

DR11C

COMMUNICATION EXERCISER
MD-11-DZDRF-A

EP DZDRF A DL

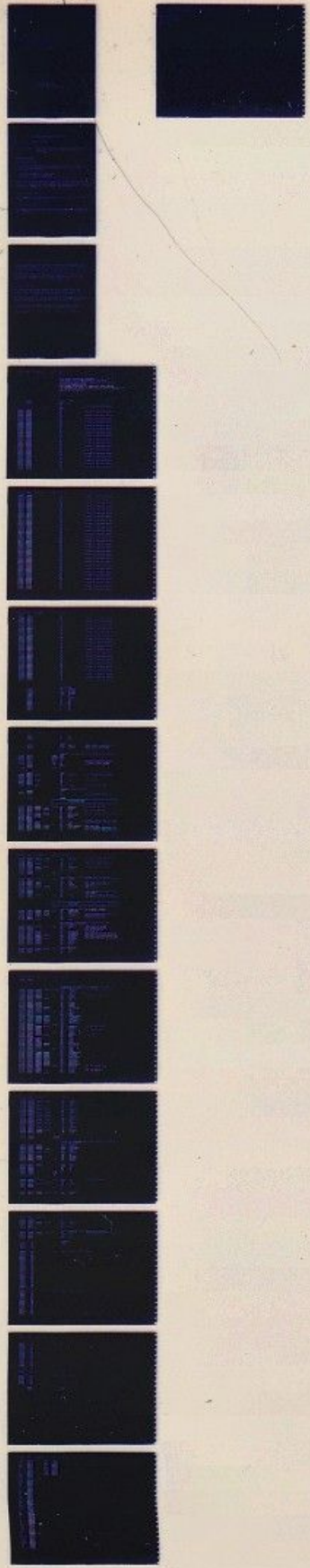
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IDENTIFICATION

PRODUCT CODE MAINDEC-11-DZDRF-A-D
PRODUCT NAME DUAL DR11C COMMUNICATION EXERCISER
DATE CREATED DECEMBER 4, 1973
MAINTAINER IPG COUSTON SYSTEMS
AUTHOR R.C. BALDWIN

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DUAL DR11C COMMUNICATION EXERCISER

Memory Storage: 000000 - 002500

Loading Procedure: (Paper tape supplied) loaded using normal binary procedure). Both processors are loaded with MD-11-DZDRF-A.

Starting Procedures

Starting Address 200:

For non-standard vectors, device addresses & priority interrupt levels. The teletype will ask the following questions to which the operator must respond:

First device address = 6 characters

First int. vector = 3 characters

Priority int. level = Input int. level of device 4-7

If an error is encountered while inputting the device address or int. vector, the operator may type a rub out and repeat entire line inputting. When line is complete or if no changes (from standard device), the operator must terminate the line with a carriage return.

Starting Address 210:

Start address 210 in processor designated to echo data for the transmitter module in adjacent computer.

Starting Address 220:

Designates this processor the echo for the transmitter (S/A 210). No data checking is done in this mode, only received data is returned to the transmitter.

Control & Status Register Functions:

Since no transmit & receive flags are specifically designated, the program must transmit its own flags. After data is transmitted from the transmitter module, Bit 01 is set in the transmitter's CSR which alerts the echoing module of data transmitted.

The receiving module then responds to a request "A" interrupt and notifies the transmitter that data was received by setting Bit 00 in its CSR. The data is then transferred back to the transmit module which raises a request "B" int. in the transmit module.

Exerciser Testing:

The returned data is then checked against the original data sent. A data error will cause a halt and the operator may examine location "STO" for data returned and location "Count" for data sent.

The data transferred in a binary count pattern from 000000 to 111111. The exerciser will loop continuously until halted by the operator or upon a data failure.

To designate or redesignate the DR11's from transmitter to echo or echo to transmitter, the program must be halted and restarted.

Upon a successful full-count pattern transfer, the teletype will report "PASS".

