op 182 | Op 183 | Op 184 | Op 185 | Op 186 | Op 187 | Op 188 | Op 189 | Op 190 | Op 191 | Op 192 | Op 193 | Op 194 | Op 195 | Op 196 | Op 197 | Op 198 | Op 199 | Op 200 | Op 201 | Op 202 | Op 203 | Op 204 | Op 205 | Op 206 | Op 207 | Op 208 | Op 209 | Op 210 | Op 211 | Op 212 | Op 213 | Op 214 | Op 215 | Op 216 | Op 217 | Op 218 | Op 219 | Op 220 | Op 221 | Op 222 | Op 223 | Op 224 | Op 225 | Op 226 | Op 227 | Op 228 | Op 229 | Op 230 | Op 231 | Op 232 | Op 233 | Op 234 | Op 235 | Op 236 | Op 237 | Op 238 | Op 239 | Op 240 | Op 241 | Op 242 | Op 243 | Op 244 | Op 245 | Op 246 | Op 247 | Op 248 | Op 249 | Op 250 | Op 251 | Op 252 | Op 253 | Op 254 | Op 255 | Op 256 | Op 257 | Op 258 | Op 259 | Op 260 | Op 261 | Op 262 | Op 263 | Op 264 | Op 265 | Op 266 | Op 267 | Op 268 | Op 269 | Op 270 | Op 271 | Op 272 | Op 273 | Op 274 | Op 275 | Op 276 | Op 277 | Op 278 | Op 279 | Op 280 | Op 281 | Op 282 | Op 283 | Op 284 | Op 285 | Op 286 | Op 287 | Op 288 | Op 289 | Op 290 | Op 291 | Op 292 | Op 293 | Op 294 | Op 295 | Op 296 | Op 297 | Op 298 | Op 299 | Op 300 | Op 301 | Op 302 | Op 303 | Op 304 | Op 305 | Op 306 | Op 307 | Op 308 | Op 309 | Op 310 | Op 311 | Op 312 | Op 313 | Op 314 | Op 315 | Op 316 | Op 317 | Op 318 | Op 319 | Op 320 | Op 321 | Op 322 | Op 323 | Op 324 | Op 325 | Op 326 | Op 327 | Op 328 | Op 329 | Op 330 | Op 331 | Op 332 | Op 333 | Op 334 | Op 335 | Op 336 | Op 337 | Op 338 | Op 339 | Op 340 | Op 341 | Op 342 | Op 343 | Op 344 | Op 345 | Op 346 | Op 347 | Op 348 | Op 349 | Op 350 | Op 351 | Op 352 | Op 353 | Op 354 | Op 355 | Op 356 | Op 357 | Op 358 | Op 359 | Op 360 | Op 361 | Op 362 | Op 363 | Op 364 | Op 365 | Op 366 | Op 367 | Op 368 | Op 369 | Op 370 | Op 371 | Op 372 | Op 373 | Op 374 | Op 375 | Op 376 | Op 377 | Op 378 | Op 379 | Op 380</ |
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|      |        |        |        |        |        |                              |                |  |                                                  |
|------|--------|--------|--------|--------|--------|------------------------------|----------------|--|--------------------------------------------------|
| 2501 |        |        |        |        |        |                              |                |  |                                                  |
| 2502 |        |        |        |        |        |                              |                |  | ;SET SECONDARY TRANSMIT ON ANSWER LINE           |
| 2503 |        |        |        |        |        |                              |                |  | ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES |
| 2504 |        |        |        |        |        |                              |                |  |                                                  |
| 2505 | 010622 | 013777 | 015644 | 004722 | T202E: | MOV                          | LINANS,BDMCSR  |  | ;SET LINE COUNTER TO ANSWER LINE                 |
| 2506 | 010630 | 052777 | 000010 | 004716 |        | BIS                          | @SECTX,BDMPLSR |  | ;SET SECONDARY RECEIVE ON ANSWER LINE            |
| 2507 | 010636 | 104026 |        |        |        | CKINTT                       |                |  |                                                  |
| 2508 | 010640 | 104022 |        |        |        | WAITRN                       |                |  | ;WAIT FOR TRANSITIONS TO OCCUR                   |
| 2509 |        |        |        |        |        |                              |                |  |                                                  |
| 2510 |        |        |        |        |        |                              |                |  | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON     |
| 2511 |        |        |        |        |        |                              |                |  | ;SELECTED ORIGINATE AND ANSWER LINES             |
| 2512 |        |        |        |        |        |                              |                |  |                                                  |
| 2513 | 010642 | 104023 |        |        |        | CKTRAN                       |                |  | ;CHECK TRANSITIONS AND STATUS                    |
| 2514 |        |        |        |        |        |                              |                |  | ;ON SELECTED ANSWER AND                          |
| 2515 |        |        |        |        |        |                              |                |  | ;ORIGINATE LINES                                 |
| 2516 | 010644 | 000133 |        |        |        | SECTX+CO+LINENA+TRMRDY+SECRX |                |  | ;EXPECT SECONDARY TRANSMIT                       |
| 2517 |        |        |        |        |        |                              |                |  | ;SECONDARY RECEIVE, CARRIER                      |
| 2518 |        |        |        |        |        |                              |                |  | ;LINE ENABLE AND TERMINAL READY                  |
| 2519 |        |        |        |        |        |                              |                |  | ;STATUS BITS SET ON ANSWER LINE                  |
| 2520 | 010646 | 000167 |        |        |        | SECRX+RS+CO+CS+LINENA+TRMRDY |                |  | ;EXPECT SECONDARY RECEIVE,                       |
| 2521 |        |        |        |        |        |                              |                |  | ;REQUEST TO SEND, CLEAR TO SEND                  |
| 2522 |        |        |        |        |        |                              |                |  | ;CARRIER, LINE ENABLE AND                        |
| 2523 |        |        |        |        |        |                              |                |  | ;TERMINAL READY STATUS BITS                      |
| 2524 |        |        |        |        |        |                              |                |  | ;SET ON ORIGINATE LINE                           |
| 2525 | 010650 | 000001 |        |        |        | XSCRX                        |                |  | ;EXPECT SECONDARY RECEIVE                        |
| 2526 |        |        |        |        |        |                              |                |  | ;TRANSITION ON ANSWER LINE                       |
| 2527 | 010652 | 000001 |        |        |        | XSCRX                        |                |  | ;EXPECT SECONDARY RECEIVE                        |
| 2528 |        |        |        |        |        |                              |                |  | ;TRANSITION ON ORIGINATE LINE                    |
| 2529 | 010654 | 010666 |        |        |        | T202E1                       |                |  | ;GO HERE ON ANSWER LINE STATUS ERROR             |
| 2530 | 010656 | 010672 |        |        |        | T202E2                       |                |  | ;GO HERE ON ORIGINATE LINE STATUS ERROR          |
| 2531 | 010660 | 010676 |        |        |        | T202E3                       |                |  | ;GO HERE ON ANSWER LINE TRANSITION ERROR         |
| 2532 | 010662 | 010702 |        |        |        | T202E4                       |                |  | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR      |
| 2533 | 010664 | 010706 |        |        |        | T202F                        |                |  | ;GO TO NEXT TEST IF NO ERRORS                    |
| 2534 | 010666 | 104015 |        |        |        | T202E1: ERRORS               |                |  | ;ANSWER LINE STATUS ERROR                        |
| 2535 | 010670 | 000207 |        |        |        | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2536 | 010672 | 104015 |        |        |        | T202E2: ERRORS               |                |  | ;ORIGINATE LINE STATUS ERROR                     |
| 2537 | 010674 | 000207 |        |        |        | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2538 | 010676 | 104014 |        |        |        | T202E3: ERROR                |                |  | ;ANSWER LINE TRANSITION ERROR                    |
| 2539 | 010700 | 000207 |        |        |        | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2540 | 010702 | 104014 |        |        |        | T202E4: ERROR                |                |  | ;ORIGINATE LINE TRANSITION ERROR                 |
| 2541 | 010704 | 000207 |        |        |        | RTS                          | PC             |  | ;CONTINUE CHECKING                               |



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|      |        |        |        |        |        |                |                |  |                                                  |
|------|--------|--------|--------|--------|--------|----------------|----------------|--|--------------------------------------------------|
| 2542 |        |        |        |        |        |                |                |  |                                                  |
| 2543 |        |        |        |        |        |                |                |  | ;DROP REQUEST TO SEND ON ORIGINATE LINE          |
| 2544 |        |        |        |        |        |                |                |  | ;DROP SECONDARY TRANSMIT ON ANSWER LINE          |
| 2545 |        |        |        |        |        |                |                |  | ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES |
| 2546 |        |        |        |        |        |                |                |  |                                                  |
| 2547 | 010706 | 013777 | 015642 | 004636 | T202F: | MOV            | LINORG,BDMCSR  |  | ;SET LINE COUNTER TO ORIGINATE LINE              |
| 2548 | 010714 | 042777 | 000004 | 004632 |        | BIC            | #RS,BDMPLSR    |  | ;DROP REQUEST TO SEND                            |
| 2549 | 010722 | 013777 | 015644 | 004622 |        | MOV            | LINANS,BDMCSR  |  | ;SET LINE COUNTER TO ANSWER LINE                 |
| 2550 | 010730 | 042777 | 000010 | 004616 |        | BIC            | #SECTX,BDMPLSR |  | ;DROP SECONDARY RECEIVE                          |
| 2551 | 010736 | 104026 |        |        |        | CKINTT         |                |  |                                                  |
| 2552 | 010740 | 104022 |        |        |        | WAITRN         |                |  | ;WAIT FOR TRANSITIONS TO OCCUR                   |
| 2553 |        |        |        |        |        |                |                |  |                                                  |
| 2554 |        |        |        |        |        |                |                |  | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON     |
| 2555 |        |        |        |        |        |                |                |  | ;SELECTED ORIGINATE AND ANSWER LINES             |
| 2556 |        |        |        |        |        |                |                |  |                                                  |
| 2557 | 010742 | 104023 |        |        |        | CKTRAN         |                |  | ;CHECK TRANSITIONS AND STATUS                    |
| 2558 |        |        |        |        |        |                |                |  | ;ON SELECTED ANSWER AND                          |
| 2559 |        |        |        |        |        |                |                |  | ;ORIGINATE LINES                                 |
| 2560 | 010744 | 000003 |        |        |        | LINENA+TRMRDY  |                |  | ;EXPECT LINE ENABLE AND                          |
| 2561 |        |        |        |        |        |                |                |  | ;TERMINAL READY STATUS BITS                      |
| 2562 |        |        |        |        |        |                |                |  | ;SET ON ANSWER LINE                              |
| 2563 | 010746 | 000003 |        |        |        | LINENA+TRMRDY  |                |  | ;EXPECT LINE ENABLE AND                          |
| 2564 |        |        |        |        |        |                |                |  | ;TERMINAL READY STATUS BITS                      |
| 2565 |        |        |        |        |        |                |                |  | ;SET ON ORIGINATE LINE                           |
| 2566 | 010750 | 000005 |        |        |        | XCO+XSCRX      |                |  | ;EXPECT CARRIER AND SECONDARY                    |
| 2567 |        |        |        |        |        |                |                |  | ;RECEIVE TRANSITIONS ON                          |
| 2568 |        |        |        |        |        |                |                |  | ;ANSWER LINE                                     |
| 2569 | 010752 | 000007 |        |        |        | XCO+XCS+XSCRX  |                |  | ;EXPECT CARRIER, CLEAR TO SEND                   |
| 2570 |        |        |        |        |        |                |                |  | ;AND SECONDARY RECEIVE                           |
| 2571 |        |        |        |        |        |                |                |  | ;TRANSITIONS ON ORIGINATE LINE                   |
| 2572 | 010754 | 010766 |        |        |        | T202F2         |                |  | ;GO HERE ON ANSWER LINE STATUS ERROR             |
| 2573 | 010756 | 010772 |        |        |        | T202F3         |                |  | ;GO HERE ON ORIGINATE LINE STATUS ERROR          |
| 2574 | 010760 | 010776 |        |        |        | T202F4         |                |  | ;GO HERE ON ANSWER LINE TRANSITION ERROR         |
| 2575 | 010762 | 011002 |        |        |        | T202F5         |                |  | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR      |
| 2576 | 010764 | 011006 |        |        |        | T202G          |                |  | ;GO TO NEXT TEST IF NO ERRORS                    |
| 2577 | 010766 | 104015 |        |        |        | T202F2: ERRORS |                |  | ;ANSWER LINE STATUS ERROR                        |
| 2578 | 010770 | 000207 |        |        |        | RTS            | PC             |  | ;CONTINUE CHECKING                               |
| 2579 | 010772 | 104015 |        |        |        | T202F3: ERRORS |                |  | ;ORIGINATE LINE STATUS ERROR                     |
| 2580 | 010774 | 000207 |        |        |        | RTS            | PC             |  | ;CONTINUE CHECKING                               |
| 2581 | 010776 | 104014 |        |        |        | T202F4: ERROR  |                |  | ;ANSWER LINE TRANSITION ERROR                    |
| 2582 | 011000 | 000207 |        |        |        | RTS            | PC             |  | ;CONTINUE CHECKING                               |
| 2583 | 011002 | 104014 |        |        |        | T202F5: ERROR  |                |  | ;ORIGINATE LINE TRANSITION ERROR                 |
| 2584 | 011004 | 000207 |        |        |        | RTS            | PC             |  | ;CONTINUE CHECKING                               |

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|      |        |        |        |        |         |                       |                                                |
|------|--------|--------|--------|--------|---------|-----------------------|------------------------------------------------|
| 2585 |        |        |        |        |         |                       |                                                |
| 2586 |        |        |        |        |         |                       |                                                |
| 2587 |        |        |        |        |         |                       | ;SET REQUEST TO SEND ON ANSWER LINE            |
| 2588 |        |        |        |        |         |                       | ;WAIT FOR TRANSITIONS ON SELECTED LINES        |
| 2589 |        |        |        |        |         |                       |                                                |
| 2590 | 011006 | 013777 | 015644 | 004536 | T202G:  | MOV                   | LINANS,BDMCSR ;SET LINE COUNTER TO ANSWER LINE |
| 2591 | 011014 | 052777 | 000004 | 004532 |         | BIS                   | ORS,BDMPLSR ;SET REQUEST TO SEND               |
| 2592 | 011022 | 104026 |        |        |         | CKINTT                |                                                |
| 2593 | 011024 | 104022 |        |        |         | WAITRN                | ;WAIT FOR TRANSITIONS TO OCCUR                 |
| 2594 |        |        |        |        |         |                       |                                                |
| 2595 |        |        |        |        |         |                       | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON   |
| 2596 |        |        |        |        |         |                       | ;SELECTED ORIGINATE AND ANSWER LINES           |
| 2597 |        |        |        |        |         |                       |                                                |
| 2598 | 011026 | 104023 |        |        |         | CKTRAN                | ;CHECK TRANSITIONS AND STATUS                  |
| 2599 |        |        |        |        |         |                       | ;ON SELECTED ANSWER AND                        |
| 2600 |        |        |        |        |         |                       | ;ORIGINATE LINES                               |
| 2601 | 011030 | 000147 |        |        |         | RS.CO.CS.LINENA.TMRDY | ;EXPECT LINE ENABLE, TERMINAL                  |
| 2602 |        |        |        |        |         |                       | ;READY, REQUEST TO SEND, CLEAR                 |
| 2603 |        |        |        |        |         |                       | ;TO SEND, AND CARRIER                          |
| 2604 |        |        |        |        |         |                       | ;STATUS BITS SET ON ANSWER LINE                |
| 2605 | 011032 | 000103 |        |        |         | CO.LINENA.TMRDY       | ;EXPECT LINE ENABLE, TERMINAL                  |
| 2606 |        |        |        |        |         |                       | ;READY AND CARRIER STATUS                      |
| 2607 |        |        |        |        |         |                       | ;BITS SET ON ORIGINATE LINE                    |
| 2608 | 011034 | 000006 |        |        |         | XCO.XCS               | ;EXPECT CARRIER AND CLEAR                      |
| 2609 |        |        |        |        |         |                       | ;TO SEND TRANSITIONS ON                        |
| 2610 |        |        |        |        |         |                       | ;ANSWER LINE                                   |
| 2611 | 011036 | 000004 |        |        |         | XCO                   | ;EXPECT CARRIER TRANSITION                     |
| 2612 |        |        |        |        |         |                       | ;ON ORIGINATE LINE                             |
| 2613 | 011040 | 011052 |        |        |         | T202G1                | ;GO HERE ON ANSWER LINE STATUS ERROR           |
| 2614 | 011042 | 011056 |        |        |         | T202G2                | ;GO HERE ON ORIGINATE LINE STATUS ERROR        |
| 2615 | 011044 | 011062 |        |        |         | T202G3                | ;GO HERE ON ANSWER LINE TRANSITION ERROR       |
| 2616 | 011046 | 011066 |        |        |         | T202G4                | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR    |
| 2617 | 011050 | 011072 |        |        |         | T202H                 | ;GO TO NEXT TEST IF NO ERRORS                  |
| 2618 | 011052 | 104015 |        |        | T202G1: | ERRORS                | ;ANSWER LINE STATUS ERROR                      |
| 2619 | 011054 | 000207 |        |        |         | RTS                   | ;CONTINUE TESTING                              |
| 2620 | 011056 | 104015 |        |        | T202G2: | ERRORS                | ;ORIGINATE LINE STATUS ERROR                   |
| 2621 | 011060 | 000207 |        |        |         | RTS                   | ;CONTINUE TESTING                              |
| 2622 | 011062 | 104014 |        |        | T202G3: | ERRORT                | ;ANSWER LINE TRANSITION ERROR                  |
| 2623 | 011064 | 000207 |        |        |         | RTS                   | ;CONTINUE TESTING                              |
| 2624 | 011066 | 104014 |        |        | T202G4: | ERRORT                | ;ORIGINATE LINE TRANSITION ERROR               |
| 2625 | 011070 | 000207 |        |        |         | RTS                   | ;CONTINUE TESTING                              |



