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DHVD DEC/X11 SYSTEM EXERCISER M MACRO Y05.02 Wednesday 27-Feb-85 09:12 Page 2
DOCUMENTATION

.SBTTL DOCUMENTATION
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IDENTIFICATION

PRODUCT CODE: AC-T673D MC
PRODUCT NAME: CXDHVDO DHV11 DEC/X11 MODULE
PRODUCT DATE: FEBRUARY 1985
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT:

This document describes the DHV11 DEC/X11 EXERCISER MODULE. The program exercises up to 8 (consecutively addressed) DHV11 asynchronous interfaces. Maintenance mode is used to transmit and receive a binary count pattern outputted and received in 108 character bursts. All devices selected for testing are activated and run concurrently. All eight lines are run on each selected device.

This program will be runnable only on a 'Q' bus processor. This program will not support any device other than the DHV11.

The DHV11 is an asynchronous multiplexer that provides an interface between eight asynchronous serial data communications channels and any 'Q' bus processor. DHV11 is compatible with both 'Q18' and 'Q22' buses.

The DHV11 provides RS232-A and RS423-A interfaces with enough modem control to permit full duplex point to point operation or dial up (auto answer) operation over the Public Switched Telephone Network.

For each line the characteristics are set under program control, the only information that is set via switches on the card being the Q bus address and the vector address.

2. REQUIREMENTS:

-
- HARDWARE:
- o An LSI-11 System with Q18 or Q22 bus.
 - o 32 K bytes of memory (Total) on the system.
 - o 1-4 DHV11 interfaces. No wraparound or maintenance cable is needed if running in local loopback mode.

When running in normal operation mode, 2 BC05L cables will be required for each device, and an H325 line loopback connector.

STORAGE: This module (DHV11) requires:

- | | | |
|-------------------|-------|--------|
| 1. DECIMAL WORDS: | 2240 | ;RG001 |
| 2. OCTAL WORDS: | 4300 | ;RG001 |
| 3. OCTAL BYTES: | 10600 | ;RG001 |

SOFTWARE: Latest revision of the DEC/X11 Monitor & Linker.

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3. PASS DEFINITION:

ONE PASS OF THE DHV MODULE CONSISTS OF MULTIPLE ITERATIONS OF THE FOLLOWING FOR A PERIOD OF APPROXIMATELY 1 MINUTE:

TRANSMITTING AND RECEIVING 108 CHARACTERS PER ITERATION ON ALL LINES SELECTED FOR EACH DHV11 SELECTED.

4. EXECUTION TIME:

EXECUTION TIME IS PROPORTIONAL TO THE BAUD RATE BUT SHOULD TAKE AN AVERAGE OF ONE MINUTE TO COMPLETE ONE PASS WHEN RUNNING ALONE ON A PDP11/23 AT 9600. BAUD.

5. CONFIGURATION PARAMETERS:

DEFAULT PARAMETERS:

DVA: 1, VCT: 1, BR1: 5, BR2: 5, DVC: 1, SR1: 0

REQUIRED PARAMETERS:

AT CONFIGURATION TIME THE USER MUST SPECIFY:

DVA: ADDRESS OF FIRST DHV11 CSR REG.
VCT: VECTOR ADDRESS OF FIRST DHV11
DVC: NO. OF DHV11'S IF GREATER THAN 1

MODULE LOCATION DVID1 MAY BE MODIFIED (MOD DHVD 14) TO EXERCISE ANY COMBINATION OF DHV11'S. (SEE ITEM #8, "OPERATOR OPTIONS").

6. DEVICE OPTION SETUP:

NONE REQUIRED

7. MODULE OPERATION:

The DHV11 DEC/X11 Module is assembled and linked according to standards outlined in the DEC/X11 Module Programmer's Guide.

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THE MAIN ALGORITHM:

The testing is performed with internal loopback selected, via maintenance mode. The characters 224 - 377 (octal) are transmitted on 8 lines simultaneously via direct memory access. The receiver, not operating on a DMA basis, will receive characters on a per/character basis into the receive silo. If successful, 108 (decimal) characters per line should be received. Each received line will be checked for properly received data by comparing each received character to its expected value.

START:

- o SETUP # OF DHV's TO BE TESTED.

RESTRT:

- o SETUP DEVICE ADDRESSES & VECTORS.

SELFTST:

- o RUN INTERNAL SELF TEST DIAGNOSTICS ON ALL DHV11s SELECTED FOR TESTING.

DHVT02:

- o GET LINES TO BE TESTED ON THIS DHV11.

DHVBUF:

- o SET-UP WRITE COUNT PATTERN INTO XMIT BUFFER.
- o SET-UP LINE PARAMETERS.
(9600 BAUD, 8 BIT/CHAR., ENABLE RECEIVER)
- o START ALL LINES/DHV11 SELECTED.
- o ENDPASS WHEN ALL LINES OF ALL DHV11s HAVE PASSED 256 CHARACTERS EACH, FOR 20 ITERATIONS.

XMITTER ROUTINE:

- o ALL DATA IS MOVED VIA DMAs.
- o XMITTER ROUTINE RE-QUEUES BUFFER.

RECEIVER ROUTINE:

- o RECEIVES EACH CHARACTER OF EACH LINE UPON GETTING SILO INTERRUPTS.
- o VERIFIES CORRECT DATA AT LOWERED PRIORITY.

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8. OPERATOR OPTIONS:

1). TESTING MULTIPLE DHVS:

MODULE LOCATION DVID1 (MOD DHVD 14) MAY BE MODIFIED TO EXERCISE ANY COMBINATION OF FOUR DHV11'S:

DEVICE TO TEST -----	DVID1 = -----
# 1	1
2	2
3	4
4	10
1,2	3
1,3	5
1,4	11
2,3	6
2,4	12
3,4	14
1,2,3	7
1,2,4	13
1,3,4	15
2,3,4	16
1,2,3,4	17

2). SELECTABLE BAUD RATE:

THE BAUD RATE MAY BE SELECTED BASED ON THE CODE BELOW. THE SELECTION PROCEDURE IS VERY SIMPLE.

IF YOU WANT TO USE 9600 BITS/SEC. THEN SIMPLY LEAVE BOTH SR1 & SR2 "0". THIS IS THE DEFAULT VALUE.

IF YOU WISH TO USE OTHER BAUD RATES THEN FOLLOW THIS PROCEDURE:

- A. SELECT THE BAUD RATE YOU DESIRE FROM THE BAUD RATE TABLE. WE WILL USE 38.4 K FOR EXAMPLE.

NOTE#1: THE TRANSMIT & RECEIVE BAUD RATES WILL BE THE SAME.

NOTE#2: IF USING 38.4 K BAUD RATE, A MAXIMUM OF 2 LINES MAY BE USED AT ONE TIME.

IF USING 19.2 K BAUD RATE, A MAXIMUM OF 4 LINES MAY BE USED AT ONE TIME.

THE VARIABLE "LINESELECT" MUST BE CHANGED TO REFLECT THE MAXIMUM ALLOWABLE # OF LINES THAT MAY BE TESTED. (2 LINES @ 38.4, 4 LINES @ 19.2)

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- B. PLACE THE BINARY CODE FOR THE PARTICULAR BAUD RATE INTO SR1. FOR OUR EXAMPLE 38.4 K HAS A BINARY CODE VALUE OF 17.
- C. PLACE A "1" IN SR2. SR2 MUST ALWAYS CONTAIN A ONE WHENEVER A BAUD RATE (OTHER THAN THE DEFAULT) IS SELECTED.
- D. IN ORDER FOR THE PROGRAM TO RUN FOR 1 MINUTE, THE VALUE "ICONT" MUST BE MODIFIED FOR EACH SELECTED BAUD RATE. THE APPROPRIATE VALUE FOR "ICONT" MAY BE FOUND IN THE BAUD RATE TABLE. THE 1 MINUTE RUNTIME IS BASED ON RUNNING 1 DHV11. THE RUNTIME WILL BE PROPORTIONATLY LONGER FOR EACH ADDITIONAL DHV11 SELECTED FOR TESTING.

THE BAUD RATE MAY BE SELECTED AT TIME OF CONFIGURATION OR AT RUNTIME BY CHANGING THE CONTENTS OF SR1, SR2, & ICONT TO SELECT A PARTICULAR BAUD RATE.

LOCATION SR1 (MOD DHVD 16).
 LOCATION SR2 (MOD DHVD 20).
 LOCATION ICONT (MOD DHVD 36).

(NOTE: IF SR2 CONTAINS A "0", THE BAUD RATE SELECTED WILL BE 9600 NO MATTER WHAT IS IN SR1!!)

BAUD RATE TABLE
 =====

DATA RATE (BITS/SEC)	BINARY CODE (SR1 =)	ICONT =
50	0	2
75	1	3
110	2	4
134.5	3	5
150	4	5
300	5	10
600	6	12
1200	7	14
1800	10	15
2000	11	15
2400	12	16
4800	13	16
7200	14	16
9600	15	16
19200	16	17
38400	17	17

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3). MAY CHOOSE BETWEEN INTERNAL LOOPBACK OR NORMAL OPERATION.

- A. INTERNAL LOOPBACK REQUIRES NO CABLES, ONLY THE MODULE IS TESTED.
- B. NORMAL OPERATION ALLOWS THE OPERATOR TO TEST NOT ONLY THE MODULE, BUT THE CABLES TOO. HOWEVER, ONLY ONE LINE MAY BE TESTED AT ANY ONE TIME.

REQUIRES 2 BC05L CABLES AND AN H325 LOOPBACK CONNECTOR.

INTERNAL LOOPBACK: LEAVE SR3 "0".
 NORMAL OPERATION: PLACE INTO SR3 THE BIT MASK OF THE LINE DESIRED FOR TESTING, (SEE BIT MASK VALUES BELOW). (THE SAME LINE NUMBER WILL BE TESTED ON ALL DEVICES SELECTED).

LOCATION SR3: (MOD DHVD 22).

BIT MASK VALUES FOR TESTING A LINE IN NORMAL OPERATION

LINE # DESIRED	SR3 =
-----	-----
0	1
1	2
2	4
3	10
4	20
5	40
6	100
7	200

4). INDIVIDUAL & MULTIPLE LINE TESTING

MODULE VARIABLE "LINESELECT" MAY BE MODIFIED TO EXERCISE ANY COMBINATION OF EIGHT LINES:

LINE # TO BE TESTED	LINESELECT =
-----	-----
0	1
1	2
2	4
3	10
4	20
5	40
6	100
7	200
1,2	3
1,3	5
1,4	11
ETC.	
ALL 8 LINES	377

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9. ERROR REPORTS:

STANDARD ERROR REPORTS ARE GENERATED EXCEPT AS NOTED UNDER THE DESCRIPTION FOR NON-STANDARD PRINTOUTS. SEE THE DEC/X11 USERS GUIDE FOR EXAMPLES.

10. NON-STANDARD PRINTOUTS:

A. HARD ERROR REPORT

ASTAT (STATC) IS THE CONTENTS OF THE RECEIVER BUFFER.

B. DATA ERROR REPORT

WRADR IS THE LINE NUMBER.
RDADR HAS NO MEANING AND WILL ALWAYS EQUAL "0".

11. MNEMONICS:

THE FOLLOWING INFORMATION SHOULD BE USEFUL IN UNDERSTANDING NAMES GIVEN TO VARIABLES IN THIS PROGRAM:

LINESELECT: ; INDICATES LINES SELECTED. (8 LINES UNLESS CHANGED BY OPERATOR).
LINESDONE: ; INDICATES HOW MANY LINES ARE DONE.
LINECOUNT: ; # OF LINES BEING TESTED.

DHVS DONE: ; INDICATES HOW MANY DHV'S ARE DONE.
DHVS LEFT: ; INDICATES DHV'S LEFT TO DO.
DHV.LIVE: ; BIT MAP OF NUMBER OF DHV'S TO TEST.
DHV NOW: ; CURRENT DHV #.
DHV CSR: ; DHV CSR.

POINT: ; POINTS TO CURRENT DHV BEING TESTED.
OFFSET: ; OFFSET TO INDICATE SPECIFIC UNIT.
BUFADR: ; HOLDS CURRENT BUFFER ADDRESS FOR BINARY COUNT PATTERN.
CDHVCSR: ; HOLDS CSR.
LCKOUT: ; ALLOWS ONLY 1 DHV TO RUN TEST AT A TIME.

TXSPEED: ; TRANSMIT SPEED (BAUD RATE).
RCVSPEED: ; RECEIVE SPEED (BAUD RATE).

DHXBUF: ; HOLDS TRANSMIT MESSAGE
DHR0BUF: ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #1.
DHR1BUF: ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #2.
DHR2BUF: ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #3.
DHR3BUF: ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #4.
DHVVECT: ; HOLDS THE VECTOR ADDRESS OF CURRENT DHV.

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VA:           ; VIRTUAL ADDRESS.
PA:           ; PHYSICAL ADDRESS.
EA:           ; EXTENDED ADDRESS.
PA22:        ; PHYSICAL ADDRESS (22 BIT).
EA22:        ; EXTENDED ADDRESS (22 BIT).

ADDR0:       ; HOLDS CSR ADDRESS OF DHV #1.
ADDR1:       ; HOLDS CSR ADDRESS OF DHV #2.
ADDR2:       ; HOLDS CSR ADDRESS OF DHV #3.
ADDR3:       ; HOLDS CSR ADDRESS OF DHV #4.

