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IDENTIFICATION

PRODUCT CODE: AC-E842E-MC
PRODUCT NAME: CXLPCEO LPS11/LPS-VC MODULE
PRODUCT DATE: SEPTEMBER 1978
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT:

LPC IS A IOMOD THAT EXERCISES THE LPS-VC SCOPE CONTROLLER. A CONFIDENCE LOGIC TEST IS EXECUTED ON THE CONTROL/STATUS, X POSITION AND Y POSITION REGISTERS. ALL LOGIC ERRORS ARE REPORTED TO THE CONSOLE TELETYPE. THE MAJOR PORTION OF THIS MODULE IS DEFERRED TO LEVEL 0 SERVICE. A SIX LETTER MESSAGE (LPS-11) WILL BE PLOTTED ON THE SCREEN DURING EXECUTION. IF A 611/613 SCOPE IS CONNECTED, ALTERNATING CHARACTERS MAY APPEAR TO HAVE ALTERNATING INTENSITY LEVELS. WHEN A VR14 SCOPE IS CONNECTED CHANGING THE CHANNEL SWITCH TO CHANNEL ONE ONLY WILL DISPLAY "L S 1". PLACING THE SWITCH TO CHANNEL TWO ONLY WILL DISPLAY "P - 1".

2. REQUIREMENTS:

HARDWARE: LPS-11 INTERFACE WITH A LPS-VC SCOPE CONTROL INSTALLED

STORAGE:: LPC REQUIRES:

1. DECIMAL WORDS: 442
2. OCTAL WORDS: 0672
3. OCTAL BYTES: 1564

3. PASS DEFINITION:

ONE PASS OF THE LPC MODULE CONSISTS OF DISPLAYING 55,296 POINTS ON THE SCREEN. THIS MEANS THAT 55,296 DATA TRANSFERS OCCURED ON THE UNIBUS.

4. EXECUTION TIME:

VARIABLES WITH SCOPE DELAY BUT SHOULD TAKE AN AVERAGE OF THIRTY SECONDS TO COMPLETE ONE PASS. WHEN RUNNING ALONE.

5. CONFIGURATION PARAMETERS:

DEFAULT PARAMETERS:

DVA: 170416, VCT: 1, BR1: 4

REQUIRED PARAMETERS:

AT CONFIGURATION TIME THE USER MUST SPECIFY:

VCT: VECTOR ADDRESS OF LPS-VC

6. DEVICE OPTION SETUP:

A. TURN ON SCOPE POWER.

B. PLACE CHANNEL SW TO 1 & 2 (IF VR14)

7. MODULE OPERATION:

7.1 TEST SEQUENCE:

A. START: USING THE DEVICE ADDRESS, THIS SECTION OF CODE, DETERMINES THE CONTROL, X AND Y POSITION ADDRESSES, AND VECTORS.

B. TESTVC: THIS SECTION OF CODE PREFORMS A CONFIDENCE REGISTER TEST OF THE CONTROL, X AND Y AXIS REGISTERS.

C. PRIME: IN THIS SECTION, THE X AXIS, Y AXIS AND CONTROL REGISTERS ARE LOADED. THE SCOPE IS ENABLED AND AN "EXIT" RETURN TO THE MONITOR.

D. LPSVC: UPON A SCOPE INTERRUPT, THE PROGRAM WILL RETURN TO THIS CODE. ENTER DEFERRED SERVICE MODE AND TEST FOR A MODE FLAG. IF NO MODE FLAG, REPORT IT AS AN ERROR.

E. LPSVCA: THRU CHAR13: THIS SECTION SELECTS
THE PROPER POINTS TO BE INTENSIFIED
ON THE SCREEN.

F. CHAR11: IN THIS CODE, THE COLOR AND
CHANNEL BITS ARE ALTERNATED
TO DISPLAY EACH CHANNEL AND COLOR
IF A 611/613 SCOPE IS CONNECTED
ALTERNATING CHARACTERS WILL HAVE
ALTERNATING INTENSITY LEVELS.

