DU11

OFF-LINE COMBINED TEST

MD-11-DZDUF-C

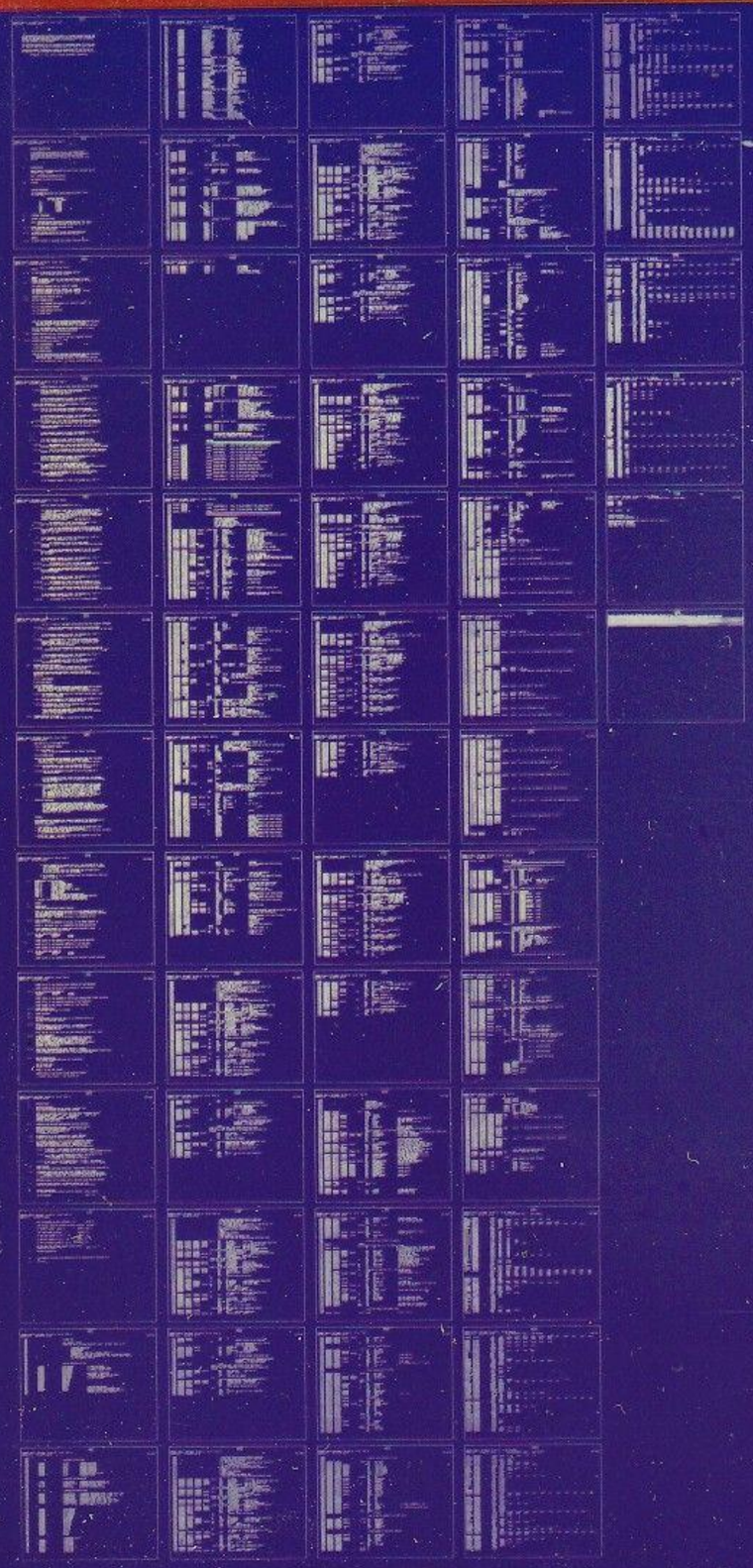
EP-DZDUF-C-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.A.



GENERAL DESCRIPTION

THIS DIAGNOSTIC CAN CHAIN 16 DU11'S. THIS MEANS THAT
16 DEVICES CAN BE SEQUENTIALLY EXERCISED. THE DIAGNOSTIC
MAKES ONE PASS BEFORE PROCEEDING TO THE NEXT DEVICE,
AND CONTINUES EXERCISING ALL DEVICES IN THIS FASHION UNTIL
HALTED.

2. REQUIREMENTS

POP-11 FAMILY STANDARD COMPUTER WITH OR WITHOUT HARDWARE SWITCH
REGISTER (LOC. 177570)

DU11 SYNCRONOUS/ISOCRONOUS OPTION

ONE CONSOLE TELETYPE OR EQUIVALENT

2.2 STORAGE

3. LOADING PROCEDURE

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

	STARTING ADDRESS FOR ABSOLUTE LOADER
4K	017500
8K	037500
12K	057500
16K	077500
20K	117500
24K	137500
28K	157500

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

NOTE: SOFTWARE SWITCH REGISTER IS DEFINED AS LOC. 176, WHILE
THE SOFTWARE DISPLAY REGISTER IS DEFINED AS LOC. 174.

4.1.1 AFTER PROGRAM LOAD (INITIAL PROGRAM START)
ALL CONSOLE SWITCHES DOWN

4.1.2 TO MODIFY DEVICE VECTOR AND CONTROL REGISTER ADDRESSES
AFTER PROGRAM RESTART OR TO RUN MULTIPLE DEVICES

SW00=1

4.1.3 TO START PROGRAM AT SELECTED TEST AFTER A PROGRAM RESTART

(ONLY IN SINGLE DEVICE TESTS)
SW01=1

4.1.4 TO LOCK ON SELECTED TEST AFTER A PROGRAM RESTART
(ONLY IN SINGLE DEVICE TESTS)

SW02=1
NOTE1: IN GENERAL SW01 WILL BE USED WHEN SW02=1 IS USED
NOTE2: WITHOUT SW01=1 "LOCK ON TEST" WILL DEFAULT TO TEST 1

4.2 STARTING ADDRESS

THE STARTING ADDRESS FOR ALL TESTS IS 000200

THE RETARTING ADDRESS FOR ALL TESTS IS 000200
THE STARTING ADDRESS TO ENTER A SELECTED TEST IS 000200
THE STARTING ADDRESS TO LOCK ON TEST IS 000200

4.3 PROGRAM AND/OR OPERATOR ACTION

4.3.1 INITIAL PROGRAM START

4.3.1.1 LOAD PROGRAM INTO MEMORY WITH ABSOLUTE LOADER

4.3.1.2 LOAD ADDRESS 000200

4.3.1.3 CLEAR CONSOLE SWITCHES

4.3.1.4 PRESS START

NOTE:IF THE SOFTWARE SWITCH REGISTER IS SELECTED THEN THE FOLLOWING
WILL BE TYPED AFTER THE PROGRAM IDENTIFIES ITSELF:
SWR=XXXXXX NEW= (REFER TO SECTION 5. FOR OPERATOR'S OPTION)

4.3.1.7 THE PROGRAM WILL TYPE "R" TO INDICATE THAT IT IS ABOUT
TO START TESTING ,AND THEN TESTING WILL BEGIN

4.3.2 PROGRAM RESTART WITH ALL SWITCHES DOWN

4.3.2.1 THE PROGRAH WILL TYPE "R" AND WILL COMMENCE TESTING

4.3.3 PROGRAM RESTART WITH SW00=1

4.3.3.1 LOAD ADDRESS 000200

4.3.3.2 SET SW00=1

4.3.3.3 PRESS START

NOTE:IF THE SOFTWARE SWITCH REGISTER IS SELECTED THEN THE FOLLOWING
WILL BE TYPED AFTER THE PROGRAM IDENTIFIES ITSELF:
SWR=XXXXXX NEW= (REFER TO SECTION 5. FOR OPERATOR'S OPTION)

4.3.3.4 THE PROGRAM WILL TYPE " 1ST DEVICE: RECEIVER CONTROL REGISTER

ADDRESS" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.5 TYPE IN THE ADDRESS OF THE FIRST RECEIVER CONTROL REGISTER ADDRESS OF THE DU11 TO BE TESTED FOLLOWED BY A <CARRIAGE RETURN>

IF AN INCORRECT ADDRESS IS TYPED ,THE PROGRAM WILL TYPE "?" AND WILL THEN REPEAT THE MESSAGE OF 4.3.3.4

4.3.3.6 THE PROGRAM WILL TYPE "VECTOR ADDRESS-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.7 TYPE IN THE BASE RECEIVER INTERRUPT VECTOR ADDRESS FOR THE DU11 TO BE TESTED FOLLOWED BY A <CARRIAGE RETURN>

IF AN INCORRECT ADDRESS IS TYPED ,THE PROGRAM WILL TYPE "?" AND WILL THEN REPEAT THE MESSAGE OF 4.3.3.6

4.3.3.8 THE PROGRAM WILL TYPE "ARE YOU RUNNING MULTIPLE DEVICES ?" (Y OR N)-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.9 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED BY A <CARRIAGE RETURN>

IF AN INCORRECT ANSWER IS GIVEN, THE PROGRAM WILL TYPE "?" AND WILL THEN REPEAT THE MESSAGE OF 4.3.3.8

IF A "NO" ANSWER IS GIVEN: JUMP TO SECTION 4.3.3.12
IF A "YES" ANSWER IS GIVEN:THE NEXT QUESTION IS ASKED

4.3.3.10 THE PROGRAM WILL TYPE "LAST DEVICE:RECEIVER CONTROL REGISTER ADDRESS-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.11 TYPE IN THE ADDRESS OF THE LAST RECEIVER CONTROL REGISTER ADDRESS OF THE DU11 TO BE TESTED FOLLOWED BY A <CARRIAGE RETURN>

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?" AND WILL THEN REPEAT THE MESSAGE OF 4.3.3.10
NOTE:ALL ADDRESSES SHALL BE CONTIGUOUS

4.3.3.11.1 IF AN "OUT OF RANGE" ADDRESS IS TYPED IE. MORE THAN 16 (10) DEVICES AWAY (UPWARDS).....THE PROGRAM WILL TYPE "OUT OF RANGE:RETYPE LAST DEVICE RXCSR ADDRESS-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.11.2 TYPE IN THE ADDRESS OF THE LAST RECEIVER CONTROL REGISTER ADDRESS OF THE DU11 TO BE TESTED FOLLOWED BY A <CARRIAGE RETURN>

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?"

F01

AND WILL REPEAT THE MESSAGE OF 4.3.3.11.1

IF A DEVICE ADDRESS LOWER THAN 1ST DEVICE ADDRESS IS TYPED.....
....SCHOOLS OUT.....THERE IS NO PROTECTION FOR THIS.
THE PROGRAM WILL DEFAULT TO TWO DEVICES ACTIVE (UPWARDS FROM
1ST DEVICE ADDRESS).THE SAME APPLIES TO IDENTICAL ADDRESSES
TYPED FOR FIRST AND LAST DEVICE.
OBSERVE LOCATION @ ACTREG: SEE SECTION 7.2

4.3.3.12 THE PROGRAM WILL TYPE "DU PRIORITY LEVEL-" AND
WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.13 TYPE IN THE APPROPRIATE DEVICE PRIORITY LEVEL OF THE
DU11 OR DU11'S TO BE TESTED FOLLOWED BY A <CARRIAGE RETURN>
(NOTE THAT ALL MULTIPLE DEVICES MUST BE AT THE SAME PRIORITY
LEVEL). IE "5"

IF AN INCORRECT LEVEL IS TYPED ,THE PROGRAM WILL TYPE "?"
AND REPEAT THE MESSAGE OF 4.3.3.12

4.3.3.14 THE PROGRAM WILL TYPE "# OF SYNC CHARS
SELECTED (1 OR 2)-" AND WAIT FOR AN INPUT FROM THE TELETYPE
KEYBOARD

4.3.3.15 TYPE IN THE APPROPRIATE ANSWER "1" OR "2" FOLLOWED
BY A <CARRIAGE RETURN>.(NOTE:ALL MULTIPLE DEVICES MUST
BE THE SAME)

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?"
AND WILL REPEAT THE MESSAGE OF 4.3.3.14

4.3.3.16 THE PROGRAM WILL TYPE " IS SEC XMIT JUMPER #6 IN ? (Y OR N)-"
AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.17 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED
BY A <CARRIAGE RETURN>.(NOTE THAT ALL MULTIPLE DEVICES
MUST BE THE SAME)

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?"
AND WILL REPEAT THE MESSAGE OF 4.3.3.16

4.3.3.18 THE PROGRAM WILL TYPE "IS SEC REC JUMPER # 5 IN ?
(Y OR N)-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.19 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED
BY A <CARRIAGE RETURN>. (NOTE: ALL MULTIPLE DEVICES MUST BE THE SAME)

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?"
AND WILL REPEAT THE MESSAGE OF 4.3.3.18

4.3.3.20 THE PROGRAM WILL TYPE "IS OPT CLR ENABLE JUMPER

8 4 IN ? (Y OR N)-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.21 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED BY A <CARRIAGE RETURN>. (NOTE: ALL MULTIPLE DEVICES MUST BE THE SAME)

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?" AND WILL REPEAT THE MESSAGE OF 4.3.3.20

4.3.3.22 THE PROGRAM WILL TYPE "ARE YOU RUNNING IN MAINT. MODE EXTERNAL ? AND .....DO YOU HAVE THE EXTERNAL MODEM BYPASS JUMPER CONNECTOR ON ? (Y OR N)-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.3.23 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED BY A <CARRIAGE RETURN>. (NOTE: ALL MULTIPLE DEVICES MUST BE THE SAME)

IF AN INCORRECT ANSWER IS TYPED ,THE PROGRAM WILL TYPE "?" AND WILL REPEAT THE MESSAGE OF 4.3.3.22

4.3.3.24 THE PROGRAM WILL TYPE "R" TO INDICATE THAT IT HAS STARTED AND WILL COMMENCE TESTING AT TEST 1

4.3.4 PROGRAM RESTART WITH SW01=1
NOTE: THIS WILL ONLY WORK WHEN A SINGLE DEVICE IS SELECTED
,,,IT WILL NOT WORK IF MULTIPLE DEVICES ARE SELECTED

IF MULTIPLE DEVICES WERE PREVIOUSLY SELECTED,LOAD 000200, AND SELECT SW00=1 AND ANSWER "NO" TO THE MULTIPLE DEVICE QUESTION SEE 4.3.3

4.3.4.1 LOAD 000200

4.3.4.2 SET SW01=1

4.3.4.3 PRESS START
NOTE:IF THE SOFTWARE SWITCH REGISTER IS SELECTED THEN THE FOLLOWING WILL BE TYPED AFTER THE PROGRAM IDENTIFIES ITSELF:
SWR=XXXXXX NEW= (REFER TO SECTION 5. FOR OPERATOR'S OPTION)

4.3.4.4 THE PROGRAM WILL TYPE "TEST PC-" AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.4.5 TYPE IN THE ADDRESS OF THE TEST AT WHICH THE PROGRAM IS TO BE STARTED FOLLOWED BY A <CARRIAGE RETURN>

4.3.4.6 THE PROGRAM WILL TYPE "R" TO INDICATE THAT IT HAS STARTED TESTING AT THE SELECTED TEST

NOTE: CARE MUST BE TAKEN WHEN THIS FEATURE IS USED SINCE THERE IS NO PROTECTION AGAINST SELECTING AN ADDRESS THAT IS IN THE MIDDLE OF A TEST

4.3.5 PROGRAM RESTART WITH SW02 =1
NOTE: THIS WILL ONLY WORK WHEN A SINGLE DEVICE IS SELECTED

SEE NOTE IN 4.3.4 FOR MORE DETAILS

4.3.5.1 LOAD ADDRESS 000200

4.3.5.2 SET SW02 =1
NOTE: IT MAY BE ADVANTAGEOUS TO SET SW01=1 (OPTIONAL)

4.3.5.3 PRESS START

NOTE:IF THE SOFTWARE SWITCH REGISTER IS SELECTED THEN THE FOLLOWING
WILL BE TYPED AFTER THE PROGRAM IDENTIFIES ITSELF:
SWR=XXXXXX NEW= (REFER TO SECTION 5. FOR OPERATOR'S OPTION)

4.3.5.4 THE PROGRAM WILL TYPE "LOCK ON SELECTED TEST ? (Y OR N)-"
AND WAIT FOR AN INPUT FROM THE TELETYPE KEYBOARD

4.3.5.5 TYPE IN THE APPROPRIATE ANSWER YES OR NO FOLLOWED BY A
<CARRIAGE RETURN>

IF A NO ANSWER IS GIVEN: THIS LOCK ON TEST WILL BE IGNORED
AND THE PROGRAM WILL TYPE "R" TO INDICATE THAT IT HAS STARTED
TESTING AT TEST 1

4.3.5.6 IF A YES ANSWER WAS GIVEN:THE PROGRAM WILL ACT AS FOLLOWS...
THE PROGRAM WILL TYPE "R" TO INDICATE THAT IT HAS STARTED
TESTING AT TEST 1 AND WILL REMAIN IN TEST 1 UNTIL HALTED
OR IF ANY KEY IS STRUCK ON THE TELETYPE ,THE PROGRAM
WILL FREEZE ON THE NEXT TEST UNTIL A KEY IS STRUCK ON
THE TELETYPE AND SO FORTH THRU THE PROGRAM. IF SW01 =1 IT
WILL PERFORM AS IN SECTION 4.3.4 ALLOWING ONE TO FREEZE
ON A SELECTED TEST RATHER THAN DEFAULTING TO TEST 1

5. OPERATING PROCEDURE

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.

5.1 OPERATIONAL SWITCH SETTINGS

SW15 =1	HALT ON ERROR
SW14 =1	LOOP ON CURRENT TEST
SW13 =1	INHIBIT ERROR TYPEOUT
SW11 =1	INHIBIT ITERATIONS
SW10 =1	ESCAPE TO NEXT TEST ON ERROR
SW08 =1	LOOP ON ERROR
SW02 =1	LOCK ON TEST
SW01 =1	RESTART PROGRAM AT SELECTED TEST
SW00 =1	RESELECT VECTOR AND CONTROL REGISTER ADRESSES &PARAMETERS AFTER A PROGRAM RESTART

TO INHIBIT "END OF PASS" TYPEOUT - TURN TELETYPE OFF

6. ERRORS

6.1 ERROR HALTS
THERE ARE FOUR DISTINCT ERROR TYPEOUTS

NOTE: IF THE SOFTWARE SWITCH REGISTER IS TO BE CHANGED AFTER A HALT
THE THE OPERATOR IS REQUIRED TO TYPE A <↑G> BEFORE DEPRESSING CONTINUE.
THE FOLLOWING WILL BE TYPED:
SWR=XXXXXX NEW= (REFER TO SECTION 5. FOR OPERATOR OPTION)

6.1.1 PC+2 = ERROR PC
WHERE PC +2 IS THE ADDRESS OF THE CALL TO THE ERROR HANDLER +2

REFER TO THE ABOVE "HLT" IN DIAGNOSTIC FOR ERROR DESCRIPTION

CHECK ADDRESS @ RXCSR: TO LOCATE THE DEVICE PRESENTLY UNDER
TEST WHEN RUNNING MULTIPLE DEVICES

6.1.2 PC +2 = REGISTER ERROR PC

REGISTER	EXPECTED	ACTUAL
16XXXX	YYYYYY	ZZZZZZ

WHERE 16XXXX IS THE ADDRESS OF THE FAILING DEVICE REGISTER

WHERE YYYYYY IS THE EXPECTED CONTENTS OF THAT REGISTER

WHERE ZZZZZZ IS THE ACTUAL CONTENTS OF THAT REGISTER

6.1.3 PC +2 = RECEIVER ERROR PC

REGISTER	EXPECTED	ACTUAL
16XXXX	YYYYYY	ZZZZZZ

WHERE 16XXXX IS THE ADDRESS OF THE FAILING RECEIVER (RXDBUF) REGISTER

WHERE YYYYYY IS THE EXPECTED DATA CONTENTS OF THAT REGISTER

WHERE ZZZZZZ IS THE ACTUAL DATA CONTENTS OF THAT REGISTER

6.1.4 PC +2 = TRANSMITTER ERROR PC

REGISTER	EXPECTED	ACTUAL
16XXXX	YYYYYY	ZZZZZZ

WHERE 16XXXX IS THE ADDRESS OF THE FAILING TRANSMITTER (TXCSR) REGISTER

WHERE YYYYYY IS THE EXPECTED CONTENTS OF THAT REGISTER

WHERE ZZZZZZ IS THE ACTUAL CONTENTS OF THAT REGISTER

6.1.5 ERROR DESCRIPTIONS
SEE LISTINGS FOR DETAILS OF ERRORS

6.2 ERROR RECOVERY

6.2.1 SW15 =0
IF THE PROGRAM IS RUN WITH SW15 =0 ,NO OPERATOR ACTION IS
REQUIRED TO CONTINUE TESTING

6.2.2 SW15 =1
IF THE PROGRAM IS RUN WITH SW15 =1 ,TO CONTINUE TESTING
AFTER THE PROGRAM HAS HALTED ,PRESS THE PROCESSOR
CONSOLE "CONTINUE SWITCH"

NOTE: THE PC + 2 OF THE "HLT" WILL BE DISPLAYED IN THE DATA LIGHTS

6.2.3 ILLEGAL INTERRUPTS
IF AN INTERRUPT OCCURS TO A VECTOR ADDRESS NOT SELECTED
DURING PROGRAM INITIALIZATION, THE PROGRAM WILL HALT IN
THE TRAP CATCHER. THE ADDRESS AT WHICH THE PROGRAM
HALTS IS 2 GREATER THAN THE ADDRESS TO WHICH THE INTERRUPT
OCCURED. THE PROGRAM MUST BE RESTARTED AT 000200 TO
RECOVER FROM THIS ERROR.

