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.REM *

IDENTIFICATION

PRODUCT CODE:	AC-E7828-MC
PRODUCT NAME:	CZDRKBO DR11-W INTRPROC EXER
DATE:	DEC 1983
MAINTAINER:	DIAGNOSTIC ENGINEERING

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2. MAKE SURE THE DEVICE & VECTOR ADDRESSES AGREE WITH THE
DEFAULT VALUES DEFINED IN SECTION 6.1. IF NOT, CHANGE
LOCATION(S) AS DESIRED VIA A 'PATCH' METHOD CONSISTENT WITH
WITH THE SYSTEM USED.

3. INSURE THAT THE HALT SWITCH IS DISABLED (IF ANY).

4. DEFINE WHAT COMPUTER IS TO BE THE INITIAL SLAVE - THE
OTHER WILL BE THE INITIAL MASTER (THE ONE STARTED AS
MASTER WILL REPORT THE 'END OF PASS' MESSAGE).

5. START THE SLAVE **FIRST** AT ADDRESS 204. AFTER THE SLAVE
HAS BEEN STARTED THE FOLLOWING PRINTOUT WILL OCCUR:

DR11W INTERPROCESSOR EXERCISER

IS THIS CPU TESTING A DRV11B OR DR11W?
TYPE V OR W:

THE OPERATOR TYPES V FOR DRV11B OR W FOR DR11W. IF THE USER
WERE TO TYPE 'V' THEN THE FOLLOWING WOULD BE PRINTED:

DRV11B BOARD
INTERPROCESSOR LINK NOW IN PROGRESS....

AT THIS POINT THE SLAVE IS WAITING FOR THE MASTER TO BE STARTED.

6. NOW START THE OTHER COMPUTER(MASTER) AT SA 200. SIMILARLY THE
PROGRAM WILL REQUEST THE BOARD TYPE. WHEN USER ANSWERS
(LET'S SAY WITH A W) THE PRINTOUT WILL SHOW:

DR11W BOARD
INTERPROCESSOR LINK NOW IN PROGRESS....

THE TWO SYSTEMS SHOULD NOW BE COMMUNICATING WITH THE TESTS
BEING PERFORMED.

THE END OF PASS MESSAGE WILL SUSEQUENTLY OCCUR AS FOLLOWS:

```
END PASS      ♦      1
END PASS      ♦      2
.
.
.
ETC.
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THE FIRST END PASS IS WITH NO ITERATIONS; ALL OTHERS ARE
WITH ITERATIONS.

4.0 ERRORS

4.1 ERROR COMMENT

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ALL ERRORS ARE ACCOMPAINED WITH AN ENGLISH LANGUAGE DESCRIPTIVE COMMENT AS TO THE TYPE OF FAILURE. FURTHER QUALIFICATION OF THE ERROR CAN BE OBTAINED FROM THE COMMENT AT THE ERROR PC OF FROM THE TEST ITSELF.

4.2 ERROR DATA

ERRPC	LISTING ADDRESS WHERE THE ERROR WAS DETECTED
BUSADR	DRV11B BUS REG ADDRESS OF CONCERNED OPERATION
EXPT	DATA THAT WAS EXPECTED
RCVD	DATA THAT WAS RECEIVED
MEMADR	MEMORY ADDRESS OF DATA ERROR

4.3 ERROR RECOVERY

4.3.1 RECOVERABLE ERRORS

BECAUSE OF THE SYNCHRONIZATION ESTABLISHED WITH THE OTHER COMPUTER, MOST ERROR CONDITIONS WILL CAUSE BOTH COMPUTERS TO RE-SYNCHRONIZE AT THE START OF THE PROGRAM. WHEN AN ERROR OCCURS, AN ERROR MESSAGE WILL BE PRINTED. FOLLOWING THIS, A DELAY OF 5-10 SEC WILL OCCUR AND THE COMPUTER STARTED AS SLAVE WILL PRINT:

*RESYNC...

THIS INDICATES THAT THIS CPU HAS SUCCESSFULLY STARTED ITS PROGRAM AGAIN AND IS WAITING FOR MASTER CPU. APPROX. 5-10 SEC LATER THE CPU STARTED AS MASTER WILL TYPE:

*RESYNC...

AT THIS POINT BOTH CPU'S SHOULD BE AGAIN COMMUNICATING AND TESTING WILL HAVE BEEN RESUMED FROM THE START OF THE PROGRAM.

4.3.2 NON-RECOVERABLE ERRORS

SOME ERRORS CAN OCCUR DUE TO DMA INTERFACE MALFUNCTIONS, INTERMITTENT CABLE CONNECTIONS, ETC.

1. AN ERROR OF THIS TYPE MAY RESULT IN ONE OR BOTH SYSTEMS STUCK IN ONE OF THE 'WAIT LOOPS' FOUND IN THE PROGRAM. THE WAIT LOOP COULD BE A SOFTWARE LOOP INVOKED BY A SYSTEM WHILE WAITING FOR ITS COMPANION TO SET A BIT IN IT'S REGISTER. IF THIS NEVER COMES THEN THE SYSTEM WAITS INDEFINITELY AND SYNCHRONIZATION IS LOST.
2. A TEST SUCH AS 'BURST DATA LATE' MAY FAIL AND HANG THE BUS OF ONE SYSTEM. IN THIS CASE, THE CPU FAILS TO EXECUTE ANY FURTHER INSTRUCTIONS.

AS STATED IN 4.3.1 MOST ERROR CONDITIONS CAN BE HANDLED BY RESYNCHRONIZATION. HOWEVER, THE PROGRAMS WILL NOT BE ABLE TO RECOVER

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THEMSELVES FROM THE ABOVE ERROR TYPES. THEREFORE IT BEHOVES THE OPERATOR TO PERIODICALLY CHECK FOR 'END PASS' PRINTOUTS WHICH WILL OCCUR APPROX. EVERY 2 MINUTES. THIS WILL VERIFY THAT BOTH SYSTEMS ARE STILL IN SYNC.

IF SYNCHRONIZATION IS LOST, BOTH SYSTEMS MUST BE HALTED WHEREBY THE ADDRESS LOCATION OF EACH PROGRAM CAN BE DETECTED THRU 'ADDRESS' REGISTER OR 'OOT' PRINTOUT. BOTH PROGRAMS MUST BE RE-STARTED AS SPECIFIED IN SECT. 3.0.

5.0 SOFTWARE SWITCH REGISTER

5.1 OPTIONS

SWITCH	OCTAL	FUNCTION
-----	-----	-----
BIT15=1	100000	HALT ON ERROR
BIT13=1	020000	INHIBIT ERROR TYPEOUTS
BIT10=1	002000	BELL ON ERROR

5.2 IMPLEMENTATION

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED. UNDER THESE CONDITIONS THE PROGRAM WILL REQUEST THAT THE SOFTWARE SWITCH REGISTER BE LOADED UPON 1ST PASS OF THE PROGRAM. IT WILL PRINT:

SWR:=-XXXXXX NEW= (USER ENTERS IN FOLLOWING NEW=)

5.3 CONTROL

1. THE SOFTWARE SWITCH REGISTER 'SWREG' (LOC. 176) CAN BE CHANGED BY USING OOT FACILITIES.
2. THE SOFTWARE SWITCH REGISTER CAN BE CHANGED UNDER PROGRAM CONTROL BY TYPING THE 'CONTROL & G' KEYS. THIS KEYBOARD OPERATION WILL PRINT OUT THE CURRENT CONTENTS AND ACCEPT NEW OCTAL SWITCH REGISTER DATA TERMINATED WITH A CARRIAGE RETURN.

WHEN USING THE OOT MODE AND ONCE IT HAS BEEN ENTERED DUE TO AN ERROR CONDITION WITH BIT15 SET (HALT ON ERROR), STEP #2 ABOVE IS OF NO VALUE, SO RESORT TO STEP #1 TO ALTER THE CONTENTS.

311
312
313 6.0 MISCELLANEOUS
314 ---
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317
318 6.1 DRV11B AND/OR DR11W BUS & VECTOR ADDRESS MODIFICATION
319
320 MODIFY LOCATION 'INTADR' IF BASE BUS ADDRESS IS NOT 172410
321 MODIFY LOCATION 'DRVECT' IF VECTOR ADDRESS IS NOT 124
322
323 NOTE: USE APPROPRIATE PATCH FACILITIES TO MODIFY THESE LOCATIONS
324 AFTER PROGRAM LOAD.
325
326 6.2 POWER FAIL
327
328 THE PROGRAM OFFERS NO PROVISIONS FOR RESTART PROCEDURES
329 DUE TO POWER FAIL. UPON POWER UP, AND ASSUMING NON
330 VOLATILE MEMORY, THE PROGRAM OF EACH SYSTEM MUST BE RESTARTED
331 ACCORDING TO SECT. 3.0.
332
333
334 7.0 EXECUTION TIME
335 -----
336
337 EXECUTION TIME IS ABOUT 3 SEC FOR NO ITERATIONS
338 EXECUTION TIME W/ITERATIONS IS DETERMINED BY THE SYSTEM CONFIGURATION
339 ACTUAL RUN TIMES ARE AS FOLLOWS:
340 11/34 - 11/05: 3MIN
341 11/70 - 11/45: 45SEC.
342 11/70 - 11/03: 1MIN 15SEC.
343
344 8.0 PROGRAM DESCRIPTION
345 -----
346
347
348
349 8.1 GENERAL
350
351 THIS INTERPROCESSOR EXERCISER WAS DESIGNED TO TEST THE I/O
352 ABILITY OF THE DR11W GENERAL PURPOSE INTERFACE TO COMMUNICATE TO
353 ANOTHER DR11W OR DRV11B LOCATED IN ANOTHER SYSTEM. THE TWO
354 COMPUTERS ARE STARTED AT DIFFERENT ADDRESSES TO ESTABLISH
355 INITIAL SYNCHRONIZATION. THE SLAVE COMPUTER IS STARTED 1ST
356 (START 204) AND THE MASTER COMPUTER IS STARTED 2ND (START 200).
357 THE TERMS 'MASTER' AND 'SLAVE' SHOULD BE USED LOOSELY AS THE
358 MASTER WILL BECOME THE SLAVE AND THE SLAVE WILL BECOME THE
359 MASTER AS THE PROGRAM ADVANCES. THE COMPUTER STARTED AT
360 ADDRESS 200 WILL ALWAYS REPORT THE 'END OF PASS' MESSAGE.
361
362
363 8.2 PROGRAM SEGMENTS
364
365 1A. MYST1 - MASTER SENDS OUT PROGRAM CONTROLLED SINGLE WORDS
366 THRU THE DATA BUFFER REGISTER AND EXPECTS THE SLAVE TO ECHO
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EACH WORD BACK TO THE MASTER VIA THE DATA BUFFER REGISTER.

1B. STST1 - SLAVE ECHOS ALL CHANGES IN THE DATA BUFFER REGISTER

2A. TEST THAT SLAVE CAN INTERRUPT MASTER: F2(SLAVE) TO ATTN(MASTER)

2B. TEST THAT SLAVE INTERRUPTS MASTER:F2 TO ATTN

3A. MTST2 - MASTER SENDS OUT A 'FNCT' BIT CODE IN THE COMMAND STATUS REGISTER AND EXPECTS THE SLAVE TO ECHO EACH CODE IN ITS 'FNCT' BITS. THE MASTER WILL READ THE 'STAT' BIT CODE FROM THE COMMAND/STATUS REGISTER AND COMPARE IT TO THE CODE WRITTEN.

3B. STST2 - SLAVE READS THE 'STAT' BIT CODE FROM IT'S COMMAND/STATUS REGISTER, CONVERTS THIS CODE AND WRITES IT INTO IT'S 'FNCT' BITS IN THE COMMAND/STATUS REGISTER.

4A. MTST3-BLOCK MODE XFER-MASTER SENDS OUT A 32 WORD DATA BLOCK TO THE SLAVE AND CHECKS FOR PROPER INTERRUPT STATUS, WORD COUNT, AND BUFFER ADDRESS AT THE COMPLETION OF THE TRANSFER.

4B. STST3-BLOCK MODE XFER-SLAVE RECEIVES A 32 WORD DATA BLOCK FROM THE MASTER AND CHECKS FOR PROPER INTERRUPT STATUS, WORD COUNT, BUFFER ADDRESS, AND DATA CONTENT.

5A. MTST4 BURST MODE WORD XFER-MASTER XMITTS 32 WORDS TO SLAVE (DR11-W TO (DR11-W ONLY) SAME AS 4A EXCEPT BURST MODE:BOARD DOES NOT RELEASE BUS UNTIL WORD COUNT OVERFLOW

5B. STST4 BURST MODE WORD XFER TEST-SLAVE RECEIVES 32 WORDS FROM MASTER(DR11W TO DR11W ONLY) SAME AS 4B EXCEPT BURST MODE

6A. MTST5 BURST DATA LATE TEST-MASTER XMITTS 5 WORDS TO SLAVE WHILE SLAVE RECEIVES 5 AND TIMES OUT (DR11-W TO DR11-W ONLY)

PROCEDURE: MASTER XMITTS 5 WORDS TO SLAVE IN BURST MODE SLAVE IS SETUP TO DO 10 XFERS. CHECK THAT MASTER INTERRUPTS BY WCOF. CHECK CSR,WC,AND BA. AFTER 5 XFERS ARE DONE IN SLAVE,TIMEOUT OCCURS(5OUS), SINCE SLAVE WAITS FOR GO-AHEAD FROM MASTER TO CONTINUE,BUT MASTER NEVER RESPONDS. IN SLAVE: CHECK THAT 5 XFERS HAVE BEEN COMPLETED.
NOTE: 5OUS IS MAX TIMEOUT THAT REPRESENTS LENGTH OF TIME BOARD HOLDS THE BUS WHILE WAITING FOR COMPANION . IT IS BEYOND THE CAPABILITY OF THIS DIAGNOSTIC TO VERIFY A 5OUS TIMEOUT. IN FACT, IF THE TIMEOUT FEATURE MALFUNCTIONS SO AS TO HOLD THE BUS INDEFINITELY,THE PROGRAM WILL 'HANG UP' THE CPU WITH NO RECOVERY PROVIDED FOR.

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THEREFORE, OPERATOR SCRUTINY IS ADVISABLE TO VERIFY THAT THE PROGRAM IS STILL RUNNING AND THAT THE DR11-W HAS AT LEAST RELEASED THE BUS IN TEST 5.

- 6B. STS5 BURST DATA LATE TEST-SLAVE RECEIVES 5 WORDS FROM MASTER AND TIMES OUT WHILE EXPECTING MORE (DR11-W TO DR11-W ONLY). SETS UP TO RECEIVE 10 WORDS IN BURST MODE FROM MASTER, BUT MASTER WILL ONLY SEND 5 WORDS. TIMEOUT OCCURS AND THE BUS IS RELEASED THEN CHECKS FOR PROPER INTERRUPT STATUS, WC, BA & DATA.

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9.0 MODIFICATION HISTORY

REV 8.0 12-DEC-83 H.P. HOLSINGER (CWO)
ALTERED TEST EXIT (MTST4&5, STST4&5) COMPANION STATUS
CHECK TO COMPENSATE FOR ANY STATUS LINE SKEWING.
ADDED SAVE PC TO RESYNC CODE FOR LINK DEBUG ASSISTANCE.

*

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.TITLE CZDRKBO DR11-W INTRPROC EXER
;*COPYRIGHT (C) 1979
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY JOHN W. CIUKAJ
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C5), JAN, 1981.

```

```

000001
160000
478 122000
479 000001
480

```

```

$TN=1
$SWR=160000 ;;HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYP0UT
$SWR=122000
$TN=1
.SBTTL OPERATIONAL SWITCH SETTINGS
;*
;* SWITCH USE
;* -----
;* 15 HALT ON ERROR
;* 13 INHIBIT ERROR TYPEOUTS
;* 10 BELL ON ERROR

```

481

.SBTTL BASIC DEFINITIONS

```

;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100 STACK= 1100
104000 ERROR=EMT
000004 SCOPE=IOT

```

```

;*MISCELLANEOUS DEFINITIONS
000011 MT= 11 ;;CODE FOR HORIZONTAL TAB
000012 LF= 12 ;;CODE FOR LINE FEED
000015 CR= 15 ;;CODE FOR CARRIAGE RETURN
000200 CRLF= 200 ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776 PS= 177776 ;;PROCESSOR STATUS WORD
177776 PSW=PS
177774 STKLMT= 177774 ;;STACK LIMIT REGISTER
177772 PIRQ= 177772 ;;PROGRAM INTERRUPT REQUEST REGISTER
177570 DSWR= 177570 ;;HARDWARE SWITCH REGISTER
177570 DDISP= 177570 ;;HARDWARE DISPLAY REGISTER

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;*GENERAL PURPOSE REGISTER DEFINITIONS
000000 R0= %0 ;;GENERAL REGISTER
000001 R1= %1 ;;GENERAL REGISTER
000002 R2= %2 ;;GENERAL REGISTER
000003 R3= %3 ;;GENERAL REGISTER
000004 R4= %4 ;;GENERAL REGISTER
000005 R5= %5 ;;GENERAL REGISTER
000006 R6= %6 ;;GENERAL REGISTER
000007 R7= %7 ;;GENERAL REGISTER
000006 SP= %6 ;;STACK POINTER
000007 PC= %7 ;;PROGRAM COUNTER

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;*PRIORITY LEVEL DEFINITIONS
000000 PR0= 0 ;;PRIORITY LEVEL 0
000040 PR1= 40 ;;PRIORITY LEVEL 1
000100 PR2= 100 ;;PRIORITY LEVEL 2

```

000140	PR3=	140	::PRIORITY LEVEL 3
000200	PR4=	200	::PRIORITY LEVEL 4
000240	PR5=	240	::PRIORITY LEVEL 5
000300	PR6=	300	::PRIORITY LEVEL 6
000340	PR7=	340	::PRIORITY LEVEL 7

;"SWITCH REGISTER" SWITCH DEFINITIONS

100000	SW15=	100000
040000	SW14=	40000
020000	SW13=	20000
010000	SW12=	10000
004000	SW11=	4000
002000	SW10=	2000
001000	SW09=	1000
000400	SW08=	400
000200	SW07=	200
000100	SW06=	100
000040	SW05=	40
000020	SW04=	20
000010	SW03=	10
000004	SW02=	4
000002	SW01=	2
000001	SW00=	1
001000	SW9=SW09	
000400	SW8=SW08	
000200	SW7=SW07	
000100	SW6=SW06	
000040	SW5=SW05	
000020	SW4=SW04	
000010	SW3=SW03	
000004	SW2=SW02	
000002	SW1=SW01	
000001	SW0=SW00	

;"DATA BIT DEFINITIONS (BIT00 TO BIT15)

100000	BIT15=	100000
040000	BIT14=	40000
020000	BIT13=	20000
010000	BIT12=	10000
004000	BIT11=	4000
002000	BIT10=	2000
001000	BIT09=	1000
000400	BIT08=	400
000200	BIT07=	200
000100	BIT06=	100
000040	BIT05=	40
000020	BIT04=	20
000010	BIT03=	10
000004	BIT02=	4
000002	BIT01=	2
000001	BIT00=	1
001000	BIT9=BIT09	
000400	BIT8=BIT08	
000200	BIT7=BIT07	
000100	BIT6=BIT06	
000040	BIT5=BIT05	
000020	BIT4=BIT04	

```

000010      BIT3=BIT03
000004      BIT2=BIT02
000002      BIT1=BIT01
000001      BIT0=BIT00

          ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004      ERRVEC= 4          ;;TIME OUT AND OTHER ERRORS
000010      RESVEC= 10       ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014      TBITVEC=14      ;; "T" BIT
000014      TRTVEC= 14      ;;TRACE TRAP
000014      BPTVEC= 14      ;;BREAKPOINT TRAP (BPT)
000020      IOTVEC= 20      ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024      PWRVEC= 24      ;;POWER FAIL
000030      EMTVEC= 30      ;;EMULATOR TRAP (EMT) **ERROR**
000034      TRAPVEC=34      ;; "TRAP" TRAP
000060      TKVEC= 60        ;;TTY KEYBOARD VECTOR
000064      TPVEC= 64        ;;TTY PRINTER VECTOR
000240      PIRQVEC=240     ;;PROGRAM INTERRUPT REQUEST VECTOR
482 106427  MTPS=106427     ;;INSTR EQUATE THAT MOVES BYTE TO PSW
483      .SBTTL TRAP CATCHER

          .=0
          ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
          ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
          ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
000174      .=174
000174 000000  DISPREG: .WORD 0          ;;SOFTWARE DISPLAY REGISTER
000176 000000  SWREG:   .WORD 0          ;;SOFTWARE SWITCH REGISTER
          .SBTTL STARTING ADDRESS(ES)
484 000200 000137 001506  JMP      @START1          ;;JUMP TO STARTING ADDRESS OF PROGRAM
485 000204 000137 001514  JMP      @START2          ;;GO START AS SLAVE COMPUTER
486 000100 000104 000200 000002  .=100
487      .WORD 104,200,2          ;IF 'B EVENT' ON Q-BUS IS CONNECTED
          ;JUST DO A RTI (IGNORE IT)