DUAL DRIC COMMUNICATION EXERCISER
BOTH DRIC'S ARE INTERCONNECTED TO COMMUNICATE
BIDIRECTIONAL OVER 2 SCOP CABLES, WITH OUTS CONNECTED
TO INS ON ADJACENT MODULES
BOTH PDP-11 PROCESSORS ARE LOADED WITH MOD 11 DZXXX-A,
ONE PROCESSOR AND DRIC IS DESIGNATED THE TRANSMITTER (S/A 21P)
AND THE 2ND THE ECHO (S/A 22B); THE ECHO MUST BE STARTED
BEFORE THE TRANSMITTER;

000000
000100

000000 000002
000002 000000
000004 000000
000006 000000
000010 000012
000012 000000
000014 000016
000016 000000
000020 000022
000022 000000
000024 000026
000026 000000
000030 000032
000032 000000
000034 000036
000036 000000
000040 000042
000042 000000
000044 000046
000046 000000
000050 000052
000052 000000
000054 000056
000056 000000
000060 000062
000062 000000
000064 000066
000066 000000
000070 000072
000072 000000
000074 000076
000076 000000
000100 000102
000102 000000
000104 000106

REPT 100
END

TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
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TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR
TRAPPED TO PREVIOUS VECTOR

000006
000007
177776

SP 0X6
PC 0X7
PS 0177776

167770
167772
167774

|
|DR11C
DCSR 0167770 |DR11C CONTROL AND STATUS REG;
DOUTB 0167772 |DR11C OUTPUT BUFFER REG;
DINB 0167774 |DR11C INPUT BUFFER REG;
|

000400 167770
000402 167772
000404 167774
000406 000200
000410 000110
000412 000114
000600
000600

|INDIRECT ADDRESSING FOR NON-STANDARD DEVICE ADDRESSES
XDCSR1 DCSR
XDOUTB1 DOUTB
XDINB1 DINB
PRIV1 200 |PRIORITY INTERRUPT VECTOR #1
VEC1 110 |INTERRUPT VECTOR ADDRESS
VEC21 114 |INTERRUPT VECTOR ADDRESS
|

STACK1

000000
|

000200
000200 004507 001144
000204 000000
000206 000240
000210 000107 001002
000214 000240
000216 000240
000220 000107 000254

|
| 0200
JSR RD,VECTOR |INPUT NON-STANDARD ADDRESS
HLT
NOP
JMP ECHO |RON ECHO MODE
NOP
NOP
JMP TRMTR |RON TRANSMITTER MODE
|

|INTERRUPT VECTOR POINTERS

000300
000300 000000
000302 000340

001000

| 0300
|
340 |BRING PROCESSOR STATUS TO 7
|
| 01000

|.....
| TRANSMITTER MODE
|.....

001000 012706 000000
001004 012707 000300 176764
001012 032707 000001 176250
001020 001774
001022 012777 001150 177360
001030 012777 001150 177354
001036 005777 177336
001042 001401
001044 000000
001046 005007 000074
001052 005207 000070
001056 016777 000004 177316
001064 052777 000102 177306
001072 016767 177310 176676
001100 000001

TRMTR1 MOV #STACK,SP |INITIALIZE THE STACK
MOV #340,PS
BIT 01,SR |WAIT FOR GO COMMAND
BEQ ,06
MOV #SERB,OVEC |SET INT, SERVICE ROUTINE FOR REG A00
MOV #SERB,OVEC2
TST #XDCSR
BEQ ,04
HLT
CLR COUNT |CONTROL + STATUS REG; NOT CLEAR
|CLEAR INCREMENTAL PATTERN REG;
CVI INC COUNT
MOV COUNT,#XDOUTB |SEND DATA OUT
BIS #102,#XDCSR |NOTIFY ADJACENT PROCESSOR THAT
MOV PRIV,PS |DATA IS READY +ENABLE REG A INT
WAIT |WAIT FOR A DATA TRANSMITTED FLAG