G. CHAR20: ENDIT CALL TO THE MONITOR.

8. OPERATOR OPTIONS:

A. LOCATION (VCPASS) CAN BE MODIFIED TO VARY THE NO.
LOOPS THRU TEST BEFORE END OF PASS IS REPORTED.

9. NON-STANDARD PRINTOUTS:

NONE: ALL PRINTOUTS HAVE THE STANDARD FORMAT.

```
174  
175  
176 ;LPS-11 VC DFC/X11 EXERCISER MODULE  
177 000000 IOMOD <LPCE >170416,1,4,2000,47  
178 000000 MODUL 140000,LPCE 170416,1,4,2000,47  
179 ; TITLE LPCE DEC/X11 SYSTEM EXERCISER MODULE  
180 ; DDXCUM VERSION 6 23-MAY-78  
181 ; LIST BIN  
182 ;*****  
183 000000 BEGIN:  
184 000000 MODNAM: .ASCII /LPCE / ;MODULE NAME  
185 000005 XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE  
186 000006 ADDR: 170416 ;LIST DEVICE ADDR  
187 000010 VECTOR: 1+0 ;LIST DEVICE VECTOR.  
188 000012 BPI: .BYTE PRTY4+0 ;LIST BR LEVEL.  
189 000013 BR2: .BYTE PRTY+0 ;2ND BR LEVEL.  
190 000014 DVTD1: +1 ;DEVICE INDICATOR 1.  
191 000016 SR1: OPEN ;SWITCH REGISTER 1  
192 000020 SR2: OPEN ;SWITCH REGISTER 2  
193 000022 SR3: OPEN ;SWITCH REGISTER 3  
194 000024 SR4: OPEN ;SWITCH REGISTER 4  
195 ;*****  
196 000026 STAT: 140000 ;STATUS WORD  
197 000030 INIT: START ;MODULE START ADDR.  
198 000032 SPOINT: MODSP ;MODULE STACK POINTER.  
199 000034 PASCNT: 0 ;PASS COUNTER  
200 000036 ICNT: 2000 ;# OF ITERATIONS PER PASS=2000  
201 000040 ICDCNT: 0 ;LCC TO COUNT ITERATIONS  
202 000042 SOFCNT: 0 ;LCC TO SAVE TOTAL SOFT ERRORS  
203 000044 HRDCNT: 0 ;LCC TO SAVE TOTAL HARD ERRORS  
204 000046 SOFPAS: 0 ;LCC TO SAVE SOFT ERRORS PER PASS  
205 000050 HRDPAS: 0 ;LCC TO SAVE HARD ERRORS PER PASS  
206 000052 SVSCNT: 0 ;# OF SVS ERRORS ACCUMULATED  
207 000054 RANRND: 0 ;# HOLDS RANDOM # WHEN RAND MACPG IS CALLED  
208 000056 CONFIG: 0 ;RESERVED FOR MONITOR USE  
209 000058 RES1: 0 ;RESERVED FOR MONITOR USE  
210 000060 RES2: 0 ;RESERVED FOR MONITOR USE  
211 000062 SVR0: OPEN ;LCC TO SAVE R0.  
212 000064 SVR1: OPEN ;LCC TO SAVE R1.  
213 000066 SVR2: OPEN ;LCC TO SAVE R2.  
214 000070 SVR3: OPEN ;LCC TO SAVE R3.  
215 000072 SVR4: OPEN ;LCC TO SAVE R4.  
216 000074 SVR5: OPEN ;LCC TO SAVE R5.  
217 000076 SVR6: OPEN ;LCC TO SAVE R6.  
218 000100 CSRA: OPEN ;ADDR OF CURRENT CSR.  
219 000102 SBADR: ;ADDR OF GOOD DATA, OR  
220 000104 ACSR: OPEN ;CONTENTS OF CSR.  
221 000106 WASADR: ;ADDR OF BAD DATA, OR  
222 000108 ASAT: OPEN ;STATUS REG CONTENTS.  
223 000110 ERRTYP: OPEN ;TYPE OF ERROR  
224 000112 ASB: OPEN ;EXPECTED DATA.  
225 000114 AWAS: OPEN ;ACTUAL DATA.  
226 000116 RSTRT: RSTRT ;RESTART ADDRESS AFTER END OF PASS  
227 000118 WDMTO: OPEN ;WORDS TO MEMORY PER ITERATION  
228 000120 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION  
229 000122 INTR: OPEN ;# OF INTERUPTS PER ITERATION
```

```
230 000122 IDNUM: 47 ;MODULE IDENTIFICATION NUMBER=47  
231 .REPT SPSIZ ;MODULE STACK STARTS HERE.  
232 .NLIST  
233 .WORD 0  
234 .LIST  
235 .ENDR  
236 000224 MODSP: ;*****  
237 ;*****  
238
```

```
239  
240 ;LPS-VC OPERATOR CHANGEABLE LOCATIONS  
241  
242  
243 ; COMMON LPS-VC DEVICE ADDRESSES  
244  
245  
246 000224 170416 VCSTAT: 170416 ;SCOPE STATUS REGISTER  
247 000226 170420 VCXREG: 170420 ;SCOPE X AXIS REGISTER  
248 000230 170422 VCYREG: 170422 ;SCOPE Y AXIS REGISTER  
249  
250 ;COMMON LPS-VC DEVICE VECTOR  
251  
252 000232 000320 VCIV: 320 ;SCOPE INTERRUPT VECTOR  
253 000234 000322 VCIVS: 322  
254  
255 ;NOW SFT UP THE ADDRESS AND VECTOR DISPATCH LOC.  
256  
257 START: MOV ADDR,VCSTAT ;LOAD DEVICE ADDRESS  
258 MOV ADDR,VCXREG ;18 INTERRUPTS/ITERATION  
259 ADD #2,VCXREG ;6 WDS FROM PEM  
260 MOV ADDR,VCYREG  
261 ADD #4,VCYREG  
262 MOV VECTOR,VCIV  
263 MOV VECTOR,VCIVS  
264 ADD #2,VCIVS  