```

488

.SBTTL COMMON TAGS

```

;*****
;THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
;USED IN THE PROGRAM.
001100 001100          .-1100
001100 000000      $CMTAG:          ;; START OF COMMON TAGS
001102 000          $PASS: .WORD    0      ;; CONTAINS PASS COUNT
001103 000          $TSTNM: .BYTE    0      ;; CONTAINS THE TEST NUMBER
001104 000000      $ERFLG: .BYTE    0      ;; CONTAINS ERROR FLAG
001106 000000      $ICNT:  .WORD    0      ;; CONTAINS SUBTEST ITERATION COUNT
001110 000000      $LPADR: .WORD    0      ;; CONTAINS SCOPE LOOP ADDRESS
001112 000000      $LPERR: .WORD    0      ;; CONTAINS SCOPE RETURN FOR ERRORS
001114 000          $ERTTL: .WORD    0      ;; CONTAINS TOTAL ERRORS DETECTED
001115 001          $ITEMB: .BYTE    0      ;; CONTAINS ITEM CONTROL BYTE
001116 000000      $ERMAX: .BYTE    1      ;; CONTAINS MAX. ERRORS PER TEST
001120 000000      $ERRPC: .WORD    0      ;; CONTAINS PC OF LAST ERROR INSTRUCTION
001122 000000      $GDADR: .WORD    0      ;; CONTAINS ADDRESS OF 'GOOD' DATA
001124 000000      $BDADR: .WORD    0      ;; CONTAINS ADDRESS OF 'BAD' DATA
001126 000000      $GDDAT: .WORD    0      ;; CONTAINS 'GOOD' DATA
001130 000000      $BDDAT: .WORD    0      ;; CONTAINS 'BAD' DATA
001132 000000      .WORD    0      ;; RESERVED--NOT TO BE USED
001134 000          $AUTOB: .BYTE    0      ;; AUTOMATIC MODE INDICATOR
001135 000          $INTAG: .BYTE    0      ;; INTERRUPT MODE INDICATOR
001136 000000      .WORD    0
001140 177570      $SWR:   .WORD    DSWR    ;; ADDRESS OF SWITCH REGISTER
001142 177570      $DISP: .WORD    DDISP   ;; ADDRESS OF DISPLAY REGISTER
001144 177560      $TKS:   177560        ;; TTY KBD STATUS
001146 177562      $TKB:   177562        ;; TTY KBD BUFFER
001150 177564      $TPS:   177564        ;; TTY PRINTER STATUS REG. ADDRESS
001152 177566      $TPB:   177566        ;; TTY PRINTER BUFFER REG. ADDRESS
001154 000          $NULL: .BYTE    0      ;; CONTAINS NULL CHARACTER FOR FILLS
001155 002          $FILLS: .BYTE    2      ;; CONTAINS # OF FILLER CHARACTERS REQUIRED
001156 012          $FILLC: .BYTE   12      ;; INSERT FILL CHARS. AFTER A "LINE FEED"
001157 000          $TPFLG: .BYTE    0      ;; "TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160 207          377 377 $BELL: .ASCIZ <207><377><377> ;; CODE FOR BELL
001163 000
001164 077          $QUES: .ASCII  /?/      ;; QUESTION MARK
001165 015          $CRLF: .ASCII  <15>    ;; CARRIAGE RETURN
001166 012          000 $LF:   .ASCIZ  <12>    ;; LINE FEED
;*****

```

.SBTTL ERROR POINTER TABLE

;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
 ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
 ;*LOCATION \$ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
 ;*NOTE1: IF \$ITEMB IS 0 THE ONLY PERTINENT DATA IS (\$ERRPC).
 ;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

;* EM ;POINTS TO THE ERROR MESSAGE
 ;* DM ;POINTS TO THE DATA HEADER
 ;* DT ;POINTS TO THE DATA
 ;* DF ;POINTS TO THE DATA FORMAT

489	001170		\$ERRTB:				
490	001170	014234	;\$ERROR	1	EM1	;\$SLAVE FAILED TO ECHO DBR CONTENTS	
491	001172	016113			DM1	;\$ERRPC BUSADR EXPCT RCVD	
492	001174	016214			DT1	;\$ERRPC \$BDADR \$GDDAT \$BDDAT	
493	001176	000000			0		
494							
495			;\$ERROR	2	EM2	;\$SLAVE FAILED TO ECHO 'STAT' BITS	
496	001200	014327			DM1	;\$ERRPC BUSADR EXPCT RCVD	
497	001202	016113			DT1	;\$ERRPC \$BDADR \$GDDAT \$BDDAT	
498	001204	016214			0		
499	001206	000000					
500							
501			;\$ERROR	3	EM3	;\$FAILED TO INTR ON A 'DATI'	
502	001210	014410			DM1	;\$ERRPC BUSADR EXPCT RCVD	
503	001212	016113			DT1	;\$ERRPC \$BDADR \$GDDAT \$BDDAT	
504	001214	016214			0		
505	001216	000000					
506							
507			;\$ERROR	4	EM4	;\$STATUS ER ON 'DATI'	
508	001220	014463			DM1	;\$ERRPC BUSADR EXPCT RCVD	
509	001222	016113			DT1	;\$ERRPC \$BDADR \$GDDAT \$BDDAT	
510	001224	016214			0		
511	001226	000000					

D??

513				
514	001230	014527	;ERROR 5	
515	001232	016113	EM5	;WORD COUNT ER ON 'DATI'
516	001234	016214	DH1	;ERRPC BUSADR EXPCT RCVD
517	001236	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
518			0	
519				
520	001240	014577	;ERROR 6	
521	001242	016113	EM6	;BUFFER ADRS ER ON 'DATI'
522	001244	016214	DH1	;ERRPC BUSADR EXPCT RCVD
523	001246	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
524			0	
525				
526	001250	014650	;ERROR 7	
527	001252	016113	EM7	;FAILED TO INTR ON A 'DATO'
528	001254	016214	DH1	;ERRPC BUSADR EXPCT RCVD
529	001256	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
530			0	
531	001260	014722	;ERROR 10	
532	001262	016113	EM10	;STATUS ER ON 'DATO'
533	001264	016214	DH1	;ERRPC BUSADR EXPCT RCVD
534	001266	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
535			0	
536				
537	001270	014765	;ERROR 11	
538	001272	016113	EM11	;WORD COUNT ER ON 'DATO'
539	001274	016214	DH1	;ERRPC BUSADR EXPCT RCVD
540	001276	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
541			0	
542				
543	001300	015034	;ERROR 12	
544	001302	016113	EM12	;BUFFER ADRS ER ON 'DATO'
545	001304	016214	DH1	;ERRPC BUSADR EXPCT RCVD
546	001306	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
547			0	
548				
549	001310	015104	;ERROR 13	
550	001312	016150	EM13	;DATA ER ON 'DATO'
551	001314	016214	DH2	;ERRPC MEMADR EXPCT RCVD
552	001316	000000	DT1	;ERRPC \$BDADR \$GDDAT \$BDDAT
553			0	
554				
555	001320	015145	;ERROR 14	
556	001322	016113	EM14	;CSR READY BIT WAS SET - SHOULD BE CLEAR
557	001324	016214	DH1	
558	001326	000000	DT1	
559			0	
560				
561				
562	001330	015233	;ERROR 15	
563	001332	016205	EM15	;PROTOCOL INITIALIZATION ERROR -MASTER AND SLAVE
564	001334	016226	DH3	
565	001336	000000	DT2	
566			0	
567				
568	001340	015355	;ERROR 16	
569	001342	016205	EM16	;STUCK FOREVER WAITING FOR COMPANION
			DH3	

570	001344	016232	DT3	
571	001346	000000	0	
572				
573				
574	001350	015427	;ERROR 17	
575	001352	016205	EM17	;TIMEOUT ERROR BURST MODE XFER-INCURRED INTERRUPT
576	001354	016226	DH3	
577	001356	000000	DT2	
578			0	
579				
580	001360	015521	;ERROR 20	;SLAVE DID NOT INTERRUPT MASTER
581	001362	016205	EM20	
582	001364	016226	DH3	
583	001366	000000	DT2	
584			0	
585				
586	001370	015634	;ERROR 21	
587	001372	016205	EM21	;TEST 2-ERROR BIT SET IN MASTER
588	001374	016232	DH3	
589	001376	000000	DT3	
590			0	
591				
592	001400	015726	;ERROR 22	
593	001402	016113	EM22	;BURST DATA LATE BIT IN EIR NOT SET
594	001404	016214	DH1	
595	001406	000000	DT1	
596			0	

```

601      ; BASE REGISTER ADDRESS ASSIGNMENT
602
603 001410 172410      INTADR: 172410      ;MODIFY THIS LOC IF DIFFERENT
604
605      ; VECTOR ADDRESS ASSIGNMENT
606
607 001412 000124      DRVECT: 124      ;MODIFY THIS LOC IF DIFFERENT
608
609      ; BUS REGISTER ADDRESS POINTERS
610
611 001414 172410      WCR:      172410      ;WORD COUNT
612 001416 172412      BAR:      172412      ;BUFFER ADDRESS
613 001420 172414      CSR:      172414      ;COMMAND/STATUS
614 001422 172416      BDR:      172416      ;BUFFER DATA REGISTER
615
616      ; VECTOR ADDRESS POINTERS
617
618 001424 000124      DRVCT0: 124      ;READY & NEX VECTOR
619 001426 000126      DRVCT2: 126      ;NEW PSW ON INTR
620
621      ;COMMON PROGRAM LOCATION(S)
622
623 001430 000000      CNT:      0
624 001432 000000      NUM:      0
625 001434 000000      BOARD: 0      ;DESCRIBES BOARD TYPE:DR11W OR DRV11B
626 001436 000000      ABORT: 0      ;TIMER FOR ABORTING PROGRAM
627 001440 000000      TESTPC: 0
628 001442 000000      TOTAL: 0      ;USED TO DETERMINE BOARD TYPE
629 001444 000000      TIME: 0      ;GENERAL PURPOSE COUNTER
630 001446 000000      TEMP: 0
631 001450 000000      SAVE: 0      ;REG DATA SAVED HERE
632 001452 000000      MSTER: 0      ;0=MASTER START - NON-ZERO=SLAVE START
633 001454 000001      ICOUNT: 1      ;# OF TIMES TO REPEAT ALL TESTS BEFORE END PASS MSG
634 001456 177740      XPRAM: -32.      ;XMIT WORD COUNT
635 001460 016236      DBUF      ;XMIT BUFFER ADRS
636 001462 000511      511      ;XMIT STATUS/CONTROL
637 001464 177740      RPRAM: -32.      ;RCV WORD COUNT
638 001466 016236      DBUF      ;RCV BUFFER ADRS
639 001470 000113      113      ;RCV STATUS/CONTROL
640
641 001472 177773      XMITMO: -5      ;XMIT BURST DATA LATE TEST.
642 001474 016236      DBUF
643 001476 000501      501
644
645 001500 177766      RCVTMO: -10.      ;RCV BURST DATA LATE TEST
646 001502 016236      DBUF
647 001504 000103      103
648

```

G?

```

651          .SBTTL PROGRAM START
652 001506 005037 001452 START1: CLR MSTER ;THIS IT MASIER START
653 001512 000403          BR START ;SKIP NEXT
654 001514 012737 177777 001452 START2: MOV #-1,MSTER ;SLAVE START
655 001522          START:
          .SBTTL INITIALIZE THE COMMON TAGS
          ;;CLEAR THE COMMON TAGS (%CMTAG) AREA
001522 012706 001100          MOV #CMTAG,R6 ;;FIRST LOCATION TO BE CLEARED
001526 005026          CLR (R6)+ ;;CLEAR MEMORY LOCATION
001530 022706 001140          CMP #SWR,R6 ;;DONE?
001534 001374          BNE .-6 ;;LOOP BACK IF NO
001536 012706 001100          MOV #STACK,SP ;;SETUP THE STACK POINTER
          ;;INITIALIZE A FEW VECTORS
001542 012737 012714 000020          MOV #SCOPE,#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
001550 012737 000340 000022          MOV #340,#IOTVEC+2 ;;LEVEL 7
001556 012737 012434 000030          MOV #ERROR,#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
001564 012737 000340 000032          MOV #340,#EMTVEC+2 ;;LEVEL 7
001572 012737 013572 000034          MOV #TRAP,#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001600 012737 000340 000036          MOV #340,#TRAPVEC+2 ;;LEVEL 7
          ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
          ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
001606 013746 000004          MOV #ERRVEC,-(SP) ;;SAVE ERROR VECTOR
001612 012737 001646 000004          MOV #64,#ERRVEC ;;SET UP ERROR VECTOR
001620 012737 177570 001140          MOV #DSWR,SWR ;;SETUP FOR A HARDWARE SWICH REGISTER
001626 012737 177570 001142          MOV #DISP,DISPLAY ;;AND A HARDWARE DISPLAY REGISTER
001634 022777 177777 177276          CMP #-1,DSWR ;;TRY TO REFERENCE HARDWARE SWR
001642 001012          BNE 66# ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
          ;;AND THE HARDWARE SWR IS NOT = -1
001644 000403          BR 65# ;;BRANCH IF NO TIMEOUT
001646 012716 001654          64#: MOV #65#,(SP) ;;SET UP FOR TRAP RETURN
001652 000002          RTI
001654 012737 000176 001140          65#: MOV #SWREG,SWR ;;POINT TO SOFTWARE SWR
001662 012737 000174 001142          MOV #DISPREG,DISPLAY
001670 012637 000004          66#: MOV (SP)+,#ERRVEC ;;RESTORE ERROR VECTOR

656 001674 012700 001414          MOV #WCR,R0 ;SET UP REG ADRS POINTERS
657 001700 013701 001410          MOV INTADR,R1 ;GET BASE ADRS
658 001704 010120          SETUP2: MOV R1,(R0)+ ;LOAD EM
659 001706 062701 000002          ADD #2,R1 ;
660 001712 022700 001424          CMP #BDR+2,R0 ;ALL DONE?
661 001716 001372          BNE SETUP2 ;BR IF NOT
662 001720 012700 001424          MOV #DRVCT0,R0 ;SET UP VECTOR ADRS POINTER
663 001724 013701 001412          MOV DRVECT,R1 ;GET BASE VECTOR ADRS
664 001730 010120          SETUP3: MOV R1,(R0)+ ;
665 001732 062701 000002          ADD #2,R1 ;
666 001736 022700 001430          CMP #DRVCT2+2,R0 ;ALL DONE?
667 001742 001372          BNE SETUP3 ;BR IF NOT
668          .SBTTL TYPE PROGRAM NAME
          ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
001744 005227 177777          INC #-1 ;;FIRST TIME?
001750 001041          BNE 64# ;;BRANCH IF NO
001752 104401 002010          TYPE ,65# ;;TYPE ASCIZ STRING
          .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
001756 005737 000042          TST #42 ;;ARE WE RUNNING UNDER XXDP/ACT?
001762 001006          BNE 66# ;;BRANCH IF YES
001764 023727 001140 000176          CMP SWR,#SWREG ;;SOFTWARE SWITCH REG SELECTED?
001772 001005          BNE 67# ;;BRANCH IF NO

```

H2

```
001774 104406          GTSWR          ;;GET SOFT-SWR SETTINGS
001776 000403          BR           67$
002000 112737 000001 001134 66$: MOVB        #1,$AUTOB    ;;SET AUTO-MODE INDICATOR
002006 000422          67$:
002006 000422          BR           64$          ;;GET OVER THE ASCIZ
002054          ;;65$: .ASCIZ <CRLF>#DR11W INTERPROCESSOR EXERCISER #<CRLF>
669 002054 000240          64$: NOP
```

```

671          .SBTTL BOARD TYPE DIALOGUE
672 002056   BRDTYP:
673 002056   012706 001100   MOV    #STACK,SP      ;ALWAYS RESET STACK PTR
674 002062   000005   RESET                ;INITIALIZE BEFORE TESTING
675 002064   012737 000001 001454   MOV    #1,ICOUNT     ;1ST TIME DO ALL TEST ONCE - THEN 100(10)
676 002072   005227 177777   INC    #-1           ;DETERMINE BOARD TYPE ON FIRST PASS ONLY
677 002076   001402   BEQ    5$
678 002100   000137 002524   JMP    MORS
679 002104   5$:
   002104 104401 002112   TYPE   .65$          ;;TYPE ASCIZ STRING
   002110 000425   BR     64$          ;;GET OVER THE ASCIZ
   ;;65$: .ASCIZ <CRLF>/IS THIS CPU TESTING A DRV11B OR DR11W?/<CRLF>
680 002164   64$:
   002164 104401 002172   TYPE   .67$          ;;TYPE ASCIZ STRING
   002170 000411   BR     66$          ;;GET OVER THE ASCIZ
   ;;67$: .ASCIZ /TYPE V OR W: /
681 002214   66$:
   002214 104410   RDCHR
682 002216   021627 000126   2$:  CMP    (SP),#126
683 002222   001051   BNE    3$
684 002224   012737 000126 001434   MOV    #126,BOARD
685 002232   104401 002240   TYPE   .69$          ;;TYPE ASCIZ STRING
   002236 000411   BR     68$          ;;GET OVER THE ASCIZ
   ;;69$: .ASCIZ /V/<CRLF><CRLF>/DRV11B BOARD/<CRLF>
686 002262   68$:
   002262 104401 002270   TYPE   .71$          ;;TYPE ASCIZ STRING
   002266 000426   BR     70$          ;;GET OVER THE ASCIZ
   ;;71$: .ASCIZ /INTERPROCESSOR LINK NOW IN PROGRESS...../<CRLF><CRLF>
687 002344   70$:
   002344 000576   BR     SYNCST
688 002346   021627 000127   3$:  CMP    (SP),#127
689 002352   001414   BEQ    6$
690 002354   104401 002362   TYPE   .73$          ;;TYPE ASCIZ STRING
   002360 000410   BR     72$          ;;GET OVER THE ASCIZ
   ;;73$: .ASCIZ /ERROR IN ENTRY/
691 002402   72$:
   002402 000640   BR     5$
692 002404   012737 000127 001434   6$:  LOV    #127,BOARD
693 002412   104401 002420   TYPE   .75$          ;;TYPE ASCIZ STRING
   002416 000410   BR     74$          ;;GET OVER THE ASCIZ
   ;;75$: .ASCIZ /W/<CRLF><CRLF>/DR11W BOARD/<CRLF>
694 002440   74$:
   002440 104401 002446   TYPE   .77$          ;;TYPE ASCIZ STRING
   002444 000426   BR     76$          ;;GET OVER THE ASCIZ
   ;;77$: .ASCIZ /INTERPROCESSOR LINK NOW IN PROGRESS...../<CRLF><CRLF>
695 002522   76$:
   002522 000507   BR     SYNCST
696 002524   MORS:
697 002524   022737 000126 001434   4$:  CMP    #126,BOARD
698 002532   001403   BEQ    16$
699 002534   104401 002645   TYPE   .7$
700 002540   000500   BR     15$
701 002542   104401 002550   16$: TYPE   .8$
702 002546   000475   BR     15$
703 002550   200     200     040   8$:  .ASCII <CRLF><CRLF>/ DRV11B BOARD/<CRLF>
   002553   104     122     126
   002556   061     061     102

```

	002561	040	102	117	
	002564	101	122	104	
	002567	200			
704	002570	111	116	124	.ASCII /INTERPROCESSOR LINK NOW IN PROGRESS...../<CRLF><CRLF><CRLF>
	002573	105	122	120	
	002576	122	117	103	
	002601	105	123	123	
	002604	117	122	040	
	002607	114	111	116	
	002612	113	040	116	
	002615	117	127	040	
	002620	111	116	040	
	002623	120	122	117	
	002626	107	122	105	
	002631	123	123	056	
	002634	056	056	056	
	002637	056	200	200	
	002642	200			
705	002643	040	000		.ASCIZ / /
706	002645	200	200	040	74: .ASCII <CRLF><CRLF>/ DR11W BOARD /<CRLF>
	002650	104	122	061	
	002653	061	127	040	
	002656	102	117	101	
	002661	122	104	040	
	002664	200			
707	002665	111	116	124	.ASCII /INTERPROCESSOR LINK NOW IN PROGRESS...../<CRLF><CRLF><CRLF>
	002670	105	122	120	
	002673	122	117	103	
	002676	105	123	123	
	002701	117	122	040	
	002704	114	111	116	
	002707	113	040	116	
	002712	117	127	040	
	002715	111	116	040	
	002720	120	122	117	
	002723	107	122	105	
	002726	123	123	056	
	002731	056	056	056	
	002734	056	200	200	
	002737	200			
708	002740	040	000		.ASCIZ / /
709					.EVEN

711
712
713

.SBTTL
.SBTTL
.SBTTL

MASTER TESTS

714 002742
715 002742 004737 014050
716 002746 005737 001452
717 002752 001402
718 002754 000137 006162

15:

SYNCST: JSR PC,CPUHI
TST MSTER
BEQ MINIT1
JMP SINIT1

;START AS MASTER?
;YES - GO SEND TO SLAVE & CHECK ECHO
;NO - GO ECHO MASTER'S DATA


```

720                                     ;MASTER PROTOCOL INIT-TEST 1
721                                     ;*****
722
723 002760 032777 020000 176432 MINIT1: BIT    @BIT13,@CSR
724 002766 001425                BEQ      1#
725 002770 104401 002776                TYPE   ,65#           ;;TYPE ASCIZ STRING
      002774 000421                BR      64#           ;;GET OVER THE ASCIZ
      003040                ;;65#: .ASCIZ <CRLF>/CABLE IS NOT INSERTED - HALTING /
      64#:
726 003040 000000                HALT
727 003042 004737 014050                1#:   JSR    PC,CPUHI
728 003046 012706 001100                MOV    @STACK,SP
729 003052 005077 176342                CLR    @CSR
730 003056 012737 001000 001444        MOV    @1000,TIME
731 003064 032777 001000 176326        2#:   BIT    @1000,@CSR           ;HAS SLAVE SET MASTER. DSTATC
732 003072 001005                BNE    MTST1
733 003074 005337 001444                DEC    TIME
734 003100 001371                BNE    2#
735 003102 104015                104000+15
736 003104 104412                RSYNC