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#01102 052777 000040 177270      BIS      #40,0XDCSR      ISET REG B ENABLE FOR N.D.R.
#01110 016707 177272 176660      MOV      PRIV,PS
#01116 000001      WAIT
#01120 005707 000022      TST      COUNT      IWAIT FOR A REG B INT
#01124 001352      BNE      CY          IWAIT FOR A NEW DATA READY
#01126 012707 002317 001000      MOV      @PASS,MES   IPRINT PASS WHEN COMPLETE
#01134 004307 000704      JSR      R3,PRINT
#01140 000107 177702      JMP      CY=4
#01144 000000      STOI    P
#01146 000020      COUNTI 2
|
|SERVICE REQUEST AND INTERRUPTS (BIT 7&15 OF CSR)
SERBI  TSTB    0XDCSR      ICHECK FOR BIT 7 (REG A) INTERRUPT
#01150 105777 177224      BPL      ,+6
#01154 100002      JMP      CLRX
#01156 000107 000020      CLR      0XDCSR      IBIT 7 SET SO CLR BIT 1 OF CSR
#01162 005077 177212      CLR      0XDCSR      ICLR FLAG + INT, ENABLE
#01166 019707 177212 177750      MOV      @XDING,STO  IREAD DATA IN
#01174 026707 177740 177742      CMP      COUNT,STO  IVERIFY DATA
#01202 001401      BEQ      ,+4
#01204 000000      HLT
#01206 000002      RTI
#01210 005077 177104      CLRX    0XDCSR
#01214 000002      RTI
|
|.....
|                               ECHO MODE
|.....
|
IRUN ECHO MODE OF DATA FROM ADJACENT COMPUTER
#01216 012777 001294 177104  ECHOI  MOV      @SERA,0VEC  ISET FOR REG M INTS,
#01224 012777 001294 177100      MOV      @SERA,0VEC2
#01232 016707 177190 176936      MOV      PRIV,PS    IDROP PRICESSOR STATUS FOR DR, INT,
#01240 012777 000040 177132      MOV      #40,0XDCSR IENABLE A REG INTS,
#01246 000001      WAIT
#01250 000107 177742      JMP      ECHO
|
|SERVICE REG. B INTERRUPTS BY ECHOING DATA BACK
|TO INTERRUPTING DEVICE
SERAI  TST      0XDCSR      ITEST THAT BIT 15 SET
#01254 005777 177120      BHI      ,+4         IBIT 15 NEW DATA READY
#01260 100401      HLT                IBIT 15 OF CSR SET
#01262 000000
#01264 019700 177114      MOV      @XDING,R0  IIN TO REG B
#01270 010077 177100      MOV      R0,0XDOUT0 IDATA WAS TRANSMITTED SEND BACK
#01274 052777 000001 177076      BIS      #1,0XDCSR  ISET CSR 0 TO INFORM SENDER THAT
#01302 004407 000022      JSR      R4,TIME    IWAIT FOR MASTER TO CLR ITS CSR,
#01306 012777 000002 177004      MOV      #2,0XDCSR ICLR CORR, SET CSRS AND CLR INT. EN,
#01314 004407 000010      JSR      R4,TIME
#01320 012700 000000      MOV      @STACK,SP
#01324 000107 177000      JMP      ECHO
|
|TIME LOOP DELAY
#01330 012707 000090 000010  TIMEI  MOV      #50,DCNT
#01336 005307 000004      DEC      DCNT
#01342 001375      BNE      ,+4

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001344 000274
001346 000070

DCNTI

MYS M4

F

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ISUBROUTINE FOR INPUTTING NON-STANDARD VECTORS, DEVICE
ADDRESSES AND PRIORITY INT. LEVELS.

