

PDP11/34

MEM MANG PROC STATES
MD-11-DFKTD-A

EP-DFKTD-A-DL-A

OCT 1976

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FICHE 1 OF 1

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.REM *

IDENTIFICATION

| | |
|---------------|---|
| PRODUCT CODE: | MAINDEC-11-DFKTD-A-A |
| PRODUCT NAME: | 11/34 MEMORY MANAGEMENT PROCESSOR STATES TEST |
| DATE CREATED: | DECEMBER 21, 1975 |
| MAINTAINER: | DIAGNOSTIC GROUP |
| AUTHOR: | GLENN JOHNSON |

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THE NUMBER OF PROGRAM PASSES COMPLETED IS CONTAINED IN ADDRESS ICNT (LOC. 1000). THIS ADDRESS MAY BE EXAMINED TO DETERMINE IN WHICH PASS THE ERROR OCCURRED.

6.0 ERRORS

6.1 TEST ERROR WILL CAUSE A HALT

FALSE TRAP/INTERRUPT ERRORS - THE PROGRAM WILL HALT AT THE TRAP VECTOR ADDRESS +2. THE CONTENTS OF R6 CONTAINS THE ADDRESS WHERE THE PC OF THE INSTRUCTION THAT CAUSED THE TRAP IS STORED.

6.2 ERROR RECOVERY

TEST ERRORS - PRESS CONTINUE OR LOOP TEST (SEE 6.3)
TRAP ERRORS - DETERMINE WHERE ERROR OCCURRED (SEE 6.1)

6.3 ERROR LOOPING

TO LOOP ON AN ERROR REPLACE THE HLT INSTRUCTION WITH A BRANCH BACK TO THE PREVIOUS SCOPE INSTRUCTION. NOTE THAT IF THE ERROR IS INTERMITTENT THE TEST WILL DROP THRU THE HLT AND PROCEED TO THE NEXT TEST. THEREFORE TO LOOP THE TEST CONTINUOUSLY, REPLACE THE BEQ +4 INSTRUCTION PRECEEDING THE HLT WITH THE BRANCH BACK TO THE PREVIOUS SCOPE.

7.0 RESTRICTIONS

THIS PROGRAM MUST BE LOADED IN LOWER 4K.

7.1 STARTING RESTRICTION

ALL PROGRAMS MUST BE INITIALLY STARTED AT 200 AND MAY BE STARTED AT A SCOPE INSTRUCTION THEREAFTER.

7.2 OPERATIONAL RESTRICTIONS

NONE

8.1 EXECUTION TIME

ONE PASS TAKES APPROXIMATELY 10 SECONDS.

*

.TITLE TEST DFKTDA PDP11/34 PROCESSER STATES TEST
.ABS

: THIS TEST IS A MODIFICATION TO THE PDP-11/40 TEST, DFKTD.
: THIS TEST HAS BEEN MODIFIED TO ACCOUNT FOR ANY 11/40 - 11/34
: DIFFERENCES. THIS PROGRAM IS INTENDED TO BE RUN ON ONLY THE
: 11/34.

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000200
000340

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000034
000020
000014
000014
000064

177776
177560
177562
177564
177566
177570

000500
000700
001000
000736

100000

; TEST DFKTDA TESTS FEATURES OF THE TWO PROCESSOR STATES AND INCLUDES
; TRAPS FROM ALL STATES TO ALL OTHER STATES, AND MFP/MTP INSTRUCTIONS IN ALL
; STATES AND PREVIOUS STATES.
; NOTE: ALL TESTS ARE ENTERED AND EXITED IN KERNEL MODE.

; STARTING PROCEEDURE
LOAD ADDRESS=200
START
KERNEL STACK POINTER IS AT 500
USER STACK POINTER IS AT 700
BELL WILL RING WHEN TEST IS COMPLETE

; REGISTER ASSIGNMENTS
R0=X0
R1=X1
R2=X2
R3=X3
R4=X4
R5=X5
PC=X7

; STACK POINTERS
KSP=X6 ; KERNEL STACK POINTER
USP=X6 ; USER STACK POINTER
HLT=HALT
SCOPE=010701 ; MOVE PC TO R1
TRT=3 ; TRACE TRAP
PRTY3=140
PRTY4=200
PRTY7=340

; VECTOR ADDRESSES
ERRVEC=4 ; ADDRESS OF ERROR VECTOR
RESVEC=10 ; ADDRESS OF RESERVED INST TRAP VECTOR
EMTVEC=30 ; ADDRESS OF EMT VECTOR
TRAPVEC=34 ; ADDRESS OF TRAP VECTOR
IOTVEC=20 ; ADDRESS OF IOT VECTOR
TBITVEC=14 ; ADDRESS OF 'T' BIT TRAP VECTOR
TRTVEC=14 ; ADDRESS OF 'TRACE' TRAP
TPVEC=64 ; ADDRESS OF TTY PRINTER INTERRUPT VECTOR

; HARDWARE REGISTER ASSIGNMENTS
PSW=177776 ; ADDRESS OF STATUS REGISTER
TKS=177560 ; ADDRESS OF KEYBOARD CSR
TKB=177562 ; ADDRESS OF KEYBOARD BUFFER
TPS=177564 ; ADDRESS OF TELEPRINTER CSR
TPB=177566 ; ADDRESS OF TELEPRINTER BUFFER
SWR=177570 ; ADDRESS OF CONSOL SWITCH REGISTER

; INITIAL STACK POINTER SETTINGS
KPTR=500 ; KERNEL INITIAL STACK POINTER VALUE
UPTR=700 ; USER INITIAL STACK POINTER VALUE
YELPTR=1000 ; STACK POINTER VALUE FOR 'YELLOW' OVFLW
REDPTR=736 ; STACK POINTER VALUE FOR 'RED' OVFLW

; MISC. BIT ASSIGNMENTS
BIT15=100000

```

217      040000
218      020000
219      000100
220
221
222
223      140000
224      100000
225      040000
226      000000
227      030000
228      000000
229      000000
230      000020
231      000001
232      000002
233      000004
234      000010
235
236      000000
237
238      000046
239      000144
240      000052
241      000000
242
243      000200
244      000167
245      000606
246
247      001000
248
249      001000
250      000000
251      001002
252      001012

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```

BIT14=40000
BIT13=20000
BIT6=100

```

;STATUS REGISTER BIT ASSIGNMENTS

```

UM=140000
IM=100000
IM1=40000
KI=0
PUM=030000
PKI=0
REG=0
TBIT=20
C=1
V=2
Z=4
N=10

```

```

:USER MODE
:ILLEGAL MODE
:ILLEGAL MODE
:ILLEGAL MODE
:KERNEL MODE
:PREVIOUS USER MODE
:PREVIOUS KERNEL MODE
:REGISTER BIT: HAS NO EFFECT!!!!
:'T' BIT IN JMWPSW
:'C' BIT IN PS
:'V' BIT IN PS
:'Z' BIT IN PS
:'N' BIT IN PS

```

```

.=0
.REPT 100
+2
HALT
.ENDR

```

```

.=46
LOGIC
.=52
0

```

```

.=200
JMP START

```

;TAGS

```

ICNT: 0
TEMP: 0

```

```

.=1000
.=.+6

```

;GO START

;CONTAINS PASS COUNT

```

257
258 001012 012706 000500 START: MOV #KPTR,KSP
259 001016 005067 177756 CLR ICNT
260 :TEST THAT PROCESSOR POWERED UP OK FOR THE TEST
261 001022 032737 000000 177776 PWRUP: BIT #KM+PKM,@#PSW ;IS STATUS CORRECT
262 001030 001377 . ;LOOP HERE IF NOT
263
264 001032 012706 000500 BEGIN: MOV #KPTR,KSP ;INITIALIZE THE STACK POINTER
265
266 ;CHECK THAT THE NOP INSTRUCTION IS A 'NOP' IN USER MODE.
267 †1: SCOPE
268 001040 012737 140000 177776 MOV #UM,@#PSW ;USER MODE,PRIORITY LEVEL 0
269 001046 000240 NOP
270 001050 013700 177776 MOV @#PSW,R0 ;GET @#PSW
271 001054 005037 177776 CLR @#PSW ;KERNEL MODE!!!
272 001060 022700 140000 CMP #UM,R0 ;TEST THAT NOP DID NOT ALTER @#PSW
273 001064 001401 BEQ .+4
274 001066 000000 HLT ;ERPOR! NOP CHANGED STATUS WORD
275
276
277 :TEST TRAP FROM USER MODE TO KERNEL MODE
278 †5: SCOPE
279 001070 010701 MOV #KPTR,KSP
280 001072 012706 000500 MOV #TSA,@#IOTVEC
281 001076 012737 001134 000020 CLR IOTVEC+2
282 001110 012737 140340 177776 MOV #UM+PRTY7,@#PSW ;USER MODE!!!
283 001116 012706 000700 MOV #UPTR,USP
284 001122 000277 SCC
285 001124 000004 IOT
286 001126 005037 177776 TSAA: CLR @#PSW
287 001132 000000 HLT
288 001134 013700 177776 TSA: MOV @#PSW,R0
289 001140 005037 177776 CLR @#PSW
290 001144 022700 030000 CMP #KM+PUM,R0
291 001150 001401 BEQ .+4
292 001152 000000 HLT
293 001154 022767 001126 177312 CMP #TSAA,KPTR-4
294 001162 001401 BEQ .+4
295 001164 000000 HLT
296 001166 022767 140357 177302 CMP #UM+PRTY7+17,KPTR-2
297 001174 001401 BEQ .+4
298 001176 000000 HLT
299 001200 022706 000474 CMP #KPTR-4,KSP
300 001204 001401 BEQ .+4
301 001206 000000 HLT
302 001210 012737 140000 177776 MOV #UM,@#PSW
303 001216 010600 MOV USP,R0
304 001220 005037 177776 CLR @#PSW
305 001224 022700 000700 CMP #UPTR,R0
306 001230 001401 BEQ .+4
307 001232 000000 HLT
308 001234 012737 000022 000020 MOV #IOTVEC+2,@#IOTVEC
309
310 :TEST TRAP FROM USER TO USER MODE (VIA TRACE TRAP)
311 †7: SCOPE
312 001242 010701 MOV #T7A,TRTVEC