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|      |        |        |        |        |         |                              |                |  |                                                  |
|------|--------|--------|--------|--------|---------|------------------------------|----------------|--|--------------------------------------------------|
| 2626 |        |        |        |        |         |                              |                |  |                                                  |
| 2627 |        |        |        |        |         |                              |                |  | ;SET SECONDARY TRANSMIT ON ORIGINATE LINE        |
| 2628 |        |        |        |        |         |                              |                |  | ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES |
| 2629 |        |        |        |        |         |                              |                |  |                                                  |
| 2630 | 011072 | 013777 | 015642 | 004452 | T202H:  | MOV                          | LINORG,BDMCSR  |  | ;SET LINE COUNTER TO ORIGINATE LINE              |
| 2631 | 011100 | 052777 | 000010 | 004446 |         | BIS                          | #SECTX,BDMPLSR |  | ;SET SECONDARY TRANSMIT                          |
| 2632 | 011106 | 104026 |        |        |         | CKINTT                       |                |  |                                                  |
| 2633 | 011110 | 104022 |        |        |         | WAITRN                       |                |  | ;WAIT FOR TRANSITIONS TO OCCUR                   |
| 2634 |        |        |        |        |         |                              |                |  |                                                  |
| 2635 |        |        |        |        |         |                              |                |  | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON     |
| 2636 |        |        |        |        |         |                              |                |  | ;SELECTED ORIGINATE AND ANSWER LINES             |
| 2637 |        |        |        |        |         |                              |                |  |                                                  |
| 2638 | 011112 | 104023 |        |        |         | CKTRAN                       |                |  | ;CHECK TRANSITIONS AND STATUS                    |
| 2639 |        |        |        |        |         |                              |                |  | ;ON SELECTED ANSWER AND                          |
| 2640 |        |        |        |        |         |                              |                |  | ;ORIGINATE LINES                                 |
| 2641 | 011114 | 000167 |        |        |         | RS+CS+CO+LINENA+TRMRDY+SECRX |                |  | ;EXPECT LINE ENABLE, TERMINAL                    |
| 2642 |        |        |        |        |         |                              |                |  | ;READY, REQUEST TO SEND, CLEAR                   |
| 2643 |        |        |        |        |         |                              |                |  | ;TO SEND, CARRIER AND SECONDARY                  |
| 2644 |        |        |        |        |         |                              |                |  | ;RECEIVE STATUS BITS SET                         |
| 2645 |        |        |        |        |         |                              |                |  | ;ON ANSWER LINE                                  |
| 2646 | 011116 | 000133 |        |        |         | SECTX+CO+LINENA+TRMRDY+SECRX |                |  | ;EXPECT LINE ENABLE, TERMINAL                    |
| 2647 |        |        |        |        |         |                              |                |  | ;READY, CARRIER, SECONDARY                       |
| 2648 |        |        |        |        |         |                              |                |  | ;TRANSMIT AND SECONDARY                          |
| 2649 |        |        |        |        |         |                              |                |  | ;RECEIVE STATUS BITS SET                         |
| 2650 |        |        |        |        |         |                              |                |  | ;ON ORIGINATE LINE                               |
| 2651 | 011120 | 000001 |        |        |         | XSCRX                        |                |  | ;EXPECT SECONDARY RECEIVE                        |
| 2652 |        |        |        |        |         |                              |                |  | ;TRANSITION ON ANSWER LINE                       |
| 2653 | 011122 | 000001 |        |        |         | XSCRX                        |                |  | ;EXPECT SECONDARY RECEIVE                        |
| 2654 |        |        |        |        |         |                              |                |  | ;TRANSITION ON ORIGINATE LINE                    |
| 2655 | 011124 | 011136 |        |        |         | T202H2                       |                |  | ;GO HERE ON ANSWER LINE STATUS ERROR             |
| 2656 | 011126 | 011142 |        |        |         | T202H3                       |                |  | ;GO HERE ON ORIGINATE LINE STATUS ERROR          |
| 2657 | 011130 | 011146 |        |        |         | T202H4                       |                |  | ;GO HERE ON ANSWER LINE TRANSITION ERROR         |
| 2658 | 011132 | 011152 |        |        |         | T202H5                       |                |  | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR      |
| 2659 | 011134 | 011154 |        |        |         | T202I                        |                |  | ;GO TO NEXT TEST IF NO ERRORS                    |
| 2660 | 011136 | 104015 |        |        | T202H2: | ERRORS                       |                |  | ;ANSWER LIN STATUS ERROR                         |
| 2661 | 011140 | 000207 |        |        |         | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2662 | 011142 | 104015 |        |        | T202H3: | ERRORS                       |                |  | ;ORIGINATE LINE STATUS ERROR                     |
| 2663 | 011144 | 000207 |        |        |         | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2664 | 011146 | 104014 |        |        | T202H4: | ERRORT                       |                |  | ;ANSWER LINE TRANSITION ERROR                    |
| 2665 | 011150 | 000207 |        |        |         | RTS                          | PC             |  | ;CONTINUE CHECKING                               |
| 2666 | 011152 | 104014 |        |        | T202H5: | ERRORT                       |                |  | ;ORIGINATE LINE TRANSITION ERROR                 |
| 2667 | 011154 | 000207 |        |        |         | RTS                          | PC             |  | ;CONTINUE CHECKING                               |

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|      |        |        |        |        |        |                 |                |  |                                                  |
|------|--------|--------|--------|--------|--------|-----------------|----------------|--|--------------------------------------------------|
| 2668 |        |        |        |        |        |                 |                |  |                                                  |
| 2669 |        |        |        |        |        |                 |                |  | ;DROP REQUEST TO SEND ON ANSWER LINE             |
| 2670 |        |        |        |        |        |                 |                |  | ;WAIT FOR TRANSITIONS TO OCCUR ON SELECTED LINES |
| 2671 |        |        |        |        |        |                 |                |  |                                                  |
| 2672 | 011156 | 013777 | 015644 | 004366 | T202I: | MOV             | LINANS,BDMCSR  |  | ;SET LINE COUNTER TO ANSWER LINE                 |
| 2673 | 011164 | 042777 | 000004 | 004362 |        | BIC             | #RS,BDMPLSR    |  | ;CLEAR REQUEST TO SEND                           |
| 2674 | 011172 | 013777 | 015642 | 004352 |        | MOV             | LINORG,BDMCSR  |  | ;SET LINE COUNTER TO ORIGINATE LINE              |
| 2675 | 011200 | 042777 | 000010 | 004346 |        | BIC             | #SECTX,BDMPLSR |  | ;CLEAR SECONDARY TRANSMIT                        |
| 2676 | 011205 | 104026 |        |        |        | CKINTT          |                |  |                                                  |
| 2677 | 011210 | 104022 |        |        |        | WAITRN          |                |  | ;WAIT FRO TRANSITIONS TO OCCUR                   |
| 2678 |        |        |        |        |        |                 |                |  |                                                  |
| 2679 |        |        |        |        |        |                 |                |  | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON     |
| 2680 |        |        |        |        |        |                 |                |  | ;SELECTED ORIGINATE AND ANSWER LINES             |
| 2681 |        |        |        |        |        |                 |                |  |                                                  |
| 2682 | 011212 | 104023 |        |        |        | CKTRAN          |                |  | ;CHECK TRANSITION S AND STATUS                   |
| 2683 |        |        |        |        |        |                 |                |  | ;ON SELECTED ANSWE AND                           |
| 2684 |        |        |        |        |        |                 |                |  | ;ORIGINATE LINES                                 |
| 2685 | 011214 | 000003 |        |        |        | LINENA+TRMRDY   |                |  | ;EXPECT LINE ENABLE AND                          |
| 2686 |        |        |        |        |        |                 |                |  | ;TERMINAL READY STATUS BITS SET                  |
| 2687 |        |        |        |        |        |                 |                |  | ;ON ANSWER LINE                                  |
| 2688 | 011216 | 000003 |        |        |        | LINENA+TRMRDY   |                |  | ;EXPECT LINE ENABLE AND                          |
| 2689 |        |        |        |        |        |                 |                |  | ;TERMINAL READY STATUS BITS                      |
| 2690 |        |        |        |        |        |                 |                |  | ;SET ON ORIGINATE LINE                           |
| 2691 | 011220 | 000007 |        |        |        | XCO+XCS+XSCRX   |                |  | ;EXPECT CARRIER, CLEAR TO SEND                   |
| 2692 |        |        |        |        |        |                 |                |  | ;AND SECONDARY RECEIVE TRANSITIONS               |
| 2693 |        |        |        |        |        |                 |                |  | ;ON ANSWER LINE                                  |
| 2694 | 011222 | 000005 |        |        |        | XCO+XSCRX       |                |  | ;EXPECT CARRIER AND SECONDARY                    |
| 2695 |        |        |        |        |        |                 |                |  | ;RECEIVE TRANSITIONS ON                          |
| 2696 |        |        |        |        |        |                 |                |  | ;ORIGINATE LINE                                  |
| 2697 | 011224 | 011236 |        |        |        | T202I2          |                |  | ;GO HERE ON ANSWER LINE STATUS ERROR             |
| 2698 | 011226 | 011242 |        |        |        | T202I3          |                |  | ;GO HERE ON ORIGINATE LINE STATUS ERROR          |
| 2699 | 011230 | 011246 |        |        |        | T202I4          |                |  | ;GO HERE ON ANSWER LINE TRANSITIN ERROR          |
| 2700 | 011232 | 011252 |        |        |        | T202I5          |                |  | ;GO HERE ON ORIGINATE LINE TRANSITION ERROR      |
| 2701 | 011234 | 011256 |        |        |        | T202J           |                |  | ;GO TO NEXT TEST IF NO ERRORS                    |
| 2702 | 011236 | 104015 |        |        |        | T202I2: ERRORS  |                |  | ;ANSWER LINE STATUS ERROR                        |
| 2703 | 011240 | 000207 |        |        |        | RTS             | PC             |  | ;CONTINUE CHECKING                               |
| 2704 | 011242 | 104015 |        |        |        | T202I3: ERRORS  |                |  | ;ORIGINATE LINE STATUS ERROR                     |
| 2705 | 011244 | 000207 |        |        |        | RTS             | PC             |  | ;CONTINUE CHECKING                               |
| 2706 | 011246 | 104014 |        |        |        | T202I4: ERRORRT |                |  | ;ANSWE LINE TRANSITION ERROR                     |
| 2707 | 011250 | 000207 |        |        |        | RTS             | PC             |  | ;CONTINUE CHECKING                               |
| 2708 | 011252 | 104014 |        |        |        | T202I5: ERRORRT |                |  | ;ORIGINATE LINE TRANSITION ERROR                 |
| 2709 | 011254 | 000207 |        |        |        | RTS             | PC             |  | ;CONTINUE CHECKING                               |

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2710
2711      ;SET UP TO TEST DISCONNECT SEQUENCE
2712      ;THE PROGRAM WILL REQUEST THE OPERATOR TO TYPE A CHARACTER
2713      ;TO INITIATE THE DISCONNECT SEQUENCE
2714      ;THE OPERATOR MAY MANUALLY SWITCH THE DATA SETS FROM
2715      ;DATA TO TALK MODE AS MANY TIMES AS DESIRED
2716      ;BEFORE THE SWITCH SEETIN IS MADE
2717      ;ANY TRANSITIONS DETECTED DURING THIS TIME WILL BE
2718      ;REPORTED BY TYPEOUT
2719
2720 011256 104004      T202J: TYPE      ;TYPE "STRIKE ANY TTY KEY
2721 011260 016432      MDISC      ;TEST DISCONNECT"
2722 011262 012737 000340 177776      MOV      @340,PS      ;LOCK OUT INTERRUPTS
2723 011270 012777 011726 004250      MOV      @TRNTYP,BDMVEC      ;SET UP TO DETECT TRANSITIONS
2724 011276 012737 011316 015672      MOV      @T202JS,ANGRET      ;SET UP DUMMY RETURN FOR RING
2725                                ;FROM RING INTERRUPT
2726 011304 012777 000140 004240      MOV      @SCNENA+INTENA,BDMCSR      ;ENABLE LINE SCANNER
2727                                ;START SCANNER
2728 011312 005037 177776      CLR      PS      ;ENABLE INTERRUPTS
2729 011316 005077 004236      T202JS: CLR      @TKDBR
2730 011322 105777 004230      11:  TSTB      @TKCSR
2731 011326 100375      BPL      11
2732 011330 005777 004224      TST      @TKDBR
2733
2734      ;DISCONNECT SEQUENCE REQUESTED
2735
2736 011334 012737 000340 177776      MOV      @340,PS      ;LOCK OUT INTERRUPTS
2737 011342 005077 004204      CLR      BDMCSR      ;STOP SCANNER
2738 011346 013777 015642 004176      MOV      LINORG,BDMCSR      ;SET LINE COUNTER TO SELECTED ORIGINATE LINE
2739 011354 042777 000002 004172      BIC      @TRMRDY,BDMPLSR      ;SET TERMINAL READY ON SELECTED LINE
2740 011362 104024      WAITS      ;DELAY
2741 011364 104026      CKINTT
2742 011366 104022      WAITRN      ;WAIT FOR TRANSITIONS TO OCCUR

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|      |        |        |        |                |                                                       |
|------|--------|--------|--------|----------------|-------------------------------------------------------|
| 2743 |        |        |        |                |                                                       |
| 2744 |        |        |        |                | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON SELECTED |
| 2745 |        |        |        |                | ;ORIGINATE AND ANSWER LINES                           |
| 2746 |        |        |        |                |                                                       |
| 2747 | 011370 | 104023 |        | CKTRAN         | ;CHECK TRANSITIONS AND STATUS                         |
| 2748 |        |        |        |                | ;ON SELECTED ANSWER AND                               |
| 2749 |        |        |        |                | ;ORIGINATE LINES                                      |
| 2750 | 011372 | 000003 |        | LINENA+TRMDY   | ;EXPECT LINE ENABLE AND                               |
| 2751 |        |        |        |                | ;TERMINAL READY STATUS BITS                           |
| 2752 |        |        |        |                | ;SET ON ANSWER LINE                                   |
| 2753 | 011374 | 000001 |        | LINENA         | ;EXPECT LINE ENABLE STATUS                            |
| 2754 |        |        |        |                | ;BIT SET ON ORIGINATE LINE                            |
| 2755 | 011376 | 000000 |        | 0              | ;EXPECT NO TRANSITIONS ON                             |
| 2756 |        |        |        |                | ;ANSWER LINE                                          |
| 2757 | 011400 | 000000 |        | 0              | ;EXPECT NO TRANSITIONS ON                             |
| 2758 |        |        |        |                | ;ORIGINATE LINE                                       |
| 2759 | 011402 | 011414 |        | T202J1         | ;GO HERE IF ANSWER LINE STATUS ERROR                  |
| 2760 | 011404 | 011420 |        | T202J2         | ;GO HERE IF ORIGINATE LINE STATUS ERROR               |
| 2761 | 011406 | 011424 |        | T202J3         | ;GO HERE IF ANSWER LINE TRANSITION ERROR              |
| 2762 | 011410 | 011430 |        | T202J4         | ;GO HERE IF ORIGINATE LINE TRANSITIONS ERROR          |
| 2763 | 011412 | 011434 |        | T202JN         | ;GO TO END OF TEST IF NO ERRORS                       |
| 2764 | 011414 | 104015 |        | T202J1: ERRORS | ;ANSWER LINE STATUS ERROR                             |
| 2765 | 011416 | 000207 |        | RTS            | ;CONTINUE CHECKING                                    |
| 2766 | 011420 | 104015 |        | T202J2: ERRORS | ;ORIGINATE LINE STATUS ERROR                          |
| 2767 | 011422 | 000207 |        | RTS            | ;CONTINUE CHECKING                                    |
| 2768 | 011424 | 104014 |        | T202J3: ERROR  | ;ANSWER LINE TRANSITION ERROR                         |
| 2769 | 011426 | 000207 |        | RTS            | ;CONTINUE CHECKING                                    |
| 2770 | 011430 | 104014 |        | T202J4: ERROR  | ;ORIGINATE LINE TRANSITION ERROR                      |
| 2771 | 011432 | 000207 |        | RTS            | ;CONTINUE CHECKING                                    |
| 2772 |        |        |        |                |                                                       |
| 2773 | 011434 | 104004 |        | T202JN: TYPE   | ;TYPE "202C TEST COMPLETE"                            |
| 2774 | 011436 | 016403 |        | MT202A         |                                                       |
| 2775 | 011440 | 104026 |        | CKINTT         |                                                       |
| 2776 | 011442 | 000137 | 010466 | JMP            | ;GET NEW LINE NUMBERS                                 |
| 2777 |        |        |        | ST202B         | ;RESTART TEST                                         |

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2778
2779      ;DETECT AND RECORD TRANSITIONS ON SELECTED
2780      ;ORIGINATE AND ANSWER LINES
2781
2782      ;TRANSITION DATA IS STORED IN LOCATIONS ANSFLG AND ORGFLG
2783      ;FOR ANSWER AND ORIGINATE LINES RESPECTIVELY
2784      ;FORMAT OF DATA IS (FOR BOTH LINES)
2785
2786      ;BIT0=1, SECONDARY RECEIVE CAUSED INTERRUPT
2787      ;BIT1=1, CLEAR TO SEND CAUSED INTERRUPT
2788      ;BIT2=1, CARRIER CAUSED INTERRUPT
2789      ;BIT3=1, RING CAUSED INTERRUPT
2790
2791 011446 017704 004100      TRANS: MOV      BDHPCSR,R4      ;GET LINE NUMBER AND
2792                                ;INTERRUPT FLAGS
2793 011452 010405      MOV      R4,R5
2794 011454 042705 177760      BIC      #177760,R5      ;EXTRACT LINE NUMBER
2795 011460 023705 015642      CMP      LINORG,R5      ;DID ORIGINATE LINE INTERRUPT
2796 011464 001411      BEQ      ORGTR      ;IF YES, SERVICE
2797 011466 023705 015644      CMP      LINANS,R5      ;DID ANSWER LINE INTERRUPT
2798 011472 001443      BEQ      ANSTR      ;IF YES, SERVICE
2799 011474 010577 004052      MOV      R5,BDHPCSR
2800 011500 017703 004050      MOV      BDHPLSR,R3
2801 011504 104016      ERRORN
2802 011506 000471      BR      FATEX      ;INTERRUPT ON INCORRECT LINE
2803
2804      ;RECORD TRANSITIONS FOR ORIGINATE LINE
2805
2806 011510 032704 100000      ORGTR: BIT      #RINGF,R4      ;IF RING CAUSED INTERRUPT,
2807 011514 001403      BEQ      ORGTR1      ;SET RING TRANSITION BIT
2808 011516 052737 000010 015650      BIS      #10,ORGFLG
2809 011524 032704 040000      ORGTR1: BIT      #COF,R4      ;IF CARRIER CAUSED INTERRUPT
2810 011530 001403      BEQ      ORGTR2      ;SET CARRIER TRANSITION BIT
2811 011532 052737 000004 015650      BIS      #4,ORGFLG
2812 011540 032704 020000      ORGTR2: BIT      #CSF,R4      ;IF CLEAR TO SEND
2813                                ;CAUSED INTERRUPT
2814 011544 001403      BEQ      ORGTR3      ;SET CLEAR TO SEND
2815                                ;TRANSITION BIT
2816 011546 052737 000002 015650      BIS      #2,ORGFLG
2817 011554 032704 010000      ORGTR3: BIT      #SECRXF,R4      ;IF SECONDARY RECEIVE
2818                                ;CAUSED INTERRUPT
2819 011560 001403      BEQ      ORGTR4      ;SET SECONDARY RECEIVE
2820 011562 052737 000001 015650      BIS      #1,ORGFLG      ;TRANSITION BIT
2821 011570 032704 170000      ORGTR4: BIT      #RINGF+COF+CSF+SECRXF,R4
2822                                ;IF NO INTERRUPT FLAGS SET
2823 011574 001044      BNE      TRANEX      ;EXIT TRANSITION DETECTION
2824 011576 104016      ORGTRR: ERRORN
2825 011600 000434      BR      FATEX