```

```

738 .SBTTL * MTST1 TEST THAT SLAVE CAN ECHO THE DBR CORRECTLY
739 ;*****
740 ;*****
741 ;MASTER COMPUTER STARTS HERE FROM PROGRAM START
742 ;IT SENDS OUT SINGLE WORDS (FLOATING 1/0 PTRN) THRU THE
743 ;DBR TO THE SLAVE COMPUTER
744 ;IT LOOKS FOR THE SLAVE TO ECHO THE DBR WORD CORRECTLY
745 ;WITHIN A CERTIAN AMOUNT OF TIME
746 ;IF IT FAILS TO RETURN THE WORD AN ERROR IS REPORTED
747 ;THIS TEST IS NOT EXITED UNTIL ALL DATA PATTERNS HAVE
748 ;BEEN SENT AND RECEIVED CORRECTLY
749 ;*****
750 ;*****
751 003106 MTST1:
752 003106 005001 1#: CLR R1 ;R1 SAYS FLOAT 0 LEFT WHEN ZERO
753 003110 012700 177776 MOV #-2,R0 ;START WITH #177776 IN R0
754 003114 010077 176302 2#: MOV R0,#BDR ;SEND PATTERN OUT
755 003120 004737 013754 JSR PC,GOCMPN ;TELL SLAVE TO PROCEED
756 003124 010037 001124 MOV R0,#GDDAT ;SAVE IN EXPECTED
757 003130 013737 001422 001122 MOV BDR,#BDADR ;SET UP DBR ADRS
758 003136 004737 013666 JSR PC,WTCMPN ;WAIT FOR SLAVE TO ECHO DATA
759 003142 017737 176254 001126 MOV #BDR,#BDDAT ;READ IT BACK
760 003150 012737 001000 001444 MOV #1000,TIME ;DELAY
761 003156 005337 001444 3#: DEC TIME
762 003162 001375 BNE 3#
763 003164 023737 001124 001126 CMP #GDDAT,#BDDAT ;CORRECT?
764 003172 001402 BEQ 4# ;BR IF SO
765 003174 104001 104000+1 RSYNC
766 003176 104412 4#: COM R0 ;RSYNC ON ERROR
767 003200 005100 COM R1 ;CONVERT PTRN TO FLOATING 1
768 003202 005101 BNE 2# ;TIME TO FLOAT LEFT?
769 003204 001343 ASL R0 ;BR IF NOT
770 003206 006300 INC R0 ;YES - FLOAT LEFT
771 003210 005200 BCS 2# ;KEEP LSB SET
772 003212 103740 MOV #177001,#BDR ;BR IF ZERO NOT TO CARRY YET
773 003214 012777 177001 176200 JSR PC,GOCMPN ;TELL SLAVE TO GO TO NEXT TEST
774 003222 004737 013754 ;TELL SLAVE TO READ TEST TERMINATOR
775

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777                                     ;MASTER PROTOCOL INIT-TEST2
778                                     .SBTTL * TEST THAT SLAVE CAN INTERRUPT MASTER: F2(SLAVE) TO ATTN(MASTER)
779                                     ;:*****
780 003226 012737 001000 001444 MINIT2: MOV #1000,TIME ;WAIT FOR SLAVE TO CLEAR
781 003234 005337 001444 1$: DEC TIME
782 003240 001375 BNE 1$
783 003242 017737 176152 001446 MOV @CSR,TEMP
784 003250 042737 177775 001446 BIC #177775,TEMP ;CLEAR ALL BUT F1
785 003256 013777 001446 176134 MOV TEMP,@CSR
786 003264 032777 100000 176126 BIT #100000,@CSR ;IS ERROR BIT CLEAR
787 003272 001402 BEQ .+6
788 003274 104021 104000+21
789 003276 104412 RSYNC ;RSYNC ON ERROR
790 003300 012777 003462 176116 MOV @RTRN,@DRVCTO ;DEFINE RETURN
791 003306 012777 000340 176112 MOV #340,@DRVCT2
792 003314 004737 014076 JSR PC,CPULO ;ALLOW CPU INTERRUPT
793 003320 017737 176074 001446 MOV @CSR,TEMP
794 003326 042737 100000 001446 BIC #BIT15,TEMP
795 003334 052737 000101 001446 BIS #101,TEMP ;IE,GO
796 003342 013777 001446 176050 MOV TEMP,@CSR
797 003350 032777 000002 176042 BIT #2,@CSR ;TELL SLAVE TO INTERRUPT MASTER
798 003356 001415 BEQ 4$
799 003360 017737 176034 001446 MOV @CSR,TEMP
800 003366 042737 000002 001446 BIC #2,TEMP
801 003374 042737 100000 001446 BIC #BIT15,TEMP
802 003402 013777 001446 176010 MOV TEMP,@CSR
803 003410 000414 BR 5$
804 003412 017737 176002 001446 4$: MOV @CSR,TEMP
805 003420 052737 000002 001446 BIS #2,TEMP
806 003426 042737 100000 001446 BIC #BIT15,TEMP
807 003434 013777 001446 175756 MOV TEMP,@CSR
808 003442 012737 010000 001444 5$: MOV #10000,TIME ;DELAY;WAIT FOR SLAVE TO INTERRUPT
809 003450 005337 001444 3$: DEC TIME
810 003454 001375 BNE 3$
811 003456 104020 104000+20
812 003460 104412 RSYNC ;RESYNC ON ERROR
813 003462 RTRN:
814 003462 004737 011360 1$: JSR PC,RSTVEC
815 003466 032777 002000 175724 BIT #2000,@CSR ;IS ATTN CLR?
816 003474 001372 BNE 1$
817 003476 012777 000000 175714 MOV #0,@CSR ;MAKE SURE DSTATC OF SLAVE IS CLR
818 003504 022626 CMP (SP)+,(SP)+ ;READJUST STACK
819 003506 012737 001000 001444 MOV #1000,TIME ;DELAY
820 003514 005337 001444 2$: DEC TIME
821 003520 001375 BNE 2$
822
823 003522 005077 175674 CLR @BDR

```

```

825 .SBTTL • MTST2 TEST THAT SLAVE CAN ECHO THE STAT' BITS CORRECTLY
826 ;*****
827 ;*****
828 ;MASTER SENDS OUT A 'FNCT' CODE (1-7) TO THE SLAVE COMPUTER
829 ;THE MASTER THEN LOOKS FOR THE SLAVE TO ECHO THE CODE VIA THE
830 ;'STAT' BITS WITHIN A CERTIAN AMOUNT OF TIME
831 ;IF IT FAILS TO RETURN THE CORRECT CODE AN ERROR IS REPORTED
832 ;THIS TEST IS NOT EXITED UNTIL ALL 'FNCT' CODES HAVE BEEN
833 ;SENT AND RECEIVED CORRECTLY
834 ;*****
835 ;*****
836 MTST2:
837 003526 013737 001420 001122      MOV      CSR,#BDAOR      ;SET UP CSR ADRS
838 003534 012700 000002              MOV      #2,R0          ;SET UP INITIAL FNCT BIT COUNT
839 003540 012737 001202 001124      MOV      #1202,#GDDAT   ;LD EXPECTED
840 003546 010077 175646      1$: MOV      R0,#CSR      ;LOAD FNCT BITS
841 003552 004737 013666      JSR      PC,WTCMPN     ;LOOK FOR SLAVE TO ECHO VIA STAT' BITS
842 003556 012737 001000 001444      MOV      #1000,TIME    ;DELAY
843 003564 005337 001444      2$: DEC      TIME
844 003570 001375              BNE      2$
845 003572 017737 175622 001126      MOV      #CSR,#BDDAT   ;READ CSR
846 003600 033737 001124 001126      BIT      #GDDAT,#BDDAT ;CORRECT?
847 003606 001002              BNE      3$           ;BR IF SO
848 003610 104002              104000*2
849 003612 104412              RSYNC
850 003614 062737 001002 001124      3$: ADD      #1002,#GDDAT ;RSYNC ON ERROR
851 003622 062700 000002              ADD      #2,R0         ;ADVANCE EXPECTED
852 003626 032700 000020              BIT      #20,R0       ;ADVANCE PTRN
853 003632 001745              BEQ      1$           ;ALL BEEN DONE?
854 003634 012777 177002 175560      MOV      #177002,#BDR  ;BR IF NOT
855 003642 004737 013754              JSR      PC,GOCMPN     ;TELL SLAVE TO GO TO NEXT TEST
856 003646 004737 013666              JSR      PC,WTCMPN     ;GO TO COMPANION
857                               ;WAIT FOR COMPANION

```

```

859 .SBTTL * MTST3 BLOCK MODE WORD XFER-MASTER XMIT 32 WORDS TO SLAVE
860 ;*****
861 ;*****
862 ;MASTER XMIT A 32 WORD BLOCK OF DATA TO SLAVE
863 ;THEN CHECKS FOR PROPER INTERRUPT STATUS, WC & BA
864 ;THE SLAVE CHECKS THE SAME PLUS THE DATA RECEIVED
865 ;*****
866 ;*****
867 003652 MTST3:
868 003652 004737 014050 18: JSR PC,CPUMI ;NO INTR ALLOWED YET
869 003656 005077 175536 418: CLR BCSR
870 003662 022777 000200 175530 CMP #200,BCSR ;IS ONLY READY SET
871 003670 001372 BNE 418
872 003672 017737 175522 001446 388: MOV BCSR,TEMP
873 003700 042737 100000 001446 BIC #BIT15,TEMP
874 003706 052737 000002 001446 BIS #2,TEMP ;SET DSTATC IN SLAVE
875 ;TELLS SLAVE TO SETUP FOR XFERS
876 003714 013777 001446 175476 408: MOV TEMP,BCSR
877 003722 032777 001000 175470 BIT #1000,BCSR ;DSTATC HERE SAYS SLAVE
878 ;IS READY TO DO XFERS
879 003730 001774 BEQ 408
880 003732 004537 011340 378: JSR R5,SETVEC ;SET UP INTR RETURN ADRS
881 003736 004172 38 JSR R5,LDBUF ;RETURN TO 38 ON INTR
882 003740 004537 011416 ;GO LOAD 'DBUF' WITH DATA PTRN
883 003744 177740 -32. ;DO 32. LOCATIONS
884 003746 012737 010000 001444 MOV #10000,TIME ;SET UP A TIMER VALUE
885 003754 013777 001456 175432 MOV XPRAM,BMCR ;SET UP WORD COUNT
886 003762 013777 001460 175426 MOV XPRAM+2,BBAR ;SET UP BUFFER ADRS
887 003770 004737 014076 JSR PC,CPULO ;ALLOW THE RDY INTR
888 003774 017737 175420 001446 MOV BCSR,TEMP
889 004002 042737 100000 001446 BIC #BIT15,TEMP
890 004010 052737 000010 001446 BIS #10,TEMP ;SINGLE CYCLE
891 004016 013777 001446 175374 MOV TEMP,BCSR
892 004024 017737 175370 001446 MOV BCSR,TEMP
893 004032 042737 100000 001446 BIC #BIT15,TEMP
894 004040 042737 000002 001446 BIC #2,TEMP
895 004046 013777 001446 175344 MOV TEMP,BCSR
896 004054 013777 001462 175336 28: MOV XPRAM+4,BCSR ;SET UP CONTROL - IE, FNCT 3 & GO,AND CYCLE
897 004062 005337 001444 DEC TIME ;WAIT FOR INTR
898 004066 001375 BNE 28 ;UNTIL 0
899 004070 017737 175324 001126 MOV BCSR,#BD0AT ;READ CSR - SHOULD NEVER GET HERE
900 004076 017737 175316 001446 MOV BCSR,TEMP
901 004104 042737 100000 001446 BIC #BIT15,TEMP
902 004112 042737 000500 001446 BIC #500,TEMP ;DISABLE IE & CYCLE(IF THIS IS
903 ;A DRV118: CYCLE HIGH WILL
904 ;PREVENT BDR FROM BEING READ)
905 004120 013777 001446 175272 MOV TEMP,BCSR
906 004126 022737 000127 001434 CMP #127,BOARD ;IF DR11W:CYCLE WILL BE CLEAR
907 004134 001404 BEQ 458
908 004136 012737 005710 001124 MOV #5710,#GDDAT ;LD EXPECTED - STAT A & C, CYCLE, RDY, IE, FNCT 3
909 ;MUST BE DRV118
910 004144 000403 BR 468
911 004146 012737 005310 001124 458: MOV #5310,#GDDAT ;STAT ACC,RDY,IE, FNCT 3
912 004154 013737 001420 001122 468: MOV CSR,#BDADR ;SET UP CSR ADRS
913 004162 104401 TYPE ,MSG1
914 004166 104003 104000*3
915 004170 000514 BR 68 ;GO RESYNC ON ERROR
  
```

D4

```

916 004172 022626          30:  CMP      (SP), (SP),      ;FIX STACK SINCE NO RTI
917 004174 017737 175220 001126  MOV      @CSR, @BDDAT    ;READ STATUS
918 004202 017737 175212 001446  MOV      @CSR, TEMP
919 004210 042737 100000 001446  BIC      @BIT15, TEMP
920 004216 042737 000500 001446  BIC      @500, TEMP      ;DISABLE IE & CYCLE(CLR CYCLE IF THIS IS A DRV11B)
921 004224 013777 001446 175166  MOV      TEMP, @CSR
922 004232 022737 000127 001434  CMP      @127, BOARD
923 004240 001404          BEQ      31$
924 004242 012737 005710 001124  MOV      @5710, @GDDAT  ;LD EXPECTED - STAT A & C, CYCLE, RDY, IE, FNCT 3
925                                ;MUST BE DRV11B
926 004250 000403          BR       30$
927 004252 012737 005310 001124 31$:  MOV      @5310, @GDDAT
928 004260          30$:
929 004266 023737 001124 001126  CMP      @GDDAT, @BDDAT ;CORRECT?
930 004270 013737 001420 001122  BEQ      4$              ;BR IF SO
931 004276 104401 015776          MOV      CSR, @BDADR    ;SET UP CSR ADRS
932 004302 104004          TYPE    .MSG1
933 004304 000446          104000.4
934 004306 005037 001124          BR       6$              ;GO RESYNC ON ER
935 004312 017737 175076 001126 4$:  CLR      @GDDAT        ;LD EXPECTED WC
936 004320 001407          MOV      @WCR, @BDDAT  ;READ WORD COUNT
937 004322 013737 001414 001122  BEQ      5$              ;BR IF ZERO
938 004330 104401 015776          MOV      WCR, @BDADR   ;SET UP WCR ADRS
939 004334 104005          TYPE    .MSG1
940 004336 000431          104000.5
941 004340 013737 001460 001124 5$:  BR       6$              ;GO RESYNC ON ER
942 004346 013700 001456          MOV      XPRAM+2, @GDDAT ;GET STARTING ADRS OF XFER
943 004352 005400          MOV      XPRAM, RO     ;GET WC
944 004354 006300          NEG      RO            ;GET ACTUAL #
945 004356 060037 001124          ASL      RO            ;CONVERT TO WORD
946 004362 017737 175030 001126  ADD      RO, @GDDAT    ;ADD TO BASE ADRS
947 004370 042737 000001 001126  MOV      @BAR, @BDDAT  ;READ BAR ADRS
948 004376 023737 001124 001126  BIC      @BIT00, @BDDAT ;ELIMINATE LSB
949 004404 001431          CMP      @GDDAT, @BDDAT ;CORRECT?
950 004406 013737 001416 001122  BEQ      8$              ;BR IF SO
951 004414 104401 015776          MOV      BAR, @BDADR   ;SET UP BAR ADRS
952 004420 104006          TYPE    .MSG1
953                                104000.6

```

E3

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955                                     ;ERROR IN MASTER WAIT ON SLAVE FOR ITS STATUS
956
957 004422 012737 010000 001444 6: MOV #10000,TIME ;WAIT FOR SLAVE TO COMPLETE DATA CK
958 004430 005337 001444 7: DEC TIME ;COUNT AWAY
959 004434 001375 BNE 7: ;UNTIL DONE
960 004436 000005 RESET ;TELL SLAVE WE HAVE AN ERROR
961 004440 017737 174754 001450 21: MOV @BCSR,SAVE
962 004446 042737 170777 001450 BIC @170777,SAVE
963 004454 001404 BEQ 24:
964
965 004456 022737 001000 001450 23: CMP #1000,SAVE
966 004464 001365 BNE 21:
967 004466 104412 24: RSYNC ;RSYNC ON ERROR
968
969                                     ;NO ERROR IN MASTER-WAIT ON SLAVE FOR ITS STATUS
970
971 004470 012737 010000 001444 8: MOV #10000,TIME ;WAIT FOR SLAVE TO COMPLETE CKS
972 004476 005337 001444 20: DEC TIME ;COUNT AWAY
973 004502 001375 BNE 20: ;UNTIL DONE
974 004504 112777 000002 174706 MOVB @2,@BCSR ;TELL SLAVE ALL OK
975 004512 017737 174702 001450 9: MOV @BCSR,SAVE ;READ CSR
976 004520 042737 170777 001450 BIC @170777,SAVE ;SAVE 'STAT' BITS
977 004526 001405 BEQ 11: ;WAS THERE AN ERROR?
978 004530 022737 001000 001450 CMP #1000,SAVE ;NO ERROR?
979 004536 001402 BEQ 10:
980 004540 000764 BR 9:
981 004542 104412 11: RSYNC ;RSYNC ON ERROR
982 004544 004737 011360 10: JSR PC,RSTVEC ;GO RESTORE VECTOR
983

```

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985                                     ;BURST MODE TESTING DETERMINATION
986                                     ;*****
987                                     ;DETERMINE IF BURST XFERS AND BURST DATA LATE ARE
988                                     ;BE DONE. TEST WILL BE DONE ONLY IF BOTH MASTER AND SLAVE
989                                     ;ARE BOTH DR11W'S. OTHERWISE ,SLAVE WILL BECOME MASTER
990                                     ;AND MASTER SLAVE AND TESTS 1 THRU 3 WILL BE DONE AGAIN.
991                                     ;*****
992
993
994 004550 012737 001000 001444 MSBRD: MOV @1000,TIME ;WAIT FOR SLAVE
995 004556 005337 001444 1$: DEC TIME
996 004562 001375 BNE 1$
997 004564 013777 001434 174630 MOV BOARD,8BDR ;TELL SLAVE WHAT BOARD
998 ;TYPE MASTER IS
999 004572 004737 013754 JSR PC,GOCPN ;TELL SLAVE TO RESPOND
1000 004576 004737 013666 JSR PC,WTCMPN ;WAIT FOR SLAVE TO EVALUATE
1001 004602 005777 174614 TST 8BDR ;SLAVE RESPONDS AND MASTER CAN
1002 ;FIND OUT IF TEST 4 SHOULD BE DONE
1003 004606 001402 BEQ 2$ ;O SAYS NO
1004 004610 000137 004620 JMP MTST4 ;YES;DO TEST 4
1005 004614 000137 006162 2$: JMP SINIT1 ;
1006
1007
    
```



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1009 .SBTTL * MTST4 BURST MODE WORD XFER-MASTER XMIT 32 WORDS TO SLAVE
1010 .SBTTL (DR11-W TO DR11-W ONLY)
1011 ;*****
1012 ;*****
1013 ;SAME AS TEST 3 EXCEPT BURST MODE:BOARD DOES NOT RELEASE BUS
1014 ;UNTIL WORD COUNT OVERFLOW
1015 ;*****
1016 ;*****
1017 MTST4:
1018 004620 004737 014050 1# : JSR PC,CPUHI ;NO INTR ALLOWED YET
1019 004624 005077 174570 41# : CLR @BCSR
1020 004630 022777 000200 174562 CMP @200,@BCSR ;IS ONLY READY SET
1021 004636 001372 BNE 41#
1022 004640 017737 174554 001446 38# : MOV @BCSR,TEMP
1023 004646 042737 100000 001446 BIC @BIT15,TEMP
1024 004654 052737 000002 001446 BIS @2,TEMP ;SET DSTATC IN SLAVE
1025 ;TELLS SLAVE TO SETUP FOR XFERS
1026 004662 013777 001446 174530 MOV TEMP,@BCSR
1027 004670 032777 001000 174522 40# : BIT @1000,@BCSR ;DSTATC HERE SAYS SLAVE
1028 ;IS READY TO DO XFERS
1029 004676 001774 BEQ 40#
1030 004700 004537 011340 37# : JSR R5,SETVEC ;SET UP INTR RETURN ADRS
1031 004704 005070 3# ;RETURN TO 3# ON INTR
1032 004706 004537 011416 JSR R5,LDBUF ;GO LOAD 'DBUF' WITH DATA PTRN
1033 004712 177740 -32. ;DO 32. LOCATIONS
1034 004714 012737 010000 001444 MOV @10000,TIME ;SET UP A TIMER VALUE
1035 004722 013777 001456 174464 MOV XPRAM,@MCR ;SET UP WORD COUNT
1036 004730 013777 001460 174460 MOV XPRAM+2,@BAR ;SET UP BUFFER ADRS
1037 004736 004737 014076 JSR PC,CPULO ;ALLOW THE RDY INTR
1038 004742 017737 174452 001446 MOV @BCSR,TEMP
1039 004750 042737 100000 001446 BIC @BIT15,TEMP
1040 004756 042737 000002 001446 BIC @2,TEMP
1041 004764 013777 001446 174426 MOV TEMP,@BCSR
1042 004772 012777 000501 174420 MOV @501,@BCSR ;SET UP CONTROL - IE, GO,AND CYCLE
1043 005000 005337 001444 2# : DEC TIME ;WAIT FOR INTR
1044 005004 001375 BNE 2# ;UNTIL 0
1045 005006 017737 174406 001126 MOV @BCSR,@BDDAT ;READ CSR - SHOULD NEVER GET HERE
1046 005014 017737 174400 001446 MOV @BCSR,TEMP
1047 005022 042737 100000 001446 BIC @BIT15,TEMP
1048 005030 042737 000100 001446 BIC @100,TEMP ;DISABLE IE
1049 005036 013777 001446 174354 MOV TEMP,@BCSR
1050 005044 012737 001300 001124 45# : MOV @1300,@GDDAT ;STAT C.RDY,IE
1051 005052 013737 001420 001122 46# : MOV CSR,@BDADR ;SET UP CSR ADRS
1052 005060 104401 016030 TYPE ,MSG2
1053 005064 104003 104000*3
1054 005066 000504 BR 6# ;GO RESYNC ON ERROR
1055 005070 022626 3# : CMP (SP)+,(SP)+ ;FIX STACK SINCE NO RTI
1056 005072 017737 174322 001126 MOV @BCSR,@BDDAT ;READ STATUS
1057 005100 017737 174314 001446 MOV @BCSR,TEMP
1058 005106 042737 100000 001446 BIC @BIT15,TEMP
1059 005114 042737 000100 001446 BIC @100,TEMP ;DISABLE IE
1060 005122 013777 001446 174270 MOV TEMP,@BCSR
1061 005130 012737 001300 001124 31# : MOV @1300,@GDDAT
1062 005136 023737 001124 001126 30# : CMP @GDDAT,@BDDAT ;CORRECT?
1063 005144 001407 BEQ 4# ;BR IF SO
1064 005146 013737 001420 001122 MOV CSR,@BDADR ;SET UP CSR ADRS