```

HO1

TEST DFKTDA PDP11/34 PROCESSOR STATES TEST
DFKTDA.P11

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| | | | | | | | |
|-----|--------|--------|--------|--------|------------|------------------|---------------------------|
| 313 | 001252 | 012767 | 140000 | 176536 | MOV | #UM,TRTVEC+2 | ;USER MODE ON TRAP |
| 314 | 001260 | 012737 | 140000 | 177776 | MOV | #UM,@#PSW | |
| 315 | 001266 | 012706 | 000700 | | MOV | #UPTR,USP | |
| 316 | 001272 | 000003 | | | TRT | | |
| 317 | 001274 | 005037 | 177776 | | T7AA: CLR | @#PSW | |
| 318 | 001300 | 000000 | | | HLT | | |
| 319 | 001302 | 013700 | 177776 | | T7A: MOV | @#PSW,R0 | |
| 320 | 001306 | 010602 | | | MOV | USP,R2 | |
| 321 | 001310 | 042737 | 140000 | 177776 | BIC | #UM,@#PSW | |
| 322 | 001316 | 022767 | 001274 | 177350 | CHP | #T7AA,UPTR-4 | |
| 323 | 001324 | 001401 | | | BEQ | +.4 | |
| 324 | 001326 | 000000 | | | HLT | | |
| 325 | 001330 | 022700 | 170000 | | CHP | #UM+PUM,R0 | |
| 326 | 001334 | 001401 | | | BEQ | +.4 | |
| 327 | 001336 | 000000 | | | HLT | | |
| 328 | 001340 | 012767 | 000016 | 176446 | MOV | #TRTVEC+2,TRTVEC | |
| 329 | 001346 | 005067 | 176444 | | CLR | TRTVEC+2 | |
| 330 | | | | | | | |
| 331 | | | | | | | |
| 332 | | | | | | | |
| 333 | | | | | | | |
| 334 | 001352 | 010701 | | | | | |
| 335 | 001354 | 012737 | 001410 | 000010 | T12: SCOPE | | |
| 336 | 001362 | 005037 | 000012 | | MOV | #T12A,@#RESVEC | |
| 337 | 001366 | 012706 | 000500 | | CLR | @#RESVEC+2 | |
| 338 | 001372 | 012737 | 140000 | 177776 | MOV | #KPTR,KSP | |
| 339 | 001400 | 000000 | | | MOV | #UM,@#PSW | ;USER MODE!!! |
| 340 | 001402 | 005037 | 177776 | | HALT | | ;HALT TRAPS IN USER MODE |
| 341 | 001406 | 000000 | | | T12AA: CLR | @#PSW | |
| 342 | 001410 | 013700 | 177776 | | HALT | | ;ERROR! HALT DID NOT TRAP |
| 343 | 001414 | 005037 | 177776 | | T12A: MOV | @#PSW,R0 | |
| 344 | 001420 | 022700 | 030000 | | CLR | @#PSW | |
| 345 | 001424 | 001401 | | | CHP | #UM+PUM,R0 | |
| 346 | 001426 | 000000 | | | BEQ | +.4 | |
| 347 | 001430 | 022767 | 001402 | 177036 | HLT | | |
| 348 | 001436 | 001401 | | | CHP | #T12AA,KPTR-4 | |
| 349 | 001440 | 000000 | | | BEQ | +.4 | |
| 350 | | | | | HLT | | |
| 351 | | | | | | | |
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;TEST THAT THE 'HALT' INSTRUCTION TRAPS TO LOCATION 10 IN USER MODE.

;CHECK THAT SPL TRAPS TO 10 IN USER MODE.