001350	012707	002232	000996	VECTORI	MOV	RASK1, MES	ASK FOR FIRST DEVICE ADDRESS
001356	004307	000402			JSR	R3, PRINT	
001362	005007	000452			CLR	ADDRES	
001366	004107	000244		MODI	JSR	R1, REC	RECIEVING A CHARACTER
001372	004307	000012			JSR	R3, ECH	
001376	022707	000219	000990		CMP	#219, HLD	TEST FOR A C.R.
001404	001410				BEO	SET	
001406	006307	000420			ASL	ADDRES	
001412	006307	000422			ASL	ADDRES	
001416	006307	000410			ASL	ADDRES	
001422	042707	177770	000924		BIC	#177770, HLD	
001430	066707	000220	000402		ADD	HLD, ADDRES	
001436	000107	177724			JMP	MOD	
001442	005707	000372		SEYI	TST	ADDRES	
001446	001417				BEO	STRB	
001450	016707	000304	176722		MOV	ADDRES, XDCSR	
001456	062707	000002	000394		ADD	#2, ADDRES	
001464	016707	000390	176710		MOV	ADDRES, XDOUTR	
001472	062707	000002	000340		ADD	#2, ADDRES	
001500	016707	000334	176676		MOV	ADDRES, XDINS	
001506	000240			STRBI	NOP		
001510	012707	002200	000410		MOV	RASK2, MES	ASK FOR INT VECTOR
001516	004307	000322			JSR	R3, PRINT	
001522	005007	000314			CLR	VADDR	CLR VECTOR ADDRES
001526	004107	000404		MODAI	JSR	R1, REC	
001532	004307	000452			JSR	R3, ECH	
001536	022707	000219	000410		CMP	#219, HLD	TEST FOR A C.R.
001544	001410				BEO	SEYA	
001546	006307	000270			ASL	VADDR	
001552	006307	000204			ASL	VADDR	
001556	006307	000200			ASL	VADDR	
001562	042707	177770	000304		BIC	#177770, HLD	
001570	066707	000300	000244		ADD	HLD, VADDR	
001576	000107	177724			JMP	MODA	
001602	005707	000234		SEYAI	TST	VADDR	
001606	001430				BEO	STRPA	
001610	042707	177000	000224		BIC	#177000, VADDR	
001616	016707	000220	176504		MOV	VADDR, VEC	
001624	062707	000002	000210		ADD	#2, VADDR	
001632	012777	000340	000202		MOV	#340, #VADDR	
001640	062707	000002	000174		ADD	#2, VADDR	
001646	016707	000170	176536		MOV	VADDR, VEC2	
001654	062707	000002	000160		ADD	#2, VADDR	
001662	012777	000340	000192		MOV	#340, #VADDR	
001670	012707	002270	000236	STRBAI	MOV	RASK3, MES	ASK FOR VECTOR LEVEL
001676	004307	000142			JSR	R3, PRINT	
001702	004107	000230			JSR	R1, REC	REC ONE CHARACTER
001706	004307	000270			JSR	R3, ECH	ECHO CHARACTER
001712	022707	000219	000234		CMP	#219, HLD	

001720	001487				BEG	,+20	
001722	022707	000204	000224		CHP	0204,HLD	
001730	001084				BNE	,+12	
001732	012707	000140	170446		MOV	0140,PRIV	!SET PRIORITY AT 3
001740	000205				RTS	R5	
001742	022707	000205	000204		CHP	0205,HLD	
001750	001084				BNE	,+12	
001752	012707	000200	170426		MOV	0200,PRIV	
001760	000205				RTS	R5	
001762	022707	000206	000104		CHP	0206,HLD	
001770	001084				BNE	,+12	
001772	012707	000240	170406		MOV	0240,PRIV	
002000	000205				RTS	R5	
002002	022707	000207	000144		CHP	0207,HLD	
002010	001084				BNE	,+12	
002012	012707	000300	170366		MOV	0300,PRIV	
002020	000205				RTS	R5	
002022	012707	002315	000104		MOV	00U,MES	
002030	004367	000010			JSR	R3,PRINT	
002034	000107	177030			JMP	STRBA	!TRY AGAIN
002040	000000			ADDRESS	B		
002042	000000			VADDR	B		
							!PRINT DATA SPECIFIED BY LEADING ADDRESS IN REGISTER 4
							!UNTIL TERMINATED BY (0)
002044	016704	000004		PRINT	MOV	MES,R4	
002050	112407	000050			MOV	(R4)+,DBUF	
002054	122707	000100	000050		CHPB	0100,DBUF	
002062	001422				BEG	DONE	
002064	122707	000045	000040		CHPB	045,DBUF	
002072	001084				BNE	OUT	
002074	004207	000050			JSR	R2,LPCR	
002100	000107	177744			JMP	PRINT+4	
002104	004567	000002		OUT	JSR	R5,PRY	
002110	000757				BR	PRINT+4	
002112	116707	000014	175446	PRY	MOV	DBUF,TYDB	
002120	105707	175440			TSTB	TYSR	
002124	100375				BPL	,+4	
002126	000205				RTS	R5	
002130	000203			DONE	RTS	R3	
002132	000000			DBUF	B		
002134	000000			MES	B		
002136	105707	175410		REC	TSTB	TKS	!WAIT FOR KEYBOARD
002142	100375				BPL	,+4	
002144	016707	175412	000002		MOV	TKB,HLD	
002152	000201				RTS	R1	
002154	000000			HLD	B		
002156	012707	000215	175402	LPCR	MOV	0215,TYDB	
002164	105707	175374			TSTB	TYSR	