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1065 005154 104401 016030          TYPE      ,MSG2
1066 005160 104004          104000.4
1067 005162 000446          BR        6$          ;GO RESYNC ON ER
1068 005164 005037 001124      4$:      CLR      $GDDAT      ;LD EXPECTED WC
1069 005170 017737 174220 001126      MOV      @WCR,$BDDAT    ;READ WORD COUNT
1070 005176 001407          BEQ      5$          ;BR IF ZERO
1071 005200 013737 001414 001122      MOV      WCR,$BDADR    ;SET UP WCR ADRS
1072 005206 104401 016030          TYPE      ,MSG2
1073 005212 104005          104000.5
1074 005214 000431          BR        6$          ;GO RESYNC ON ER
1075 005216 013737 001460 001124      5$:      MOV      XPRAM+2,$GDDAT ;GET STARTING ADRS OF XFER
1076 005224 013700 001456          MOV      XPRAM,RO      ;GET WC
1077 005230 005400          NEG      RO           ;GET ACTUAL #
1078 005232 006300          ASL      RO           ;CONVERT TO WORD
1079 005234 060037 001124          ADD      RO,$GDDAT    ;ADD TO BASE ADRS
1080 005240 017737 174152 001126      MOV      @BAR,$BDDAT   ;READ BAR ADRS
1081 005246 042737 000001 001126      BIC      @BIT00,$BDDAT ;ELIMINATE LSB
1082 005254 023737 001124 001126      CMP      $GDDAT,$BDDAT ;CORRECT?
1083 005262 001446          BEQ      8$          ;BR IF SO
1084 005264 013737 001416 001122      MOV      BAR,$BDADR   ;SET UP BAR ADRS
1085 005272 104401 016030          TYPE      ,MSG2
1086 005276 104006          104000.6
1087
1088
1089
1090          ;ERROR IN MASTER-WAIT ON SLAVE FOR ITS STATUS
1091
1092 005300 012737 010000 001444      6$:      MOV      @10000,TIME    ;WAIT FOR SLAVE TO COMPLETE DATA CK
1093 005306 005337 001444          7$:      DEC      TIME          ;COUNT AWAY
1094 005312 001375          BNE      7$          ;UNTIL DONE
1095 005314 000005          RESET
1096 005316 012777 000010 174074      MOV      @10,@CSR     ;IF ERROR THAN INIT
1097          ;TELL SLAVE WE HAVE AN ERROR
1098
1099          ;THIS SECTION MODIFIED FOR STATUS LINE SKEW
1100 005324          21$:
1101 005324 017737 174070 001450      MOV      @CSR,SAVE    ; READ STATUS
1102 005332 042737 170777 001450      BIC      @170777,SAVE ; CLEAR DON'T CARES
1103 005340 001771          BEQ      21$          ; LOOP IF COMPANION NOT READY YET
1104 005342 017737 174052 001450      MOV      @CSR,SAVE    ; RE-READ STATUS
1105 005350 042737 170777 001450      BIC      @170777,SAVE ; CLEAR DON'T CARES
1106 005356 022737 005000 001450      CMP      @5000,SAVE   ; CHECK FOR GOOD STATUS
1107 005364 001404          BEQ      24$          ; IF EQ THEN RESYNC
1108 005366          23$:
1109 005366 022737 004000 001450      CMP      @4000,SAVE   ; ELSE CHECK FOR COMPANION ERROR
1110 005374 001353          BNE      21$          ; IF NE THEN COMPANION STILL NOT READY
1111 005376          24$:
1112 005376 104412          RSYNC              ;RSYNC ON ERROR
1113
1114          ;NO ERROR IN MASTER-WAIT ON SLAVE FOR ITS STATUS
1115
1116 005400 012737 010000 001444      8$:      MOV      @10000,TIME    ;WAIT FOR SLAVE TO COMPLETE CKS
1117 005406 005337 001444          20$:      DEC      TIME          ;COUNT AWAY
1118 005412 001375          BNE      20$          ;UNTIL DONE
1119 005414 012777 000012 173776      MOV      @12,@CSR     ;TELL SLAVE ALL OK
1120
1121          ;THIS SECTION MODIFIED FOR STATUS LINE SKEW

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1122 005422          9$:
1123 005422 017737 173772 001450      MOV      @CSR,SAVE      ; READ CSR
1124 005430 042737 170777 001450      BIC      @170777,SAVE  ; SAVE 'STAT' BITS
1125 005436 001771          9$        BEQ          ; IF COMPANION NOT READY THEN LOOP
1126
1127 005440 017737 173754 001450      MOV      @CSR,SAVE      ; RE-READ STATUS
1128 005446 042737 170777 001450      BIC      @170777,SAVE  ; CLEAR DON'T CARES
1129 005454 022737 005000 001450      CMP      @5000,SAVE    ; CHECK FOR COMPANION OK
1130 005462 001405          10$       BEQ          ; IF SLAVE OK THEN CONTINUE
1131
1132 005464 022737 004000 001450      CMP      @4000,SAVE    ; ELSE CHECK FOR COMPANION ERROR
1133 005472 001353          9$        BNE          ; IF NE THEN COMPANION STILL NOT READY
1134 005474          11$:
1135 005474 104412          RSYNC          ;RSYNC ON ERROR
1136 005476          10$:
1137 005476 004737 011360      JSR      PC,RSTVEC    ;GO RESTORE VECTOR

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1139 .SBTTL * MTSTS BURST DATA LATE TEST-MASTER XMIT5 5 WORDS TO SLAVE
1140 .SBTTL WHILE SLAVE RECEIVES 5 AND TIMES OUT (DR11-W TO DR11-W ONLY)
1141
1142 ;*****
1143 ;*****
1144 ;PROCEDURE: MASTER XMIT5 5 WORDS TO SLAVE IN BURST MODE
1145 ;SLAVE IS SETUP TO DO 10 XFERS. CHECK THAT MASTER INTERRUPTS
1146 ;BY WCOF. AFTER 5 XFERS ARE DONE IN
1147 ;SLAVE, TIMEOUT OCCURS, SINCE SLAVE WAITS FOR GO-AHEAD
1148 ;FROM MASTER TO CONTINUE, BUT MASTER NEVER RESPONDS. IN
1149 ;SLAVE: CHECK THAT 5 XFERS HAVE BEEN COMPLETED.
1150 ;*****
1151 ;*****
1152 MTSTS:
1153 005502 004737 014050 18: JSR PC, CPUHI ;NO INTR ALLOWED YET
1154 005506 005077 173706 41: CLR BCSR
1155 005512 022777 000200 173700 CMP #200, BCSR ;IS ONLY READY SET
1156 005520 001372 BNE 41:
1157 005522 017737 173672 001446 38: MOV BCSR, TEMP
1158 005530 042737 100000 001446 BIC #BIT15, TEMP
1159 005536 052737 000002 001446 BIS #2, TEMP ;SET DSTATC IN SLAVE
1160 ; TELLS SLAVE TO SETUP FOR XFERS
1161 005544 013777 001446 173646 MOV TEMP, BCSR
1162 005552 032777 001000 173640 40: BIT #1000, BCSR ;DSTATC HERE SAYS SLAVE
1163 ; IS READY TO DO XFERS
1164 005560 001774 BEQ 40:
1165 005562 004537 011340 37: JSR R5, SETVEC ;SET UP INTR RETURN ADRS
1166 005566 005722 3: ;RETURN TO 3: ON INTR
1167 005570 004537 011416 JSR R5, LDBUF ;GO LOAD 'DBUF' WITH DATA PTRN
1168 005574 177740 -32: ;DO 32. LOCATIONS
1169 005576 012737 010000 001444 MOV #10000, TIME ;SET UP A TIMER VALUE
1170 005604 013777 001472 173602 MOV XMITMO, BCSR ;SET UP WORD COUNT
1171 005612 013777 001474 173576 MOV XMITMO+2, BBAR ;SET UP BUFFER ADRS
1172 005620 004737 014076 JSR PC, CPULO ;ALLOW THE RDY INTR
1173 005624 013777 001476 173566 MOV XMITMO+4, BCSR ;SET UP CONTROL - IE, GO, AND CYCLE
1174
1175 005632 005337 001444 2: DEC TIME ;WAIT FOR INTR
1176 005636 001375 BNE 2: ;UNTIL 0
1177 005640 017737 173554 001126 MOV BCSR, #BDDAT ;READ CSR - SHOULD NEVER GET HERE
1178 005646 017737 173546 001446 MOV BCSR, TEMP
1179 005654 042737 100000 001446 BIC #BIT15, TEMP
1180 005662 042737 000100 001446 BIC #100, TEMP ;DISABLE IE
1181 005670 013777 001446 173522 MOV TEMP, BCSR
1182 005676 012737 001300 001124 MOV #1300, #GDDAT ;LD EXPECTED STAT C , RDY, IE
1183 005704 013737 001420 001122 MOV CSR, #BDADR ;SET UP CSR ADRS
1184 005712 104401 016062 TYPE ,MSG3
1185 005716 104003 104000+3
1186 005720 000430 BR 6: ;GO RESYNC ON ERROR
1187 005722 022626 3: CMP (SP)+, (SP)+ ;FIX STACK SINCE NO RTI
1188 005724 017737 173470 001446 MOV BCSR, TEMP
1189 005732 042737 100000 001446 BIC #BIT15, TEMP
1190 005740 042737 000100 001446 BIC #100, TEMP ;DISABLE IE
1191 005746 013777 001446 173444 MOV TEMP, BCSR
1192 005754 017737 173434 001126 MOV BCSR, #BDDAT ;READ WORD COUNT
1193 005762 001441 BEQ 9: ;BR IF ZERO
1194 005764 013737 001414 001122 MOV WCR, #BDADR ;SET UP WCR ADRS
1195

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```

1196 005772 104401 016062          TYPE      ,MSG3
1197 005776 104005          104000*5
1198 006000 000400          BR        6$          ;GO RESYNC ON ER
1199
1200
1201
1202          ;ERROR IN MASTER-WAIT FOR SLAVE STATUS
1203
1204 006002 000005          6$:  RESET
1205 006004 012777 000010 173406  MOV      #10,BCSR          ;TELL SLAVE WE HAVE AN ERROR
1206
1207          ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1208 006012          21$:
1209 006012 017737 173402 001450  MOV      @BCSR,SAVE          ; READ STATUS
1210 006020 042737 170777 001450  BIC      #170777,SAVE          ; CLEAR DON'T CARES
1211 006026 001771          BEQ      21$          ; IF COMPANION NOT READY THEN LOOP
1212
1213 006030 017737 173304 001450  MOV      @BCSR,SAVE          ; RE-READ STATUS
1214 006036 042737 170777 001450  BIC      #170777,SAVE          ; CLEAR DON'T CARES
1215 006044 022737 005000 001450  CMP      #5000,SAVE          ; CHECK FOR COMPANION OK
1216 006052 001404          BEQ      24$          ; IF EQ THEN RESYNC
1217 006054          23$:
1218 006054 022737 004000 001450  CMP      #4000,SAVE          ; CHECK FOR COMPANION ERROR
1219 006062 001353          BNE      21$          ; IF NE THEN COMPANION STILL NOT READY
1220 006064          24$:
1221 006064 104412          RSYNC          ;RSYNC ON ERROR
1222
1223
1224
1225          ;NO ERROR IN MASTER-WAIT FOR SLAVE STATUS
1226
1227          ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1228 006066          9$:
1229 006066 017737 173326 001450  MOV      @BCSR,SAVE          ; READ CSR
1230 006074 042737 170777 001450  BIC      #170777,SAVE          ; SAVE 'STAT' BITS
1231 006102 001771          BEQ      9$          ; IF COMPANION NOT READY THEN LOOP
1232
1233 006104 017737 173310 001450  MOV      @BCSR,SAVE          ; RE-READ STATUS
1234 006112 042737 170777 001450  BIC      #170777,SAVE          ; CLEAR DON'T CARES
1235 006120 022737 005000 001450  CMP      #5000,SAVE          ; CHECK FOR COMPANION OK
1236 006126 001410          BEQ      10$          ; IF SLAVE OK THEN CONTINUE
1237
1238 006130 022737 004000 001450  CMP      #4000,SAVE          ; ELSE CHECK FOR COMPANION ERROR
1239 006136 001353          BNE      9$          ; IF NE THEN COMPANION STILL NOT READY
1240
1241 006140 012777 000010 173252  MOV      #10,BCSR          ; REPORT ERROR STATUS TO SLAVE
1242 006146 104412          RSYNC          ; RSYNC ON ERROR
1243 006150          10$:
1244 006150 012777 000012 173242  MOV      #12,BCSR          ; TELL SLAVE ALL OK
1245 006156 004737 011360          JSR      PC,RSTVEC          ; GO RESTORE VECTOR

```

```

1248
1249
1250
1251
1252
1253
1254
1255 006162 032777 020000 173230
1256 006170 001425
1257 006172 104401 006200
      006176 000421
      006242
1258 006242 000000
1259 006244 004737 014050
1260 006250 012706 001100
1261 006254 005077 173140
1262 006260 032777 001000 173132
1263 006266 001404
1264 006270 032777 001000 173122
1265 006276 001374
1266 006300 004737 013754
1267 006304 032777 001000 173106
1268 006312 001774
1269 006314 000137 006330

      .SBTTL
      .SBTTL          SLAVE TESTS
      .SBTTL

      ;SLAVE PROTOCOL INIT-TEST1
      ;*****
SINIT1: BIT      @BIT13,@CSR
      BEQ      1#
      TYPE     .65#           ;;TYPE ASCIZ STRING
      BR       64#           ;;GET OVER THE ASCIZ
      ;;65# : .ASCIZ <CRLF>/CABLE IS NOT INSERTED - HALTING /
      64# :
      HALT
      1# : JSR      PC,CPUHI
      MOV      @STACK,SP
      CLR      @CSR
      BIT      @1000,@CSR           ;WHAT IS DSTATC
      BEQ      3#           ;IF CLR-BRANCH AND WAIT FOR MASTER
      BIT      @1000,@CSR           ;IF NOT, WAIT FOR CLEAR
      BNE     2#
      2# : JSR      PC,GOCPN
      3# :
      4# : BIT      @1000,@CSR           ;HAS MASTER SET DSTATC IN SLAVE?
      BEQ      4#           ;NOT YET
      JMP     SL1STR

```

```

1271 .SBTTL * STST1 RECEIVE MASTER'S DBR DATA AND SEND IT BACK VIA DBR
1272 ;*****
1273 ;*****
1274 ;NOW THIS COMPUTER BECOMES THE SLAVE AND ECHOS MASTER'S DBR DATA
1275 ;SLAVE COMPUTER STARTS HERE FROM PROGRAM START 204
1276 ;*****
1277 ;*****
1278 ;*****
1279
1280 006320 004737 013754 STST1: JSR PC,GOCMPN ;TELL MASTER WE ARE READY
1281 006324 004737 013666 JSR PC,WTCMPN ;DATA AVAILABLE?
1282 ;WAIT ON IT
1283 006330 017737 173066 001450 SL1STR: MOV @BDR,SAVE ;GET DATA
1284 006336 022737 177001 001450 CMP @177001,SAVE ;TEST TERMINATOR?
1285 006344 001412 BEQ 4$ ;BR IF SO
1286 006346 013777 001450 173046 MOV SAVE,@BDR ;SEND IT BACK
1287 006354 012737 001000 001444 MOV @1000,TIME ;DELAY BEFORE CALLING MASTER
1288 006362 005337 001444 5$: DEC TIME
1289 006366 001375 BNE 5$
1290 006370 000753 BR STST1 ;GO LOOK FOR MORE DATA
1291 006372 000240 4$: NOP ;

```

```

1293 .SBTTL * TEST THAT SLAVE INTERR PTS MASTER:F2 TO ATTN
1294 ;SLAVE PROTOCOL INIT-TEST2
1295 ;:*****
1296 006374 SINIT2:
1297
1298 006374 005077 173020 CLR @CSR ;CLR DSTATC OF MASTER
1299 006400 004737 013666 JSR PC,WTCMPN
1300 006404 017737 173010 001446 MOV @CSR,TEMP
1301 006412 042737 100000 001446 BIC @BIT15,TEMP
1302 006420 052737 000004 001446 BIS #4,TEMP ;SET INTERRUPT MASTER
1303 006426 013777 001446 172764 MOV TEMP,@CSR
1304 006434 017737 172760 001446 MOV @CSR,TEMP
1305 006442 042737 100000 001446 BIC @BIT15,TEMP
1306 006450 042737 000004 001446 BIC #4,TEMP ;CLR F2
1307 006456 013777 001446 172734 MOV TEMP,@CSR
1308 006464 012737 010000 001444 MOV #10000,TIME
1309 006472 032777 001000 172720 2+: BIT #1000,@CSR ;WAIT DSTATC SLAVE TO CLEAR
1310 006500 001404 BEQ STST2
1311 006502 005337 001444 DEC TIME
1312 006506 001371 BNE 2+
1313 006510 104412 RSYNC

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H4.

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1315 .SBTTL * STST2 RECEIVE MASTER'S 'STAT' BITS AND SEND IT BACK VIA 'FNC' BITS
1316 ;*****
1317 ;*****
1318 ;RECEIVE 'STAT' BITS AND CONVERT TO 'FNC' BITS AND WRITE TO CSR
1319 ;*****
1320 ;*****
1321 006512 STST2:
1322 006512 004737 013666 48: JSR PC,WTCMPN ;WAIT FOR MASTER
1323 006516 012737 001000 001444 MOV #1000,TIME ;DELAY
1324 006524 005337 001444 58: DEC TIME
1325 006530 001375 BNE 58
1326 006532 022777 177002 172662 28: CMP #177002,BBDR ;TEST TERMINATOR?
1327 006540 001412 BEQ 38 ;BR IF SO
1328 006542 017737 172652 001450 MOV BCSR,SAVE ;READ THE CSR
1329 006550 042737 170777 001450 BIC #170777,SAVE ;SAVE ONLY THE STAT BITS
1330 006556 113777 001451 172634 MOVB SAVE+1,BCSR ;ECHO WITH FNC: BITS
1331 006564 000752 BR 48 ;LOOK FOR NEXT 'STAT' CODE
1332 006566 004737 013754 38: JSR PC,GOCPN ;TELL MASTER TO CONTINUE
1333

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1335      .SBTTL * STS3 BLOCK MODE WORD XFER TEST SLAVE RECEIVES 32
1336      .SBTTL  WORDS FROM MASTER
1337      ;*****
1338      ;*****
1339      ;THIS TEST SETS UP TO RECEIVE A 32 WORD BLOCK OF DATA FROM THE MASTER
1340      ;THEN CHECKS FOR PROPER INTERRUPT STATUS, WC, BA & DATA
1341      ;IF AN ERROR IS DETECTED THE SLAVE TELLS THE MASTER, REPORTS THE
1342      ;ERROR, AND RESYNCS ON PROGRAM
1343      ;*****
1344      ;*****
1345      STS3:
1346      18:   JSR    PC,CPUMI      ;NO INTRs ALLOWED YET
1347      006572 004737 014050      MOV    #1000,TIME
1348      006576 012737 001000 001444 40:   DEC    TIME
1349      006604 005337 001444      BNE   40:
1350      006612 005077 172602      41:   CLR    BCSR
1351      006616 022777 001200 172574 41:   CMP    #1200,BCSR ;ONLY DSTATC AND READY SET
1352      006624 001372      BNE   41:
1353      006626 004537 011340      39:   JSR    R5,SETVEC ;SET UP THE INTR RETURN ADRS
1354      006632 007016 3:   JSR    R5,CLBUF ;RETURN TO 3: ON DATA INTR
1355      006634 004537 011400      JSR    R5,CLBUF ;GO CLR 'DBUF'
1356      006640 177740      -32. ;DO 32. LOCATIONS
1357      006642 012737 010000 001444  MOV    #10000,TIME ;SET UP A TIMER VALUE
1358      006650 013777 001464 172536  MOV    RPRAM,BMCR ;SET UP WORD COUNT
1359      006656 013777 001466 172532  MOV    RPRAM+2,BBAR ;SET UP BUFFER ADRS
1360      006664 004737 014076      JSR    PC,CPULO ;ALLOW THE INTR
1361      006670 017737 172524 001446  MOV    BCSR,TEMP
1362      006676 042737 100000 001446  BIC   #BIT15,TEMP
1363      006704 052737 000012 001446  BIS   #12,TEMP ;FNCT 3&1
1364      006712 013777 001446 172500  MOV    TEMP,BCSR
1365      006720 013777 001470 172472  MOV    RPRAM+4,BCSR ;SET UP CONTROL - FNCT 3 & 1, IE & GO
1366      006726 005337 001444      2:   DEC    TIME ;WAIT FOR INTR
1367      006732 001375      BNE   2: ;UNTIL ZERO
1368      006734 017737 172460 001126  MOV    BCSR,#BDDAT ;READ CSR - SHOULD NEVER GET HERE
1369      006742 017737 172452 001446  MOV    BCSR,TEMP
1370      006750 042737 100000 001446  BIC   #BIT15,TEMP
1371      006756 042737 000100 001446  BIC   #100,TEMP ;DISABLE IE
1372      006764 013777 001446 172426  MOV    TEMP,BCSR
1373      006772 012737 004312 001124  MOV    #4312,#GDDAT ;LD EXPECTED - STAT A, RDY, IE & FNCT 3 & 1
1374      007000 013737 001420 001122  MOV    CSR,#BDADR ;SET UP CSR ADRS
1375
1376      007006 104401 015776      TYPE  .MSG1
1377      007012 104007      104000.7
1378      007014 000540      BR    10:
1379      007016 022626      3:   CMP    (SP), (SP) ;GO RESYNC ON ER
1380      007020 017737 172374 001126  MOV    BCSR,#BDDAT ;IX STACK SINCE NO RETURN
1381      007026 017737 172366 001446  MOV    BCSR,TEMP ;READ STATUS
1382      007034 042737 000100 001446  BIC   #100,TEMP ;DISABLE IE
1383      007042 042737 100000 001446  BIC   #BIT15,TEMP
1384      007050 013777 001446 172342  MOV    TEMP,BCSR
1385      007056 012737 004312 001124  MOV    #4312,#GDDAT ;LD EXPECTED - STAT A, RDY, IE & FNCT 3 & 1
1386      007064 023737 001124 001126  CMP    #GDDAT,#BDDAT ;CORRECT?
1387      007072 001407      BEQ   4: ;BR IF SO
1388      007074 013737 001420 001122  MOV    CSR,#BDADR ;SET UP CSR ADRS
1389
1390      007102 104401 015776      TYPE  .MSG1
1391      007106 104010      104000.10
    