;SET KERNEL STACK PTR
;USER MODE!!!
;SPL TRAPS IN USER MODE
;KERNEL MODE!!!
;ERROR! SPL FAILED TO TRAP IN USER MODE

;TEST THAT "RESET" RESETS IN KERNEL MODE


```

369 001534 010701          T18:  SCOPE
370 001536 005037 177776    CLR      @#PSW
371 001542 012737 000340 177776  MOV      @#PTY7,@#PSW ; PRIORITY TO 2
372 001550 012767 000100 176003  MOV      @100,177564 ; SET "IE" IN TPS
373 001556 000005          RESET    ; CLEAR "IE"
374 001560 001037 177776    CLR      @#PSW
375 001564 032767 000100 175772  BIT      @:00,177564
376 001572 001401          BEQ     .+4
377 001574 000000          HLT     ; RESET DID NOT
378                                     ; CLEAR "IE"
379
380                                     ; TEST THAT "RESET" NOP'S IN USER MODE
381 001576 010701          †19:  SCOPE
382 001600 012737 140340 177776  MOV      @UM+PTY7,@#PSW ; USER MODE!!!
383 001606 012767 000100 175750  MOV      @100,177564 ; SET "IE"
384 001614 000005          RESET    ; SHOULD NOP
385 001616 032767 000100 175740  BIT      @100,177564
386 001624 001001          BNE     .+4
387 001626 000000          HLT     ; "IE" CLEARED
388 001630 005067 175730    CLR      177564
389 001634 005037 177776    CLR      @#PSW
390
391                                     ; TEST INTERRUPT SEQUENCE USER TO KERNEL MODE
392 001640 010701          †15:  SCOPE
393 001642 012706 000500    MOV      @KPTR,KSP ; SET KERNEL STACK POINTER
394 001646 012737 170340 177776  MOV      @UM+PUM+PTY7,@#PSW ; USER MODE!!!
395 001654 012767 001720 176202  MOV      @T15A,64 ; INTERRUPT VEC.
396 001662 012767 000200 176176  MOV      @KM+PTY4,66
397 001670 012706 000700    MOV      @UPTR,USP ; SET USER STACK POINTER
398 001674 042737 000200 177776  BIC      @PTY4,@#PSW ; SET PRIORITY LEVEL=3
399 001702 012767 000100 175654  MOV      @100,177564 ; REQUEST AN INTERRUPT AT LEVEL 4
400 001710 000240          T15AA:  NOP
401 001712 005037 177776    CLR      @#PSW ; KERNEL MODE!!!
402 001716 000000          HLT     ; ERROR! NO INTERRUPT REQUEST
403 001720 013700 177776    T15A:  MOV      @#PSW,RO ; GET "NEW" @#PSW
404 001724 005067 175634    CLR      177564 ; DISABLE REQUEST
405 001730 005037 177776    CLR      @#PSW
406 001734 022700 030200    CMP      @KM+PUM+PTY4,RO ; TEST THAT "NEW" @#PSW IS CORRECT
407 001740 001401          BEQ     .+4 ; ((PIRVEC+2)
408 001742 000000          HLT     ; ERROR! "NEW" @#PSW NOT = TO (PIRVEC+2)
409 001744 022767 001710 176522  CMP      @T15AA,KPTR-4 ; IS RETURN ADDRESS ON KERNEL STACK
410 001752 001401          BEQ     .+4
411 001754 000000          HLT     ; ERROR! RETURN ADDRESS NOT ON KERNEL STACK
412 001756 022767 170140 176512  CMP      @UM+PUM+PTY3,KPTR-2 ; TEST THAT "OLD" @#PSW WAS SAVED ON
413 001764 001401          BEQ     .+4 ; KERNEL STACK
414 001766 000000          HLT     ; ERROR!
415 001770 012767 000066 176066  MOV      @66,64
416 001776 005067 176064    CLR      66
417
418                                     ; TEST THAT THERE IS NO STACK OVERFLOW IN USER MODE.
419 002002 010701          †17:  SCOPE
420 002004 012737 140000 177776  MOV      @UM,@#PSW ; USER MODE!!!
421 002012 012737 002234 000004  MOV      @T17ERR,@ERRVEC
422 002020 012706 000700    MOV      @UPTR,USP ; SET USER STACK POINTER
423 002024 005067 176752    CLR      TEMP ; CLEAR INDICATOR LOCATION
424 002030 004767 000006    T17A:  JSR      7,T17B ; PUSH ONTO USER STACK

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| | | | | | | | | |
|-----|--------|--------|--------|--------|---------|-------|----------------------|-----------------------------------|
| 425 | 002034 | 052767 | 000400 | 176740 | | BIS | #400,TEMP | ;SET ERROR INDICATOR BIT |
| 426 | 002042 | 052767 | 000001 | 176732 | T17B: | BIS | #1,TEMP | ;SET INDICATOR BIT |
| 427 | 002050 | 004567 | 000006 | | | JSR | 5,↑17C | ;PUSH ONTO USER STACK |
| 428 | 002054 | 052767 | 001000 | 176720 | | BIS | #1000,TEMP | ;SET ERROR INDICATOR BIT |
| 429 | 002062 | 052767 | 000002 | 176712 | T17C: | BIS | #2,TEMP | ;SET INDICATOR BIT |
| 430 | 002070 | 050546 | | | | BIS | RS,-(USP) | ;PUSH ONTO USER STACK |
| 431 | 002072 | 052767 | 000004 | 176702 | | BIS | #4,TEMP | ;SET INDICATOR BIT |
| 432 | 002100 | 004767 | 000006 | | | JSR | 7,↑17D | ;PUSH ONTO USER STACK |
| 433 | 002104 | 052767 | 002000 | 176670 | | BIS | #2000,TEMP | ;SET ERROR INDICATOR BIT |
| 434 | 002112 | 052767 | 000010 | 176662 | T17D: | BIS | #10,TEMP | |
| 435 | 002120 | 012702 | 002134 | | | MOV | #17E,R2 | ;SET UP RETURN FOR RTS |
| 436 | 002124 | 000202 | | | | RTS | R2 | ;GO TO T16E |
| 437 | 002126 | 052767 | 004000 | 176646 | | BIS | #4000,TEMP | ;SET INDICATOR TO SHOW ERROR |
| 438 | 002134 | 052767 | 000020 | 176640 | T17E: | BIS | #20,TEMP | |
| 439 | 002142 | 004567 | 000006 | | | JSR | RS,↑17F | |
| 440 | 002146 | 052767 | 010000 | 176626 | | BIS | #10000,TEMP | ;SET ERROR INDICATOR BIT |
| 441 | 002154 | 052767 | 000040 | 176620 | T17F: | BIS | #40,TEMP | |
| 442 | 002162 | 012737 | 002206 | 000034 | | MOV | #17G,2#TRAPVEC | ;SET UP TRAP VECTOR FOR TRAP |
| 443 | 002170 | 012737 | 140000 | 000036 | | MOV | #UM,2#TRAPVEC+2 | |
| 444 | 002176 | 104400 | | | | TRAP | | |
| 445 | 002200 | 052767 | 020000 | 176574 | | BIS | #20000,TEMP | |
| 446 | 002206 | 052767 | 000100 | 176566 | T17G: | BIS | #100,TEMP | |
| 447 | 002214 | 005037 | 177776 | | | CLR | 2#PSW | ;KERNEL MODE!!! |
| 448 | 002220 | 022767 | 000177 | 176554 | | CMP | #177,TEMP | |
| 449 | 002226 | 001401 | | | | BEQ | .+4 | |
| 450 | 002230 | 000000 | | | | HLT | | |
| 451 | 002232 | 000403 | | | | BR | T17X | |
| 452 | 002234 | 005037 | 177776 | | T17ERR: | CLR | 2#PSW | |
| 453 | 002240 | 000000 | | | | HLT | | ;ERROR! OVERFLOW OCCURED |
| 454 | 002242 | 000240 | | | T17X: | NOP | | |
| 455 | 002244 | 012737 | 000036 | 000034 | | MOV | #TRAPVEC+2,2#TRAPVEC | |
| 456 | 002252 | 005067 | 175560 | | | CLR | TRAPVEC+2 | |
| 457 | | | | | | | | |
| 458 | | | | | | | | |
| 459 | | | | | | | | |
| 460 | | | | | | | | |
| 461 | 002256 | 010701 | | | | | | |
| 462 | 002260 | 005037 | 177776 | | | SCOPE | | |
| 463 | 002264 | 012706 | 000500 | | | CLR | 2#PSW | |
| 464 | 002270 | 012700 | 177777 | | | MOV | #KPTR,KSP | ;SET KERNEL STACK POINTER |
| 465 | 002274 | 005016 | | | | MOV | #-1,R0 | ;PRE-SET R0 |
| 466 | 002276 | 012737 | 030011 | 177776 | | CLR | (KSP) | ;PUT 0 ON THE STACK |
| 467 | 002304 | 006600 | | | | MOV | #PUM+N+C,2#PSW | ;PRE SET STATUS |
| 468 | | | | | | MTP | R0 | ;R0<--(KSP)+ |
| 469 | 002306 | 013702 | 177776 | | | MOV | 2#PSW,R2 | ;GET STATUS |
| 470 | 002312 | 022702 | 030005 | | | CMP | #PUM+Z+C,R2 | |
| 471 | 002316 | 001401 | | | | BEQ | .+4 | |
| 472 | 002320 | 000000 | | | | HLT | | ;ERROR! INCORRECT STATUS |
| 473 | 002322 | 022706 | 000502 | | | CMP | #KPTR+2,KSP | ;DID KSP INCREMENT BY 2 |
| 474 | 002326 | 001401 | | | | BEQ | .+4 | |
| 475 | 002330 | 000000 | | | | HLT | | ;ERROR! KSP DID NOT POP |
| 476 | 002332 | 005700 | | | | TST | R0 | ;DID WORD ON STACK (0) GET TO R0? |
| 477 | 002334 | 001401 | | | | BEQ | .+4 | |
| 478 | 002336 | 000000 | | | | HLT | | ;ERROR! MTPD DID NOT POP 0 OFF |