6.2.4 ADDITIONAL TROUBLESHOOTING AIDS ERRCNT: & PASCNT:
CHECK THESE TWO TAG LOCATIONS FOR TOTAL # OF ERRORS AND PASSES RESPECTIVELY.
LOADING 000200 AND RESTARTING WILL CLEAR THESE LOCATIONS.

6.3 END OF PASS ROUTINE
THIS TYPEOUT IS MENTIONED HERE FOR CONVENIENCE
IT IS IN THE FORM:

END OF PASS TAPE Y
16XXXX = DEVICE

WHERE Y IS THE TAPE LOADED

WHERE 16XXXX IS THE DEVICE'S BASE REGISTER ADDRESS

TO INHIBIT THIS TYPEOUT - TURN TELETYPE OFF

7. RESTRICTIONS

7.1 MULTIPLE DEVICES
UP TO 16(10) DEVICES MAY BE TESTED. HOWEVER, THEY
MUST HAVE CONTIGUOUS ADDRESSES AND VECTORS

NOTE: IF ALL DEVICES UNDER TEST HAVE THE SAME INTERRUPT VECTOR
YOU CAN CHANGE "ZERO: ADD #10,BASEIV ;NEXT BLOCK
(VECTORS)" TO "ZERO: ADD #0,BASEIV";
THEREBY THE VECTOR ADDRESSES WILL NOT BE
UPDATED AFTER EACH PASS.

7.2 DISQUALIFYING DEVICES WHEN RUNNING MULTIPLE DEVICES

WHEN RUNNING MULTIPLE DEVICES , AN ACTIVE BIT IS SET
FOR EACH DEVICE RUNNING UNDER TEST IE. BIT 0 FOR
DEVICE 0 ,BIT 15 FOR DEVICE 15
TO DISQUALIFY DEVICES:

7.2.1 IF DEVICE 0 IS TO BE DISQUALIFIED ,SIMPLY RESTART
PROGRAM WITH SW00 =1 AND OMIT THE FIRST DEVICE.

7.2.2 IF HOWEVER, DEVICES 1 THRU 15 OR ANY COMBINATION THEREOF
ARE TO BE DISQUALIFIED...LOAD THE LOCATION OF ACTREG:
OBSERVE THE ACTIVE BITS (ACTIVE =1, NONACTIVE = 0)
AND DEPOSIT 0 WHERE THOSE DEVICES ARE TO BE DISQUALIFIED

7.2.2.1 TO RESTART...LOAD 000200 IN SWR AND DEPRESS START....
THE PROGRAM WILL CONTINUE WITH THE DEVICE IT WAS IN BEFORE HALTING.

7.2.2.2 .....OR .....LOAD 000200 WITH SW00 =1 AND DEPRESS START....
ANSWER THE QUESTION :1ST DEVICE ; ETC.....
....THE PROGRAM WILL CONTINUE WITH DEVICE 0

7.2.2.3 IF ALL DEVICES ARE DISQUALIFIED BY MISTAKE THE PROGRAM
WILL TYPEOUT AN ERROR MESSAGE.....LOAD & START AT 000200

7.3 CABLE DELAYS
NOTE: EXTERNAL LOOP BACK TESTS ONLY (MODEM CABLE WITH H315 CONNECTOR ON)

7.3.1 TO PROVIDE SUFFICIENT DELAY FOR CLOCK SIGNAL OVER THE CABLE,
LOCATION "HOLD:" MUST BE MODIFIED TO ACCOMODATE FOR FASTER MACHINES.
PRESENTLY "HOLD:" =20 IS SUFFICIENT TIME ON AN 11/20 MACHINE.
IF RUNNING ON AN 11/40 OR AN 11/45 "HOLD:" MUST BE PATCHED TO 40

BASICALLY DON'T TRY TO EXCEED 10K TO 12K RATE USING THE EIA DRIVERS

7.4 TO USE THE "XOR" TESTER ,THE BRANCH AROUND THE "XOR"
CODE MUST BE PATCHED TO A "NOP". (SEE LISTINGS FOR DETAILS)

8. DEFAULT PARAMETERS:
1ST DEVICE: RECEIVER CONTROL REGISTER ADDRESS- RXCSR: 160040

VECTOR ADDRESS- DURIV: 770

ARE YOU RUNNING MULTIPLE DEVICES ?- NO MULTD: 0

LAST DEVICE: RECEIVER CONTROL REGISTER ADDRESS- LASTADD: 0

DU PRIORITY LEVEL- LEVEL 5 DUPRT: LEVEL 5

OF SYNC CHARS SELECTED - 2 SYNCNO: 377

IS SEC XMIT JUMPER # 6 IN ?- YES SEXMIT: 377

IS SEC REC JUMPER # 5 IN ?- YES SEREC: 377

IS OPT CLR ENABLE JUMPER # 4 IN ?- YES OPTCLR: 377

DO YOU HAVE THE EXTERNAL MODEM BYPASS JUMPER CONNECTOR ON (H315)- YES JMRBY: 377

9. PROGRAM DESCRIPTION

10. FLOW CHARTS: RECEIVER FLOW,TRANSMITTER FLOW,TRANSMITTER & RECEIVER FLOW

11. LISTINGS

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                                .ENABLE ABS

                                ;DU11 DZDUF-C TAPE F
                                ;COPYRIGHT 1973, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754

                                        ;STARTING PROCEDURE
                                        ;LOAD PROGRAM
                                        ;PRESS START
                                        ;PROGRAM WILL TYPE "DU11 DZDUF-C TAPE F "
                                        ;PROGRAM WILL TYPE "R" TO INDICATE THAT TESTING HAS STARTED
                                        ;AT THE END OF A PASS, PROGRAM WILL TYPE "END OF PASS TAPE F"
                                        ;AND THEN RESUME TESTING


                                ;SWITCH REGISTER OPTIONS

  100000                        SW15=100000             ;=1,HALT ON ERROR
  040000                        SW14=40000              ;=1,LOOP ON CURRENT TEST
  020000                        SW13=20000              ;=1,INHIBIT ERROR TYPEOUT
  010000                        SW12=10000
  004000                        SW11=4000               ;=1,INHIBIT ITERATIONS
  002000                        SW10=2000               ;=1,ESCAPE TO NEXT TEST ON ERROR
  001000                        SW09=1000               ;=1,LOOP WITH CURRENT DATA
  000400                        SW08=400                ;=1,LOOP ON ERROR
  000100                        SW06=100
  000040                        SW05=40
  000020                        SW04=20
  000010                        SW03=10
  000004                        SW02=4                  ;LOCK ON TEST SELECT
  000002                        SW01=2                  ;RESTART PROGRAM AT SELECTED TEST
  000001                        SW00=1                  ;RESELECT VECTOR AND CONTROL REGISTER
                                                        ;ADDRESS AFTER PROGRAM RESTART
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                        ;REGISTER DEFINITIONS
                        ;
000000                  R0=%0           ;GENERAL REGISTER
000001                  R1=%1           ;GENERAL REGISTER
000002                  R2=%2           ;GENERAL REGISTER
000003                  R3=%3           ;GENERAL REGISTER
000004                  R4=%4           ;GENERAL REGISTER
000005                  R5=%5           ;GENERAL REGISTER
000006                  SP=%6           ;PROCESSOR STACK POINTER
000007                  PC=%7           ;PROGRAM COUNTER
                        ;
                        ;LOCATION EQUIVALENCIES
                        ;
177570                  DSWR=177570     ;HARDWARE SWITCH REGISTER LOC.
177570                  DLIGHTS=177570  ;HARDWARE DISPLAY REGISTER LOC.
177776                  PS=177776       ;PROCESSOR STATUS WORD
001100                  STACK=1100      ;START OF PROCESSOR STACK
                        ;
                        ;INSTRUCTION DEFINITIONS
                        ;
005746                  PUSH1SP=5746    ;DECREMENT PROCESSOR STACK 1 WORD =TST -(SP)
005726                  POP1SP=5726     ;INCREMENT PROCESSOR STACK 1 WORD =TST (SP)+
010046                  PUSHR0=10046    ;SAVE R0 ON STACK =MOV R0,-(SP)
012600                  POPR0=12600     ;RESTORE R0 FROM STACK =MOV (SP)+,R0
024646                  PUSH2SP=24646   ;DECREMENT STACK TWICE =CMP -(SP),-(SP)
022626                  POP2SP=22626    ;INCREMENT STACK TWICE =CMP (SP)+,(SP)+
                        .EQUIV  EMT,HLT ;BASIC DEFINITION OF ERROR CALL
                        ;
                        ;
100000                  BIT15=100000
040000                  BIT14=40000
020000                  BIT13=20000
010000                  BIT12=10000
004000                  BIT11=4000
002000                  BIT10=2000
001000                  BIT9=1000
000400                  BIT8=400
000200                  BIT7=200
000100                  BIT6=100
000040                  BIT5=40
000020                  BIT4=20
000010                  BIT3=10
000004                  BIT2=4
000002                  BIT1=2
000001                  BIT0=1
                        ;
                        ;PROCESSER LEVELS
000340                  LEVEL7=340
000300                  LEVEL6=300
000240                  LEVEL5=240
000200                  LEVEL4=200
000140                  LEVEL3=140
000100                  LEVEL2=100
000040                  LEVEL1=040
000000                  LEVEL0=000
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                        ;REGISTER DEFINITIONS
                                ;RXCSR BIT DEFINITIONS
100000                  DSC=BIT15               ;DATA SET CHANGE
040000                  RING=BIT14              ;RING
020000                  CTS=BIT13               ;CLR TO SEND
010000                  CARDET=BIT12            ;CARRIER DETECT
004000                  RECACT=BIT11            ;REC ACTIVE
002000                  SRD=BIT10               ;SEC REC DATA
001000                  DSR=BIT9                ;DATA SET RDY
000400                  STPSYN=BIT8             ;STRIP SYNC
000200                  RXDONE=BIT7             ;REC DONE
000100                  RINTEN=BIT6             ;REC INTR ENABLE
000040                  DSINTE=BIT5             ;DSC INTR ENABLE
000020                  SYNSCH=BIT4             ;SYNC SEARCH
000010                  STD=BIT3                ;SEC XMIT DATA
000004                  RTS=BIT2                ;REQ TO SEND
000002                  DTR=BIT1                ;DATA TERM RDY
000001                  VOID=BIT0
                                ;RXDBUF BIT DEFINITIONS
100000                  RXERR=BIT15             ;REC ERROR
040000                  OVRRUN=BIT14            ;OVERRUN
020000                  FRMERR=BIT13            ;FRAME ERROR
010000                  PARER=BIT12             ;PARITY ERROR
                                ;PARCSR BIT DEFINITIONS
001000                  PAREN=BIT9              ;PARITY ENABLE
000400                  EVPAR=BIT8              ;EVEN PARITY SENSE
                                ;PARCSR WRD DEFINITIONS
030000                  SYNINT=30000            ;SYNC EXTERNAL MODE
020000                  SYNEXT=20000            ;SYNC INTERNAL MODE
000000                  ISYMOD=0                ;ISOC MODE
000000                  FIVE=0                  ;WORD LENGTH 5 BITS
002000                  SIX=2000                ;WORD LENGTH 6 BITS
004000                  SEVEN=4000              ;WORD LENGTH 7 BITS
006000                  EIGHT=6000              ;WORD LENGTH 8 BITS
000000                  NOPAR=0                 ;NO PARITY
001000                  ODDPAR=1000             ;ODD PARITY
001400                  EVEPAR=1400             ;EVEN PARITY
                                ;TXCSR BIT DEFINITIONS
100000                  DNA=BIT15               ;DATA NOT AVAILABLE
040000                  MTDATA=BIT14            ;MAINT DATA
020000                  CLK=BIT13               ;CLK
002000                  BITW=BIT10              ;BIT WINDOW
000400                  MRESET=BIT8             ;MASTER RESET
000200                  TXDONE=BIT7             ;XMIT DONE
000100                  TXINTE=BIT6             ;XMIT INTR ENABLE
000040                  DNAINTE=BIT5            ;DNA INTR ENAB
000020                  SEND=BIT4               ;SEND
000010                  HDXEN=BIT3              ;HDX/FDX
000001                  BREAK=BIT0              ;BREAK
                                ;TXCSR WRD DEFINITIONS
000000                  USER=0                  ;USER MODE
004000                  MINT=4000               ;MAINT INT MODE
010000                  MEXT=10000              ;MAINT EXT MODE
014000                  SYSTST=14000            ;SYSTEM TEST MODE
                                ;TRAPCATCHER FOR ILLEGAL INTERRUPTS
```

```
                                ;STANDARD INTERRUPT VECTORS
                        .=24
000024  007332                  .PFAIL          ;POWER FAIL HANDLER
000026  000340                  340             ;SERVICE AT LEVEL 7
000030  007062                  .HLT            ;ERROR HANDLER
000032  000340                  340             ;SERVICE AT LEVEL 7
000034  007030                  .TRPSRV         ;GENERAL HANDLER DISPATCH SERVICE
000036  000340                  340             ;SERVICE AT LEVEL 7

                                ;SOFTWARE SWITCH REGISTER

                        .=174
000174  000000          DISPREG:.WORD 0         ;SOFTWARE DISPLAY REG.
000176  000000          SWREG:  .WORD 0         ;SOFTWARE SWITCH REGISTER
000200  000167  001054          JMP     .START  ;GO TO START OF PROGRAM


                        .=1100

                                ;INDIRECT POINTERS

001100  177570          SWR:    177570          ;SWITCH REGISTER POINTER
001102  177570          LIGHTS: 177570          ;DISPLAY REGISTER POINTER
001104  177560          TKCSR:  177560          ;TELETYPE KEYBOARD CONTROL REGISTER
001106  177562          TKDBR:  177562          ;TELETYPE KEYBOARD DATA BUFFER
001110  177564          TPCSR:  177564          ;TELEPRINTER CONTROL REGISTER
001112  177566          TPDBR:  177566          ;TELEPRINTER DATA BUFFER

                                ;PROGRAM CONTROL PARAMETERS

001114  000000          RTRN:   0               ;SCOPE ADDRESS FOR LOOP ON TEST
001116  000000          NEXT:   0               ;ADDRESS OF NEXT TEST TO BE EXECUTED
001120  000000          LOCK:   0               ;ADDRESS FOR LOCK ON CURRENT DATA
001122  000000          ICOUNT: 0               ;NUMBER OF ITERATIONS THAT CURRENT TEST WILL BE EXECUTED
001124  000000          LPCNT:  0               ;NUMBER OF ITEREATIONS COMPLETED
001126  000000          TSTNO:  0               ;NUMBER OF TEST IN PROGRESS
001130  000000          PASCNT: 0               ;NUMBER OF PASSES COMPLETED
001132  000000          ERRCNT: 0               ;TOTAL NUMBER OF ERRORS
001134  000000          LSTERR: 0               ;PC OF LAST ERROR CALL

                                ;PROGRAM VARIABLES

001136  000020          HOLD:   20              ;TEMPORARY STORAGE=DELAY TIME FOR CABLES
001140  000000          SHIFT:  0               ;TEMPORARY STORAGE= # OF SHIFTS PER CHAR
001142  000000          COUNT:  0               ;TEMPORARY STORAGE= # OF TIMES A CHAR WILL BE SENT
001144  000000          TEMP1:  0               ;TEMPORARY STORAGE
001146  000000          TEMP2:  0               ;TEMPORARY STORAGE
001150  000000          TEMP3:  0               ;TEMPORARY STORAGE
001152  000000          TEMP4:  0               ;TEMPORARY STORAGE
001154  000000          TEMP5:  0               ;TEMPORARY STORAGE
001156  000000          SAVR0:  0               ;R0 STORAGE
001160  000000          SAVR1:  0               ;R1 STORAGE
001162  000000          SAVR2:  0               ;R2 STORAGE
```

```
 752  001164  000000          SAVR3:  0       ;R3 STORAGE
 753  001166  000000          SAVR4:  0       ;R4 STORAGE
 754  001170  000000          SAVR5:  0       ;R5 STORAGE
 755  001172  000000          SAVSP:  0       ;STACK POINTER STORAGE
 756  001174  000000          SAVPC:  0       ;PROGRAM COUNTER STORAGE
```

```
                                ;PROGRAM CONVERSATIONAL PARAMETERS
001176      377     SYNCNO: .BYTE   377             ;# OF SYNC CHARS REQ'D FOR SYNC'ZATION
001177      377     SEXMIT: .BYTE   377             ;SEC XMIT JUMPER "IN"
001200      377     SEREC:  .BYTE   377             ;SEC REC JUMPER "IN"
001201      377     OPTCLR: .BYTE   377             ;OPTIONAL JUMPER CLR "IN"
001202      000     MULTD:  .BYTE   0               ;NO MULTIPLE DEVICE FLAG
001203      377     JMRBY:  .BYTE   377             ;EXTERNAL MODEM BYPASS JUMPER "IN"
                    .EVEN

                                ;PROGRAM MULTIPLE DEVICE PARAMETERS
001204  000000      BASEADD:        0               ;PROG CONTROLLED 1ST DEVICE ADDR
001206  000000      KEEPADD:        0               ;SAVED 1ST DEVICE ADDR
001210  000000      LASTADD:        0               ;LAST DEVICE RXCSR ADDR
001212  000000      BASEIV:         0               ;PROG CONTROLLED IV
001214  000000      KEEPIV:         0               ;SAVED INTR VECTOR
001216  000000      ACTREG:         0               ;ACTIVE REGISTER ,,,MODIFY THIS
                                                    ;LOCATION TO DISQUALIFY OR QUALIFY
                                                    ;DEVICES (1= RUN,,0= DON'T RUN)
001220  000000      ROTADD:         0               ;ROTATING POINTER FOR ACTREG..POINTS
                                                    ;TO DEVICE PRESENTLY UNDER TEST WHEN RUNNING MULTIPLE DE

                                ;PROGRAM CONTROL FLAGS

001222      000     INIFLG: .BYTE   0               ;PROGRAM INITIALIZATION FLAG
001223      000     STFLG:  .BYTE   0               ;TEST START FLAG
001224      000     ERRFLG: .BYTE   0               ;ERROR OCCURED FLAG
001225      000     LOKFLG: .BYTE   0               ;LOCK ON CURRENT TEST FLAG

                                ;DEFINITIONS FOR TRAP SUBROUTINE CALLS
                                ;POINTERS TO SUBROUTINES CAN BE FOUND
                                ;IN THE TABLE IMMEDIATLY FOLLOWING THE DEFINITIONS

