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IDENTIFICATION  
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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:  
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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. 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 011/613 SCOPE IS CONNECTED ALTERNATING CHARACTERS MAY APPEAR TO HAVE ALTERNATING INTENSITY LEVELS. WHEN A VRI4 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:  
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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:  
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ONE PASS OF THE LPC MODULE CONSISTS OF DISPLAYING 55,296 POINTS ON THE SCREEN. THIS MEANS THAT 55,296 DATA TRANSFERS OCCURRED ON THE UNIBUS.

4. EXECUTION TIME:  
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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, BRI: 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 VRI4)
7. MODULE OPERATION:  
7.1 TEST SEQUENCE:  
A. START:  
P. TESTVC:  
C. PRIME:  
D. LPSVC:
- USING THE DEVICE ADDRESS, THIS SECTION OF CODE DETERMINES THE CONTROL, X AND Y POSITION ADDRESSES, AND VECTORS.
- THIS SECTION OF CODE PERFORMS A CONFIDENCE REGISTER TEST OF THE CONTROL, X AND Y AXIS REGISTERS.
- IN THIS SECTION THE X AXIS Y AXIS AND CONTROL REGISTERS ARE LOADED. THE SCOPE IS ENABLED AND AN "EXIT" RETURN TO THE MONITOR.
- 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: EMDIT CALL TO THE MONITOR.

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

9. NON-STANDARD PRINTOUTS:  
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NONE: ALL PRINTOUTS HAVE THE STANDARD FORMAT.

```
174  
175  
176 ;LPS-11 VC DFC/X11 EXERCISER MODULE  
177  
178 000000*  
179 000000*  
180 IQMOD <LPCE > 170416 144 2000,47  
181 MODULE 140000 LPCE 170416 2000,47  
182 TITLE LPCE DEC/X11 SYSTEM EXERCISER MODULE  
183 ;  