265 MOV VCSTAT,CSRA  
266 MOV #18,INTC  
267 MOV #6,WDFR  
268
```

```
269 ;LPS-VC LOGIC TEST  
270  
271 000340 005077 177660 RESTR: CLR @VCSTAT ;CLEAR STATUS  
272 000344 005077 177656 CLR @VCXREG ;CLEAR X  
273 000350 005077 177654 CLR @VCYREG ;CLEAR Y  
274 000354 005067 177524 CLR ASTAT ;CLEAR POINTER  
275  
276 000360 005777 177642 TST @VCXREG ;TEST X AXIS  
277 000364 001100 BNE IS ;BR IF SET  
278  
279 000366 012777 002525 177632 MOV #2525,@VCXREG ;LOAD X  
280 000374 012767 002525 177502 MOV #2525,ASTAT ;LOAD POINTER  
281 000402 022777 002525 177616 CMP #2525,@VCXREG ;TEST X  
282 000410 001066 BNE IS ;BR IF ERROR  
283  
284 000412 012777 005252 177606 MOV #5252,@VCXREG ;LOAD X  
285 000420 012767 005252 177456 MOV #5252,ASTAT ;LOAD POINTER  
286 000426 022777 005252 177572 CMP #5252,@VCXREG ;TEST X  
287 000434 001054 BNE IS ;BR IF ERROR  
288  
289 000436 005777 177566 TST @VCYREG ;TEST Y AXIS  
290 000442 001071 BNE IS ;BR IF ERROR  
291  
292 000444 012777 002525 177556 MOV #2525,@VCYREG ;LOAD Y  
293 000452 012767 002525 177424 MOV #2525,ASTAT ;LOAD POINTER  
294 000460 022777 002525 177542 CMP #2525,@VCYREG ;TEST Y  
295 000466 001057 BNE IS ;BR IF ERROR  
296  
297 000470 012777 005252 177532 MOV #5252,@VCYREG ;LOAD Y  
298 000476 012767 005252 177400 MOV #5252,ASTAT ;LOAD POINTER  
299 000504 022777 005252 177516 CMP #5252,@VCYREG ;TEST Y  
300 000512 001045 BNE IS ;BR IF ERROR  
301  
302 000514 012777 002324 177502 MOV #2324,@VCSTAT ;LOAD STATUS  
303 000522 012767 002324 177354 MOV #2324,ASTAT ;LOAD POINTER  
304 000530 022777 002324 177466 CMP #2324,@VCSTAT ;TEST STATUS  
305 000536 001053 BNE IS ;BR IF ERROR  
306  
307 000540 012777 005212 177456 MOV #5212,@VCSTAT ;LOAD STATUS  
308 000546 012767 005212 177330 MOV #5212,ASTAT ;LOAD POINTER  
309 000554 022777 005212 177442 CMP #5212,@VCSTAT ;TEST STATUS  
310 000562 001041 BNE IS  
311 000564 000460 BR PRIME ;START DYNAMIC TEST
```

```
312  
313  
314  
315 000566 017767 177434 177306 1S: MOV @VCXREG,ACSR ;LOAD CONTENTS  
316 000574 016767 177426 177276 MOV @VCXREG,CSRA ;LOAD ADDRESS  
317 000607 005077 177416 177236 CLR @VCSTAT ;ENSURE CLEAR STATUS  
318 000606 012767 000025 177272 MOV #25,ERRTYP ;BIT STUCK IN REGISTER  
319 ***** ;*****  
320 000614 104405 000000 000000 HRDRS,BEGIN,NULL ;X AXIS REGISTER BIT IN ERROR  
321 ***** ;*****  
322 ENDS,BEGIN ;  
323  
324 000622 104410 000000 000000  
325  
326 000626 017767 177376 177246 2S: MOV @VCYREG,ACSR ;LOAD CONTENTS  
327 000634 016767 177370 177236 MOV @VCYREG,CSRA ;LOAD ADDRESS  
328 000642 005077 177356 177232 CLR @VCSTAT ;ENSURE CLEAR STATUS  
329 000646 012767 000025 177232 MOV #25,ERRTYP ;BIT STUCK IN Y AXIS REGISTER  
330 ***** ;*****  
331 HRDRS,BEGIN,NULL ;Y AXIS REGISTER BIT IN ERROR  
332 ***** ;*****  
333 ENDS,BEGIN ;  
334  
335 000666 017767 177332 177206 3S: MOV @VCSTAT,ACSR ;LOAD CONTENTS  
336 000674 016767 177324 177176 MOV @VCSTAT,CSRA ;LOAD ADDRESS  
337 000702 005077 177316 177172 CLR @VCSTAT ;ENSURE CLEAR STATUS  
338 000706 012767 000025 177172 MOV #25,ERRTYP ;BIT STUCK IN C/S REG  
339 ***** ;*****  
340 HRDRS,BEGIN,NULL ;CONTROL/STATUS BIT IN ERROR  
341 ***** ;*****  
342 ENDS,BEGIN ;  
343  
344 ; PRIMER ROUTINE  
345 PRIME: CLR @VCSTAT ;ENSURE CLEAR STATUS  
346 MOV @LPSVC,@VCIV ;SET UP LPSVC VECTOR  
347 MOVB BR,@VCIVS ;SET UP  
348 MOV #101,@VCSTAT ;START DISPLAY AND INTERRUPT ENABLE  
349 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
```

```
350 ;LPS VC DISPLAY TEST  
351 ;DISPLAY "LPS-11" ON THE SCOPE  
352  
353 000760 LPSVC:-----  