FLAG:        ; INDICATES IF DEVICE CAN INTERRUPT O.K.
XOFF:        ; INDICATES STATUS OF "XOFF".
LPR:         ; LPR BEFORE SETTING BAUD RATES.
LPRSELECT:   ; LPR AFTER SETTING BAUD RATES.  NEEDED BECAUSE
              ; THE BAUD RATES ARE SET TO DEFAULTS DURING SELF TEST.

```

```

;
;*****
;
;  EDIT   DATE       BY      REASON
;  ----   -
;
;  A.0    ??JUL-83   N.MACCAMY  First release
;
;  B.0    ??-OCT-83  N.MACCAMY  Secound release
;
;  C.0    15-DEC-83  A.HYATT    Third release
;
;          ADDED SHIFTS TO 18 BIT ADDRESS ON NON 22 BIT MACHINE. RCVBUF
;          CLEARING CHANGED TO STOP THE OVER WRITTING OF NEXT
;          LOCATIONS. INTERRUPT ENABLING IN DMA SECTION MOVED TO THE
;          POINT WHERE ALL BOARDS ARE SET UP, THIS AVOIDS A RACE
;          BETWEEN SETUP OF BOARDS AND COMPLETION OF DMA.
;          ADDED THIS REVISION HISTORY.
;
;  001    26-FEB-1985  R. GAUDET  INCREASE THE LOOP COUNT OF THE
;          WATCHDOG TIMER TO ALLOW SELF-TEST
;          TO COMPLETE ON FASTER PROCESSORS
;          THAN THE F-11.
;          UPDATE THE MODULE ID NUMBER AND
;          DOCUMENTATION.
;
;*****
;

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DOCUMENTATION

456
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.SBTTL MODULE DEFINITIONS
.LIST SEQ,LOC,BIN
.TITLE DHVD DEC/X11 SYSTEM EXERCISER MODULE
; DDXCOM VERSION 6.4 28-JAN-82
.LIST BIN
;*****
BEGIN:
000000 104 110 126 MODNAM: .ASCII /DHVD / ;MODULE NAME.
000003 104 040
000005 000
000006 000001 XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE
000010 000001 ADDR: 1+0 ;1ST DEVICE ADDR.
000012 240 VECTOR: 1+0 ;1ST DEVICE VECTOR.
000013 240 BR1: .BYTE PRTY5+0 ;1ST BR LEVEL.
000014 000020 BR2: .BYTE PRTY5+0 ;2ND BR LEVEL.
000016 000000 DVID1: 17+1 ;DEVICE INDICATOR 1.
000020 000000 SR1: OPEN ;SWITCH REGISTER 1
000022 000000 SR2: OPEN ;SWITCH REGISTER 2
000024 000000 SR3: OPEN ;SWITCH REGISTER 3
000026 140000 SR4: OPEN ;SWITCH REGISTER 4
;*****
000026 140000 STAT: 140000 ;STATUS WORD.
000030 004344' INIT: START ;MODULE START ADDR.
000032 000224' SPOINT: MODSP ;MODULE STACK POINTER.
000034 000000 PASCNT: 0 ;PASS COUNTER.
000036 000016 ICONT: 16 ;# OF ITERATIONS PER PASS=16
000040 000000 ICOUNT: 0 ;LOC TO COUNT ITERATIONS
000042 000000 SOFCNT: 0 ;LOC TO SAVE TOTAL SOFT ERRORS
000044 000000 HRDCNT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
000046 000000 SOFPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
000050 000000 HRDPAS: 0 ;LOC TO SAVE HARD ERRORS PER PASS
000052 000000 SYSCNT: 0 ;# OF SYS ERRORS ACCUMULATED
000054 000000 RANNUM: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056 000000 CONFIG: ;RESERVED FOR MONITOR USE
000056 000000 RES1: 0 ;RESERVED FOR MONITOR USE
000060 000000 RES2: 0 ;RESERVED FOR MONITOR USE
000062 000000 SVRO: OPEN ;LOC TO SAVE R0,
000064 000000 SVR1: OPEN ;LOC TO SAVE R1.
000066 000000 SVR2: OPEN ;LOC TO SAVE R2.
000070 000000 SVR3: OPEN ;LOC TO SAVE R3.
000072 000000 SVR4: OPEN ;LOC TO SAVE R4.
000074 000000 SVR5: OPEN ;LOC TO SAVE R5.
000076 000000 SVR6: OPEN ;LOC TO SAVE R6.
000100 000000 CSRA: OPEN ;ADDR OF CURRENT CSR.
000102 SBADR: ;ADDR OF GOOD DATA, OR
000102 000000 ACSR: OPEN ;CONTENTS OF CSR.
000104 WASADR: ;ADDR OF BAD DATA, OR
000104 000000 ASTAT: OPEN ;STATUS REG CONTENTS.
000106 ERR TYP: ;TYPE OF ERROR
000106 000000 ASB: OPEN ;EXPECTED DATA.
000110 000000 AWAS: OPEN ;ACTUAL DATA.
000112 004360' RSTRT: RESTRT ;RESTART ADDRESS AFTER END OF PASS
000114 000000 WDTO: OPEN ;WORDS TO MEMORY PER ITERATION
000116 000000 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION
000120 000000 INTR: OPEN ;# OF INTERRUPTS PER ITERATION

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MODULE DEFINITIONS

000122 000144
000040
000224

IDNUM: 144 ;MODULE IDENTIFICATION NUMBER=144
.REPT SPSIZ ;MODULE STACK STARTS HERE.

MODSP:
;*****

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100000
040000
020000
010000
004000
002000
001000
000400
000200
000100
000040
000020
000010
000004
000002
000001

000000
000002
000002
000004
000010
000012
000014
000016

100000
040000
020000

; BIT DEFINITIONS

BIT15 = 100000
BIT14 = 40000
BIT13 = 20000
BIT12 = 10000
BIT11 = 4000
BIT10 = 2000
BIT9 = 1000
BIT8 = 400
BIT7 = 200
BIT6 = 100
BIT5 = 40
BIT4 = 20
BIT3 = 10
BIT2 = 4
BIT1 = 2
BIT0 = 1

; OFFSETS FOR REGISTERS (BASE IS CSR).

CSR = 0
RBUF = 2
TXCHAR = 2
LPR = 4
LNCTRL = 10
TX1BUFADR = 12
TX2BUFADR = 14
TXBUFCNTR = 16

; REGISTER DEFINITIONS.

; CSR(R2) ===== CSR.
; RBUF(R2) ===== RECEIVE BUFFER.
; TXCHAR(R2) ===== TRANSMIT CHARACTER REGISTER.
; LPR(R2) ===== LINE PARAMETER REGISTER.
; LNCTRL(R2) ===== LINE CONTROL REGISTER.
; TX1BUFADR(R2) = TRANSMIT BUFFER ADDRESS REGISTER 1.
; TX2BUFADR(R2) = TRANSMIT BUFFER ADDRESS REGISTER 2.
; TXBUFCNTR(R2) = TRANSMIT DMA BUFFER COUNTER.

; CSR BIT DEFINITIONS.

TX.ACTION - BIT15
TXINTR.ENABLE - BIT14
DIAG.FAIL = BIT13

MODULE DEFINITIONS

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511      010000      TXDMA.ERROR      =      BIT12
512      000200      RCVDATA.AVAIL    =      BIT7
513      000100      RCVINTR.ENABLE  =      BIT6
514      000040      MASTER.RESET    =      BIT5
515
516
517      ; RECEIVE BUFFER BIT DEFINITIONS.
518
519      100000      DATA.VALID      =      BIT15
520      040000      OVERRUN.ERROR    =      BIT14
521      020000      FRAMING.ERROR    =      BIT13
522      010000      PARITY.ERROR     =      BIT12
523
524
525      ; TRANSMIT CHARACTER REGISTER BIT DEFINITIONS.
526
527      100000      TXDATA.VALID     =      BIT15
528
529
530      ; LINE CONTROL REGISTER BIT DEFINITIONS.
531
532      000200      LOCAL.LOOP       =      BIT7
533      000004      RX.ENABLE       =      BIT2
534      000020      AUTO0          =      BIT4
535      000002      AUTO1          =      BIT1
536
537
538      ; TRANSMIT BUFFER ADDRESS 2 BIT DEFINITIONS.
539
540      100000      TX.ENABLE       =      BIT15
541      000200      DMA.START       =      BIT7
542
543
544      ; THESE ARE THE PROGRAM PARAMETERS:
545
546 000224 000377    LINESELECT: .WORD 377 ; INDICATES LINES SELECTED. (8 LINES UNLESS
547                                     ; CHANGED BY OPERATOR).
548 000226          LINESDONE: .BLKW 4 ; INDICATES HOW MANY LINES ARE DONE.
549 000236 000000    LINECOUNT: .WORD 0 ; # OF LINES BEING TESTED.
550
551 000240 000000    DHVSDONE: .WORD 0 ; INDICATES HOW MANY DHV'S ARE DONE.
552 000242 000000    DHVSLEFT: .WORD 0 ; INDICATES DHV'S LEFT TO DO.
553 000244 000000    DHV.LIVE: .WORD 0 ; BIT MAP OF NUMBER OF DHV'S TO TEST.
554 000246 000000    DHVNOW: .WORD 0 ; CURRENT DHV #.
555 000250 000000    DHVCSR: .WORD 0 ; DHV CSR.
556
557 000252 000000    POINT: .WORD 0 ; POINTS TO CURRENT DHV BEING TESTED.
558 000254 000000    OFFSET: .WORD 0 ; OFFSET TO INDICATE SPECIFIC UNIT.
559 000256 000000    BUFADR: .WORD 0 ; HOLDS CURRENT BUFFER ADDRESS FOR BINARY COUNT PATTERN.
560 000260 000000    CDHVCSR: .WORD 0 ; HOLDS CSR.
561 000262 000000    LCKOUT: .WORD 0 ; ALLOWS ONLY 1 DHV TO RUN TEST AT A TIME.
562
563 000264 000000    TXSPEED: .WORD 0 ; TRANSMIT SPEED (BAUD RATE).
564 000266 000000    RCVSPEED: .WORD 0 ; RECEIVE SPEED (BAUD RATE).
565

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MODULE DEFINITIONS

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566 000270          TXBUF:      .BLKB  256.  ; HOLDS TRANSMIT MESSAGE
567 000670          DHR0BUF:    .BLKB  256.  ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #1.
568 001270          DHR1BUF:    .BLKB  256.  ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #2.
569 001670          DHR2BUF:    .BLKB  256.  ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #3.
570 002270          DHR3BUF:    .BLKB  256.  ; HOLDS THE BINARY COUNT PATTERN FOR DEVICE #4.
571 002670 000000   DHVVECT:    .WORD   0      ; HOLDS THE VECTOR ADDRESS OF CURRENT DHV.
572
573 002672 000000   VA:          .WORD   0      ; VIRTUAL ADDRESS.
574 002674 000000   PA:          .WORD   0      ; PHYSICAL ADDRESS.
575 002676 000000   EA:          .WORD   0      ; EXTENDED ADDRESS.
576 002700 000000   PA22:       .WORD   0      ; PHYSICAL ADDRESS (22 BIT).
577 002702 000000   EA22:       .WORD   0      ; EXTENDED ADDRESS (22 BIT).
578
579 002704 000000   ADDR0:      .WORD   0      ; HOLDS CSR ADDRESS OF DHV #1.
580 002706 000000   ADDR1:      .WORD   0      ; HOLDS CSR ADDRESS OF DHV #2.
581 002710 000000   ADDR2:      .WORD   0      ; HOLDS CSR ADDRESS OF DHV #3.
582 002712 000000   ADDR3:      .WORD   0      ; HOLDS CSR ADDRESS OF DHV #4.
583
584 002714 000000   FLAG:        .WORD   0      ; INDICATES IF DEVICE CAN INTERRUPT O.K.
585 002716 000000   XOFF:        .WORD   0      ; INDICATES STATUS OF "XOFF".
586 002720 000030   DHVLPR:     .WORD  30      ; LPR BEFORE SETTING BAUD RATES.
587 002722 000000   LPRSELECT:  .WORD   0      ; LPR AFTER SETTING BAUD RATES. NEEDED BECAUSE
588                                     ; THE BAUD RATES ARE SET TO DEFAULTS DURING SELF TEST.
589

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; THESE ARE THE ERROR MESSAGES

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591
592          .NLIST  BEX
593 002724      045    106    101  ERR.A: .ASCIZ  'FATAL ERROR!! CANNOT SELECT MORE THAN 4 LINES @19.2 K BAUD!!'
594 003024      045    106    101  ERR.B: .ASCIZ  'FATAL ERROR!! CANNOT SELECT MORE THAN 2 LINES @38.4 K BAUD!!'
595 003124      045    106    101  ERR.C: .ASCIZ  'FATAL ERROR!! SELF-TEST TIMED OUT!! DROP THE UNIT!!'
596 003214      045    106    101  ERR.D: .ASCIZ  'FATAL ERROR!! SELF-TEST DIAGNOSTICS FAILED!! DROP THE UNIT!!'
597 003315      045    106    101  ERR.E: .ASCIZ  'FATAL ERROR!! DATA VALID DID NOT SET!! DROP THE UNIT!!'
598 003410      045    106    101  ERR.F: .ASCIZ  'FATAL ERROR!! OVERRUN, PARITY, OR FRAMING ERROR!! DROP THE UNIT!!'
599 003515      045    106    101  ERR.G: .ASCIZ  'FATAL ERROR!! SELF-TEST ERROR CODE INDICATES AN ERROR!! DROP THE UNIT!!'

600 003631      045    105    122  ERR.H: .ASCIZ  'ERROR!! ILLEGAL TRANSMIT INTERRUPT!!'
601 003701      045    105    122  ERR.I: .ASCIZ  'ERROR!! OVERRUN, PARITY, OR FRAMING ERROR!!'
602 003757      045    105    122  ERR.J: .ASCIZ  'ERROR!! DATA ERROR!!'
603 004007      045    105    122  ERR.K: .ASCIZ  'ERROR!! NO LINES SELECTED!!'
604 004046      045    106    101  ERR.L: .ASCIZ  'FATAL ERROR!! DEVICE DID NOT INTERRUPT PROPERLY!! DROP THE UNIT!!'
605 004154      045    106    101  ERR.M: .ASCII  'FATAL ERROR!! DEVICE DID NOT INTERRUPT PROPERLY!!'
606 004240      045    103    110          .ASCIZ  'CHECK EXTERNAL CABLE OR TURNAROUND CONNECTION!! DROP THE UNIT!!'
607          .LIST  BEX
608          .EVEN
609