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702170 100375
702172 012707 000212 175300
702200 105707 175300
702204 100375
702206 000202

RPL ,04
MOV 0212,TVDR
TSYB TVSR
RPL ,04
RTS R2

702210 016707 175340 175350 ECHI
702216 105707 175342
702222 100375
702224 000203

ECHO CHARACTERS IN TELETYPE BUFFER REGISTER
(READER BUFFER TO PRINTER BUFFER)
(TEST PRINTER STATUS)
MOV YKB,TVDB
TSYB TVSR
RPL ,04
RTS R3

702226 000
702227 045
702230 045
702231 100

[T0] ,ASCII /XX0/ (INITIALIZE TELEPRINTER

702232 045
702233 100
702234 111
702235 122
702236 123
702237 124
702240 040
702241 104
702242 105
702243 126
702244 111
702245 103
702246 105
702247 040
702250 101
702251 104
702252 104
702253 122
702254 105
702255 123
702256 075
702257 100

ASK1 ,ASCII /XFIRST DEVICE ADDRESS0/

702260 045
702261 111
702262 110
702263 124
702264 056
702265 040
702266 126
702267 105
702270 103
702271 124
702272 117
702273 122
702274 075
702275 100

ASK2 ,ASCII /XINT; VECTOR00/

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702276 045
 702277 111
 702300 116
 702301 124
 702302 096
 702303 120
 702304 122
 702305 111
 702306 117
 702307 122
 702310 111
 702311 124
 702312 131
 702313 075
 702314 100

ASKSI ,ASCII /XINT,PRIORIVV60/

702315 077
 702316 100

QUI ,ASCII /70/

702317 120
 702320 101
 702321 123
 702322 123
 702323 045
 702324 100

PASSI ,ASCII /PASSX0/

702326
 700001

,EVEN
,END

ADDRES	002040	TYDB	177566
ASK1	002232	TYBR	177564
ASK2	002200	VADDR	002042
ASK3	002270	VEC	000410
CLR X	001210	VEC2	000412
COUNT	001140	VECTOR	001350
CV	001052	XDCSR	000400
DBUF	002132	XDINB	000404
DCNT	001346	XDOU TB	000402
DCSR	107770		
DINB	107774		
DONE	002130		
DOUTR	107772		
ECH	002210		
ECHO	001210		
HL D	002154		
HLT	000000		
ITP	002227		
LFCH	002196		
MES	002134		
MOD	001306		
MODA	001526		
NOP	000240		
OUT	002104		
PASS	002317		
PC	000007R		
PRINT	002044		
PRIV	000406		
PRY	002112		
PS	177776		
PU	002315		
R0	000000R		
R1	000001R		
R2	000002R		
R3	000003R		
R4	000004R		
R5	000005R		
REC	002130		
SENA	001254		
SENB	001150		
SET	001442		
SETA	001602		
SP	000006R		
SR	177570		
STACK	000600		
STD	001144		
STRB	001506		
STRBA	001670		
TIME	001330		
TKB	177562		
TKS	177560		
TRMTER	001000		

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ERRORS DETECTED 0

RUNTIME 2 SECONDS

5K CORE USED