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D4

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1392 007110 000502          BR      10#          ;GO RESYNC ON ERROR
1393 007112 005037 001124 4# :    CLR      $GDDAT      ;LD EXPECTED WC
1394 007116 017737 172272 001126   MOV     @WCR, $BDDAT  ;READ WCR
1395 007124 001407          BEQ     5#          ;BR IF SO
1396 007126 013737 001414 001122   MOV     WCR, $BDADR  ;SET UP WCR ADRS
1397
1398 007134 104401 015776          TYPE   ,MSG1
1399 007140 104011          104000.11
1400 007142 000465          BR      10#          ;GO RESYNC ON ERROR
1401 007144 013737 001466 001124 5# :    MOV     RPRAM+2, $GDDAT ;GET STARTING ADRS OF XFER
1402 007152 013700 001464          MOV     RPRAM, R0    ;GET WC
1403 007156 005400          NEG     R0           ;GET ACTUAL #
1404 007160 006300          ASL     R0           ;CONVERT TO WORD
1405 007162 060037 001124          ADD     R0, $GDDAT   ;ADD TO BASE ADRS
1406 007166 017737 172224 001126   MOV     @BAR, $BDDAT ;READ BAR ADRS
1407 007174 042737 000001 001126   BIC     @BIT00, $BDDAT ;ELIMINATE LSB
1408 007202 023737 001124 001126   CMP     $GDDAT, $BDDAT ;CORRECT?
1409 007210 001407          BEQ     6#          ;BR IF SO
1410 007212 013737 001416 001122   MOV     BAR, $BDADR  ;SET UP BAR ADRS
1411
1412 007220 104401 015776          TYPE   ,MSG1
1413 007224 104012          104000.12
1414 007226 000433          BR      10#          ;GO RESYNC ON ERROR
1415 007230 013700 001466 6# :    MOV     RPRAM+2, R0   ;GET BUFFER ADRS
1416 007234 013701 001464          MOV     RPRAM, R1   ;GET WORD COUNT
1417 007240 012702 177776 7# :    MOV     @177776, R2  ;GET 1ST DATA PTRN (FLOATING 0)
1418 007244 005003          CLR     R3           ;R3 SAYS WHEN TO SHIFT PTRN
1419 007246 020220 8# :    CMP     R2, (R0)    ;COMPARE DATA IN DBUF TO EXPECTED
1420 007250 001011          BNE     9#          ;BR IF DATA ERROR
1421 007252 005201          INC     R1           ;COUNT THE WORD COUNT
1422 007254 001435          BEQ     13#         ;BR IF DATA CHECKS DONE
1423 007256 005102          COM     R2           ;CONVERT PTRN TO FLOATING 1
1424 007260 005103          COM     R3           ;TIME TO SHIFT?
1425 007262 001371          BNE     8#          ;BR IF NOT - GO CK NEXT
1426 007264 006302          ASL     R2           ;FLOAT PTRN LEFT
1427 007266 005202          INC     R2           ;KEEP LSB SET
1428 007270 103363          BCC     7#          ;GO RESET FLOATING PTRN
1429 007272 000765          BR      8#          ;GO CHECK NEXT
1430 007274 014037 001126 9# :    MOV     -(R0), $BDDAT ;GET BAD DATA
1431 007300 010037 001122          MOV     R0, $BDADR  ;GET MEM ADRS OF DATA ER
1432 007304 010237 001124          MOV     R2, $GDDAT  ;LD EXPECTED DATA
1433
1434 007310 104401 015776          TYPE   ,MSG1
1435 007314 104013          104000.13
    
```

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1437                                     ;ERROR IN SLAVE-WAIT FOR MASTER STATUS
1438
1439 007316 000005                       10#: RESET                               ;TELL MASTER WE HAVE ERROR
1440
1441 007320 017737 172074 001450 15#: MOV      @CSR,SAVE           ;LOOP ON ERROR
1442 007326 042737 170777 001450      BIC      @170777,SAVE       ;BUT WAIT FOR MASTER
1443 007334 001404                        BEQ      24#
1444 007336 022737 001000 001450 16#: CMP      @1000,SAVE
1445 007344 001365                        BNE      15#
1446 007346 104412                        24#: RSYNC                               ;RSYNC ON ERROR
1447
1448
1449
1450                                     ;NO ERROR IN SLAVE-WAIT FOR MASTER STATUS
1451
1452 007350 112777 000002 172042 13#: MOVB     @2,@CSR           ;TELL MASTER ALL OK
1453 007356 017737 172036 001450 14#: MOV      @CSR,SAVE           ;READ CSR
1454 007364 042737 170777 001450      BIC      @170777,SAVE       ;SAVE 'STAT' BITS ONL.Y
1455 007372 001405                        BEQ      31#                 ;IS ER IN MASTER?
1456 007374 022737 001000 001450      CMP      @1000,SAVE         ;MASTER OK?
1457 007402 001402                        BEQ      30#
1458 007404 000764                        BR       14#
1459 007406 104412                        31#: RSYNC                               ;RSYNC ON ERROR
1460 007410 004737 011360 30#: JSR      PC,RSTVEC         ;GO RESTORE VECTOR
1461
1462
1463

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```

1465                                     ;BURST MODE WORD XFER TEST DETERMINATION
1466                                     ;*****
1467                                     ;DETERMINE IF BURST XFERS AND BURST DATA LATE ARE TO BE
1468                                     ;DONE
1469                                     ;*****
1470
1471 007414 004737 013666                JSR      PC,WICMPN      ;WAIT FOR MASTER TO INDICATE
1472                                     ;WHAT BOARD TYPE IT IS
1473 007420 012737 001000 001444  SLBRD: MOV      @1000,TIME    ;WAIT ON MASTER
1474 007426 005337 001444 1$: DEC      TIME
1475 007432 001375                BNE      1$
1476 007434 013737 001434 001442      MOV      BOARD,TOTAL  ;DETERMINE IF BOTH MASTER
1477                                     ;AND SLAVE ARE DR11W'S
1478 007442 067737 171754 001442      ADD      @BDR,TOTAL
1479 007450 023727 001442 000256      CMP      TOTAL,@256
1480 007456 001406                BEQ      2$           ;DO BURST MODE
1481
1482
1483 007460 005077 171736                CLR      @BDR
1484 007464 004737 013754                JSR      PC,GOCPN
1485 007470 000137 011156                JMP      SLVFIN      ;NO BURST MODE
1486 007474 012777 000001 171720 2$: MOV      @1,@BDR
1487 007502 004737 013754                JSR      PC,GOCPN
1488

```

```

1490 .SBTTL * STST4 BURST MODE WORD XFER TEST-SLAVE RECEIVES 32
1491 .SBTTL WORDS FROM MASTER(DR11-W TO DR11-W ONLY)
1492 ;*****
1493 ;*****
1494 ;THIS TEST SETS UP TO RECEIVE A 32 WORD BLOCK OF DATA FROM THE MASTER
1495 ;SAME AS TEST 3 EXCEPT BURST MODE
1496 ;*****
1497 ;*****
1498 STST4:
1499 007506 004737 014050 18: JSR PC,CPUL0 ;NO INTRs ALLOWED YET
1500 007512 012737 001000 001444 MOV #1000,TIME
1501 007520 005337 001444 40: DEC TIME
1502 007524 001375 BNE 40:
1503 007526 005077 171666 41: CLR BCSR
1504 007532 022777 001200 171660 CMP #1200,BCSR ;ONLY DSTATC AND READY SET
1505 007540 001372 BNE 41:
1506 007542 004537 011340 39: JSR R5,SETVEC ;SET UP THE INTR RETURN ADRS
1507 007546 007732 3: ;RETURN TO 3: ON DATO INTR
1508 007550 004537 011400 JSR R5,CLRBUF ;GO CLR 'DBUF'
1509 007554 177740 -32. ;DO 32. LOCATIONS
1510 007556 012737 010000 001444 MOV #10000,TIME ;SET UP A TIMER VALUE
1511 007564 013777 001464 171622 MOV RPRAM,BWCR ;SET UP WORD COUNT
1512 007572 013777 001466 171616 MOV RPRAM+2,GBAR ;SET UP BUFFER ADRS
1513 007600 004737 014076 JSR PC,CPULO ;ALLOW THE INTR
1514 007604 017737 171610 001446 MOV BCSR,TEMP
1515 007612 042737 100000 001446 BIC #BIT15,TEMP
1516 007620 052737 000002 001446 BIS #2,TEMP ;FNCT 1
1517 007626 013777 001446 171564 MOV TEMP,BCSR
1518 007634 012777 000103 171556 MOV #103,BCSR ;SET UP CONTROL - FNCT 1, IE & GO
1519 007642 005337 001444 2: DEC TIME ;WAIT FOR INTR
1520 007646 001375 BNE 2: ;UNTIL ZERO
1521 007650 017737 171544 001126 MOV BCSR,#BDDAT ;READ CSR - SHOULD NEVER GET HERE
1522 007656 017737 171536 001446 MOV BCSR,TEMP
1523 007664 042737 100000 001446 BIC #BIT15,TEMP
1524 007672 042737 000100 001446 BIC #100,TEMP ;DISABLE IE
1525 007700 013777 001446 171512 MOV TEMP,BCSR
1526 007706 012737 000302 001124 MOV #302,#GDDAT ;LD EXPECTED - RDY, IE & FNCT 1
1527 007714 013737 001420 001122 MOV CSR,#BDADR ;SET UP CSR ADRS
1528
1529 007722 104401 016030 TYPE ,MSG2
1530 007726 104007 104000.7
1531 007730 000540 BR 10: ;GO RESYNC ON ER
1532 007732 022626 3: CMP (SP), (SP) ;FIX STACK SINCE NO RETURN
1533 007734 017737 171460 001126 MOV BCSR,#BDDAT ;READ STATUS
1534 007742 017737 171452 001446 MOV BCSR,TEMP
1535 007750 042737 100000 001446 BIC #BIT15,TEMP
1536 007756 042737 000100 001446 BIC #100,TEMP ;DISABLE IE
1537 007764 013777 001446 171426 MOV TEMP,BCSR
1538 007772 012737 000302 001124 MOV #302,#GDDAT ;LD EXPECTED - RDY, IE & FNCT 1
1539 010000 023737 001124 001126 CMP #GDDAT,#BDDAT ;CORRECT?
1540 010006 001407 BEQ 4: ;BR IF SO
1541 010010 013737 001420 001122 MOV CSR,#BDADR ;SET UP CSR ADRS
1542
1543 010016 104401 016030 TYPE ,MSG2
1544 010022 104010 104000.10
1545 010024 000502 BR 10: ;GO RESYNC ON ERROR
1546 010026 005037 001124 4: CLR #GDDAT ;LD EXPECTED WC

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1547	010032	017737	171356	001126		MOV	WCR,#BDDAT	;READ WCR
1548	010040	001407				BEQ	5#	;BR IF SO
1549	010042	013737	001414	001122		MOV	WCR,#BDADR	;SET UP WCR ADRS
1550								
1551	010050	104401	016030			TYPE	,MSG2	
1552	010054	104011			104000.11			
1553	010056	000465				BR	10#	;GO RESYNC ON ERROR
1554	010060	013737	001466	001124	5#:	MOV	RPRAM.2,#GDDAT	;GET STARTING ADRS CF XFER
1555	010066	013700	001464			MOV	RPRAM,R0	;GET WC
1556	010072	005400				NEG	R0	;GET ACTUAL #
1557	010074	006300				ASL	R0	;CONVERT TO WORD
1558	010076	060037	001124			ADD	R0,#GDDAT	;ADD TO BASE ADRS
1559	010102	017737	171310	001126		MOV	BAR,#BDDAT	;READ BAR ADRS
1560	010110	042737	000001	001126		BIC	#BIT00,#BDDAT	;ELIMINATE LSB
1561	010116	023737	001124	001126		CMF	#GDDAT,#BDDAT	;CORRECT?
1562	010124	001407				BEQ	6#	;BR IF SO
1563	010126	013737	001416	001122		MOV	BAR,#BDADR	;SET UP BAR ADRS
1564								
1565	010134	104401	016030			TYPE	,MSG2	
1566	010140	104012			104000.12			
1567	010142	000433				BR	10#	;GO RESYNC ON ERROR
1568	010144	013700	001466		6#:	MOV	RPRAM.2,R0	;GET BUFFER ADRS
1569	010150	013701	001464			MOV	RPRAM,R1	;GET WORD COUNT
1570	010154	012702	177776		7#:	MOV	#177776,R2	;GET 1ST DATA PTRN (FLOATING 0)
1571	010160	005003				CLR	R3	;R3 SAYS WHEN TO SHIFT PTRN
1572	010162	020220			8#:	CMF	R2,(R0),	;COMPARE DATA IN DBUF TO EXPECTED
1573	010164	001011				BNE	9#	;BR IF DATA ERROR
1574	010166	005201				INC	R1	;COUNT THE WORD COUNT
1575	010170	001452				BEQ	13#	;BR IF DATA CHECKS DONE
1576	010172	005102				COM	R2	;CONVERT PTRN TO FLOATING 1
1577	010174	005103				COM	R3	;TIME TO SHIFT?
1578	010176	001371				BNE	8#	;BR IF NOT - GO CK NEXT
1579	010200	006302				ASL	R2	;FLOAT PTRN LEFT
1580	010202	005202				INC	R2	;KEEP LSB SET
1581	010204	103363				BCC	7#	;GO RESET FLOATING PTRN
1582	010206	000765				BR	8#	;GO CHECK NEXT
1583	010210	014037	001126		9#:	MOV	-(R0),#BDDAT	;GET BAD DATA
1584	010214	010037	001122			MOV	R0,#BDADR	;GET MEM ADRS OF DATA ER
1585	010220	010237	001124			MOV	R2,#GDDAT	;LD EXPECTED DATA
1586								
1587	010224	104401	016030			TYPE	,MSG2	
1588	010230	104013			104000.13			

```

1590 ;ERROR IN SLAVE-WAIT FOR MASTER STATUS
1591
1592 010232 000005 10#: RESET
1593 010234 012777 000010 171156 MOV #10,@CSR ;TELL MASTER WE HAVE AN ERROR
1594
1595 ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1596 010242 15#:
1597 010242 017737 171152 001450 MOV @CSR,SAVE ; READ STATUS
1598 010250 042737 170777 001450 BIC #170777,SAVE ; CLEAR DON'T CARES
1599 010256 001771 BEQ 15# ; IF COMPANION NOT READY THEN LOOP
1600
1601 010260 017737 171134 001450 MOV @CSR,SAVE ; RE-READ STATUS
1602 010266 042737 170777 001450 BIC #170777,SAVE ; CLEAR DON'T CARES
1603 010274 022737 005000 001450 CMP #5000,SAVE ; CHECK FOR COMPANION OK
1604 010302 001404 BEQ 24# ; IF EQ THEN RESYNC
1605 010304 16#:
1606 010304 022737 004000 001450 CMP #4000,SAVE ; ELSE CHECK FOR COMPANION ERROR
1607 010312 001353 BNE 15# ; IF NE THEN COMPANION STILL NOT READY
1608 010314 24#:
1609 010314 104412 RSYNC ; RSYNC ON ERROR
1610
1611
1612
1613 ;NO ERROR IN SLAVE-WAIT FOR MASTER STATUS
1614
1615 010316 012777 000012 171074 13#: MOV #12,@CSR ; TELL MASTER ALL OK
1616
1617 ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1618 010324 14#:
1619 010324 017737 171070 001450 MOV @CSR,SAVE ; READ CSR
1620 010332 042737 170777 001450 BIC #170777,SAVE ; SAVE 'STAT' BITS ONLY
1621 010340 001771 BEQ 14# ; IF COMPANION NOT READY THEN LOOP
1622
1623 010342 017737 171052 001450 MOV @CSR,SAVE ; RE-READ STATUS
1624 010350 042737 170777 001450 BIC #170777,SAVE ; CLEAR DON'T CARES
1625 010356 022737 005000 001450 CMP #5000,SAVE ; CHECK FOR COMPANION OK
1626 010364 001405 BEQ 30# ; IF MASTER OK THEN CONTINUE
1627
1628 010366 022737 004000 001450 CMP #4000,SAVE ; ELSE CHECK FOR COMPANION ERROR
1629 010374 001353 BNE 14# ; IF NE THEN COMPANION STILL NOT READY
1630 010376 31#:
1631 010376 104412 RSYNC ; RSYNC ON ERROR
1632 010400 30#:
1633 010400 004737 011360 JSR PC,RSTVEC ; GO RESTORE VECTOR

```



```

1635 .SBTTL * STSTS BURST DATA LATE TEST-SLAVE RECEIVES 5 WORDS
1636 .SBTTL FROM MASTER AND TIMES OUT WHILE EXPECTING MORE
1637 .SBTTL (DR11-W TO DR11-W ONLY)
1638 ;*****
1639 ;*****
1640 ;SETS UP TO RECEIVE 10 WORDS IN BURST MODE FROM MASTER,
1641 ;BUT MASTER WILL ONLY SEND 5 WORDS.
1642 ;TIMEOUT OCCURS AND THE BUS IS RELEASED
1643 ;THEN CHECKS FOR PROPER INTERRUPT STATUS, WC, BA & DATA
1644 ;IF AN ERROR IS DETECTED THE SLAVE TELLS THE MASTER, REPORTS THE
1645 ;ERROR, AND RESYNCS ON PROGRAM
1646 ;IF ALL OK THEN THIS COMPUTER BECOMES MASTER AND GOES TO MTST1
1647 ;*****
1648 ;*****
1649 STSTS:
1650 010404 004737 014050 18: JSR PC,CPUI ;NO INTRs ALLOWED YET
1651 010410 012737 001000 001444 MOV #1000,TIME ;DELAY ON MASTER
1652 010416 005337 001444 40: DEC TIME
1653 010422 001375 BNE 40:
1654 010424 005077 170770 41: CLR @BCSR
1655 010430 022777 001200 170762 CMP #1200,@BCSR ;ONLY DSTATC AND READY
1656 010436 001372 BNE 41:
1657 010440 004537 011340 39: JSR R5,SETVEC ;SET UP THE INTR RETURN ADRS
1658 010444 010550 2: ;RETURN TO 2: ON DATO INTR
1659 010446 004537 011400 JSR R5,CLRBUF ;GO CLR 'DBUF'
1660 010452 177740 -32. ;DO 32. LOCATIONS
1661 010454 012737 040000 001444 MOV #40000,TIME ;SET UP A TIMER VALUE
1662 010462 013777 001500 170724 MOV RCVTMO,@BCR ;SET UP WORD COUNT
1663 010470 013777 001502 170720 MOV RCVTMO+2,@BAR ;SET UP BUFFER ADRS
1664 010476 004737 014076 JSR PC,CPULO ;ALLOW THE INTR
1665 010502 017737 170712 001446 MOV @BCSR,TEMP
1666 010510 042737 100060 001446 BIC @BIT15,TEMP
1667 010516 052737 000002 001446 BIS #2,TEMP ;FNCT1
1668 010524 013777 001446 170666 MOV TEMP,@BCSR
1669 010532 013777 001504 170660 MOV RCVTMO+4,@BCSR ;SET UP CONTROL:IE,FNCT1 & GO
1670 ;TIMEOUT
1671 010540 005337 001444 25: DEC TIME ;WAIT FOR MASTER TO SETUP;
1672 010544 001375 BNE 25: ;THEN SLAVE BUS WILL BE HELD FOR DURATION
1673 ;OF BURST XFERS;TIMEOUT WILL OCCUR WITH SUBSEQUENT
1674 ;RELEASE OF BUS AND PROGRAM CONTINUATION
1675 010546 000416 BR 3: ;GO TO CHECKS
1676 010550 017737 170644 001446 2: MOV @BCSR,TEMP
1677 010556 042737 100000 001446 BIC @BIT15,TEMP
1678 010564 042737 000100 001446 BIC #100,TEMP ;DISABLE IE
1679 010572 013777 001446 170620 MOV TEMP,@BCSR
1680 010600 104017 104000+17 BR 10:
1681 010602 000471 BR 10:
1682 010604 017737 170610 001126 3: MOV @BCSR,@BDDAT ;READ STATUS
1683 010612 032737 000200 001126 BIT @BIT7,@BDDAT ;TEST READY BIT
1684 010620 001412 BEQ 5:
1685 010622 013737 001446 001124 MOV TEMP,@GDDAT
1686 010630 013737 001420 001122 MOV CSR,@BDADR
1687 010636 104401 016062 TYPE ,MSG3
1688 010642 104014 104000+14 BR 10:
1689 010644 000450 BR 10:
1690 010646 012777 100000 170544 5: MOV @BIT15,@BCSR ;GO TO EIR
1691 010654 017737 170540 001126 MOV @BCSR,@BDDAT ;SAVE EIR

```

1/4

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1692 010662 032737 001000 001126 BIT #BIT9,#BDDAT ;TEST BURST DATA LATE BIT
1693 010670 001015 BNE 4$
1694 010672 042737 000400 001126 BIC #BIT8,#BDDAT
1695 010700 012737 101000 001124 MOV #101000,#GDDAT
1696 010706 013737 001420 001122 MOV CSR,#BDADR
1697 010714 104401 016062 TYPE .MSG3
1698 010720 104022 104000+22
1699 010722 000421 BR 10$ ;GO RESYNC ON ERROR
1700 010724 012737 177773 001124 4$: MOV #177773,#GDDAT ;LD EXPECTED WC
1701 010732 017737 170456 001126 MOV @WCR,#BDDAT ;READ WCR
1702 010740 023737 001124 001126 CMP $GDDAT,#BDDAT ;CORRECT?
1703 010746 001441 BEQ 13$ ;BR IF SO
1704 010750 013737 001414 001122 MOV WCR,#BDADR ;SET UP WCR ADRS
1705 010756 104401 016062 TYPE .MSG3
1706 010762 104011 104000+11
1707 010764 000400 BR 10$ ;GO RESYNC ON ERROR
1708
1709
1710
1711 ;ERROR IN SLAVE-WAIT FOR MASTER STATUS
1712
1713 010766 000005 10$: RESET ;IF ERROR,INIT
1714 010770 012777 000010 170422 MOV #10,@CSR
1715
1716 ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1717 010776 15$:
1718 010776 017737 170416 001450 MOV @CSR,SAVE ; READ STATUS
1719 011004 042737 170777 001450 BIC #170777,SAVE ; CLEAR DON'T CARES
1720 011012 001771 BEQ 15$ ; IF COMPANION NOT READY THEN LOOP
1721
1722 011014 017737 170400 001450 MOV @CSR,SAVE ; RE-READ STATUS
1723 011022 042737 170777 001450 BIC #170777,SAVE ; CLEAR DON'T CARES
1724 011030 022737 005000 001450 CMP #5000,SAVE ; CHECK FOR COMPANION OK
1725 011036 001404 BEQ 24$ ; IF EQ THEN RESYNC
1726 011040 16$:
1727 011040 022737 004000 001450 CMP #4000,SAVE ; ELSE CHECK FOR COMPANION ERROR
1728 011046 001353 BNE 15$ ; IF NE THEN COMPANION STILL NOT READY
1729 011050 24$:
1730 011050 104412 RSYNC ; RSYNC ON ERROR
1731
1732
1733
1734 ;NO ERROR IN SLAVE-WAIT FOR MASTER STATUS
1735
1736 011052 000005 13$: RESET ;SLAVE HAS TIMED OUT LEAVING
1737 ;READY CLEAR. FNCT BITS TO DSTAT
1738 ;BITS COMMUNICATION CAN BE
1739 ;RESUMED BY SETTING READY.RESET
1740 ;WILL SET READY.
1741 011054 012737 010000 001444 MOV #10000,TIME
1742 011062 005337 001444 11$: DEC TIME
1743 011066 001375 BNE 11$
1744 011070 012777 000012 170322 MOV #12,@CSR ;TELL MASTER ALL OK
1745
1746 ;THIS SECTION MODIFIED FOR STATUS LINE SKEW.
1747 011076 14$:
1748 011076 017737 170316 001450 MOV @CSR,SAVE ; READ CSR