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INITIAL SETUP & SELF-TEST

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        .SBTTL INITIAL SETUP & SELF-TEST
611
612
613      ; START THE PROGRAM.
614
615      START:
616
617      004344 016767 173444 173672      MOV     DVID1,DHV.LIVE      ; SETUP # OF DHV'S TO BE TESTED.
618      004352 001002                    BNE     RESTRT             ; IF THERE ARE NO DHV'S TO TEST,
619
620      004354                    DROP:      ; THEN DROP THE MODULE.
621
622      004354 104410 000000'            END$,BEGIN      ;
623
624      004360                    RESTRT:
625
626      004360 042767 177760 173656      BIC     #+C<17>,DHV.LIVE ; # OF DHV'S TO BE TESTED.
627
628
629      ; WE MUST CONVERT THE 16 BIT VIRTUAL ADDRESS (TXBUF) TO AN 18 AND/OR 22 BIT PHYSICAL
630      ; ADDRESS DEPENDING ON THE PROCESSOR.
631
632      004366 012767 000270' 176276      MOV     #TXBUF,VA          ; GET THE TRANSMIT BUFFER ADDRESS.
633      004374 104415 000000' 002672'      GETPA$,BEGIN,VA          ;GET PHYSICAL ADDRESS FROM 16-BIT VA
634      004402 016767 176266 176270      MOV     PA,PA22           ; NOW WE HAVE THE 18 BIT PHYSICAL ADDRESS AND
635      004410 016767 176262 176264      MOV     EA,EA22           ; THE 18 BIT EXTENDED ADDRESS.
636
637      004416 032767 001000 173432      BIT     #ADDR22,CONFIG    ; CAN THE PROCESSOR HANDLE 22 BIT ADDRESSING?
638      004424 001404                    BEQ     5$                ; IF NOT, KEEP AS AN 18 BIT ADDRESS.
639
640      004426 104416 000000' 002674'      MAP22$, BEGIN,PA          ; GET 22 BIT ADDR FROM 18-BIT ADDR
641      004434 000410                    BR      SETUP1
642
643      004436                    5$:
644      004436 006267 176240              ASR     EA22              ; SHIFT THE EXTENDED ADDRESS BITS
645      004442 006267 176234              ASR     EA22              ; SO THEY ARE CORRECT FOR THE DHU
646      004446 006267 176230              ASR     EA22              ; NOTE GETPA PUTS THE EXTENDED ADDRESS
647      004452 006267 176224              ASR     EA22              ; BITS IN BITS 4 AND 5
648
649      004456                    SETUP1:
650
651      004456 016701 173562              MOV     DHV.LIVE,R1       ; ANY DHV'S TO TEST?
652      004462 001734                    BEQ     DROP              ; NO, DROP THE MODULE.
653
654      004464 012767 000001 173560      MOV     #1,POINT         ; YES, SETUP DEVICE POINTER TO POINT TO 1ST DEVICE.
655      004472 016767 173310 173550      MOV     ADDR,DHVCSR      ; GET THE CSR ADDRESS FOR FIRST DEVICE.
656      004500 016767 173304 176162      MOV     VECTOR,DHVVECT   ; GET THE DEVICE VECTOR.
657
658      004506 012703 007522'            MOV     #DHRO,R3         ; SETUP ADDRESS OF RECEIVER INTERRUPT ROUTINE.
659      004512 012704 007214'            MOV     #DHXO,R4         ; SETUP ADDRESS OF TRANSMIT INTERRUPT ROUTINE.
660      004516 012701 002704'            MOV     #ADDRO,R1        ; SETUP DEVICE ADDRESS TABLE FOR 1ST DEVICE.
661
662
663      ; DETERMINE WHICH UNITS REQUIRE TESTING.
664
665      004522                    SETUP2:

```

INITIAL SETUP & SELF-TEST

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666
667 004522 036767 173524 173514      BIT    POINT,DHV.LIVE ; DOES OPERATOR WANT THIS DHV11 TESTED?
668 004530 001002                    BNE    1$             ; YES, GO TEST IT.
669 004532 000167 001140            JMP    NEXTDHV       ; NO, GO GET ANOTHER DHV.
670
671 004536                    1$:
672 004536 016702 173506            MOV    DHVCSR,R2    ; YES, SAVE THE CSR ADDRESS OF THIS DHV11.
673
674
675                                ; ROUTINE TO MAKE SURE THE TRANSMIT & RECEIVE INTERRUPTS WORK O.K.
676
677 004542 010146                    MOV    R1,-(SP)     ; SAVE REGISTERS.
678 004544 010246                    MOV    R2,(SP)
679 004546 010346                    MOV    R3,-(SP)
680 004550 010446                    MOV    R4,-(SP)
681 004552 010546                    MOV    R5,-(SP)
682
683
684 004554                    INITIALIZE:                ; FIRST WE INITIALIZE THE DEVICE.
685
686 004554 012701 004000            MOV    #4000,R1    ; SET-UP WATCHDOG TIMER. ;RG001
687 004560 052762 000040 000000    BIS    #MASTER.RESET,CSR(R2) ; SET MASTER RESET IN CSR.
688 004566
689 004566 032762 000040 000000    10$: BIT    #MASTER.RESET,CSR(R2) ; IS MASTER RESET STILL SET?
690 004574 001442                    BEQ    20$         ; NO, SELF TEST IS DONE.
691
692 004576 104407 000000'          BREAK$,BEGIN      ;TEMPORARY RETURN TO MONITOR...
004602 104407 000000'          BREAK$,BEGIN      ;THEN CONTINUE AT NEXT INSTRUCTION.
693
694 004606 005301                    DEC    R1          ; DECREMENT WATCHDOG TIMER.
695 004610 001366                    BNE    10$        ; YES, WAIT FOR MASTER RESET TO CLEAR.
696
697
698
699
700                                ; SELF-TEST TIMED OUT!! FATAL ERROR!! DROP THE UNIT!!
701
702
703 004612 016767 173432 173260    MOV    DHVCSR,CSRA ; YES, MASTER RESET DIDN'T SET. REPORT AN ERROR.
704 004620 016267 000000 173254    MOV    CSR(R2),ACSR ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
705 004626 016267 000002 173250    MOV    RBUF(R2),ASTAT ; OF THE CSR (ACSR), AND RBUF (ASTAT).
706 004634 012767 000034 173244    MOV    #34,ERRTYP
707
708 004642 104401 000000' 003124'  MSG$,BEGIN,ERR.C ;ASCII MESSAGE CALL
709 004650 104405 000000' 000000'  HRDR$,BEGIN,NULL ;
;*****
710
711 004656 046767 173370 173360    BIC    POINT,DHV.LIVE ; FATAL ERROR!! DROP THIS DHV11 UNIT!!
712
713 004664 012605                    MOV    (SP)+,R5    ; RESTORE REGISTERS.
714 004666 012604                    MOV    (SP)+,R4
715 004670 012603                    MOV    (SP)+,R3
716 004672 012602                    MOV    (SP)+,R2
717 004674 012601                    MOV    (SP)+,R1

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INITIAL SETUP & SELF-TEST

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718
719 004676 000167 000774          JMP      NEXTDHV          ; GO BACK FOR ANOTHER DHV11.
720
721 004702                          20$:
722
723 004702                          ROUTINE:
724
725 004702                          30$:
726 004702 016200 000002          MOV      RBUF(R2),R0      ; FLUSH OUT RECEIVER SILO.
727 004706 100001                          BPL     40$
728 004710 000774                          BR      30$
729
730 004712                          40$:
731 004712 016705 175752          MOV      DHVVECT,R5      ; POINT TO VECTOR ADDRESS.
732
733 004716 012725 005240'         MOV      #RCV,(R5)+      ; LOAD INTERRUPT RECEIVE ROUTINE ADDRESS.
734 004722 116725 173064         MOV      BR1,(R5)+      ; LOAD PRIORITY.
735 004726 105025                          CLR     (R5)+
736 004730 012725 005220'         MOV      #TX,(R5)+      ; LOAD INTERRUPT TRANSMIT ROUTINE ADDRESS.
737 004734 116725 173052         MOV      BR1,(R5)+      ; LOAD PRIORITY.
738 004740 105015                          CLR     (R5)
739
740 004742 005000                          CLR     R0                ; START WITH LINE ZERO.
741 004744 012701 000001          MOV      #1,R1           ; POINT TO IT.
742 004750                          50$:
743 004750 005067 175740          CLR     FLAG             ; INIT. INTERRUPT INDICATOR.
744 004754 030167 173244          BIT     R1,LINSELECT     ; IS THIS LINE ON THE DHV SELECTED FOR TESTING?
745 004760 001512                          BEQ     70$              ; NO, DON'T SET IT UP.
746
747 004762 010062 000000          MOV      R0,CSR(R2)      ; SELECT LINE NUMBER IN CSR.
748                          ; NOTE THE INITIAL RESET SELECTED A
749                          ; XMIT AND RECEIVE BAUD OF 9600, NO PARITY,
750                          ; 1 STOP BIT, NORMAL OPERATION. WE'RE
751                          ; NOT GOING TO CHANGE THAT HERE.
752
753 004766 030167 173030          BIT     R1,SR3           ; DOES THE OPERATOR WANT TO TEST IN LOCAL LOOPBACK?
754 004772 001404                          BEQ     52$              ; YES, SET-UP FOR LOCAL LOOPBACK.
755
756                          ; NO, SET-UP IN NORMAL OPERATION.
757
758 004774 012762 000026 000010    MOV      #RX.ENABLE!AUTO1!AUTO0,LNCTRL(R2) ; SET RX ENABLE & NORMAL
759                          ; OPERATION IN LNCTRL.
760 005002 000403                          BR      100$
761
762 005004                          52$:
763 005004 012762 000226 000010    MOV      #LOCAL.LOOP!RX.ENABLE!AUTO1!AUTO0,LNCTRL(R2) ; SET RX ENABLE & LOCAL
764                          ; LOOPBACK IN LNCTRL.
765
766 005012                          100$:
767
768 005012 010004                          MOV      R0,R4
769 005014 052704 040100          BIS     #TXINTR.ENABLE!RCVINTR.ENABLE,R4 ; SET TRANSMIT & RECEIVE
770                          ; INTERRUPT ENABLES.
771 005020 010462 000000          MOV      R4,CSR(R2)
772

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INITIAL SETUP & SELF TEST

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773 005024 012762 100000 000002      MOV    #TXDATA.VALID,TXCHAR(R2)      ; SET TX DATA VALID BIT TO SEND
774                                     ; THE CHARACTER.
775
776 005032 012703 010000              MOV    #10000,R3                     ; SET WATCHDOG TIMER. WE WILL
777                                     ; TIME OUT IF IT TAKES TOO LONG
778                                     ; TO INTERRUPT SUCCESSFULLY.
779
780 005036                                2$:
781 005036 104407 000000'              BREAK$,BEGIN                        ;TEMPORARY RETURN TO MONITOR....
782 005042 104407 000000'              BREAK$,BEGIN                        ;THEN CONTINUE AT NEXT INSTRUCTION.
783
783 005046 005303                      DEC    R3                            ; UPDATE COUNTDOWN.
784 005050 001044                      BNE    3$                            ; HAS THE TIMER TIMED OUT?
785
786 005052 016767 173172 173020        MOV    DHVCSR,CSRA                  ; YES, THE DEVICE DID NOT INTERRUPT PROPERLY!
787                                     ; REPORT AN ERROR.
788 005060 016267 000000 173014        MOV    CSR(R2),ACSR                 ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
789 005066 016267 000002 173010        MOV    RBUF(R2),ASTAT              ; OF THE CSR (ACSR), AND RBUF (ASTAT).
790
791 005074 022767 000002 175612        CMP    #BIT1,FLAG                  ; DID TRANSMITTER INTERRUPT?
792 005102 001007                      BNE    80$                          ; NO IT DIDN'T, REPORT INTERRUPT ERROR.
793 005104 030167 172712              BIT    R1,SR3                      ; EXTERNAL LOOPBACK MODE (NORMAL)?
794 005110 001404                      BEQ    80$                          ; NO, REPORT INTERRUPT ERROR.
795 005112 104401 000000' 004154'      MSG$,BEGIN,ERR.M                  ;ASCII MESSAGE CALL
796 005120 000403                      BR     85$
797 005122                                80$:
798 005122 104401 000000' 004046'      MSG$,BEGIN,ERR.L                  ;ASCII MESSAGE CALL
799 005130                                85$:
800 005130 104405 000000' 000000      ;*****
HRDR$,BEGIN,NULL                    ;
;*****
801
802 005136 046767 173110 173100        BIC    POINT,DHV.LIVE              ; FATAL ERROR!! DROP THIS DHV11 UNIT!!
803
804 005144 012605                      MOV    (SP)+,R5                     ; RESTORE REGISTERS.
805 005146 012604                      MOV    (SP)+,R4
806 005150 012603                      MOV    (SP)+,R3
807 005152 012602                      MOV    (SP)+,R2
808 005154 012601                      MOV    (SP)+,R1
809
810 005156 000167 000514              JMP    NEXTDHV                     ; GO BACK FOR ANOTHER DHV11.
811
812 005162                                3$:
813 005162 022767 000006 175524        CMP    #6,FLAG                     ; HAVE WE INTERRUPTED SUCCESSFULLY?
814 005170 001322                      BNE    2$                            ; NO, WAIT FOR FLAG TO SET.
815
816 005172 012762 000000 000000        MOV    #0,CSR(R2)                  ; DISABLE TRANSMIT & RECEIVER INTERRUPTS.
817 005200 042762 100000 000002        BIC    #TXDATA.VALID,TXCHAR(R2)    ; DISABLE TRANSMIT DATA VALID.
818
819 005206                                70$:
820 005206 005200                      INC    R0                            ; UPDATE LINE NUMBER FOR CSR.
821 005210 106301                      ASLB   R1                            ; POINT TO NEXT LINE.
822 005212 001256                      BNE    50$                          ; HAVE WE DONE 8 LINES?
823
824 005214 000167 000040              JMP    EX                            ; FINISHED TESTING INTERRUPT CAPABILITIES.

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INITIAL SETUP & SELF-TEST

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825
826 005220 TX: ; TRANSMIT ROUTINE.
827 005220 000004 000000' 005226' PIRQ$,BEGIN,1$ ; QUEUE UP TO CONTINUE AT 1$ AND RTI
;-----;
828 005226 1$:
829 005226 052767 000002 175460 BIS #BIT1,FLAG ; SET FLAG INDICATING SUCCESSFUL TRANSMIT INTERRUPT.
830 005234 104400 000000' EXIT$,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
831
832 005240 RCV: ; RECEIVE ROUTINE.
833 005240 000004 000000' 005246' PIRQ$,BEGIN,1$ ; QUEUE UP TO CONTINUE AT 1$ AND RTI
;-----;
834 005246 1$:
835 005246 052767 000004 175440 BIS #BIT2,FLAG ; SET FLAG INDICATING SUCCESSFUL RECEIVE INTERRUPT.
836 005254 104400 000000' EXIT$,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
837
838 005260 EX:
839 005260 012701 002000 MOV #2000,R1 ; SET-UP WATCHDOG TIMER.
840 005264 052762 000040 000000 BIS #MASTER.RESET,CSR(R2) ; SET MASTER RESET IN CSR.
841 005272 10$:
842 005272 032762 000040 000000 BIT #MASTER.RESET,CSR(R2) ; IS MASTER RESET STILL SET?
843 005300 001406 BEQ 20$ ; NO, SELF-TEST IS DONE.
844
845 005302 104407 000000' BREAK$,BEGIN ;TEMPORARY RETURN TO MONITOR....
005306 104407 000000' BREAK$,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
846
847 005312 005301 DEC R1 ; DECREMENT WATCHDOG TIMER.
848 005314 001366 BNE 10$ ; YES, WAIT FOR MASTER RESET TO CLEAR.
849
850 005316 20$:
851 005316 012605 MOV (SP)+,R5 ; RESTORE REGISTERS.
852 005320 012604 MOV (SP)+,R4
853 005322 012603 MOV (SP)+,R3
854 005324 012602 MOV (SP)+,R2
855 005326 012601 MOV (SP)+,R1
856
857 ; SET UP THE BAUD RATES.
858
859 CHECKLINES:
860 005330
861 005330 022767 000000 172666 CMP #0,LINSELECT ; MAKE SURE THERE ARE LINES SELECTED.
863 005336 001024 BNE 3$ ; YES, THERE ARE. GO TEST THEM.
864
865 005340 016767 172704 172532 MOV DHVCSR,CSRA ; NO, THERE ARE NO LINES SELECTED. REPORT AN ERROR.
866 005346 016267 000000 172526 MOV CSR(R2),ACSR ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
867 005354 016267 000002 172522 MOV RBUF(R2),ASTAT ; OF THE CSR (ACSR), AND RBUF (ASTAT).
868
869 005362 104401 000000' 004007' MSG$,BEGIN,ERR.K ;ASCII MESSAGE CALL
870 005370 104405 000000' 000000 HRDR$,BEGIN,NULL ;
;*****
871
872 005376 046767 172650 172640 BIC POINT,DHV.LIVE ; FATAL ERROR!! DROP THIS DHV11 UNIT!!

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INITIAL SETUP & SELF-TEST

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873 005404 000167 000266      JMP      NEXTDHV      ; GO BACK FOR ANOTHER DHV11.
874
875 005410                    3$:
876 005410 012700 000010      MOV      #8,R0        ; SET-UP BIT COUNTER.
877 005414 005067 172616      CLR      LINECOUNT  ; INITIALIZE THE "LINES SELECTED INDICATOR".
878 005420 022767 000000 172372  CMP      #0,SR2      ; DOES OPERATOR WANT TO RUN AT 9600 BAUD?
879 005426 001005            BNE      5$          ; NO, DETERMINE THE BAUD RATE DESIRED.
880
881 005430 012767 000015 172360  MOV      #15,SR1     ; YES, SET-UP BAUD USING 9600.
882 005436 000167 000200      JMP      12$         ; GO DO THE SET-UP.
883
884 005442                    5$:
885
886
887 005442 106167 172556      ROLB    LINESELECT   ; PLACE THE LINESELECT BIT INTO THE CARRY BIT.
888 005446 103002            BCC     7$          ; IS THIS LINE SELECTED?
889 005450 005267 172562      INC     LINECOUNT  ; YES, INDICATE THAT IT IS.
890
891 005454                    7$:
892 005454 077006            SOB     R0,5$       ; UPDATE COUNT-DOWN UNTIL ALL BITS ARE CHECKED.
893
894 005456 106167 172542      ROLB    LINESELECT   ; RESTORE LINESELECT.
895 005462 022767 000016 172326  CMP      #16,SR1     ; IS SELECTED BAUD RATE 19.2 K?
896 005470 001030            BNE     10$        ; NO, SEE IF IT IS SET FOR 38.4 K.
897 005472 022767 000004 172536  CMP      #4,LINECOUNT ; YES. ARE THERE MORE THAN 4 LINES SELECTED?
898 005500 002060            BGE     12$        ; NO, THAT'S GOOD. GO SET-UP THE BAUD RATE.
899
900 005502 016767 172542 172370  MOV      DHVCSR,CSRA ; YES, TOO MANY LINES SELECTED. REPORT AN ERROR.
901 005510 016267 000000 172364  MOV      CSR(R2),ACSR ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
902 005516 016267 000002 172360  MOV      RBUF(R2),ASTAT ; OF THE CSR (ACSR), AND RBUF (ASTAT).
903
904 005524 104401 000000' 002724'  MSG$,BEGIN,ERR.A    ;ASCII MESSAGE CALL
905                                     ; RUNNING CONCURRENTLY AT 19.2 K BAUD!
906                                     ;*****
005532 104405 000000' 000000  HRDR$,BEGIN,NULL    ;
                                     ;*****
907
908 005540 046767 172506 172476  BIC     POINT,DHV.LIVE ; FATAL ERROR!! DROP THIS DHV11 UNIT!!
909 005546 000167 000124      JMP     NEXTDHV      ; GO BACK FOR ANOTHER DHV11.
910
911 005552                    10$:
912 005552 022767 000017 172236  CMP      #17,SR1     ; IS SELECTED BAUD RATE 38.4 K?
913 005560 001030            BNE     12$        ; NO, GO SETUP ITS BAUD RATE.
914 005562 022767 000002 172446  CMP      #2,LINECOUNT ; YES. ARE THERE MORE THAN 2 LINES SELECTED?
915 005570 002024            BGE     12$        ; NO, GO SET-UP THE BAUD RATE.
916
917 005572 016767 172452 172300  MOV      DHVCSR,CSRA ; YES, TOO MANY LINES SELECTED. REPORT AN ERROR.
918 005600 016267 000000 172274  MOV      CSR(R2),ACSR ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
919 005606 016267 000002 172270  MOV      RBUF(R2),ASTAT ; OF THE CSR (ACSR), AND RBUF (ASTAT).
920
921 005614 104401 000000' 003024'  MSG$,BEGIN,ERR.B    ;ASCII MESSAGE CALL
922                                     ; RUNNING CONCURRENTLY AT 38.4 K BAUD!
923                                     ;*****
924 005622 104405 000000' 000000  HRDR$,BEGIN,NULL    ;