| 479 | | | | | | | | ;KSP INTO R0 |
| 480 | | | | | | | | |

| Address | OpCode | PC | PSW | Mode | Instruction | Comments |
|---------|--------|--------|--------|--------|-------------|----------|
| 481 | | | | | | |
| 482 | 002340 | 010701 | | | | |
| 483 | 002342 | 005037 | 177776 | | | |
| 484 | 002346 | 012706 | 000500 | | | |
| 485 | 002352 | 005002 | | | | |
| 486 | 002354 | 012716 | 177777 | | | |
| 487 | 002360 | 012737 | 030006 | 177776 | | |
| 488 | 002366 | 006602 | | | | |
| 489 | | | | | | |
| 490 | 002370 | 013700 | 177776 | | | |
| 491 | 002374 | 022700 | 030010 | | | |
| 492 | 002400 | 001401 | | | | |
| 493 | 002402 | 000000 | | | | |
| 494 | 002404 | 022706 | 000502 | | | |
| 495 | 002410 | 001401 | | | | |
| 496 | 002412 | 000000 | | | | |
| 497 | 002414 | 005202 | | | | |
| 498 | 002416 | 001401 | | | | |
| 499 | 002420 | 000000 | | | | |
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| 510 | 002422 | 010701 | | | | |
| 511 | 002424 | 012737 | 140000 | 177776 | | |
| 512 | 002432 | 012706 | 000700 | | | |
| 513 | 002436 | 052716 | 177777 | | | |
| 514 | 002442 | 000261 | | | | |
| 515 | 002444 | 042705 | 177777 | | | |
| 516 | 002450 | 006605 | | | | |
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:MTP1, KERNEL MODE
↑22:

:MTPD, USER MODE
↑25:

:MTP1, USER MODE
↑26:

537 002554 022702 140004
538 002560 001401
539 002562 000000
540 002564 022703 000702
541 002570 001401
542 002572 000000
543 002574 005700
544 002576 001401
545 002600 000000

CMP #UM+Z,R2
BEQ .+4
HLT
CMP #UPTR+2,R3
BEQ .+4
HLT
TST R0
BEQ .+4
HLT

;TEST THAT MTP D/I POPS WORD OFF STACK (AS DETERMINED BY BITS 15 & 14
;INTO STACK POINTER (AS DETERMINED BY BITS 13 & 12).

↑30: ;USP+(KSP)+, MTPD
SCOPE

550 002602 010701
551 002604 012737 140000 177776
552 002612 005006
553 002614 012737 030000 177776
554 002622 012706 000500
555 002626 012716 000700
556 002632 000277
557 002634 006606
558
559 002636 013702 177776
560 002642 012737 140000 177776
561 002650 010600
562 002652 005037 177776
563 002656 022700 000700
564 002662 001401
565 002664 000000
566 002666 022706 000502
567 002672 001401
568 002674 000000
569
570
571

MOV #UM,#PSW ;USER MODE!!!
CLR USP ;PRESET USER STACK POINTER
MOV #KM+PUM,#PSW ;KERNEL MODE!!!, PREV USER MODE!!
MOV #KPTR,KSP ;SET KERNEL STACK POINTER
MOV #UPTR,(KSP)
SCC ;PRESET CC'S
MTP1 USP ;USP+(KSP)+
MOV #PSW,R2 ;SAVE CC'S
MOV #UM,#PSW ;USER MODE!!!
MOV USP,R0 ;GET USER STACK POINTER
CLR #PSW ;KERNEL MODE!!!
CMP #UPTR,R0 ;CHECK THAT MTPD SET USER STACK
BEQ .+4 ;POINTER PROPERLY
HLT ;ERROR!
CMP #KPTR+2,KSP ;CHECK KERNEL STACK POINTER
BEQ .+4
HLT

↑31: ;KSP+(KSP)+, MTPD
SCOPE

572 002676 010701
573 002700 012706 000500
574 002704 012716 000736
575 002710 006606
576 002712 022706 000736
577 002716 001401
578 002720 000000
579

MOV #KPTR,KSP
MOV #REDPTR,(KSP)
MTP1 KSP ;KSP+(KSP)+
CMP #REDPTR,KSP
BEQ .+4
HLT

↑31C: ;USP+(USP)+, MTPD
SCOPE

581 002722 010701
582 002724 012737 170000 177776
583 002732 012706 000700
584 002736 005016
585 002740 000257
586 002742 006606
587
588 002744 013700 177776
589 002750 010602
590 002752 005037 177776
591 002756 022700 170004
592 002762 001401

MOV #UM+PUM,#PSW ;USER MODE!!!, PREV USER MODE!!
MOV #UPTR,USP ;SET USER STACK PTR
CLR (USP) ;PUT #0 ON USER STACK
CCC
MTP1 USP ;USP+(USP)+
MOV #PSW,R0 ;SAVE CC'S
MOV USP,R2 ;SAVE USER STACK POINTER
CLR #PSW ;KERNEL MODE!!!
CMP #UM+PUM+Z,R0 ;CHECK STATUS
BEQ .+4

| | | | | | | | |
|-----|--------|--------|--------|--------|-------|-----------------|--|
| 649 | 003204 | 012716 | 125252 | | MOV | #125252,(USP) | ;PRESET USER STACK |
| 650 | 003210 | 012737 | 003234 | 000004 | MOV | #T40A,#ERRVEC | ;LOAD ERROR VECTOR |
| 651 | 003216 | 012737 | 140000 | 000006 | MOV | #UM,#ERRVEC+2 | |
| 652 | 003224 | 006642 | | | MTP I | -(R2) | ;- (R2)+(USP)+; SHOULD TRAP ON ODD ADDS |
| 653 | 003226 | 005037 | 177776 | | CLR | #PSW | ;KERNEL MODE!!! |
| 654 | 003232 | 000000 | | | HLT | | ;ERROR DID NOT TRAP |
| 655 | 003234 | 010600 | | | MOV | USP,R0 | ;GET USEPS STACK POINTER |
| 656 | 003236 | 042737 | 140000 | 177776 | BIC | #UM,#PSW | ;KERNEL MODE!!! |
| 657 | 003244 | 022700 | 000676 | | CMP | #UPTR-2,R0 | ;CHECK THAT USER STACK POINTER |
| 658 | 003250 | 001401 | | | BEQ | .+4 | ;PUSHED PROPERLY (1 POP, 2 PUSHES) |
| 659 | 003252 | 000000 | | | HLT | | ;ERROR! INCORRECT USER STACK POINTER |
| 660 | 003254 | 022737 | 170010 | 000700 | CMP | #UM+PUM+N,#UPTR | ;CHECK THAT CORRECT STATUS WAS |
| 661 | 003262 | 001401 | | | BEQ | .+4 | ;SAVED ON USER STACK ('N' IS DATA POPPED) |
| 662 | 003264 | 000000 | | | HLT | | ;ERROR! INCORRECT STATUS SAVED ON USER STACK |
| 663 | 003266 | 022767 | 003226 | 175402 | CMP | #T40AA,UPTR-2 | ;CHECK THAT RETURN ADDRESS WAS |
| 664 | 003274 | 001401 | | | BEQ | .+4 | ;SAVED ON USER STACK |
| 665 | 003276 | 000000 | | | HLT | | ;ERROR! RETURN PC NOT ON USER STACK |
| 666 | 003300 | 022702 | 177777 | | CMP | #-1,R2 | ;DID R2 DECREMENT BY 2 |
| 667 | 003304 | 001401 | | | BEQ | .+4 | |
| 668 | 003306 | 000000 | | | HLT | | |
| 669 | | | | | | | |
| 670 | | | | | | | |
| 671 | 003310 | 010701 | | | | | |
| 672 | 003312 | 005037 | 177776 | | | | |
| 673 | 003316 | 012700 | 177777 | | | | |
| 674 | 003322 | 012737 | 003356 | 000004 | | | |
| 675 | 003330 | 005067 | 174452 | | | | |
| 676 | 003334 | 052737 | 000000 | 177776 | | | |
| 677 | 003342 | 005000 | | | | | |
| 678 | 003344 | 012746 | 000002 | | | | |
| 679 | 003350 | 000261 | | | | | |
| 680 | 003352 | 005620 | | | | | |
| 681 | 003354 | 000401 | | | | | |
| 682 | 003356 | 000000 | | | | | |
| 683 | 003360 | 103401 | | | | | |
| 684 | 003362 | 000000 | | | | | |
| 685 | 003364 | 022767 | 000002 | 174406 | | | |
| 686 | 003372 | 001401 | | | | | |
| 687 | 003374 | 000000 | | | | | |
| 688 | | | | | | | |
| 689 | | | | | | | |
| 690 | 003376 | 010701 | | | | | |
| 691 | 003400 | 012737 | 003426 | 000004 | | | |
| 692 | 003406 | 012706 | 000500 | | | | |
| 693 | 003412 | 012716 | 177777 | | | | |
| 694 | 003416 | 000257 | | | | | |
| 695 | 003420 | 006637 | 001002 | | | | |
| 696 | | | | | | | |
| 697 | 003424 | 000401 | | | | | |
| 698 | 003426 | 000000 | | | | | |
| 699 | 003430 | 013700 | 177776 | | | | |
| 700 | 003434 | 022700 | 000010 | | | | |
| 701 | 003440 | 001401 | | | | | |
| 702 | 003442 | 000000 | | | | | |
| 703 | 003444 | 005237 | 001002 | | | | |
| 704 | 003450 | 001401 | | | | | |

;TEST THAT MTP D/I CAN LOAD MEMORY ADDRESSES.

;KERNEL MODE
T41:

SCOPE

CLR #PSW

MOV #-1,R0

MOV #T41A,#ERRVEC

CLR ERRVEC+2

BIS #REG,#PSW ;RO-R5

CLR R0

MOV #2,-(KSP)

SEC

MTP I (R0)+ ;(R0)++(KSP)+

BR .+4

T41A: HLT ;ERROR! TRAPPED

BCS .+4 ;MTP D/I SHOULD NOT AFFECT CARRY

HLT ;BIT ERROR! CARRY BIT, BUT CLEARED.

CMP #2,0

BEQ .+4

HLT

T41B: SCOPE

MOV #T41BB,#ERRVEC ;LOAD ERROR VECTOR

MOV #KPTR,KSP ;SET KERNEL STACK POINTER

MOV #-1,(KSP) ;LOAD KERNEL STACK

CCC ;PRESET CC'S

MTP I #TEMP ;#TEMP+(KSP)+

BR .+4

T41BB: HLT ;ERROR! TRAPPED

MOV #PSW,R0 ;SAVE CC'S

CMP #REG+N,R0 ;CHECK RESULT STATUS

BEQ .+4

HLT ;ERROR! INCORRECT STATUS AFTER MTPD

INC #TEMP ;CHECK RESULT

BEQ .+4

