PDP11

SPL INSTRUCTION TEST

MD-11-DCKBG-B

EP DCKBG B DL A

FICHE 1 OF 1

NOV 1976

digital

MADE IN USA

.REM

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DCKBG-B-D

PRODUCT NAME: SPL INTSTRUCTION TEST

DATE: JAN 1976

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: JOHN ADAMS

1.0 ABSTRACT

THIS IS A TEST OF THE SPL INSTRUCTION. THE TEST
CHECKS THAT ONLY PRIORITY LEVEL BITS IN THE
PSW(PSW7-4) ARE EFFECTED BY THE SPL INSTRUCTION.

2.0 REQUIREMENTS

2.1 EQUIPMENT
BASIC 11/45 SYSTEM

2.2 STORAGE
THIS PROGRAM USES 0 THRU 17500

2.3 PRELIMINARY PROGRAMS
D0AA THRU D0MA

3.0 LOADING PROCEDURE
LOAD PROGRAM USING ABS LOADER

4.0 STARTING PROCEDURE
LOAD ADDRESS 200. PRESS START. THE PROGRAM WILL LOOP
AND RING BELL ON PASS COMPLETION.

5.0 OPERATING PROCEDURE

5.1 SWITCH SETTINGS
NONE

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE
SCOPE IS A MOVE PC,R1 AND STORES THE PC+2 IN R1.

5.2.2 HLT
HLT IS A HALT INSTRUCTION.

6.0 ERRORS
ALL ERRORS WILL CAUSE A HALT
TRAP AND INTERRUPT ERRORS WILL CAUSE A HALT AT VECTOR+2.

6.1 ERROR RECOVERY
PRESS CONTINUE TO PROCEDE TO NEXT TEST

6.2 ERROR LOOPING
TO LOOP ON AN ERROR, PLACE A BRANCH TO THE PREVIOUS SCOPE
INSTRUCTION IN PLACE OF THE HALT INSTRUCTION.
NOTE THAT IF THE ERROR IS INTERMITTANT THAT THE TEST WILL
DROP THRU THE HALT AND PROCEED TO THE NEXT TEST.
THEREFORE, TO LOOP THE TEST CONTINUOSLY REPLACE THE BEQ .+4
INSTRUCTION IMMEDIATLY PRECEEDING THE HALT WITH A BRANCH
BACK TO THE PREVIOUS SCOPE.