```

INITIAL SETUP & SELF-TEST

```

;*****
925
926 005630 046767 172416 172406      3IC  POINT,DHV.LIVE ; FATAL ERROR!! DROP THIS DHV11 UNIT!!
927 005636 000167 000034              JMP  NEXTDHV      ; GO BACK FOR ANOTHER DHV11.
928
929 005642              12$:
930 005642 004767 002656      JSR  PC,BAUDRATE  ; GO SET-UP THE BAUDRATE.
931
932
933      ; SETUP VECTOR ADDRESSES.
934
935 005646      VECT:
936 005646 016705 175016      MOV  DHVVECT,R5   ; POINT TO THE VECTOR.
937 005652 016711 172372      MOV  DHVCSR,(R1)  ; MOVE THE CSR ADDRESS INTO THE ADDRESS TABLE.
938 005656 010325              MOV  R3,(R5)+     ; MOVE THE ADDRESS OF THE RECEIVER INTERRUPT
939                                ; ROUTINE & THE PRIORITY OF THIS DHV11 INTO
940 005660 116725 172126      MOVB BR1,(R5)+    ; THE VECTOR ADDRESS FOR THIS DHV.
941 005664 105025              CLRB (R5)+
942 005666 010425              MOV  R4,(R5)+     ; MOVE THE ADDRESS OF THE TRANSMIT INTERRUPT
943                                ; ROUTINE & THE PRIORITY OF THIS DHV11 INTO
944 005670 116725 172116      MOVB BR1,(R5)+    ; THE VECTOR ADDRESS FOR THIS DHV.
945 005674 105015              CLRB (R5)
946
947 005676      NEXTDHV:
948
949 005676 006367 172350      ASL  POINT        ; POINT TO NEXT DHV11.
950 005702 062701 000002      ADD  #2,R1        ; POINT TO NEXT LOC. IN ADDRESS TABLE.
951 005706 062703 000034      ADD  #DHR1-DHR0,R3 ; POINT TO NEXT DHV'S RX INTERRUPT ROUTINE.
952 005712 062704 000020      ADD  #DHX1-DHX0,R4 ; POINT TO NEXT DHV'S TX INTERRUPT ROUTINE.
953
954 005716 032767 000020 172326      BIT  #20,POINT    ; HAVE WE SETUP ALL DHV11s?
955 005724 001010              BNE  SELFTEST     ; YES, LET'S GO TEST THEM!
956
957 005726 062767 000020 172314      ADD  #20,DHVCSR   ; NO, GO SETUP ANOTHER DHV11.
958 005734 062767 000010 174726      ADD  #10,DHVVECT
959 005742 000167 176554      JMP  SETUP2
960
961
962      ; NOW BEGIN THE SELF TEST
963
964 005746      SELFTEST:
965
966 005746 012767 000001 172276      MOV  #1,POINT     ; SETUP DEVICE POINTER TO POINT TO 1ST DEVICE.
967 005754 016767 172026 172266      MOV  ADDR,DHVCSR  ; SETUP ADDRESS OF 1ST DEVICE.
968
969 005762      DHV.L1:
970
971 005762 036767 172264 172254      BIT  POINT,DHV.LIVE ; DOES THE OPERATOR WANT TO TEST THIS DEVICE?
972 005770 001002              BNE  5$           ; YES, GO TEST IT.
973 005772 000167 000502              JMP  DHV.N1       ; NO, GO LOOK AT THE NEXT DHV.
974 005776      5$:
975 005776 016702 172246      MOV  DHVCSR,R2    ; SETUP THIS DHV'S DEVICE ADDRESS.
976 006002 012701 003720      MOV  #2000.,R1    ; SETUP WATCHDOG TIMER.
977
978

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INITIAL SETUP & SELF-TEST

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979 ; THE ONBOARD SELF-TEST DIAGNOSTIC WILL NOW BE RUN.
980 ; THIS IS ACCOMPLISHED BY SETTING THE MASTER RESET IN THE CSR. THE
981 ; CSR MASTER RESET BIT IS CLEARED WHEN THE SELF TEST IS COMPLETED.
982
983 006006 052762 000040 000000 10$: BIS #MASTER.RESET,CSR(R2) ; SET MASTER RESET IN CSR.
984 006014 BIT #MASTER.RESET,CSR(R2) ; IS MASTER RESET STILL SET?
985 006014 032762 000040 000000 BEQ 20$ ; NO, SELF-TEST IS DONE.
986 006022 001435
987
988 006024 104407 000000' BREAK$,BEGIN ;TEMPORARY RETURN TO MONITOR....
006030 104407 000000' BREAK$,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
989
990 006034 005301 DEC R1 ; DECREMENT WATCHDOG TIMER.
991 006036 001366 BNE 10$ ; YES, WAIT FOR MASTER RESET TO CLEAR.
992
993
994 ; SELF-TEST TIMED OUT!! FATAL ERROR!! DROP THE UNIT!!
995
996 006040 016767 172204 172032 MOV DHVCSR,CSRA ; YES, MASTER RESET DIDN'T SET. REPORT AN ERROR.
997 006046 016267 000000 172026 MOV CSR(R2),ACSR ; PRINTOUT THE CSR ADDRESS (CSRA), THE CONTENTS
998 006054 016267 000002 172022 MOV RBUF(R2),ASTAT ; OF THE CSR (ACSR), AND RBUF (ASTAT).
999 006062 012767 000034 172016 MOV #34,ERRTYP
1000
1001 006070 104401 000000' 003124' MSG$,BEGIN,ERR.C ;ASCII MESSAGE CALL
1002 006076 104405 000000' 000000 ;*****
HRDR$,BEGIN,NULL ;
;*****
1003
1004 006104 046767 172142 172132 BIC POINT,DHV.LIVE ; FATAL ERROR!! DROP THIS DHV11 UNIT!!
1005 006112 000167 000362 JMP DHV.N1 ; GO BACK FOR ANOTHER DHV11.
1006
1007
1008 ; THE SELF-TEST DID COMPLETE FOR THIS DHV11. BUT, WERE THERE ANY FAILURES?
1009
1010 006116 20$: BIT #DIAG.FAIL,@DHVCSR ; DID SELF-TEST DIAGNOSTICS PASS?
1011 006116 032777 020000 172124 BEQ 30$ ; YES, IF "DIAGNOSTICS FAILURE" BIT CLEAR.
1012 006124 001426
1013
1014 ; SELF-TEST DIAGNOSTICS FAILED!! FATAL ERROR!! DROP THE UNIT!!
1015
1016
1017 006126 016767 172116 171744 MOV DHVCSR,CSRA ; REPORT CSR.
1018 006134 016267 000000 171740 MOV CSR(R2),ACSR ; REPORT CSR CONTENTS.
1019 006142 010567 171736 MOV R5,ASTAT ; REPORT CONTENTS OF RBUF.
1020 006146 012767 000034 171732 MOV #34,ERRTYP ; REPORT ERROR TYPE.
1021
1022 006154 104401 ^00000' 003214' MSG$,BEGIN,ERR.D ;ASCII MESSAGE CALL
1023 006162 104405 000000' 000000 ;*****
HRDR$,BEGIN,NULL ;
;*****
1024
1025 006170 046767 172056 172046 BIC POINT,DHV.LIVE ; REMOVE THIS FAULTY DEVICE FROM TESTING.
1026 006176 000167 000276 JMP DHV.N1 ; GO GET NEXT DHV.
1027
1028

```

INITIAL SETUP & SELF-TEST

```

1029 ; SELF-TEST PASSED O.K.
1030
1031 006202 30$:
1032 006202 012704 000007 MOV #7.,R4 ; SETUP TO READ 8 CHAR. CODES FROM RBUF.
1033 006206 012701 003720 MOV #2000.,R1 ; SETUP WATCHDOG TIMER.
1034 006212 40$:
1035 006212 016203 000002 MOV RBUF(R2),R3 ; READ RBUF FIFO. A VALID CHAR. WILL SET BIT
1036 006216 100434 BMI 50$ ; #15 (FIFO NOT EMPTY).
1037
1038 006220 104407 000000' BREAK$,BEGIN ; TEMPORARY RETURN TO MONITOR....
006224 104407 000000' BREAK$,BEGIN ; THEN CONTINUE AT NEXT INSTRUCTION.
1039
1040 006230 005301 DEC R1 ; DECREMENT WATCHDOG TIMER.
1041 006232 001367 BNE 40$ ; WAIT, WE WANT TO READ RBUF FIFO.
1042
1043 ; DATA VALID DID NOT SET!! FATAL ERROR!! DROP THIS DHV11!!
1044
1045 ; BIT #15 DIDN'T SET! REPORT AN ERROR!
1046 ; REPORT CSR.
1047 006234 016767 172010 171636 MOV DHVCSR,CSRA ; REPORT CSR CONTENTS.
1048 006242 016267 000000 171632 MOV CSR(R2),ACSR ; REPORT CONTENTS OF RBUF.
1049 006250 010367 171630 MOV R3,ASTAT ; REPORT ERROR TYPE.
1050 006254 012767 000034 171624 MOV #34,ERRTYP
1051
1052 006262 104401 000000' 003315' MSG$,BEGIN,ERR.E ; ASCII MESSAGE CALL
1053 006270 104405 000000' 000000 ; *****
HRDR$,BEGIN,NULL ; *****
1054
1055 006276 046767 171750 171740 BIC POINT,DHV.LIVE ; REMOVE THIS FAULTY DHV FROM TESTING.
1056 006304 000167 000170 JMP DHV.N1 ; GO GET NEXT DHV.
1057
1058 ; IT IS A VALID CHARACTER. CHECK BITS 12-14 FOR A POSSIBLE ERROR.
1059
1060 50$:
1061 006310 BIT #OVERRUN.ERROR!FRAMING.ERROR!PARITY.ERROR,R3 ; IS IT MODEM STATUS,
1062 006310 032703 070000 ; SELF-TEST ERROR CODE,
1063 ; OR DATA?
1064
1065 006314 001736 BEQ 40$ ; IF NONE SET THEN IT IS DATA. IT DOESN'T COUNT.
1066 006316 062703 010000 ADD #BIT12,R3 ; MAKE SURE ALL THE BITS WERE SET!
1067 006322 100026 BPL 60$ ; THEY WERE. THAT'S GOOD.
1068
1069 ; OVERRUN, PARITY OR FRAMING ERROR!! FATAL ERROR!! DROP THIS UNIT!!
1070
1071 ; IF OVERFLOW TO BIT 15 DID NOT OCCUR,
1072 ; THEN WE KNOW ALL 3 BITS WERE NOT SET!
1073 ; REPORT AN ERROR.
1074
1075 006324 016767 171720 171546 MOV DHVCSR,CSRA ; REPORT CSR.
1076 006332 016267 000000 171542 MOV CSR(R2),ACSR ; REPORT CSR CONTENTS.
1077 006340 010367 171540 MOV R3,ASTAT ; REPORT RBUF CONTENTS.
1078 006344 012767 000034 171534 MOV #34,ERRTYP ; REPORT ERROR TYPE.
1079
1080 006352 104401 000000' 003410' MSG$,BEGIN,ERR.F ; ASCII MESSAGE CALL