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2826
2827                                ;RECORD TRANSITIONS FOR ANSWER LINE
2828
2829 011602 032704 100000          ANSTR: BIT    @RINGF,R4          ;IF RING CAUSED INTERRUPT,
2830 011606 001403                BEQ      ANSTR1          ;SET RING TRANSITION BIT
2831 011610 052737 000010 015646  BIS      @10,ANSFLG
2832 011616 032704 040000          ANSTR1: BIT    @COF,R4          ;IF CARRIER CAUSED INTERRUPT
2833 011622 001403                BEQ      ANSTR2          ;SET CARRIER TRANSITION BIT
2834 011624 052737 000004 015646  BIS      @4,ANSFLG
2835 011632 032704 020000          ANSTR2: BIT    @CSF,R4          ;IF CLEAR TO SEND
2836                                ;CAUSED INTERRUPT
2837 011636 001403                BEQ      ANSTR3          ;SET CLEAR TO SEND
2838                                ;TRANSITION BIT
2839 011640 052737 000002 015646  BIS      @2,ANSFLG
2840 011646 032704 010000          ANSTR3: BIT    @SECRXF,R4        ;IF SECONDARY RECEIVE
2841                                ;CAUSED INTERRUPT
2842 011652 001403                BEQ      ANSTR4          ;SET SECONDARY RECEIVE
2843 011654 052737 000001 015646  BIS      @1,ANSFLG          ;TRANSITION BIT
2844 011662 032704 170000          ANSTR4: BIT    @RINGF+COF+CSF+SECRXF,R4
2845                                ;IF NO INTERRUPT FLAGS SET
2846 011666 001007                BNE      TRANEX          ;EXIT TRANSITION DETECTION
2847 011670 104016                ANSTR: ERRORN
2848 011672 005037 015600          FATEX: CLR      TSTNO
2849 011676 022626                POP2SP
2850 011700 000177 000000          JMP      @FATRET
2851 011704 000000          FATRET: 0
2852
2853                                ;EXIT TRANSITION DETECTION
2854
2855 011706 005704                TRANEX: TST      R4          ;IF RING FLAG WAS SET
2856 011710 100002                BPL      .+6          ;SET UP SPECIAL RETURN
2857 011712 013716 015672          MOV      RINGRET,(SP)
2858 011716 012777 000140 003626  TRANX1: MOV      @SCNENA+INTENA,@DMHCSR ;RESTART SCANNER
2859 011724 000002                RTI
2860
2861                                ;TYPE TRANSITION DATA AND RETURN
2862
2863 011726 017737 003620 012712  TRNTYP: MOV      @DMHCSR,DATA1
2864 011734 017737 003614 012714  MOV      @DMHLSR,DATA2
2865 011742 104004                TYPE
2866 011744 017054                MTRNDCT
2867 011746 104006                OCTASC
2868 011750 011754                TRNTAB
2869 011752 000761                BR      TRANX1
2870 011754 000002          TRNTAB: 2
2871 011756 000006                6
2872 011760 012712                DATA1
2873 011762 000003                3
2874 011764 012714                DATA2

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2875
2876                                ;INPUT ORIGINATE AND ANSWER LINES FROM TELETYPE KEYBOARD
2877
2878 011766 000005      GETLIN: RESET
2879 011770 104013      INSTRG                                ;TYPE "ORIGINATE LINE-"
2880 011772 016311      MSELOR                                ;AND GET LINE NUMBER
2881 011774 000000      0
2882 011776 000017      17
2883 012000 015642      LINORG
2884 012002 104013      INSTRG                                ;TYPE "ANSWER LINE-"
2885 012004 016335      MSELANS                                ;AND GET LINE NUMBER
2886 012006 000000      0
2887 012010 000017      17
2888 012012 015644      LINANS
2889 012014 104004      TYPE
2890 012016 016745      MCRLF
2891 012020 000002      RTI                                ;RETURN TO CALLING ROUTINE
2892
2893                                ;INITIALIZE INTERFACE
2894
2895 012022 000005      SETUPS: RESET
2896 012024 012737 000340 177776      MOV      #340,PS                                ;LOCK OUT ALL INTERRUPTS
2897 012032 011605      MOV      (SP),R5
2898 012034 012537 012722      MOV      (R5)+,NXTTS
2899 012040 012537 012702      MOV      (R5)+,ERR1
2900 012044 010516      MOV      R5,(SP)
2901 012046 012777 006000 003476      MOV      @CLRSCN+CLRMUX,BDHMCSR ;CLEAR LINE SCANNER AND MULTIPLEXER
2902 012054 032777 000020 003470      SETUP1: BIT      @BUSY,BDHMCSR ;WAIT FOR SCANNER TO CLEAR
2903 012062 001374      BNE      SETUP1
2904 012064 005037 015572      CLR      ERRFLG
2905
2906                                ;ENABLE SELECTED LINES
2907                                ;SET TERMINAL READY ON SELECTED ORIGINATE LINE
2908
2909 012070 013777 015642 003454      SETUP2: MOV      LINORG,BDHMCSR ;SET UP TO ENABLE ORIGINATE LINE
2910                                ;ORIGINATE LINE NUMBER
2911 012076 012777 000003 003450      MOV      @LINENA+TRMROY,BDHMLSR ;SET LINE ENABLE AND
2912                                ;TERMINAL READY ON ORIGINATE LINE
2913 012104 013777 015644 003440      MOV      LINANS,BDHMCSR ;SET LINE COUNTER TO ANSWER LINE
2914 012112 012777 000001 003434      MOV      @LINENA,BDHMLSR ;SET LINE ENABLE ON ANSWER LINE
2915
2916                                ;REQUEST OPERATOR TO DIAL SELECTED ANSWER TERMINAL
2917                                ;SET UP TO RECEIVE INTERRUPTS
2918                                ;START LINE SCANNER
2919
2920 012120 012777 011446 003420      MOV      @TRANS,BDHMVEC ;SET UP INTERRUPT VECTOR
2921                                ;FOR TRANSITION DETECTION
2922 012126 012777 000340 003414      MOV      #340,BDHMLVL ;SET UP INTERRUPT SERVICE LEVEL
2923 012134 012777 000140 003410      MOV      @SCNENA+INTENA,BDHMCSR ;START SCANNER, ENABLE INTERRUPTS
2924 012142 005037 015646      CLR      ANSFLG ;CLEAR TRANSITION DETECTED FLAGS
2925 012146 005037 015650      CLR      ORGFLG
2926 012152 012737 012202 015672      MOV      @SETUP4,RNGRET ;SET UP RETURN FROM
2927                                ;DETECTION OF RING INTERRUPT
2928 012160 104004      TYPE ;REQUEST OPERATOR TO DIAL
2929 012162 016131      DIALM
2930 012164 005037 177776      CLR      PS ;CLEAR PROCESSOR STATUS WORD

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|      |        |        |        |        |                |             |  |                                                   |
|------|--------|--------|--------|--------|----------------|-------------|--|---------------------------------------------------|
| 2931 | 012170 | 005037 | 015652 |        | CLR            | TIME1       |  | ;CLEAR TIMER                                      |
| 2932 | 012174 | 012737 | 001000 | 015654 | MOV            | #1000,TIME2 |  | ;SET UP FOR 5 MINUTE DELAY                        |
| 2933 | 012202 | 005737 | 015646 |        | SETUP4: TST    | ANSFLG      |  | ;IF TRANSITION HAS OCCURED.                       |
| 2934 | 012206 | 001014 |        |        | BNE            | SETUPB      |  | ;EXIT WAIT LOOP                                   |
| 2935 | 012210 | 005737 | 015650 |        | TST            | ORGFLG      |  |                                                   |
| 2936 | 012214 | 001011 |        |        | BNE            | SETUPB      |  |                                                   |
| 2937 | 012216 | 005237 | 015652 |        | INC            | TIME1       |  | ;ALLOW OPERATOR 5 MINUTES TO DIAL                 |
| 2938 | 012222 | 001367 |        |        | BNE            | SETUP4      |  |                                                   |
| 2939 | 012224 | 005337 | 015654 |        | DEC            | TIME2       |  |                                                   |
| 2940 | 012230 | 001364 |        |        | BNE            | SETUP4      |  |                                                   |
| 2941 | 012232 | 022626 |        |        | POP2SP         |             |  |                                                   |
| 2942 | 012234 | 000177 | 000442 |        | JMP            | BERR1       |  |                                                   |
| 2943 | 012240 | 022626 |        |        | SETUPB: POP2SP |             |  |                                                   |
| 2944 | 012242 | 000177 | 000454 |        | JMP            | BNXTTS      |  |                                                   |
| 2945 | 012246 | 012766 | 000340 | 000002 | MOV            | #340,+2(SP) |  |                                                   |
| 2946 | 012254 | 000002 |        |        | RTI            |             |  |                                                   |
| 2947 |        |        |        |        |                |             |  |                                                   |
| 2948 |        |        |        |        |                |             |  | ;CHECK FOR RING INTERRUPT ON SELECTED ANSWER LINE |
| 2949 |        |        |        |        |                |             |  |                                                   |
| 2950 | 012256 | 011605 |        |        | CKRNG: MOV     | (SP),R5     |  |                                                   |
| 2951 | 012260 | 012537 | 012722 |        | MOV            | (R5)+,NXTTS |  |                                                   |
| 2952 | 012264 | 012537 | 012702 |        | MOV            | (R5)+,ERR1  |  |                                                   |
| 2953 | 012270 | 012537 | 012704 |        | MOV            | (R5)+,ERR2  |  |                                                   |
| 2954 | 012274 | 010516 |        |        | MOV            | R5,(SP)     |  |                                                   |
| 2955 | 012276 | 012705 | 000010 |        | MOV            | #10,R5      |  | ;EXPECT RING ONLY ON ANSWER LINE                  |
| 2956 | 012302 | 013704 | 015646 |        | MOV            | ANSFLG,R4   |  | ;GET ACTUAL TRANSITION DATA                       |
| 2957 | 012306 | 013703 | 015644 |        | MOV            | LINANS,R3   |  | ;SET UP LINE NUMBER                               |
| 2958 | 012312 | 020504 |        |        | CMP            | R5,R4       |  | ;DID RING CAUSE INTERRUPT                         |
| 2959 | 012314 | 001402 |        |        | BEQ            | CKRNG1      |  | ;ON ANSWER LINE                                   |
| 2960 | 012316 | 004777 | 000360 |        | JSR            | PC,BERR1    |  |                                                   |
| 2961 | 012322 | 005005 |        |        | CKRNG1: CLR    | R5          |  |                                                   |
| 2962 | 012324 | 013704 | 015650 |        | MOV            | ORGFLG,R4   |  |                                                   |
| 2963 | 012330 | 013703 | 015642 |        | MOV            | LINORG,R3   |  |                                                   |
| 2964 | 012334 | 005704 |        |        | TST            | R4          |  | ;IF TRANSITION OCCURED                            |
| 2965 | 012336 | 001403 |        |        | BEQ            | CKRNG2      |  | ;ON ORIGINATE LINE, ERROR                         |
| 2966 | 012340 | 022626 |        |        | POP2SP         |             |  |                                                   |
| 2967 | 012342 | 000177 | 000336 |        | JMP            | BERR2       |  |                                                   |
| 2968 | 012346 | 022626 |        |        | CKRNG2: POP2SP |             |  |                                                   |
| 2969 | 012350 | 000177 | 000346 |        | JMP            | BNXTTS      |  |                                                   |



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|      |        |        |        |        |         |     |                        |                                              |
|------|--------|--------|--------|--------|---------|-----|------------------------|----------------------------------------------|
| 2970 |        |        |        |        |         |     |                        |                                              |
| 2971 | 012354 | 005037 | 015646 |        | WAITR:  | CLR | ANSFLG                 |                                              |
| 2972 | 012360 | 005037 | 015650 |        |         | CLR | ORGFLG                 |                                              |
| 2973 | 012364 | 012777 | 011446 | 003154 |         | MOV | #TRANS,BDMIVEC         |                                              |
| 2974 | 012372 | 012737 | 012412 | 015672 |         | MOV | #WAITRR,RNGRET         | ;SET UP FOR RETURN                           |
| 2975 |        |        |        |        |         |     |                        | ;FROM RING DETECTION                         |
| 2976 | 012400 | 012777 | 000140 | 003144 |         | MOV | #SCNENA*INTENA,BDMPCSR | ;START SCANNER                               |
| 2977 | 012406 | 005037 | 177776 |        |         | CLR | PS                     |                                              |
| 2978 | 012412 | 005037 | 015652 |        | WAITRR: | CLR | TIME1                  |                                              |
| 2979 | 012416 | 012737 | 000025 | 015654 |         | MOV | #25,TIME2              |                                              |
| 2980 | 012424 | 005237 | 015652 |        | WAITR1: | INC | TIME1                  | ;WAIT FOR TRANSITIONS OF                     |
| 2981 | 012430 | 001375 |        |        |         | BNE | WAITR1                 | ;CARRIER AND CLEAR TO SEND                   |
| 2982 | 012432 | 005337 | 015654 |        |         | DEC | TIME2                  |                                              |
| 2983 | 012436 | 001372 |        |        |         | BNE | WAITR1                 |                                              |
| 2984 | 012440 | 000002 |        |        |         | RTI |                        |                                              |
| 2985 |        |        |        |        |         |     |                        |                                              |
| 2986 |        |        |        |        |         |     |                        | ;CHECK FOR CORRECT STATUS AND TRANSITIONS ON |
| 2987 |        |        |        |        |         |     |                        | ;SELECTED ORIGINATE AND ANSWER LINES         |
| 2988 |        |        |        |        |         |     |                        |                                              |
| 2989 | 012442 | 012737 | 000340 | 177776 | CKTRN:  | MOV | #340,PS                | ;LOCK OUT FURTHER INTERRUPTS                 |
| 2990 | 012450 | 005077 | 003076 |        |         | CLR | BDMPCSR                | ;STOP LINE SCANNER                           |
| 2991 | 012454 | 011605 |        |        |         | MOV | (SP),R5                |                                              |
| 2992 | 012456 | 012537 | 012712 |        |         | MOV | (R5)+,DATA1            |                                              |
| 2993 | 012462 | 012537 | 012714 |        |         | MOV | (R5)+,DATA2            |                                              |
| 2994 | 012466 | 012537 | 012716 |        |         | MOV | (R5)+,DATA3            |                                              |
| 2995 | 012472 | 012537 | 012720 |        |         | MOV | (R5)+,DATA4            |                                              |
| 2996 | 012476 | 012537 | 012702 |        |         | MOV | (R5)+,ERR1             |                                              |
| 2997 | 012502 | 012537 | 012704 |        |         | MOV | (R5)+,ERR2             |                                              |
| 2998 | 012506 | 012537 | 012706 |        |         | MOV | (R5)+,ERR3             |                                              |
| 2999 | 012512 | 012537 | 012710 |        |         | MOV | (R5)+,ERR4             |                                              |
| 3000 | 012516 | 012537 | 012722 |        |         | MOV | (R5)+,NXTTS            |                                              |
| 3001 | 012522 | 010516 |        |        |         | MOV | R5,(SP)                |                                              |
| 3002 | 012524 | 013705 | 012712 |        |         | MOV | DATA1,R5               |                                              |
| 3003 | 012530 | 013777 | 015644 | 003014 |         | MOV | LINANS,BDMPCSR         | ;SET LINE COUNTER TO ANSWER LINE             |
| 3004 | 012536 | 017704 | 003012 |        |         | MOV | BDMPLSR,R4             | ;GET ACTUAL ANSWER LINE STATUS               |
| 3005 | 012542 | 013703 | 015644 |        |         | MOV | LINANS,R3              |                                              |
| 3006 | 012546 | 020504 |        |        |         | CHP | R5,R4                  | ;COMPARE                                     |
| 3007 | 012550 | 001402 |        |        |         | BEQ | CKTRN1                 |                                              |
| 3008 | 012552 | 004777 | 000124 |        |         | JSR | PC,BERR1               |                                              |
| 3009 | 012556 | 013777 | 015642 | 002766 | CKTRN1: | MOV | LINORG,BDMPCSR         | ;SET LINE COUNTER TO ORIGINATE LINE          |
| 3010 | 012564 | 017704 | 002764 |        |         | MOV | BDMPLSR,R4             | ;GET ACTUAL ORIGINATE LINE STATUS            |
| 3011 | 012570 | 013705 | 012714 |        |         | MOV | DATA2,R5               |                                              |
| 3012 | 012574 | 013703 | 015642 |        |         | MOV | LINORG,R3              |                                              |
| 3013 | 012600 | 020504 |        |        |         | CHP | R5,R4                  | ;COMPARE                                     |
| 3014 | 012602 | 001402 |        |        |         | BEQ | CKTRN2                 |                                              |
| 3015 | 012604 | 004777 | 000074 |        |         | JSR | PC,BERR2               |                                              |

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3016
3017
3018
3019
3020 012610 105737 012717 CKTRN2: TSTB DATA3+1
3021 012614 100003 BPL .+10
3022 012616 042737 000010 015646 BIC #10,ANSFLG
3023 012624 113704 015646 MOVB ANSFLG,R4 ;GET TRANSITION DATA FOR
3024 012630 113705 012716 MOVB DATA3,R5
3025 012634 013703 015644 MOV LINANS,R3
3026 012640 020504 CMP R5,R4 ;DID CORRECT TRANSITIONS OCCUR
3027 012642 001402 BEQ CKTRN3
3028 012644 004777 000036 JSR PC,BERR3
3029 012650 013704 015650 CKTRN3: MOV ORGFLG,R4 ;GET TRANSITION DATA FOR
3030 012654 013705 012720 MOV DATA4,R5
3031 012660 013703 015642 MOV LINORG,R3
3032 012664 020504 CMP R5,R4 ;DID CORRECT TRANSITIONS OCCUR
3033 012666 001402 BEQ CKTRN4
3034 012670 004777 000014 JSR PC,BERR4
3035 012674 022626 CKTRN4: POP2SP
3036 012676 000177 000020 JMP BNXTTS
3037 012702 000000 ERR1: 0
3038 012704 000000 ERR2: 0
3039 012706 000000 ERR3: 0
3040 012710 000000 ERR4: 0
3041 012712 000000 DATA1: 0
3042 012714 000000 DATA2: 0
3043 012716 000000 DATA3: 0
3044 012720 000000 DATA4: 0
3045 012722 000000 NXTTS: 0