TO LOOP ON TRAP FAILURES, PATCH IN THE FOLLOWING ROUTINE
AT THE ADDRESS OF THE TRAP VECTOR.

```
TRAPVEC:        TRAPVEC+4
TRAPVEC+2:      0
```

```
                                        TRAPVEC+4:      012716  ;MOVE SCOPE ADDRESS TO STACK
                                        TRAPVEC+6:      ADDRESS ;ADDRESS OF PREVIOUS SCOPE
                                        TRAPVEC+10:     000006  ;RETURN TO TEST AT SCOPE

                                        RESTORE ALL LOCATIONS BEFORE PROCEEDING TO NEXT TEST.

                                7.0     RESTRICTIONS
                                        NONE

                                8.0     MISCELLANEOUS
                                        ON TRAP ERRORS THE STACK POINTER(R6) WILL CONTAIN THE
                                        ADDRESS WHERE THE TRAP OCCURED.

                                9.1     EXECUTION TIME
                                        THIS PROGRAM TAKES ABOUT 1 MINUTE.

                                9.2     STACK POINTER
                                        THIS PROGRAM INITIALY SETS THE STACK POINTER AT 500.
                                        %
                                        .TITLE  MAINDEC-11-DCKBG-B PDP11/45 SPL INST TEST
                                        .NLIST  MC,MD,SEQ
                                        .LIST   ME
                                        .ABS

                                ;TEST DCKBGB- SPL INSTRUCTION TEST (KERNEL MODE ONLY). SEE TEST DCKBOA
                                ;FOR SPL IN SUPERVISORY AND USER MODES.
                                ;THE SPL INSTRUCTION SETS THE PRIOTITY LEVEL AS INDICATED AND DOES NOT
                                ;AFFECT THE CONDITION CODES.
                                ;NOTE: THIS TEST WILL ALSO RUN ON THE PDP11/25 WITH THE EIS OPTION.

                                ;STARTING PROCEEDURE
                                ;       LOAD ADDRESS =200
                                ;       PRESS START
                                ;       STACK POINTER IS AT 500
                                ;       BELL WILL RING WHEN TEST IS COMPLETE

                                ;REGISTER ASSIGNMENTS
000000                                  R0=%0
000001                                  R1=%1
000002                                  R2=%2
000003                                  R3=%3
000004                                  R4=%4
000005                                  R5=%5
000006                                  SP=%6
000007                                  PC=%7

010701                                  SCOPE=010701            ;MOVE PC TO R1
000000                                  HLT=HALT                ;ERROR HALT
177776                                  PSW=177776              ;PROCESSER STATUS WORD ADDRESS
177770                                  UBREAK=177770           ;ADDRESS OF PDP11/45 MICRO BREK REGISTER
177564                                  TPS=177564              ;TELEPRINTER CONTROL STATUS AND
177566                                  TPB=177566              ;DATA BUFFER REGISTER ADDRESSES
177570                                  SWR=177570              ;ADDRESS OF CONSOLE SWITCH REGISTER
177570                                  DISPLAY=177570          ;ADDRESS OF CONSOLE DISPLAY REGISTER
000500                                  STKPTR=500              ;INITIAL STACK POINTER
000000                                  M=0
```

```
                    000000          N=0
                    000000          .=0
000000              000002          .+2
000002              000000          HALT
000004              000006          .+2
000006              000000          HALT
000010              000012          .+2
000012              000000          HALT
000014              000016          .+2
000016              000000          HALT
000020              000022          .+2
000022              000000          HALT
000024              000026          .+2
000026              000000          HALT
000030              000032          .+2
000032              000000          HALT
000034              000036          .+2
000036              000000          HALT
000040              000042          .+2
000042              000000          HALT
000044              000046          .+2
000046              000000          HALT
000050              000052          .+2
000052              000000          HALT
000054              000056          .+2
000056              000000          HALT
000060              000062          .+2
000062              000000          HALT
000064              000066          .+2
000066              000000          HALT
000070              000072          .+2
000072              000000          HALT
000074              000076          .+2
000076              000000          HALT
000100              000102          .+2
000102              000000          HALT
000104              000106          .+2
000106              000000          HALT
000110              000112          .+2
000112              000000          HALT
000114              000116          .+2
000116              000000          HALT
000120              000122          .+2
000122              000000          HALT
000124              000126          .+2
000126              000000          HALT
000130              000132          .+2
000132              000000          HALT
000134              000136          .+2
000136              000000          HALT
000140              000142          .+2
000142              000000          HALT
000144              000146          .+2
000146              000000          HALT
000150              000152          .+2
000152              000000          HALT
```

```
000154  000156                  .+2
000156  000000                  HALT
000160  000162                  .+2
000162  000000                  HALT
000164  000166                  .+2
000166  000000                  HALT
000170  000172                  .+2
000172  000000                  HALT
000174  000176                  .+2
000176  000000                  HALT
000200  000202                  .+2
000202  000000                  HALT
000204  000206                  .+2
000206  000000                  HALT
000210  000212                  .+2
000212  000000                  HALT
000214  000216                  .+2
000216  000000                  HALT
000220  000222                  .+2
000222  000000                  HALT
000224  000226                  .+2
000226  000000                  HALT
000230  000232                  .+2
000232  000000                  HALT
000234  000236                  .+2
000236  000000                  HALT
000240  000242                  .+2