```

INITIAL SETUP & SELF-TEST

```

1081      006360 104405 000000' 000000      ;*****
      HRDR$,BEGIN,NULL      ;
      ;*****
1082
1083 006366 046767 171660 171650      BIC    POINT,DHV.LIVE ; REMOVE THIS FAULTY DHV FROM TESTING.
1084 006374 000167 000100      JMP    DHV.N1      ; GO GET NEXT DHV.
1085
1086
1087      ; THE "ALL ONES" CODE FOR BITS 12-14 IN RBUF INDICATES THAT MODEM
1088      ; STATUS OR SELF TEST DIAGNOSTIC INFO. IS BEING HELD IN RBUF BITS 0-7.
1089      ; WE WANT TO LOOK AT THE SELF-TEST CODE TO ASSURE THAT THE SELF-TEST
1090      ; COMPLETED O.K.
1091
1092 006400      60$:
1093 006400 032703 000001      BIT    #BIT0,R3      ; IS THIS MODEM STATUS OR SELF-TEST ERROR CODE?
1094 006404 001702      BEQ    40$      ; IGNOR THE MODEM STATUS. WE JUST WANT
      ; SELF-TEST ERROR CODES.
1095
1096
1097 006406 105703      TSTB   R3      ; LOOK TO SEE IF ROM VERSION OR SELF-TEST ERROR CODE.
1098 006410 100031      BPL    70$      ; IF BIT7=0 THEN ROM VERSION. READ AND IGNOR.
1099 006412 120327 00201      CMPB   R3,#201      ; DID WE GET SUCCESSFUL COMPLETION CODE?
1100 006416 001426      BEQ    70$      ; IF SO, CODE 201 RETURNED. ANY OTHER CODE IS
      ; AN ERROR!
1101
1102
1103
1104      ; SELF-TEST ERROR CODE INDICATES AN ERROR!! FATAL ERROR!! DROP THIS DHV1!!
1105
1106
1107 006420 016767 171624 171452      MOV    DHVCSR,CSRA      ; REPORT AN ERROR.
1108 006426 016267 000000 171446      MOV    CSR(R2),ACSR      ; REPORT CSR.
1109 006434 010367 171444      MOV    R3,ASTAT      ; REPORT RBUF CONTENTS.
1110 006440 012767 000034 171440      MOV    #34,ERRTYP      ; REPORT ERROR TYPE.
1111
1112 006446 104401 000000' 003515'      MSG$,BEGIN,ERR.G      ;ASCII MESSAGE CALL
1113      006454 104405 000000' 000000      ;*****
      HRDR$,BEGIN,NULL      ;
      ;*****
1114
1115 006462 046767 171564 171554      BIC    POINT,DHV.LIVE ; REMOVE THIS FAULTY DHV FROM TESTING.
1116 006470 000167 000004      JMP    DHV.N1      ; GO GET NEXT DHV.
1117
1118
1119      ; THESE ARE THE SELF-TEST ERROR CODES
1120
1121      ; CODE          MEANING
1122
1123      ; 201      SELF TEST NULL CODE (OK)
1124      ; 203      SELF TEST CODE SKIPPED
1125      ; 211      BASIC DATA PATH ERROR FRO PROC2
1126      ; 213      UNDEFINED UART ERROR
1127      ; 225      PROC1 TO EXTERNAL RAM ERROR
1128      ; 227      PROC2 TO EXTERNAL RAM ERROR
1129      ; 231      PROC1 TO INTERNAL RAM ERROR
1130      ; 233      PROC2 TO INTERNAL RAM ERROR
1131      ; 235      PROC1 ROM ERROR

```

INITIAL SETUP & SELF-TEST

```

1132          ; 237  PROC2 ROM ERROR
1133          ; 241-277 UART ACCESS OR FUNCTION
1134          ; BIT 7=0 AND BIT0-1 ROM VERSION
1135          ; ALL OTHER CODES ARE UNDEFINED ERRORS.
1136
1137 006474          70$:
1138 006474 005304   DEC      R4          ; NEXT CHARACTER.
1139 006476 001245   BNE      40$          ; HAVE WE DONE ALL 8 CHARACTERS?
1140                                     ; IF NOT, GO BACK & DO THEM.
1141
1142
1143          ; LET'S LOOK AT THE NEXT DHV11
1144
1145 006500          DHV.N1:
1146
1147 006500 005767 171540   TST      DHV.LIVE      ; ANY DHVS TO TEST?
1148 006504 001002          BNE      10$
1149 006506 000167 175642   JMP      DROP
1150
1151 006512          10$:
1152 006512 106367 171534   ASLB    POINT         ; LOOK AT NEXT DHV.
1153 006516 032767 000020 171526 BIT     #20,POINT     ; HAVE WE TESTED ALL DHV'S.
1154 006524 001005          BNE     DHVT02        ; YES, GOTO NEXT TEST SECTION.
1155 006526 062767 000020 171514 ADD     #20,DHVCSR    ; NO, GET NEXT DHV ADDRESS.
1156 006534 000167 177222   JMP     DHV.L1        ; GO BACK AND TEST.

```


MODE SET-UP

```

1158          .sbt1  MODE SET-UP
1159          ;) **
1160          ;)
1161          ;)  NAME:  DHVT02
1162          ;)
1163          ;)  FUNCTIONAL DESCRIPTION:  THIS SECTION SETS UP THE DHV11 TO PASS DATA IN
1164          ;)                               INTERNAL LOOPBACK MODE OR TO LOOPBACK DATA
1165          ;)                               EXTERNALLY IN NORMAL MODE.
1166          ;)
1167          ;)
1168          ;)  CALLING SEQUENCE:          IN LINE.
1169          ;)
1170          ;)  INPUTS REQUIRED:            NONE
1171          ;)
1172          ;)  OUTPUTS GIVEN:            NONE.
1173          ;)
1174          ;)  REGISTERS USED, UNRESTORED: ALL
1175          ;)
1176          ;)  SUBROUTINES USED:         NONE.
1177          ;)
1178          ;)  RESTRICTIONS:
1179          ;)
1180          ;)  --
1181
1182          006540  DHVT02:
1183
1184          006540  005067  171516          CLR    LCKOUT          ;  INIT. LOCKOUT.
1185          006544  005067  174146          CLR    XOFF           ;  INIT. XOFF INDICATOR.
1186          006550  005067  171452          CLR    LINESDONE      ;  INIT. LINE DONE INDICATOR.
1187          006554  005067  171450          CLR    LINESDONE+2    ;  INIT. LINE DONE INDICATOR.
1188          006560  005067  171446          CLR    LINESDONE+4    ;  INIT. LINE DONE INDICATOR.
1189          006564  005067  171444          CLR    LINESDONE+6    ;  INIT. LINE DONE INDICATOR.
1190
1191          006570  005067  171452          CLR    DHVNOW         ;  START WITH DEVICE #0.
1192          006574  016767  171206  171446  MOV    ADDR,DHVCSR     ;  GET ADDRESS OF FIRST DHV11.
1193          006602  016767  171202  174060  MOV    VECTOR,DHVVECT ;  GET VECTOR OF FIRST DHV11.
1194
1195          006610  012767  000001  171434  MOV    #1,POINT       ;  RECORD WORKING ON 1ST DHV11.
1196          006616  005067  171416          CLR    DHVSDONE       ;  CLEAR THE INDICATOR OF HOW MANY DHVS
1197          ;)                               ;  ARE DONE.
1198          006622  005067  171414          CLR    DHVSLEFT       ;  AND HOW MANY ARE LEFT TO DO.
1199
1200          006626          DHV.L2:
1201
1202          006626  036767  171420  171410  BIT    POINT,DHV.LIVE ;  DOES OPERATOR WANT THIS DHV11 TESTED?
1203          006634  001503          BEQ    DHV.N2         ;  NO, GO LOOK AT THE NEXT DHV.
1204
1205          006636  016702  171406          MOV    DHVCSR,R2      ;  SAVE DHV ADDRESS FOR SUBROUTINES.
1206
1207
1208          ;  SETUP THE COUNT PATTERN TO SEND VIA THE TRANSMITTER.
1209          ;  THE COUNT PATTERN IS 224-377 (148-255 DECIMAL).
1210
1211          006642          DHV.BUF:
1212

```


MODE SET-UP

```

1268 006770 000403          BR      54$
1269
1270 006772          52$:
1271 006772 012762 000226 000010  MOV     #LOCAL.LOOP!RX.ENABLE!AUTO1!AUTO0, LNCTRL(R2) ; SET RX ENABLE & LOCAL
1272                                     ; LOOPBACK IN LNCTRL.
1273
1274 007000          54$:
1275 007000 016762 173674 000012  MOV     PA22, TX1BUFADR(R2) ; PUT XMIT BUF ADDRESS IN TBUFAD1.
1276                                     ; IF EXTENDED ADDRESS, MUST SET UP -14.
1277 007006 116762 173670 000014  MOVB   EA22, TX2BUFADR(R2)
1278 007014 012762 000154 000016  MOV     #108., TXBUFCNTR(R2) ; SET UP BYTE COUNT.
1279
1280
1281                                     ; SETUP THE BAUD RATES.
1282
1283 007022 016762 173674 000004  MOV     LPRSELECT, LPR(R2) ; SETUP THE BAUD RATES.
1284
1285
1286                                     ; TURN ON THE TRANSMITTER & LET HER SEND THOSE CHARACTERS!
1287
1288 007030 052762 100200 000014  BIS     #TX.ENABLE!DMA.START, TX2BUFADR(R2) ; ENABLE DMA START AND TXMIT ENABLE.
1289 007036          70$:
1290 007036 005200          INC     R0 ; UPDATE LINE NUMBER FOR CSR.
1291 007040 106301          ASLB   R1 ; POINT TO NEXT LINE.
1292 007042 001337          BNE    50$ ; HAVE WE DONE 8 LINES?
1293
1294
1295                                     ; LET'S LOOK AT THE NEXT DHV11
1296
1297 007044          DHV.N2:
1298
1299 007044 062767 000020 171176  ADD     #20, DHVCSR ; NEXT DHV ADDRESS.
1300 007052 062767 000010 173610  ADD     #10, DHVVECT ; NEXT VECTOR ADDRESS.
1301 007060 005267 171162          INC     DHVNOW ; UPDATE FOR ERROR TYPECOUNT IF ANY.
1302
1303 007064 106367 171162          ASLB   POINT ; LOOK TO NEXT DHV BITMASK POSITION.
1304 007070 032767 000020 171154  BIT     #20, POINT ; HAVE WE TESTED ALL DHV'S.
1305 007076 001653          BEQ    DHV.L2 ; GO BACK AND TEST IF ANY.
1306
1307                                     ; YES ALL BOARDS SET SO TURN ON THE TRANSMITTER
1308                                     ; AND RECEIVER INTERRUPT ENABLES AND LET HER FLY!!
1309
1310 007100 032767 000001 171136  BIT     #1, DHV.LIVE ;CHECK FOR DHV
1311 007106 001405          BEQ    10$
1312 007110 016702 173570          MOV     ADDR0, R2 ; SET UP R2 FOR FIRST CSR
1313 007114 012762 040100 000000  MOV     #TXINTR.ENABLE!RCVINTR.ENABLE, CSR(R2) ; SET XMIT INTERPT-ENABLE AND
1314                                     ; RECEIVE DATA INTERRUPT ENABLE.
1315 007122          10$:
1316 007122 032767 000002 171114  BIT     #2, DHV.LIVE ;CHECK FOR DHV
1317 007130 001405          BEQ    20$
1318 007132 016702 173550          MOV     ADDR1, R2 ; SET UP R2 FOR SECOUND CSR
1319 007136 012762 040100 000000  MOV     #TXINTR.ENABLE!RCVINTR.ENABLE, CSR(R2) ; SET XMIT-INTERPT-ENABLE AND
1320                                     ; RECEIVE DATA INTERRUPT ENABLE.
1321 007144          20$:
1322 007144 032767 000004 171072  BIT     #4, DHV.LIVE ;CHECK FOR DHV

```

MODE SET-UP

```

1323 007152 001405          BEQ      30$
1324 007154 016702 173530    MOV      ADDR2,R2      ; SET UP R2 FOR THIRD CSR
1325 007160 012762 040100 000000  MOV      #TXINTR.ENABLE!RCVINTR.ENABLE,CSR(R2) ; SET XMIT-INTERPT-ENABLE AND
1326                                     ; RECEIVE DATA INTERRUPT ENABLE.
1327 007166                                     30$:
1328 007166 032767 000010 171050    BIT      #10,DHV.LIVE   ;CHECK FOR DHV
1329 007174 001405          BEQ      40$
1330 007176 016702 173510    MOV      ADDR3,R2      ; SET UP R2 FOR FORTH CSR
1331 007202 012762 040100 000000  MOV      #TXINTR.ENABLE!RCVINTR.ENABLE,CSR(R2) ; SET XMIT-INTERPT-ENABLE AND
1332                                     ; RECEIVE DATA INTERRUPT ENABLE.
1333 007210                                     40$:
1334 007210 104400 000000'      EXIT$,BEGIN          ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
1335

```

DHV11 XMITTER INTERRUPT SERVICE ROUTINES.

```

1337          .sbttl  DHV11 XMITTER INTERRUPT SERVICE ROUTINES.
1338          ;) **
1339          ;)
1340          ;) NAME:                DHX0-X3,DHXSrv
1341          ;)
1342          ;) FUNCTIONAL DESCRIPTION:  PROCESS THE INTERRUPTS OF XMITTERS.
1343          ;)
1344          ;) CALLING SEQUENCE:       THESE ROUTINES ARE INTERRUPTED INTO.
1345          ;)
1346          ;) INPUTS REQUIRED:         ADDRESS OF ROUTINES MUST BE SET UP.
1347          ;)
1348          ;) OUTPUTS GIVEN:
1349          ;)
1350          ;) REGISTERS USED, UNRESTORED:
1351          ;)
1352          ;) SUBROUTINE ROUTINES USED:
1353          ;)
1354          ;) RESTRICTIONS:
1355          ;)
1356          ;) --
1357
1358          ; ENTRANCE POINT FOR DHV'S DURING TRANSMITTER INTERRUPTS.
1359
1360          DHX0:
1361
1362          007214 010246          MOV     R2,-(SP)          ; SAVE THE REGISTERS.
1363          007216 010146          MOV     R1,-(SP)
1364          007220 012701 000770'  MOV     #DHR0BUF+100,R1 ; SAVE BUFFER AREA FOR ERROR REPORTS.
1365
1366          007224 016702 173454    MOV     ADDR0,R2        ; CSR ADDRESS FOR DHV #1.
1367          007230 000167 000060    JMP     TXSERV          ; GOTO COMMON TX INTERRUPT ROUTINE.
1368
1369          DHX1:
1370
1371          007234 010246          MOV     R2,-(SP)          ; SAVE THE REGISTERS.
1372          007236 010146          MOV     R1,-(SP)
1373          007240 012701 001370'  MOV     #DHR1BUF+100,R1 ; SAVE BUFFER AREA FOR ERROR REPORTS.
1374
1375          007244 016702 173436    MOV     ADDR1,R2        ; CSR ADDRESS FOR DHV #2.
1376          007250 000167 000040    JMP     TXSERV          ; GOTO COMMON TX INTERRUPT ROUTINE.
1377
1378          DHX2:
1379
1380          007254 010246          MOV     R2,-(SP)          ; SAVE REGISTERS.
1381          007256 010146          MOV     R1,-(SP)
1382          007260 012701 001770'  MOV     #DHR2BUF+100,R1 ; SAVE BUFFER AREA FOR ERROR REPORTS.
1383
1384          007264 016702 173420    MOV     ADDR2,R2        ; CSR ADDRESS FOR DHV #3.
1385          007270 000167 000020    JMP     TXSERV          ; GOTO COMMON TX INTERRUPT ROUTINE.
1386
1387          DHX3:
1388
1389          007274 010246          MOV     R2,-(SP)          ; SAVE REGISTERS.
1390          007276 010146          MOV     R1,-(SP)
1391          007300 012701 002370'  MOV     #DHR3BUF+100,R1 ; SAVE BUFFER AREA FOR ERROR REPORTS.