001226                  .TRPTAB:
                        ;*******************************************************************************
                        ;*******************************************************************************
        104400          SCOPE=TRAP+0    ;CALL TO SCOPE LOOP AND ITERATION HANDLER
001226  005614  .SCOPE
        104401          SCOP1=TRAP+1    ;CALL TO LOOP ON CURRENT DATA HANDLER
001230  006000  .SCOP1
        104402          TYPE=TRAP+2     ;CALL TO TELETYPE OUTPUT ROUTINE
001232  006020  .TYPE
        104403          INSTR=TRAP+3    ;CALL TO ASCII STRING INPUT ROUTINE
001234  006060  .INSTR
        104404          INSTER=TRAP+4   ;CALL TO INPUT ERROR HANDLER
001236  006176  .INSTER
        104405          PARAM=TRAP+5    ;CALL TO NUMERICAL DATA INPUT ROUTINE
001240  006230  ..PARAM
        104406          SAVOS=TRAP+6    ;CALL TO REGISTER SAVE ROUTINE
001242  006444  .SAVOS
        104407          RESOS=TRAP+7    ;CALL TO REGISTER RESTORE ROUTINE
001244  006504  .RESOS
        104410          CONVRT=TRAP+10  ;CALL TO DATA OUTPUT ROUTINE
001246  006536  .CONVRT
        104411          CNVRT=TRAP+11   ;CALL TO DATA OUTPUT ROUTINE WITHOUT CR/LF
001250  006542  .CNVRT
        104412          SETFLG=TRAP+12  ;CALL TO FLAG SET ROUTINE
```

```
                                .SETFLG
                                        CKSWR=TRAP+13   ;CALL TO ALLOW SWREG TO BE LOADED FROM TTY
                                .CKSWR
                                        CNTLU=TRAP+14   ;CALL TO ALLOW LOADING  OF SWREG FROM TTY
                                .CNTLU
                                ;*****************************************************************
                                ;*****************************************************************

                                        ;PROGRAM INITIALIZATION
                                        ;LOCK OUT INTERRUPTS
                                        ;SET UP PROCESSOR STACK
                                        ;SET UP POWER FAIL VECTOR
                                        ;CLEAR PROGRAM CONTROL FLAGS AND COUNTS
                                        ;TYPE TITLE MESSAGE

001260  012767  000340  176510  .START: MOV     #340,PS                 ;LOCK OUT INTERRUPTS
001266  012706  001100          MOV     #STACK,SP               ;SET UP STACK
001272  012737  007332  000024  MOV     #.PFAIL,@#24            ;SET UP POWER FAIL VECTOR
001300  005067  177620          CLR     LPCNT                   ;CLEAR # OF ITERATION COMPLETED LOCATION
001304  105067  177713          CLRB    STFLG                   ;CLEAR START FLAG
001310  005067  177614          CLR     PASCNT                  ;CLEAR PASS COUNT
001314  105067  177704          CLRB    ERRFLG                  ;CLEAR ERROR FLAG
001320  005067  177606          CLR     ERRCNT                  ;CLEAR ERROR COUNT
001324  005067  177604          CLR     LSTERR                  ;CLEAR LAST ERROR POINTER
001330  012767  000001  177570  MOV     #1,TSTNO                ;SET UP FOR TEST 1
001336  012767  001260  177550  MOV     #.START,RTRN            ;SET UP FOR POWER FAIL BEFORE
                                                                ;TESTING STARTS
001344  105767  177652          TSTB    INIFLG                  ;HAS INITIALIZATION BEEN PERFORMED
001350  001004                  BNE     ONCE
001352  104402  007652          TYPE    ,MTITLE                 ;TYPE TITLE MESSAGE
001356  105167  177640          COMB    INIFLG                  ;IF NOT SET FLAG AND DO
001362  012767  177570  177510  ONCE:   MOV     #DSWR,SWR               ;RELOAD HARDWARE SWITCH REGISTER INTO POINTER
001370  012767  177570  177504          MOV     #DLIGHTS,LIGHTS         ;RELOAD HARDWARE DISPLAY REGISTER INTO POINTER
001376  013746  000006          MOV     @#6,-(SP)               ;SAVE VECTORS
001402  013746  000004          MOV     @#4,-(SP)
001406  012737  001426  000004  MOV     #64$,@#4                ;SET UP FOR TIMEOUT
001414  022777  177777  177456  CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
001422  001402                  BEQ     65$
001424  000407                  BR      66$
001426  022626          64$:    CMP     (SP)+,(SP)+             ;ADJUST STACK
001430  012767  000176  177442  65$:    MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
001436  012767  000174  177436          MOV     #DISPREG,LIGHTS         ;POINT TO SOFT DISPLAY REG
001444  012637  000004  66$:    MOV     (SP)+,@#4               ;RESTORE VECTORS
001450  012637  000006          MOV     (SP)+,@#6
001454  005737  000042          TST     @#42                    ;UNDER MONITOR
001460  001005                  BNE     67$
001462  022767  000176  177410  CMP     #SWREG,SWR              ;IS SWREG USED
001470  001001                  BNE     67$
001472  104414                  CNTLU
001474  032777  000001  177376  67$:    BIT     #SW00,@SWR              ;RESELECT VECTOR & CONTROL REG?
001502  001002                  BNE     1$
001504  000167  000446          JMP     .BEGIN
001510  012700  000300  1$:     MOV     #300,R0                 ;RESTORE VECTOR AREA TO TRAPCATCHER
001514  012701  000302          MOV     #302,R1                 ;START AT LOCATION 300
001520  012702  000004          MOV     #4,R2
001524  010110          2$:     MOV     R1,(R0)
```

```
                                        CLR     (R1)
                                        ADD     R2,R0
                                        ADD     R2,R1
001000                                  CMP     #1000,R1                ;END AT LOCATION 777
                                        BLT     2$
                                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
                                        MREQAD                          ;MESSAGE
                                        PARAM                           ;CONVERT STRING
                                        160000                          ;LOW LIMIT
                                        167776                          ;HIGH LIMIT
                                        DUBASE                          ;STORE AT THIS LOCATION
                                .BYTE   1                               ;MASK
                                .BYTE   1                               ;HOW MANY TIMES + 2
007776  177420                          MOV     DUBASE,KEEPADD  ;SAVE
007636                                  JSR     PC,DUADDR
177410  177404                          MOV     KEEPADD,BASEADD ;RESTORE FOR ROTATION
                                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
                                        MVECTO                          ;MESSAGE
                                        PARAM                           ;CONVERT STRING
                                        300                             ;LOW LIMIT
                                        776                             ;HIGH LIMIT
                                        DURIV                           ;STORE AT THIS LOCATION
                                .BYTE   1                               ;MASK
                                .BYTE   4                               ;HOW MANY TIMES + 2
010262  177370                          MOV     DURIV,KEEPIV    ;SAVE
010254  177360                          MOV     DURIV,BASEIV    ;SET UP FOR ROTATION
                                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
                                        MMULT                           ;MESSAGE
                                        SETFLG                          ;SET FLAG BASED UPON INPUT STRING
                                        MULTD                           ;THIS FLAG
177334                                  TSTB    MULTD   ;ARE THERE MULTIPLE DEVICES
                                                        ;ON THE SYSTEM ?
                                        BMI     BBB     ;YES,ASK NEXT QUESTION
177342                                  CLR     ACTREG
177340                                  CLR     ROTADD
000140                                  JMP     OUTMUL  ;JUMP AROUND NEXT QUESTION
                                BBB:
                                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
                                        MLASTD                          ;MESSAGE
                                        PARAM                           ;CONVERT STRING
                                        160000                          ;LOW LIMIT
                                        167776                          ;HIGH LIMIT
                                        LASTADD                         ;STORE AT THIS LOCATION
                                .BYTE   1                               ;MASK
                                .BYTE   1                               ;HOW MANY TIMES + 2
                                ;THE FOLLOWING ROUTINE SETS UP ACTREG FOR THE FIRST TIME
000001  177310                  1$:    MOV     #1,ROTADD       ;SET UP POINTER
                                        CLR     ACTREG  ;CLR ACTIVE REGISTER
177300  177274                  2$:    BIS     ROTADD,ACTREG   ;MAKE THIS DEVICE ACTIVE
                                        CLC
177270                                  ROL     ROTADD  ;SET UP POINTER
                                        BCS     3$      ;ARE YOU OUT OF RANGE ?
000010  177244                          ADD     #10,BASEADD     ;SET UP BASE ADDRESS
177244  177236                          CMP     LASTADD,BASEADD ;IS THIS THE LAST DEVICE ?
                                        BMI     2$      ;NO DO IT AGAIN
177244  177240                          BIS     ROTADD,ACTREG   ;THIS ASSUMES THAT THERE ARE AT
```

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                                        ;LEAST TWO DEVICES WHEN YOU ANSWER YES TO
                                        ;MULTIPLE DEVICE QUESTION
001756  012767  000001  177234  4$:   MOV     #1,ROTADD       ;SET UP FOR LATER USE IN END OF PASS ROUTINE
001764  016767  177216  177212        MOV     KEEPADD,BASEADD ;DITTO
001772  000414                        BR      OUTMUL  ;CONTINUE QUESTIONS
001774  016767  177206  177202  3$:   MOV     KEEPADD,BASEADD ;RESTORE
002002  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002004  010251                        MRANGE                          ;MESSAGE
002006  104405                        PARAM                           ;CONVERT STRING
002010  160000                        160000                          ;LOW LIMIT
002012  167776                        167776                          ;HIGH LIMIT
002014  001210                        LASTADD                         ;STORE AT THIS LOCATION
002016      001                 .BYTE 1                               ;MASK
002017      001                 .BYTE 1                               ;HOW MANY TIMES + 2
002020  000167  177656                JMP     1$      ;DO IT AGAIN
002024                        OUTMUL:
002024  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002026  010536                        MLEVEL                          ;MESSAGE
002030  104405                        PARAM                           ;CONVERT STRING
002032  000004                        4                               ;LOW LIMIT
002034  000007                        7                               ;HIGH LIMIT
002036  011424                        DUPRT                           ;STORE AT THIS LOCATION
002040      000                 .BYTE 0                               ;MASK
002041      001                 .BYTE 1                               ;HOW MANY TIMES + 2
002042  004767  007306                JSR     PC,DULEV
                                        ;COMPARE THE FIRST CHARACTER IN THE TELETYPE INPUT
                                        ;BUFFER TO THE CHARACTERS "1" AND "2".
                                        ;IF THE CHARACTER IS "1" CLEAR THE FLAG
                                        ;IF THE CHARACTER IS "2" SET THE FLAG
002046                        AAA:
002046  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002050  010562                        MSYNC                           ;MESSAGE
002052  122767  000061  007134  3$:   CMPB    #'1,INBUF               ;IS IT "1" ?
002060  001003                        BNE     1$
002062  105067  177110                CLRB    SYNCNO                  ;000
002066  000412                        BR      4$
002070  122767  000062  007116  1$:   CMPB    #'2,INBUF               ;IS IT "2" ?
002076  001004                        BNE     2$
002100  112767  177777  177070        MOVB    #-1,SYNCNO                      ;377
002106  000402                        BR      4$
002110  104404                2$:     INSTER                          ;RETRY
002112  000757                        BR      3$
002114  000240                4$:     NOP
002116  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002120  010630                        MWIRE6                          ;MESSAGE
002122  104412                        SETFLG                          ;SET FLAG BASED UPON INPUT STRING
002124  001177                        SEXMIT                          ;THIS FLAG
002126  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002130  010676                        MWIRE5                          ;MESSAGE
002132  104412                        SETFLG                          ;SET FLAG BASED UPON INPUT STRING
002134  001200                        SEREC                           ;THIS FLAG
002136  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002140  010743                        MWIRE4                          ;MESSAGE
002142  104412                        SETFLG                          ;SET FLAG BASED UPON INPUT STRING
002144  001201                        OPTCLR                          ;THIS FLAG
002146  104403                        INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
```

```
                                        MEXTJ                           ;MESSAGE
                                        SETFLG                          ;SET FLAG BASED UPON INPUT STRING
                                        JMRBY                           ;THIS FLAG

                                        ;TEST START AND RESTART

002156  012767  000340  175612  .BEGIN: MOV     #340,PS                 ;LOCK OUT INTERRUPTS
002164  012706  001100                  MOV     #STACK,SP               ;SET UP STACK
002170  005737  000042                  TST     @#42                    ;IS PROGRAM UNDER MONITOR CONTROL
002174  001056                          BNE     3$
002176  105767  177000                  TSTB    MULTD   ;DON'T ALLOW LOCK ON TEST IF RUNNING
                                                ;MULTIPLE DEVICES
002202  001407                          BEQ     5$                      ;IF NO,TEST FOR LOCK ON TEST
002204  016767  003564  003464          MOV     BRW,TTST                ;RESTORE NORMAL SCOPE LOOP
002212  016767  003560  003460          MOV     BRX,TTST+2              ;DITTO
002220  000444                          BR      3$                      ;JUMP AROUND IF YES
002222  032777  000004  176650  5$:     BIT     #BIT2,@SWR              ;CHECK FOR LOCK ON TEST
002230  001416                          BEQ     1$
002232  104403                          INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002234  010472                          MLOCK                           ;MESSAGE
002236  104412                          SETFLG                          ;SET FLAG BASED UPON INPUT STRING
002240  001225                          LOKFLG                          ;THIS FLAG
002242  105767  176757                  TSTB    LOKFLG                  ;IS LOCK ON TEST OPTION SELECTED
002246  001407                          BEQ     1$
002250  012767  000240  003420          MOV     #NOP,TTST
002256  012767  000240  003414          MOV     #NOP,TTST+2             ;SET UP TO LOCK
002264  000406                          BR      2$
002266  016767  003502  003402  1$:     MOV     BRW,TTST
002274  016767  003476  003376          MOV     BRX,TTST+2              ;LOCK NOT SELECTED, SET UP FOR NORMAL SCOPE LOOP
002302  032777  000002  176570  2$:     BIT     #SW01,@SWR              ;IF SW01=1, GET STARTING PC
002310  001410                          BEQ     3$
002312  104403                          INSTR                           ;OUTPUT MESSAGE & GET INPUT STRING
002314  010457                          MTSTPC                          ;MESSAGE
002316  104405                          PARAM                           ;CONVERT STRING
002320  002350                          TST1                            ;LOW LIMIT
002322  005004                          TLAST                           ;HIGH LIMIT
002324  001114                          RTRN                            ;STORE AT THIS LOCATION
002326      001                 .BYTE   1                               ;MASK
002327      001                 .BYTE   1                               ;HOW MANY TIMES + 2
002330  000403                          BR      4$
002332  012767  002350  176554  3$:     MOV     #TST1,RTRN              ;START AT TEST 1
002340  104402  010453          4$:     TYPE    ,MR                     ;TYPE R
002344  000177  176544                  JMP     @RTRN                   ;START TESTING
```

```
                                        ;;THIS TEST VERIFYS MATCH DETECT & DATA RDY
                                        ;;FLAGS FOR EVERY POSSIBLE MATCH CHARACTER
                                        ;;BY OBSERVING RECACT BIT
                                        ;;IT WILL TAKE TWO SYNC # CHARACTERS TO GET RECACT BIT
                                        ;;#:    DEPENDENT ON MONITOR .............
                                        ;;IF ONE SYNC STRAP IS SELECTED ,IT WILL
                                        ;;ONLY TAKE ONE SYNC CHARACTER BEFORE RECACT TO
                                        ;;ASSERT
                                        ;;MODE: SYNC INTERNAL
                                        ;;LENGTH: FIVE
                                        ;;SYNC CHARACTER FOR MATCH: B/C
                                        ;;THIS TEST USES THE TRANSMITTER AND RECEIVER CHIPS
                                        ;;
002350  012767  000001  176550  TST1:   MOV     #1,TSTNO        ;SAVE THIS
002356  012767  002676  176532          MOV     #TST2,NEXT              ;GO TO THIS TEST WHEN THRU
002364  012767  002500  176526          MOV     #3$,LOCK        ;SET UP FOR SCOPE LOOP
002372  052777  000400  007474          BIS     #MRESET,@TXCSR  ;MASTER RESET
002400  016703  007460                  MOV     RXDBUF,R3       ;SET UP FOR ERROR MESSAGE
                        ;SET SYNC INTERNAL,FIVE,NO PARITY,0 SYNC REGISTER
002404  012704  030000                  MOV     #SYNINT!FIVE!NOPAR,R4   ;CREATE PARAMETERS
002410  012777  004020  007456  1$:     MOV     #MINT!SEND,@TXCSR       ;SET SEND & MAINT INTER
002416  010477  007446                  MOV     R4,@PARCSR      ;LOAD CSR
002422  052777  000020  007430          BIS     #SYNSCH,@RXCSR  ;SET SYNC SEARCH
                        ;POKE CLK TO GET INTO SYNCRONIZATION
                        ;BOTH THE LOGIC & RECEIVER
002430  052777  020000  007436          BIS     #CLK,@TXCSR     ;POKE CLK UP
002436  042777  020000  007430          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
002444  110477  007430                  MOVB    R4,@TXDBUF      ;LOAD DATA CHARACTER
                        ;POKE CLK TO GET TRANSMITTER & RECEIVER INTO SYNCRONIZATION
002450  052777  020000  007416          BIS     #CLK,@TXCSR     ;POKE CLK UP
002456  042777  020000  007410          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
002464  032777  004000  007366          BIT     #RECACT,@RXCSR  ;RECACT ?
002472  001401                          BEQ     2$
002474  104000                          HLT     ;RECACT SHOULD NOT BE SET
002476                          2$:
002476  000404                          BR      4$
002500  010477  007364          3$:     MOV     R4,@PARCSR      ;LOAD PARCSR WITH PARAMETERS
002504  110477  007370                  MOVB    R4,@TXDBUF      ;LOAD SYNC CHAR
002510  012767  000002  176424  4$:     MOV     #2,COUNT        ;# OF SYNC CHARS
002516  005777  007352          5$:     TST     @TXCSR  ;DNA ?
002522  100001                          BPL     6$      ;BR IF NOT SET
002524  104000                          HLT     ;DNA SHOULD NOT BE SET OR....
002526                          6$:
                                        ;IT SHOULD BE CLEARED FROM PREVIOUS READ
002526  012767  000005  176404          MOV     #5,SHIFT        ;# OF SHIFTS
002534                          7$:
002534  052777  020000  007332          BIS     #CLK,@TXCSR     ;POKE CLK UP
002542  042777  020000  007324          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
002550  005367  176364                  DEC     SHIFT   ;# OF SHIFTS
002554  001367                          BNE     7$
002556  005367  176360                  DEC     COUNT   ;# OF SYNC CHARS
002562  001403                          BEQ     8$
                        ;TEST SYNCNO TO SEE HOW MANY SYNC CHARACTERS NEEDED
002564  105767  176406                  TSTB    SYNCNO
002570  100752                          BMI     5$      ;TWO SYNC CHARACTERS..
002572  032777  004000  007260  8$:     BIT     #RECACT,@RXCSR  ;RECACT ?
```

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1081   002600  001001                          BNE     9$
1082   002602  104000                          HLT                     ;RECACT FAILED TO SET,POSSIBLE
1083   002604                          9$:
1084                                            ;THAT THE RECEIVER FAILED TO MATCH
1085                                            ;THE SYNC CHARACTER
1086   002604  017701  007254                  MOV     @RXDBUF,R1      ;SAVE ACTUAL
1087   002610  010400                          MOV     R4,R0           ;SAVE EXPECTED
1088   002612  042700  177400                  BIC     #177400,R0      ;CLR UPPER BYTE
1089   002616  020001                          CMP     R0,R1   ;DO THEY COMPARE ?
1090   002620  001401                          BEQ     10$
1091   002622  104002                          HLT     2               ;IF RECACT FAILED ALONG WITH THIS
1092   002624                          10$:
1093                                           ;...IT PROBABLY IS A TRANSMITTER ERROR
1094                                           ;HOWEVER...IF ONLY THIS FAILED IT
1095                                           ;PROBABLY IS A RECEIVER ERROR
1096   002624  104401                          SCOP1
1097                                  ;POKE CLK TO SEE DNA...DNA COMES UP ON THE FIRST
1098                                  ;BIT OF THE NEXT CHARACTER IF NO CHARACTER IS LOADED INTO
1099                                  ;TXDBUF
1100   002626  052777  020000  007240          BIS     #CLK,@TXCSR     ;POKE CLK UP
1101   002634  005777  007234                  TST     @TXCSR  ;DNA?
1102   002640  100401                          BMI     11$
1103   002642  104000                          HLT     ;DNA DID NOT ASSERT
1104   002644                          11$:
1105                                  ;SET UP CONDITIONS FOR NEXT SYNC CHARACTER MATCH
1106   002644  052777  000400  007222          BIS     #MRESET,@TXCSR  ;MASTER RESET
1107   002652  032777  000020  007200          BIT     #SYNSCH,@RXCSR  ;SYNC SEARCH = 0 ?
1108   002660  001401                          BEQ     12$
1109   002662  104000                          HLT     ;SYNC SEARCH SHOULD BE NOT SET
1110   002664                          12$:
1111   002664  005204                          INC     R4
1112   002666  122704  000040                  CMPB    #40,R4  ;IS THIS THE LAST CHARACTER ?
1113   002672  001246                          BNE     1$      ;NO
1114   002674  104400                          SCOPE
```