000242  000000                  HALT
000244  000246                  .+2
000246  000000                  HALT
000250  000252                  .+2
000252  000000                  HALT
000254  000256                  .+2
000256  000000                  HALT
000260  000262                  .+2
000262  000000                  HALT
000264  000266                  .+2
000266  000000                  HALT
000270  000272                  .+2
000272  000000                  HALT
000274  000276                  .+2
000276  000000                  HALT
000300  000302                  .+2
000302  000000                  HALT
000304  000306                  .+2
000306  000000                  HALT
000310  000312                  .+2
000312  000000                  HALT
000314  000316                  .+2
000316  000000                  HALT
000320  000322                  .+2
000322  000000                  HALT
000324  000326                  .+2
000326  000000                  HALT
000330  000332                  .+2
000332  000000                  HALT
```

```
000334  000336                          .+2
000336  000000                          HALT
000340  000342                          .+2
000342  000000                          HALT
000344  000346                          .+2
000346  000000                          HALT
000350  000352                          .+2
000352  000000                          HALT
000354  000356                          .+2
000356  000000                          HALT
000360  000362                          .+2
000362  000000                          HALT
000364  000366                          .+2
000366  000000                          HALT
000370  000372                          .+2
000372  000000                          HALT
000374  000376                          .+2
000376  000000                          HALT
        000046                          .=46
000046  001466                          ENDAD
        000052                          .=52
000052  040000                          40000
        000200                          .=200
000200  C00167  000576                  JMP     START
        001000                          .=1000
001000  000000                  ICNT:   0                       ;CONTAINS PASS COUNT
001002  005067  177772          START:  CLR     ICNT
001006  012706  000500          BEGIN:  MOV     #STKPTR,SP      ;INITIALIZE THE STACK POINTER
001012  016737  177762  177570        MOV     ICNT,@#DISPLAY  ;DISPLAY PASS COUNT
001020  032737  000400  177570        BIT     #400,@#SWR      ;LOAD PDP11/45 MICRO BREAK REGISTER?
001026  001403                        BEQ     .+10
001030  113737  177570  177770        MOVB    @#SWR,@#UBREAK  ;LOAD MICRO BREAK REG WITH SR0-7

                        ;TEST THAT SPL INSTRUCTION WILL LOAD THE PSW WITH THE PROPER PRIORITY
                        ;LEVEL
                                        SCOPE
001036  010701
001040  005037  177776                  CLR     @#PSW           ;CLEAR STATUS
001044  000230                          SPL     0               ;SET PROCESSER PRIORITY = 0
001046  013700  177776                  MOV     @#PSW,R0        ;GET STATUS WORD
001052  022700  000000                  CMP     #0,R0           ;PRIORITY LEVEL = 0
001056  001401                          BEQ     .+4
001060  000000                          HLT                     ;ERROR!

        000001                          N=N+1
        000040                          M=M+40
001062  010701                          SCOPE
001064  005037  177776                  CLR     @#PSW           ;CLEAR STATUS
001070  000231                          SPL     1               ;SET PROCESSER PRIORITY = 1
001072  013700  177776                  MOV     @#PSW,R0        ;GET STATUS WORD
001076  022700  000040                  CMP     #40,R0          ;PRIORITY LEVEL = 1
001102  001401                          BEQ     .+4
001104  000000                          HLT                     ;ERROR!

        000002                          N=N+1
        000100                          M=M+40
001106  010701                          SCOPE
```

```
001110  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001114  000232                  SPL     2               ;SET PROCESSER PRIORITY = 2
001116  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001122  022700  000100          CMP     #100,R0         ;PRIORITY LEVEL = 2
001126  001401                  BEQ     .+4
001130  000000                  HLT                     ;ERROR!

        000003                  N=N+1
        000140                  M=M+40
001132  010701                  SCOPE
001134  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001140  000233                  SPL     3               ;SET PROCESSER PRIORITY = 3
001142  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001146  022700  000140          CMP     #140,R0         ;PRIORITY LEVEL = 3
001152  001401                  BEQ     .+4
001154  000000                  HLT                     ;ERROR!

        000004                  N=N+1
        000200                  M=M+40
001156  010701                  SCOPE
001160  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001164  000234                  SPL     4               ;SET PROCESSER PRIORITY = 4
001166  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001172  022700  000200          CMP     #200,R0         ;PRIORITY LEVEL = 4
001176  001401                  BEQ     .+4
001200  000000                  HLT                     ;ERROR!

        000005                  N=N+1
        000240                  M=M+40
001202  010701                  SCOPE
001204  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001210  000235                  SPL     5               ;SET PROCESSER PRIORITY = 5
001212  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001216  022700  000240          CMP     #240,R0         ;PRIORITY LEVEL = 5
001222  001401                  BEQ     .+4
001224  000000                  HLT                     ;ERROR!

        000006                  N=N+1
        000300                  M=M+40
001226  010701                  SCOPE
001230  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001234  000236                  SPL     6               ;SET PROCESSER PRIORITY = 6
001236  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001242  022700  000300          CMP     #300,R0         ;PRIORITY LEVEL = 6
001246  001401                  BEQ     .+4
001250  000000                  HLT                     ;ERROR!

        000007                  N=N+1
        000340                  M=M+40
001252  010701                  SCOPE