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3046
3047      ;END OF PASS
3048      ;UPDATE PASS COUNT
3049      ;TYPE END OF PASS MESSAGE
3050
3051      EOP:
3052      012724 005237 015576      INC      PASCNT      ;UPDATE PASS COUNT
3053      012730 012737 000001 015600  MOV      #1,TSTNO  ;START AT FIRST TEST OF GROUP
3054      012736 000005      RESET      ;CLEAR THE WORLD
3055      012740 005037 015670      CLR      FILLA      ;INIT COUNTER
3056      012744 005337 015670 14:  DEC      FILLA      ;COUNT THE CTR
3057      012750 001375      BNE      14      ;BR TIL STALL TIMES OUT
3058      012752 104004      TYPE      ; RING BELL
3059      012754 017231      MEPASS
3060      012756 013701 000042      MOV      42,R1      ;ARE YOU ON ACT11?
3061      012762 001521      BEQ      TSTENT      ;NO
3062      012764 000005      RESET
3063      012766 004711      LOGICAL: JSR      PC,(R1)
3064      012770 000240      NOP
3065      012772 000240      NOP
3066      012774 000240      NOP
3067      012776 000240      NOP
3068      013000 000137 013226      JMP      TSTENT      ;GET ADDRESS OF FIRST TEST
3069
3070      ;EMT DISPATCH SERVICE
3071      ;ARGUMENT OF EMT IS EXTRACTED
3072      ;AND USED AS OFFSET TO OBTAIN POINTER
3073      ;TO SELECTED SUBROUTINE
3074
3075      013004 011646      EMTSRV: MOV      (SP),-(SP)      ;GET PC OF RETURN
3076      013006 162716 000002      SUB      #2,(SP)      ;=PC OF EMT
3077      013012 017616 000000      MOV      B(SP),(SP)      ;GET EMT
3078      013016 006316      FMTOK: ASL      (SP)      ;MULTIPLY EMT ARG BY 2
3079      013020 042716 177001      BIC      #177001,(SP)      ;CLEAR UNWANTED BITS
3080      013024 042716 017366      ADD      #EMTTAB,(SP)      ;POINTER TO SUBROUTINE ADDRESS
3081      013030 017616 000000      MOV      B(SP),(SP)      ;SUBROUTINE ADDRESS
3082      013034 000136      JMP      B(SP)+      ;GO TO SUBROUTINE
3083
3084      013036 105777 002514      CKINT: TSTB      BTKCSR
3085      013042 100001      BPL      14
3086      013044 104027      KBDIN
3087      013046 000002      14:  RTI
3088

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3089
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3094
3095
3096
3097 013050 005737 001252      LOOP:  TST      XFLAG      ;IS THERE AN XOR TESTER OUT THERE ?
3098 013054 100022                BPL      4#          ;NO
3099 013056 013746 000004                MOV      4,-(SP)    ;SAVE 4
3100 013062 012737 013102 000004                MOV      #14,4     ;SET UP SVC ROUTINE
3101 013070 005737 177060                TST      177060    ;GOT SOMETHING LIKE SLAVE SYNC
3102 013074 012637 000004                MOV      (SP)+,4   ;YOU BETCHUM
3103 013100 000404                BR       2#
3104 013102 022626                1#:  POP2SP          ;RESTORE STACK
3105 013104 012637 000004                MOV      (SP)+,4   ;RESTORE 4
3106 013110 000402                BR       3#
3107 013112 000137 013222                2#:  JMP      LOOPX      ;GO TO NEXT TEST
3108 013116 000137 013226                3#:  JMP      TSTENT     ;GO
3109 013122
3110 013122 005037 177776                CLR      PSW
3111 013126 052777 000100 002422                BIS      #INTENA,BTKCSR
3112 013134 005737 015576                TST      PASCNT
3113 013140 001430                BEQ      LOOPX
3114 013142 005737 015572                5#:  TST      ERRFLG
3115 013146 001404                BEQ      LOOPS
3116 013150 032777 002000 002410                BIT      #SW10,BSWR
3117 013156 001021                BNE      LOOPX
3118 013160 032777 040000 002400  LOOPS:  BIT      #SW14,BSWR
3119 013166 001041                BNE      LOOPL
3120 013170 032777 004000 002370                BIT      #SW11,BSWR
3121 013176 001011                BNE      LOOPX
3122 013200 005337 015604                DEC      ICOUNT
3123 013204 001406                BEQ      LOOPX
3124 013206 013716 015602                LOOPER: MOV      RETURN,(SP)
3125 013212 042777 000100 002336                BIC      #INTENA,BTKCSR
3126 013220 000002                RTI
3127 013222 005237 015600                LOOPX: INC      TSTNO
3128 013226 013705 015600                TSTENT: MOV     TSTNO,R5
3129 013232 006305                ASL      R5
3130 013234 006305                ASL      R5
3131 013236 063705 015632                ADD     TSTPNT,R5
3132 013242 011537 015602                MOV     (R5),RETURN
3133 013246 001626                BEQ     EOP
3134 013250 012516                MOV     (R5)+,(SP)
3135 013252 011537 015604                MOV     (R5),ICOUNT
3136 013256 005037 015572                CLR     ERRFLG
3137 013262 042777 000100 002266                BIC     #INTENA,BTKCSR
3138 013270 000002                RTI
3139 013272 012737 000001 015604  LOOPL: MOV     #1,ICOUNT
3140 013300 000742                BR      LOOPER
3141
3142
3143
3144

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;END OF SUBTEST SERVICE  
;CHECK FOR LOOP ON CURRENT TEST  
;CHECK FOR ESCAPE TO NEXT TEST ON ERROR  
;UPDATE ITERATION COUNT AND EXIT TO NEXT TEST IF 0  
;TEST XOR FLAG (XFLAG) FOR EXISTANCE OF XOR TESTER.  
;IS THERE AN XOR TESTER OUT THERE ?  
;NO  
;SAVE 4  
;SET UP SVC ROUTINE  
;GOT SOMETHING LIKE SLAVE SYNC  
;YOU BETCHUM  
;RESTORE STACK  
;RESTORE 4  
;GO TO NEXT TEST  
;GO  
;1ST PASS  
;NO ITERATIONS  
;IF ERROR OCCURED FLAG=1.  
;CHECK FOR ESCAPE TO NEXT TEST  
;IF SW10=1.  
;ESCAPE TO NEXT TEST  
;IF SW14=1.  
;LOOP ON CURRENT TEST  
;IF SW11=1.  
;INHIBIT ITERATIONS  
;UPDATE ITERATION COUNT  
;IF ICOUNT=0, GO TO NEXT TEST  
;SET UP FOR RETURN TO CURRENT TEST  
;RETURN TO CURRENT TEST  
;UPDATE TEST NUMBER  
;GET TEST NUMBER  
;MULTIPLY TEST NUMBER BY 4  
;GET POINTER FOR TEST ENTRY  
;GET STARTING ADDRESS OF NEXT TEST  
;IF ADDRESS=0, GO TO END OF PASS  
;PUT STARTING ADDRSS ON STACK  
;GET ITERATION COUNT FOR TEST  
;CLEAR ERROR OCCURED FLAG  
;GO TO TEST  
;SET UP TO EXIT TEST AFTER LOOP  
;GO TO LOOP SERVICE  
;CHECK FOR LOOPING WITH SAME DATA  
;CHECK FOR ESCAPE TO NEXT TEST ON ERROR

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|      |        |        |        |        |                              |              |                            |
|------|--------|--------|--------|--------|------------------------------|--------------|----------------------------|
| 3145 | 013302 | 005737 | 015572 |        | FREEZE: TST                  | ERRFLG       | ; IF ERROR FLAG=0,         |
| 3146 | 013306 | 001413 |        |        | BEQ                          | FREEZX       | ; DO NOT TEST FOR ESCAPE   |
| 3147 | 013310 | 032777 | 002000 | 002250 | BIT                          | #SW10,BSWR   | ; IF SW10=1,               |
| 3148 | 013316 | 001341 |        |        | BNE                          | LOOPX        | ; ESCAPE TO NEXT TEST      |
| 3149 | 013320 | 032777 | 001000 | 002240 | BIT                          | #SW09,BSWR   | ; IF SW09=1,               |
| 3150 | 013326 | 001403 |        |        | BEQ                          | FREEZX       | ; FREEZE CURRENT DATA      |
| 3151 | 013330 | 017616 | 000000 |        | MOV                          | B(SP),(SP)   | ; GET LOOPING ADDRESS      |
| 3152 | 013334 | 000002 |        |        | RTI                          |              | ; LOOP                     |
| 3153 | 013336 | 062716 | 000002 |        | FREEZX: ADD                  | #2,(SP)      | ; CONTINUE IN CURRENT TEST |
| 3154 | 013342 | 000002 |        |        | RTI                          |              |                            |
| 3155 |        |        |        |        |                              |              |                            |
| 3156 |        |        |        |        |                              |              |                            |
| 3157 |        |        |        |        | ; ROUTINE TO STEP THRU LINES |              |                            |
| 3158 | 013344 | 052777 | 000400 | 002200 | STEPR: BIS                   | #STEP,BDMCSR |                            |
| 3159 | 013352 | 032777 | 000020 | 002172 | 1\$: BIT                     | #BUSY,BDMCSR |                            |
| 3160 | 013360 | 001374 |        |        | BNE                          | 1\$          |                            |
| 3161 | 013362 | 000207 |        |        | RETURN                       |              |                            |
| 3162 |        |        |        |        |                              |              |                            |
| 3163 |        |        |        |        |                              |              |                            |

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3164
3165      ;GENERAL ERROR SERVICE
3166      ;ONLY PC OF FAILING TEST IS OUTPUT TO TELEPRINTER
3167
3168 013364 005037 015572      ERR:  CLR      ERRFLG      ;ALWAYS TYPE PC+2
3169                                ;OF TEST THAT FAILED
3170 013370 005037 013604      CLR      ERRMSG      ;NO MESSAGE
3171 013374 005037 013616      CLR      ERTAB      ;NO TABLE OF DATA
3172 013400 000451      BR      ERRGEN      ;OUTPUT ERROR MESSAGE
3173
3174      ;TRANSITION DETECTION ERROR SERVICE
3175
3176      ;FORMAT FOR ERROR TYPEOUT IS
3177
3178      ;XXXXXX TRANSITION ERROR
3179      ;EXP  REC  LINE
3180      ;AA   BB   CC
3181
3182      ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3183      ;      AA=EXPECTED INTERRUPT FLAGS (CORRESPONDS TO 4 MSB OF CONTROL REGISTER)
3184      ;      BB=RECEIVED INTERRUPT FLAGS (AS ABOVE)
3185      ;      CC=LINE ON WHICH ERROR OCCURED
3186 013402 005037 015572      ERRT:  CLR      ERRFLG      ;ALWAYS OUTPUT ALL DATA
3187 013406 012737 016072 013604  MOV      @MTRANE,ERRMSG      ;TYPE "TRANSITION ERROR"
3188 013414 012737 013710 013616  MOV      @ERTAB1,ERTAB      ;TABLE OF DATA
3189 013422 000440      BR      ERRGEN      ;OUTPUT ERROR MESSAGE
3190
3191      ;ON-LINE STATUS ERROR SERVICE
3192
3193      ;FORMAT FOR LINE STATUS ERROR IS
3194
3195      ;XXXX LINE ERROR
3196      ;EXP  REC  LINE
3197      ;AAA  BBB  CC
3198
3199      ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3200      ;      AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3201      ;      BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3202      ;      CC=LINE ON WHICH ERROR OCCURED
3203
3204
3205 013424 005037 015572      ERRS:  CLR      ERRFLG      ;ALWAYS OUTPUT ALL DATA
3206 013430 012737 016041 013604  MOV      @MLINE1,ERRMSG      ;TYPE "LINE ERROR"
3207                                ;EXP REC LINE"
3208 013436 012737 013726 013616  MOV      @ERTAB2,ERTAB      ;TABLE OF DATA
3209 013444 000427      BR      ERRGEN      ;OUTPUT ERROR MESSAGE

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3210
3211 ;FATAL TRANSITION ERROR
3212 ;FORMAT FOR FATAL ERROR TYPEOUT IS
3213
3214 ;XXXXXX FATAL ERROR
3215 ;CSTAT LSTAT
3216 ;AAAAAA BBB
3217
3218 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3219 ;      AAAAAA=RECEIVED CONTROL STATUS ON LINE THAT INTERRUPTED
3220 ;      BBB=RECEIVED LINE STATUS ON LINE THAT INTERRUPTED
3221
3222 013446 005037 015572 ERRN: CLR      ERRFLG      ;ALWAYS OUTPUT ALL DATA
3223 013452 012737 017022 013604 MOV      #MFATAL,ERRMSG ;TYPE "FATAL ERROR"
3224 ;CSTAT LSTAT"
3225 013460 012737 013744 013616 MOV      #ERTAB3,ERTAB ;TABLE OF DATA
3226 013466 000416 BR        ERRGEN      ;OUTPUT ERROR MESSAGE
3227
3228 ;"CONTROL STATUS" ERROR SERVICE
3229 ;FORMAT FOR CONTROL STATUS ERROR IS
3230
3231 ;XXXXXX STATUS ERROR
3232 ;EXP REC
3233 ;AAAAAA BBBB
3234
3235 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3236 ;      AAAAAA=EXPECTED CONTROL STATUS AT TIME OF ERROR
3237 ;      BBBB=RECEIVED(ACTUAL) CONTROL STATUS AT TIME OF ERROR
3238
3239
3240 013470 012737 015753 013604 ERRCS: MOV      #MSTATE,ERRMSG ;TYPE "STATUS ERROR"
3241 ;"EXP REC"
3242 013476 012737 013756 013616 MOV      #ERTAB4,ERTAB ;TABLE OF DATA
3243 013504 000407 BR        ERRGEN      ;OUTPUT DATA
3244
3245 ;LINE STATUS ERROR SERVICE
3246
3247 ;FORMAT FOR LINE STATUS ERROR IS
3248
3249 ;XXXX LINE ERROR
3250 ;EXP REC LINE SEL
3251 ;AAA DDD CC DD
3252
3253 ;WHERE XXXXXX=PC+2 OF CALL TO ERROR ROUTINE
3254 ;      AAA=EXPECTED LINE STATUS AT TIME OF ERROR
3255 ;      BBB=RECEIVED LINE STATUS AT TIME OF ERROR
3256 ;      CC=LINE ON WHICH ERROR OCCURED
3257 ;      DD=THE LINE ON WHICH THE PROGRAM WAS OPERATING
3258
3259
3260 013506 012737 016004 013604 ERRLS: MOV      #MLINER,ERRMSG
3261 013514 012737 013770 013616 MOV      #ERTAB5,ERTAB
3262 013522 000400 BR        ERRGEN

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3263
3264
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3268
3269 013524 005037 177776
3270 013530 012777 000100 002020
3271 013536 032777 020000 002022
3272 013544 001026
3273 013546 021637 015624
3274 013552 001402
3275 013554 005037 015572
3276 013560 104005
3277 013562 005737 015572
3278 013566 001007
3279 013570 104006
3280 013572 013702
3281 013574 005737 013604
3282 013600 001407
3283 013602 104004
3284 013604 000000
3285 013606 005737 013616
3286 013612 001402
3287 013614 104006
3288 013616 000000
3289 013620 104007
3290
3291
3292
3293 013622 032777 100000 001736
3294 013630 001406
3295 013632 000000
3296 013634 022737 000176 015566
3297 013642 001001
3298 013644 104025
3299 013646 012737 000001 015572
3300 013654 042777 000100 001674
3301 013662 000002
3302
3303
3304 013664 012737 015674 013604
3305 013672 012737 014020 013616
3306 013700 000711
3307
3308

;GENERAL ERROR HANDLER
;TYPE PC.2 OF TEST THAT FAILED
;TYPE ERROR MESSAGE (IF ANY)
;TYPE DATA RELATING TO FAILURE (IF ANY)

ERRGEN: CLR PSW
MOV #INTENA,BTKCSR
BIT #SW13,BSWR ;IF SW13=1, DO NOT
BNE .3 ;TYPE ERROR MESSAGE
CMP (SP),SAVPC ;SAME ERROR AGAIN
BEQ .+6
CLR ERRFLG
SAVOSP
TST ERRFLG ;IF ERROR OCCURED FLAG=1.
BNE .1 ;TYPE DATA ONLY
OCTASC ;TYPE PC.2 OF CALL TO ERROR ROUTINE
ERTABO
TST ERRMSG
BEQ .2
TYPE ;TYPE ERROR MESSAGE

ERRMSG: 0
.1: TST ERTAB
BEQ .2
OCTASC ;TYPE DATA
ERTAB: 0
.2: RESOS ;RESTORE R0-R5

;ERROR HALT SERVICE
.3: BIT #SW15,BSWR ;IF SW15=0, DO NOT
BEQ .4 ;HALT ON ERROR
HALT ;HALT AND DISPLAY ADDRESS OF FAILING TEST
CMP #SWREG,SWR
BNE .4
CNTRLU:
.4: MOV #1,ERRFLG ;SET ERROR OCCURED FLAG
BIC #INTENA,BTKCSR ;RETURN TO TEST
RTI

;TIMEOUT ERROR WAITING FOR INTERRUPT ON TEST 33
ERRQ: MOV #MNOINT,ERRMSG
MOV #ERTAB6,ERTAB
BR ERRGEN ;TYPE LNO,CSR,LSR,MSG
;OUTPUT DATA