```

705 003452 000000          ;ERROR! MTPD FAILED
706
707
708 003454 010701          :USER MODE
709 003456 005037 177776  ↑43: SCOPE
710 003462 012703 177777   CLR      20PSW
711 003466 012737 003526 000004  MOV     0-1,R3
712 003474 012737 140000 177776  MOV     0T43A,20ERRVEC
713 003502 012703 001004  MOV     0UM,20PSW
714 003506 005067 175270  MOV     0TEMP+2,R3
715 003512 012706 000700  CLR     TEMP
716 003516 052716 177777  MOV     0UPTR,USP
717 003522 006643  MOV     0-1,(USP)
718 003524 000401  MTPDI  -(R3)          ;-(R3)+(USP)+
719 003526 000000  BR      .+4
720 003530 013700 177776  HLT
721 003534 042737 140000 177776  T43A: MOV     20PSW,R0          ;ERROR TRAPPED
722 003542 122700 000010  BIC     0UM,20PSW          ;KERNEL MODE!!!
723 003546 001401  BEQ     .+4
724 003548 000000  HLT
725 003550 005167 175221  COM     TEMP
726 003552 001401  BEQ     .+4
727 003554 000000  HLT
728 003556 012737 000006 000004  MOV     0ERRVEC+2,20ERRVEC
729 003570 005067 174212  CLR     ERRVEC+2
730
731 :TEST THAT MFP D/I PUSHES DESTINATION REGISTER DATA ONTO THE APPROPRIATE STACK
732 : (AS DETERMINED BY 20PSW BITS 15 & 14)
733 : KERNEL MODE, MFPD
734 003574 010701          ↑44: SCOPE
735 003576 012706 000500  MOV     0KPTR,KSP
736 003602 012716 125252  MOV     0125252,(KSP)
737 003606 012700 177777  MOV     0-1,R0
738 003612 000261  SEC
739 003614 006500  MFPDI  R0          ;-(KSP)+R0,(R0)=-1
740 003616 013702 177776  MOV     20PSW,R2          ;GET STATUS RESULT
741 003622 022702 000011  CMP     0REG+R+C,R2
742 003626 001401  BEQ     .+4
743 003630 000000  HLT          ;ERROR! INCORRECT STATUS RESULT
744 003632 022706 000476  CMP     0KPTR-2,KSP      ;DID KERNEL STACK POINTER GET
745 003636 001401  BEQ     .+4          ;PUSHED?
746 003640 000000  HLT          ;ERROR!
747 003642 005116  COM     (KSP)          ;TEST THAT CORRECT DATA(-1) GOT
748 003644 001401  BEQ     .+4          ;PUSHED ONTO KERNEL STACK
749 003646 000000  HLT          ;ERROR! -1 NOT PUSHED ONTO KERNEL STACK
750
751 003650 010701          :KERNEL MODE, MFPD
752 003652 012706 000500  ↑45: SCOPE
753 003656 012716 052525  MOV     0KPTR,KSP
754 003662 005004  MOV     052525,(KSP)
755 003664 012737 000001 177776  CLR     R4          ;PRE SET STACK
756 003672 012704 125252  MOV     0REG+C,20PSW    ;PRESET 'WRONG' REGISTER
757 003676 006504  MFPDI  R4          ;SELECT R0-R5, SET C
758
759 003700 013700 177776  MOV     20PSW,R0
760 003704 022700 000011  CMP     0REG+R+C,R0    ;CHECK STATUS RESULT

```

| | | | | | | | |
|-----|--------|--------|--------|--------|-----------------|----------------|--------------------------------------|
| 761 | 003710 | 001401 | | | BEQ | .+4 | |
| 762 | 003712 | 000000 | | | HLT | | ;ERROR! INCORRECT STATUS |
| 763 | 003714 | 022706 | 000476 | | CMP | #UPTR-2,KSP | ;CHECK PUSH |
| 764 | 003720 | 001401 | | | BEQ | .+4 | |
| 765 | 003722 | 000000 | | | HLT | | ;ERROR! KSP DID NOT PUSH DOWN |
| 766 | 003724 | 022716 | 125252 | | CMP | #125252,(KSP) | ;CHECK DATA ON THE STACK |
| 767 | 003730 | 001401 | | | BEQ | .+4 | |
| 768 | 003732 | 000000 | | | HLT | | ;ERROR! INCORRECT DATA ON THE STACK |
| 769 | | | | | | | ;IF DATA=0 THEN INCORRECT REGISTER |
| 770 | | | | | | | ; (R4), IF DATA=52525 NO DATA PUSHED |
| 771 | | | | | | | ; ON THE STACK. |
| 772 | | | | | :USER MODE MFPO | | |
| 773 | 003734 | 010701 | | | TSO: SCOPE | | |
| 774 | 003736 | 005003 | | | CLR | R3 | ;PRESET |
| 775 | 003740 | 012737 | 140000 | 177776 | MOV | #UM,#PSW | ;USER MODE, R0-R5 |
| 776 | 003746 | 012706 | 000700 | | MOV | #UPTR,USP | ;SET USER'S STACK POINTER |
| 777 | 003752 | 012726 | 125252 | | MOV | #125252,(USP)+ | ;PRESET STACK |
| 778 | 003756 | 012703 | 177777 | | MOV | #-1,R3 | |
| 779 | 003762 | 000257 | | | CCC | | |
| 780 | 003764 | 006503 | | | MFPI | R3 | ;-(USP)+R3 (R3)=-1 |
| 781 | | | | | | | |
| 782 | 003766 | 013700 | 177776 | | MOV | #PSW,R0 | |
| 783 | 003772 | 010604 | | | MOV | USP,R4 | |
| 784 | 003774 | 042737 | 140000 | 177776 | BIC | #UM,#PSW | |
| 785 | 004002 | 022700 | 140010 | | CMP | #UM+H,R0 | |
| 786 | 004006 | 001401 | | | BEQ | .+4 | |
| 787 | 004010 | 000000 | | | HLT | | |
| 788 | 004012 | 022704 | 000700 | | CMP | #UPTR,R4 | |
| 789 | 004016 | 001401 | | | BEQ | .+4 | |
| 790 | 004020 | 000000 | | | HLT | | |
| 791 | 004022 | 005214 | | | INC | (R4) | |
| 792 | 004024 | 001401 | | | BEQ | .+4 | |
| 793 | 004026 | 000000 | | | HLT | | |
| 794 | 004030 | 005037 | 177776 | | CLR | #PSW | |
| 795 | | | | | :USER MODE MFPI | | |
| 796 | 004034 | 010701 | | | TSI: SCOPE | | |
| 797 | 004036 | 005005 | | | CLR | RS | |
| 798 | 004040 | 012737 | 140000 | 177776 | MOV | #UM,#PSW | ;USER MODE!!! |
| 799 | 004046 | 012706 | 000700 | | MOV | #UPTR,USP | ;SET USER STACK POINTER |
| 800 | 004052 | 012716 | 177777 | | MOV | #-1,(USP) | ;PRESET USER STACK |
| 801 | 004056 | 012705 | 000700 | | MOV | #UPTR,RS | ;PRESET RS |
| 802 | 004062 | 000277 | | | SCC | | ;PRESET CONDITION CODES |
| 803 | 004064 | 006505 | | | MFPI | RS | ;-(USP)+RS |
| 804 | | | | | | | |
| 805 | 004066 | 013700 | 177776 | | MOV | #PSW,R0 | ;GET STATUS RESULT |
| 806 | 004072 | 010602 | | | MOV | USP,R2 | ;GET USER STACK POINTER |
| 807 | 004074 | 042737 | 140000 | 177776 | BIC | #UM,#PSW | ;KERNEL MODE!!! |
| 808 | 004102 | 022700 | 140001 | | CMP | #UM+C,R0 | ;CHECK STATUS RESULT AFTER MFPI INST |
| 809 | 004106 | 001401 | | | BEQ | .+4 | |
| 810 | 004110 | 000000 | | | HLT | | ;ERROR! INCORRECT STATUS AFTER MFPI |
| 811 | 004112 | 022702 | 000676 | | CMP | #UPTR-2,R2 | |
| 812 | 004116 | 001401 | | | BEQ | .+4 | |
| 813 | 004120 | 000000 | | | HLT | | |
| 814 | 004122 | 022712 | 000700 | | CMP | #UPTR,(R2) | |
| 815 | 004126 | 001401 | | | BEQ | .+4 | |
| 816 | 004130 | 000000 | | | HLT | | |


```

817
818
819
820 004132 010701
821 004134 007037 177776
822 004140 012700 001002
823 004144 052737 000000 177776
824 004152 012700 001004
825 004156 012767 177777 174616
826 004164 007067 174614
827 004170 012706 000500
828 004174 012716 125252
829 004200 006520
830
831 004202 013732 177776
832 004206 022732 000004
833 004212 001401
834 004214 007000
835 004216 007006 000476
836 004222 001401
837 004224 000000
838 004226 005716
839 004230 001401
840 004232 000000
841
842
843 004234 010701
844 004236 012737 140000 177776
845 004244 012703 001004
846 004250 052737 000340 177776
847 004256 012703 001006
848 004262 005067 174514
849 004266 012767 177777 174510
850 004274 012706 000700
851 004300 012716 125252
852 004304 006563 177776
853
854 004310 013700 177776
855 004314 010602
856 004316 042737 140000 177776
857 004324 022700 140350
858 004330 001401
859 004332 000000
860 004334 022702 000676
861 004340 001401
862 004342 000000
863 004344 005112
864 004346 001401
865 004350 000000
866
867 004352 010701
868 004354 012706 000500
869 004360 012737 000340 000036
870 004366 012737 004456 000034
871 004374 012737 140000 177776
872 004402 005002

```

: TEST THAT MFPO/I PUSHES DESTINATION MEMORY DATA ONTO THE APPROPRIATE

: STACK.

: KERNEL MODE MFPO

```

↑52: SCOPE
CLR @@PSW
MOV @TEMP, R0 : KERNEL MODE!!!
BIS @REG, @@PSW : PRESET R0
MOV @TEMP+2, R0 : SELECT R0-R5
CLR @-1, TEMP : PRESET R0
MOV @TEMP+2
MOV @KPTR, KSP : SET KERNEL STACK POINTER
MOV @125252, (KSP) : PRESET KERNEL STACK
MFPI (R0)+ : -(KSP)+(R0)+, R0=TEMP+2, TEMP+2=0

MOV @@PSW, R2
CMP @REG+2, R2
BEQ .+4
HLT
CMP @KPTR-2, KSP
BEQ .+4
HLT
TST (KSP)
BEQ .+4
HLT

```

: USER MODE MFPI

```

↑54: SCOPE
MOV @UM, @@PSW
MOV @TEMP+2, R3
BIS @REG+PRTY7, @@PSW
MOV @TEMP+4, R3
CLR TEMP
MOV @-1, TEMP+2
MOV @UPTR, USP
MOV @125252, (USP)
MFPI -2(R3) ; -(USP+-2(R3), R3=@TEMP+4, TEMP+2=-1

```

```

MOV @@PSW, R0
MOV USP, R2
BIC @UM, @@PSW
CMP @UM+PRTY7+N, R0
BEQ .+4
HLT
CMP @UPTR-2, R2
BEQ .+4
HLT
COM (R2)
BEQ .+4
HLT

```

: TEST TRAP & RETURN USER-KERNEL-USER