001254  005037  177776          CLR     @#PSW           ;CLEAR STATUS
001260  000237                  SPL     7               ;SET PROCESSER PRIORITY = 7
001262  013700  177776          MOV     @#PSW,R0        ;GET STATUS WORD
001266  022700  000340          CMP     #340,R0         ;PRIORITY LEVEL = 7
001272  001401                  BEQ     .+4
001274  000000                  HLT                     ;ERROR!
```

```
                000010                          N=N+1
                000400                          M=M+40

                                        ;TEST THAT ONLY PRIORITY LEVEL BITS ARE AFFECTED BY SPL INSTRUCTION.
001276  010701                          SCOPE
001300  012737  034357  177776          MOV     #34357,@#PSW    ;SET ALL BITS EXCEPT USER MODE BIT
001306  000230                          SPL     0               ;SET PRIORITY LEVEL 0
001310  013700  177776                  MOV     @#PSW,%0                ;GET PSW
001314  022700  034017                  CMP     #34017,%0       ;CONDITION CODES STILL SET?
001320  001401                          BEQ     .+4
001322  000000                          HLT                     ;ERROR! ALL COND. CODES NOT STILL SET

001324  000257                          CCC                     ;CLEAR ALL CONDITION CODES
001326  000237                          SPL     7               ;SET PRIOITY LEVEL =7
001330  013700  177776                  MOV     @#PSW,%0                ;GET PSW
001334  122700  000340                  CMPB    #340,%0         ;CONDITION CODES CLEAR?
001340  001401                          BEQ     .+4
001342  000000                          HLT                     ;ERROR! CONDITION CODES NOT CLEAR

                                        ;TEST THAT THE INSTRUCTION FOLLOWING AN SPL IS EXECUTED IF THE SPL
                                        ;SETS THE PRIORITY LEVEL BELOW THE REQUEST LEVEL
001344  010701                          SCOPE
001346  012706  000500                  MOV     #STKPTR,SP      ;SET STACK POINTER
001352  012737  000340  177776          MOV     #340,@#PSW      ;SET PRIOTITY LEVEL 7
001360  005000                          CLR     R0              ;PRESET R0
001362  012767  001404  176474          MOV     #TPINT,64       ;LOAD TTY PRINTER VECTOR
001370  012737  000100  177564          MOV     #100,@#TPS      ;ENABLE PRINTER TO INTERRUPT
001376  000230                          SPL     0               ;SET PRIORITY LEVEL = 0
001400  005100                          COM     R0              ;COMPLIMENT R0
001402  000000                          HLT                     ;ERROR! NO INTERRUPT
001404  005200                  TPINT:  INC     R0              ;DID R0 COMPLIMENT?
001406  001401                          BEQ     .+4
001410  000000                          HLT                     ;ERROR! INST. FOLLOWING SPL NOT EXECUTED
001412  012767  000066  176444          MOV     #66,64          ;RESTORE TTY VECTOR
001420  005037  177564                  CLR     @#TPS           ;DISABLE INTERRUPT

001424  005267  177350          END:    INC     ICNT            ;INCREMENT PASS COUNT
001430  026727  177344  020000          CMP     ICNT,#20000     ;20000 PASSES?
001436  001402                          BEQ     DONE
001440  000167  177342                  JMP     BEGIN
001444  012737  000007  177566  DONE:   MOV     #7,@#TPB        ;RING BELL
001452  105737  177564                  TSTB    @#TPS           ;WAIT FOR THE
001456  100375                          BPL     .-4             ;BELL TO RING
001460  013702  000042                  MOV     @#42,%2         ;GET DECTAPE MONITOR RETURN ADDRESS
001464  001404                          BEQ     DONE1           ;DO NOT RETURN IF (42)=0
001466  004712                  ENDAD:  JSR     7,(2)           ;RETURN TO DECTAPE MONITOR
001470  000240                          NOP                     ;ACT11
001472  000240                          NOP                     ;OVERLAY
001474  000240                          NOP                     ;AREA
001476  000167  177300          DONE1:  JMP     START           ;RESTART TEST

                000001                          .END
```

```
BEGIN   001006          297*    422
DISPLA= 177570          155*    298*
DONE    001444          421     423*
DONE1   001476          427     432*
END     001424          419*
ENDAD   001466          289     428*
HLT   = 000000          149*    311     321     331     341     351     361     371     381     393     400     412     415
ICNT    001000          295*    296*    298     419*    420
M     = 000400          157*    305     314*    315     324*    325     334*    335     344*    345     354*    355     364*
                        365     374*    375     384*
N     = 000010          158*    305     313*    315     323*    325     333*    335     343*    345     353*    355     363*
                        365     373*    375     383*
PC    =%000007          146*
PSW   = 177776          150*    306*    308     316*    318     326*    328     336*    338     346*    348     356*    358
                        366*    368     376*    378     388*    390     397     406*
R0    =%000000          139*    308*    309     318*    319     328*    329     338*    339     348*    349     358*    359
                        368*    369     378*    379     407*    411*    413*
R1    =%000001          140*
R2    =%000002          141*
R3    =%000003          142*
R4    =%000004          143*
R5    =%000005          144*
SCOPE = 010701          148*    305     315     325     335     345     355     365     375     387     404
SP    =%000006          145*    297*    405*
START   001002          293     296*    432
STKPTR= 000500          156*    297     405
SWR   = 177570          154*    299     301
TPB   = 177566          153*    423*
TPINT   001404          408     413*
TPS   = 177564          152*    409*    417*    424
UBREAK= 177770          151*    301*
.     = 001502          159*    160     162     164     166     168     170     172     174     176     178     180     182
                        184     186     188     190     192     194     196     198     200     202     204     206     208
                        210     212     214     216     218     220     222     224     226     228     230     232     234
                        236     238     240     242     244     246     248     250     252     254     256     258     260
                        262     264     266     268     270     272     274     276     278     280     282     284     286
                        288*    290*    292*    294*    300     310     320     330     340     350     360     370     380
                        392     399     414     425
```