184 DDXCOM VERSION 6 23-MAY-78  
185 ;LIST  
186 *****  
187 BEGIN:  
188 MODNAM: .ASCII /LPCE / ;MODULE NAME.  
189 XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE  
190 ADDR: 170416+0 ;1ST DEVICE ADDR.  
191 VECTOR: 1+0 ;1ST DEVICE VECTOR.  
192 BR1: .BYTE PRTY4+0 ;1ST BR LEVEL.  
193 BR2: .BYTE PRTY+0 ;2ND BR LEVEL.  
194 DIVID1: *1 ;DEVICE INDICATOR 1.  
195 SR1: OPEN ;SWITCH REGISTER 1.  
196 SR2: OPEN ;SWITCH REGISTER 2.  
197 SR3: OPEN ;SWITCH REGISTER 3.  
198 SR4: OPEN ;SWITCH REGISTER 4.  
199 *****  
200 STAT: 140000 ;STATUS WORD.  
201 HIT: START ;MODULE START ADDR.  
202 SPOINT: MODSP ;MODULE STACK POINTER.  
203 PASCNT: 0 ;PASS COUNTED.  
204 ICOUNT: 2000 ;# OF ITERATIONS PER PASS=2000  
205 LCC: 0 ;LCC TO COUNT ITERATIONS  
206 HRDCNT: 0 ;LCC TO SAVE TOTAL HARD ERRORS  
207 SOFPAS: 0 ;LCC TO SAVE TOTAL SOFT ERRORS  
208 HRDPAS: 0 ;LCC TO SAVE HARD ERRORS PER PASS  
209 SYSCNT: 0 ;# OF SYS ERRORS ACCUMULATED  
210 RANNUM: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED  
211 CONFIG: ;RESERVED FOR MONITOR USE  
212 RES1: 0 ;RESERVED FOR MONITOR USE  
213 RES2: 0 ;RESERVED FOR MONITOR USE  
214 SVR0: OPEN ;LCC TO SAVE R0.  
215 SVR1: OPEN ;LCC TO SAVE R1.  
216 SVR2: OPEN ;LCC TO SAVE R2.  
217 SVR3: OPEN ;LCC TO SAVE R3.  
218 SVR4: OPEN ;LCC TO SAVE R4.  
219 SVR5: OPEN ;LCC TO SAVE R5.  
220 SVR6: OPEN ;LCC TO SAVE R6.  
221 CSRA: OPEN ;ADDR OF CURRENT CSR.  
222 SBADR: ;ADDR OF GOOD DATA, OR  
223 ACSR: OPEN ;CONTENTS OF CSR.  
224 WASADR: ;ADDR OF BAD DATA, OR  
225 ASR: OPEN ;STATUS REG CONTENTS.  
226 ERRTP: ;TYPE OF ERROR.  
227 ASB: OPEN ;EXPECTED DATA.  
228 AWAS: OPEN ;ACTUAL DATA.  
229 RSTRT: RSTRT ;RSTART ADDRESS AFTER END OF PASS  
230 WDRS: OPEN ;WORDS TO MEMORY PER ITERATION  
231 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION  
232 INTR: OPEN ;# OF INTERRUPTS PER ITERATION
```

```
230 000122* 000047 IDNUM: 47 ;MODULE IDENTIFICATION NUMBER=47  
231 000040 ;MODULE STACK STARTS HERE.  
232 .REPT SPSIZ  
233 .NLST  
234 .WORD 0  
235 .LIST  
236 .ENDR  
237 MODSP: *****  
238 ;*****
```

```

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

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269 ;LPS-VC LOGIC TEST
270
271 RESTRT: CLR @VCSTAT ;CLEAR STATUS
272 CLR @VXCXREG ;CLEAR X
273 CLR @VCYREG ;CLEAR Y
274 CLR ASTAT ;CLEAR POINTER
275
276 TST @VXCXREG ;TEST X AXIS
277 BNE IS ;BR IF SET
278
279 MOV #2525,@VXCXREG ;LOAD X
280 MOV #2525,ASTAT ;LOAD POINTER
281 CMP #2525,@VXCXREG ;TEST X
282 BNE IS ;BR IF ERROR
283
284 MOV #5252,@VXCXREG ;LOAD X
285 MOV #5252,ASTAT ;LOAD POINTER
286 CMP #5252,@VXCXREG ;TEST X
287 BNE IS ;BR IF ERROR
288
289 TST @VCYREG ;TEST Y AXIS
290 BNE 25 ;BR IF ERROR
291
292 MOV #2525,@VCYREG ;LOAD Y
293 MOV #2525,ASTAT ;LOAD POINTER
294 CMP #2525,@VCYREG ;TEST Y
295 BNE IS ;BR IF ERROR
296
297 MOV #5252,@VCYREG ;LOAD Y
298 MOV #5252,ASTAT ;LOAD POINTER
299 CMP #5252,@VCYREG ;TEST Y
300 BNE 25 ;BR IF ERROR
301
302 MOV #2324,@VCSTAT ;LOAD STATUS
303 MOV #2324,ASTAT ;LOAD POINTER
304 CMP #2324,@VCSTAT ;TEST STATUS
305 BNE 35 ;BR IF ERROR
306