```
                                        ;;THIS TEST VERIFYS MATCH DETECT & DATA RDY
                                        ;;FLAGS FOR EVERY POSSIBLE MATCH CHARACTER
                                        ;;BY OBSERVING RECACT BIT
                                        ;;IT WILL TAKE TWO SYNC # CHARACTERS TO GET RECACT BIT
                                        ;;*:    DEPENDENT ON MONITOR ..............
                                        ;;IF ONE SYNC STRAP IS SELECTED IT WILL
                                        ;;ONLY TAKE ONE SYNC CHARACTER BEFORE RECACT TO
                                        ;;ASSERT
                                        ;;MODE: SYNC INTERNAL
                                        ;;LENGTH: SIX
                                        ;;SYNC CHARACTER FOR MATCH: B/C
                                        ;;THIS TEST USES THE TRANSMITTER AND RECEIVER CHIPS
                                        ;;
002676  012767  000002  176222  TST2:   MOV     #2,TSTNO        ;SAVE THIS
002704  012767  003224  176204          MOV     #TST3,NEXT              ;GO TO THIS TEST WHEN THRU
002712  012767  003026  176200          MOV     #3$,LOCK        ;SET UP FOR SCOPE LOOP
002720  052777  000400  007146          BIS     #MRESET,@TXCSR  ;MASTER RESET
002726  016703  007132                  MOV     RXDBUF,R3       ;SET UP FOR ERROR MESSAGE
                              ;SET SYNC INTERNAL,SIX,NO PARITY,0 SYNC REGISTER
002732  012704  032000                  MOV     #SYNINT!SIX!NOPAR,R4    ;CREATE PARAMETERS
002736  012777  004020  007130  1$:     MOV     #MINT!SEND,@TXCSR       ;SET SEND & MAINT INTER
002744  010477  007120                  MOV     R4,@PARCSR      ;LOAD CSR
002750  052777  000020  007102          BIS     #SYNSCH,@RXCSR  ;SET SYNC SEARCH
                              ;POKE CLK TO GET INTO SYNCRONIZATION
                              ;BOTH THE LOGIC & RECEIVER
002756  052777  020000  007110          BIS     #CLK,@TXCSR     ;POKE CLK UP
002764  042777  020000  007102          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
002772  110477  007102                  MOVB    R4,@TXDBUF      ;LOAD DATA CHARACTER
                              ;POKE CLK TO GET TRANSMITTER & RECEIVER INTO SYNCRONIZATION
003000  052777  020000  007070          BIS     #CLK,@TXCSR     ;POKE CLK UP
003004  042777  020000  007062          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
003012  032777  004000  007040          BIT     #RECACT,@RXCSR  ;RECACT ?
003020  001401                          BEQ     2$
003022  104000                          HLT     ;RECACT SHOULD NOT BE SET
003024                          2$:
003024  000404                          BR      4$
003026  010477  007036          3$:     MOV     R4,@PARCSR      ;LOAD PARCSR WITH PARAMETERS
003032  110477  007042                  MOVB    R4,@TXDBUF      ;LOAD SYNC CHAR
003036  012767  000002  176076  4$:     MOV     #2,COUNT        ;# OF SYNC CHARS
003044  005777  007024          5$:     TST     @TXCSR  ;DNA ?
003050  100001                          BPL     6$      ;BR IF NOT SET
003052  104000                          HLT     ;DNA SHOULD NOT BE SET OR....
003054                          6$:
                                        ;IT SHOULD BE CLEARED FROM PREVIOUS READ
003054  012767  000006  176056          MOV     #6,SHIFT        ;# OF SHIFTS
003062                          7$:
003062  052777  020000  007004          BIS     #CLK,@TXCSR     ;POKE CLK UP
003070  042777  020000  006776          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
003076  005367  176036                  DEC     SHIFT   ;# OF SHIFTS
003102  001367                          BNE     7$
003104  005367  176032                  DEC     COUNT   ;# OF SYNC CHARS
003110  001403                          BEQ     8$
                              ;TEST SYNCNO TO SEE HOW MANY SYNC CHARACTERS NEEDED
003112  105767  176060                  TSTB    SYNCNO
003116  100752                          BMI     5$      ;TWO SYNC CHARACTERS..
003120  032777  004000  006732  8$:     BIT     #RECACT,@RXCSR  ;RECACT ?
```

```
1171  003126  001001                        BNE     9$
1172  003130  104000                        HLT                     ;RECACT FAILED TO SET,POSSIBLE
1173  003132                          9$:
1174                                        ;THAT THE RECEIVER FAILED TO MATCH
1175                                        ;THE SYNC CHARACTER
1176  003132  017701  006726                MOV     @RXDBUF,R1      ;SAVE ACTUAL
1177  003136  010400                        MOV     R4,R0           ;SAVE EXPECTED
1178  003140  042700  177400                BIC     #177400,R0      ;CLR UPPER BYTE
1179  003144  020001                        CMP     R0,R1   ;DO THEY COMPARE ?
1180  003146  001401                        BEQ     10$
1181  003150  104002                        HLT     2               ;IF RECACT FAILED ALONG WITH THIS
1182  003152                          10$:
1183                                        ;...IT PROBABLY IS A TRANSMITTER ERROR
1184                                        ;HOWEVER,...IF ONLY THIS FAILED IT
1185                                        ;PROBABLY IS A RECEIVER ERROR
1186  003152  104401                        SCOPE
1187                                  ;POKE CLK TO SEE DNA...DNA COMES UP ON THE FIRST
1188                                  ;BIT OF THE NEXT CHARACTER IF NO CHARACTER IS LOADED INTO
1189                                  ;TXDBUF
1190  003154  052777  020000  006712        BIS     #CLK,@TXCSR     ;POKE CLK UP
1191  003162  005777  006706                TST     @TXCSR  ;DNA?
1192  003166  100401                        BMI     11$
1193  003170  104000                        HLT     ;DNA DID NOT ASSERT
1194  003172                          11$:
1195                                  ;SET UP CONDITIONS FOR NEXT SYNC CHARACTER MATCH
1196  003172  052777  000400  006674        BIS     #MRESET,@TXCSR  ;MASTER RESET
1197  003200  032777  000020  006652        BIT     #SYNSCH,@RXCSR  ;SYNC SEARCH = 0 ?
1198  003206  001401                        BEQ     12$
1199  003210  104000                        HLT     ;SYNC SEARCH SHOULD BE NOT SET
1200  003212                          12$:
1201  003212  005204                        INC     R4
1202  003214  122704  000100                CMPB    #100,R4 ;IS THIS THE LAST CHARACTER ?
1203  003220  001246                        BNE     1$      ;NO
1204  003222  104400                        SCOPE
```

```
 1205                                   ;;THIS TEST VERIFYS MATCH DETECT & DATA RDY
 1206                                   ;;FLAGS FOR EVERY POSSIBLE MATCH CHARACTER
 1207                                   ;;BY OBSERVING RECACT BIT
 1208                                   ;;IT WILL TAKE TWO SYNC * CHARACTERS TO GET RECACT BIT
 1209                                   ;;*:    DEPENDENT ON MONITOR ..............
 1210                                   ;;IF ONE SYNC STRAP IS SELECTED ,IT WILL
 1211                                   ;;ONLY TAKE ONE SYNC CHARACTER BEFORE RECACT TO
 1212                                   ;;ASSERT
 1213                                   ;;MODE: SYNC INTERNAL
 1214                                   ;;LENGTH: SEVEN
 1215                                   ;;SYNC CHARACTER FOR MATCH: B/C
 1216                                   ;;THIS TEST USES THE TRANSMITTER AND RECEIVER CHIPS
 1217                                   ;;
 1218  003224  012767  000003  175674  TST3:  MOV   #3,TSTNO          ;SAVE THIS
 1219  003232  012767  003552  175656        MOV   #TST4,NEXT                ;GO TO THIS TEST WHEN THRU
 1220  003240  012767  003354  175652        MOV   #3$,LOCK          ;SET UP FOR SCOPE LOOP
 1221  003246  052777  000400  006620        BIS   #MRESET,@TXCSR    ;MASTER RESET
 1222  003254  016703  006604                MOV   RXDBUF,R3         ;SET UP FOR ERROR MESSAGE
 1223                         ;SET SYNC INTERNAL,SEVEN,NO PARITY,0 SYNC REGISTER
 1224  003260  012704  034000                MOV   #SYNINT!SEVEN!NOPAR,R4  ;CREATE PARAMETERS
 1225  003264  012777  004020  006602  1$:   MOV   #MINT!SEND,@TXCSR        ;SET SEND & MAINT INTER
 1226  003272  010477  006572                MOV   R4,@PARCSR        ;LOAD CSR
 1227  003276  052777  000020  006554        BIS   #SYNSCH,@RXCSR    ;SET SYNC SEARCH
 1228                         ;POKE CLK TO GET INTO SYNCRONIZATION
 1229                         ;BOTH THE LOGIC & RECEIVER
 1230  003304  052777  020000  006562        BIS   #CLK,@TXCSR       ;POKE CLK UP
 1231  003312  042777  020000  006554        BIC   #CLK,@TXCSR       ;POKE CLK DOWN
 1232  003320  110477  006554                MOVB  R4,@TXDBUF        ;LOAD DATA CHARACTER
 1233                         ;POKE CLK TO GET TRANSMITTER & RECEIVER INTO SYNCRONIZATION
 1234  003324  052777  020000  006542        BIS   #CLK,@TXCSR       ;POKE CLK UP
 1235  003332  042777  020000  006534        BIC   #CLK,@TXCSR       ;POKE CLK DOWN
 1236  003340  032777  004000  006512        BIT   #RECACT,@RXCSR    ;RECACT ?
 1237  003346  001401                        BEQ   2$
 1238  003350  104000                        HLT   ;RECACT SHOULD NOT BE SET
 1239  003352                         2$:
 1240  003352  000404                        BR    4$
 1241  003354  010477  006510          3$:   MOV   R4,@PARCSR        ;LOAD PARCSR WITH PARAMETERS
 1242  003360  110477  006514                MOVB  R4,@TXDBUF        ;LOAD SYNC CHAR
 1243  003364  012767  000002  175550  4$:   MOV   #2,COUNT          ;# OF SYNC CHARS
 1244  003372  005777  006476          5$:   TST   @TXCSR    ;DNA ?
 1245  003376  100001                        BPL   6$        ;BR IF NOT SET
 1246  003400  104000                        HLT   ;DNA SHOULD NOT BE SET OR....
 1247  003402                         6$:
 1248                                 ;IT SHOULD BE CLEARED FROM PREVIOUS READ
 1249  003402  012767  000007  175530        MOV   #7,SHIFT          ;# OF SHIFTS
 1250  003410                         7$:
 1251  003410  052777  020000  006456        BIS   #CLK,@TXCSR       ;POKE CLK UP
 1252  003416  042777  020000  006450        BIC   #CLK,@TXCSR       ;POKE CLK DOWN
 1253  003424  005367  175510                DEC   SHIFT   ;# OF SHIFTS
 1254  003430  001367                        BNE   7$
 1255  003432  005367  175504                DEC   COUNT   ;# OF SYNC CHARS
 1256  003436  001403                        BEQ   8$
 1257                         ;TEST SYNCNO TO SEE HOW MANY SYNC CHARACTERS NEEDED
 1258  003440  105767  175532                TSTB  SYNCNO
 1259  003444  100752                        BMI   5$        ;TWO SYNC CHARACTERS..
 1260  003446  032777  004000  006404  8$:   BIT   #RECACT,@RXCSR  ;RECACT ?
```

```
1261  003454  001001                        BNE     9$
1262  003456  104000                        HLT                     ;RECACT FAILED TO SET,POSSIBLE
1263  003460                          9$:                           ;THAT THE RECEIVER FAILED TO MATCH
1264                                                                ;THE SYNC CHARACTER
1265
1266  003460  017701  006400                MOV     @RXDBUF,R1      ;SAVE ACTUAL
1267  003464  010400                        MOV     R4,R0           ;SAVE EXPECTED
1268  003466  042700  177400                BIC     #177400,R0      ;CLR UPPER BYTE
1269  003472  020001                        CMP     R0,R1   ;DO THEY COMPARE ?
1270  003474  001401                        BEQ     10$
1271  003476  104002                        HLT     2               ;IF RECACT FAILED ALONG WITH THIS
1272  003500                          10$:                          ;...IT PROBABLY IS A TRANSMITTER ERROR
1273                                                                ;HOWEVER,...IF ONLY THIS FAILED IT
1274                                                                ;PROBABLY IS A RECEIVER ERROR
1275
1276  003500  104401                        SCOP1
1277                                  ;POKE CLK TO SEE DNA...DNA COMES UP ON THE FIRST
1278                                  ;BIT OF THE NEXT CHARACTER IF NO CHARACTER IS LOADED INTO
1279                                  ;TXDBUF
1280  003502  052777  020000  006364        BIS     #CLK,@TXCSR     ;POKE CLK UP
1281  003510  005777  006360                TST     @TXCSR  ;DNA?
1282  003514  100401                        BMI     11$
1283  003516  104000                        HLT     ;DNA DID NOT ASSERT
1284  003520                          11$:
1285                                  ;SET UP CONDITIONS FOR NEXT SYNC CHARACTER MATCH
1286  003520  052777  000400  006346        BIS     #MRESET,@TXCSR  ;MASTER RESET
1287  003526  032777  000020  006324        BIT     #SYNSCH,@RXCSR  ;SYNC SEARCH = 0 ?
1288  003534  001401                        BEQ     12$
1289  003536  104000                        HLT     ;SYNC SEARCH SHOULD BE NOT SET
1290  003540                          12$:
1291  003540  005204                        INC     R4
1292  003542  122704  000200                CMPB    #200,R4 ;IS THIS THE LAST CHARACTER ?
1293  003546  001246                        BNE     1$      ;NO
1294  003550  104400                        SCOPE
```

```
                                        ;;THIS TEST VERIFYS MATCH DETECT & DATA RDY
                                        ;;FLAGS FOR EVERY POSSIBLE MATCH CHARACTER
                                        ;;BY OBSERVING RECACT BIT
                                        ;;IT WILL TAKE TWO SYNC # CHARACTERS TO GET RECACT BIT
                                        ;;#:    DEPENDENT ON MONITOR ..............
                                        ;;IF ONE SYNC STRAP IS SELECTED ,IT WILL
                                        ;;ONLY TAKE ONE SYNC CHARACTER BEFORE RECACT TO
                                        ;;ASSERT
                                        ;;MODE: SYNC INTERNAL
                                        ;;LENGTH: EIGHT
                                        ;;SYNC CHARACTER FOR MATCH: B/C
                                        ;;THIS TEST USES THE TRANSMITTER AND RECEIVER CHIPS
                                        ;;
003552  012767  000004  175346  TST4:   MOV     #4,TSTNO        ;SAVE THIS
003560  012767  004100  175330          MOV     #TST5,NEXT              ;GO TO THIS TEST WHEN THRU
003566  012767  003702  175324          MOV     #3$,LOCK        ;SET UP FOR SCOPE LOOP
003574  052777  000400  006272          BIS     #MRESET,@TXCSR  ;MASTER RESET
003602  016703  006256                  MOV     RXDBUF,R3       ;SET UP FOR ERROR MESSAGE
                                ;SET SYNC INTERNAL,EIGHT,NO PARITY,0 SYNC REGISTER
003606  012704  036000                  MOV     #SYNINT!EIGHT!NOPAR,R4  ;CREATE PARAMETERS
003612  012777  004020  006254  1$:     MOV     #MAINT!SEND,@TXCSR      ;SET SEND & MAINT INTER
003620  010477  006244                  MOV     R4,@PARCSR      ;LOAD CSR
003624  052777  000020  006226          BIS     #SYNSCH,@RXCSR  ;SET SYNC SEARCH
                                ;POKE CLK TO GET INTO SYNCRONIZATION
                                ;BOTH THE LOGIC & RECEIVER
003632  052777  020000  006234          BIS     #CLK,@TXCSR     ;POKE CLK UP
003640  042777  020000  006226          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
003646  110477  006226                  MOVB    R4,@TXDBUF      ;LOAD DATA CHARACTER
                                ;POKE CLK TO GET TRANSMITTER & RECEIVER INTO SYNCRONIZATION
003652  052777  020000  006214          BIS     #CLK,@TXCSR     ;POKE CLK UP
003660  042777  020000  006206          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
003666  032777  004000  006164          BIT     #RECACT,@RXCSR  ;RECACT ?
003674  001401                          BEQ     2$
003676  104000                          HLT     ;RECACT SHOULD NOT BE SET
003700                          2$:
003700  000404                          BR      4$
003702  010477  006162          3$:     MOV     R4,@PARCSR      ;LOAD PARCSR WITH PARAMETERS
003706  110477  006166                  MOVB    R4,@TXDBUF      ;LOAD SYNC CHAR
003712  012767  000002  175222  4$:     MOV     #2,COUNT        ;# OF SYNC CHARS
003720  005777  006150          5$:     TST     @TXCSR  ;DNA ?
003724  100001                          BPL     6$      ;BR IF NOT SET
003726  104000                          HLT     ;DNA SHOULD NOT BE SET OR....
003730                          6$:
                                ;IT SHOULD BE CLEARED FROM PREVIOUS READ
003730  012767  000010  175202          MOV     #8.,SHIFT       ;# OF SHIFTS
003736                          7$:
003736  052777  020000  006130          BIS     #CLK,@TXCSR     ;POKE CLK UP
003744  042777  020000  006122          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
003752  005367  175162                  DEC     SHIFT   ;# OF SHIFTS
003756  001367                          BNE     7$
003760  005367  175156                  DEC     COUNT   ;# OF SYNC CHARS
003764  001403                          BEQ     8$
                                ;TEST SYNCNO TO SEE HOW MANY SYNC CHARACTERS NEEDED
003766  105767  175204                  TSTB    SYNCNO
003772  100752                          BMI     5$      ;TWO SYNC CHARACTERS..
003774  032777  004000  006056  8$:     BIT     #RECACT,@RXCSR  ;RECACT ?
```