```

DHV11 XMITTER INTERRUPT SERVICE ROUTINES.

```

1392
1393 007304 016702 173402      MOV   ADDR3,R2      ; CSR ADDRESS FOR DHV #4.
1394 007310 000167 000000      JMP   TXSERV        ; GOTO COMMON TX INTERRUPT ROUTINE.
1395
1396
1397      ; COMMON TRANSMITTER SERVICE ROUTINE.
1398
1399 007314      TXSERV:
1400
1401 007314 016267 000000 170736  MOV   CSR(R2),CDHVCSR ; GET CSR.
1402 007322 100474      BMI   100$          ; REPORT ERROR IF TRANSMITTER ACTION BIT (15) NOT SET.
1403
1404
1405      ; ILLEGAL TRANSMIT INTERRUPT!! ERROR!!
1406
1407      ; REPORT "ILLEGAL TRANSMIT INTERRUPT ERROR."
1408 007324 010221      MOV   R2,(R1)+      ; STORE CSR REPORT.
1409 007326 016221 000000      MOV   CSR(R2),(R1)+ ; STORE CSR CONTENTS.
1410 007332 016221 000002      MOV   RBUF(R2),(R1)+ ; STORE RBUF CONTENTS.
1411
1412 007336 042762 040100 000000  BIC   #TXINTR.ENABLE!RCVINTR.ENABLE,CSR(R2) ; DISABLE TRANSMIT &
1413                                          ; RECEIVER INTERRUPTS.
1414
1415 007344 012601      MOV   (SP)+,R1      ; RESTORE REGISTERS.
1416 007346 012602      MOV   (SP)+,R2
1417
1418      ;-----
1419      007350 000004 000000' 007356' PIRQ$,BEGIN,10$      ; QUEUE UP TO CONTINUE AT 10$ AND RTI
1420
1421      10$:
1422 007356 005767 170700      TST   LCKOUT        ; DO NOT TYPEOUT ERROR REPORT IF ANOTHER REPORT
1423 007362 001405      BEQ   15$           ; IS IN PROGRESS.
1424 007364 104407 000000'   BREAK$,BEGIN        ; TEMPORARY RETURN TO MONITOR....
1425 007370 104407 000000'   BREAK$,BEGIN        ; THEN CONTINUE AT NEXT INSTRUCTION.
1426 007374 000770      BR    10$
1427
1428      15$:
1429 007376 005267 170660      INC   LCKOUT        ; DURING ERROR TYPEOUT, WE MUST NOT ALLOW ANY OTHER
1430 007402 012704 000770'   MOV   #DHROBUF+100,R4 ; SECTION TO REPORT AN ERROR.
1431
1432      20$:
1433 007406 005714      TST   (R4)          ; DOES THIS LINE HAVE A SAVED ERROR? (R4<>0).
1434 007410 001003      BNE   30$           ; YES, REPORT IT.
1435 007412 062704 000400      ADD   #DHR1BUF-DHROBUF,R4 ; NO, THEN LOOK AT NEXT LINE FOR ERROR.
1436 007416 000773      BR    20$
1437
1438      30$:
1439 007420 011467 170454      MOV   (R4),CSRA     ; REPORT CSR ADDRESS.
1440 007424 005024      CLR   (R4)+         ; CLEAR ERROR INDICATION.
1441
1442 007426 012467 170450      MOV   (R4)+,ACSR    ; REPORT CSR CONTENTS.
1443 007432 012467 170446      MOV   (R4)+,ASTAT   ; REPORT RBUF CONTENTS.
1444 007436 012767 000025 170442  MOV   #25,ERRTYP    ; REPORT ERROR TYPE.
1445
1446 007444 104401 000000' 003631' MSG$,BEGIN,ERR.H    ; ASCII MESSAGE CALL
1447
1448      ;*****
1449      007452 104405 000000' 000000 HRDR$,BEGIN,NULL    ;

```

DHV11 XMITTER INTERRUPT SERVICE ROUTINES.

```

;*****
1443
1444 007460 005067 170576 CLR LCKOUT ; ALLOW ANOTHER DHV TO RUN THIS DIAGNOSTIC.
1445 007464 005267 170550 INC DHVSDONE ; ANOTHER DHV IS DONE.
1446 007470 026767 170544 170544 CMP DHVSDONE,DHVSLEFT ; ANY DHVS LEFT TO TEST?
1447 007476 001402 BEQ 35$ ; YES, GO DO THEM.
1448
1449 007500 104400 000000' EXIT$,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
1450
1451 007504 35$: ENDIT$,BEGIN ;SIGNAL END OF ITERATION.
1452 007504 104413 000000' ;MONITOR SHALL TEST END OF PASS
1453 007510 000167 174644 JMP RESTRT ; GO START TESTING ANOTHER DHV.
1454
1455 007514 100$: MOV (SP)+,R1 ; RESTORE REGISTERS.
1456 007514 012601 MOV (SP)+,R2
1457 007516 012602 RTI
1458 007520 000002
1459

```

DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

```

1461          .sbtll DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.
1462          ;) **
1463          ;)
1464          ;) NAME:                DHR0-R3,DHRSRV
1465          ;)
1466          ;) FUNCTIONAL DESCRIPTION:  PROCESS THE INTERRUPTS OF RECEIVERS.
1467          ;)
1468          ;) CALLING SEQUENCE:       THESE ROUTINES ARE INTERRUPTED INTO.
1469          ;)
1470          ;) INPUTS REQUIRED:         ADDRESS OF ROUTINES MUST BE SET UP.
1471          ;)
1472          ;) OUTPUTS GIVEN:
1473          ;)
1474          ;) REGISTERS USED, UNRESTORED:
1475          ;)
1476          ;) SUBROUTINE ROUTINES USED:
1477          ;)
1478          ;) RESTRICTIONS:
1479          ;)
1480          ;) --
1481          ;
1482          ; ENTRANCE POINT FOR DHV'S DURING RECEIVER INTERRUPTS.
1483          ;
1484          DHR0:
1485
1486          007522 010146          MOV     R1,-(SP)          ; SAVE REGISTERS ON STACK.
1487          007524 010246          MOV     R2,-(SP)
1488          007526 010346          MOV     R3,-(SP)
1489          007530 010446          MOV     R4,-(SP)
1490
1491          007532 012767 000000 170514  MOV     #0,OFFSET          ; INDICATE THIS IS DEVICE #1.
1492          007540 012767 000670' 170510  MOV     #DHR0BUF,BUFADR    ; GET BUFFER TO RECEIVE CHARACTERS.
1493          007546 016702 173132          MOV     ADDR0,R2          ; CSR ADDRESS FOR DHV #1.
1494          007552 000167 000124          JMP     RXSERV            ; GOTO COMMON RECEIVER INTERRUPT SERVICE ROUTINE.
1495
1496          DHR1:
1497
1498          007556 010146          MOV     R1,-(SP)          ; SAVE REGISTERS ON STACK.
1499          007560 010246          MOV     R2,-(SP)
1500          007562 010346          MOV     R3,-(SP)
1501          007564 010446          MOV     R4,-(SP)
1502
1503          007566 012767 000002 170460  MOV     #2,OFFSET          ; INDICATE THIS IS DEVICE #2.
1504          007574 012767 001270' 170454  MOV     #DHR1BUF,BUFADR    ; GET BUFFER TO RECEIVE CHARACTERS.
1505          007602 016702 173100          MOV     ADDR1,R2          ; CSR ADDRESS FOR DHV #2.
1506          007606 000167 000070          JMP     RXSERV            ; GOTO COMMON RECEIVER INTERRUPT SERVICE ROUTINE.
1507
1508          DHR2:
1509
1510          007612 010146          MOV     R1,-(SP)          ; SAVE REGISTERS ON STACK.
1511          007614 010246          MOV     R2,-(SP)
1512          007616 010346          MOV     R3,-(SP)
1513          007620 010446          MOV     R4,-(SP)
1514
1515          007622 012767 000004 1,0424  MOV     #4,OFFSET          ; INDICATE THIS IS DEVICE #3.

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DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

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1516 007630 012767 001670' 170420      MOV    #DHR2BUF, BUFADR ; GET BUFFER TO RECEIVE CHARACTERS.
1517 007636 016702 173046              MOV    ADDR2, R2        ; CSR ADDRESS FOR DHV #3.
1518 007642 000167 000034              JMP    RXSERV          ; GOTO COMMON RECEIVER INTERRUPT SERVICE ROUTINE.
1519
1520 007646                                DHR3:
1521
1522 007646 010146              MOV    R1, -(SP)       ; SAVE REGISTERS ON STACK.
1523 007650 010246              MOV    R2, -(SP)
1524 007652 010346              MOV    R3, -(SP)
1525 007654 010446              MOV    R4, -(SP)
1526
1527 007656 012767 000006 170370      MOV    #6, OFFSET     ; INDICATE THIS IS DEVICE #4.
1528 007664 012767 002270' 170364      MOV    #DHR3BUF, BUFADR ; GET BUFFER TO RECEIVE CHARACTERS.
1529 007672 016702 173014              MOV    ADDR3, R2      ; CSR ADDRESS FOR DHV #4.
1530 007676 000167 000000              JMP    RXSERV          ; GOTO COMMON RECEIVER INTERRUPT SERVICE ROUTINE.
1531
1532                                ; COMMON RECEIVER INTERRUPT SERVICE ROUTINE.
1533
1534                                RXSERV:
1535 007702
1536
1537 007702                                20$:
1538 007702 016201 000002              MOV    RBUF(R2), R1   ; PULL OUT RECEIVED CHARACTER.
1539 007706 100402              BMI    25$           ; ARE THERE ANY CHARACTERS?
1540 007710 000167 000576              JMP    100$          ; THERE ARE NO MORE CHARACTERS TO PROCESS.
1541 007714                                25$:
1542 007714 032701 070000              BIT    #OVERRUN.ERROR!FRAMING.ERROR!PARITY.ERROR, R1 ; YES. ARE THERE
1543                                ; ANY ERRORS?
1544 007720 001510              BEQ    40$           ; NO.
1545
1546 007722 010103              MOV    R1, R3        ; THERE COULD BE AN ERROR.
1547 007724 062703 010000              ADD    #BIT12, R3    ; ARE BITS 12, 13, & 14 SET? WE HOPE SO.
1548 007730 103764              BCS    20$           ; YES THEY ARE. NO PROBLEM.
1549
1550                                ; ERROR!! OVERRUN, PARITY, OR FRAMING ERROR!!
1551
1552
1553 007732 016704 170320      MOV    BUFADR, R4     ; GET BUFFER TO STORE ERROR REPORT.
1554 007736 062704 000040      ADD    #40, R4
1555
1556 007742 010224              MOV    R2, (R4)+     ; STORE THE CSR.
1557 007744 016224 000000      MOV    CSR(R2), (R4)+ ; STORE THE CSR CONTENTS.
1558 007750 010124              MOV    R1, (R4)+     ; STORE THE RECEIVE BUFFER CONTENTS.
1559
1560 007752 042762 040100 000000      BIC    #TXINTR.ENABLE!RCVINTR.ENABLE, CSR(R2) ; DISABLE TX & RECEIVE
1561                                ; INTERRUPTS.
1562
1563 007760              MOV    (SP)+, R4     ; RESTORE THE REGISTERS.
1564 007762              MOV    (SP)+, R3
1565 007764              MOV    (SP)+, R2
1566 007766              MOV    (SP)+, R1
1567
1568 007770 000004 000000' 007776'      PIRQ$, BEGIN, 26$    ; QUEUE UP TO CONTINUE AT 26$ AND RTI

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DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

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1569
1570 007776          26$:
1571 007776 005767 170260      TST    LCKOUT          ; DO NOT TYPEOUT ERROR REPORT IF ANOTHER ERROR
1572 010002 001405          BEQ    27$            ; REPORT IS IN PROGRESS.
1573 010004 104407 000000'    BREAK$,BEGIN          ; TEMPORARY RETURN TO MONITOR....
1574 010014 104407 000000'    BREAK$,BEGIN          ; THEN CONTINUE AT NEXT INSTRUCTION.
1575 010016          27$:
1576 010016 005267 170240      INC    LCKOUT          ; DURING ERROR TYPEOUT, WE MUST NOT ALLOW ANY OTHER
1577 010022 012704 000730'    MOV    #DHROBUF+40,R4 ; SECTION TO REPORT AN ERROR.
1578 010026          28$:
1579 010026 005714          TST    (R4)           ; DOES THIS LINE HAVE A SAVED ERROR? (R1<>0).
1580 010030 001003          BNE    29$            ; YES, REPORT IT.
1581 010032 062704 000400      ADD    #DHR1BUF-DHROBUF,R4 ; NO, THEN LOOK AT NEXT LINE FOR ERROR.
1582 010036 000773          BR     28$
1583
1584 010040          29$:
1585 010040 011467 170034      MOV    (R4),CSRA      ; REPORT THE CSR ADDRESS.
1586 010044 005024          CLR    (R4)+          ; CLEAR ERROR INDICATION.
1587
1588 010046 012467 170030      MOV    (R4)+,ACSR     ; REPORT THE CSR CONTENTS.
1589 010052 012467 170026      MOV    (R4)+,ASTAT    ; REPORT THE CONTENTS OF RBUF.
1590
1591 010056 012767 000034 170022  MOV    #34,ERRTYP     ; REPORT ERROR TYPE.
1592 010064 104401 000000' 003701'  MSG$,BEGIN,ERR.I     ; ASCII MESSAGE CALL
1593 010072          30$:          ; ERROR OCCURRED.
1594          ; *****
1595          HRDR$,BEGIN,NULL ;
1596          ; *****
1595
1596 010100          32$:
1597 010100 005067 170156      CLR    LCKOUT          ;
1598 010104 005267 170130      INC    DHVSDONE        ; THIS DHV IS DONE!
1599 010110 026767 170124 170124  CMP    DHVSDONE,DHVSLEFT ; ANY MORE DHVS TO DO?
1600 010116 001405          BEQ    36$
1601
1602 010120          33$:
1603 010120 104400 000000'    EXIT$,BEGIN          ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
1604
1605 010124          35$:
1606          ;-----
1607          PIRQ$,BEGIN,36$ ; QUEUE UP TO CONTINUE AT 36$ AND RTI
1608          ;-----
1607 010132          36$:
1608 010132 104413 000000'    ENDIT$,BEGIN         ;SIGNAL END OF ITERATION.
1609          ;MONITOR SHALL TEST END OF PASS
1610
1610 010136 000167 174216      JMP    RESTRT
1611
1612 010142          40$:
1613 010142 010103          MOV    R1,R3          ; GET LINE #.
1614 010144 000303          SWAB   R3             ; PLACE LINE # IN 1ST FOUR BITS.
1615 010146 042703 177760      BIC    #1C<17>,R3     ; CLEAR OUT EVERYTHING BUT THE LINE #.
1616
1617 010152 066703 170100      ADD    BUFADR,R3     ; SET-UP LOCATION FOR LINE #.

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DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

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1618
1619 010156          60$:
1620 010156 042701 177400      BIC    #+C<377>,R1      ; CLEAR OUT EVERYTHING BUT THE CHARACTER RECEIVED.
1621 010162 120113          CMPB   R1,(R3)         ; DOES THE EXPECTED (R3) MATCH THE RECEIVED R1.
1622 010164 001504          BEQ    70$             ; BRANCH IF EQUAL. THIS IS WHAT WE WANT.
1623
1624 010166 020127 000021      CMP    R1,#21         ; XON? IF SO, WE MUST IGNORE.
1625 010172 001643          BEQ    20$
1626
1627 010174 020127 000023      CMP    R1,#23         ; XOFF? IF SO, WE MUST IGNORE. IF NOT, REPORT
1628 010200 001640          BEQ    20$             ; A DATA ERROR. IF CHARACTER DOES NOT MATCH
1629                                     ; EXPECTED, IT MUST BE EITHER XOFF OR XON.
1630
1631                                     ; ERROR!! DATA ERROR!!
1632
1633 010202          62$:
1634 010202 016704 170050      MOV    BUFADR,R4
1635 010206 062704 000010      ADD    #10,R4
1636
1637 010212 010124          MOV    R1,(R4)+       ; ACTUAL DATA.
1638 010214 011324          MOV    (R3),(R4)+     ; EXPECTED DATA.
1639 010216 010224          MOV    R2,(R4)+       ; CSR ADDRESS.
1640 010220 010314          MOV    R3,(R4)+       ; LINE # + BUFADR.
1641 010222 166724 170030      SUB    BUFADR,(R4)+   ; LINE #.
1642
1643 010226 042762 040100 000000 BIC    #TXINTR.ENABLE!RCVINTR.ENABLE,CSR(R2) ; DISABLE TX & RECEIVE
1644                                     ; INTERRUPTS.
1645
1646 010234 012604          MOV    (SP)+,R4       ; RESTORE REGISTERS.
1647 010236 012603          MOV    (SP)+,R3
1648 010240 012602          MOV    (SP)+,R2
1649 010242 012601          MOV    (SP)+,R1
1650
1651                                     ;-----
1651 010244 000004 000000' 010252' PIRQ$,BEGIN,66$      ; QUEUE UP TO CONTINUE AT 66$ AND RTI
1652                                     ;-----
1652 010252          66$:
1653 010252 005767 170004      TST    LCKOUT         ; DON'T TYPEOUT ERROR REPORT IF ANOTHER ERROR
1654 010256 001405          BEQ    67$           ; REPORT IS IN PROGRESS.
1655 010260 104407 000000'    BREAK$,BEGIN        ; TEMPORARY RETURN TO MONITOR...
1656 010264 104407 000000'    BREAK$,BEGIN        ; THEN CONTINUE AT NEXT INSTRUCTION.
1657 010270 000770          BR     66$
1658
1658 010272          67$:
1659 010272 005267 167764      INC    LCKOUT         ; DURING ERROR TYPEOUT, WE MUST NOT ALLOW ANY OTHER
1660 010276 012701 000700'    MOV    #DHROBUF+10,R1 ; SECTION TO REPORT AN ERROR.
1661
1662 010302          68$:
1663 010302 005711          TST    (R1)           ; DOES THIS LINE HAVE A SAVED ERROR? (R1<>0)
1664 010304 001003          BNE   69$           ; YES, REPORT IT.
1665 010306 062701 000400      ADD    #DHR1BUF-DHROBUF,R1 ; NO, THEN LOOK AT NEXT LINE FOR ERROR.
1666 010312 000773          BR     68$
1667
1668 010314          69$:
1669 010314 011167 167570      MOV    (R1),AWAS     ; REPORT ACTUAL DATA.

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DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

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1670 010320 005021          CLR      (R1)+          ; CLEAR ERROR INDICATION.
1671
1672 010322 112167 167560    MOV      (R1)+,ASB      ; REPORT EXPECTED DATA.
1673 010326 105021          CLR      (R1)+
1674 010330 012167 167544    MOV      (R1)+,CSRA     ; REPORT CSR ADDRESS.
1675 010334 012167 167542    MOV      (R1)+,SBADR    ; REPORT LINE #.
1676
1677 010340 104401 000000' 003757' MSG$,BEGIN,ERR.J      ;ASCII MESSAGE CALL
1678
1679          010346 104404 000000'
;*****
DATER$,BEGIN          ;DATA ERROR!!!
;*****

1680
1681 010352 005067 167704    CLR      LCKOUT         ; DONE REPORTING THIS ERROR?
1682 010356 005267 167656    INC      DHVSDONE        ; MARK THIS DHV AS BEING DONE.
1683 010362 026767 167652 167652 CMP      DHVSDONE,DHVSLEFT ; ARE ALL THE DHVS DONE?
1684 010370 001660          BEQ      36$            ; YES, THEN END PASS. ELSE NORMAL EXIT.
1685
1686 010372 104400 000000'    EXIT$,BEGIN            ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
1687
1688 010376          70$:
1689 010376 105213          INCB     (R3)           ; INCREMENT CHARACTER.
1690 010400 001402          BEQ      75$            ; SEE IF DID LAST CHARACTER (377), BR IF NOT.
1691 010402 000167 177274    JMP      20$            ; NOT THE LAST CHARACTER. GO SEE IF ANOTHER
1692 010406          75$:
1693 010406 166703 167644    SUB      BUFADR,R3      ; CHARACTER IS AVAILABLE.
1694 010412 012704 000001    MOV      #1,R4          ; R3 = LINE# + BUFFER ADDRESS. GET LINE#.
1695 010416          80$:
1696 010416 005303          DEC      R3             ; DECREMENT UNTIL 0.
1697 010420 100402          BMI     90$            ;
1698 010422 006304          ASL     R4              ; SHIFT UNTIL # GOES TO ZERO FOR BITMASK.
1699 010424 000774          BR      80$            ; BITMASK IN R4.
1700 010426          90$:
1701 010426 016701 167622    MOV      OFFSET,R1
1702 010432 050461 000226'    BIS      R4,LINESDONE(R1) ; RECORD THIS LINE DONE.
1703
1704 010436 026761 167562 000226' CMP      LINESELECT,LINESDONE(R1) ; SEE IF ALL LINES DONE ON THIS UNIT.
1705 010444 001402          BEQ     95$            ;
1706 010446 000167 177230    JMP      20$            ; BR IF ALL LINES NOT DONE.
1707
1708 010452          95$:
1709 010452 042762 040100 000000 BIC      #TXINTR.ENABLE!RCVINTR.ENABLE,CSR(R2) ; DISABLE TX & RECEIVE
1710
1711
1712 010460 012604          MOV      (SP)+,R4       ; RESTORE REGISTERS.
1713 010462 012603          MOV      (SP)+,R3
1714 010464 012602          MOV      (SP)+,R2
1715 010466 012601          MOV      (SP)+,R1
1716
1717 010470 005267 167544    INC      DHVSDONE        ; RECORD THIS DHV AS BEING DONE.
1718 010474 026767 167540 167540 CMP      DHVSDONE,DHVSLEFT ; ARE ALL DHVS DONE?
1719 010502 001002          BNE     97$            ; NO, EXIT.
1720 010504 000167 177414    JMP      35$            ; YES, REPORT END OF PASS.
1721 010510          97$:
1722 010510 000002          RTI                    ; EXIT, JUST THIS DHV IS DONE.

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DHV11 RECEIVER INTERRUPT SERVICE ROUTINES.

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1723
1724 010512          100$:      MOV      (SP)+,R4          ; RESTORE REGISTERS.
1725 010512 012604      MOV      (SP)+,R3
1726 010514 012603      MOV      (SP)+,R2
1727 010516 012602      MOV      (SP)+,R1
1728 010520 012601      RTI
1729 010522 000002
1730
1731
1732 ; )!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1733 ; )!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1734 ; )!!!!                                     !!!!
1735 ; )!!!! SUBROUTINE TO SET-UP THE BAUD RATE  !!!!
1736 ; )!!!!                                     !!!!
1737 ; )!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1738 ; )!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1739
1740
1741 010524          BAUDRATE:
1742
1743 010524 016767 167266 167532      MOV      SR1, TXSPEED      ; GET SELECTED TRANSMIT SPEED.
1744 010532 016767 167260 167526      MOV      SR1, RCVSPEED     ; GET SELECTED RECEIVE SPEED.
1745
1746 010540 012700 000004          MOV      #4, R0          ; SET UP SHIFT COUNTER.
1747 010544          10$:
1748
1749 010544 006367 167514          ASL      TXSPEED          ; LINE-UP TRANSMIT SPEED SELECTOR W/LPR.
1750 010550 077003          SOB      R0, 10$
1751
1752 010552 056767 167506 167506      BIS      TXSPEED, RCVSPEED ; PUT TRANSMIT & SPEED SELECTION TOGETHER.
1753 010560 000367 167502          SWAB     RCVSPEED
1754
1755
1756 010564 016767 172130 172130      MOV      DHVLPR, LPRSELECT ; INITIALIZE THE LINE PARAMETER SELECTION.
1757 010572 056767 167470 172122      BIS      RCVSPEED, LPRSELECT ; SAVE THE TRANSMIT & RECEIVE SPEEDS.
1758
1759 010600 000207          RTS      PC              ; RETURN TO MAIN PROGRAM.
1760
1761          000001          .END