307 MOV #5212,@VCSTAT ;LOAD STATUS
308 MOV #5212,ASTAT ;LOAD POINTER
309 CMP #5212,@VCSTAT ;TEST STATUS
310 BNE 35
311 BR PRIME ;START DYNAMIC TEST

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312
313
314 000566 017767 177434 177306 1S: MOV @VCXREG,ACSR ;LOAD CONTENTS
315 000574 016767 177426 177276 MOV @VCYREG,CSRA ;LOAD ADDRESS
316 000602 005077 177416 MOV @VCSTAT ;ENSURE CLEAR STATUS
317 000606 012767 000025 177272 CLR @VCSTAT ;BIT STUCK IN REGISTER
318 ***** ;*****
319 000614 104405 000000 000000 ;*****
320 @RDERS,BEGIN,NULL ;X AXIS REGISTER BIT IN ERROR
321 ***** ;*****
322 000622 104410 000000 ENDS,BEGIN ;
323
324 000626 017767 177376 177246 2S: MOV @VCYREG,ACSR ;LOAD CONTENTS
325 000634 016767 177370 177236 MOV @VCXREG,CSRA ;LOAD ADDRESS
326 000642 005077 177356 CLR @VCSTAT ;ENSURE CLEAR STATUS
327 000646 012767 000025 177232 MOV @VCSTAT ;BIT STUCK IN V AXIS REGISTER
328 ***** ;*****
329 @RDERS,BEGIN,NULL ;V AXIS REGISTER BIT IN ERROR
330 ***** ;*****
331 000662 104410 000000 ENDS,BEGIN ;
332
333 000666 017767 177332 177206 3S: MOV @VCSTAT,ACSR ;LOAD CONTENTS
334 000674 016767 177324 177176 MOV @VCSTAT,CSRA ;LOAD ADDRESS
335 000702 005077 177316 CLR @VCSTAT ;ENSURE CLEAR STATUS
336 000706 012767 000025 177172 MOV @VCSTAT ;BIT STUCK IN C/S REG
337 ***** ;*****
338 @RDERS,BEGIN,NULL ;CONTROL/STATUS BIT IN ERROR
339 ***** ;*****
340 000722 104410 000000 ENDS,BEGIN ;
341
342 ; PRIMER ROUTINE
343
344 000726 005077 177272 PRIME: CLR @VCSTAT ;ENSURE CLEAR STATUS
345 000732 012777 000760 177272 MOV @LPSVC,@VCIV ;SET UP LPSVC VECTOR
346 000740 116777 177046 MOV @B1,@VCIV ;SET UP
347 000746 012777 000101 177250 MOV @H10,@VCSTAT ;START DISPLAY AND INTERRUPT ENABLE
348 ***** ;*****
349 000754 104400 000000 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 000760 000004 000000 000766 -----
355 ;PIRQS,BEGIN,IS ; GUEUE UP TO CONTINUE AT IS AND RTI
356 -----
357 000766 105777 177232 1S: ISTR @VCSTAT
358 000772 100415 BMI @LPSVCA ;LOAD VALUE
359 000774 017767 177224 177100 MOV @VCSTAT,ACSR ;LOAD VALUE
360 001002 005077 177216 CLR @VCSTAT ;NOT READY
361 001006 012767 000006 177072 MOV @H6,ERRTYP ;*****
362 ***** ;*****
363 @RDERS,BEGIN,NULL ; NO DISPLAY READY FLAG
364 ***** ;*****
365 001022 104410 000000 ENDS,BEGIN ;
366
367 001026 012767 002000 000502 LPSVCA: MOV @H2000,XPOS ;LOAD X AXIS
368 001034 012767 005000 000476 MOV @H5000,YPOS ;LOAD Y AXIS
369 001042 012767 000006 000472 MOV @H6,CNTP ;SET UP FOR 6 CHARACTERS
370 001050 012767 001470 000466 MOV @TEXT,@PNTR ;TEXT LPS-11
371 001056 012777 001204 177146 TXN1: MOV @CHAR,@VCIV ;LOAD INTERRUPT VECTOR
372 001064 017767 000454 000462 MOV @PNTR,@AR2 ;LOAD
373
374 ;PLOT CHARACTER
375
376 001072 016767 000442 000446 CHAR: MOV @YPOS,@PT ;INIT POINT
377 001100 042777 000016 177116 @IC @H16,@VCSTAT
378 001106 016777 000424 177112 MOV @XPOS,@VCXREG
379 001114 016777 000420 177106 MOV @YPOS,@VCYREG
380 001122 052777 000010 177074 CHAR5: @H16,@VCSTAT ;LOAD STATUS
381 001130 012767 177773 000412 MOV @H-5,@AR0 ;MATRIX COUNT <ROW>
382 001136 012767 177771 000406 CHAR1: MOV @H-7,@AR1 ;MATRIX COUNT <COLUMN>