```
1351  004002  001001                        BNE     9$
1352  004004  104000                        HLT                     ;RECACT FAILED TO SET,POSSIBLE
1353  004006                          9$:
1354                                        ;THAT THE RECEIVER FAILED TO MATCH
1355                                        ;THE SYNC CHARACTER
1356  004006  017701  006052                MOV     @RXDBUF,R1      ;SAVE ACTUAL
1357  004012  010400                        MOV     R4,R0           ;SAVE EXPECTED
1358  004014  042700  177400                BIC     #177400,R0      ;CLR UPPER BYTE
1359  004020  020001                        CMP     R0,R1   ;DO THEY COMPARE ?
1360  004022  001401                        BEQ     10$
1361  004024  104002                        HLT     2               ;IF RECACT FAILED ALONG WITH THIS
1362  004026                          10$:
1363                                        ;...IT PROBABLY IS A TRANSMITTER ERROR
1364                                        ;HOWEVER...IF ONLY THIS FAILED IT
1365                                        ;PROBABLY IS A RECEIVER ERROR
1366  004026  104401                        SCOPE1
1367                                  ;POKE CLK TO SEE DNA...DNA COMES UP ON THE FIRST
1368                                  ;BIT OF THE NEXT CHARACTER IF NO CHARACTER IS LOADED INTO
1369                                  ;TXDBUF
1370  004030  052777  020000  006036        BIS     #CLK,@TXCSR     ;POKE CLK UP
1371  004036  005777  006032                TST     @TXCSR  ;DNA?
1372  004042  100401                        BMI     11$
1373  004044  104000                        HLT     ;DNA DID NOT ASSERT
1374  004046                          11$:
1375                                  ;SET UP CONDITIONS FOR NEXT SYNC CHARACTER MATCH
1376  004046  052777  000400  006020        BIS     #MRESET,@TXCSR  ;MASTER RESET
1377  004054  032777  000020  005776        BIT     #SYNSCH,@RXCSR  ;SYNC SEARCH = 0 ?
1378  004062  001401                        BEQ     12$
1379  004064  104000                        HLT     ;SYNC SEARCH SHOULD BE NOT SET
1380  004066                          12$:
1381  004066  005204                        INC     R4
1382  004070  122704  000000                CMPB    #0,R4   ;IS THIS THE LAST CHARACTER ?
1383  004074  001246                        BNE     1$      ;NO
1384  004076  104400                        SCOPE
```

```
                                        ;;THIS TEST PERFORMS A BINARY COUNT DATA PATTERN ON
                                        ;;BOTH THE TRANSMITTER AND RECEIVER LOGIC
                                        ;;MODE:SYNC EXTERNAL (SYNEXT)
                                        ;;LENGTH:EIGHT PLUS PARITY
                                        ;;PARITY:EVEPAR
                                        ;;MAINT. MODE:MINT
                                        ;;
004100  012767  000005  175020  TST5:   MOV     #5,TSTNO        ;SAVE THIS
004106  012767  004312  175002          MOV     #TST6,NEXT              ;GO TO THIS TEST WHEN THRU
004114  052777  000400  005752          BIS     #MRESET,@TXCSR  ;MASTER RESET
004122  012777  020000  005740          MOV     #SYNEXT,@PARCSR ;SET THE MODE
004130  052777  000400  005736          BIS     #MRESET,@TXCSR  ;MASTER RESET

                        ;SET MAINTENANCE MODE & SEND
                                ;NOTE:BIT WINDOW&CLK ARE CLEARED (MTDATA=0)
004136  012777  004020  005730          MOV     #MINT!SEND,@TXCSR

                        ;SET MODE,# OF BITS,PARITY SENSE,& LOAD SYNC REG
004144  012777  027426  005716          MOV     #SYNEXT!EIGHT!EVEPAR!26,@PARCSR
004152  016703  005706                  MOV     RXDBUF,R3       ;SETUP FOR ERROR MSG
004156  005004                          CLR     R4      ;FOR DATA CHAR CREATION
004160  110477  005714                  MOVB    R4,@TXDBUF      ;LOAD CHARACTER
004164  052777  000020  005666          BIS     #SYNSCH,@RXCSR  ;SET SEARCH SYNC
                        ;GET INTO SYNCRONIZATION
004172  052777  020000  005674          BIS     #CLK,@TXCSR     ;POKE CLK UP
004200  042777  020000  005666          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
004206  012767  000011  174724  1$:     MOV     #9.,SHIFT       ;# OF SHIFTS
004214  010400                          MOV     R4,R0   ;EXPECTED
004216                          2$:
004216  052777  020000  005650          BIS     #CLK,@TXCSR     ;POKE CLK UP
004224  042777  020000  005642          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
004232  005367  174702                  DEC     SHIFT   ;# OF SHIFTS
004236  022767  000003  174674          CMP     #3,SHIFT        ;TIME TO LOAD NEXT CHAR ?
004244  001003                          BNE     3$      ;NO ?
004246  005204                          INC     R4      ;GENERATE NEXT CHAR
004250  110477  005624                  MOVB    R4,@TXDBUF      ;LOAD NEXT CHARACTER
004254  005767  174660          3$:     TST     SHIFT   ;IS IT 0 ?
004260  001356                          BNE     2$
004262  105777  005572                  TSTB    @RXCSR  ;RXDONE = 1 ?
004266  100401                          BMI     5$
004270  104000                          HLT     ;RXDONE SHOULD BE SET
004272                          5$:
004272  017701  005566                  MOV     @RXDBUF,R1      ;ACTUAL
004276  020001                          CMP     R0,R1   ;COMPARE EXP VS ACT
004300  001401                          BEQ     6$
004302  104002                          HLT     2       ;CHARACTERS SHOULD COMPARE
004304                          6$:
004304  105704                          TSTB    R4      ;LAST CHARACTER ?
004306  001337                          BNE     1$      ;NO
004310  104400                  4$:     SCOPE
```

```
                                        ;;THIS TEST PERFORMS A BINARY COUNT DATA PATTERN ON
                                        ;;BOTH THE TRANSMITTER AND RECEIVER LOGIC
                                        ;;MODE:SYNC EXTERNAL (SYNEXT)
                                        ;;LENGTH:EIGHT PLUS PARITY
                                        ;;PARITY:ODDPAR
                                        ;;MAINT. MODE:MINT
                                        ;;
004312  012767  000006  174606  TST6:   MOV     #6,TSTNO        ;SAVE THIS
004320  012767  004524  174570          MOV     #TST7,NEXT              ;GO TO THIS TEST WHEN THRU
004326  052777  000400  005540          BIS     #MRESET,@TXCSR  ;MASTER RESET
004334  012777  020000  005526          MOV     #SYNEXT,@PARCSR ;SET THE MODE
004342  052777  000400  005524          BIS     #MRESET,@TXCSR  ;MASTER RESET

                                ;SET MAINTENANCE MODE & SEND
                                        ;NOTE:BIT WINDOW&CLK ARE CLEARED (MTDATA=0)
004350  012777  004020  005516          MOV     #MINT!SEND,@TXCSR

                                ;SET MODE,# OF BITS,PARITY SENSE,& LOAD SYNC REG
004356  012777  027026  005504          MOV     #SYNEXT!EIGHT!ODDPAR!26,@PARCSR
004364  016703  005474                  MOV     RXDBUF,R3       ;SETUP FOR ERROR MSG
004370  005004                          CLR     R4              ;FOR DATA CHAR CREATION
004372  110477  005502                  MOVB    R4,@TXDBUF      ;LOAD CHARACTER
004376  052777  000020  005454          BIS     #SYNSCH,@RXCSR  ;SET SEARCH SYNC
                                ;GET INTO SYNCRONIZATION
004404  052777  020000  005462          BIS     #CLK,@TXCSR     ;POKE CLK UP
004412  042777  020000  005454          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
004420  012767  000011  174512  1$:     MOV     #9.,SHIFT       ;# OF SHIFTS
004426  010400                          MOV     R4,R0   ;EXPECTED
004430                          2$:
004430  052777  020000  005436          BIS     #CLK,@TXCSR     ;POKE CLK UP
004436  042777  020000  005430          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
004444  005367  174470                  DEC     SHIFT   ;# OF SHIFTS
004450  022767  000003  174462          CMP     #3,SHIFT        ;TIME TO LOAD NEXT CHAR ?
004456  001003                          BNE     3$      ;NO ?
004460  005204                          INC     R4      ;GENERATE NEXT CHAR
004462  110477  005412                  MOVB    R4,@TXDBUF      ;LOAD NEXT CHARACTER
004466  005767  174446          3$:     TST     SHIFT   ;IS IT 0 ?
004472  001356                          BNE     2$
004474  105777  005360                  TSTB    @RXCSR  ;RXDONE = 1 ?
004500  100401                          BMI     5$
004502  104000                          HLT     ;RXDONE SHOULD BE SET
004504                          5$:
004504  017701  005354                  MOV     @RXDBUF,R1      ;ACTUAL
004510  020001                          CMP     R0,R1   ;COMPARE EXP VS ACT
004512  001401                          BEQ     6$
004514  104002                          HLT     2       ;CHARACTERS SHOULD COMPARE
004516                          6$:
004516  105704                          TSTB    R4      ;LAST CHARACTER ?
004520  001337                          BNE     1$      ;NO
004522  104400                  4$:     SCOPE
```

```
                                        ;;THIS TEST PERFORMS A BINARY COUNT DATA PATTERN ON
                                        ;;BOTH THE TRANSMITTER AND RECEIVER LOGIC
                                        ;;MODE:SYNC EXTERNAL (SYNEXT)
                                        ;;LENGTH:EIGHT PLUS PARITY
                                        ;;PARITY:EVEPAR
                                        ;;MAINT. MODE:NEXT
                                        ;;
004524  012767  000007  174374  TST7:   MOV     #7,TSTNO        ;SAVE THIS
004532  012767  005004  174356          MOV     #TSTB,NEXT              ;GO TO THIS TEST WHEN THRU
004540  105767  174437                  TSTB    JMRBY   ;JUMP AROUND TEST ?
004544  100116                          BPL     4$      ;YES ?
004546  052777  000400  005320          BIS     #MRESET,@TXCSR  ;MASTER RESET
004554  012777  020000  005306          MOV     #SYNEXT,@PARCSR ;SET THE MODE
004562  052777  000400  005304          BIS     #MRESET,@TXCSR  ;MASTER RESET

                                ;SET MAINTENANCE MODE & SEND
                                        ;NOTE:BIT WINDOW&CLK ARE CLEARED (MTDATA=0)
004570  012777  010020  005276          MOV     #NEXT!SEND,@TXCSR

                                ;SET MODE,# OF BITS,PARITY SENSE,& LOAD SYNC REG
004576  012777  027426  005264          MOV     #SYNEXT!EIGHT!EVEPAR!26,@PARCSR
004604  016703  005254                  MOV     RXDBUF,R3       ;SETUP FOR ERROR MSG
004610  005004                          CLR     R4      ;FOR DATA CHAR CREATION
004612  110477  005262                  MOVB    R4,@TXDBUF      ;LOAD CHARACTER
004616  052777  000020  005234          BIS     #SYNSCH,@RXCSR  ;SET SEARCH SYNC
                                ;GET INTO SYNCRONIZATION
004624  052777  020000  005242          BIS     #CLK,@TXCSR     ;POKE CLK UP
                                        ;WAIT FOR CABLE & DRIVER DELAYS
004632  016702  174300                  MOV     HOLD,R2 ;WAIT THIS AMT
004636                          64$:
004636  005302                          DEC     R2      ;WAIT
004640  001376                          BNE     64$
                                        ;EXIT...
004642  042777  020000  005224          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
                                        ;WAIT FOR CABLE & DRIVER DELAYS
004650  016702  174262                  MOV     HOLD,R2 ;WAIT THIS AMT
004654                          65$:
004654  005302                          DEC     R2      ;WAIT
004656  001376                          BNE     65$
                                        ;EXIT...
004660  012767  000011  174252  1$:     MOV     #9.,SHIFT       ;# OF SHIFTS
004666  010400                          MOV     R4,R0   ;EXPECTED
004670                          2$:
004670  052777  020000  005176          BIS     #CLK,@TXCSR     ;POKE CLK UP
                                        ;WAIT FOR CABLE & DRIVER DELAYS
004676  016702  174234                  MOV     HOLD,R2 ;WAIT THIS AMT
004702                          66$:
004702  005302                          DEC     R2      ;WAIT
004704  001376                          BNE     66$
                                        ;EXIT...
004706  042777  020000  005160          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
                                        ;WAIT FOR CABLE & DRIVER DELAYS
004714  016702  174216                  MOV     HOLD,R2 ;WAIT THIS AMT
004720                          67$:
004720  005302                          DEC     R2      ;WAIT
004722  001376                          BNE     67$
```

```
1541
1542  004724  005367  174210                    ;EXIT...
1543  004730  022767  000003  174202            DEC     SHIFT   ;# OF SHIFTS
1544  004736  001003                            CMP     #3,SHIFT        ;TIME TO LOAD NEXT CHAR ?
1545  004740  005204                            BNE     3$      ;NO ?
1546  004742  110477  005132                    INC     R4      ;GENERATE NEXT CHAR
1547  004746  005767  174166          3$:       MOVB    R4,@TXDBUF      ;LOAD NEXT CHARACTER
1548  004752  001345                            TST     SHIFT   ;IS IT 0 ?
1549  004754  105777  005100                    BNE     2$
1550  004760  100401                            TSTB    @RXCSR  ;RXDONE = 1 ?
1551  004762  104000                            BMI     5$
1552  004764                          5$:       HLT     ;RXDONE SHOULD BE SET
1553  004764  017701  005074                    MOV     @RXDBUF,R1      ;ACTUAL
1554  004770  020001                            CMP     R0,R1   ;COMPARE EXP VS ACT
1555  004772  001401                            BEQ     6$
1556  004774  104002                            HLT     2       ;CHARACTERS SHOULD COMPARE
1557  004776                          6$:
1558                                            ;CHECK OUT MODEM BYPASS JUMPER
1559  004776  105704                            TSTB    R4      ;LAST CHARACTER ?
1560  005000  001327                            BNE     1$      ;NO
1561  005002  104400                  4$:       SCOPE
```

```
                                        ;;THIS TEST PERFORMS A BINARY COUNT DATA PATTERN ON
                                        ;;BOTH THE TRANSMITTER AND RECEIVER LOGIC
                                        ;;MODE:SYNC EXTERNAL (SYNEXT)
                                        ;;LENGTH:EIGHT PLUS PARITY
                                        ;;PARITY:ODDPAR
                                        ;;MAINT. MODE:MEXT
                                        ;;
005004  012767  000010  174114  TST8:   MOV     #8,TSTNO        ;SAVE THIS
005012  012767  005264  174076          MOV     #.EOP,NEXT              ;GO TO THIS TEST WHEN THRU
005020  105767  174157                  TSTB    JMRBY   ;JUMP AROUND TEST ?
005024  100116                          BPL     4$      ;YES ?
005026  052777  000400  005040          BIS     #MRESET,@TXCSR  ;MASTER RESET
005034  012777  020000  005026          MOV     #SYNEXT,@PARCSR ;SET THE MODE
005042  052777  000400  005024          BIS     #MRESET,@TXCSR  ;MASTER RESET

                                ;SET MAINTENANCE MODE & SEND
                                        ;NOTE:BIT WINDOW&CLK ARE CLEARED (MTDATA=0)
005050  012777  010020  005016          MOV     #MEXT!SEND,@TXCSR

                                ;SET MODE,8 OF BITS,PARITY SENSE,& LOAD SYNC REG
005056  012777  027026  005004          MOV     #SYNEXT!EIGHT!ODDPAR!26,@PARCSR
005064  016703  004774                  MOV     RXDBUF,R3               ;SETUP FOR ERROR MSG
005070  005004                          CLR     R4      ;FOR DATA CHAR CREATION
005072  110477  005002                  MOVB    R4,@TXDBUF      ;LOAD CHARACTER
005076  052777  000020  004754          BIS     #SYNSCH,@RXCSR  ;SET SEARCH SYNC
                                ;GET INTO SYNCRONIZATION
005104  052777  020000  004762          BIS     #CLK,@TXCSR     ;POKE CLK UP
                                        ;WAIT FOR CABLE & DRIVER DELAYS
005112  016702  174020                  MOV     HOLD,R2 ;WAIT THIS AMT
005116                          64$:
005116  005302                          DEC     R2      ;WAIT
005120  001376                          BNE     64$
                                        ;EXIT...
005122  042777  020000  004744          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
                                        ;WAIT FOR CABLE & DRIVER DELAYS
005130  016702  174002                  MOV     HOLD,R2 ;WAIT THIS AMT
005134                          65$:
005134  005302                          DEC     R2      ;WAIT
005136  001376                          BNE     65$
                                        ;EXIT...
005140  012767  000011  173772  1$:     MOV     #9.,SHIFT       ;# OF SHIFTS
005146  010400                          MOV     R4,R0   ;EXPECTED
005150                          2$:
005150  052777  020000  004716          BIS     #CLK,@TXCSR     ;POKE CLK UP
                                        ;WAIT FOR CABLE & DRIVER DELAYS
005156  016702  173754                  MOV     HOLD,R2 ;WAIT THIS AMT
005162                          66$:
005162  005302                          DEC     R2      ;WAIT
005164  001376                          BNE     66$
                                        ;EXIT...
005166  042777  020000  004700          BIC     #CLK,@TXCSR     ;POKE CLK DOWN
                                        ;WAIT FOR CABLE & DRIVER DELAYS
005174  016702  173736                  MOV     HOLD,R2 ;WAIT THIS AMT
005200                          67$:
005200  005302                          DEC     R2      ;WAIT
005202  001376                          BNE     67$
```

```
1618
1619  005204  005367  173730                  ;EXIT...
1620  005210  022767  000003  173722          DEC     SHIFT   ;# OF SHIFTS
1621  005216  001003                          CMP     #3,SHIFT        ;TIME TO LOAD NEXT CHAR ?
1622  005220  005204                          BNE     3$      ;NO ?
1623  005222  110477  004652                  INC     R4      ;GENERATE NEXT CHAR
1624  005226  005767  173706          3$:     MOVB    R4,@TXDBUF      ;LOAD NEXT CHARACTER
1625  005232  001346                          TST     SHIFT   ;IS IT 0 ?
1626  005234  105777  004620                  BNE     2$
1627  005240  100401                          TSTB    @RXCSR  ;RXDONE = 1 ?
1628  005242  104000                          BMI     5$
1629  005244                          5$:     HLT     ;RXDONE SHOULD BE SET
1630  005244  017701  004614                  MOV     @RXDBUF,R1      ;ACTUAL
1631  005250  020001                          CMP     R0,R1   ;COMPARE EXP VS ACT
1632  005252  001401                          BEQ     6$
1633  005254  104002                          HLT     2       ;CHARACTERS SHOULD COMPARE
1634  005256                          6$:
1635                                  ;CHECK OUT MODEM BYPASS JUMPER
1636  005256  105704                          TSTB    R4      ;LAST CHARACTER ?
1637  005260  001327                          BNE     1$      ;NO
1638  005262  104400                  4$:     SCOPE
```

```
                                        ;END OF PASS
                                        ;TYPE NAME OF TEST
                                        ;UPDATE PASS COUNT
                                        ;CHECK FOR EXIT TO ACT-11
                                        ;RESTART TEST

005264  104402                .EOP:   TYPE                            ;TYPE NAME OF TEST
005266  010426                        MEPASS
005270  104410  005522                CONVRT  ,OUTCRY
005274  104402  010147                TYPE    ,DEVICE
005300  105767  173676                TSTB    MULTD                   ;ARE YOU RUNNING MULTIPLE DEVICES ?
005304  001511                        BEQ     CCC                     ;NO,JUMP AROUND
005306  005767  173704                TST     ACTREG                  ;ARE ANY DEVICES ACTIVE ?
005312  001007                        BNE     RUNIT                   ;YES
005314  104402  010161                TYPE    ,MCOW                   ;NO
005320  016700  173672                MOV     ACTREG,R0               ;DISPLAY ACTREG
005324  000000                        HALT                            ;SELECT SOMETHING TO RUN @ ACTREG:
                                        ;SELECT SWITCHES & HIT CONTINUE (PUT SW00 =1)
005326  000167  173726                JMP     .START                  ;START OVER AGAIN.....YOU DESELECTED EVERYTHING
005332  062767  000010  173644  RUNIT:  ADD     #10,BASEADD             ;NEXT BLOCK (ADDRESSES)
005340  062767  000010  173644  ZERO:   ADD     #10,BASEIV              ;NEXT BLOCK (VECTORS)
005346  000241                        CLC
005350  006167  173644                ROL     ROTADD                  ;UP DATE ROTATING POINTER
005354  103410                        BCS     2$                      ;IS IT THE LAST DEVICE
                                                                        ;TO BE TESTED IN THIS PASS ?
005356  036767  173636  173632        BIT     ROTADD,ACTREG           ;TEST THIS DEVICE FOR ACTIVE STATUS
005364  001762                        BEQ     RUNIT                   ;IF NOT ACTIVE, TRY NEXT ADDRESS
005366  004767  000034                JSR     PC,REPLAY               ;CALCULATE NEW PARAMETERS
005372  000167  000174                JMP     RESTRT                  ;YES IT WAS ACTIVE,TEST THIS DEVICE
005376  012767  000001  173614  2$:   MOV     #1,ROTADD               ;OK!,NOW SET UP  ROTATING
                                                                        ;POINTER FOR NEXT MULTIPLE PASS
005404  016767  173576  173572        MOV     KEEPADD,BASEADD         ;RESTORE BASE ADDRESS
005412  016767  173576  173572        MOV     KEEPIV,BASEIV           ;RESTORE BASE INTERRUPT VECTORS
005420  004767  000002                JSR     PC,REPLAY               ;CALC NEW PARAMETERS
005424  000441                        BR      CCC                     ;JUMP AROUND REPLAY
005426  016767  173552  004126  REPLAY: MOV     BASEADD,DUBASE          ;SET UP FOR NEW ADDRESSES
005434  004767  003770                JSR     PC,DUADDR               ;CREATE NEW ADDRESSES
005440  016767  173546  004436        MOV     BASEIV,DURIV            ;CREATE DURIV
005446  062767  000002  173536        ADD     #2,BASEIV
005454  016767  173532  004424        MOV     BASEIV,DURIS            ;CREATE DURIS
005462  062767  000002  173522        ADD     #2,BASEIV
005470  016767  173516  004412        MOV     BASEIV,DUTIV            ;CREATE DUTIV
005476  062767  000002  173506        ADD     #2,BASEIV
005504  016767  173502  004400        MOV     BASEIV,DUTIS            ;CREATE DUTIS
005512  016767  004366  173472        MOV     DURIV,BASEIV            ;RESTORE
005520  000207                        RTS     PC