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|      |        |        |         |       |                                              |
|------|--------|--------|---------|-------|----------------------------------------------|
| 3309 |        |        |         |       |                                              |
| 3310 |        |        |         |       |                                              |
| 3311 |        |        |         |       |                                              |
| 3312 |        |        |         |       |                                              |
| 3313 | 013702 | 000001 | ERTAB0: | 1     |                                              |
| 3314 | 013704 | 000006 |         | 6     |                                              |
| 3315 | 013706 | 015624 |         | SAVPC |                                              |
| 3316 | 013710 | 000003 | ERTAB1: | 3     |                                              |
| 3317 | 013712 | 000002 |         | 2     |                                              |
| 3318 | 013714 | 015620 |         | SAVR5 | ;CONTAINS EXPECTED TRANSITION STATUS         |
| 3319 | 013716 | 000002 |         | 2     |                                              |
| 3320 | 013720 | 015616 |         | SAVR4 | ;CONTAINS RECEIVED TRANSITION STATUS         |
| 3321 | 013722 | 000002 |         | 2     |                                              |
| 3322 | 013724 | 015614 |         | SAVR3 | ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED |
| 3323 | 013726 | 000003 | ERTAB2: | 3     |                                              |
| 3324 | 013730 | 000003 |         | 3     |                                              |
| 3325 | 013732 | 015620 |         | SAVR5 | ;CONTAINS EXPECTED LINE STATUS               |
| 3326 | 013734 | 000003 |         | 3     |                                              |
| 3327 | 013736 | 015616 |         | SAVR4 | ;CONTAINS RECEIVED LINE STATUS               |
| 3328 | 013740 | 000002 |         | 2     |                                              |
| 3329 | 013742 | 015614 |         | SAVR3 | ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED |
| 3330 | 013744 | 000002 | ERTAB3: | 2     |                                              |
| 3331 | 013746 | 000006 |         | 6     |                                              |
| 3332 | 013750 | 015616 |         | SAVR4 |                                              |
| 3333 | 013752 | 000003 |         | 3     |                                              |
| 3334 | 013754 | 015614 |         | SAVR3 |                                              |
| 3335 | 013756 | 000002 | ERTAB4: | 2     |                                              |
| 3336 | 013760 | 000006 |         | 6     |                                              |
| 3337 | 013762 | 015620 |         | SAVR5 | ;CONTAINS EXPECTED CONTROL STATUS            |
| 3338 | 013764 | 000006 |         | 6     |                                              |
| 3339 | 013766 | 015616 |         | SAVR4 | ;CONTAINS RECEIVED CONTROL STATUS            |
| 3340 | 013770 | 000004 | ERTAB5: | 4     |                                              |
| 3341 | 013772 | 000003 |         | 3     |                                              |
| 3342 | 013774 | 015620 |         | SAVR5 | ;CONTAINS EXPECTED LINE STATUS               |
| 3343 | 013776 | 000003 |         | 3     |                                              |
| 3344 | 014000 | 015616 |         | SAVR4 | ;CONTAINS RECEIVED LINE STATUS               |
| 3345 | 014002 | 000002 |         | 2     |                                              |
| 3346 | 014004 | 015614 |         | SAVR3 | ;CONTAINS NUMBER OF LINE WHERE ERROR OCCURED |
| 3347 | 014006 | 000002 |         | 2     |                                              |
| 3348 | 014010 | 015610 |         | SAVR1 | ;CONTAINS NUMBER OF LINE UNDER TEST          |
| 3349 |        |        |         |       |                                              |
| 3350 |        |        |         |       |                                              |
| 3351 | 014012 | 000001 | SWRTB:  | 1     |                                              |
| 3352 | 014014 | 000006 |         | 6     |                                              |
| 3353 | 014016 | 000176 |         | SWREG |                                              |
| 3354 |        |        |         |       |                                              |
| 3355 | 014020 | 000003 | ERTAB6: | 3     |                                              |
| 3356 | 014022 | 000003 |         | 3     |                                              |
| 3357 | 014024 | 015616 |         | SAVR4 | ;FAILING LINE #                              |
| 3358 | 014026 | 000006 |         | 6     |                                              |
| 3359 | 014030 | 015612 |         | SAVR2 | ;CSR OF DEVICE                               |
| 3360 | 014032 | 000006 |         | 6     |                                              |
| 3361 | 014034 | 015614 |         | SAVR3 | ;LSR OF DEVICE                               |
| 3362 |        |        |         |       |                                              |

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3363
3364
3365
3366
3367 014036 017605 000000 OCTAS4: MOV B(SP),R5 ;GET POINTER TO TABLE OF DATA
3368 014042 062716 000002 ADD #2,(SP)
3369 014046 012737 000010 014376 MOV #10,RADIX
3370 014054 012704 017251 MOV #MBCD*2,R4 ;SET UP POINTER FOR CONVERTED DATA
3371 014060 012537 01562F MOV (R5),,WDCNT ;GET NUMBER OF WORDS TO BE CONVERTED
3372 014064 012537 015630 OCTAS1: MOV (R5),,CHRCNT ;GET NUMBER OF DIGITS IN WORD
3373 014070 015537 014372 MOV B(R5),,BINWORD ;GET DATA TO BE CONVERTED
3374 014074 104010 CONVERT ;CONVERT TO ASCII
3375 014076 005337 015626 DEC WDCNT ;IF ALL DATA IS NOT CONVERTED
3376 014102 001370 BNE OCTAS1 ;CONTINUE
3377 014104 112714 000100 MOVB #100,(R4) ;PUT TERMINATOR AT END OF MESSAGE
3378 014110 005737 014226 TST SMLN
3379 014114 001002 BNE 11
3380 014116 104004 TYPE ;OUTPUT CONVERTED DATA
3381 014120 017247 MBCD ;TO TELETYPE
3382 014122 000002 11: RTI ;RETURN TO CALLING ROUTINE
3383
3384
3385
3386 014124 005037 014222 CNTLU: CLR TMP1
3387 014130 012737 000001 014224 MOV #1,TMP2
3388 014136 104004 TYPE
3389 014140 017206 ISWREQ
3390 014142 052737 000001 014226 BIS #1,SMLN
3391 014150 104006 OCTASC
3392 014152 014012 SWRTB
3393 014154 104004 TYPE
3394 014156 017251 MBCD*2
3395 014160 104013 INSTRG
3396 014162 017217 #NEWIS
3397 014164 000000 0
3398 014166 177777 177777
3399 014170 014222 TMP1
3400 014172 123727 015122 000015 CMPB INBUF,#15
3401 014200 001403 BEQ 11
3402 014202 013777 014222 001356 MOV TMP1,#SWR
3403 014210 005037 014224 11: CLR TMP2
3404 014214 005037 014226 CLR SMLN
3405 014220 000002 RTI
3406 014222 000000 TMP1: 0
3407 014224 000000 TMP2: 0
3408 014226 000000 SMLN: 0
3409
3410

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3411
3412                                     ;INTEGER BINARY TO ASCII CONVERSION COMMON ROUTINE
3413
3414 014230 013700 015630      BINASC: MOV      CHRCNT,R0      ;SET UP COUNT FOR DIGITS TO BE CONVERTED
3415 014234 012701 017352      MOV      @TEMTAB,R1      ;SET UP POINTER FOR TEMPORARY STORAGE
3416 014240 104011              BINASA: EXTRACT              ;EXTRACT ONE DIGIT
3417 014242 062737 000060 014374  ADD      @60,DIGIT      ;CONVERT FROM BCD TO ASCII
3418 014250 113721 014374      MOVB     DIGIT,(R1).      ;STORE DIGIT
3419 014254 005300              DEC      R0              ;IF ALL DIGITS NOT DONE.
3420 014256 001370              BNE      BINASA            ;CONTINUE
3421 014260 114124              RINASB: MOVB     -(R1),(R4). ;REVERSE ORDER OF DIGITS
3422 014262 005337 015630      DEC      CHRCNT            ;IF ALL CHARACTERS ARE NOT
3423 014266 001374              BNE      BINASB            ;IN ORDER, CONTINUE
3424 014270 112724 000040      MOVB     @40,(R4).      ;INSERT SPACE AFTER LAST DIGIT
3425 014274 000002              RTI                      ;RETURN TO CALLING ROUTINE
3426
3427                                     ;SINGLE PRECISION UNSIGNED DIVIDE LOOP
3428
3429 014276 005037 014374      DIVI:   CLR      DIVIDH
3430 014302 023737 014374 014376  DIVIU:  CMP      DIVIDH,DIVIS
3431 014310 103027              BHS      DIVIB
3432 014312 012737 000021 014352      MOV      @17.,DIVCNT
3433 014320 000407              BR      DIVIC
3434 014322 023737 014374 014376  DIVIA:  CMP      DIVIDH,DIVIS
3435 014330 103403              BLO      DIVIC
3436 014332 163737 014376 014374      SUB      DIVIS,DIVIDH
3437 014340 006137 014372      DIVIC:  ROL      DIVIDL
3438 014344 006137 014374      ROL      DIVIDH
3439 014350 005327              DEC      (PC).
3440 014352 000000              DIVCNT: 0
3441 014354 001362              BNE      DIVIA
3442 014356 006037 014374      ROR      DIVIDH
3443 014362 005137 014372      COM      DIVIDL
3444 014366 000002              RTI
3445 014370 000000      DIVIB:  HALT
3446 014372 000000      DIVIDL: 0
3447 014374 000000      DIVIDH: 0
3448 014376 000000      DIVIS: 0
3449
3450                                     ;SAVE PC OF TEST THAT FAILED AND R0-R5
3451
3452 014400 016637 000004 015624  SV05P:  MOV      4(SP),SAVPC
3453
3454                                     ;SAVE R0-R5
3455
3456 014406 010537 015620      SV05:   MOV      R5,SAVR5
3457 014412 010437 015616      MOV      R4,SAVR4
3458 014416 010337 015614      MOV      R3,SAVR3
3459 014422 010237 015612      MOV      R2,SAVR2
3460 014426 010137 015610      MOV      R1,SAVR1
3461 014432 010037 015606      MOV      R0,SAVR0
3462 014436 000002              RTI

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3463
3464
3465
3466 014440 013700 015606 RS05: MOV SAVR0,R0
3467 014444 013701 015610 MOV SAVR1,R1
3468 014450 013702 015612 MOV SAVR2,R2
3469 014454 013703 015614 MOV SAVR3,R3
3470 014460 013704 015616 MOV SAVR4,R4
3471 014464 013705 015620 MOV SAVR5,R5
3472 014470 000002 RTI
3473
3474
3475
3476 014472 017605 000000 TYPER: MOV B(SP),R5 ;GET POINTER TO MESSAGE (ON STACK)
3477 014476 062716 000002 ADD #2,(SP) ;CORRECT STACK FOR RETURN
3478 014502 105777 001054 TYPERA: TSTB BTPCSR ;WAIT FOR TELEPRINTER READY
3479 014506 100375 BPL TYPERA
3480 014510 122765 000012 177777 CMPB #12,-1(R5) ;WAS LAST ONE A L.F. ??
3481 014516 001405 BEQ 14 ;BR IF YES
3482 014520 122765 000015 177777 CMPB #15,-1(R5) ;WAS LAST ONE A C.R. ??
3483 014526 001401 BEQ 14 ;BR IF YES
3484 014530 000402 BR 24 ;CONTINUE IF NEITHER
3485 014532 004737 014602 14: JSR PC,TYFILL ;GO OUT PUT FILLERS
3486 014536 122715 000100 24: CMPB #100,(R5) ;IF CHARACTER IS NOT TERMINATOR, TYPE IT
3487 014542 001001 BNE TYPER1
3488 014544 000002 RTI ;CHARACTER IS TERMINATOR, EXIT
3489 014546 122715 000042 TYPER1: CMPB #42,(R5) ;IF CHARACTER=42,
3490 014552 001406 BEQ TYPECL ;TYPE LINE FEED
3491 014554 122715 000045 CMPB #45,(R5) ;IF CHARACTER=45,
3492 014560 001403 BEQ TYPECL ;TYPE CARRIAGE RETURN
3493 014562 112577 000776 TYPER2: MOVB (R5)+,BTPDBR ;GET CHARACTER
3494 014566 000745 BR TYPERA ;TYPE IT
3495 014570 142715 000040 TYPECL: BICB #40,(R5) ;CONVERT CODE OF 42 OR 45
3496 014574 152715 000010 BISB #10,(R5) ;TO 12 OR 15
3497 014600 000770 BR TYPER2 ;TYPE IT
3498
3499
3500
3501
3502 014602 113737 015666 015670 TYFILL: MOVB FILL,FILLA ;GET FILL COUNT
3503 014610 113777 015667 000746 14: MOVB FILL+1,BTPDBR ;OUT PUT ONE FILLER
3504 014616 105777 000740 24: TSTB BTPCSR ;WAIT FOR TTY TO FINISH OUTPUT
3505 014622 100375 BPL 24 ;BR IF TTY NOT DONE
3506 014624 105337 015670 DECB FILLA ;COUNT ONE FILLER
3507 014630 001367 BNE 14 ;BR TIL ALL DONE
3508 014632 000207 RTS PC ;RETURN TO CALLER ABOVE
3509
3510
3511
3512
3513
3514
3515
3516 014634 INSTR: MOV (SP),R5 ;GET POINTER TO ARGUMENTS
3517 014634 011605 MOV (R5)+,MSG ;GET MESSAGE TO BE TYPED
3518 014636 012537 014662

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|      |        |        |        |              |               |                                            |
|------|--------|--------|--------|--------------|---------------|--------------------------------------------|
| 3519 | 014642 | 012537 | 015114 | MOV          | (R5)+,LOLIM   | ;GET LOWER LIMIT                           |
| 3520 | 014646 | 012537 | 015116 | MOV          | (R5)+,HILIM   | ;GET UPPER LIMIT                           |
| 3521 | 014652 | 012537 | 015120 | MOV          | (R5)+,STORE   | ;GET DATA STORAGE LOCATION                 |
| 3522 | 014656 | 010516 |        | MOV          | R5,(SP)       | ;RESTORE STACK                             |
| 3523 | 014660 | 104004 |        | INSTR1: TYPE |               | ;TYPE MESSAGE                              |
| 3524 | 014662 | 000000 |        | MSG:         | 0             |                                            |
| 3525 | 014664 | 012704 | 015122 | MOV          | #INBUF,R4     | ;SET UP CHARACTER INPUT BUFFER             |
| 3526 | 014670 | 012703 | 000007 | MOV          | #7,R3         | ;SET UP INPUT COUNT                        |
| 3527 | 014674 | 105777 | 000656 | INSTRB: TSTB | #TKCSR        | ;WAIT FOR CHARACTER                        |
| 3528 | 014700 | 100375 |        | BPL          | INSTRB        |                                            |
| 3529 | 014702 | 005037 | 002206 | INSTRB: CLR  | SINTFL        |                                            |
| 3530 | 014706 | 017737 | 000646 | MOV          | #TKDDBR,TMP1  |                                            |
| 3531 | 014714 | 142737 | 000200 | BICB         | #200,TMP1     |                                            |
| 3532 | 014722 | 113714 | 014222 | MOVB         | TMP1,(R4)     |                                            |
| 3533 | 014726 | 121427 | 000007 | CMPB         | (R4),#7       |                                            |
| 3534 | 014732 | 001420 |        | BEQ          | INSTR         |                                            |
| 3535 | 014734 | 121427 | 000015 | CMPB         | (R4),#15      | ;IS CHARACTER TERMINATOR                   |
| 3536 | 014740 | 001420 |        | BEQ          | INSTR2        | ;IF IT IS, CONVERT INPUT STRING            |
| 3537 | 014742 | 121427 | 000025 | CMPB         | (R4),#25      |                                            |
| 3538 | 014746 | 001003 |        | BNE          | 14            |                                            |
| 3539 | 014750 | 005037 | 014222 | CLR          | TMP1          |                                            |
| 3540 | 014754 | 000741 |        | BR           | INSTR1        |                                            |
| 3541 | 014756 | 112477 | 000602 | MOVB         | (R4)+,#TPDDBR |                                            |
| 3542 | 014762 | 105777 | 000574 | INSTRC: TSTB | #TPCSR        | ;WAIT TO FINISH TYPING                     |
| 3543 | 014766 | 100375 |        | BPL          | INSTRC        |                                            |
| 3544 | 014770 | 005303 |        | DEC          | R3            | ;UPDATE RECEIVED COUNT                     |
| 3545 | 014772 | 001340 |        | BNE          | INSTRB        | ;AND CONTINUE                              |
| 3546 | 014774 | 104004 |        | INSTR: TYPE  |               | ;TYPE "?" AND RE-REQUEST INPUT             |
| 3547 | 014776 | 016741 |        | MOVB         |               |                                            |
| 3548 | 015000 | 000727 |        | BR           | INSTR1        |                                            |
| 3549 |        |        |        |              |               |                                            |
| 3550 |        |        |        |              |               | ;CONVERT ASCII STRING TO OCTAL             |
| 3551 |        |        |        |              |               |                                            |
| 3552 | 015002 | 104004 |        | INSTR2: TYPE |               |                                            |
| 3553 | 015004 | 016745 |        | MCRLF        |               |                                            |
| 3554 | 015006 | 012704 | 015122 | MOV          | #INBUF,R4     | ;GET POINTER TO ASCII STRING               |
| 3555 | 015012 | 005003 |        | CLR          | R3            |                                            |
| 3556 | 015014 | 122714 | 000015 | CMPB         | #15,(R4)      | ;IS TERMINATOR FIRST                       |
| 3557 |        |        |        |              |               | ;CHARACTER IN STRING                       |
| 3558 | 015020 | 001431 |        | BEQ          | CHCK          |                                            |
| 3559 | 015022 | 121427 | 000060 | INSTRD: CMPB | (R4),#60      | ;IS CHARACTER OCTAL DIGIT                  |
| 3560 | 015026 | 002762 |        | BLT          | INSTR         | ;IF 67>=CHAR>=60                           |
| 3561 | 015030 | 121427 | 000067 | CMPB         | (R4),#67      | ;CHARACTER IS OCTAL DIGIT                  |
| 3562 | 015034 | 003357 |        | BGT          | INSTR         |                                            |
| 3563 | 015036 | 142714 | 000060 | BICB         | #60,(R4)      | ;STRIP ASCII                               |
| 3564 | 015042 | 152403 |        | BISB         | (R4)+,R3      | ;GENERATE OCTAL NUMBER                     |
| 3565 | 015044 | 121427 | 000015 | CMPB         | (R4),#15      | ;IF END OF STRING, CHECK LIMITS            |
| 3566 | 015050 | 001404 |        | BEQ          | INSTR3        |                                            |
| 3567 | 015052 | 006303 |        | ASL          | R3            | ;MULTIPLY DIGIT BY 10 (OCTAL               |
| 3568 | 015054 | 006303 |        | ASL          | R3            |                                            |
| 3569 | 015056 | 006303 |        | ASL          | R3            |                                            |
| 3570 | 015060 | 000760 |        | BR           | INSTRD        | ;GET NEXT DIGIT                            |
| 3571 |        |        |        |              |               |                                            |
| 3572 |        |        |        |              |               | ;TEST NUMBER TO SEE IF IT IS WITHIN LIMITS |
| 3573 |        |        |        |              |               |                                            |
| 3574 | 015062 | 020337 | 015116 | INSTR3: CMP  | R3,HILIM      | ;TEST HI LIMIT                             |

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3575 015066 101342          BMI    INSTER          ;IF R3>HILIM, ERROR
3576 015070 020337 015114    CMP    R3,LOLIM        ;TEST LOW LIMIT
3577 015074 103737          BLO    INSTER          ;IF R3<LOLIM, ERROR
3578 015076 010377 000016    MOV    R3,BSTORE      ;STORE NUMBER
3579 015102 000002          RTI                     ;EXIT
3580 015104 005737 014224    CMCK:  TST    TMP2
3581 015110 001731          BEQ    INSTER
3582 015112 000002          RTI
3583 015114 000000          LOLIM: 0
3584 015116 000000          HILIM: 0
3585 015120 000000          STORE: 0
3586 015122 000000          INBUF: 0
3587          .*.20
3588          ;ENTER HERE ON POWER FAILURE
3589
3590
3591 015144 010046          PFAIL: MOV    R0,-(SP)          ;SAVE R0-R5 ON PROCESSOR STACK
3592 015146 010146          MOV    R1,-(SP)
3593 015150 010246          MOV    R2,-(SP)
3594 015152 010346          MOV    R3,-(SP)
3595 015154 010446          MOV    R4,-(SP)
3596 015156 010546          MOV    R5,-(SP)
3597 015160 013746 000024    MOV    24,-(SP)
3598 015164 010637 015622    MOV    SP,SAVSP          ;SAVE STACK POINTER
3599 015170 012737 015202 000024    MOV    @RESTART,24      ;SET UP FOR POWER UP TRAP
3600 015176 000000          HALT
3601 015200 000776          BR     .-2          ;HALT ON POWER DOWN NORMAL
3602
3603          ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
3604
3605 015202 013706 015622    RESTAR: MOV    SAVSP,SP          ;RESTORE STACK POINTER
3606 015206 012605          MOV    (SP)+,R5          ;RESTORE R0-R5
3607 015210 012604          MOV    (SP)+,R4
3608 015212 012603          MOV    (SP)+,R3
3609 015214 012602          MOV    (SP)+,R2
3610 015216 012601          MOV    (SP)+,R1
3611 015220 012600          MOV    (SP)+,R0
3612 015222 012737 015144 000024    MOV    @PFAIL,24          ;SET UP FOR POWER FAILURE
3613 015230 005726          POP1SP
3614 015232 104004          TYPE
3615 015234 017120          MPFAIL
3616 015236 005737 001756    TST    TIPFLG
3617 015242 001002          BNE    RESTA1
3618 015244 000137 001262    JMP     START0
3619 015250 104004          RESTA1: TYPE
3620 015252 017140          MPF1
3621 015254 012746 000340    MOV    #340,-(SP)
3622 015260 005746          PUSH1SP
3623 015262 000137 013226    JMP     TSTENT
3624
3625
3626          ;THE FOLLOWING AUTO VECTORS USING THE FIRST BASE ADDRESS
3627 015266 013746 000020    XOR:  MOV    20,-(SP)          ;SAVE 20
3628 015272 013746 000022    MOV    22,-(SP)          ;SAVE 22
3629 015276 012737 015470 000020    MOV    #24,20          ;IOT INTR VECTOR
3630 015304 012737 000340 000022    MOV    #340,22          ;IOT INTR LVL