354 ;IRQS,BEGIN,IS ; GUEUE UP TO CONTINUE AT IS AND RTI  
355  
356 000760 000004 000000 000766 1S: ;STB @VCSTAT  
357 000766 105777 177232 BMI @LPSVCA ;LOAD VALUE  
358 000772 100415 177224 177100 MOV @VCXREG,ACSR ;LOAD VALUE  
359 000774 017767 177216 177100 CLR @VCSTAT ;NOT READY  
360 001002 005077 177216 177072 MOV #6,ERRTYP ;NOT READY  
361 001006 012767 000006 177072 ***** ;*****  
362 HRDRS,BEGIN,NULL ; NO DISPLAY READY FLAG  
363 ***** ;*****  
364 ENDS,BEGIN ;  
365  
366 001022 104410 000000 000000 LPSVCA: MOV #2000,XPOS ;LOAD X AXIS  
367 001026 012767 002000 000502 MOV #5000,YPOS ;LOAD Y AXIS  
368 001034 012767 005000 000476 MOV #6,CNTP ;SET UP FOR 6 CHARACTERS  
369 001042 012767 000006 000472 MOV #TEXT,@PNTR ;TEXT LPS-11  
370 001050 012767 001470 000466 TXT1: MOV #CHAR3,@VCIV ;LOAD INTERRUPT VECTOR  
371 001056 012767 001204 177146 MOV @PNTR,AA#2 ;LOAD  
372 001064 017767 000454 000462  
373  
374 ;PLOT CHARACTER  
375  
376 001072 016767 000442 000446 CHAR: MOV YPOS,YPT ;INIT POINT  
377 001100 042777 000016 177116 GIC #16,@VCSTAT  
378 001106 016777 000424 177112 MOV XPOS,@VCXREG  
379 001114 016777 000420 177106 MOV YPOS,@VCYREG  
380 001122 052777 000010 177074 BIS #10,@VCSTAT ;LOAD STATUS  
381 001130 012767 177773 000412 MOV #5,AA#0 ;MATRIX COUNT <ROW>  
382 001136 012767 177771 000406 CHAR1: MOV #7,AA#1 ;MATRIX COUNT <COLUMN>  
383 001144 117767 000404 000404 MOVB @AA#2,AA#3 ;GET CHARACTER  
384 001152 005267 000376 INC AA#2  
385 001156 106167 000374 CHAR2: ROLB AA#3  
386 001162 100033 BPL CHAR13  
387 001164 016777 000346 177034 MOV XPOS,@VCXREG ;LOAD X  
388 001172 016777 000342 177030 MOV YPOS,@VCYREG  
389 001200 104400 000000 000000 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.  
390 001204  
391  
392 001204 000004 000000 001212 CHAR3:-----  
393 ;IRQS,BEGIN,IS ; GUEUE UP TO CONTINUE AT IS AND RTI  
394  
395 001212 105777 177006 1S: ;STB @VCSTAT  
396 001216 100415 177000 176654 BMI CHAR13 ;LOAD VALUE  
397 001226 005077 176772 176654 MOV @VCXREG,ACSR ;LOAD VALUE  
398 001232 012767 000006 176646 CLR @VCSTAT ;NOT READY  
399 001240 104405 000000 000000 MOV #6,ERRTYP ;NOT READY  
400 ***** ;*****  
401 HRDRS,BEGIN,NULL ;NO DISPLAY READY  
402 ***** ;*****  
402 ENDS,BEGIN ;
```

```

403
404 001252 062767 000070 000260 CHAR13: ADD #70,YPOS ;NEXT POINT
405 001260 05267 000266 ;ALL POINTS IN THE COLUMN
406 001264 001534 RNE CHAR2
407 001266 016767 000254 000244 MOV YPT,YPOS ;LOAD NEXT COLUMN
408 001274 062767 000070 000234 ADD #70,XPOS ;ADD SCALCE
409 001302 05267 000242 INC AAR0 ;DONE ALL COLUMN
410 001306 001313 RNE CHAR1
411 001310 062767 000070 000220 ADD #70,XPOS ;YES, NEXT CHARACTER
412 001316 062767 000002 000240 ADD #2,PNTN
413 001324 032777 000400 176672 BIT #BIT9,@VCSTAT ;TEST COLOR
414 001332 001004 RNE IS
415 001334 052777 001400 176662 BIS #BIT8|BIT9,@VCSTAT
416 001342 000403 BR CHAR11
417 001344 042777 001400 176652 BIC #BIT8|BIT9,@VCSTAT
418 001352 015777 001364 176652 CHAR11: MOV #CHAR4,@VCIV
419 001360 104400 000000 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
420
421 001364 CHAR4:
422
423 001364 000004 000000 001372 ;-----
424 ;IRQS,BEGIN,IS ; QUEUE UP TO CONTINUE AT IS AND PTI
425
426 001372 105777 176626 1S:
427 ;STB @VCSTAT
428 RMI CHAR20
429 001400 016767 176620 176472 MOV VCSTAT,CSRA ;LOAD DEVICE ADDRESS
430 001406 017767 176612 176466 MOV @VCSTAT,ACSR ;LOAD VALUE
431 001414 050777 176604 CLR @VCSTAT
432 001420 012767 000006 176460 MOV #6,ERRTYP ;NOT READY
433 ;*****
434 001426 104405 000000 000000 HRDR$,BEGIN,NULL ;NO DISPLAY READY AFTER COLOR CHANGE
435 ;*****
436 001434 104410 000000 ENDS,BEGIN ;