383 001144 117767 000404 MOV @AR2,@AR3 ;GET CHARACTER
384 001152 005267 000376 INC @AR2
385 001156 106167 000374 CHAR2: ROLB @AR3
386 001162 100033 BPL @AR3
387 001164 016777 000346 177034 MOV @XPOS,@VCXREG ;LOAD X
388 001172 016777 000342 177030 MOV @YPOS,@VCYREG
389 001200 104400 000000 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
390 001204
391
392 001204 000004 000000 001212 CHAR3:
393 -----
394 001212 105777 177006 1S: ISTR @VCSTAT
395 001216 100415 BMI @CHAR1
396 001220 017767 177000 176654 MOV @VCSTAT,ACSR ;LOAD VALUE
397 001226 005077 176772 CLR @VCSTAT
398 001232 012767 000006 176646 MOV @H6,ERRTYP ;NOT READY
399 ***** ;*****
400 @RDERS,BEGIN,NULL ;NO DISPLAY READY
401 ***** ;*****
402 001246 104410 000000 ENDS,BEGIN ;
  
```

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403 001252* 062767 000070 000260 CHAR13: ADD #70,YPOS ;NEXT POINT
404 001260* 005267 000266 INC AAR1 ;ALL POINTS IN THE COLUMN
405 001264* 001334 BNE CHAR2
406 001266* 016767 000254 000244 MOV YPT,YPOS ;LOAD NEXT COLUMN
407 001274* 062767 000070 000234 ADD #70,XPOS ;ADD SCALCE
408 001302* 005267 000242 INC AAR0 ;DONE ALL COLUMN
409 001306* 001313 BNE CHAR1
410 001310* 062767 000070 000220 ADD #70,XPOS ;YES, NEXT CHARACTER
411 001316* 032767 000070 000220 ADD #4,PNTB
412 001324* 032767 000406 176672 BIT #18,@VCSTAT ;TEST COLOR
413 001332* 001004 BNE IS
414 001334* 052777 001400 176662 BIS #BIT8|BIT9,@VCSTAT
415 001342* 000403 BR CHAR11
416 001344* 042777 001400 176652 BIC #BIT8|BIT9,@VCSTAT
417 001352* 012777 001364* 176652 CHAR11: MOV #CHAR4,@VC1V
418 001360* 104400 000000* EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
419
420
421 001364* CHAR4:
422
423 001364* 000004 000000* 001372* ;-----
424 ; PIRQS,BEGIN,IS ; QUEUE UP TO CONTINUE AT IS AND PTI
425 ;-----
426 001372* 105777 176626 1S:
427 001376* 100420 TSTB @VCSTAT
428 001400* 016767 176620 176472 BMI CHAR20
429 001414* 005077 176604 176466 MOV VCSTAT,CSRA ;LOAD DEVICE ADDRESS
430 001420* 012767 000006 176460 MOV VCSTAT,ACSR ;LOAD VALUE
431 CLR VCSTAT
432 MOV #6,ERRTYP ;NOT READY
433 *****
434 *****
435 *****
436 *****
437 *****
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435
436
437 001440* 005367 000076 CHAR20: DEC CNTR
438 001444* 001007 BNE ZS
439 001446* 042777 000002 176550 BIC #2,@VCSTAT
440 001454* 104413 000000* ENDIRS,BEGIN ;SIGNAL END OF ITERATION.
441 ;MONITOR SHALL TEST END OF PASS
442 001460* 000167 177342 JMP LPSVCA
443
444 001464* 000167 177366 2S: JMP TXT1
445
446 ;TEXT FOR THE LPSVC SCOPE OPTION
447 ;TEXT = "LPS-11"
448
449 TEXT: L
450 P
451 S
452 DASH
453 N1
454 N1
455
456 001504* 177 100 100 L: .BYTE 177,100,100,100,100
457 001507* 100 100 011 P: .BYTE 177,11,11,11,6
458 001511* 177 011 111 S: .BYTE 46,111,111,111,62
459 001514* 011 006 010 DASH: .BYTE 0,10,10,10,0
460 001517* 011 111 177 N1: .BYTE 0,102,177,100,0
461 001521* 111 062
462 001523* 000 010
463 001526* 010 000
464 001530* 000 002
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 PNTB: 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
  
```