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3666
3667                                ,INDIRECT POINTERS
3668
3669 015546 000300      DMHVEC: 300                ,MODEM CONTROL INTERRUPT VECTOR
3670 015550 000302      DMHVLVL: 302              ,MODEM CONTROL ONTERRUPT PRIORITY
3671 015552 170500      DMHCSR: 170500            ,MODEM CONTROL CONTROL STATUS REGISTER
3672 015554 170502      DMHLSR: 170502            ,MODEM CONTROL CONTROL STATUS REGISTER
3673 015556 177560      TKCSR: 177560
3674 015560 177562      TKDBR: 177562
3675 015562 177564      TPCSR: 177564
3676 015564 177566      TPDBR: 177566
3677 015566 177570      SWR: 177570
3678 015570 177570      DISPLAY:177570
3679
3680                                ,PROGRAM VARIABLES
3681
3682 015572 000000      ERRFLG: 0
3683 015574 000000      TRACON: 0
3684 015576 000000      PASCNT: 0
3685 015600 000000      TSTNO: 0
3686 015602 000000      RETURN: 0
3687 015604 000000      ICOUNT: 0
3688 015606 000000      SAVRO: 0
3689 015610 000000      SAVR1: 0
3690 015612 000000      SAVR2: 0
3691 015614 000000      SAVR3: 0
3692 015616 000000      SAVR4: 0
3693 015620 000000      SAVR5: 0
3694 015622 000000      SAVSP: 0
3695 015624 000000      SAVPC: 0
3696 015626 000000      WRDCNT: 0
3697 015630 000000      CHRCNT: 0
3698 015632 017502      TSTPNT: TSTTBO
3699 015634 000000      TSTMAX: 0
3700 015636 000000      LINFLG: 0
3701 015640 000000      LINE: 0
3702 015642 000000      LINORG: 0
3703 015644 000000      LINANG: 0
3704 015646 000000      ANSFLG: 0
3705 015650 000000      ORGFLG: 0
3706 015652 000000      TIME1: 0
3707 015654 000000      TIME2: 0
3708 015656 000000      TIFLG: 0
3709 015660 177777      LINSEL: 177777
3710 015662 000000      SELMSK: 0
3711 015664 000000      SLMSK: 0
3712 015666 000002      FILL: 2                    ,FILL CHAR/COUNT
3713 015670 000000      FILLA: 0                    ,TEMP STORAGE FOR FILL COUNT
3714 015672 000000      RNGRET: 0
3715
3716                                .NLIST BEX
      015674 044524 042515 047440 MNOINT: .ASCII ,TIME OUT WAITING FOR INTERRUPT";
      015734 047114 020040 051503      .ASCII ,LN CSR LSR0;
      015753 123 040524 052524 MSTATE: .ASCII ,STATUS ERROR"EXP REC0;
      016004 044514 042516 042440 MLINER: .ASCII ,LINE ERROR"EXP REC LINE SEL0;
      016041 114 047111 020105 MLINE1: .ASCII ,LINE ERROR"EXP REC LINE0;

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|        |        |        |        |         |        |                                                 |
|--------|--------|--------|--------|---------|--------|-------------------------------------------------|
| 016072 | 051124 | 047101 | 044523 | MTRANE: | .ASCII | ;TRANSITION ERROR="EXP REC LINE";               |
| 016131 | 045    | 022442 | 042042 | DIALM:  | .ASCII | ;""DIAL ANSWERING DATA SET"";                   |
| 016167 | 045    | 022442 | 030442 | MT103T: | .ASCII | ;""103A MODEM CONNECT-DISCONNECT TEST"";        |
| 016240 | 021045 | 021045 | 030062 | MT202T: | .ASCII | ;""202C MODEM CONNECT-DISCONNECT TEST"";        |
| 016311 | 045    | 022442 | 047442 | MSELOR: | .ASCII | ;""ORIGINATE LINE-;";                           |
| 016335 | 045    | 040442 | 051516 | MSELAN: | .ASCII | ;""ANSWER LINE-;";                              |
| 016354 | 021045 | 030061 | 040463 | MT103A: | .ASCII | ;""103A TEST COMPLETE"";                        |
| 016403 | 045    | 031042 | 031060 | MT202A: | .ASCII | ;""202C TEST COMPLETE"";                        |
| 016432 | 021045 | 052123 | 044522 | MDISC:  | .ASCII | ;""STRIKE ANY TTY KEY TO TEST DISCONNECT;";     |
| 016502 | 021045 | 021045 | 033061 | M16:    | .ASCII | ;""16 LINE SCANNER TEST"";                      |
| 016535 | 045    | 022442 | 042042 | MTITLE: | .ASCII | ;""CZDHE-E ----MODEM CONTROL DIAGNOSTIC-----""; |
| 016621 | 045    | 053042 | 041505 | MVECTO: | .ASCII | ;""VECTOR ADDRESS-;";                           |
| 016643 | 045    | 041442 | 047117 | MREGAD: | .ASCII | ;""CONTROL REGISTER ADDRESS-;";                 |
| 016677 | 045    | 046042 | 047111 | MLINSL: | .ASCII | ;""LINE SELECT PARAMETER -;";                   |
| 016731 | 045    | 052042 | 051505 | MTEST:  | .ASCII | ;""TEST-;";                                     |
| 016741 | 040    | 037440 | 100    | MM:     | .ASCII | ; 7;";                                          |
| 016745 | 045    | 040042 |        | MCRLF:  | .ASCII | ;"";";                                          |
| 016750 | 021045 | 044523 | 043516 | MLINE:  | .ASCII | ;""SINGLE LINE CABLE TEST"";                    |
| 017003 | 045    | 046042 | 047111 | MLINEI: | .ASCII | ;""LINE NUMBER-;";                              |
| 017022 | 040506 | 040524 | 020114 | MFATAL: | .ASCII | ;FATAL ERROR="CSTAT LSTAT;";                    |
| 017054 | 021045 | 051124 | 047101 | MTRNDE: | .ASCII | ;""TRANSITION DETECTED="CSTAT LSTAT;";          |
| 017120 | 021045 | 047520 | 042527 | MPFAIL: | .ASCII | ;""POWER FAILURE;";                             |
| 017140 | 041455 | 051125 | 042522 | MPF1:   | .ASCII | ;""CURRENT TEST WILL RESTART"";                 |
| 017175 | 136    | 040103 |        | MCONTC: | .ASCII | ;"";";                                          |
| 017200 | 053136 | 100    |        | MCONTV: | .ASCII | ;"";";                                          |
| 017203 | 136    | 040114 |        | MCONTL: | .ASCII | ;"";";                                          |
| 017206 | 021045 | 053523 | 036522 | MSREQ:  | .ASCII | ;""SMR= ;";                                     |
| 017217 | 040    | 020040 | 042516 | MNEWIS: | .ASCII | ;""NEW= ;";                                     |
| 017231 | 045    | 042442 | 042116 | MEPASS: | .ASCII | ;""END PASS ;";                                 |
| 017247 | 045    | 042    |        | MBCD:   | .ASCII | ;"";";                                          |
|        | 017351 |        |        |         |        | ;""..+100                                       |
|        | 017352 |        |        |         |        | ;""EVEN                                         |
| 017352 | 000000 |        |        | TEMTAB: | 0      |                                                 |
|        | 017364 |        |        |         |        | ;""..+10                                        |
| 017364 | 000000 |        |        |         | 0      |                                                 |

## ;EMT DISPATCH TABLE

|        |        |         |        |
|--------|--------|---------|--------|
| 017366 | 013470 | EMTTAB: | ERRCS  |
| 017370 | 013506 |         | ERRLS  |
| 017372 | 013050 |         | LOOP   |
| 017374 | 013302 |         | FREEZE |
| 017376 | 014472 |         | TYPER  |
| 017400 | 014400 |         | SVOSP  |
| 017402 | 014036 |         | OCTASN |
| 017404 | 014440 |         | RSOS   |
| 017406 | 014230 |         | BINASC |
| 017410 | 014276 |         | DIVI   |
| 017412 | 013364 |         | ERR    |
| 017414 | 014634 |         | INSTR  |
| 017416 | 013402 |         | ERRT   |
| 017420 | 013424 |         | ERRS   |
| 017422 | 013446 |         | ERRN   |
| 017424 | 011766 |         | GETLIN |
| 017426 | 012022 |         | SETUPS |

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|            |        |         |                       |
|------------|--------|---------|-----------------------|
| 017430     | 012256 | CKRNG   |                       |
| 017432     | 012354 | WAITR   |                       |
| 017434     | 012442 | CKTRN   |                       |
| 017436     | 012412 | WAITRR  |                       |
| 017440     | 014124 | CNTLU   | ;CALL BY EMT CNTLUU   |
| 017442     | 013036 | CKINT   | ;CALL BY EMT CKINTT   |
| 017444     | 001760 | KBDINT  | ;CALLBY EMT KBDIN     |
| 017446     | 013664 | ERRG    | ;CALLED BY EMT ERRINT |
| 017450     | 000000 | EMTLIM: | 0                     |
| 017452     | 017502 | TSTLST: | TSTTB0                |
| 017454     | 017664 |         | TSTTB1                |
| 017456     | 017726 |         | TSTTB2                |
| 017460     | 017734 |         | TSTTB3                |
| 017462     | 000000 |         | 0                     |
| 017464     | 000000 |         | 0                     |
| 017466     | 000000 |         | 0                     |
| 017470     | 000000 |         | 0                     |
| 017472     | 000033 | GRO:    | NO-1                  |
| 017474     | 000007 |         | N1-100-1              |
| 017476     | 000001 |         | N2-200-1              |
| 017500     | 000000 |         | N3-300-1              |
| 017502     | 002210 | TSTTB0: | T0                    |
| 017504     | 000001 |         | 1                     |
| (2) 017506 | 002236 |         | T1                    |
| (2) 017510 | 004000 |         | TIMES                 |
| (2) 017512 | 002300 |         | T2                    |
| (2) 017514 | 004000 |         | TIMES                 |
| (2) 017516 | 002342 |         | T3                    |
| (2) 017520 | 004000 |         | TIMES                 |
| (2) 017522 | 002404 |         | T4                    |
| (2) 017524 | 004000 |         | TIMES                 |
| (2) 017526 | 002446 |         | T5                    |
| (2) 017530 | 004000 |         | TIMES                 |
| (2) 017532 | 002510 |         | T6                    |
| (2) 017534 | 004000 |         | TIMES                 |
| (2) 017536 | 002564 |         | T7                    |
| (2) 017540 | 004000 |         | TIMES                 |
| (2) 017542 | 002640 |         | T10                   |
| (2) 017544 | 004000 |         | TIMES                 |
| (2) 017546 | 002730 |         | T11                   |
| (2) 017550 | 004000 |         | TIMES                 |
| (2) 017552 | 003020 |         | T12                   |
| (2) 017554 | 004000 |         | TIMES                 |
| (2) 017556 | 003110 |         | T13                   |
| (2) 017560 | 004000 |         | TIMES                 |
| (2) 017562 | 003200 |         | T14                   |
| (2) 017564 | 004000 |         | TIMES                 |
| (2) 017566 | 003270 |         | T15                   |
| (2) 017570 | 004000 |         | TIMES                 |
| (2) 017572 | 003356 |         | T16                   |
| (2) 017574 | 004000 |         | TIMES                 |
| (2) 017576 | 003444 |         | T17                   |
| (2) 017600 | 004000 |         | TIMES                 |
| (2) 017602 | 003532 |         | T20                   |
| (2) 017604 | 004000 |         | TIMES                 |
| (2) 017606 | 003620 |         | T21                   |

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|     |        |        |              |
|-----|--------|--------|--------------|
| (2) | 017610 | 004000 | TIMES        |
| (2) | 017612 | 003714 | T22          |
| (2) | 017614 | 000400 | TIMES        |
| (2) | 017616 | 004030 | T23          |
| (2) | 017620 | 000400 | TIMES        |
| (2) | 017622 | 004220 | T24          |
| (2) | 017624 | 000400 | TIMES        |
| (2) | 017626 | 004372 | T25          |
| (2) | 017630 | 000200 | TIMES        |
| (2) | 017632 | 004534 | T26          |
| (2) | 017634 | 000200 | TIMES        |
| (2) | 017636 | 004774 | T27          |
| (2) | 017640 | 000200 | TIMES        |
| (2) | 017642 | 005230 | T30          |
| (2) | 017644 | 000200 | TIMES        |
| (2) | 017646 | 005464 | T31          |
| (2) | 017650 | 000200 | TIMES        |
| (2) | 017652 | 005720 | T32          |
| (2) | 017654 | 000200 | TIMES        |
| (2) | 017656 | 006104 | T33          |
| (2) | 017660 | 000200 | TIMES        |
|     | 017662 | 000000 | 0            |
|     | 017664 | 006414 | TSTTB1: T100 |
|     | 017666 | 000001 | 1            |
| (2) | 017670 | 006452 | T101         |
| (2) | 017672 | 000200 | TIMES        |
| (2) | 017674 | 006632 | T102         |
| (2) | 017676 | 000200 | TIMES        |
| (2) | 017700 | 007006 | T103         |
| (2) | 017702 | 000200 | TIMES        |
| (2) | 017704 | 007162 | T104         |
| (2) | 017706 | 000200 | TIMES        |
| (2) | 017710 | 007336 | T105         |
| (2) | 017712 | 000200 | TIMES        |
| (2) | 017714 | 007514 | T106         |
| (2) | 017716 | 000200 | TIMES        |
| (2) | 017720 | 007672 | T107         |
| (2) | 017722 | 000200 | TIMES        |
|     | 017724 | 000000 | 0            |
|     | 017726 | 010050 | TSTTB2: T200 |
|     | 017730 | 000001 | 1            |
|     | 017732 | 000000 | 0            |
|     | 017734 | 010424 | TSTTB3: T300 |
|     | 017736 | 000001 | 1            |
|     |        | 000001 | .END         |

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## CROSS REFERENCE TABLE -- USER SYMBOLS