```

↑57: SCOPE
MOV @KPTR, KSP : SET KERNEL STACK POINTER
MOV @PRTY7, @@TRAPVEC+2
MOV @T57A, @@TRAPVEC
MOV @UM, @@PSW : USER MODE!!!
CLR R2

```

| | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|-------|----------------|--|---|
| 873 | 004404 | 104400 | | | | TRAP | | | ; TRAP & ENTER KERNEL MODE |
| 874 | 004406 | 013767 | 177776 | 174366 | T57AA: | MOV | #PSW, TEMP | | |
| 875 | 004414 | 042737 | 140000 | 177776 | | BIC | #UM, #PSW | | ; KERNEL MODE!!! |
| 876 | 004422 | 022767 | 004406 | 174044 | | CMP | #T57AA, KPTR-4 | | ; CHECK THAT RETURN ADDRESS IS ON |
| 877 | 004430 | 001401 | | | | BEQ | .+4 | | ; KERNEL STACK |
| 878 | 004432 | 000000 | | | | HLT | | | ; ERROR! RETURN ADDRESS NOT ON STACK |
| 879 | 004434 | 022767 | 140004 | 174340 | | CMP | #UM+2, TEMP | | ; CHECK THAT CORRECT #PSW WAS |
| 880 | 004442 | 001401 | | | | BEQ | .+4 | | ; RESTORED ON THE RETURN |
| 881 | 004444 | 000000 | | | | HLT | | | ; ERROR! INCORRECT STATUS WAS RETURNED |
| 882 | | | | | | | | | ; BY KERNEL FROM TRAP |
| 883 | 004446 | 005102 | | | | COM | R2 | | ; CHECK THAT TRAP ROUTINE WAS EXECUTED |
| 884 | 004450 | 001401 | | | | BEQ | .+4 | | |
| 885 | 004452 | 000000 | | | | HLT | | | ; ERROR! KERNEL DID NOT DO COM R2 |
| 886 | | | | | | | | | ; (AT T57A) |
| 887 | 004454 | 000402 | | | | BR | T57EX | | ; EXIT TEST |
| 888 | 004456 | 005102 | | | T57A: | COM | R2 | | ; COMPLEMENT R2 |
| 889 | 004460 | 000002 | | | | RTI | | | ; AND EXIT |
| 890 | 004462 | 000240 | | | T57EX: | NOP | | | |
| 891 | | | | | | | | | |
| 892 | | | | | | | | | ; TEST THAT MFPD/I CAN PUSH ONTO CURRENT STACK (AS DETERMINED BY PS15 & |
| 893 | | | | | | | | | ; PS14) THE PREVIOUS MODES STACK POINTER (AS DETERMINED BY PS13 & PS12) |
| 894 | | | | | | | | | ;- (KSP)+KSP, MFPD |
| 895 | 004464 | 010701 | | | ↑60: | SCOPE | | | |
| 896 | 004466 | 005037 | 177776 | | | CLR | #PSW | | ; KERNEL MODE!!!, PREV KERNEL MODE!! |
| 897 | 004472 | 012706 | 000500 | | | MOV | #KPTR, KSP | | ; SET KERNEL STACK POINTER |
| 898 | 004476 | 006506 | | | | MFPD | KSP | | ;- (KSP)+KSP |
| 899 | 004500 | 022767 | 000500 | 173770 | | CMP | #KPTR, KPTR-2 | | ; TEST THAT VALUE OF KERNEL STACK POINTER |
| 900 | 004506 | 001401 | | | | BEQ | .+4 | | ; WAS PUSHED ONTO KERNEL STACK |
| 901 | 004510 | 000000 | | | | HLT | | | ; ERROR! |
| 902 | | | | | | | | | |
| 903 | | | | | | | | | ;- (KSP)+USP, MFPD |
| 904 | 004512 | 010701 | | | ↑62: | SCOPE | | | |
| 905 | 004514 | 012737 | 030000 | 177776 | | MOV | #UM+PUM, #PSW | | ; KERNEL MODE!!!, PREV USER MODE!! |
| 906 | 004522 | 012706 | 000500 | | | MOV | #KPTR, KSP | | ; SET KERNEL STACK POINTER |
| 907 | 004526 | 012716 | 177777 | | | MOV | #-1, (KSP) | | |
| 908 | 004532 | 006606 | | | | MTPD | USP | | ; SET USER STACK POINTER USP'+(KSP)+ |
| 909 | 004534 | 005166 | 177776 | | | COM | -2(KSP) | | ; PRESET KERNEL STACK |
| 910 | 004540 | 006506 | | | | MFPD | USP | | ;- (KSP)+USP |
| 911 | 004542 | 022716 | 177777 | | | CMP | #-1, (KSP) | | ; CHECK THAT USER STACK POINTER WAS |
| 912 | 004546 | 001401 | | | | BEQ | .+4 | | ; PUSHED ONTO KERNEL STACK |
| 913 | 004550 | 000000 | | | | HLT | | | ; ERROR! |
| 914 | | | | | | | | | |
| 915 | | | | | | | | | ;- (USP)+USP, MFPD |
| 916 | 004552 | 010701 | | | ↑65: | SCOPE | | | |
| 917 | 004554 | 012737 | 030000 | 177776 | | MOV | #PUM, #PSW | | ; KERNEL MODE!!!, PREV USER MODE!! |
| 918 | 004562 | 012706 | 000500 | | | MOV | #KPTR, KSP | | ; SET KERNEL STACK POINTER |
| 919 | 004566 | 012716 | 000700 | | | MOV | #UPTR, (KSP) | | |
| 920 | 004572 | 006606 | | | | MTPD | USP | | ; SET USER STACK POINTER |
| 921 | 004574 | 005067 | 174076 | | | CLR | UPTR-2 | | |
| 922 | 004600 | 052737 | 140000 | 177776 | | BIS | #UM, #PSW | | ; USER MODE!!!, PREV USER MODE!!! |
| 923 | 004606 | 006506 | | | | MFPD | USP | | ; PUSH USER STACK POINTER ONTO USER STACK |
| 924 | 004610 | 042737 | 140000 | 177776 | | BIC | #UM, #PSW | | ; KERNEL MODE!!!, PREV USER MODE!! |
| 925 | 004616 | 006506 | | | | MFPD | USP | | ; PUSH USER STACK POINTER ONTO KERNEL STACK |
| 926 | 004620 | 022716 | 000676 | | | CMP | #UPTR-2, (KSP) | | ; CHECK THAT USER STACK POINTER WAS |
| 927 | 004624 | 001401 | | | | BEQ | .+4 | | ; PUSHED PROPERLY (ONCE) |
| 928 | 004626 | 000000 | | | | HLT | | | ; ERROR! |

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929 004630 022767 000700 174040      CMP      @UPTR,UPTR-2      ;CHECK THAT USER STACK POINTER IS ON THE
930 004636 001401                                BEQ      .+4              ;USERS STACK
931 004640 000000                                HLT                                     ;ERROR!
932 004642 010701                                ;-(KSP)+KSP MFPI
933 004644 005037 177776      ↑66:  SCOPE
934 004650 012706 000500      CLR      @#PSW           ;KERNEL MODE!!!, PREV KERNEL MODE!!
935 004654 006506                                MOV      @KPTR,KSP      ;SET KERNEL STACK POINTER
936 004656 022767 000500 173612      CMP      @KPTR,KPTR-2    ;PUSH KERNEL STACK POINTER ONTO KERNEL
937 004664 001401                                BEQ      .+4              ;STACK
938 004666 000000                                HLT                       ;CHECK RESULT
939 004670 010701                                ;-(KSP)+USP MFPI
940 004672 012737 030000 177776      ↑70:  SCOPE
941 004700 012706 000500      MOV      @PUM,@#PSW     ;KERNEL MODE!!!, PREV USER MODE!!
942 004704 012716 177777      MOV      @KPTR,KSP      ;SET KERNEL STACK POINTER
943 004710 006506                                MTPU     USP            ;SET USER STACK POINTER
944 004712 006506 177776      COM      -2(KSP)        ;PRESET KERNEL STACK
945 004716 006506                                MFPI     USP            ;PUSH USER STACK POINTER ONTO KERNEL STACK
946 004720 012716 177777      CMP      @-1,(KSP)      ;CHECK RESULT
947 004724 001401                                BEQ      .+4
948 004726 000000                                HLT                       ;ERROR! USER STACK POINTER NOT ON KERNEL STACK
949 004730 010701                                ;-(USP)+USP MFPI
950 004732 012737 030000 177776      ↑73:  SCOPE
951 004740 012706 000500      MOV      @PUM,@#PSW     ;KERNEL MODE!!!, PREV USER MODE!!
952 004744 012716 000700      MOV      @KPTR,KSP      ;SET KERNEL STACK POINTER
953 004750 006506                                MTPU     USP            ;SET USER STACK POINTER
954 004752 006506 173720      CLR      UPTR-2         ;PRESET USER STACK
955 004756 006506 140000 177776      BIS      @UM,@#PSW     ;USER MODE!!!, PREV USER MODE!!
956 004764 006506                                MFPI     USP            ;-(USP)+USP
957 004766 042737 140000 177776      BIC      @UM,@#PSW     ;KERNEL MODE!!!
958 004774 006506                                MFPI     USP            ;GET USER STACK POINTER
959 004776 022716 000676      CMP      @UPTR-2,(KSP)  ;CHECK THAT USER STACK POINTER WAS
960 005002 001401                                BEQ      .+4              ;PUSHED ONCE