005522  000001                OUTCRY: 1
005524     006     002                .BYTE   6,2
005526  012060                        RXCSR

005530                          CCC:
005530  005067  173400                CLR     LSTERR                  ;CLEAR LAST ERROR PC
005534  005067  173464                CLR     ERRFLG                  ;CLEAR ERROR FLAG
005540  005267  173364                INC     PASCNT                  ;UPDATE PASS COUNT
```

```
 1695  005544  016777  173360  173330          MOV     PASCNT,@LIGHTS          ;DISPLAY PASS COUNT
 1696  005552  013701  000042                  MOV     @#42,R1                 ;CHECK FOR ACT-11 OR DDP
 1697  005556  001405                          BEQ     RESTRT                  ;IF NOT, CONTINUE TESTING
 1698  005560  000005                          RESET
 1699  005562  004711                  LOGICAL:        JSR     PC,(R1)
 1700  005564  000240                          NOP
 1701  005566  000240                          NOP
 1702  005570  000240                          NOP
 1703  005572  012767  000340  172176  RESTRT: MOV     #340,PS                 ;PREVENT INTERRUPTS (PRIO: 7)
 1704  005600  104413                          CKSWR                           ;CHECK FOR ↑G
 1705  005602  012767  002350  173304          MOV     #TST1,RTRN
 1706  005610  000167  174534                  JMP     TST1
 1707
 1708                                          ;SCOPE LOOP AND INTERATION HANDLER
 1709
 1710  005614                          .SCOPE:
 1711                                  ;**** START OF CODE FOR THE X OR TESTER ******
 1712  005614  000424                          BR      4$                      ;IF RUNNING ON THE X OR TESTER CHANGE
 1713                                                                          ;THIS INSTRUCTION TO A "NOP"(NOP=240)
 1714  005616  013746  000004                  MOV     @#4,-(SP)               ;SAVE CONTENTS OF ERROR VECTOR
 1715  005622  012737  005642  000004          MOV     #1$,@#4                 ;SET FOR TIME OUT
 1716  005630  005737  177060                  TST     @#177060                ;TIME OUT ON  X OR ?
 1717  005634  012637  000004                  MOV     (SP)+,@#4               ;RESTORE ERROR VECTOR
 1718  005640  000404                          BR      2$                      ;GO TO NEXT TEST
 1719  005642  022626                  1$:     CMP     (SP)+,(SP)+             ;CLEAR THE STACK AFTER A TIMEOUT
 1720  005644  012637  000004                  MOV     (SP)+,@#4               ;RESTORE ERROR VECTOR
 1721  005650  000403                          BR      3$                      ;LOOP ON PRESENT TEST
 1722  005652  016767  173240  173234  2$:     MOV     NEXT,RTRN               ;SET UP NEXT TEST IN RTRN
 1723  005660  016716  173230          3$:     MOV     RTRN,(SP)               ;SET UP STACK FOR RTI
 1724  005664  000002                          RTI
 1725  005666                          4$:     ;**** END OF CODE FOR THE  X OR TESTER ******
 1726  005666  104413                          CKSWR                           ;CHECK FOR ↑G
 1727  005670  032777  040000  173202          BIT     #SW14,@SWR              ;LOOP ON CURRENT TEST ?
 1728  005676  001407                  TTST:   BEQ     1$
 1729  005700  000432                          BR      3$
 1730  005702  105777  173176                  TSTB    @TKCSR                  ;TEST TTY FLAG
 1731  005706  100027                          BPL     3$
 1732  005710  017700  173172                  MOV     @TKDBR,R0               ;CLR DONE BIT
 1733  005714  000412                          BR      2$                      ;IF A TTY KEY IS STRUCK GO TO NEXT TST
 1734  005716  032777  004000  173154  1$:     BIT     #SW11,@SWR              ;INHIBIT ITERATIONS ?
 1735  005724  001006                          BNE     2$
 1736  005726  005267  173172                  INC     LPCNT
 1737  005732  026767  173166  173162          CMP     LPCNT,ICOUNT            ;CHECK FOR ITERATION CNT FINISH
 1738  005740  101412                          BLOS    3$
 1739  005742  105067  173256          2$:     CLRB    ERRFLG
 1740  005746  005067  173152                  CLR     LPCNT
 1741  005752  012767  000005  173142          MOV     #5,ICOUNT               ;SET UP ITERATION COUNT
 1742  005760  016767  173132  173126          MOV     NEXT,RTRN               ;SET UP NEXT TEST IN RTRN
 1743  005766  016716  173122          3$:     MOV     RTRN,(SP)               ;SET UP STACK FOR RTI
 1744  005772  000002                          RTI
 1745  005774  001407                  BRW:    1407                            ;RESTORE "BEQ 1$" INSTRUCTION
 1746  005776  000432                  BRX:    432                             ;RESTORE "BR 3$" INSTRUCTION
 1747
 1748                                          ;CHECK FOR FREEZE ON CURRENT DATA
 1749
 1750  006000  104413                  .SCOP1: CKSWR                           ;CHECK  FOR ↑G
```

```
1751  006002  032777  001000  173070          BIT     #SW09,@SWR
1752  006010  001402                          BEQ     1$
1753  006012  016716  173102                  MOV     LOCK,(SP)
1754  006016  000002                  1$:     RTI
1755
1756                                          ;TELETYPE OUTPUT ROUTINE
1757
1758  006020  010546                  .TYPE:  MOV     R5,-(SP)
1759  006022  017605  000002                  MOV     @2(SP),R5
1760  006026  062766  000002  000002          ADD     #2,2(SP)
1761  006034  105715                  1$:     TSTB    (R5)                    ;LOOK FOR "0"
1762  006036  001406                          BEQ     3$
1763  006040  105777  173044          2$:     TSTB    @TPCSR                  ;TEST DONE BIT
1764  006044  100375                          BPL     2$
1765  006046  112577  173040                  MOVB    (R5)+,@TPDBR            ;TYPE CHAR
1766  006052  000770                          BR      1$                      ;DO IT AGAIN UNTIL "0" IS SEEN
1767  006054  012605                  3$:     MOV     (SP)+,R5
1768  006056  000002                          RTI
1769
1770                                          ;ASCII STRING INPUT ROUTINE
1771
1772  006060  010346                  .INSTR: MOV     R3,-(SP)
1773  006062  010446                          MOV     R4,-(SP)
1774  006064  017667  000004  000010          MOV     @4(SP),.MSG
1775  006072  062766  000002  000004          ADD     #2,4(SP)
1776  006100  104402                  .INST1: TYPE
1777  006102  000000                  .MSG:   0
1778  006104  012704  011214                  MOV     #INBUF,R4
1779  006110  012703  000007                  MOV     #7,R3
1780  006114  105777  172764          1$:     TSTB    @TKCSR
1781  006120  100375                          BPL     1$
1782  006122  117714  172760                  MOVB    @TKDBR,(R4)
1783  006126  142714  000200                  BICB    #200,(R4)
1784  006132  121427  000025                  CMPB    (R4),#25                ;IS IT <^U>
1785  006136  001003                          BNE     200$
1786  006140  104402  010336                  TYPE,MCRLF
1787  006144  000755                          BR      .INST1
1788  006146  122427  000015          200$:   CMPB    (R4)+,#15
1789  006152  001423                          BEQ     INSTR2
1790  006154  117777  172726  172730          MOVB    @TKDBR,@TPDBR
1791  006162  105777  172722          2$:     TSTB    @TPCSR
1792  006166  100375                          BPL     2$
1793  006170  005303                          DEC     R3
1794  006172  001350                          BNE     1$
1795  006174  000402                          BR      .INSTG
1796  006176  010346                  .INSTE: MOV     R3,-(SP)
1797  006200  010446                          MOV     R4,-(SP)
1798  006202  104402                  .INSTG: TYPE
1799  006204  010332                          MQM
1800  006206  005737  007474                  TST     @#RDSW
1801  006212  001402                          BEQ     400$
1802  006214  104402  010336                  TYPE,MCRLF
1803  006220  000727                  400$:   BR      .INST1
1804  006222  012604                  INSTR2: MOV     (SP)+,R4
1805  006224  012603                          MOV     (SP)+,R3
1806  006226  000002                          RTI
```

```
1807
1808                                        ;CONVERT ASCII STRING TO OCTAL
1809
1810  006230  010546                .PARAM: MOV     R5,-(SP)
1811  006232  010446                        MOV     R4,-(SP)
1812  006234  016605  000004               MOV     4(SP),R5
1813  006240  012567  000170               MOV     (R5)+,LOLIM
1814  006244  012567  000166               MOV     (R5)+,HILIM
1815  006250  012567  000164               MOV     (R5)+,DEVADR
1816  006254  112567  000162               MOVB    (R5)+,LOBITS
1817  006260  112567  000157               MOVB    (R5)+,ADRCNT
1818  006264  010566  000004               MOV     R5,4(SP)
1819  006270  005005                PARAM1: CLR     R5
1820  006272  012704  011214               MOV     #INBUF,R4
1821  006276  122714  000015               CMPB    #15,(R4)
1822  006302  001420                        BEQ     PARERR
1823  006304  121427  000060         1$:   CMPB    (R4),#60
1824  006310  002415                        BLT     PARERR
1825  006312  121427  000067               CMPB    (R4),#67
1826  006316  003012                        BGT     PARERR
1827  006320  142714  000060               BICB    #60,(R4)
1828  006324  152405                        BISB    (R4)+,R5
1829  006326  122714  000015               CMPB    #15,(R4)
1830  006332  001414                        BEQ     LIMITS
1831  006334  006305                        ASL     R5
1832  006336  006305                        ASL     R5
1833  006340  006305                        ASL     R5
1834  006342  000760                        BR      1$
1835  006344  122714  000015   PARERR: CMPB    #15,(R4)        ;IS FIRST CHARACTER A <CR>
1836  006350  001003                        BNE     120$
1837  006352  005737  007474               TST     @#ROSW          ;IS CKSWR ROUTINE BEING USED
1838  006356  001023                        BNE     PARTI
1839  006360  104404                120$:   INSTER
1840  006362  000742                        BR      PARAM1
1841
1842                                        ;TEST TO SEE IF NUMBER IS WITHIN LIMITS
1843
1844  006364  020567  000046   LIMITS: CMP     R5,HILIM
1845  006370  101365                        BHI     PARERR
1846  006372  020567  000036               CMP     R5,LOLIM
1847  006376  103762                        BLO     PARERR
1848  006400  136705  000036               BITB    LOBITS,R5
1849  006404  001357                        BNE     PARERR
1850
1851                                        ;STORE NUMBER AT SPECIFIED ADDRESS
1852
1853  006406  016704  000026               MOV     DEVADR,R4
1854  006412  110524                1$:     MOV     R5,(R4)+
1855  006414  062705  000002               ADD     #2,R5
1856  006420  105367  000017               DECB    ADRCNT
1857  006424  001372                        BNE     1$
1858  006426  012604                PARTI:  MOV     (SP)+,R4
1859  006430  012605                        MOV     (SP)+,R5
1860  006432  000002                        RTI
1861  006434  000000                LOLIM:  0
1862  006436  000000                HILIM:  0
```

```
1863  006440  000000                  DEVADR: 0
1864  006442  000000                  LOBITS: 0
1865          006443                  ADRCNT=LOBITS+1
1866
1867                                  ;SAVE PC OF TEST THAT FAILED AND R0-R5
1868
1869  006444  016667  000004  172522  .SAV05: MOV     4(SP),SAVPC
1870
1871                                  ;SAVE R0-R5
1872
1873  006452  010567  172512          SV05:   MOV     R5,SAVR5
1874  006456  010467  172504                  MOV     R4,SAVR4
1875  006462  010367  172476                  MOV     R3,SAVR3
1876  006466  010267  172470                  MOV     R2,SAVR2
1877  006472  010167  172462                  MOV     R1,SAVR1
1878  006476  010067  172454                  MOV     R0,SAVR0
1879  006502  000002                          RTI
1880
1881                                  ;RESTORE R0-R5
1882
1883  006504  016700  172446          .RES05: MOV     SAVR0,R0
1884  006510  016701  172444                  MOV     SAVR1,R1
1885  006514  016702  172442                  MOV     SAVR2,R2
1886  006520  016703  172440                  MOV     SAVR3,R3
1887  006524  016704  172436                  MOV     SAVR4,R4
1888  006530  016705  172434                  MOV     SAVR5,R5
1889  006534  000002                          RTI
1890
1891                                  ;CONVERT OCTAL NUMBER TO ASCII AND OUTPUT TO TELEPRINTER
1892
1893  006536  104402                  .CONVR: TYPE
1894  006540  010336                          MCRLF
1895  006542  010046                  .CNVRT: MOV     R0,-(SP)
1896  006544  010146                          MOV     R1,-(SP)
1897  006546  010346                          MOV     R3,-(SP)
1898  006550  010446                          MOV     R4,-(SP)
1899  006552  010546                          MOV     R5,-(SP)
1900  006554  017601  000012                  MOV     @12(SP),R1
1901  006560  016767  002470  172362          MOV     TEMP,TEMP3
1902  006566  062766  000002  000012          ADD     #2,12(SP)
1903  006574  012167  000154                  MOV     (R1)+,WRDCNT
1904  006600  112167  000152          1$:     MOVB    (R1)+,CHRCNT
1905  006604  112167  000157                  MOVB    (R1)+,SPACNT
1906  006610  013167  000144                  MOV     @(R1)+,BINWRD
1907  006614  016704  000140          2$:     MOV     BINWRD,R4
1908  006620  116705  000132                  MOVB    CHRCNT,R5
1909  006624  012700  011254                  MOV     #TEMP,R0
1910  006630  010403                  3$:     MOV     R4,R3
1911  006632  042703  177770                  BIC     #177770,R3
1912  006636  062703  000060                  ADD     #060,R3
1913  006642  110320                          MOVB    R3,(R0)+
1914  006644  006204                          ASR     R4                      ;SHIFT FOR NEXT #
1915  006646  042704  100000                  BIC     #100000,R4              ;CLUGE TO STOP BIT 15 PROPAGATING.
1916  006652  006204                          ASR     R4                      ;DITTO
1917  006654  006204                          ASR     R4                      ;DITTO
1918  006656  005305                          DEC     R5
```

```
                                        BNE     3$
                                        MOV     #MDATA,R3
                                4$:     MOVB    -(R0),(R3)+
                                        DECB    CHRCNT
                                        BNE     4$
                                        TSTB    SPACNT
                                        BEQ     6$
                                5$:     MOVB    #040,(R3)+
                                        DECB    SPACNT
                                        BNE     5$
                                6$:     CLRB    (R3)
                                        TYPE
                                        MDATA
                                        DEC     WRDCNT
                                        BNE     1$
                                        MOV     TEMP3,TEMP
                                        MOV     (SP)+,R5
                                        MOV     (SP)+,R4
                                        MOV     (SP)+,R3
                                        MOV     (SP)+,R1
                                        MOV     (SP)+,R0
                                        RTI
                                WRDCNT: 0
                                CHRCNT: 0
                                SPACNT=CHRCNT+1
                                BINWRD: 0

                                        ;COMPARE THE FIRST CHARACTER IN THE TELETYPE INPUT
                                        ;BUFFER TO THE CHARACTERS "N" AND "Y".
                                        ;IF THE CHARACTER IS "N" CLEAR THE FLAG
                                        ;IF THE CHARACTER IS "Y" SET THE FLAG

                                .SETFLG:MOV     @(SP),R5
                                        CMPB    #'N,INBUF       ;IS IT "N" ?
                                        BNE     1$
                                        CLRB    (R5)    ;000
                                        BR      2$
                                1$:     CMPB    #'Y,INBUF               ;IS IT "Y" ?
                                        BNE     3$
                                        MOVB    #-1,(R5)                ;377
                                2$:     ADD     #2,(SP)
                                        RTI
                                3$:     INSTER                          ;RETRY
                                        BR      .SETFLG
                                        ;TRAP DISPATCH SERVICE
                                        ;ARGUMENT OF TRAP IS EXTRACTED
                                        ;AND USED AS OFFSET TO OBTAIN POINTER
                                        ;TO SELECTED SUBROUTINE

                                .TRPSR: MOV     (SP),-(SP)              ;GET PC OF RETURN
                                        SUB     #2,(SP)                 ;=PC OF TRAP
                                        MOV     @(SP),(SP)              ;GET TRP
                                TRPOK:  ASL     (SP)                    ;MULTIPLY TRAP ARG BY 2
                                        BIC     #177001,(SP)            ;CLEAR UNWANTED BITS
                                        ADD     #.TRPTAB,(SP)           ;POINTER TO SUBROUTINE ADDRESS
                                        MOV     @(SP),(SP)              ;SUBROUTINE ADDRESS
```

```
007060  000136                          JMP     @(SP)+                  ;GO TO SUBROUTINE

                                        ;ERROR HANDLER

007062  104413                  .HLT:   CKSWR                           ;CHECK FOR ↑G
007064  032777  020000  172006          BIT     #SW13,@SWR              ;INHIBIT ERROR TYPE OUT ?
007072  001061                          BNE     HALTS
007074  021667  172034                  CMP     (SP),LSTERR
007100  001404                          BEQ     1$
007102  011667  172026                  MOV     (SP),LSTERR
007106  105067  172112                  CLRB    ERRFLG
007112  104406                  1$:     SAVOS
007114  011605                          MOV     (SP),R5
007116  162705  000002                  SUB     #2,R5
007122  011504                          MOV     (R5),R4
007124  006304                          ASL     R4
007126  061504                          ADD     (R5),R4
007130  006304                          ASL     R4
007132  042704  177001                  BIC     #177001,R4
007136  062704  012030                  ADD     #.ERRTAB,R4
007142  012467  000040                  MOV     (R4)+,ERRMSG
007146  012467  000046                  MOV     (R4)+,DATAHD
007152  011467  000054                  MOV     (R4),DATABP
007156  105767  172042                  TSTB    ERRFLG
007162  001403                          BEQ     TYPMSG
007164  005767  000042                  TST     DATABP
007170  001014                          BNE     TYPDAT
007172  104410                  TYPMSG: CONVRT
007174  007324                          ERTAB0
007176  112767  177777  172020          MOVB    #-1,ERRFLG
007204  104402                          TYPE
007206  000000                  ERRMSG: 0
007210  005767  000004                  TST     DATAHD
007214  001402                          BEQ     TYPDAT
007216  104402                          TYPE
007220  000000                  DATAHD: 0
007222  005767  000004          TYPDAT: TST     DATABP
007226  001402                          BEQ     RESREG
007230  104410                          CONVRT
007232  000000                  DATABP: 0
007234  104407                  RESREG: RESOS
007236  005777  171636          HALTS:  TST     @SWR
007242  100005                          BPL     EXITER
007244  010046                          PUSHR0
007246  016600  000002                  MOV     2(SP),R0
007252  000000                          HALT
007254  012600                          POPR0
007256  104413                  EXITER: CKSWR                           ;CHECK FOR ↑G
007260  005267  171646                  INC     ERRCNT
007264  032777  000400  171606          BIT     #SW08,@SWR              ;LOOP ON ERROR ?
007272  001007                          BNE     1$
007274  032777  002000  171576          BIT     #SW10,@SWR              ;ESCAPE TO NEXT ON ERROR ?
007302  001407                          BEQ     2$
007304  016767  171606  171602          MOV     NEXT,RTRN               ;SET UP FOR NEXT TEST
007312  012706  001100          1$:     MOV     #STACK,SP               ;REINITIALIZE SP
007316  000177  171572                  JMP     @RTRN
```