```

```

1749 011104 042737 170777 001450      BIC      #170777,SAVE      ; SAVE 'STAT' BITS ONLY
1750 011112 001771                      BEQ      14$              ; IF COMPANION NOT READY THEN LOOP
1751
1752 011114 017737 170300 001450      MOV      @BCSR,SAVE      ; RE-READ STATUS
1753 011122 042737 170777 001450      BIC      #170777,SAVE      ; CLEAR DON'T CARES
1754 011130 022737 005000 001450      CMP      #5000,SAVE      ; CHECK FOR COMPANION OK
1755 011136 001405                      BEQ      EOPT            ; IF MASTER OK THEN END OF PASS
1756
1757 011140 022737 004000 001450      CMP      #4000,SAVE      ; ELSE CHECK FOR COMPANION ERROR
1758 011146 001353                      BNE      14$              ; IF NE THEN COMPANION STILL NOT READY
1759
1760 011150 104412                      RSYNC                      ; RSYNC ON ERROR
1761 011152                      EOPT:
1762 011152 004737 011360                      JSR      PC,RSTVEC      ;GO RESTORE VECTOR
1763 011156                      SLVFIN:
1764 011156 104407                      CKSWR                      ;GO CHECK SWR
1765 011160 005737 001452                      TST      MSTER          ;WERE WE STARTED AS MASTER?
1766 011164 001055                      BNE      EOPTA          ;BR IF NOT
1767 011166 005337 001454                      DEC      ICOUNT         ;COUNT TEST PASS
1768 011172 001052                      BNE      EOPTA          ;BR IF NOT DUE FOR 'END PASS' MSG
1769 011174 012737 000144 001454      MOV      #144,ICOUNT    ;RESET PASS COUNT TO 100 ITERATIONS

```

1771

.SBTTL END OF PASS ROUTINE

;;*****
;*INCREMENT THE PASS NUMBER (\$PASS)
;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
;*IF THERES A MONITOR GO TO IT
;*IF THERE ISN'T JUMP TO EOPTA

011202				\$EOP:	NOP			
011202	000240				CLR	\$TSTNM	::ZERO THE TEST NUMBER	
011204	005037	001102			INC	\$PASS	::INCREMENT THE PASS NUMBER	
011210	005237	001100			BIC	#100000,\$PASS	::DON'T ALLOW A NEG. NUMBER	
011214	042737	100000	001100		DEC	(PC)+	::LOOP?	
011222	005327							
011224	000001			\$EOPCT:	.WORD	1		
011226	003022				BGT	\$DOAGN	::YES	
011230	012737				MOV	(PC)+,\$(PC)+	::RESTORE COUNTER	
011232	000001			\$ENDCT:	.WORD	1		
011234	011224				\$EOPCT			
011236	104401	011303			TYPE	,\$ENDMG	::TYPE "END PASS #"	
011242	013746	001100			MOV	\$PASS,-(SP)	::SAVE \$PASS FOR TYPEOUT	
011246	104405				TYPDS		::GO TYPE--DECIMAL ASCII WITH SIGN	
011250	104401	011300			TYPE	,\$ENULL	::TYPE A NULL CHARACTER	
011254	013700	000042		\$GET42:	MOV	\$42,R0	::GET MONITOR ADDRESS	
011260	001405				BEQ	\$DOAGN	::BRANCH IF NO MONITOR	
011262	000005				RESET		::CLEAR THE WORLD	
011264	004710			\$ENDAD:	JSR	PC,(R0)	::GO TO MONITOR	
011266	000240				NOP		::SAVE ROOM	
011270	000240				NOP		::FOR	
011272	000240				NOP		::ACT11	
011274				\$DOAGN:				
011274	000137				JMP	\$(PC)+	::RETURN	
011276	011320			\$RTNAD:	.WORD	EOPTA		
011300	377	377	000	\$ENULL:	.BYTE	-1,-1,0	::NULL CHARACTER STRING	
011303	015	012	105	\$ENDMG:	.ASCIIZ	<15><12>/END PASS #/		
011306	116	104	040					
011311	120	101	123					
011314	123	040	043					
011317	000							
1772	011320	012737	001000	001444	EOPTA:	MOV	#1000,TIME	::SET UP A COUNT
1773	011326	005337	001444		EOPTB:	DEC	TIME	::STALL FOR OTHER CPU TO BECOME SLAVE
1774	011332	001375				BNE	EOPTB	::UNTIL TIME=0
1775	011334	000137	002760			JMP	MINIT1	::NOW BECOME MASTER

```

1777      .SBTTL
1778      .SBTTL  PROGRAM SUBROUTINES
1779
1780      ;;*****
1781      ;THIS ROUTINE SETS THE PRIORITY LEVEL FOR NO INTERRUPT -
1782      ;SETS UP THE INTERRUPT TO RETURN ON INTERRUPT
1783      ;TO THE ADDRESS INDICATED ((R5)) BY THE CALL +2
1784      ;;*****
1785 011340 004737 014050  SETVEC: JSR    PC,CPUMI    ;SET UP FOR NO INTERRUPT
1786 011344 012577 170054      MOV    (R5)+,SDRVCT0    ;SET UP INTR RETURN ADRS
1787 011350 012777 000200 170050      MOV    #200,SDRVCT2    ;KEEP PRIORITY LEVEL AT TOP ON INTR
1788 011356 000205      RTS     R5             ;EXIT
1789
1790      ;;*****
1791      ;THIS ROUTINE RESTORES THE INTERRUPT VECTOR TO A HALT
1792      ;AND RAISES THE PRIORITY LEVEL
1793      ;;*****
1794 011360 013777 001426 170036  RSTVEC: MOV    DRVCT2,SDRVCT0 ;POINT VECTOR TO HALT
1795 011366 005077 170034      CLR    SDRVCT2        ;SET UP HALT
1796 011372 004737 014050      JSR    PC,CPUMI      ;RAISE PRIORITY LEVEL
1797 011376 000207      RTS     PC             ;EXIT
1798
1799      ;;*****
1800      ;THIS ROUTINE CLEARS THE 'DBUF' BEFORE A 'DATI' XFER
1801      ;THE # OF LOCATIONS IN 'DBUF' TO BE CLEARED IS SPECIFIED BY
1802      ;THE VALUE IN THE CALL +2 - WHEN ALL CLEARED THE RETURN IS TO
1803      ;THE CALL +4
1804      ;;*****
1805 011400 012500      CLRBUF: MOV    (R5)+,R0    ;GET THE LOC COUNT
1806 011402 012701 016236      MOV    #DBUF,R1        ;GET 1ST ADRS
1807 011406 005021 1$:      CLR    (R1)+          ;CLR MEM LOC
1808 011410 005200      INC    R0             ;COUNT LOC
1809 011412 001375      BNE    1$            ;UNTIL ALL DONE
1810 011414 000205      RTS     R5             ;EXIT
1811

```

```

1813 ;*****
1814 ;THIS ROUTINE LOADS DBUF WITH A FLOATING ZERO/ONE PATTERN
1815 ;THE # OF LOCATIONS IN DBUF TO BE LOADED IS SPECIFIED BY
1816 ;THE VALUE IN THE CALL .2 WHEN ALL LOADED THE RETURN IS TO CALL .4
1817 ;*****
1818 011416 012500      _DBUF: MOV      (R5),R0      ;GET LOC COUNT
1819 011420 012701 016236 MOV      @DBUF,R1      ;GET 1ST ADRS
1820 011424 012702 177776 18:  MOV      @177776,R2      ;SET UP FLOATING ZERO PTRN
1821 011430 005003      CLR      R3          ;R3 SAYS WHEN TO SHIFT PTRN
1822 011432 010221 28:  MOVB    R2,(R1)      ;LOAD MEM WITH PTRN
1823 011434 005200      INC      R0          ;COUNT LOC
1824 011436 001001      BNE     38          ;BR IF MORE
1825 011440 000205      RTS     R5          ;EXIT
1826 011442 005102 38:  COM     R2          ;CONVERT PTRN TO FLOATING 1
1827 011444 005103      COM     R3          ;SHOULD WE SHIFT?
1828 011446 001371      BNE     28          ;BR IF NOT THIS WILL BE A FLOATING 1
1829 011450 006302      ASL     R2          ;FLOAT ZERO LEFT
1830 011452 005202      INC     R2          ;KEEP LSB SET
1831 011454 103363      BCC    18          ;GO RESET FLOATING PTRN
1832 011456 000765      BR     28          ;GO LOAD NEXT PTRN

```

1834
 1835
 1836

.SBTTL SYSMAC ROUTINES

.SBTTL TYPE ROUTINE

```

;*****
;ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
;THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
;NOTE1:      %NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
;NOTE2:      %FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
;NOTE3:      %FILLC CONTAINS THE CHARACTER TO FILL AFTER.
;
;CALL:
;1) USING A TRAP INSTRUCTION
;      TYPE      ,MESADR      ;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
;OR
;      TYPE
;      MESADR
;

```

```

011460 105737 001157      %TYPE:  TSTB      %TPFLG      ;IS THERE A TERMINAL?
011464 100002              BPL          1%          ;BR IF YES
011466 000000              HALT              ;HALT HERE IF NO TERMINAL
011470 000407              BR           3%          ;LEAVE
011472 010046      1%:    MOV      RO,-(SP)      ;SAVE RO
011474 017600 000002      MOV      @2(SP),RO      ;GET ADDRESS OF ASCIZ STRING
011500 112046      2%:    MOV      (RO),-(SP)      ;PUSH CHARACTER TO BE TYPED ONTO STACK
011502 001005              BNE          4%          ;BR IF IT ISN'T THE TERMINATOR
011504 005726              TST      (SP),%          ;IF TERMINATOR POP IT OFF THE STACK
011506 012600      6%:    MOV      (SP),%RO      ;RESTORE RO
011510 062716 000002      3%:    ADD      @2,(SP)      ;ADJUST RETURN PC
011514 000002              RTI
011516 122716 000011      4%:    CMPB     @HT,(SP)      ;BRANCH IF <HT>
011522 001430              BEQ          8%          ;BRANCH IF NOT <CRLF>
011524 122716 000200      CMPB     @CRLF,(SP)
011530 001006              BNE          5%          ;POP <CR><LF> EQUIV
011532 005726              TST      (SP),%          ;TYPE A CR AND LF
011534 104401              TYPE
011536 001165              %CRLF
011540 105037 011756      CLRB     %CHARCNT      ;CLEAR CHARACTER COUNT
011544 000755              BR           2%          ;GET NEXT CHARACTER
011546 004737 011630      5%:    JSR      PC,%TYPEC      ;GO TYPE THIS CHARACTER
011552 123726 001156      6%:    CMPB     %FILLC,(SP),%          ;IS IT TIME FOR FILLER CHARS.?
011556 001350              BNE          2%          ;IF NO GO GET NEXT CHAR.
011560 013746 001154              MOV      %NULL,-(SP)      ;GET # OF FILLER CHARS. NEEDED
                                ;AND THE NULL CHAR.
011564 105366 000001      7%:    DECB     1(SP)          ;DOES A NULL NEED TO BE TYPED?
011570 002770              BLT          6%          ;BR IF NO--GO POP THE NULL OFF OF STACK
011572 004737 011630              JSR      PC,%TYPEC      ;GO TYPE A NULL
011576 105337 011756      DECB     %CHARCNT      ;DO NOT COUNT AS A COUNT
011602 000770              BR           7%          ;LOOP

```

;HORIZONTAL TAB PROCESSOR

```

011604 112716 000040      8%:    MOV      #' ,(SP)      ;REPLACE TAB WITH SPACE
011610 004737 011630      9%:    JSR      PC,%TYPEC      ;TYPE A SPACE
011614 132737 000007 011756      BITB     @7,%CHARCNT      ;BRANCH IF NOT AT
011622 001372              BNE          9%          ;TAB STOP

```

```

011624 005726          TST      (SP).      ;;POP SPACE OFF STACK
011626 000724          BR        2$          ;;GET NEXT CHARACTER
011630                    $TYPEC:
011630 105777 167310    TSTB     @TKS          ;;CHAR IN KYBD BUFFER?      ;MJD001
011634 100022          BPL      10$          ;;BR IF NOT                ;MJD001
011636 017746 167304    MOV      @TKB, -(SP)   ;;GET CHAR                  ;MJD001
011642 042716 177600    BIC     @177600,(SP)  ;;STRIP EXTRANEIOUS BITS   ;MJD001
011646 122716 000023    CMPB    @XOFF,(SP)   ;;WAS CHAR XOFF            ;MJD001
011652 001012          BNE     102$         ;;BR IF NOT                ;MJD001
011654                    101$:
011654 105777 167264    TSTB     @TKS          ;;WAIT FOR CHAR            ;MJD001
011660 100375          BPL      101$         ;;BR IF NOT                ;MJD001
011662 117716 167260    MOVB    @TKB,(SP)    ;;GET CHAR                  ;MJD001
011666 042716 177600    BIC     @177600,(SP)  ;;STRIP IT                  ;MJD001
011672 122716 000021    CMPB    @XON,(SP)    ;;WAS IT XON?              ;MJD001
011676 001366          BNE     101$         ;;BR IF NOT                ;MJD001
011700                    102$:
011700 005726          TST      (SP).      ;;FIX STACK                ;MJD001
011702                    10$:
011702 105777 167242    TSTB     @TPS          ;;WAIT UNTIL PRINTER IS READY ;MJD001
011706 100375          BPL      10$          ;;BR IF NOT                ;MJD001
011710 126627 000002 000021  CMPB     2(SP),@XON   ;;IS CHARACTER A RANDOM XON? ;RAN001
011716 001420          BEQ     $TYPEX       ;;BRANCH IF YES            ;RAN001
011720 116677 000002 167224  MOVB    2(SP),@TPB   ;;LOAD CHAR TO BE TYPED INTO DATA REG.
011726 122766 000015 000002  CMPB    @CR,2(SP)    ;;IS CHARACTER A CARRIAGE RETURN?
011734 001003          BNE     1$          ;;BRANCH IF NO
011736 105037 011756    CLRB    $CHARCNT     ;;YES--CLEAR CHARACTER COUNT
011742 000406          BR      $TYPEX       ;;EXIT
011744 122766 000012 000002 1$:  CMPB    @LF,2(SP)    ;;IS CHARACTER A LINE FEED?
011752 001402          BEQ     $TYPEX       ;;BRANCH IF YES
011754 105227          INCB    (PC).      ;;COUNT THE CHARACTER
011756 000000          $CHARCNT: .WORD 0  ;;CHARACTER COUNT STORAGE
011760 000207          $TYPEX: RTS      PC

```


1838

.SBTTL BINARY TO OCTAL (ASCII) AND TYPE

```

;*****
;THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
;OCTAL (ASCII) NUMBER AND TYPE IT.
;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
;CALL:
;*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
;*   TYPOS   ;;CALL FOR TYPEOUT
;*   .BYTE  N              ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
;*   .BYTE  M              ;;M=1 OR 0
;*                               ;;1=TYPE LEADING ZEROS
;*                               ;;0=SUPPRESS LEADING ZEROS
;*$TYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
;*$TYPOS OR $TYPOC
;CALL:
;*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
;*   TYPON   ;;CALL FOR TYPEOUT
;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
;CALL:
;*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
;*   TYPOC   ;;CALL FOR TYPEOUT
011762 017646 000000      $TYPOS: MOV     8(SP),-(SP)      ;;PICKUP THE MODE
011766 116637 000001 012205  MOVB   1(SP),#0FILL      ;;LOAD ZERO FILL SWITCH
011774 112637 012207      MOVB   (SP),#0MODE*1    ;;NUMBER OF DIGITS TO TYPE
012000 062716 000002      ADD     #2,(SP)        ;;ADJUST RETURN ADDRESS
012004 000406      BR     $TYPON
012006 112737 000001 012205 $TYPOC: MOVB   #1,#0FILL      ;;SET THE ZERO FILL SWITCH
012014 112737 000006 012207  MOVB   #6,#0MODE*1    ;;SET FOR SIX(6) DIGITS
012022 112737 000005 012204 $TYPON: MOVB   #5,#0CNT      ;;SET THE ITERATION COUNT
012030 010346      MOV     R3,-(SP)      ;;SAVE R3
012032 010446      MOV     R4,-(SP)      ;;SAVE R4
012034 010546      MOV     R5,-(SP)      ;;SAVE R5
012036 113704 012207      MOVB   #0MODE*1,R4    ;;GET THE NUMBER OF DIGITS TO TYPE
012042 005404      NEG     R4
012044 062704 000006      ADD     #6,R4        ;;SUBTRACT IT FOR MAX. ALLOWED
012050 110437 012206      MOVB   R4,#0MODE      ;;SAVE IT FOR USE
012054 113704 012205      MOVB   #0FILL,R4     ;;GET THE ZERO FILL SWITCH
012060 016605 000012      MOV     12(SP),R5    ;;PICKUP THE INPUT NUMBER
012064 005003      CLR     R3          ;;CLEAR THE OUTPUT WORD
012066 006105      1#:   ROL     R5      ;;ROTATE MSB INTO "C"
012070 000404      BR     3#
012072 006105      2#:   ROL     R5      ;;FORM THIS DIGIT
012074 006105      ROL     R5
012076 006105      ROL     R5
012100 010503      MOV     R5,R3
012102 006103      3#:   ROL     R3      ;;GET LSB OF THIS DIGIT
012104 105337 012206      DECB   #0MODE        ;;TYPE THIS DIGIT?
012110 100016      BPL    7#           ;;BR IF NO
012112 042703 177770      BIC    #177770,R3    ;;GET RID OF JUNK
012116 001002      BNE    4#           ;;TEST FOR 0
012120 005704      TST    R4           ;;SUPPRESS THIS 0?
012122 001403      BEQ    5#           ;;BR IF YES
012124 005204      4#:   INC     R4      ;;DON'T SUPPRESS ANYMORE 0'S
    
```


1840

.SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

```

;*****
;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
;*REPLACED WITH SPACES.
;*CALL:
;*      MOV      NUM,-(SP)      ;;PUT THE BINARY NUMBER ON THE STACK
;*      TYPDS                    ;;GO TO THE ROUTINE

012210
012210 010046
012212 010146
012214 010246
012216 010346
012220 010546
012222 012746 020200
012226 016605 000020
012232 100004
012234 005405
012236 112766 000055 000001
012244 005000
012246 012703 012424
012252 112723 000040
012256 005002
012260 016001 012414
012264 160105
012266 002402
012270 005202
012272 000774
012274 060105
012276 005702
012300 001002
012302 105716
012304 100407
012306 106316
012310 103003
012312 116663 000001 177777
012320 052702 000060
012324 052702 000040
012330 110223
012332 005720
012334 020027 000010
012340 002746
012342 003002
012344 010502
012346 000764
012350 105726
012352 100003
012354 116663 177777 177776
012362 105013
012364 012605
012366 012603
012370 012602
012372 012601

;TYPDS:
MOV      R0,-(SP)      ;;PUSH R0 ON STACK
MOV      R1,-(SP)      ;;PUSH R1 ON STACK
MOV      R2,-(SP)      ;;PUSH R2 ON STACK
MOV      R3,-(SP)      ;;PUSH R3 ON STACK
MOV      R5,-(SP)      ;;PUSH R5 ON STACK
MOV      @20200,-(SP)  ;;SET BLANK SWITCH AND SIGN
MOV      20(SP),R5    ;;GET THE INPUT NUMBER
BPL      1#           ;;BR IF INPUT IS POS.
NEG      R5           ;;MAKE THE BINARY NUMBER POS.
MOVB    #'-.1(SP)    ;;MAKE THE ASCII NUMBER NEG.
1#:     CLR      R0    ;;ZERO THE CONSTANTS INDEX
MOV      @#DBLK,R3    ;;SETUP THE OUTPUT POINTER
MOVB    #' ,(R3)     ;;SET THE FIRST CHARACTER TO A BLANK
2#:     CLR      R2    ;;CLEAR THE BCD NUMBER
MOV      @DTBL(R0),R1 ;;GET THE CONSTANT
3#:     SUB      R1,R5 ;;FORM THIS BCD DIGIT
BLT     4#           ;;BR IF DONE
INC     R2           ;;INCREASE THE BCD DIGIT BY 1
BR      3#
4#:     ADD      R1,R5 ;;ADD BACK THE CONSTANT
TST     R2           ;;CHECK IF BCD DIGIT=0
BNE     5#           ;;FALL THROUGH IF 0
TSTB   (SP)         ;;STILL DOING LEADING 0'S?
BMI     7#           ;;BR IF YES
5#:     ASLB    (SP)  ;;MSD?
BCC     6#           ;;BR IF NO
MOVB    1(SP),-1(R3) ;;YES--SET THE SIGN
6#:     BIS     #'0,R2 ;;MAKE THE BCD DIGIT ASCII
7#:     BIS     #' ,R2 ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
MOVB    R2,(R3)     ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
TST     (R0)        ;;JUST INCREMENTING
CMP     R0,@10     ;;CHECK THE TABLE INDEX
BLT     2#           ;;GO DO THE NEXT DIGIT
BGT     8#           ;;GO TO EXIT
MOV     R5,R2      ;;GET THE LSD
BR      6#         ;;GO CHANGE TO ASCII
8#:     TSTB   (SP)  ;;WAS THE LSD THE FIRST NON-ZERO?
BPL     9#         ;;BR IF NO
9#:     MOVB   -1(SP),-2(R3) ;;YES--SET THE SIGN FOR TYPING
CLRB   (R3)        ;;SET THE TERMINATOR
MOV     (SP),R5    ;;POP STACK INTO R5
MOV     (SP),R3    ;;POP STACK INTO R3
MOV     (SP),R2    ;;POP STACK INTO R2
MOV     (SP),R1    ;;POP STACK INTO R1
    
```

H^c,

```
012374 012600          MOV      (SP)+,R0      ;;POP STACK INTO R0
012376 104401 012424    TYPE      ,#DBLK      ;;NOW TYPE THE NUMBER
012402 016676 000002 000004    MOV      2(SP),4(SP)    ;;ADJUST THE STACK
012410 012616          MOV      (SP)+,(SP)
012412 000002          RTI                          ;;RETURN TO USER
012414 023420          $DTBL: 10000.
012416 001750          1000.
012420 000144          100.
012422 000012          10.
012424          $DBLK: .BLKW 4
```