961 005004 000000                                HLT                       ;ERROR!
962 005006 022767 000700 173662      CMP      @UPTR,UPTR-2   ;CHECK THAT USER STACK POINTER WAS PUSHED
963 005014 001401                                BEQ      .+4              ;ONTO USER STACK
964 005016 000000                                HLT                       ;ERROR!
965 005020 010701                                ;TEST THAT ILLEGAL MODE DOES NOT HANG BUS.
966 005022 012737 100000 177776      ↑74:  SCOPE
967 005030 013700 177776      MOV      @IM,@#PSW     ;ILLEGAL MODE!!!
968 005034 005037 177776      MOV      @#PSW,RO      ;GET ILLEGAL MODE
969 005040 022700 100000      CLR      @#PSW         ;KERNEL MODE!!
970 005044 001401                                CMP      @IM,RO         ;CHECK THAT ILLEGAL MODE WAS SET
971 005046 000000                                BEQ      .+4              ;INTO STATUS
972 005050 010701                                ;TEST THAT ILLEGAL MODE DOES NOT HANG BUS.
973 005052 012737 040000 177776      ↑75:  SCOPE
974 005054 000000                                MOV      @IMI,@#PSW     ;ILLEGAL MODE!!!

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|------|--------|--------|--------|--------|------------|---------------|--|
| 985 | 005060 | 013700 | 177776 | | MOV | 2#PSW,R0 | ;GET ILLEGAL MODE |
| 986 | 005074 | 005037 | 177776 | | CLR | 2#PSW | ;KERNEL MODE!! |
| 987 | 005070 | 022700 | 040000 | | CMP | 8IMI,R0 | ;CHECK THAT ILLEGAL MODE WAS SET |
| 988 | 005074 | 001401 | | | BEQ | .+4 | ;INTO STATUS |
| 989 | 005076 | 000000 | | | HLT | | |
| 990 | | | | | | | |
| 991 | | | | | | | |
| 992 | | | | | | | |
| 993 | 005100 | 010701 | | | | | |
| 994 | 005102 | 012737 | 030000 | 177776 | ↑76: SCOPE | | |
| 995 | 005110 | 012706 | 000500 | | MOV | 8KM+PUM,2#PSW | ;KERNEL MODE!!! PREV USER MODE!! |
| 996 | 005114 | 012716 | 000700 | | MOV | 8KPTR,KSP | ;SET KERNEL STACK POINTER |
| 997 | 005120 | 006606 | | | MOV | 8UPTR,(KSP) | |
| 998 | 005122 | 005067 | 173552 | | MTP | USP | ;SET USER STACK POINTER |
| 999 | 005126 | 005016 | | | CLR | UPTR | ;PRESET USER STACK |
| 1000 | 005130 | 012766 | 177777 | 177776 | CLR | (KSP) | ;PRESET KERNEL STACK |
| 1001 | 005136 | 006506 | | | MOV | 8-1,-2(KSP) | |
| 1002 | 005140 | 006576 | 000000 | | MFP | USP | ;-(KSP)+USP |
| 1003 | 005144 | 000240 | | | MFP | 2(KSP) | ;LIKE MOV 2(6),-(6) |
| 1004 | 005146 | 013703 | 177776 | | NOP | | |
| 1005 | 005152 | 022767 | 000700 | 173320 | MOV | 2#PSW,R3 | ;SAVE STATUS RESULT |
| 1006 | 005160 | 001401 | | | CMP | 8UPTR,KPTR | ;CHECK THAT USER STACK POINTER WAS |
| 1007 | 005162 | 000000 | | | BEQ | .+4 | ;PUSHED ONTO KERNEL STACK |
| 1008 | 005164 | 022706 | 000476 | | HLT | | ;ERROR! |
| 1009 | 005170 | 001401 | | | CMP | 8KPTR-2,KSP | ;CHECK THAT KERNEL STACK POINTER IS POS- |
| 1010 | 005172 | 000000 | | | BEQ | .+4 | ;ITIONED PROPERLY |
| 1011 | 005174 | 005716 | | | HLT | | ;ERROR! INCORRECT KERNEL STACK POINTER |
| 1012 | 005176 | 001401 | | | TST | (KSP) | ;CHECK THAT CORRECT DATA |
| 1013 | 005200 | 000000 | | | BEQ | .+4 | ;WAS PUSHED ONTO KERNEL STACK |
| 1014 | 005202 | 022703 | 030004 | | HLT | | ;ERROR! |
| 1015 | 005206 | 001401 | | | CMP | 8KM+PUM+2,R3 | ;CHECK STATUS |
| 1016 | 005210 | 000000 | | | BEQ | .+4 | |
| 1017 | | | | | HLT | | ;ERROR! INCORRECT STATUS |
| 1018 | | | | | | | |
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:TEST THAT KERNEL CAN GET DATA FROM USER STACK

↑76:

SCOPE
 MOV 8KM+PUM,2#PSW ;KERNEL MODE!!! PREV USER MODE!!
 MOV 8KPTR,KSP ;SET KERNEL STACK POINTER
 MOV 8UPTR,(KSP)
 MTP USP ;SET USER STACK POINTER
 CLR UPTR ;PRESET USER STACK
 CLR (KSP) ;PRESET KERNEL STACK
 MOV 8-1,-2(KSP)
 MFP USP ;-(KSP)+USP
 MFP 2(KSP) ;LIKE MOV 2(6),-(6)
 NOP
 MOV 2#PSW,R3 ;SAVE STATUS RESULT
 CMP 8UPTR,KPTR ;CHECK THAT USER STACK POINTER WAS
 BEQ .+4 ;PUSHED ONTO KERNEL STACK
 HLT ;ERROR!
 CMP 8KPTR-2,KSP ;CHECK THAT KERNEL STACK POINTER IS POS-
 BEQ .+4 ;ITIONED PROPERLY
 HLT ;ERROR! INCORRECT KERNEL STACK POINTER
 TST (KSP) ;CHECK THAT CORRECT DATA
 BEQ .+4 ;WAS PUSHED ONTO KERNEL STACK
 HLT ;ERROR!
 CMP 8KM+PUM+2,R3 ;CHECK STATUS
 BEQ .+4
 HLT ;ERROR! INCORRECT STATUS

:CHECK THAT MTPD CAN LOAD MEMORY ADDRESS DM=7,PC

↑102:

SCOPE
 MOV 8KM+PUM,2#PSW ;KERNEL MODE!!! PREV USER MODE!!
 MOV 8KPTR,KSP ;SET KERNEL STACK PTR
 CLR (KSP) ;PUT DATA ON STACK
 MOV 8TEMP,2#TEMP+2 ;LOAD ADDRESS
 MOV 8-1,TEMP ;PRESET DATA
 SCC ;PRESET CC'S
 MTP 2#TEMP+2 ;TEMP+(KSP)+
 MOV 2#PSW,R3 ;CHECK CC'S
 CMP 8PUM+2+C,R3 ;CHECK CC'S
 BEQ .+4
 HLT ;ERROR! INCORRECT CC'S AFTER MTPD
 TST 2#TEMP ;CHECK RESULT
 BEQ .+4
 HLT ;ERROR! INCORRECT RESULT

:CHECK THAT MTPD CAN LOAD MEMORY ADDRESS DM=7

↑103:

SCOPE
 MOV 8KM+PUM,2#PSW ;KERNEL MODE!!!
 MOV 8KPTR,KSP ;SET KERNEL STACK PTR
 MOV 8-1,(KSP) ;LOAD DATA ONTO STACK
 MOV 8-2,R4 ;LOAD INDEX REGISTER
 CLR TEMP ;PRESET DATA

| | | | | | | | |
|------|--------|--------|--------|--------|---------|-----------------|---|
| 1041 | 005326 | 012767 | 001002 | 173450 | MOV | %TEMP, TEMP+2 | |
| 1042 | 005334 | 006674 | 001006 | | MTPD | @TEMP+4(R4) | ;TEMP+(KSP)+ |
| 1043 | 005340 | 013703 | 177776 | | MOV | @PSW, R3 | ;SAVE STATUS RESULT |
| 1044 | 005344 | 022706 | 000502 | | CMP | %KPTR+2, KSP | ;CHECK THAT KSP POPPED |
| 1045 | 005350 | 001401 | | | BEQ | .+4 | |
| 1046 | 005352 | 000000 | | | HLT | | ;ERROR! INCORRECT STACK PTR |
| 1047 | 005354 | 022703 | 030010 | | CMP | %PUM+N, R3 | ;CHECK STATUS RESULT |
| 1048 | 005360 | 001401 | | | BEQ | .+4 | |
| 1049 | 005362 | 000000 | | | HLT | | ;ERROR! INCORRECT STATUS |
| 1050 | 005364 | 005267 | 173412 | | INC | TEMP | ;CHECK RESULT |
| 1051 | 005370 | 001401 | | | BEQ | .+4 | |
| 1052 | 005372 | 000000 | | | HLT | | ;ERROR! INCORRECT RESULT |
| 1053 | | | | | | | |
| 1054 | | | | | | | |
| 1055 | 005374 | 010701 | | | | | |
| 1056 | 005376 | 012737 | 000000 | 177776 | ↑104: | SCOPE | |
| 1057 | 005404 | 012706 | 000500 | | MOV | %KM, @PSW | ;KERNEL MODE!!! |
| 1058 | 005410 | 012716 | 005422 | | MOV | %KPTR, KSP | ;SET KERNEL STACK PTR |
| 1059 | 005414 | 000277 | | | MOV | @T104A, (KSP) | ;PUT NEW PC ON STACK |
| 1060 | 005416 | 005607 | | | SCC | | ;PRESET CC'S |
| 1061 | 005420 | 000000 | | | MTPD | PC | ;PC+(KSP)+ |
| 1062 | 005422 | 100001 | | | HLT | | ;ERROR! MTPD FAILED TO SET PC |
| 1063 | 005424 | 000000 | | | T104A: | BPL | .+4 |
| 1064 | 005426 | 103401 | | | HLT | | ;ERROR! 'N' FAILED TO CLEAR IN STATUS |
| 1065 | 005430 | 000000 | | | BCS | .+4 | |
| 1066 | | | | | HLT | | ;ERROR! 'C' WAS CLEARED BY MTPD |
| 1067 | | | | | | | |
| 1068 | 005432 | 010701 | | | | | |
| 1069 | 005434 | 012737 | 170000 | 177776 | ↑106: | SCOPE | |
| 1070 | 005442 | 012706 | 000700 | | MOV | %UM+PUM, @PSW | ;USER MODE!!! |
| 1071 | 005446 | 012716 | 005464 | | MOV | %UPTR, USP | ;SET USER STACK PTR |
| 1072 | 005452 | 000277 | | | MOV | @T106A, (USP) | ;PUT NEW PC ON STACK |