```

```

435
436 001440 005367 000076 CHAR20: DEC CNTR
437 001444 001007 RNE 2S
438 001446 042777 000002 176550 BIC #2,@VCSTAT
439 001454 104413 000000 ENDS,BEGIN ;SIGNAL END OF ITERATION.
440
441 001460 000167 177342 JMP LPSVCA ;MONITOR SHALL TEST END OF PASS
442
443 001464 000167 177366 2S: JMP TXT1
444
445 ;TEXT FOR THE LPSVC SCOPE OPTION
446 ;TEXT = "LPS-11"
447
448 TEXT: L
449 P
450 001470 001504 S
451 001472 001511 DASH
452 001474 001516 NI
453 001476 001523 NI
454 001500 001530
455 001502 001530
456
457 001504 177 100 L: .BYTE 177,100,100,100,100
458 001511 177 011 011 P: .BYTE 177,11,11,11,6
459 001514 011 006 111 S: .BYTE 46,111,111,111,62
460 001516 046 111
461 001521 111 062
462 001523 000 010 010 DASH: .BYTE 0,10,10,10,0
463 001526 010 000
464 001530 000 177 N1: .BYTE 0,102,177,100,0
465 001533 100 000
466
467 001536 .EVEN
468
469 001536 000000 XPOS: 0
470 001540 000000 YPOS: 0
471 001542 000000 CNTR: 0
472 001544 000000 PNTN: 0
473 001546 000000 YPT: 0
474 001550 000000 AAR0: 0
475 001552 000000 AAR1: 0
476 001554 000000 AAR2: 0
477 001556 000000 AAR3: 0
478 001560 000000 TEMP1: 0
479 001562 000000 TEMP2: 0
480
481 000001 .END

```