1842

.SBTTL ERROR HANDLER ROUTINE

```
;;*****  
; *THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,  
; *SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL  
; *AND GO TO SWRCK ON ERROR  
; *THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:  
; *SW15=1      HALT ON ERROR  
; *SW13=1      INHIBIT ERROR TYPEOUTS  
; *SW10=1      BELL ON ERROR  
; *CALL  
; *      ERROR  N      ;;ERROR=EMT AND N=ERROR ITEM NUMBER  
  
012434      $ERROR:  
012434 104407      CKSWR      ;;TEST FOR CHANGE IN SOFT-SWR  
012436 104407      CKSWR      ;;GO LOOK FOR SWR CHANGE  
012440 105237 001103 7$: INCB      $ERFLG      ;;SET THE ERROR FLAG  
012444 001775      BEQ      7$      ;;DON'T LET THE FLAG GO TO ZERO  
012446 013777 001102 166466 MOV      $TSTNM,$DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG  
012454 032777 002000 166456 BIT      @BIT10,$SWR      ;;BELL ON ERROR?  
012462 001402      BEQ      1$      ;;NO - SKIP  
012464 104401 001160      TYPE      , $BELL      ;;RING BELL  
012470 005237 001112 1$: INC      $ERTTL      ;;COUNT THE NUMBER OF ERRORS  
012474 011637 001116      MOV      (SP), $ERRPC ;;GET ADDRESS OF ERROR INSTRUCTION  
012500 162737 000002 001116 SUB      @2, $ERRPC  
012506 117737 166404 001114 MOVB     @ $ERRPC, $ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE  
012514 032777 020000 166416 BIT      @BIT13,$SWR      ;;SKIP TYPEOUT IF SET  
012522 001004      BNE      20$      ;;SKIP TYPEOUTS  
012524 004737 012550      JSR      PC, SWRCK      ;;GO TO USER ERROR ROUTINE  
012530 104401 001165      TYPE      , $CRLF  
012534  
012534 005777 166400 2$: TST      @SWR      ;;HALT ON ERROR  
012540 100002      BPL      3$      ;;SKIP IF CONTINUE  
012542 000000      HALT      ;;HALT ON ERROR!  
012544 104407      CKSWR      ;;TEST FOR CHANGE IN SOFT-SWR  
012546  
1843      3$: RTI      ;;RETURN  
1844  
1845  
1846  
1847 012550 004737 012560 ;;*****  
1848 012554 104407      SWRCK: JSR      PC, $ERRTYP ;;GO TYPE ERROR  
1849 012556 000207      CKSWR      ;;GO LOOK FOR SWR CHANGE  
RTS      PC      ;;RETURN TO ERROR HANDLER
```

1651

.SBTTL ERROR MESSAGE TYPEOUT ROUTINE

 ; THIS ROUTINE USES THE "ITEM CONTROL BYTE" (\$ITEMB) TO DETERMINE WHICH
 ; ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" (\$ERRTB),
 ; AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

```

012560                                $EPRTYP:
012560 104401 001165                    TYPE      , $CRLF                ;; "CARRIAGE RETURN" & "LINE FEED"
012564 010046                          MOV      R0, -(SP)                ;; SAVE R0
012566 005000                          CLR      R0                        ;; PICKUP THE ITEM INDEX
012570 153700 001114                    BISB    @#$ITEMB, R0
012574 001004                          BNE     1$                        ;; IF ITEM NUMBER IS ZERO, JUST
                                ;; TYPE THE PC OF THE ERROR
012576 013746 001116                    MOV      $ERRPC, -(SP)           ;; SAVE $ERRPC FOR TYPEOUT
                                ;; ERROR ADDRESS
012602 104402                          TYPOC
012604 000426                          BR      6$                        ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
012606 005300 1$:                      DEC      R0                        ;; GET OUT
012610 006300                          ASL     R0                        ;; ADJUST THE INDEX SO THAT IT WILL
012612 006300                          ASL     R0                        ;; WORK FOR THE ERROR TABLE
012614 006300                          ASL     R0
012616 062700 001170                    ADD     @#$ERRTB, R0            ;; FORM TABLE POINTER
012622 012037 012632                    MOV     (R0)+, 2$              ;; PICKUP "ERROR MESSAGE" POINTER
012626 001404                          BEQ     3$                        ;; SKIP TYPEOUT IF NO POINTER
012630 104401                          TYPE
012632 000000 2$:                      .WORD  0                        ;; TYPE THE "ERROR MESSAGE"
                                ;; "ERROR MESSAGE" POINTER GOES HERE
012634 104401 001165                    TYPE      , $CRLF                ;; "CARRIAGE RETURN" & "LINE FEED"
012640 012037 012650                    3$:    MOV     (R0)+, 4$              ;; PICKUP "DATA HEADER" POINTER
012644 001404                          BEQ     5$                        ;; SKIP TYPEOUT IF 0
012646 104401                          TYPE
012650 000000 4$:                      .WORD  0                        ;; TYPE THE "DATA HEADER"
                                ;; "DATA HEADER" POINTER GOES HERE
012652 104401 001165                    TYPE      , $CRLF                ;; "CARRIAGE RETURN" & "LINE FEED"
012656 011000 5$:                      MOV     (R0), R0                ;; PICKUP "DATA TABLE" POINTER
012660 001004                          BNE     7$                        ;; GO TYPE THE DATA
012662 012600 6$:                      MOV     (SP)+, R0              ;; RESTORE R0
012664 104401 001165                    TYPE      , $CRLF                ;; "CARRIAGE RETURN" & "LINE FEED"
012670 000207                          RTS     PC                        ;; RETURN
012672                                7$:
012672 013046                          MOV     @$(R0)+, -(SP)          ;; SAVE @$(R0)+ FOR TYPEOUT
012674 104402                          TYPOC
012676 005710                          TST     (R0)                    ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
012700 001770                          BEQ     6$                        ;; IS THERE ANOTHER NUMBER?
012702 104401 012710                    TYPE      , 8$                  ;; BR IF NO
012706 000771                          BR      7$                        ;; TYPE TWO(2) SPACES
012710      040      040      000 8$:  .ASCIZ  / /                          ;; LOOP
                                .EVEN                                ;; TWO(2) SPACES

```

1853

.SBTTL SCOPE HANDLER ROUTINE

```

;*****
;THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
;AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
;AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
;CALL
;* SCOPE ;:SCOPE=IOT

012714 ;SCOPE:
012714 104407 CKSWR ;:TEST FOR CHANGE IN SOFT-SWR
012716 104407 CKSWR ;:GO LOOK FOR SWR CHANGE

;*****START OF CODE FOR THE XOR TESTER*****
012720 000416 $XTSTR: BR 6$ ;:IF RUNNING ON THE "XOR" TESTER CHANGE
;:THIS INSTRUCTION TO A "NOP" (NOP=240)

012722 013746 000004 MOV $ERRVEC,-(SP) ;:SAVE THE CONTENTS OF THE ERROR VECTOR
012726 012737 012746 000004 MOV $5,$ERRVEC ;:SET FOR TIMEOUT
012734 005737 177060 TST $177060 ;:TIME OUT ON XOR?
012740 012637 000004 MOV (SP)+,$ERRVEC ;:RESTORE THE ERROR VECTOR
012744 000404 BR $SVLAD ;:GO TO THE NEXT TEST
012746 022626 5$: CMP (SP)+,(SP)+ ;:CLEAR THE STACK AFTER A TIME OUT
012750 012637 000004 MOV (SP)+,$ERRVEC ;:RESTORE THE ERROR VECTOR
012754 000406 BR $OVER ;:LOOP ON THE PRESENT TEST
012756 6$:;*****END OF CODE FOR THE XOR TESTER*****

012756 105237 001102 $SVLAD: INCB $TSTNM ;:COUNT TEST NUMBERS
012762 011637 001106 MOV (SP),$LPADR ;:SAVE SCOPE LOOP ADDRESS
012766 105037 001103 CLRB $ERFLG ;:ZERO THE ERROR FLAG
012772 013777 001102 166142 $OVER: MOV $TSTNM,$DISPLAY ;:DISPLAY TEST NUMBER
013000 013716 001106 MOV $LPADR,(SP) ;:FUDGE RETURN ADDRESS
013004 000002 RTI ;:FIXES PS

```

1855

.SBTTL TTY INPUT ROUTINE

.ENABL LSB

; *SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
; *ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
; *SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
; *WHEN OPERATING IN TTY FLAG MODE.

```

013006 022737 000176 001140 %CKSWR: CMP      #SWREG,SWR      ;; IS THE SOFT-SWR SELECTED?
013014 001074          BNE      15#          ;; BRANCH IF NO
013016 105777 166122          TSTB   #TKS          ;; CHAR THERE?
013022 100071          BPL      15#          ;; IF NO, DON'T WAIT AROUND
013024 117746 166116          MOVB   #TKB,-(SP)    ;; SAVE THE CHAR
013030 042716 177600          BIC   #C177,(SP)    ;; STRIP-OFF THE ASCII
013034 022726 000007          CMP    #7,(SP)+     ;; IS IT A CONTROL G?
013040 001062          BNE      15#          ;; NO, RETURN TO USER
013042 123727 001134 000001          CMPB  $AUTOB,#1    ;; ARE WE RUNNING IN AUTO-MODE?
013050 001456          BEQ     15#          ;; BRANCH IF YES

013052 104401 013543          TYPE  .CNTLG        ;; ECHO THE CONTROL-G (+G)
013056 104401 013550          %GTSWR: TYPE  .MSWR        ;; TYPE CURRENT CONTENTS
013062 013746 000176          MOV   SWREG,-(SP)  ;; SAVE SWREG FOR TYPEOUT
013066 104402          TYPOC          ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
013070 104401 013561          TYPE  .MNEW        ;; PROMPT FOR NEW SWR
013074 005046          19#: CLR  -(SP)    ;; CLEAR COUNTER
013076 005046          CLR  -(SP)    ;; THE NEW SWR
013100 105777 166040          7#:  TSTB   #TKS          ;; CHAR THERE?
013104 100375          BPL   7#          ;; IF NOT TRY AGAIN

013106 117746 166034          MOVB   #TKB,-(SP)  ;; PICK UP CHAR
013112 042716 177600          BIC   #C177,(SP)  ;; MAKE IT 7-BIT ASCII

013116 021627 000025          9#:  CMP    (SP),#25  ;; IS IT A CONTROL-U?
013122 001005          BNE    10#          ;; BRANCH IF NOT
013124 104401 013536          TYPE  .CNTLU        ;; YES, ECHO CONTROL-U (+U)
013130 062706 000006          20#: ADD   #6,SP    ;; IGNORE PREVIOUS INPUT
013134 000757          BR    19#          ;; LET'S TRY IT AGAIN

013136 021627 000015          10#: CMP    (SP),#15  ;; IS IT A <CR>?
013142 001022          BNE    16#          ;; BRANCH IF NO
013144 005766 000004          TST   4(SP)        ;; YES, IS IT THE FIRST CHAR?
013150 001403          BEQ   11#          ;; BRANCH IF YES
013152 016677 000002 165760          MOV   2(SP),#SWR   ;; SAVE NEW SWR
013160 062706 000006          11#: ADD   #6,SP    ;; CLEAR UP STACK
013164 104401 001165          14#: TYPE  .CRLF        ;; ECHO <CR> AND <LF>
013170 123727 001135 000001          CMPB  $INTAG,#1    ;; RE-ENABLE TTY KBD INTERRUPTS?
013176 001003          BNE    15#          ;; BRANCH IF NOT
013200 012777 000100 165736          MOV   #100,#TKS   ;; RE-ENABLE TTY KBD INTERRUPTS
013206 000002          15#: RTI          ;; RETURN
013210 004737 011630          16#: JSR   PC,#TYPEC  ;; ECHO CHAR
013214 021627 000060          CMP   (SP),#60    ;; CHAR < 0?
013220 002420          BLT   18#          ;; BRANCH IF YES

```



```

013222 021627 000067      CMP      (SP),#67      ;;CHAR > ??
013226 003015            BGT      18$          ;;BRANCH IF YES
013230 042726 000060      BIC      #60,(SP)    ;;STRIP-OFF ASCII
013234 005766 000002      TST      2(SP)       ;;IS THIS THE FIRST CHAR
013240 001403            BEQ      17$          ;;BRANCH IF YES
013242 006316            ASL      (SP)         ;;NO, SHIFT PRESENT
013244 006316            ASL      (SP)         ;; CHAR OVER TO MAKE
013246 006316            ASL      (SP)         ;; ROOM FOR NEW ONE.
013250 005266 000002 17$: INC      2(SP)       ;;KEEP COUNT OF CHAR
013254 056616 177776      BIS      -2(SP),(SP) ;;SET IN NEW CHAR
013260 000707            BR       7$          ;;GET THE NEXT ONE
013262 104401 001164 18$: TYPE  ,#QUES      ;;TYPE ?<CR><LF>
013266 000720            BR       20$         ;;SIMULATE CONTROL-U
.DSABL  LSB

```

```

;*****
;THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
;CALL:
;*      RDCHR          ;;INPUT A SINGLE CHARACTER FROM THE TTY
;*      RETURN HERE   ;;CHARACTER IS ON THE STACK
;*                      ;;WITH PARITY BIT STRIPPED OFF
;

```

```

013270 011646            $RDCHR: MOV      (SP),-(SP)    ;;PUSH DOWN THE PC
013272 016666 000004 000002 MOV      4(SP),2(SP)  ;;SAVE THE PS
013300 105777 165640 1$: TSTB     #TKS      ;;WAIT FOR
013304 100375            BPL      1$          ;;A CHARACTER
013306 117766 165634 000004 MOVB     #TKB,4(SP)   ;;READ THE TTY
013314 042706 177600 000004 BIC      #C<177>,4(SP) ;;GET RID OF JUNK IF ANY
013322 026627 000004 000023 CMP      4(SP),#23    ;;IS IT A CONTROL-S?
013330 001013            BNE      3$          ;;BRANCH IF NO
013332 105777 165606 2$: TSTB     #TKS      ;;WAIT FOR A CHARACTER
013336 100375            BPL      2$          ;;LOOP UNTIL ITS THERE
013340 117746 165602 MOVB     #TKB,-(SP)   ;;GET CHARACTER
013344 042716 177600 BIC      #C177,(SP)  ;;MAKE IT 7-BIT ASCII
013350 022627 000021 CMP      (SP),#21    ;;IS IT A CONTROL-Q?
013354 001366            BNE      2$          ;;IF NOT DISCARD IT
013356 000750            BR       1$          ;;YES, RESUME
013360 026627 000004 000021 3$: CMP      4(SP),#XON    ;;IS IT A RANDOM XON?
013366 001744            BEQ      1$          ;;BRANCH IF YES
013370 026627 000004 000140 CMP      4(SP),#140  ;;IS IT UPPER CASE?
013376 002407            BLT      4$          ;;BRANCH IF YES
013400 026627 000004 000175 CMP      4(SP),#175  ;;IS IT A SPECIAL CHAR?
013406 003003            BGT      4$          ;;BRANCH IF YES
013410 042766 000040 000004 BIC      #40,4(SP)   ;;MAKE IT UPPER CASE
013416 000002 4$: RTI      ;;GO BACK TO USER

```

```

;RAN001
;RAN001

```

```

;*****
;THIS ROUTINE WILL INPUT A STRING FROM THE TTY
;CALL:
;*      RDLIN         ;;INPUT A STRING FROM THE TTY
;*      RETURN HERE   ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
;*                      ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
;

```

```

013420 010346            $RDLIN: MOV      R3,-(SP)    ;;SAVE R3
013422 012703 013526 1$: MOV      #TTYIN,R3    ;;GET ADDRESS
013426 022703 013536 2$: CMP      #TTYIN+8.,R3  ;;BUFFER FULL?

```

```

013432 101405      BLOS      4$          ;;BR IF YES
013434 104410      RDCHR                      ;;GO READ ONE CHARACTER FROM THE TTY
013436 112613      MOV      (SP)+,(R3)      ;;GET CHARACTER
013440 122713 000177 10$: CMPB      #177,(R3)      ;;IS IT A RUBOUT
013444 001003      BNE      3$          ;;SKIP IF NOT
013446 104401 001164 4$:  TYPE      .$QUES      ;;TYPE A '?'
013452 000763      BR        1$          ;;CLEAR THE BUFFER AND LOOP
013454 111337 013524 3$:  MOV      (R3),9$      ;;ECHO THE CHARACTER
013460 104401 013524      TYPE      .9$
013464 122723 000015      CMPB      #15,(R3)+      ;;CHECK FOR RETURN
013470 001356      BNE      2$          ;;LOOP IF NOT RETURN
013472 105063 177777      CLR      -1(R3)      ;;CLEAR RETURN (THE 15)
013476 104401 001166      TYPE      .$LF          ;;TYPE A LINE FEED
013502 012603      MOV      (SP)+,R3      ;;RESTORE R3
013504 011646      MOV      (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
013506 016666 000004 000002      MOV      4(SP),2(SP)      ;; FIRST ASCII CHARACTER ON IT
013514 012766 013526 000004      MOV      #TTYIN,4(SP)
013522 000002      RTI                      ;;RETURN
013524      000          9$:  .BYTE      0          ;;STORAGE FOR ASCII CHAR. TO TYPE
013525      000          .BYTE      0          ;;TERMINATOR
013526          .BLKB      8.          ;;RESERVE 8 BYTES FOR TTY INPUT
013536      136      125      015  $TTYIN: .BLKB      8.          ;;CONTROL "U"
013541      012      000          $CNTLU: .ASCIZ  /+U/<15><12>
013543      136      107      015  $CNTLG: .ASCIZ  /+G/<15><12>      ;;CONTROL "G"
013546      012      000
013550      015      012      123  $MSWR: .ASCIZ  <15><12>/SWR = /
013553      127      122      040
013556      075      040      000
013561      040      040      116  $MNEW: .ASCIZ  / NEW = /
013564      105      127      040
013567      075      040      000

```

B+

185
185A

.EVEN
.SBTTL TRAP DECODER

;;*****
; THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
; AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
; OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
; GO TO THAT ROUTINE.

013572	010046			\$TRAP: MOV	RO, -(SP)	;;SAVE RO
013574	016600	000002		MOV	2(SP),RO	;;GET TRAP ADDRESS
013600	005740			TST	-(RO)	;;BACKUP BY 2
013602	111000			MOVB	(RO),RO	;;GET RIGHT BYTE OF TRAP
013604	022700	000026		CMP	0\$TERM,RO	;;CHECK FOR OUT OF BOUNDS
013610	003002			BGT	..6	;;BR IF OK
013612	000000			HALT		;;OUT OF BOUNDS
013614	000776			BR	..2	;;HANGUP
013616	006300			ASL	RO	;;POSITION FOR INDEXING
013620	016000	013640		MOV	\$TRPAD(RO),RO	;;INDEX TO TABLE
013624	000200			RTS	RO	;;GO TO ROUTINE

;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

013626	011646			\$TRAP2: MOV	(SP),-(SP)	;;MOVE THE PC DOWN
013630	016666	000004	000002	MOV	4(SP),2(SP)	;;MOVE THE PSW DOWN
013636	000002			RTI		;;RESTORE THE PSW

.SBTTL TRAP TABLE

; THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
; BY THE "TRAP" INSTRUCTION.

					ROUTINE	
				\$TRPAD:	WORD	\$TRAP2
013640	013626			\$TYPE	;;CALL=TYPE	TRAP.1(104401) TTY TYPEOUT ROUTINE
013642	011460			\$TYPOC	;;CALL=TYPOC	TRAP.2(104402) TYPE OCTAL NUMBER (WITH LEADING ZEROS)
013644	012006			\$TYPOS	;;CALL=TYPOS	TRAP.3(104403) TYPE OCTAL NUMBER (NO LEADING ZEROS)
013646	011762			\$TYPON	;;CALL=TYPON	TRAP.4(104404) TYPE OCTAL NUMBER (AS PER LAST CALL)
013650	012022			\$TYPDS	;;CALL=TYPDS	TRAP.5(104405) TYPE DECIMAL NUMBER (WITH SIGN)
013652	012210					
013654	013056			\$GTSWR	;;CALL=GTSWR	TRAP.6(104406) GET SOFT-SWR SETTING
013656	013006			\$CKSWR	;;CALL=CKSWR	TRAP.7(104407) TEST FOR CHANGE IN SOFT-SWR
013660	013270			\$RDCHR	;;CALL=RDCHR	TRAP.10(104410) TTY TYPEIN CHARACTER ROUTINE
013662	013420			\$RDLIN	;;CALL=RDLIN	TRAP.11(104411) TTY TYPEIN STRING ROUTINE
1859 013664	014124			RESYNC	;;CALL=RSYNC	TRAP.12(104412) RESYNC PROGRAM
1860	000026			\$TERM=.	-\$TRPAD	
1861						

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1863 ;*****
1864
1865 .SBTTL INTERBOARD COMMUNICATION SUBROUTINES
1866 ;WTCMPN
1867 ;*****
1868
1869 013666 012737 010000 001436 WTCMPN: MOV #10000,ABORT ;SETUP ABORT TIMER
1870 013674 032777 001000 165516 BIT #1000,BCSR
1871 013702 001010 BNE 2# ;IF DSTATC IS ONE,WAIT FOR 0
1872
1873
1874 013704 032777 001000 165506 1# BIT #1000,BCSR ;WAIT FOR DSTATC=1
1875 013712 001017 BNE 4# ;GO AHEAD,IT HAS COME
1876 013714 005337 001436 DEC ABORT
1877 013720 001371 BNE 1# ;IF NOT STUCK IN WAIT LOOP,
1878 ;KEEP WAITING
1879 013722 000407 BR 3# ;WAITED TOO LONG,ABORT PROGRAM
1880 013724 032777 001000 165466 2# BIT #1000,BCSR ;WAIT DSTATC=0
1881 013732 001407 BEQ 4# ;GO AHEAD,IT HAS COME
1882 013734 005337 001436 DEC ABORT ;KEEP WAITING
1883 013740 001371 BNE 2#
1884
1885 013742 011637 001440 3# MOV (SP),TESTPC ;SAVE LOCATION WHERE PROGRAM
1886 ;ORIGINATED
1887 013746 104016 104000*16
1888 013750 104412 RSYNC ;RESYNCHRONIZE BOTH PROGRAMS
1889 ;FROM START
1890 013752 000207 4# RTS PC
1891
1892
1893 ;*****
1894 ;GOCMPN
1895 ;*****
1896
1897 013754 GOCMPN:
1898 013754 032777 000002 165436 BIT #2,BCSR ;IS F1 CLR?
1899 013762 001415 BEQ 1# ;IF SO,SET F1
1900 013764 017737 165430 001446 MOV BCSR,TEMP
1901 013772 042737 100000 001446 BIC #BIT15,TEMP
1902 014000 042737 000002 001446 BIC #2,TEMP ;F1 IS SET,CLR IT
1903 014006 013777 001446 165404 MOV TEMP,BCSR
1904 014014 000207 RTS PC
1905 014016 017737 165376 001446 1# MOV BCSR,TEMP
1906 014024 042737 100000 001446 BIC #BIT15,TEMP
1907 014032 052737 000002 001446 BIS #2,TEMP
1908 014040 013777 001446 165352 MOV TEMP,BCSR
1909 014046 000207 RTS PC
1910
1911