SPLA 292# 305 315 325 335 345 355 365 375

```
BEQ      300  310  320  330  340  350  360  370  380  392  399  414  421  427
BIT      299
BPL      425
CCC      395
CLR      296  306  316  326  336  346  356  366  376  407  417
CMP      309  319  329  339  349  359  369  379  391  420
CMPB     398
COM      411
HALT     149  161  163  165  167  169  171  173  175  177  179  181  183  185  187
         189  191  193  195  197  199  201  203  205  207  209  211  213  215  217
         219  221  223  225  227  229  231  233  235  237  239  241  243  245  247
         249  251  253  255  257  259  261  263  265  267  269  271  273  275  277
         279  281  283  285  287
INC      413  419
JMP      293  422  432
JSR      428
MOV      297  298  308  318  328  338  348  358  368  378  388  390  397  405  406
         408  409  416  423  426
MOVB     301
NOP      429  430  431
SPL      307  317  327  337  347  357  367  377  389  396  410
TSTB     424
.ABS     124
.END     434
.LIST    123
.MACR    292
.NLIST   122
.REM       1
.REPT    160  305
.TITLE   121


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DCKBGB,DCKBGB.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DCKBGB.P11
 RUN-TIME:  1  2  .4 SECONDS
 RUN-TIME RATIO:  15/5=3.0
 CORE USED:  6K  (12 PAGES)
```

M01.

Spooler runtime 2 Seconds, 13 KCS, 34 disk reads, 3 disk writes, 11 pages