```
 2031  007322  000002                  26:     RTI
 2032  007324  000001                  ERTABO: 1
 2033  007326     006      002                 .BYTE   6,2
 2034  007330  001174                          SAVPC
 2035                                          ;ENTER HERE ON POWER FAILURE
 2036
 2037
 2038  007332  010046                  .PFAIL: MOV     R0,-(SP)                ;SAVE R0-R5 ON PROCESSOR STACK
 2039  007334  010146                          MOV     R1,-(SP)
 2040  007336  010246                          MOV     R2,-(SP)
 2041  007340  010346                          MOV     R3,-(SP)
 2042  007342  010446                          MOV     R4,-(SP)
 2043  007344  010546                          MOV     R5,-(SP)
 2044  007346  016746  170452                  MOV     24,-(SP)
 2045  007352  010667  171614                  MOV     SP,SAVSP                ;SAVE STACK POINTER
 2046  007356  012767  007370  170440          MOV     @RESTART,24             ;SET UP FOR POWER UP TRAP
 2047  007364  000000                          HALT                            ;HALT ON POWER DOWN NORMAL
 2048  007366  000777                  1$:     BR      1$
 2049
 2050                                          ;PROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
 2051
 2052  007370  016706  171576          RESTAR: MOV     SAVSP,SP                ;RESTORE STACK POINTER
 2053  007374  012605                          MOV     (SP)+,R5                ;RESTORE R0-R5
 2054  007376  012604                          MOV     (SP)+,R4
 2055  007400  012603                          MOV     (SP)+,R3
 2056  007402  012602                          MOV     (SP)+,R2
 2057  007404  012601                          MOV     (SP)+,R1
 2058  007406  012600                          MOV     (SP)+,R0
 2059  007410  012767  007332  170406          MOV     #.PFAIL,24              ;SET UP FOR POWER FAILURE
 2060  007416  012767  000340  170352          MOV     #340,PS
 2061  007424  012706  001100                  MOV     #STACK,SP
 2062  007430  005067  001620                  CLR     TEMP
 2063  007434  005267  001614          1$:     INC     TEMP
 2064  007440  001375                          BNE     1$
 2065  007442  104410                          CONVRT
 2066  007444  007466                          PFTAB
 2067  007446  104402                          TYPE
 2068  007450  010341                          MPFAIL
 2069  007452  005067  171546                  CLR     ERRFLG
 2070  007456  005067  171452                  CLR     LSTERR
 2071  007462  000177  171426                  JMP     @RTRN
 2072  007466  000001                  PFTAB:  1
 2073  007470     006      002                 .BYTE   6,2
 2074  007472  001114                          RTRN
 2075
 2076
 2077                                          ;CHECK SWITCH REGISTER ROUTINE. CHECKS FOR ↑G TO ALLOW CHANGING
 2078                                          ;OF LOC.176.
 2079                                          ;LOCATIONS USED:
 2080  007474  000000                  RDSW:   .WORD   0
 2081
 2082
 2083  007476  005737  000042          .CKSWR: TST     @#42
 2084  007502  001042                          BNE     OUT
 2085  007504  022767  000176  171366          CMP     #SWREG,SWR              ;SOFTWARE SWITCH REGISTER PRESENT
 2086  007512  001036                          BNE     OUT                     ;NO, GET OUT
```

```
 2087  007514  105777  171364                  TSTB    @TKCSR          ;YES,WAIT FOR
 2088  007520  100033                          BPL     OUT             ;READY, GET CHARACTER
 2089  007522  017767  171360  176352          MOV     @TKDBR,.MSG     ;AND STRIP OFF
 2090  007530  042767  177600  176344          BIC     #177600,.MSG    ;THE GARBAGE
 2091  007536  122767  000007  176336          CMPB    #7,.MSG         ;IS IT A <^G>
 2092  007544  001021                          BNE     CUT
 2093  007546  104402  007624                  TYPE,$CNTG
 2094  007552  005137  007474          .CNTLU: COM     @#RDSW
 2095  007556  104402  007631                  TYPE,$MSWR
 2096  007562  104411  007616                  CNVRT,SWREGC
 2097  007566  104403  007641                  INSTR,$MNEW
 2098  007572  104405                          PARAM
 2099  007574  000000                          0
 2100  007576  177777                          177777
 2101  007600  000176                          SWREG
 2102  007602      000     001          .BYTE           0,1
 2103  007604  104402  010336                  TYPE,MCRLF
 2104  007610  005037  007474          OUT:    CLR     @#RDSW
 2105  007614  000002                          RTI
 2106  007616  000001                  SWREGC: 1
 2107  007620      006     002          .BYTE   6,2
 2108  007622  000176                          SWREG
 2109  007624  005015  043536      000 $CNTG:  .ASCIZ  <15><12>/^G/
 2110  007631      015  051412  051127 $MSWR:  .ASCIZ  <15><12>/SWR= /
 2111  007636  020075      000
 2112  007641      040  047040  053505 $MNEW:  .ASCIZ  /  NEW= /
 2113  007646  020075      000
 2114  007652                          .EVEN
 2115  007652  005015  042012  030525 MTITLE: .ASCIZ  <15><12><12>/DU11 DZDUF-C TAPE F /<15><12>
 2116  007660  020061  055104  052504
 2117  007666  026506  020103  040524
 2118  007674  042520  043040  006440
 2119  007702  000012
 2120  007704  005015  042526  052103 MVECTO: .ASCIZ  <15><12>/VECTOR ADDRESS-/
 2121  007712  051117  040440  042104
 2122  007720  042522  051523  000055
 2123  007726  005015  051461  020124 MREGAD: .ASCIZ  <15><12>/1ST DEVICE: RECEIVER CONTROL REGISTER ADDRESS-/
 2124  007734  042504  042506  042503
 2125  007742  020072  042522  042503
 2126  007750  053111  051105  041440
 2127  007756  047117  051124  046117
 2128  007764  051040  043505  051511
 2129  007772  042524  020122  042101
 2130  010000  051104  051505  026523
 2131  010006      000
 2132  010007      015  040412  042522 MMULT:  .ASCIZ  <15><12>/ARE YOU RUNNING MULTIPLE DEVICES ? (Y OR N)-/
 2133  010014  054440  052517  051040
 2134  010022  047125  044516  043516
 2135  010030  046440  046122  044524
 2136  010036  046120  020105  042504
 2137  010044  044526  042503  020123
 2138  010052  020077  054440  047440
 2139  010060  020122  024516  000055
 2140  010066  005015  040514  052123 MLASTD: .ASCIZ  <15><12>/LAST DEVICE:RECEIVER CONTROL REGISTER ADDRESS-/
 2141  010074  042040  053105  041511
 2142  010102  035105  042522  042503
```

```
2143  010110  053111  051105  041440
2144  010116  047117  051124  046117
2145  010124  051040  043505  051511
2146  010132  042524  020122  042101
2147  010140  051104  051505  026523
2148  010146      000
2149  010147      075  042504  044526  DEVICE: .ASCIZ  /=DEVICE  /
2150  010154  042503  020040      000
2151  010161      015  044012  053517  MCOM:   .ASCIZ  <15><12>/HOW NOW BROWN COW? ...SELECT SOMETHING TO RUN @ACTREG/
2152  010166  047040  053517  041040
2153  010174  047522  047127  041440
2154  010202  053517  020077  027056
2155  010210  051456  046105  041505
2156  010216  020124  047523  042515
2157  010224  044124  047111  020107
2158  010232  047524  051040  047125
2159  010240  040040  041501  051124
2160  010246  043505      000
2161  010251      015  047412  052125  MRANGE: .ASCIZ  <15><12>/OUT OF RANGE:RETYPE LAST DEVICE RXCSR ADDRESS-/
2162  010256  047440  020106  040522
2163  010264  043516  035105  042522
2164  010272  054524  042520  046040
2165  010300  051501  020124  042504
2166  010306  044526  042503  051040
2167  010314  041520  051123  040440
2168  010322  042104  042522  051523
2169  010330  000055
2170  010332  020040  000077          MQM:    .ASCIZ  /  ?/
2171  010336  005015      000  MCRLF:  .ASCIZ  <15><12>
2172  010341      040  050040  053517  MPFAIL: .ASCIZ  /  POWER FAILURE, PROGRAM RESTART AT TEST IN PROGRESS/
2173  010346  051105  043040  044501
2174  010354  052514  042522  020054
2175  010362  051120  043517  040522
2176  010370  020115  042522  052123
2177  010376  051101  020124  052101
2178  010404  052040  051505  020124
2179  010412  047111  050040  047522
2180  010420  051107  051505  000123
2181  010426  005015  047105  020104  MEPASS: .ASCIZ  <15><12>/END OF PASS TAPE F/
2182  010434  043117  050040  051501
2183  010442  020123  040524  042520
2184  010450  043040      000
2185  010453      015  051012      000  MR:     .ASCIZ  <15><12>/R/
2186  010457      015  052012  051505  MTSTPC: .ASCIZ  <15><12>/TEST PC-/
2187  010464  020124  041520  000055
2188  010472  005015  047514  046503  MLOCK:  .ASCIZ  <15><12>/LOCK ON SELECTED TEST? (Y OR N)-/
2189  010500  047440  020116  042523
2190  010506  042514  052103  042105
2191  010514  052040  051505  037524
2192  010522  024040  020131  051117
2193  010530  047040  026451      000
2194  010536      015  042012  020125  MLEVEL: .ASCIZ  <15><12>/DU PRIORITY LEVEL-/
2195  010545  051120  047511  044522
2196  010550  054524  046040  053105
2197  010556  046105  000055
2198  010562  005015  020043  043117  MSYNC:  .ASCIZ  <15><12>/# OF SYNC CHARS SELECTED ( 1 OR 2)-/
```

```
2199  010570  051440  047131  020103
2200  010576  044103  051101  020123
2201  010604  042523  042514  052103
2202  010612  042105  024040  030440
2203  010620  047440  020122  024462
2204  010626  000055
2205  010630  005015  051511  051440  MWIRE6: .ASCIZ  <15><12>/IS SEC XMIT JUMPER #6 IN? (Y OR N)-/
2206  010636  041505  054040  044515
2207  010644  020124  052512  050115
2208  010652  051105  021440  020064
2209  010660  047111  020077  054450
2210  010666  047440  020122  024516
2211  010674  000055
2212  010676  005015  051511  051440  MWIRE5: .ASCIZ  <15><12>/IS SEC REC JUMPER #5 IN? (Y OR N)-/
2213  010704  041505  051040  041505
2214  010712  045040  046525  042520
2215  010720  020122  032443  044440
2216  010726  037516  024040  020131
2217  010734  051117  047040  026451
2218  010742      000
2219  010743      015  044412  020123  MWIRE4: .ASCIZ  <15><12>/IS OPT CLR ENABLE JUMPER #4 IN? (Y OR N)-/
2220  010750  050117  020124  046103
2221  010756  020122  047105  041101
2222  010764  042514  045040  046525
2223  010772  042520  020122  032043
2224  011000  044440  037516  024040
2225  011006  020131  051117  047040
2226  011014  026451      000
2227  011017      015  040412  042522  MEXTJ:  .ASCII  <15><12>/ARE YOU RUNNING IN MAINT MODE EXTERNAL?/
2228  011024  054440  052517  051040
2229  011032  047124  044516  043516
2230  011040  044440  020116  040515
2231  011046  047111  020124  047515
2232  011054  042504  042440  052130
2233  011062  051105  040516  037514
2234  011070  005015  040401  042116          .ASCII  <15><12><1>/AND ..... DO YOU HAVE THE EXTERNAL MODEM BYPASS/
2235  011076  027040  027056  027056
2236  011104  042040  020117  047531
2237  011112  020124  040510  040522
2238  011120  052040  042516  042440
2239  011126  052130  051105  040516
2240  011134  020114  047515  042504
2241  011142  020115  054502  040520
2242  011150  051523
2243  011152  005015  045001  046525          .ASCIZ  <15><12><1>/JUMPER CONNECTOR ON ?(Y OR N)-/
2244  011160  042520  020122  047503
2245  011166  047116  041505  047524
2246  011174  020122  047117  037440
2247  011202  054450  047440  020122
2248  011210  024516  000055
2249                          .EVEN
2250
2251                          ;BUFFERS FOR INPUT-OUTPUT
2252
2253  011214  000040  INBUF:  .BLKB   40
2254  011254  000040  TEMP:   .BLKB   40
```

```
 2255  011314  000040                    MDATA:  .BLKB   40
 2256                                    ;*****************************************************************
 2257                                            ;UTILITIES
 2258                                    ;*****************************************************************
 2259
 2260                                    ;THIS UTILITY CALCULATES PRIORITY LEVEL
 2261  011354  006367  000044            DULEV:  ASL     DUPRT   ;SHIFT LEFT
 2262  011360  006367  000040                    ASL     DUPRT   ;
 2263  011364  006367  000034                    ASL     DUPRT   ;
 2264  011370  006367  000030                    ASL     DUPRT   ;
 2265  011374  006367  000024                    ASL     DUPRT   ;
 2266  011400  016767  000020  000020            MOV     DUPRT,LESS1     ;MOVE THIS TO LESS1
 2267  011406  162767  000001  000012            SUB     #1,LESS1        ;CREATE LESS1
 2268  011414  042767  000037  000004            BIC     #37,LESS1       ;CLEAR TNZVC
 2269  011422  000207                            RTS     PC
 2270  011424  000240                    DUPRT:  LEVEL5
 2271  011426  000200                    LESS1:  LEVEL4  ;LEVEL TO ALLOW INTERRUPTS
 2272
 2273                                            ;NEW DU ADDRESSES
 2274  011430  016767  000126  000422    DUADDR: MOV     DUBASE,RXCSR    ;XXX0
 2275  011436  005267  000120                    INC     DUBASE
 2276  011442  016767  000114  000412            MOV     DUBASE,HRXCSR   ;XXX1
 2277  011450  005267  000106                    INC     DUBASE
 2278  011454  016767  000102  000402            MOV     DUBASE,RXDBUF   ;XXX2
 2279  011462  016767  000074  000400            MOV     DUBASE,PARCSR   ;XXX2
 2280  011470  005267  000066                    INC     DUBASE
 2281  011474  016767  000062  000364            MOV     DUBASE,HRXDBUF  ;XXX3
 2282  011502  016767  000054  000362            MOV     DUBASE,HPARCSR  ;XXX3
 2283  011510  005267  000046                    INC     DUBASE
 2284  011514  016767  000042  000352            MOV     DUBASE,TXCSR    ;XXX4
 2285  011522  005267  000034                    INC     DUBASE
 2286  011526  016767  000030  000342            MOV     DUBASE,HTXCSR   ;XXX5
 2287  011534  005267  000022                    INC     DUBASE
 2288  011540  016767  000016  000332            MOV     DUBASE,TXDBUF   ;XXX6
 2289  011546  005267  000010                    INC     DUBASE
 2290  011552  016767  000004  000322            MOV     DUBASE,HTXDBUF  ;XXX7
 2291  011560  000207                            RTS     PC
 2292  011562  000000                    DUBASE: 0
 2293
 2294                                    ;THIS UTILITY POKES THE MAINT DATA BASED UPON THE
 2295                                    ;INFORMATION CONTAINED IN TEMP1 AND IT IS
 2296                                    ;SHIFTED IN BY THE CONTENTS OF SHIFT
 2297  011564  042777  040000  000302    RPOKE:  BIC     #MTDATA,@TXCSR
 2298  011572  005067  167360                    CLR     TEMP2
 2299  011576  006067  167342                    ROR     TEMP1   ;FORCE CARRY
 2300  011602  006067  167340                    ROR     TEMP2   ;PICK UP CARRY IN BIT 15
 2301  011606  006267  167334                    ASR     TEMP2   ;SHIFT INTO BIT 14
 2302  011612  042767  100000  167326            BIC     #BIT15,TEMP2    ;CLR BIT 15
 2303  011620  056777  167322  000246            BIS     TEMP2,@TXCSR    ;POKE MAINT DATA
 2304  011626  042777  020000  000240            BIC     #CLK,@TXCSR     ;POKE CLK
 2305  011634  052777  020000  000232            BIS     #CLK,@TXCSR     ;
 2306  011642  005367  167272                    DEC     SHIFT
 2307  011646  001346                            BNE     RPOKE
 2308  011650  000207                            RTS     PC
 2309
 2310                                    ;THIS ROUTINE CALCULATES ODD PARITY FOR AN 8 BIT CHAR
```

```
2311  011652  016767  167266  167266  ODD8:   MOV     TEMP1,TEMP2     ;SAVE TEMP1
2312  011660  005067  167264          CLR     TEMP3
2313  011664  012727  000010          MOV     #8.,(PC)+
2314  011670  000000          1$:     0
2315  011672  006067  167250  2$:     ROR     TEMP2
2316  011676  005567  167246          ADC     TEMP3
2317  011702  005367  177762          DEC     1$
2318  011706  001371                  BNE     2$
2319  011710  006067  167234          ROR     TEMP3
2320  011714  103404                  BCS     3$
2321  011716  052767  000400  167220  BIS     #BIT8,TEMP1     ;SET ODD PARITY
2322  011724  000400                  BR      3$
2323  011726  042767  000400  167210  3$:     BIC     #BIT8,TEMP1     ;CLR EVEN PARITY
2324                                  ;TEMP1 NOW HAS ODD PARITY CHARACTER
2325  011734  000207          4$:     RTS     PC
2326
2327                          ;THIS ROUTINE CALCULATES EVEN PARITY FOR AN 8 BIT CHARACTER
2328  011736  016767  167202  167202  EVEN8:  MOV     TEMP1,TEMP2     ;SAVE TEMP1
2329  011744  005067  167200          CLR     TEMP3
2330  011750  012727  000010          MOV     #8.,(PC)+
2331  011754  000000          1$:     0
2332  011756  006067  167164  2$:     ROR     TEMP2
2333  011762  005567  167162          ADC     TEMP3
2334  011766  005367  177762          DEC     1$
2335  011772  001371                  BNE     2$
2336  011774  006067  167150          ROR     TEMP3
2337  012000  103004                  BCC     3$
2338  012002  052767  000400  167134  BIS     #BIT8,TEMP1     ;SET EVEN PARITY
2339  012010  000403                  BR      4$
2340  012012  042767  000400  167124  3$:     BIC     #BIT8,TEMP1     ;CLR ODD PARITY
2341                                  ;TEMP1 NOW HAS EVEN PARITY CHARACTER
2342  012020  000207          4$:     RTS     PC
2343  012022  062716  000002  TRPREG: ADD     #2,(SP) ;ALLOW IT TO "CRUNCH" INTO HLT BACK
2344                                                  ;IN MAIN PART OF THE PROGRAM
2345  012026  000002                  RTI
2346                                  ;ERROR HLT TABLE
2347  012030  012114          .ERRTAB:        EM0     ;HLT 0  BIT ERROR (GENERAL)
2348  012032  000000                          0
2349  012034  000000                          0
2350  012036  012130                  EM1     ;HLT 1  REGISTER ERROR
2351  012040  012301                  DH1
2352  012042  012322                  DT1
2353  012044  012172                  EM2     ;HLT 2  RECEIVER ERROR
2354  012046  012301                  DH1
2355  012050  012322                  DT1
2356  012052  012234                  EM3     ;HLT 3  TRANSMITTER ERROR
2357  012054  012301                  DH1
2358  012056  012322                  DT1
2359                                  ;DEFAULT DU ADDRESSES
2360  012060  160040          RXCSR:  160040
2361  012062  160041          HRXCSR: 160041
2362  012064  160042          RXDBUF: 160042
2363  012066  160043          HRXDBUF:        160043
2364  012070  160042          PARCSR: 160042
2365  012072  160043          HPARCSR:        160043
2366  012074  160044          TXCSR:  160044
```