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(1)

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1913 .SBTTL CPU PRIORITY SUBROUTINES
1914 ;|*****
1915 ;|*****
1916 ;|*****
1917 ;|*****
1918 014050 CPUHI:
1919 014050 023727 001434 000126 CMP BOARD,#126 ;IS THIS CPU LSI?
1920 014056 001003 BNE 1$ ;NO,IT IS UNIBUS
1921 014060 106427 106427
1922 014062 000200 200
1923 014064 000207 RTS PC
1924 014066 012737 000340 177776 1$: MOV #340,PS ;SET HIGH PRIOR. IN UNIBUS
1925 014074 000207 RTS PC
1926
1927 ;|*****
1928 ;|*****
1929 ;|*****
1930 ;|*****
1931 014076 CPULO:
1932 014076 023727 001434 000126 CMP BOARD,#126
1933 014104 001003 BNE 1$
1934 014106 106427 106427
1935 014110 000000 0
1936 014112 000207 RTS PC
1937 014114 012737 000000 177776 1$: MOV #0,PS
1938 014122 000207 RTS PC
```

E6,

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1939      .SBTTL INTERPROCESSOR PROGRAM RESYNCHRONIZATION ROUTINE
1940      ;*****
1941      ;RSYNC
1942      ;*****
1943
1944 014124 004737 011360      RESYNC: JSR      PC,RSTVEC
1945
1946      ;MOVE TESTPC VALUE TO BDR FOR COMPANION
1947
1948 014130 013777 001440 165264      MOV      TESTPC,BDR      ; SAVE ERROR PC
1949
1950 014136 012706 001100      MOV      @STACK,SP
1951 014142 005737 001452      TST      MSTER          ;WAS THIS CPU STARTED AS MASTER?
1952 014146 001404      BEQ      MRDELY          ;YES
1953 014150 012737 000017 001444      SLDELY: MOV      @15.,TIME      ;SLAVE CPU;WAIT FOR MASTER TO REACH ITS
1954      ;RESYNC ROUTINE
1955 014156 000403      BR      WTSYNC
1956 014160 012737 000036 001444      MRDELY: MOV      @30.,TIME
1957 014166      WTSYNC:
1958 014166 005001      1#: CLR      R1
1959 014170 005301      2#: DEC      R1
1960 014172 001376      BNE      2#
1961 014174 005337 001444      DEC      TIME
1962 014200 001372      BNE      1#
1963 014202 000005      RESET
1964 014204 104401 014212      TYPE      ,65#          ;;TYPE ASCIZ STRING
1964      014210 000407      BR      64#          ;;GET OVER THE ASCIZ
1965      014230      ;;65#: .ASCIZ <CRLF>/RESYNC.../CRLF>
1965 014230 000137 002742      64#: JMP      SYNCST
1966
1967      .SBTTL ASCII MESSAGES
1968 014234      124      105      123      EM1: .ASCII /TEST 1 STATUS: MASTER/CRLF>
1968      014237      124      040      061
1968      014242      040      040      040
1968      014245      040      123      124
1968      014250      101      124      125
1968      014253      123      072      040
1968      014256      115      101      123
1968      014261      124      105      122
1968      014264      200
1969 014265      123      114      101      .ASCIZ /SLAVE FAILED TO ECHO DBR CONTENTS/
1969      014270      126      105      040
1969      014273      106      101      111
1969      014276      114      105      104
1969      014301      040      124      117
1969      014304      040      105      103
1969      014307      110      117      040
1969      014312      104      102      122
1969      014315      040      103      117
1969      014320      116      124      105
1969      014323      116      124      123
1969      014326      000
1970 014327      040      123      124      EM2: .ASCII / STATUS: MASTER/CRLF>
1970      014332      101      124      125
1970      014335      123      072      040
1970      014340      115      101      123

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F6

	014343	124	105	122	
	014346	200			
1971	014347	123	114	101	.ASCIZ /SLAVE FAILED TO ECHO 'STAT' BITS/
	014352	126	105	040	
	014355	106	101	111	
	014360	114	105	104	
	014363	040	124	117	
	014366	040	105	103	
	014371	110	117	040	
	014374	047	123	124	
	014377	101	124	047	
	014402	040	102	111	
	014405	124	123	000	
1972	014410	040	123	124	EM3: .ASCII / STATUS: MASTER/<CRLF>
	014413	101	124	125	
	014416	123	072	040	
	014421	115	101	123	
	014424	124	105	122	
	014427	200			
1973	014430	106	101	111	.ASCIZ /FAILED TO INTR ON A 'DATI' /
	014433	114	105	104	
	014436	040	124	117	
	014441	040	111	116	
	014444	124	122	040	
	014447	117	116	040	
	014452	101	040	047	
	014455	104	101	124	
	014460	111	047	000	
1974	014463	040	123	124	EM4: .ASCII / STATUS: MASTER/<CRLF>
	014466	101	124	125	
	014471	123	072	040	
	014474	115	101	123	
	014477	124	105	122	
	014502	200			
1975	014503	123	124	101	.ASCIZ /STATUS ER ON 'DATI' /
	014506	124	125	123	
	014511	040	105	122	
	014514	040	117	116	
	014517	040	047	104	
	014522	101	124	111	
	014525	047	000		
1976	014527	040	123	124	EM5: .ASCII / STATUS: MASTER/<CRLF>
	014532	101	124	125	
	014535	123	072	040	
	014540	115	101	123	
	014543	124	105	122	
	014546	200			
1977	014547	127	117	122	.ASCIZ /WORD COUNT ER ON 'DATI' /
	014552	104	040	103	
	014555	117	125	116	
	014560	124	040	105	
	014563	122	040	117	
	014566	116	040	047	
	014571	104	101	124	
	014574	111	047	000	
1978	014577	040	123	124	EM6: .ASCII / STATUS: MASTER/<CRLF>
	014602	101	124	125	

	014605	123	072	040	
	014610	115	101	123	
	014613	124	105	122	
	014616	200			
1979	014617	102	125	106	.ASCIZ /BUFFER ADRS ER ON 'DATI' /
	014622	106	105	122	
	014625	040	101	104	
	014630	122	123	040	
	014633	105	122	040	
	014636	117	116	040	
	014641	047	104	101	
	014644	124	111	047	
	014647	000			
1980	014650	040	123	124	EM7: .ASCII / STATUS: SLAVE/<CRLF>
	014653	101	124	125	
	014656	123	072	040	
	014661	123	114	101	
	014664	126	105	200	
1981	014667	106	101	111	.ASCIZ /FAILED TO INTR ON A 'DATO' /
	014672	114	105	104	
	014675	040	124	117	
	014700	040	111	116	
	014703	124	122	040	
	014706	117	116	040	
	014711	101	040	047	
	014714	104	101	124	
	014717	117	047	000	
1982	014722	040	123	124	EM10: .ASCII / STATUS: SLAVE/<CRLF>
	014725	101	124	125	
	014730	123	072	040	
	014733	123	114	101	
	014736	126	105	200	
1983	014741	123	124	101	.ASCIZ /STATUS ER ON 'DATO' /
	014744	124	125	123	
	014747	040	105	122	
	014752	040	117	116	
	014755	040	047	104	
	014760	101	124	117	
	014763	047	000		
1984	014765	040	123	124	EM11: .ASCII / STATUS: SLAVE/<CRLF>
	014770	101	124	125	
	014773	123	072	040	
	014776	123	114	101	
	015001	126	105	200	
1985	015004	127	117	122	.ASCIZ /WORD COUNT ER ON 'DATO' /
	015007	104	040	103	
	015012	117	125	116	
	015015	124	040	105	
	015020	122	040	117	
	015023	116	040	047	
	015026	104	101	124	
	015031	117	047	000	
1986	015034	040	123	124	EM12: .ASCII / STATUS: SLAVE/<CRLF>
	015037	101	124	125	
	015042	123	072	040	
	015045	123	114	101	
	015050	126	105	200	

1987	015053	102	125	106		.ASCIZ /BUFFER ADRS ER ON 'DATO' /
	015056	106	105	122		
	015061	040	101	104		
	015064	122	123	040		
	015067	105	122	040		
	015072	117	116	040		
	015075	047	104	101		
	015100	124	117	047		
	015103	000				
1988	015104	040	123	124	EM13:	.ASCII / STATUS: SLAVE/<CRLF>
	015107	101	124	125		
	015112	123	072	040		
	015115	123	114	101		
	015120	126	105	200		
1989	015123	104	101	124		.ASCIZ /DATA ER ON 'DATO' /
	015126	101	040	105		
	015131	122	040	117		
	015134	116	040	047		
	015137	104	101	124		
	015142	117	047	000		
1990	015145	123	124	101	EM14:	.ASCII /STATUS: SLAVE/<CRLF>
	015150	124	125	123		
	015153	072	040	123		
	015156	114	101	126		
	015161	105	200			
1991	015163	122	105	101		.ASCIZ /READY BIT WAS SET - IT SHOULD BE CLEAR/<CRLF>
	015166	104	131	040		
	015171	102	111	124		
	015174	040	127	101		
	015177	123	040	123		
	015202	105	124	040		
	015205	055	040	111		
	015210	124	040	123		
	015213	110	117	125		
	015216	114	104	040		
	015221	102	105	040		
	015224	103	114	105		
	015227	101	122	200		
	015232	000				
1992	015233	040	123	124	EM15:	.ASCII / STATUS: MASTER/<CRLF>
	015236	101	124	125		
	015241	123	072	040		
	015244	115	101	123		
	015247	124	105	122		
	015252	200				
1993	015253	115	101	123		.ASCII /MASTER CANNOT START COMMUNICATION WITH SLAVE- /
	015256	124	105	122		
	015261	040	103	101		
	015264	116	116	117		
	015267	124	040	123		
	015272	124	101	122		
	015275	124	040	103		
	015300	117	115	115		
	015303	125	116	111		
	015306	103	101	124		
	015311	111	117	116		
	015314	040	127	111		

	015317	124	110	040	
	015322	123	114	101	
	015325	126	105	055	
1994	015330	127	101	111	.ASCIZ /WAITING FOR DSTATC /<CRLF>
	015333	124	111	116	
	015336	107	040	106	
	015341	117	122	040	
	015344	104	123	124	
	015347	101	124	103	
	015352	040	200	000	
1995	015355	123	124	125	EM16: .ASCIZ /STUCK WAITING FOR COMPANION FOR GO-AHEAD/<CRLF>
	015360	103	113	040	
	015363	127	101	111	
	015366	124	111	116	
	015371	107	040	106	
	015374	117	122	040	
	015377	103	117	115	
	015402	120	101	116	
	015405	111	117	116	
	015410	040	106	117	
	015413	122	040	107	
	015416	117	055	101	
	015421	110	105	101	
	015424	104	200	000	
1996	015427	124	105	123	EM17: .ASCII /TEST 5 TIME OUT ERROR-/
	015432	124	040	065	
	015435	040	124	111	
	015440	115	105	040	
	015443	117	125	124	
	015446	040	105	122	
	015451	122	117	122	
	015454	055			
1997	015455	123	114	101	.ASCIZ /SLAVE SHOULD NOT HAVE INTERRUPTED/<CRLF>
	015460	126	105	040	
	015463	123	110	117	
	015466	125	114	104	
	015471	040	116	117	
	015474	124	040	110	
	015477	101	126	105	
	015502	040	040	111	
	015505	116	124	105	
	015510	122	122	125	
	015513	120	124	105	
	015516	104	200	000	
1998					
1999	015521	040	123	124	EM20: .ASCII / STATUS: MASTER/<CRLF>
	015524	101	124	125	
	015527	123	072	040	
	015532	115	101	123	
	015535	124	105	122	
	015540	200			
2000	015541	115	101	123	.ASCII /MASTER IS LEFT WAITING FOR INTERRUPT TO OCCUR/
	015544	124	105	122	
	015547	040	111	123	
	015552	040	114	105	
	015555	106	124	040	
	015560	127	101	111	

	015563	124	111	116	
	015566	107	040	106	
	015571	117	122	040	
	015574	111	116	124	
	015577	105	122	122	
	015602	125	120	124	
	015605	040	124	117	
	015610	040	117	103	
	015613	103	125	122	
2001	015616	126	111	101	.ASCIZ /VIA ATTN SET/<CRLF>
	015621	040	101	124	
	015624	124	116	040	
	015627	123	105	124	
	015632	200	000		
2002	015634	124	105	123	EM21: .ASCII /TEST 2 STATUS: MASTER/<CRLF>
	015637	124	040	062	
	015642	040	040	040	
	015645	123	124	101	
	015650	124	125	123	
	015653	072	040	115	
	015656	101	123	124	
2003	015661	105	122	200	
	015664	105	122	122	.ASCIZ /ERROR BIT IN MASTER CSR NOT CLEAR/
	015667	117	122	040	
	015672	102	111	124	
	015675	040	111	116	
	015700	040	115	101	
	015703	123	124	105	
	015706	122	040	103	
	015711	123	122	040	
	015714	116	117	124	
	015717	040	103	114	
	015722	105	101	122	
	015725	000			
2004	015726	102	125	122	EM22: .ASCIZ /BURST DATA LATE BIT OF EIR WAS NOT SET/<CRLF>
	015731	123	124	040	
	015734	104	101	124	
	015737	101	040	114	
	015742	101	124	105	
	015745	040	102	111	
	015750	124	040	117	
	015753	106	040	105	
	015756	111	122	040	
	015761	127	101	123	
	015764	040	116	117	
	015767	124	040	123	
	015772	105	124	200	
	015775	000			
2005					
2006	015776	200	124	105	MSG1: .ASCIZ <CRLF> /TEST 3-BLOCK MODE XFERS/<CRLF>
	016001	123	124	040	
	016004	063	055	102	
	016007	114	117	103	
	016012	113	040	115	
	016015	117	104	105	
	016020	040	130	106	
	016023	105	122	123	

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2007 016026      200      000
      016030      200      124      105 MSG2:  .ASCIZ  <CRLF> /TEST 4-BURST MODE XFERS/<CRLF>
      016033      123      124      040
      016036      064      055      102
      016041      125      122      123
      016044      124      040      115
      016047      117      104      105
      016052      040      130      106
      016055      105      122      123
      016060      200      000
2008 016062      200      124      105 MSG3:  .ASCIZ  <CRLF>/TEST 5-BURST DATA LATE/<CRLF>
      016065      123      124      040
      016070      065      055      102
      016073      125      122      123
      016076      124      040      104
      016101      101      124      101
      016104      040      114      101
      016107      124      105      200
      016112      000
2009 016113      105      122      122 DM1:  .ASCIZ  /ERRPC  BUSADR  EXPCT  RCVD/
      016116      120      103      040
      016121      040      040      102
      016124      125      123      101
      016127      104      122      040
      016132      040      105      130
      016135      120      103      124
      016140      040      040      040
      016143      122      103      126
      016146      104      000
2010 016150      105      122      122 DM2:  .ASCIZ  /ERRPC  MEMADR  EXPCT  RCVD/
      016153      120      103      040
      016156      040      040      115
      016161      105      115      101
      016164      104      122      040
      016167      040      105      130
      016172      120      103      124
      016175      040      040      040
      016200      122      103      126
      016203      104      000
2011 016205      105      122      122 DM3:  .ASCIZ  /ERRPC/
      016210      120      103      000
2012
2013 016214      001116      001122      001124 DT1:  .EVEN
      016222      001126      000000      $ERRPC,$BDADR,$GDDAT,$BDDAT,0
2014 016226      001116      000000      DT2:  $ERRPC,0
2015 016232      001440      000000      DT3:  TESTPC,0
2016
2017 ;*****
      ;'DBUF' IS THE WORKING AREA IN MEM FOR ALL NPR OPERATIONS
2018 ;*****
2019 016236      000000      DBUF:  0 ;1ST ADRS OF DATA BUFFER
2020      000001      .END

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ABORT	001436	EM10	014722	PS	= 177776	SW2	= 000004	\$FILLS	001155
BAR	001416	EM11	014765	PSW	= 177776	SW3	= 000010	\$GDADR	001120
BDR	001422	EM12	015034	PWRVEC	= 000024	SW4	= 000020	\$GDDAT	001124
BIT0	= 000001	EM13	015104	RCVTMO	001500	SW5	= 000040	\$GET42	011254
BIT00	= 000001	EM14	015145	RDCHR	= 104410	SW6	= 000100	\$GTSWR	013056
BIT01	= 000002	EM15	015233	RDLIN	= 104411	SW7	= 000200	\$HD	= 000003
BIT02	= 000004	EM16	015355	RESVEC	= 000010	SW8	= 000400	\$ICNT	001104
BIT03	= 000010	EM17	015427	RESYNC	014124	SW9	= 001000	\$INTAG	001135
BIT04	= 000020	EM2	014327	RPRAM	001464	SYNCST	002742	\$ITEMB	001114
BIT05	= 000040	EM20	015521	RSTVEC	011360	TBITVE	= 000014	\$LF	001166
BIT06	= 000100	EM21	015634	RSYNC	= 104412	TEMP	001446	\$LPADR	001106
BIT07	= 000200	EM22	015726	RTRN	003462	TESTPC	001440	\$LPERR	001110
BIT08	= 000400	EM3	014410	R6	= 000006	TIME	001444	\$MNEW	013561
BIT09	= 001000	EM4	014463	R7	= 000007	TKVEC	= 000060	\$MSWR	013550
BIT1	= 000002	EM5	014527	SAVE	001450	TOTAL	001442	\$NULL	001154
BIT10	= 002000	EM6	014577	SCOPE	= 000004	TPVEC	= 000064	\$OCNT	012204
BIT11	= 004000	EM7	014650	SETUP2	001704	TRAPVE	= 000034	\$OMODE	012206
BIT12	= 010000	EOPT	011152	SETUP3	001730	TRTVEC	= 000014	\$OVER	012772
BIT13	= 020000	EOPTA	011320	SETVEC	011340	TYPDS	= 104405	\$PASS	001100
BIT14	= 040000	EOPTB	011326	SINIT1	006162	TYPE	= 104401	\$QUES	001164
BIT15	= 100000	ERROR	= 104000	SINIT2	006374	TYPOC	= 104402	\$RDCHR	013270
BIT2	= 000004	ERRVEC	= 000004	SLBRD	007420	TYPON	= 104404	\$RDLIN	013420
BIT3	= 000010	GOCMPN	013754	SLDELY	014150	TYPOS	= 104403	\$ROSZ	= 000010
BIT4	= 000020	GTSWR	= 104406	SLVFIN	011156	WCR	001414	\$RTNAD	011276
BIT5	= 000040	HT	= 000011	SL1STR	006330	WTCMPN	013666	\$SCOPE	012714
BIT6	= 000100	ICOUNT	001454	STACK	= 001100	WTSYNC	014166	\$SETUP	= 000107
BIT7	= 000200	INTADR	001410	START	001522	XMITMO	001472	\$STUP	= 177777
BIT8	= 000400	IOTVEC	= 000020	START1	001506	XPRAM	001456	\$SVLAD	012756
BIT9	= 001000	LDBUF	011416	START2	001514	\$AUTOB	001134	\$SWR	= 122000
BOARD	001434	LF	= 000012	STKLMT	= 177774	\$BDADR	001122	\$SWRMK	= 000000
BPTVEC	= 000014	MINIT1	002760	STST1	006320	\$BDDAT	001126	\$TERM	= 000026
BRDTYP	002056	MINIT2	003226	STST2	006512	\$BELL	001160	\$TKB	001146
CKSWR	= 104407	MORS	002524	STST3	006572	\$CHARC	011756	\$TKS	001144
CLRBUF	011400	MRDELY	014160	STST4	007506	\$CKSWR	013006	\$TN	= 000001
CNT	001430	MSBRD	004550	STST5	010404	\$CMTAG	001100	\$TPB	001152
CPUHI	014050	MSG1	015776	SWR	001140	\$CM3	= 000000	\$TPFLG	001157
CPULO	014076	MSG2	016030	SWRCK	012550	\$CNTLG	013543	\$TPS	001150
CR	= 000015	MSG3	016062	SWREG	000176	\$CNTLU	013536	\$TRAP	013572
CRLF	= 000200	MSTER	001452	SW0	= 000001	\$CRLF	001165	\$TRAP2	013626
CSR	001420	MTPS	= 106427	SW00	= 000001	\$DBLK	012424	\$TRP	= 000013
DBUF	016236	MTST1	003106	SW01	= 000002	\$DOAGN	011274	\$TRPAD	013640
DDISP	= 177570	MTST2	003526	SW02	= 000004	\$DTBL	012414	\$TSTNM	001102
DM1	016113	MTST3	003652	SW03	= 000010	\$ENDAD	011264	\$TTYIN	013526
DM2	016150	MTST4	004620	SW04	= 000020	\$ENDCT	011232	\$TYPDS	012210
DM3	016205	MTST5	005502	SW05	= 000040	\$ENDMG	011303	\$TYPE	011460
DISPLA	001142	NUM	001432	SW06	= 000100	\$ENULL	011300	\$TYPEC	011630
DISPRE	000174	PIRQ	= 177772	SW07	= 000200	\$EOP	011202	\$TYPEX	011760
DRVCT0	001424	PIRQVE	= 000240	SW08	= 000400	\$EOPCT	011224	\$TYPOC	012006
DRVCT2	001426	PRO	= 000000	SW09	= 001000	\$ERFLG	001103	\$TYPON	012022
DRVECT	001412	PR1	= 000040	SW1	= 000002	\$ERMAX	001115	\$TYPOS	011762
DSWR	= 177570	PR2	= 000100	SW10	= 002000	\$ERROR	012434	\$XOFF	= 000023
DT1	016214	PR3	= 000140	SW11	= 004000	\$ERRPC	001116	\$XON	= 000021
DT2	016226	PR4	= 000200	SW12	= 010000	\$ERRTB	001170	\$XTSTR	012720
DT3	016232	PR5	= 000240	SW13	= 020000	\$ERTTY	012560	\$GET4	= 000000
EMTVEC	= 000030	PR6	= 000300	SW14	= 040000	\$ERTTL	001112	\$FILL	012205
EM1	014234	PR7	= 000340	SW15	= 100000	\$FILLC	001156		

M6

CZDRKBO DR11-W INTRPROC EXER MACRO M1200 27 DEC-83 11:11 PAGE 103-8
SYMBOL TABLE

SEQ 77

. ABS. 016240 000
000000 001

ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 65456 WORDS (0 PAGES)

DYNAMIC MEMORY: 20060 WORDS (77 PAGES)

ELAPSED TIME: 00:02:21

CZDRKB.BIN,CZDRKB.LST/-SP=SYSMAC.SML,CZDRKB.P11