```

Symbol table

ACSR	000102R	DATA.V=	100000	ERR.J	003757R	PARITY=	010000	SBADR	000102R
ADDR	000006R	DATCK\$=	104411	ERR.K	004007R	PARPRE=	002000	SELFTE	005746R
ADDR0	002704R	DATER\$=	104404	ERR.L	004046R	PASCNT	000034R	SETUP1	004456R
ADDR1	002706R	DHRO	007522R	ERR.M	004154R	PA22	002700R	SETUP2	004522R
ADDR2	002710R	DHROBU	000670R	EX	005260R	PDPF11=	000002	SOFCNT	000042R
ADDR22=	001000	DHR1	007556R	EXIT\$ =	104400	PDPLSI=	020000	SOFER\$=	104406
ADDR3	002712R	DHR1BU	001270R	FLAG	002714R	PDP44 =	100000	SOFPAS	000046R
APTPRE=	000200	DHR2	007612R	FRAMIN=	020000	PDP60 =	004000	SPOINT	000032R
ASB	000106R	DHR2BU	001670R	GETPA\$=	104415	PDP70 =	010000	SPSIZ =	000040
ASTAT	000104R	DHR3	007646R	GWBUF\$=	104414	PIRQ\$ =	000004	SR1	000016R
AUTO	= 000010	DHR3BU	002270R	HRDCNT	000044R	POINT	000252R	SR2	000020R
AUTO0	= 000020	DHVCSR	000250R	HRDER\$=	104405	POPSP =	005726	SR3	000022R
AUTO1	= 000002	DHVLPR	002720R	HRDPAS	000050R	POPSP2=	022626	SR4	000024R
AWAS	000110R	DHVNOW	000246R	ICONT	000036R	PRHMS\$=	000002	START	004344R
BAUDRA	010524R	DHVSDO	000240R	ICOUNT	000040R	PRTY =	000000	STAT	000026R
BEGIN	000000R	DHVSLE	000242R	IDNUM	000122R	PRTY0 =	000000	SVRO	000062R
BIT0	= 000001	DHVT02	006540R	INDPAR=	000040	PRTY1 =	000040	SVR1	000064R
BIT1	= 000002	DHVVEC	002670R	INIT	000030R	PRTY2 =	000100	SVR2	000066R
BIT10	= 002000	DHV.BU	006642R	INITIA	004554R	PRTY3 =	000140	SVR3	000070R
BIT11	= 004000	DHV.LI	000244R	INTR	000120R	PRTY4 =	000200	SVR4	000072R
BIT12	= 010000	DHV.L1	005762R	KTPRES=	000400	PRTY5 =	000240	SVR5	000074R
BIT13	= 020000	DHV.L2	006626R	KTXTND=	040000	PRTY6 =	000300	SVR6	000076R
BIT14	= 040000	DHV.N1	006500R	LCKOUT	000262R	PRTY7 =	000340	SYSCNT	000052R
BIT15	= 100000	DHV.N2	007044R	LINECO	000236R	PS	= 177776	TRPDFD=	000023
BIT2	= 000004	DHX0	007214R	LINESD	000226R	PSW	= 177776	TX	005220R
BIT3	= 000010	DHX1	007234R	LINESE	000224R	PUSH	= 005746	TXBUF	000270R
BIT4	= 000020	DHX2	007254R	LNCTRL=	000010	PUSH2 =	024646	TXBUFC=	000016
BIT5	= 000040	DHX3	007274R	LOCAL =	000200	PWRFLG=	000002	TXCHAR=	000002
BIT6	= 000100	DIAG.F=	020000	LPR	= 000004	QMON22=	000010	TXDATA=	100000
BIT7	= 000200	DMA.ST=	000200	LPRSEL	002722R	RAND\$ =	104417	TXDMA =	010000
BIT8	= 000400	DROP	004354R	MAP22\$=	104416	RANNUM	000054R	TXINTR=	040000
BIT9	= 001000	DVID1	000014R	MASTER=	000040	RBUF	= 000002	TXSERV	007314R
BREAK\$=	104407	EA	002676R	MODNAM	000000R	RCV	005240R	TXSPEE	000264R
BR1	000012R	EA22	002702R	MODSP	000224R	RCVDAT=	000200	TX.ACT=	100000
BR2	000013R	ECCMEM=	000100	MSGN\$ =	104403	RCVINT=	000100	TX.ENA=	100000
BTOD\$ =	104421	ENDIT\$=	104413	MSG\$ =	104402	RCVSPE	000266R	TX1BUF=	000012
BUFADR	000256R	END\$ =	104410	MSG\$ =	104401	RESTR	004360R	TX2BUF=	000014
CAPRES=	000004	ERRTYP	000106R	NCPUOP=	000020	RES1	000056R	USTACK=	000001
CDATA\$=	104412	ERR.A	002724R	NEXTDH	005676R	RES2	000060R	VA	002672R
CDHVCS	000260R	ERR.B	003024R	NOAPTY=	000002	RH70 =	001000	VECT	005646R
CHECKL	005330R	ERR.C	003124R	NULL =	000000	ROUTIN	004702R	VECTOR	000010R
CKHNG\$=	000001	ERR.D	003214R	OFFSET	000254R	RSTRT	000112R	WASADR	000104R
CLKPRE=	000001	ERR.E	003315R	OPEN =	000000	RXSERV	007702R	WDFR	000116R
CLKSP\$=	104422	ERR.F	003410R	OTOA\$ =	104420	RX.ENA=	000004	WDTO	000114R
CONFIG	000056R	ERR.G	003515R	OVERRU=	040000	R6	=%000006	XFLAG	000005R
CSR	= 000000	ERR.H	003631R	PA	002674R	R7	=%000007	XOFF	002716R
CSRA	000100R	ERR.I	003701R						

. ABS. 000000 000 (RW,I,GBL,ABS,OVR)
 010602 001 (RW,I,LCL,REL,CON)
 Errors detected: 0

*** Assembler statistics

Symbol table

Work file reads: 0
Work file writes: 0
Size of work file: 13467 Words (53 Pages)
Size of core pool: 19402 Words (74 Pages)
Operating system: RSX-11M/PLUS (Under VAX/VMS)