|         |        |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ANSFLG  | 015646 | 2831* | 2834* | 2839* | 2843* | 2924* | 2933  | 2956  | 2971* | 3022* | 3023  | 3704# |       |       |
| ANSTR   | 01160? | 2798  | 2829# |       |       |       |       |       |       |       |       |       |       |       |
| ANSTRR  | 011670 | 2847# |       |       |       |       |       |       |       |       |       |       |       |       |
| ANSTR1  | 011616 | 2830  | 2832# |       |       |       |       |       |       |       |       |       |       |       |
| ANSTR2  | 011632 | 2833  | 2835# |       |       |       |       |       |       |       |       |       |       |       |
| ANSTR3  | 011646 | 2837  | 2840# |       |       |       |       |       |       |       |       |       |       |       |
| ANSIR4  | 011662 | 2842  | 2844# |       |       |       |       |       |       |       |       |       |       |       |
| BINASA  | 014240 | 3416# | 3420  |       |       |       |       |       |       |       |       |       |       |       |
| BINASB  | 014260 | 3421# | 3423  |       |       |       |       |       |       |       |       |       |       |       |
| BINASC  | 014230 | 3414# | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| BINARD- | 014372 | 857#  | 3373* |       |       |       |       |       |       |       |       |       |       |       |
| BUSY -  | 000020 | 862#  | 1214  | 1218  | 1508  | 1534  | 2902  | 3159  |       |       |       |       |       |       |
| CHCK    | 015104 | 3558  | 3580# |       |       |       |       |       |       |       |       |       |       |       |
| CHRCNT  | 015630 | 3372* | 3414  | 3422* | 3697# |       |       |       |       |       |       |       |       |       |
| CKINT   | 013036 | 3084# | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| CKINTT- | 104026 | 925#  | 2304  | 2368  | 2407  | 2466  | 2507  | 2551  | 2592  | 2632  | 2676  | 2741  | 2775  |       |
| CKRING- | 104021 | 920#  | 2282  | 2443  |       |       |       |       |       |       |       |       |       |       |
| CKRING  | 012256 | 2950# | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| CKRING1 | 012322 | 2959  | 2961# |       |       |       |       |       |       |       |       |       |       |       |
| CKRING2 | 012346 | 2965  | 2968# |       |       |       |       |       |       |       |       |       |       |       |
| CKTRAN- | 104023 | 922#  | 2310  | 2374  | 2472  | 2513  | 2557  | 2598  | 2638  | 2682  | 2747  |       |       |       |
| CKTRN   | 012442 | 2989# | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| CKTRN1  | 012556 | 3007  | 3009# |       |       |       |       |       |       |       |       |       |       |       |
| CKTRN2  | 012610 | 3014  | 3020# |       |       |       |       |       |       |       |       |       |       |       |
| CKTRN3  | 012650 | 3027  | 3029# |       |       |       |       |       |       |       |       |       |       |       |
| CKTRN4  | 012674 | 3033  | 3035# |       |       |       |       |       |       |       |       |       |       |       |
| CLRMUX- | 002000 | 868#  | 1487  | 1608  | 1664  | 1718  | 1772  | 1832  | 1869  | 1955  | 1997  | 2037  | 2077  | 2901  |
| CLRSCN- | 004000 | 869#  | 1507  | 1533  | 2901  |       |       |       |       |       |       |       |       |       |
| CNTLU   | 014124 | 3386# | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| CNTLUU- | 104025 | 924#  | 1011  | 1132  | 2265  | 2426  | 3298  |       |       |       |       |       |       |       |
| CO -    | 000100 | 883#  | 2134  | 2313  | 2317  | 2475  | 2478  | 2516  | 2520  | 2601  | 2605  | 2641  | 2646  |       |
| COF -   | 040000 | 872#  | 2809  | 2821  | 2832  | 2844  |       |       |       |       |       |       |       |       |
| CONVER- | 104010 | 911#  | 3374  |       |       |       |       |       |       |       |       |       |       |       |
| CS -    | 000040 | 882#  | 2134  | 2313  | 2317  | 2478  | 2520  | 2601  | 2641  |       |       |       |       |       |
| CSF -   | 020000 | 871#  | 2812  | 2821  | 2835  | 2844  |       |       |       |       |       |       |       |       |
| CSTR1   | 002236 | 1158# |       |       |       |       |       |       |       |       |       |       |       |       |
| CSTR2   | 002300 | 1171# |       |       |       |       |       |       |       |       |       |       |       |       |
| CSTR3   | 002342 | 1184# |       |       |       |       |       |       |       |       |       |       |       |       |
| CSTR4   | 002404 | 1197# |       |       |       |       |       |       |       |       |       |       |       |       |
| CSTR5   | 002446 | 1213# |       |       |       |       |       |       |       |       |       |       |       |       |
| DATA1   | 012712 | 1015* | 1017* | 1020* | 1022  | 2863* | 2872  | 2992* | 3002  | 3041# | 3631* | 3633* | 3635* | 3637  |
| DATA2   | 012714 | 1016* | 1017  | 1018* | 1021* | 2864* | 2874  | 2993* | 3011  | 3042# | 3632* | 3633  | 3634* | 3636* |
| DATA3   | 012716 | 2994* | 3020  | 3024  | 3043# |       |       |       |       |       |       |       |       |       |
| DATA4   | 012720 | 2995* | 3030  | 3044# |       |       |       |       |       |       |       |       |       |       |
| DHMCSP  | 015552 | 1043  | 1044  | 1048  | 1105* | 1113* | 1123* | 1146  | 1158* | 1159  | 1162* | 1163  | 1171* | 1172  |
|         |        | 1175* | 1176  | 1184* | 1185  | 1188* | 1189  | 1197* | 1198  | 1202* | 1203  | 1213* | 1214  | 1217* |
|         |        | 1218  | 1228* | 1231* | 1244* | 1247* | 1260* | 1262* | 1265* | 1268* | 1279* | 1284* | 1285* | 1288* |
|         |        | 1298* | 1303* | 1304* | 1307* | 1317* | 1322* | 1323* | 1326* | 1336* | 1341* | 1342* | 1345* | 1356* |
|         |        | 1361* | 1362* | 1365* | 1375* | 1380* | 1381* | 1384* | 1394* | 1399* | 1400* | 1403* | 1413* | 1418* |
|         |        | 1419* | 1422* | 1432* | 1439* | 1440  | 1457* | 1462* | 1466  | 1475* | 1487* | 1490* | 1496* | 1498  |
|         |        | 1507* | 1509  | 1512* | 1514  | 1529* | 1533* | 1534  | 1536* | 1537* | 1539* | 1541* | 1545  | 1567* |
|         |        | 1572* | 1576* | 1579* | 1583  | 1603* | 1608* | 1612* | 1615* | 1620  | 1639* | 1659* | 1664* | 1668* |
|         |        | 1671* | 1676  | 1693* | 1713* | 1718* | 1722* | 1725* | 1730  | 1747* | 1767* | 1772* | 1776* | 1779* |
|         |        | 1784  | 1801* | 1822* | 1832* | 1835* | 1869* | 1870* | 1873* | 1884* | 1893  | 1897  | 1906  | 1912  |
|         |        | 1918* | 1920* | 1952* | 1955* | 1957* | 1959* | 1962  | 1980* | 1994* | 1997* | 1999* | 2001* | 2004  |
|         |        | 2020* | 2034* | 2037* | 2039* | 2041* | 2044  | 2060* | 2074* | 2077* | 2079* | 2081* | 2084  | 2100* |

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CROSS REFERENCE TABLE .. USER SYMBOLS

|         |        |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|         |        | 2115• | 2119• | 2127• | 2130  | 2146• | 2160• | 2164• | 2172• | 2175  | 2191• | 2205• | 2209• | 2217• |
|         |        | 2220  | 2236• | 2300• | 2358• | 2365• | 2366• | 2462• | 2464• | 2505• | 2547• | 2549• | 2590• | 2630• |
|         |        | 2672• | 2674• | 2726• | 2737• | 2738• | 2791  | 2799• | 2858• | 2863  | 2901• | 2902  | 2909• | 2913• |
|         |        | 2923• | 2976• | 2990• | 3003• | 3009• | 3158• | 3159  | 3642• | 3643• | 3645• | 3649• | 3659• | 3671• |
| DHPLSR  | 015554 | 1048• | 1049• | 1149  | 1613• | 1619  | 1641• | 1644  | 1669• | 1675  | 1695• | 1698  | 1723• | 1729  |
|         |        | 1749• | 1752  | 1777• | 1783  | 1803• | 1806  | 1825• | 1836  | 1844• | 1845  | 1853• | 1876• | 1899  |
|         |        | 1958• | 1961  | 1982• | 1985  | 2000• | 2003  | 2022• | 2025  | 2040• | 2043  | 2062• | 2065  | 2080• |
|         |        | 2083  | 2102• | 2105  | 2120• | 2129  | 2147• | 2150  | 2165• | 2174  | 2192• | 2195  | 2210• | 2219  |
|         |        | 2237• | 2240  | 2302• | 2367• | 2463• | 2465• | 2506• | 2548• | 2550• | 2591• | 2631• | 2673• | 2675• |
|         |        | 2739• | 2800  | 2864  | 2911• | 2914• | 3004  | 3010  | 3672• |       |       |       |       |       |
| DHPLVL  | 015550 | 1037• | 1038• | 1230• | 1246• | 1263• | 1283• | 1302• | 1321• | 1340• | 1359• | 1378• | 1397• | 1416• |
| DHPLVEC | 015546 | 1882• | 2922• | 3656• | 3670• |       |       |       |       |       |       |       |       |       |
|         |        | 1032  | 1033  | 1037  | 1229• | 1245• | 1261• | 1282• | 1301• | 1320• | 1339• | 1358• | 1377• | 1396• |
|         |        | 1415• | 1881• | 2354• | 2723• | 2920• | 2973• | 3654• | 3655• | 3656  | 3657• | 3669• |       |       |
| DIALM   | 016131 | 2929  | 3716• |       |       |       |       |       |       |       |       |       |       |       |
| DIGIT   | 014374 | 858•  | 3417• | 3418  |       |       |       |       |       |       |       |       |       |       |
| DISPLA  | 015570 | 977•  | 3678• |       |       |       |       |       |       |       |       |       |       |       |
| DISPRE  | 000174 | 951•  | 977   |       |       |       |       |       |       |       |       |       |       |       |
| DIVCNT  | 014352 | 3432• | 3440• |       |       |       |       |       |       |       |       |       |       |       |
| DIVI    | 014276 | 3429• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| DIVIA   | 014322 | 3434• | 3441  |       |       |       |       |       |       |       |       |       |       |       |
| DIVIB   | 014370 | 3431  | 3445• |       |       |       |       |       |       |       |       |       |       |       |
| DIVIC   | 014340 | 3433  | 3435  | 3437• |       |       |       |       |       |       |       |       |       |       |
| DIVIDM  | 014374 | 858   | 3429• | 3430  | 3434  | 3436• | 3438• | 3442• | 3447• |       |       |       |       |       |
| DIVIDL  | 014372 | 857   | 3437• | 3443• | 3446• |       |       |       |       |       |       |       |       |       |
| DIVIS   | 014376 | 856   | 3430  | 3434  | 3436  | 3448• |       |       |       |       |       |       |       |       |
| DIVIU   | 014302 | 3430• |       |       |       |       |       |       |       |       |       |       |       |       |
| DMYRTI  | 002202 | 1083  | 1120  | 1121  | 1135• |       |       |       |       |       |       |       |       |       |
| DONE    | 000200 | 865•  | 1171  | 1172  | 1175  | 1176  | 1231  | 1265  | 1285  | 1304  | 1323  | 1342  | 1362  | 1381  |
|         |        | 1400  | 1419  | 1918  | 3645  |       |       |       |       |       |       |       |       |       |
| EHTLIM  | 017450 | 3716• |       |       |       |       |       |       |       |       |       |       |       |       |
| EHTOK   | 013016 | 3078• |       |       |       |       |       |       |       |       |       |       |       |       |
| EHTSRV  | 013004 | 941   | 3075• |       |       |       |       |       |       |       |       |       |       |       |
| EHTTAB  | 017366 | 3080  | 3716• |       |       |       |       |       |       |       |       |       |       |       |
| EOP     | 012724 | 3051• | 3133  |       |       |       |       |       |       |       |       |       |       |       |
| ERR     | 013364 | 3168• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| ERRCS   | 013470 | 3240• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| ERRFLG  | 015572 | 2904• | 3114  | 3136• | 3145  | 3168• | 3186• | 3205• | 3222• | 3275• | 3277  | 3299• | 3682• |       |
| ERRGEN  | 013524 | 3172  | 3189  | 3209  | 3226  | 3243  | 3262  | 3269• | 3306  |       |       |       |       |       |
| ERRINT  | 104030 | 927•  | 1901  |       |       |       |       |       |       |       |       |       |       |       |
| ERRLS   | 013506 | 3260• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| ERRMSG  | 013604 | 3170• | 3187• | 3206• | 3223• | 3240• | 3260• | 3281  | 3284• | 3304• |       |       |       |       |
| ERRN    | 013446 | 3222• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| ERROR   | 104012 | 913•  | 1148  | 1151  | 1161  | 1165  | 1174  | 1178  | 1187  | 1191  | 1201  | 1206  | 1216  | 1220  |
|         |        | 1236  | 1252  | 1269  | 1291  | 1310  | 1329  | 1348  | 1366  | 1385  | 1404  | 1423  | 2274  | 2435  |
|         |        | 3651  |       |       |       |       |       |       |       |       |       |       |       |       |
| ERRORC  | 104000 | 903•  | 1443  | 1469  | 1501  | 1517  | 1552  | 1590  | 1907  | 1915  |       |       |       |       |
| ERRORL  | 104001 | 904•  | 1631  | 1647  | 1685  | 1701  | 1739  | 1755  | 1793  | 1809  | 1840  | 1849  | 1973  | 1988  |
|         |        | 2013  | 2028  | 2053  | 2068  | 2093  | 2108  | 2138  | 2153  | 2183  | 2198  | 2228  | 2247  |       |
| ERRORN  | 104016 | 917•  | 2801  | 2824  | 2847  |       |       |       |       |       |       |       |       |       |
| ERRORS  | 104015 | 916•  | 2333  | 2335  | 2394  | 2396  | 2493  | 2495  | 2534  | 2536  | 2577  | 2579  | 2611  | 2620  |
|         |        | 2660  | 2662  | 2702  | 2704  | 2764  | 2766  |       |       |       |       |       |       |       |
| ERRORT  | 104014 | 915•  | 2292  | 2294  | 2337  | 2339  | 2398  | 2400  | 2453  | 2455  | 2497  | 2499  | 2538  | 2540  |
|         |        | 2581  | 2583  | 2622  | 2624  | 2664  | 2666  | 2706  | 2708  | 2768  | 2770  |       |       |       |
| ERRQ    | 013664 | 3304• | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| ERRS    | 013424 | 3205• | 3716  |       |       |       |       |       |       |       |       |       |       |       |

**CROSS REFERENCE TABLE**

## USER SYMBOLS

[illegible]



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### CROSS REFERENCE TABLE

## USER SYMBOLS

[illegible]

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## CROSS REFERENCE TABLE USER SYMBOLS

|        |        |       |       |       |       |
|--------|--------|-------|-------|-------|-------|
| MENT1A | 004056 | 14910 | 1493  |       |       |
| MENT1B | 004104 | 14970 | 1506  |       |       |
| MENT1C | 004126 | 1500  | 15040 |       |       |
| MENT1D | 004134 | 15070 | 1519  |       |       |
| MENT1E | 004166 | 15130 | 1522  |       |       |
| MENT1F | 004210 | 1516  | 15200 |       |       |
| MENT2  | 004220 | 15290 |       |       |       |
| MENT2A | 004242 | 15330 | 1554  | 1559  |       |
| MENT2B | 004322 | 15440 | 1557  |       |       |
| MENT2C | 004344 | 1548  | 15500 |       |       |
| MENT2D | 004356 | 1551  | 15550 |       |       |
| MENT3  | 004372 | 15670 |       |       |       |
| MENT3A | 004414 | 15710 | 1592  | 1597  |       |
| MENT3B | 004426 | 15730 | 1575  |       |       |
| MENT3C | 004464 | 15820 | 1595  |       |       |
| MENT3D | 004506 | 1586  | 15880 |       |       |
| MENT3E | 004520 | 1589  | 15930 |       |       |
| MEPASS | 017231 | 3059  | 37160 |       |       |
| MFATAL | 017022 | 3223  | 37160 |       |       |
| MLINE  | 016750 | 1939  | 37160 |       |       |
| MLINEI | 017003 | 1941  | 37160 |       |       |
| MLINER | 016004 | 3260  | 37160 |       |       |
| MLINE1 | 016041 | 3206  | 37160 |       |       |
| MLINSL | 016677 | 1051  | 37160 |       |       |
| MNOINT | 015674 | 3304  | 37160 |       |       |
| MPFAIL | 017120 | 3615  | 37160 |       |       |
| MPF1   | 017140 | 3620  | 37160 |       |       |
| MQM    | 016741 | 3547  | 37160 |       |       |
| MREGAD | 016643 | 1040  | 37160 |       |       |
| MSELAN | 016335 | 2885  | 37160 |       |       |
| MSELOR | 016311 | 2880  | 37160 |       |       |
| MSG    | 014662 | 35180 | 35240 |       |       |
| MSTATE | 015753 | 3240  | 37160 |       |       |
| MTEST  | 016731 | 1058  | 37160 |       |       |
| MTITLE | 016535 | 999   | 37160 |       |       |
| MTRANE | 016072 | 3187  | 37160 |       |       |
| MTRNDE | 017054 | 2866  | 37160 |       |       |
| MT103A | 016354 | 2405  | 37160 |       |       |
| MT103T | 016167 | 2262  | 37160 |       |       |
| MT202A | 016403 | 2774  | 37160 |       |       |
| MT202T | 016240 | 2423  | 37160 |       |       |
| MUX1   | 004534 | 16030 |       |       |       |
| MUX1A  | 004562 | 16080 | 1649  | 1653  |       |
| MUX1B  | 004630 | 16160 | 1637  |       |       |
| MUX1C  | 004666 | 1623  | 16260 |       |       |
| MUX1D  | 004704 | 1618  | 1630  | 1633  | 16340 |
| MUX1E  | 004722 | 16390 |       |       |       |
| MUX1F  | 004754 | 1611  | 1646  | 16480 |       |
| MUX11  | 006452 | 19520 |       |       |       |
| MUX11A | 006470 | 19550 |       |       |       |
| MUX11B | 006520 | 19600 | 1978  |       |       |
| MUX11C | 006546 | 1965  | 19680 |       |       |
| MUX11D | 006564 | 1972  | 1975  | 19760 |       |
| MUX11E | 006576 | 19800 |       |       |       |
| MUX11F | 006630 | 1987  | 19890 |       |       |
| MUX12  | 006632 | 19940 |       |       |       |



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## CROSS REFERENCE TABLE -- USER SYMBOLS

|        |        |       |       |       |       |
|--------|--------|-------|-------|-------|-------|
| MUX12A | 006650 | 1997# |       |       |       |
| MUX12B | 006700 | 2002# | 2018  |       |       |
| MUX12C | 006726 | 2007  | 2010# |       |       |
| MUX12D | 006740 | 2012  | 2015  | 2016# |       |
| MUX12E | 006752 | 2020# |       |       |       |
| MUX12F | 007004 | 2027  | 2029# |       |       |
| MUX13  | 007006 | 2034# |       |       |       |
| MUX13A | 007024 | 2037# |       |       |       |
| MUX13B | 007054 | 2042# | 2058  |       |       |
| MUX13C | 007102 | 2047  | 2050# |       |       |
| MUX13D | 007114 | 2052  | 2055  | 2056# |       |
| MUX13E | 007126 | 2060# |       |       |       |
| MUX13F | 007160 | 2067  | 2069# |       |       |
| MUX14  | 007162 | 2074# |       |       |       |
| MUX14A | 007200 | 2077# |       |       |       |
| MUX14B | 007230 | 2082# | 2098  |       |       |
| MUX14C | 007256 | 2087  | 2090# |       |       |
| MUX14D | 007270 | 2092  | 2095  | 2096# |       |
| MUX14E | 007302 | 2100# |       |       |       |
| MUX14F | 007334 | 2107  | 2109# |       |       |
| MUX15  | 007336 | 2115# |       |       |       |
| MUX15A | 007354 | 2118# |       |       |       |
| MUX15B | 007402 | 2128# | 2143  |       |       |
| MUX15C | 007430 | 2133  | 2136# |       |       |
| MUX15D | 007442 | 2137  | 2140  | 2141# |       |
| MUX15E | 007456 | 2145# |       |       |       |
| MUX15F | 007512 | 2152  | 2154# |       |       |
| MUX16  | 007514 | 2160# |       |       |       |
| MUX16A | 007532 | 2163# |       |       |       |
| MUX16B | 007560 | 2173# | 2188  |       |       |
| MUX16C | 007606 | 2178  | 2181# |       |       |
| MUX16D | 007620 | 2182  | 2185  | 2186# |       |
| MUX16E | 007634 | 2190# |       |       |       |
| MUX16F | 007670 | 2197  | 2199# |       |       |
| MUX17  | 007672 | 2205# |       |       |       |
| MUX17A | 007710 | 2208# |       |       |       |
| MUX17B | 007736 | 2218# | 2233  |       |       |
| MUX17C | 007764 | 2223  | 2226# |       |       |
| MUX17D | 007776 | 2227  | 2230  | 2231# |       |
| MUX17E | 010012 | 2235# |       |       |       |
| MUX17F | 010046 | 2242  | 2244# |       |       |
| MUX2   | 004774 | 1659# |       |       |       |
| MUX2A  | 005622 | 1664# | 1703  | 1707  |       |
| MUX2B  | 005070 | 1672# | 1691  |       |       |
| MUX2C  | 005126 | 1679  | 1682# |       |       |
| MUX2D  | 005140 | 1674  | 1684  | 1687  | 1688# |
| MUX2E  | 005156 | 1693# |       |       |       |
| MUX2F  | 005210 | 1667  | 1700  | 1702# |       |
| MUX3   | 005230 | 1713# |       |       |       |
| MUX3A  | 005256 | 1718# | 1757  | 1761  |       |
| MUX3B  | 005324 | 1726# | 1745  |       |       |
| MUX3C  | 005362 | 1733  | 1736# |       |       |
| MUX3D  | 005374 | 1728  | 1738  | 1741  | 1742# |
| MUX3E  | 005412 | 1747# |       |       |       |
| MUX3F  | 005444 | 1721  | 1754  | 1756# |       |
| MUX4   | 005464 | 1767# |       |       |       |