```
2367  012076  160045                    HTXCSR: 160045
2368  012100  160046                    TXDBUF: 160046
2369  012102  160047                    HTXDBUF:        160047
2370                                            ;DEFAULT DU VECTORS
2371  012104  000770                    DURIV:  770     ;REC INTR VECTOR
2372  012106  000772                    DURIS:  772     ;REC INTR STATUS
2373  012110  000774                    DUTIV:  774     ;XMIT INTR VECTOR
2374  012112  000776                    DUTIS:  776     ;XMIT INTR STATUS
2375                                            ;ERROR MESSAGES
2376  012114  036440  042440  051122    EM0:    .ASCIZ  / = ERROR PC/
2377  012122  051117  050040  000103
2378  012130  036440  051040  043505    EM1:    .ASCIZ  / = REGISTER ERROR PC/<15><12><1>/REGISTER  /
2379  012136  051511  042524  020122
2380  012144  051105  047522  020122
2381  012152  041520  005015  051001
2382  012160  043505  051511  042524
2383  012166  020122  000040
2384  012172  036440  051040  041505    EM2:    .ASCIZ  / = RECEIVER ERROR PC/<15><12><1>/REGISTER  /
2385  012200  044505  042526  020122
2386  012206  051105  047522  020122
2387  012214  041520  005015  051001
2388  012222  043505  051511  042524
2389  012230  020122  000040
2390  012234  036440  052040  040522    EM3:    .ASCIZ  / = TRANSMITTER ERROR PC/<15><12><1>/REGISTER  /
2391  012242  051516  044515  052124
2392  012250  051105  042440  051122
2393  012256  051117  050040  006503
2394  012264  000412  042522  044507
2395  012272  052123  051105  020040
2396  012300      000
2397                                    ;DATA HEADERS FOR ERROR MESSAGES
2398  012301      105 050130  041505    DH1:    .ASCIZ  /EXPECTED  ACTUAL/
2399  012306  042524  020104  040440
2400  012314  052103  040525  000114
2401                            .EVEN
2402                                    ;DATA TABLES FOR ERROR MESSAGES
2403  012322  000003                    DT1:    3
2404  012324      006     004                   .BYTE   6,4
2405  012326  001164                            SAVR3   ;REGISTER
2406  012330      006     004                   .BYTE   6,4
2407  012332  001156                            SAVR0   ;EXPECTED DATA
2408  012334      006     002                   .BYTE   6,2
2409  012336  001160                            SAVR1   ;ACTUAL DATA
2410          000001                    .END
```

```
AAA     002046            954#
ACTREG  001216            772#    902*    916*    917*    924*   1652    1655    1665
ADRCNT= 006443           1817*   1856*   1865#
BASEAD  001204            767#    884*    921*    922     928*    930*   1659*   1671*   1675
BASEIV  001212            770#    894*   1660*   1672*   1677    1678*   1679    1680*   1681    1682*   1683    1684*
BBB     001664            901     905#
BINWRD  006760           1906*   1907    1944#
BITW  = 002000            682#
BIT0  = 000001            630#     658     689
BIT1  = 000002            629#     657
BIT10 = 002000            620#     648     682
BIT11 = 004000            619#     647
BIT12 = 010000            618#     646     663
BIT13 = 020000            617#     645     662     681
BIT14 = 040000            616#     644     661     680
BIT15 = 100000            615#     643     660     679     2302
BIT2  = 000004            628#     656     997
BIT3  = 000010            627#     655     688
BIT4  = 000020            626#     654     687
BIT5  = 000040            625#     653     686
BIT6  = 000100            624#     652     685
BIT7  = 000200            623#     651     684
BIT8  = 000400            622#     650     666     683     2321    2323    2338    2340
BIT9  = 001000            621#     649     665
BREAK = 000001            689#
BRW     005774            994     1008    1745#
BRX     005776            995     1009    1746#
CARDET= 010000            646#
CCC     005530           1651    1674    1691#
CHRCNT  006756           1904*   1908    1922*   1942#   1943
CKSWR = 104413            814#    1704    1726    1750    1979    2022
CLK   = 020000            681#    1050    1051    1054    1055    1071    1072    1100    1140    1141    1144    1145    1161
                         1162    1190    1230    1231    1234    1235    1251    1252    1280    1320    1321    1324    1325
                         1341    1342    1370    1409    1410    1414    1415    1459    1460    1464    1465    1511    1518
                         1528    1535    1588    1595    1605    1612    2304    2305
CNTLU = 104414            816#     861
CNVRT = 104411            810#    2096
CONVRT= 104410            808#    1648    2002    2013    2065
COUNT   001142            743#    1063*   1075*   1153*   1165*   1243*   1255*   1333*   1345*
CTS   = 020000            645#
DATABP  007232           1997*   2000    2011    2014#
DATAHD  007220           1996*   2007    2010#
DEVADR  006440           1815*   1853    1863#
DEVICE  010147           1649    2149#
DH1     012301           2351    2354    2357    2398#
DISPRE  000174            710#     854
DLIGHT= 177570            600#     845
DNA   = 100000            679#
DNAINT= 000040            686#
DSC   = 100000            643#
DSINTE= 000040            653#
DSR   = 001000            649#
DSWR  = 177570            599#     644
DTR   = 000002            657#
DT1     012322           2352    2355    2358    2403#
DUADDR  011430            883    1676    2274#
```

```
DUBASE  011562          879     882    1675*  2274   2275*  2276   2277*  2278   2279   2280*  2281   2282   2283*
                       2284    2285*   2286   2287*  2288   2289*  2290   2292#
DULEV   011354          949    2261#
DUPRT   011424          946    2261*   2262*  2263*  2264*  2265*  2266   2270#
DURIS   012106         1679*   2372#
DURIV   012104          890     893     894   1677*  1684   2371#
DUTIS   012112         1683*   2374#
DUTIV   012110         1681*   2373#
EIGHT = 006000          674#   1314    1403   1453   1505   1582
EM0     012114         2347    2376#
EM1     012130         2350    2378#
EM2     012172         2353    2384#
EM3     012234         2356    2390#
ERRCNT  001132          736#    835*   2023*
ERRFLG  001224          782#    834*   1693*  1739*  1985*  1998   2004*  2069*
ERRMSG  007206         1995*   2006#
ERTABO  007324         2003    2032#
EVENB   011736         2328#
EVEPAR= 001400          677#   1403    1505
EVPAR = 000400          666#
EXITER  007256         2017    2022#
FIVE  = 000005          671#   1044
FRMERR= 020000          662#
HALTS   007236         1981    2016#
HDXEN = 000010          688#
HILIM   006436         1814*   1844   1862#
HOLD    001136          741#   1513   1520   1530   1537   1590   1597   1607   1614
HPARCS  012072         2282*   2365#
HRXCSR  012062         2276*   2361#
HRXDBU  012066         2281*   2363#
HTXCSR  012076         2286*   2367#
HTXDBU  012102         2290*   2369#
ICOUNT  001122          732#   1737   1741*
INBUF   011214          957     961   1778   1820   1952   1956   2253#
INIFLG  001222          780#    840    843*
INSTER= 104404          800#    965   1839   1961
INSTR = 104403          798#    874    885    895    906    931    941    955    968    972    976    980    999
                       1012    2097
INSTR2  006222         1789    1804#
ISYMOD= 000000          670#
JMPBY   001203          763#    983   1494   1571
KEEPAD  001206          768#    882*   884    928    930   1671
KEEPIV  001214          771#    893*  1672
LASTAD  001210          769#    911    922    936
LESS1   011426         2266*   2267*  2268*  2271#
LEVEL0= 000000          640#
LEVEL1= 000040          639#
LEVEL2= 000100          638#
LEVEL3= 000140          637#
LEVEL4= 000200          636#   2271
LEVEL5= 000240          635#   2270
LEVEL6= 000300          634#
LEVEL7= 000340          633#
LIGHTS  001102          721#    845*   854*  1695*
LIMITS  006364         1830    1844#
LOBITS  006442         1816*   1848   1864#  1865
```

```
LOCK    001120            731#  1040*  1130*  1220*  1310*  1753
LOGICA  005562           1699#
LOKFLG  001225            783#  1002   1003
LOLIM   006434           1813*  1846   1861#
LPCNT   001124            733#   831*  1736*  1737   1740*
LSTERR  001134            737#   836*  1692*  1982   1984*  2070*
MCOW    010161           1654   2151#
MCRLF   010336           1786   1802   1894   2103   2171#
MDATA   011314           1920   1931   2255#
MEPASS  010426           1647   2181#
MEXT  = 010000            693#  1502   1579
MEXTJ   011017            981   2227#
MINT  = 004000            692#  1045   1135   1225   1315   1400   1450
MLASTD  010066            907   2140#
MLEVEL  010535            942   2194#
MLOCK   010472           1000   2188#
MMULT   010007            896   2132#
MPFAIL  010341           2068   2172#
MQM     010332           1799   2170#
MR      010453           1022   2185#
MRANGE  010251            932   2161#
MREGAD  007726            875   2123#
MRESET= 000400            683#  1041   1106   1131   1196   1221   1286   1311   1376   1394   1396   1444   1446
                         1496   1498   1573   1575
MSYNC   010562            956   2198#
MTDATA= 040000            680#  2297
MTITLE  007652            842   2115#
MTSTPC  010457           1013   2186#
MULTD   001202            762#   898    899    991   1650
MVECTO  007704            886   2120#
MWIRE4  010743            977   2219#
MWIRE5  010676            973   2212#
MWIRE6  010630            969   2205#
NEXT    001116            730#  1039*  1129*  1219*  1309*  1393*  1443*  1493*  1570*  1722   1742   2028
NOPAR = 000000            675#  1044   1134   1224   1314
OODPAN= 001000            676#  1453   1562
OOD8    011652           2311#
ONCE    001362            841    844#
OPTCLR  001201            761#   979
OUT     007610           2084   2086   2088   2092   2104#
OUTCRY  005522           1648   1687#
OUTMUL  002024            904    929    940#
OVRRUN= 040000            661#
PARAM = 104405            802#   876    887    908    933    943   1014   2098
PARAM1  006270           1819#  1840
PARCSR  012070           1046*  1061*  1136*  1151*  1226*  1241*  1316*  1331*  1395*  1403*  1445*  1453*  1497*
                         1505*  1574*  1582*  2279*  2364#
PAREN = 001000            665#
PARER = 010000            663#
PARERR  006344           1822   1824   1826   1835#  1845   1847   1849
PARTI   006426           1838   1858#
PASCNT  001130            735#   833*  1694*  1695
PFTAB   007466           2066   2072#
POPRO = 012600            609#  2021
POP1SP= 005726            607#
POP2SP= 022626            611#
```

```
PS     = 177776          601#   828*   987*  1703*  2060*
PUSHRO= 010046          608#  2018
PUSH1S= 005746          606#
PUSH2S= 024646          610#
ROSW    007474         1800   1837   2080#  2094*  2104*
RECACT= 004000          647#  1056   1080   1146   1170   1236   1260   1326   1350
REPLAY  005426         1667   1673   1675#
RESREG  007234         2012   2015#
RESTAR  007370         2046   2052#
RESTRT  005572         1668   1697   1703#
RESOS  = 104407          806#  2015
RING   = 040000          644#
RINTEN= 000100          652#
ROTADD  001220          775#   903*   915*   917    919*   924    927*  1662*  1665   1669*
RPOKE   011564         2297#  2307
RTRN    001114           729#   838*  1017   1021*  1023   1705*  1722*  1723   1742*  1743   2028*  2030   2071
                       2074
RTS    = 000004          656#
RUNA   = ###### U           1     33     45    108    546
RUNB   = ###### U           1     33     45    108    546
RUNC   = ###### U           1     33     45    108    546
RUND   = ###### U           1     33     45    108    546
RUNE   = ###### U           1     33     45    108    546
RUNF   = ###### U           1     33     45    108    546
RUNIT   005332         1653   1659#  1666
RXCSR   012060         1047*  1056   1080   1107   1137*  1146   1170   1197   1227*  1236   1260   1287   1317*
                       1326   1350   1377   1407*  1423   1457*  1473   1509*  1549   1586*  1626   1689   2274*
                       2360#
RXOBUF  012064         1042   1086   1132   1176   1222   1266   1312   1356   1404   1427   1454   1477   1506
                       1553   1583   1630   2278*  2362#
RXDONE= 000200          651#
RXERR  = 100000          660#
SAVPC   001174          756#  1869*  2034
SAVR0   001156          749#  1878*  1883   2407
SAVR1   001160          750#  1877*  1884   2409
SAVR2   001162          751#  1876*  1885
SAVR3   001164          752#  1875*  1886   2405
SAVR4   001166          753#  1874*  1887
SAVR5   001170          754#  1873*  1888
SAVSP   001172          755#  2045*  2052
SAVOS  = 104406          804#  1986
SCOPE  = 104400          792#  1114   1204   1294   1384   1434   1484   1561   1638
SCOPI  = 104401          794#  1096   1186   1276   1366
SEND   = 000020          687#  1045   1135   1225   1315   1400   1450   1502   1579
SEREC   001200           760#   975
SETFLG= 104412          812#   897    970    974    978    982   1001
SEVEN  = 004000          673#  1224
SEXMIT  001177           759#   971
SHIFT   001140          742#  1069*  1073*  1159*  1163*  1249*  1253*  1339*  1343*  1411*  1416*  1417   1421
                       1461*  1466*  1467   1471   1525*  1542*  1543   1547   1602*  1619*  1620   1624   2306*
SIX    = 002000          672#  1134
SPACNT= 006757         1905*  1924   1927*  1943#
SRD    = 002000          648#
STACK  = 001100          602#   829    988   2029   2061
STD    = 000010          655#
STFLG   001223           781#   832*
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
STPSYN= 000400          650#
SVOS    006452         1873#
SWR     001100          720#  844#  849   853#  859   862   997  1010  1727  1734  1751  1980  2016
                       2024  2026  2005
SWREG   000176          711#  853   859   2085  2101  2108
SWREGC  007616         2096  2106#
SW00  = 000001          582#  862
SW01  = 000002          581#  1010
SW02  = 000004          580#
SW03  = 000010          579#
SW04  = 000020          578#
SW05  = 000040          577#
SW06  = 000100          576#
SW08  = 000400          575#  2024
SW09  = 001000          574#  1751
SW10  = 002000          573#  2026
SW11  = 004000          572#  1734
SW12  = 010000          571#
SW13  = 020000          570#  1980
SW14  = 040000          569#  1727
SW15  = 100000          568#
SYNCNO  001176          758#  959#  963#  1078  1168  1258  1348
SYNEXT= 020000          669#  1395  1403  1445  1453  1497  1505  1574  1582
SYNINT= 020000          668#  1044  1134  1224  1314
SYNSCH= 000020          654#  1047  1107  1137  1197  1227  1287  1317  1377  1407  1457  1509  1586
SYSTST= 014000          694#
TEMP    011254         1901  1909  1934#  2062#  2063#  2254#
TEMP1   001144          744#  2299#  2311  2321#  2323#  2328  2338#  2340#
TEMP2   001146          745#  2298#  2300#  2301#  2302#  2303  2311#  2315#  2328#  2332#
TEMP3   001150          746#  1901#  1934  2312#  2316#  2319#  2329#  2333#  2336#
TEMP4   001152          747#
TEMP5   001154          748#
TKCSR   001104          722#  1730  1780  2087
TKDBR   001106          723#  1732  1782  1790  2089
TLAST = 005004         1016  1640#
TPCSR   001110          724#  1763  1791
TPDBR   001112          725#  1765#  1790#
TRPOK   007042         1971#
TRPREG  012022         2343#
TSTNO   001126          734#  837#  1038#  1128#  1218#  1308#  1392#  1442#  1492#  1569#
TST1    002650         1015  1021  1038#  1705  1706
TST2    002676         1039  1128#
TST3    003224         1129  1218#
TST4    003652         1219  1308#
TST5    004100         1309  1392#
TST6    004312         1393  1442#
TST7    004624         1443  1492#
TST8    005004         1493  1569#  1640
TST9  = ******  U      1570
TTST    005676          994#   995#  1005#  1006#  1008#  1009#  1728#
TXCSR   012074         1041#  1045#  1050#  1051#  1054#  1055#  1064  1071#  1072#  1100#  1101  1106#  1131#
                       1135#  1140#  1141#  1144#  1145#  1154  1161#  1162#  1190#  1191  1196#  1221#  1225#
                       1230#  1231#  1234#  1236#  1244  1251#  1252#  1280#  1281  1286#  1311#  1315#  1320#
                       1321#  1324#  1325#  1334  1341#  1342#  1370#  1371  1376#  1394#  1396#  1400#  1409#
                       1410#  1414#  1415#  1444#  1446#  1450#  1459#  1460#  1464#  1465#  1496#  1498#  1502#
                       1511#  1518#  1528#  1535#  1573#  1575#  1579#  1588#  1595#  1605#  1612#  2284#  2297#
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
TXDBUF  012100          2303*  2304*  2305*  2366#
                        1052*  1062*  1142*  1152*  1232*  1242*  1322*  1332*  1406*  1420*  1456*  1470*  1508*
                        1546*  1585*  1623*  2288*  2368#
TXDONE= 000200           684#
TXINTE= 000100           685#
TYPDAT  007222          2001   2008   2011#
TYPE    = 134402         796#   842   1022   1646   1649   1654   1776   1786   1798   1802   1893   1930   2005
                        2009   2067   2093   2095   2103
TYPMSG  007172          1999   2002#
USER    = 000000         691#
VOID    = 000001         658#
WRDCNT  006754          1903*  1932*  1941#
ZERO    005340          1650#
SCNTG   007624          2093   2109#
SE      = 000012          552#  1039   1041#  1129   1131#  1219   1221#  1309   1311#  1393   1394#  1443   1444#
                        1493   1494#  1570   1571#
SNNEW   007641          2097   2112#
SNSAR   007631          2095   2110#
SN      = 000010          552#  1038   1041#  1128   1131#  1218   1221#  1308   1311#  1392   1394#  1442   1444#
                        1492   1494#  1569   1571#  1640#
SY      = 000015          784#   792    794#   796#   798#   800#   802#   804#   806#   808#   810#   812#   814#
                         816#   816#
.       = 012340          696#   698#   709#   716#  2114#  2253#  2254#  2255#
.BEGIN  002156           864    987#
.CKSAR  007476           815   2083#
.CNTLU  007552           817   2094#
.CNVRT  006542           811   1895#
.CONVR  006536           809   1893#
.EOP    005364          1570   1646#
.ERRTA  012030          1994   2347#
.HLT    007062           702   1979#
.INSTE  006176           801   1796#
.INSTG  006202          1795   1798#
.INSTR  006060           799   1772#
.INSTI  006100          1776#  1787   1803
.MSG    006102          1774*  1777#  2089*  2090*  2091
.PARAM  006230           803   1810#
.PFAIL  007332           700    830   2038#  2059
.RESUS  006504           807   1883#
.SAVUS  006444           805   1869#
.SCOPE  005614           793   1710#
.SCOPI  006000           795   1750#
.SETFL  006762           813   1951#  1962
.START  001260           712    828#   838   1658
.TRPSR  007030           704   1968#
.TRPTA  001226           789#  1973
.TYPE   006020           797   1758#
```

CROSS REFERENCE TABLE -- MACRO NAMES

F05


```
SWORDF    552#
SWORDO    552#
SWORDP    552#


. ABS.  012340     000


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 DZDUFC,DZDUFC/CRF/SOL=HELLO.P11,PARA.P11,KEET.P11,DZDUFC.P11
 RUN-TIME:  16 23 2 SECONDS
 RUN-TIME RATIO: 117/42=2.7
 CORE USED:  18K  (35 PAGES)
```

GO5

Spooler runtime 0 Seconds, 32 KCS, 214 disk reads, 3 disk writes, 57 pages