Elapsed time: 00:00:47.21
DHVD.OBJ,DHVD.LST/CR/-SP=DDXCOM,DHVD

SYMBOL CROSS REFERENCE

CREF V02

SYMBOL	VALUE	REFERENCES
ACSR	000102 R	#11-459 *12-704 *12-788 *12-866 *12-901 *12-918 *12-997 *12-1018 *12-1048 *12-1076 *12-1108 *14-1437 *15-1588
ADDR	000006 R	#11-459 12-655 12-967 13-1192
ADDR0	002704 R	#11-579 12-660 13-1312 14-1366 15-1493
ADDR1	002706 R	#11-580 13-1318 14-1375 15-1505
ADDR2	002710 R	#11-581 13-1324 14-1384 15-1517
ADDR22	001000	#11-459 12-637
ADDR3	002712 R	#11-582 13-1330 14-1393 15-1529
APTPRE	000200	#11-459
ASB	000106 R	#11-459 *15-1672
ASTAT	000104 R	#11-459 *12-705 *12-789 *12-867 *12-902 *12-919 *12-998 *12-1019 *12-1049 *12-1077 *12-1109 *14-1438 *15-1589
AUTO	000010	#11-459
AUTO0	000020	#11-534 12-758 12-763 13-1266 13-1271
AUTO1	000002	#11-535 12-758 12-763 13-1266 13-1271
AWAS	000110 R	#11-459 *15-1669
BAUDRA	010524 R	12-930 #15-1741
BEGIN	000000 R	#11-459 12-622 12-633 12-640 12-692 12-692 12-708 12-709 12-781 12-781 12-795 12-798 12-800 12-827 12-830 12-833 12-836 12-845 12-845 12-869 12-870 12-904 12-906 12-921 12-924 12-988 12-988 12-1001 12-1002 12-1022 12-1023 12-1038 12-1038 12-1052 12-1053 12-1080 12-1081 12-1112 12-1113 13-1334 14-1417 14-1422 14-1422 14-1441 14-1442 14-1449 14-1452 15-1568 15-1573 15-1573 15-1592 15-1594 15-1603 15-1606 15-1608 15-1651 15-1655 15-1655 15-1677 15-1679 15-1686
BIT0	000001	#11-459 #11-479 12-1093
BIT1	000002	#11-459 #11-478 11-535 12-791 12-829
BIT10	002000	#11-459 #11-469
BIT11	004000	#11-459 #11-468
BIT12	010000	#11-459 #11-467 11-511 11-522 12-1066 15-1547
BIT13	020000	#11-459 #11-466 11-510 11-521
BIT14	040000	#11-459 #11-465 11-509 11-520
BIT15	100000	#11-459 #11-464 11-508 11-519 11-527 11-540
BIT2	000004	#11-459 #11-477 11-533 12-835
BIT3	000010	#11-459 #11-476
BIT4	000020	#11-459 #11-475 11-534
BIT5	000040	#11-459 #11-474 11-514
BIT6	000100	#11-459 #11-473 11-513
BIT7	000200	#11-459 #11-472 11-512 11-532 11-541
BIT8	000400	#11-459 #11-471
BIT9	001000	#11-459 #11-470
BREAK\$	104407	#11-459 12-692 12-692 12-781 12-781 12-845 12-845 12-988 12-988 12-1038 12-1038 14-1422 14-1422 15-1573 15-1573 15-1655 15-1655
BR1	000012 R	#11-459 12-734 12-737 12-940 12-944
BR2	000013 R	#11-459
BTOD\$	104421	#11-459
BUFADR	000256 R	#11-559 *15-1492 *15-1504 *15-1516 *15-1528 15-1553 15-1617 15-1634 15-1641 15-1693
CAPRES	000004	#11-459
CDATA\$	104412	#11-459
CDMVCS	000260 R	#11-560 *14-1401
CHECKL	005330 R	#12-860
CKMNG\$	000001	#11-459

SYMBOL CROSS REFERENCE

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SYMBOL	VALUE	REFERENCES
CLKPRE	= 000001	#11-459
CLKSP#	= 104422	#11-459
CONFIG	000056 R	#11-459 12-637
CSR	= 000000	#11-484 *12-687 12-689 12-704 *12-747 *12-771 12-788 *12-816 *12-840
		12-842 12-866 12-901 12-918 *12-983 12-985 12-997 12-1018 12-1048
		12-1076 12-1108 *13-1255 12-918 *13-1313 *13-1319 *13-1325 *13-1331 14-1401 14-1409
		*14-1412 15-1557 *15-1560 *15-1643 *15-1709
CSRA	000100 R	#11-459 *12-703 *12-786 *12-865 *12-900 *12-917 *12-996 *12-1017 *12-1047
		*12-1075 *12-1107 *14-1434 *15-1585 *15-1674
		#11-519
DATA.V	= 100000	#11-459
DATCK#	= 104411	#11-459
DATER#	= 104404	#11-459 15-1679
DHRO	007522 R	12-658 12-951 #15-1484
DHROBU	000670 R	#11-567 13-1222 13-1227 14-1364 14-1426 14-1430 15-1492 15-1577 15-1581
		15-1660 15-1665
DHR1	007556 R	12-951 #15-1496
DHR1BU	001270 R	#11-568 13-1227 14-1373 14-1430 15-1504 15-1581 15-1665
DHR2	007612 R	#15-1508
DHR2BU	001670 R	#11-569 14-1382 15-1516
DHR3	007646 R	#15-1520
DHR3BU	002270 R	#11-570 14-1391 15-1528
DHVCSR	000250 R	#11-555 *12-655 12-672 12-703 12-786 12-865 12-900 12-917 12-937
		*12-957 *12-967 12-975 12-996 12-1011 12-1017 12-1047 12-1075 12-1107
		*12-1154 *13-1192 13-1205 *13-1299
DHVLPR	002720 R	#11-586 15-1756
DHVNOW	000246 R	#11-554 *13-1191 13-1223 *13-1301
DHVSDO	000240 R	#11-551 *13-1196 *14-1445 14-1446 *15-1598 15-1599 *15-1682 15-1683 *15-1717
		15-1718
DHVSLE	000242 R	#11-552 *13-1198 *13-1231 14-1446 15-1599 15-1683 15-1718
DHVTO2	006540 R	12-1153 #13-1182
DHVVEC	002670 R	#11-571 *12-656 12-731 12-936 *12-958 *13-1193 *13-1300
DHV.BU	006642 R	#13-1211
DHV.LI	000244 R	#11-553 *12-617 *12-626 12-651 12-667 *12-711 *12-802 *12-872 *12-908
		*12-926 12-971 *12-1004 *12-1025 *12-1055 *12-1083 *12-1115 12-1147 13-1202
		13-1310 13-1316 13-1322 13-1328
DHV.L1	005762 R	#12-969 12-1155
DHV.L2	006626 R	#13-1200 13-1305
DHV.N1	006500 R	12-973 12-1005 12-1026 12-1056 12-1084 12-1116 #12-1145
DHV.N2	007044 R	13-1203 #13-1297
DHX0	007214 R	12-659 12-952 #14-1360
DHX1	007234 R	12-952 #14-1369
DHX2	007254 R	#14-1378
DHX3	007274 R	#14-1387
DIAG.F	= 020000	#11-510 12-1011
DMA.ST	= 000200	#11-541 13-1288
DROP	004354 R	#12-620 12-652 12-1149
DVID1	000014 R	#11-459 12-617
EA	002676 R	#11-575 12-635
EA22	002702 R	#11-577 *12-635 *12-644 *12-645 *12-646 *12-647 13-1277
ECCMEM	= 000100	#11-459
ENDIT#	= 104413	#11-459 14-1452 15-1608
END\$	= 104410	#11-459 12-622

SYMBOL CROSS REFERENCE		CREF V02								
SYMBOL	VALUE	REFERENCES								
ERR.TYP	000106 R	#11-459	*12-706	*12-999	*12-1020	*12-1050	*12-1078	*12-1110	*14-1439	*15-1591
ERR.A	002724 R	#11-593	12-904							
ERR.B	003024 R	#11-594	12-921							
ERR.C	003124 R	#11-595	12-708	12-1001						
ERR.D	003214 R	#11-596	12-1022							
ERR.E	003315 R	#11-597	12-1052							
ERR.F	003410 R	#11-598	12-1080							
ERR.G	003515 R	#11-599	12-1112							
ERR.H	003631 R	#11-600	14-1441							
ERR.I	003701 R	#11-601	15-1592							
ERR.J	003757 R	#11-602	15-1677							
ERR.K	004007 R	#11-603	12-869							
ERR.L	004046 R	#11-604	12-798							
ERR.M	004154 R	#11-605	12-795							
EX	005260 R	12-824	#12-838							
EXIT#	= 104400	#11-459	12-830	12-836	13-1334	14-1449	15-1603	15-1686		
FLAG	002714 R	#11-584	*12-743	12-791	12-813	*12-829	*12-835			
FRAMIN	= 020000	#11-521	12-1062	15-1542						
GETPA#	= 104415	#11-459	12-633							
GWBUF#	= 104414	#11-459								
HRDCNT	000044 R	#11-459								
HRDR#	= 104405	#11-459	12-709	12-800	12-870	12-906	12-924	12 1002	12-1023	12-1053
		12-1081	12-1113	14-1442	15-1594					
HRDPAS	000050 R	#11-459								
ICONT	000036 R	#11-459								
ICOUNT	000040 R	#11-459								
IDNUM	000122 R	#11-459								
INDPAR	= 000040	#11-459								
INIT	000030 R	#11-459								
INITIA	004554 R	#12-684								
INTR	000120 R	#11-459								
KTPRES	= 000400	#11-459								
KTXTND	= 040000	#11-459								
LCKOUT	000262 R	#11-561	*13-1184	14-1420	*14-1425	*14-1444	15-1571	*15-1576	*15-1597	15-1653
		*15-1659	*15-1681							
LINECO	000236 R	#11-549	*12-877	*12-889	12-897	12-914				
LINESD	000226 R	#11-548	*13-1186	*13-1187	*13-1188	*13-1189	*15-1702	15-1704		
LINESE	000224 R	#11-546	12-744	12-862	*12-887	*12-894	13-1252	15-1704		
LNCTRL	= 000010	#11-488	*12-758	*12-763	*13-1266	*13-1271				
LOCAL	= 000200	#11-532	12-763	13-1271						
LPR	= 000004	#11-487	*13-1283							
LPRSEL	002722 R	#11-587	13-1283	*15-1756	*15-1757					
MAP22#	= 104416	#11-459	12-640							
MASTER	= 000040	#11-514	12-687	12-689	12-840	12-842	12-983	12-985		
MODNAM	000000 R	#11-459								
MODSP	000224 R	11-459	#11-459							
MSGN#	= 104403	#11-459								
MSG#	= 104402	#11-459								
MSG#	= 104401	#11-459	12-708	12-795	12-798	12-869	12-904	12-921	12-1001	12-1022
		12-1052	12-1080	12-1112	14-1441	15-1592	15-1677			
NCPUOP	= 000020	#11 459								
NEXTDH	005676 R	12-669	12-719	12-810	12 873	12-909	12-927	#12-947		

SYMBOL CROSS REFERENCE

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SYMBOL	VALUE	REFERENCES
NOAPTY	= 000002	#11-459
NULL	= 000000	#11-459 12-709 12-800 12 870 12-906 12-924 12-1002 12-1023 12-1053
		12-1081 12-1113 14-1442 15-1594
OFFSET	000254 R	#11-558 *15-1491 *15-1503 *15-1515 *15-1527 15-1701
OPEN	= 000000	11-459 11-459 11-459 11-459 11-459 11-459 11-459 11-459 11-459 11-459
		11-459 11-459 11-459 #11-459
OTOA#	= 104420	#11-459
QVERRU	= 040030	#11-520 12-1062 15-1542
PA	002674 R	#11-574 12-634 12-640
PARITY	= 010000	#11-522 12-1062 15-1542
PARPRE	= 002000	#11-459
PASCNT	000034 R	#11-459
PA22	002700 R	#11-576 *12-634 13-1275
PDPF11	= 000002	#11-459
PDPLSI	= 020000	#11-459
PDP44	= 100000	#11-459
PDP60	= 004000	#11-459
PDP70	= 010000	#11-459
PIRQ#	= 000004	#11-459 12-827 12-833 14-1417 15-1568 15-1606 15-1651
POINT	000252 R	#11-557 *12-654 12-667 12-711 12-802 12-872 12-908 12-926 *12-949
		12-954 *12-966 12-971 12-1004 12-1025 12-1055 12-1083 12-1115 *12-1151
		12-1152 *13-1195 13-1202 *13-1303 13-1304
POPSP	= 005726	#11-459
POPSP2	= 022626	#11-459
PRHMS#	= 000002	#11-459
PRTY	= 000000	#11-459
PRTY0	= 000000	#11-459
PRTY1	= 000040	#11-459
PRTY2	= 000100	#11-459
PRTY3	= 000140	#11-459
PRTY4	= 000200	#11-459
PRTY5	= 000240	11-459 #11-459
PRTY6	= 000300	#11-459
PRTY7	= 000340	#11-459
PS	= 177776	#11-459
PSW	= 177776	#11-459
PUSH	= 005746	#11-459
PUSH2	= 024646	#11-459
PWRFLG	= 000002	#11-459
QMON22	= 000010	#11-459
RAND#	= 104417	#11-459
RANNUM	000054 R	#11-459
RBUF	= 000002	#11-485 12-705 12-726 12-789 12-867 12-902 12-919 12-998 12-1035
		14-1410 15-1538
RCV	005240 R	12-733 #12-832
RCVDAT	= 000200	#11-512
RCVINT	= 000100	#11-513 12-769 13-1313 13-1319 13-1325 13-1331 14-1412 15-1560 15-1643
		15-1709
RCVSPE	000266 R	#11-564 *15-1744 *15-1752 *15-1753 15-1757
RESTRT	004360 R	11-459 12-618 #12-624 14-1453 15-1610
RES1	000056 R	#11-459

SYMBOL CROSS REFERENCE

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SYMBOL	VALUE	REFERENCES
RES2	000060 R	#11-459
RH70	= 001000	#11-459
ROUTIN	004702 R	#12-723
RSTRT	000112 R	#11-459
RXSERV	007702 R	15-1494 15-1506 15-1518 15-1530 #15-1535
RX.ENA	= 000004	#11-533 12-758 12-763 13-1266 13-1271
R6	=#000006	#11-459
R7	=#000007	#11-459
SBADR	000102 R	#11-459 #15-1675
SELFTE	005746 R	12-955 #12-964
SETUP1	004456 R	12-641 #12-649
SETUP2	004522 R	#12-665 12-959
SOFcnt	000042 R	#11-459
SOFER#	= 104406	#11-459
SOPAS	000046 R	#11-459
SPOINT	000032 R	#11-459
SPSIZ	= 000040	#1-29 11-459
SR1	000016 R	#11-459 *12-881 12-895 12-912 15-1743 15-1744
SR2	000020 R	#11-459 12-878
SR3	000022 R	#11-459 12-753 12-793 13-1261
SR4	000024 R	#11-459
START	004344 R	11-459 #12-615
STAT	000026 R	#11-459
SVR0	000062 R	#11-459
SVR1	000064 R	#11-459
SVR2	000066 R	#11-459
SVR3	000070 R	#11-459
SVR4	000072 R	#11-459
SVR5	000074 R	#11-459
SVR6	000076 R	#11-459
SYSCNT	000052 R	#11-459
TRPDFD	= 000023	#11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 #11-459 11-459 11-459 11-459
TX	005220 R	12-736 #12-826
TXBUF	000270 R	#11-566 12-632 13-1213
TXBUFC	= 000016	#11-491 #13-1278
TXCHAR	= 000002	#11-486 #12-773 #12-817
TXDATA	= 100000	#11-527 12-773 12-817
TXDMA	= 010000	#11-511
TXINTR	= 040000	#11-509 12-769 13-1313 13-1319 13-1325 13-1331 14 1412 15-1560 15-1643
TXSERV	007314 R	15-1709 14-1367 14-1376 14-1385 14-1394 #14-1399
TXSPEE	000264 R	#11-563 #15-1743 #15-1749 15-1752
TX.ACT	= 100000	#11-508
TX.ENA	= 100000	#11-540 13-1288
TX1BUF	= 000012	#11-489 #13-1275
TX2BUF	= 000014	#11-490 #13-1277 #13-1288

SYMBOL CROSS REFERENCE

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SYMBOL	VALUE	REFERENCES
USTACK	= 000001	#11-459
VA	002672 R	#11-573 *12-632 12-633
VECT	005646 R	#12-935
VECTOR	000010 R	#11-459 12-656 13-1193
WASADR	000104 R	#11-459
WDFR	000116 R	#11-459
WDTO	000114 R	#11-459
XFLAG	000005 R	#11-459
XOFF	002716 R	#11-585 *13-1185