|         |        |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MUX4A   | 005512 | 17720 | 1811  | 1815  |       |       |       |       |       |       |       |       |       |       |
| MUX4B   | 005560 | 17800 | 1799  |       |       |       |       |       |       |       |       |       |       |       |
| MUX4C   | 005616 | 1787  | 17900 |       |       |       |       |       |       |       |       |       |       |       |
| MUX4D   | 005630 | 1782  | 1792  | 1795  | 17960 |       |       |       |       |       |       |       |       |       |
| MUX4E   | 005646 | 18010 |       |       |       |       |       |       |       |       |       |       |       |       |
| MUX4F   | 005700 | 1775  | 1808  | 18100 |       |       |       |       |       |       |       |       |       |       |
| MUX8    | 005720 | 18220 |       |       |       |       |       |       |       |       |       |       |       |       |
| MUX8A   | 005736 | 18250 | 1828  |       |       |       |       |       |       |       |       |       |       |       |
| MUX8B   | 005770 | 18320 | 1842  | 1851  |       |       |       |       |       |       |       |       |       |       |
| MUX8C   | 005776 | 18330 | 1856  |       |       |       |       |       |       |       |       |       |       |       |
| MUX8D   | 006032 | 1839  | 18430 |       |       |       |       |       |       |       |       |       |       |       |
| MUX8E   | 006064 | 1834  | 1848  | 18520 |       |       |       |       |       |       |       |       |       |       |
| MVECTO  | 016621 | 1029  | 37160 |       |       |       |       |       |       |       |       |       |       |       |
| MO -    | 000034 | 37160 |       |       |       |       |       |       |       |       |       |       |       |       |
| M1 -    | 000110 | 37160 |       |       |       |       |       |       |       |       |       |       |       |       |
| M16     | 016502 | 1145  | 37160 |       |       |       |       |       |       |       |       |       |       |       |
| N -     | 000300 | 11430 | 19350 | 22580 | 24190 |       |       |       |       |       |       |       |       |       |
| NXTTS   | 012722 | 28980 | 2944  | 29510 | 2969  | 30000 | 3036  | 30450 |       |       |       |       |       |       |
| NO -    | 000034 | 11430 | 11440 | 1157  | 11580 | 1170  | 11710 | 1183  | 11840 | 1196  | 11970 | 1212  | 12130 | 1226  |
|         |        | 12270 | 1242  | 12430 | 1258  | 12590 | 1278  | 12790 | 1293  | 1297  | 12980 | 1312  | 1316  | 13170 |
|         |        | 1331  | 1335  | 13360 | 1350  | 1355  | 13560 | 1370  | 1374  | 13750 | 1389  | 1393  | 13940 | 1408  |
|         |        | 1412  | 14130 | 1427  | 1431  | 14320 | 1455  | 14560 | 1486  | 14870 | 1528  | 15290 | 1566  | 15670 |
|         |        | 1602  | 16030 | 1658  | 16590 | 1712  | 17130 | 1766  | 17670 | 1821  | 18220 | 1868  | 18690 | 3716  |
| N1 -    | 000110 | 19350 | 19360 | 1951  | 19520 | 1993  | 19940 | 2033  | 20340 | 2073  | 20740 | 2114  | 21150 | 2159  |
|         |        | 21600 | 2204  | 22050 | 3716  |       |       |       |       |       |       |       |       |       |
| N2 -    | 000202 | 22580 | 22590 | 2403  | 24040 | 3716  |       |       |       |       |       |       |       |       |
| N3 -    | 000301 | 24190 | 24200 | 3716  |       |       |       |       |       |       |       |       |       |       |
| OCTASC- | 104006 | 9090  | 2867  | 3279  | 3287  | 3391  |       |       |       |       |       |       |       |       |
| OCTASN  | 014036 | 33670 | 3716  |       |       |       |       |       |       |       |       |       |       |       |
| OCTAS1  | 014064 | 33720 | 3376  |       |       |       |       |       |       |       |       |       |       |       |
| ORGFLG  | 015650 | 28080 | 28110 | 28160 | 28200 | 29250 | 2935  | 2962  | 29720 | 3029  | 37050 |       |       |       |
| ORGR    | 011510 | 2796  | 28060 |       |       |       |       |       |       |       |       |       |       |       |
| ORGRR   | 011576 | 28240 |       |       |       |       |       |       |       |       |       |       |       |       |
| ORGR1   | 011524 | 2807  | 28090 |       |       |       |       |       |       |       |       |       |       |       |
| ORGR2   | 011540 | 2810  | 28120 |       |       |       |       |       |       |       |       |       |       |       |
| ORGR3   | 011554 | 2814  | 28170 |       |       |       |       |       |       |       |       |       |       |       |
| ORGR4   | 011570 | 2819  | 28210 |       |       |       |       |       |       |       |       |       |       |       |
| PASCNT  | 015576 | 10860 | 30520 | 3112  | 36840 |       |       |       |       |       |       |       |       |       |
| PFAIL   | 015144 | 939   | 963   | 35910 | 3612  |       |       |       |       |       |       |       |       |       |
| POPPO - | 012600 | 8970  |       |       |       |       |       |       |       |       |       |       |       |       |
| POP1SP- | 005726 | 8950  | 3613  |       |       |       |       |       |       |       |       |       |       |       |
| POP2SP- | 022626 | 8990  | 994   | 1104  | 1112  | 1122  | 1235  | 1251  |       |       |       |       |       |       |

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## CROSS REFERENCE TABLE - USER SYMBOLS

|        |        |       |         |       |       |       |       |       |       |       |       |       |       |       |
|--------|--------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| RESTA1 | 015250 | 3617  | 3619*   |       |       |       |       |       |       |       |       |       |       |       |
| RESO5  | 104007 | 910*  | 3289    |       |       |       |       |       |       |       |       |       |       |       |
| RETURN | 015602 | 3124  | 3132*   | 3686* |       |       |       |       |       |       |       |       |       |       |
| RING   | 000200 | 884*  | 2179    |       |       |       |       |       |       |       |       |       |       |       |
| RINGF  | 100000 | 873*  | 2321    | 2482  | 2806  | 2821  | 2829  | 2844  |       |       |       |       |       |       |
| RNGRET | 015672 | 2356* | 2724*   | 2857  | 2926* | 2974* | 3714* |       |       |       |       |       |       |       |
| RS     | 000004 | 879*  | 1723    | 1734  | 2040  | 2048  | 2165  | 2179  | 2192  | 2465  | 2478  | 2520  | 2548  | 2591  |
|        |        | 2601  | 2641    | 2673  |       |       |       |       |       |       |       |       |       |       |
| RSO5   | 014440 | 3466* | 3716    |       |       |       |       |       |       |       |       |       |       |       |
| SAVPC  | 015624 | 3273  | 3315    | 3452* | 3695* |       |       |       |       |       |       |       |       |       |
| SAVR0  | 015606 | 3461* | 3466    | 3688* |       |       |       |       |       |       |       |       |       |       |
| SAVR1  | 015610 | 3348  | 3460*   | 3467  | 3689* |       |       |       |       |       |       |       |       |       |
| SAVR2  | 015612 | 3359  | 3459*   | 3468  | 3690* |       |       |       |       |       |       |       |       |       |
| SAVR3  | 015614 | 3322  | 3329    | 3334  | 3346  | 3361  | 3458* | 3469  | 3691* |       |       |       |       |       |
| SAVR4  | 015616 | 3320  | 3327    | 3332  | 3339  | 3344  | 3357  | 3457* | 3470  | 3692* |       |       |       |       |
| SAVR5  | 015620 | 3318  | 3325    | 3337  | 3342  | 3456* | 3471  | 3693* |       |       |       |       |       |       |
| SAVSP  | 015622 | 3598* | 3605    | 3694* |       |       |       |       |       |       |       |       |       |       |
| SAVOSP | 104005 | 908*  | 3276    |       |       |       |       |       |       |       |       |       |       |       |
| SCHEMA | 000040 | 863*  | 1197    | 1198  | 1202  | 1203  | 1213  | 1217  | 2358  | 2726  | 2858  | 2923  | 2976  |       |
| SCNT1  | 006104 | 1869* | 1903    | 1909  | 1917  |       |       |       |       |       |       |       |       |       |
| SCNT1A | 006144 | 1875* | 1878    |       |       |       |       |       |       |       |       |       |       |       |
| SCNT1B | 006220 | 1885* | 1924    |       |       |       |       |       |       |       |       |       |       |       |
| SCNT1C | 006344 | 1881  | 1911*   |       |       |       |       |       |       |       |       |       |       |       |
| SCNT1D | 006364 | 1886  | 1904    | 1910  | 1914  | 1918* |       |       |       |       |       |       |       |       |
| SCOPE  | 104002 | 905*  | 1152    | 1166  | 1179  | 1192  | 1207  | 1221  | 1237  | 1253  | 1272  | 1292  | 1311  | 1330  |
|        |        | 1349  | 1369    | 1388  | 1407  | 1426  | 1450  | 1478  | 1523  | 1560  | 1598  | 1654  | 1708  | 1762  |
|        |        | 1816  | 1857    | 1925  | 1989  | 2029  | 2069  | 2109  | 2154  | 2199  | 2244  |       |       |       |
| SCOPEF | 104003 | 906*  | 1444    | 1470  | 1502  | 1518  | 1553  | 1591  | 1632  | 1648  | 1686  | 1702  | 1740  | 1756  |
|        |        | 1794  | 1810    | 1841  | 1850  | 1902  | 1908  | 1916  | 1974  | 2014  | 2054  | 2094  | 2139  | 2184  |
|        |        | 2229  |         |       |       |       |       |       |       |       |       |       |       |       |
| SECRX  | 000020 | 881*  | 2224    | 2516  | 2520  | 2641  | 2646  |       |       |       |       |       |       |       |
| SECRXF | 010000 | 870*  | 2817    | 2821  | 2840  | 2844  |       |       |       |       |       |       |       |       |
| SECTX  | 000010 | 880*  | 1777    | 1788  | 2080  | 2088  | 2210  | 2224  | 2237  | 2506  | 2516  | 2550  | 2631  | 2646  |
|        |        | 2675  |         |       |       |       |       |       |       |       |       |       |       |       |
| SELMSK | 015662 | 1434* | 1437    | 1447* | 1459* | 1463  | 1473* | 1606* | 1610  | 1650* | 1662* | 1666  | 1704* | 1716* |
|        |        | 1720  | 1758*   | 1770* | 1774  | 1812* | 1829* | 1833  | 1854* | 1874* | 1885  | 1921* | 3710* |       |
| SETUP  | 104020 | 919*  | 2270    | 2431  |       |       |       |       |       |       |       |       |       |       |
| SETUPB | 012240 | 2934  | 2936    | 2943* |       |       |       |       |       |       |       |       |       |       |
| SETUPS | 012022 | 2895* | 3716    |       |       |       |       |       |       |       |       |       |       |       |
| SETUP1 | 012054 | 2902* | 2903    |       |       |       |       |       |       |       |       |       |       |       |
| SETUP2 | 012070 | 2909* |         |       |       |       |       |       |       |       |       |       |       |       |
| SETUP4 | 012202 | 2926  | 2933*   | 2938  | 2940  |       |       |       |       |       |       |       |       |       |
| SINGLE | 000001 | 840*  | 1602    | 1658  | 1712  | 1766  | 1927* | 1951  | 1993  | 2033  | 2073  | 2114  | 2159  | 2204  |
| SINTFL | 002206 | 1097* | 1133*   | 1138* | 3529* |       |       |       |       |       |       |       |       |       |
| SLMSK  | 015664 | 1614* | 1617    | 1635* | 1670* | 1673  | 1689* | 1724* | 1727  | 1743* | 1778* | 1781  | 1797* | 3711* |
| SMLN   | 014226 | 3378  | 3390*   | 3404* | 3408* |       |       |       |       |       |       |       |       |       |
| ST     | 000200 | 1274* | 1293*   | 1312* | 1331* | 1350* | 1351* | 1370* | 1389* | 1408* | 1427* |       |       |       |
| STACK  | 001100 | 962*  | 967     | 1014  | 1056  |       |       |       |       |       |       |       |       |       |
| START  | 001100 | 955   | 963*    |       |       |       |       |       |       |       |       |       |       |       |
| STARTN | 001574 | 1013  | 1056*   | 1107  |       |       |       |       |       |       |       |       |       |       |
| STARTO | 001262 | 985   | 992     | 996*  | 3618  |       |       |       |       |       |       |       |       |       |
| START1 | 001324 | 1004  | 1007*   |       |       |       |       |       |       |       |       |       |       |       |
| STEP   | 000400 | 866*  | 3158    |       |       |       |       |       |       |       |       |       |       |       |
| STEPR  | 013344 | 1465* | 1491*   | 1497* | 1513* | 1538* | 1544* | 1573* | 1577* | 1582* | 1634* | 1688* | 1742* | 1796* |
|        |        | 1826* | 1875*   | 1888* | 1976* | 2016* | 2056* | 2096* | 2141* | 2186* | 2231* | 3158* |       |       |
| STORE  | 015120 | 3521* | 3578*</ |       |       |       |       |       |       |       |       |       |       |       |

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 CZDMKE.P11 11-JUL-84 08:45 CROSS REFERENCE TABLE -- USER SYMBOLS

|        |        |       |       |            |
|--------|--------|-------|-------|------------|
| T20201 | 010602 | 2488  | 2493# |            |
| T20202 | 010606 | 2489  | 2495# |            |
| T20203 | 010612 | 2490  | 2497# |            |
| T20204 | 010616 | 2491  | 2499# |            |
| T202E  | 010622 | 2492  | 2505# |            |
| T202E1 | 010666 | 2529  | 2534# |            |
| T202E2 | 010672 | 2530  | 2536# |            |
| T202E3 | 010676 | 2531  | 2538# |            |
| T202E4 | 010702 | 2532  | 2540# |            |
| T202F  | 010706 | 2533  | 2547# |            |
| T202F2 | 010766 | 2572  | 2577# |            |
| T202F3 | 010772 | 2573  | 2579# |            |
| T202F4 | 010776 | 2574  | 2581# |            |
| T202F5 | 011002 | 2575  | 2583# |            |
| T202G  | 011006 | 2576  | 2590# |            |
| T202G1 | 011052 | 2613  | 2618# |            |
| T202G2 | 011056 | 2614  | 2620# |            |
| T202G3 | 011062 | 2615  | 2622# |            |
| T202G4 | 011066 | 2616  | 2624# |            |
| T202H  | 011072 | 2617  | 2630# |            |
| T202H2 | 011136 | 2655  | 2660# |            |
| T202H3 | 011142 | 2656  | 2662# |            |
| T202H4 | 011146 | 2657  | 2664# |            |
| T202H5 | 011152 | 2658  | 2666# |            |
| T202I  | 011156 | 2659  | 2672# |            |
| T202I2 | 011236 | 2697  | 2702# |            |
| T202I3 | 011242 | 2698  | 2704# |            |
| T202I4 | 011246 | 2699  | 2706# |            |
| T202I5 | 011252 | 2700  | 2708# |            |
| T202J  | 011256 | 2701  | 2720# |            |
| T202JM | 011434 | 2763  | 2773# |            |
| T202JS | 011316 | 2724  | 2729# |            |
| T202J1 | 011414 | 2759  | 2764# |            |
| T202J2 | 011420 | 2760  | 2766# |            |
| T202J3 | 011424 | 2761  | 2768# |            |
| T202J4 | 011430 | 2762  | 2770# |            |
| T21    | 003620 | 1431# | 3716  |            |
| T22    | 003714 | 1455# | 3716  |            |
| T23    | 004030 | 1486# | 3716  |            |
| T24    | 004220 | 1528# | 3716  |            |
| T25    | 004372 | 1566# | 3716  |            |
| T26    | 004534 | 1602# | 3716  |            |
| T27    | 004774 | 1658# | 3716  |            |
| T3     | 002342 | 1183# | 3716  |            |
| T30    | 005230 | 1712# | 3716  |            |
| T300   | 010424 | 2419# | 3716  |            |
| T31    | 005464 | 1766# | 3716  |            |
| T32    | 005720 | 1821# | 3716  |            |
| T33    | 006104 | 1868# | 3716  |            |
| T4     | 002404 | 1196# | 3716  |            |
| T5     | 002446 | 1212# | 3716  |            |
| T6     | 002510 | 1226# | 3716  |            |
| T7     | 002564 | 1242# | 3716  |            |
| VECS1A | 001374 | 1017# | 1023  |            |
| VECSTR | 001354 | 1002  | 1006  | 1014# 1115 |
| VECST1 | 001500 | 1034  | 1037# |            |



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CROSS REFERENCE TABLE -- USER SYMBOLS

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 CZDMKE.P11 11-JUL-84 08:45 CROSS REFERENCE TABLE -- MACRO NAMES

|        |       |      |       |       |       |       |       |       |       |       |      |      |      |      |      |
|--------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|
| COMMEN | 839#  | 959# | 1143# | 1274# | 1351# | 1927# | 1935# | 2258# | 2419# | 3716# |      |      |      |      |      |
| EMTDEF | 903   | 904  | 905   | 906   | 907   | 908   | 909   | 910   | 911   | 912   | 913  | 914  | 915  | 916  | 917  |
|        | 918   | 919  | 920   | 921   | 922   | 923   | 924   | 925   | 926   | 927   | 959# |      |      |      |      |
| INTS   | 1139# | 1351 | 1370  | 1389  | 1408  |       |       |       |       |       |      |      |      |      |      |
| MUXS1  | 1139# | 1599 | 1655  | 1709  | 1763  | 1948  | 1990  | 2030  | 2070  |       |      |      |      |      |      |
| MUXS2  | 1139# | 2110 | 2155  | 2200  |       |       |       |       |       |       |      |      |      |      |      |
| NOINT  | 1139# | 1274 | 1293  | 1312  | 1331  |       |       |       |       |       |      |      |      |      |      |
| TM     | 960#  | 3716 |       |       |       |       |       |       |       |       |      |      |      |      |      |
| TS     | 958#  | 1143 | 1157  | 1170  | 1183  | 1196  | 1212  | 1226  | 1242  | 1258  | 1278 | 1297 | 1316 | 1335 | 1355 |
|        | 1374  | 1393 | 1412  | 1431  | 1455  | 1486  | 1528  | 1566  | 1602  | 1658  | 1712 | 1766 | 1821 | 1868 | 1935 |
|        | 1951  | 1993 | 2033  | 2073  | 2114  | 2159  | 2204  | 2258  | 2403  | 2419  |      |      |      |      |      |
| TSS    | 958#  |      |       |       |       |       |       |       |       |       |      |      |      |      |      |

. ABS. 017740 000

ERRORS DETECTED: 0

CZDMKE.CZDMKE/SOL/CRF=CZDMKE.P11  
 RUN-TIME: 4 8 1 SECONDS  
 RUN-TIME RATIO: 30/14=2.0  
 CORE USED: 11K (21 PAGES)