| 1073 | 005454 | 005607 | | | SCC | | ;PRESET CC'S |
| 1074 | 005456 | 000037 | 177776 | | MTPD | PC | ;PC+(USP)+ |
| 1075 | 005462 | 000500 | | | CLR | @PSW | ;KERNEL MODE!!! |
| 1076 | 005464 | 013705 | 177776 | | HLT | | ;ERROR! MTPD FAILED TO LOAD PC |
| 1077 | 005470 | 005037 | 177776 | | T106A: | MOV | @PSW, RS |
| 1078 | 005474 | 022705 | 170001 | | CLR | @PSW | ;SAVE STATUS |
| 1079 | 005500 | 001401 | | | CMP | %UM+PUM+C, RS | ;CHECK STATUS |
| 1080 | 005502 | 000000 | | | BEQ | .+4 | |
| 1081 | | | | | HLT | | |
| 1082 | | | | | | | |
| 1083 | 005504 | 010701 | | | | | |
| 1084 | 005506 | 005037 | 177776 | | ↑107: | SCOPE | |
| 1085 | 005512 | 012706 | 000500 | | CLR | @PSW | ;KERNEL MODE!!! |
| 1086 | 005516 | 012737 | 005534 | 000004 | MOV | %KPTR, KSP | ;SET KERNEL STACK PTR |
| 1087 | 005524 | 000277 | | | MOV | @T107A, @ERRVEC | ;LOAD ERROR VECTOR |
| 1088 | 005526 | 005567 | 172247 | | SCC | | ;PRESET CC'S |
| 1089 | 005532 | 000000 | | | MFPD | 1 | ;000 ADDRESS SHOULD TRAP |
| 1090 | 005534 | 022706 | 000474 | | HLT | | ;ERROR! FAILED TO TRAP ON 000 ADDRESS |
| 1091 | 005540 | 001401 | | | T107AA: | CMP | %KPTR-4, KSP |
| 1092 | 005542 | 000000 | | | T107A: | BEQ | .+4 |
| 1093 | 005544 | 002726 | 005532 | | HLT | | ;CHECK THAT STACK PTR WAS PUSHED |
| 1094 | 005550 | 001401 | | | BEQ | .+4 | ;PROPERLY (2 PUSHES) |
| 1095 | 005552 | 000000 | | | HLT | | ;ERROR! INCORRECT STACK PTR AFTER ERROR |
| 1096 | 005554 | 022716 | 000017 | | CMP | @T107AA, (KSP)+ | ;CHECK RETURN PC ON STACK |
| | | | | | HLT | .+4 | |
| | | | | | | | ;ERROR! RETURN PC NOT ON STACK |
| | | | | | | | ;CHECK SAVED STATUS ON STACK |

| | | | | | | | | |
|------|--------|--------|--------|--------|---|---------------------|---------|---|
| 1097 | 005560 | 001401 | | | BEG | .+4 | | |
| 1098 | 005562 | 000000 | | | HLT | | | ;ERROR! INCORRECT STATUS SAVED ON STACK |
| 1099 | | | | | :USER MODE, TIME OUT | | | |
| 1100 | 005564 | 010701 | | | ↑110: | SCOPE | | |
| 1101 | 005566 | 012737 | 140000 | 177776 | MOV | #UM, @#PSW | | :USER MODE!!! |
| 1102 | 005568 | 012706 | 000700 | | MOV | #UPTR, USP | | :SET USER STACK |
| 1103 | 005570 | 012737 | 140000 | 000006 | MOV | #UM, @#ERRVEC | | :LOAD 'NEW' STATUS |
| 1104 | 005572 | 012737 | 005526 | 000004 | MOV | #T110A, @#ERRVEC+2 | | :AND PC |
| 1105 | 005574 | 005537 | 177702 | | MFPI | @#177702 | | :177702 IS NON-EXISTANT ADRS |
| 1106 | 005576 | 005537 | 177776 | | T110AA: | CLR | @#PSW | :KERNEL MODE!!! |
| 1107 | 005578 | 000000 | | | HLT | | | :ERROR! DID NOT TRAP ON NON ADRS |
| 1108 | 005580 | 010603 | | | T110A: | MOV | USP, R3 | :SAVE USER STACK PTR |
| 1109 | 005582 | 042737 | 140000 | 177776 | BIC | #UM, @#PSW | | :KERNEL MODE!!! |
| 1110 | 005584 | 022703 | 000674 | | CMP | #UPTR-4, R3 | | :CHECK USER STACK PTR |
| 1111 | 005586 | 001401 | | | BEG | .+4 | | |
| 1112 | 005588 | 000000 | | | HLT | | | :ERROR! INCORRECT USP AFTER ERROR TRAP |
| 1113 | 005590 | 022723 | 005620 | | CMP | #T110AA, (R3)+ | | :CHECK RETURN PC ON USER STACK |
| 1114 | 005592 | 001401 | | | BEG | .+4 | | |
| 1115 | 005594 | 000000 | | | HLT | | | :ERROR! RETURN PC NOT ON USER STACK |
| 1116 | 005596 | 022713 | 140000 | | CMP | #UM, (R3) | | :CHECK SAVED STATUS |
| 1117 | 005598 | 001401 | | | BEG | .+4 | | |
| 1118 | 005600 | 000000 | | | HLT | | | :ERROR! INCORRECT STATUS SAVED ON STACK |
| 1119 | | | | | :USER MODE, ODD ADDRESS | | | |
| 1120 | | | | | ↑111: | SCOPE | | |
| 1121 | 005666 | 010701 | | | MOV | #UM, @#PSW | | :USER MODE!!! |
| 1122 | 005668 | 012737 | 140000 | 177776 | MOV | #UPTR, USP | | :SET USER STACK PTR |
| 1123 | 005670 | 012706 | 000700 | | MOV | #T111A, @#ERRVEC | | :LOAD ERROR TRAP VECTOR |
| 1124 | 005672 | 012737 | 005730 | 000004 | MOV | #UM, @#ERRVEC+2 | | |
| 1125 | 005674 | 012737 | 140000 | 000006 | MOV | #UM, @#ERRVEC+2 | | |
| 1126 | 005676 | 005567 | 172055 | | MFPI | -1 | | :ODD ADDRESS SHOULD TRAP |
| 1127 | 005678 | 005037 | 177776 | | T111AA: | CLR | @#PSW | :KERNEL MODE!!! |
| 1128 | 005680 | 000000 | | | HLT | | | :ERROR! FAILED TO TRAP |
| 1129 | 005682 | 010603 | | | T111A: | MOV | USP, R3 | :SAVE USER STACK PTR |
| 1130 | 005684 | 042737 | 140000 | 177776 | BIC | #UM, @#PSW | | :KERNEL MODE!!! |
| 1131 | 005686 | 022703 | 000674 | | CMP | #UPTR-4, R3 | | :CHECK USER STACK PTR |
| 1132 | 005688 | 001401 | | | BEG | .+4 | | |
| 1133 | 005690 | 000000 | | | HLT | | | :ERROR! INCORRECT USER STACK POINTER |
| 1134 | 005692 | 022713 | 005722 | | CMP | #T111AA, (R3) | | :CHECK RETURN ADDRESS ON USER STACK |
| 1135 | 005694 | 001401 | | | BEG | .+4 | | |
| 1136 | 005696 | 000000 | | | HLT | | | :ERROR! RETURN PC NOT ON USER STACK |
| 1137 | 005698 | 012737 | 000006 | 000004 | MOV | #ERRVEC+2, @#ERRVEC | | :RESTORE ERROR TRAP TO HALT |
| 1138 | 005700 | 005067 | 172014 | | CLR | ERRVEC+2 | | |
| 1139 | | | | | :TEST THAT MTPD INSTRUCTION CAN LOAD DATA TO AN ADDRESS VIA THE STACK | | | |
| 1140 | | | | | :KERNEL MODE, PREVIOUS USER MODE | | | |
| 1141 | | | | | ↑112: | SCOPE | | |
| 1142 | 005772 | 010701 | | | MOV | #KM+PUM, @#PSW | | :KERNEL MODE!!!, PREV USER MODE!! |
| 1143 | 005774 | 012737 | 030000 | 177776 | MOV | #KPTR, KSP | | :SET KERNEL STACK PTR |
| 1144 | 006002 | 012706 | 000500 | | MOV | #UPTR, -(KSP) | | |
| 1145 | 006004 | 012746 | 000700 | | MOV | USP | | :SET USER STACK PTR |
| 1146 | 006012 | 006606 | | | MTPD | USP | | :PUT ADDRESS ON THE STACK |
| 1147 | 006014 | 012746 | 001002 | | MOV | #TEMP, -(KSP) | | :PUT DATA ON THE STAK |
| 1148 | 006020 | 012746 | 177777 | | MOV | #-1, -(KSP) | | :PRESET DATA |
| 1149 | 006024 | 005037 | 001002 | | CLR | @#TEMP | | :MOVE #-1 TO TEMP |
| 1150 | 006030 | 006636 | | | MTPD | @(KSP)+ | | :CHECK STACK PTR AFTER MTPD |
| 1151 | 006032 | 022706 | 000500 | | CMP | #KPTR, KSP | | |
| 1152 | 006036 | 001401 | | | BEG | .+4 | | |

| | | | | | | | | | | | | | | |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| BEGIN | 001032 | 264# | 1165 | | | | | | | | | | | |
| BIT13 = | 020000 | 218# | | | | | | | | | | | | |
| BIT14 = | 040000 | 217# | | | | | | | | | | | | |
| BIT15 = | 100000 | 216# | | | | | | | | | | | | |
| BIT6 = | 000100 | 219# | | | | | | | | | | | | |
| C = | 000001 | 231# | 466 | 470 | 513 | 741 | 755 | 760 | 808 | 1027 | 1078 | | | |
| DONE | 006104 | 1164 | 1166# | | | | | | | | | | | |
| EMTVEC= | 000030 | 196# | | | | | | | | | | | | |
| END | 006064 | 1162# | | | | | | | | | | | | |
| ERRVEC= | 000004 | 194# | 421# | 633# | 634# | 650# | 651# | 674# | 675# | 691# | 711# | 728# | 729# | 1086# |
| | | 1103# | 1104# | 1124# | 1125# | 1137# | 1138# | | | | | | | |
| HLT = | 000000 | 186# | 274 | 287 | 292 | 295 | 298 | 301 | 307 | 318 | 324 | 327 | 345 | 348 |
| | | 357 | 362 | 365 | 377 | 387 | 402 | 408 | 411 | 414 | 450 | 453 | 472 | 475 |
| | | 478 | 493 | 496 | 499 | 515 | 518 | 521 | 539 | 542 | 545 | 565 | 568 | 578 |
| | | 593 | 596 | 611 | 624 | 636 | 639 | 642 | 654 | 659 | 662 | 665 | 668 | 682 |
| | | 684 | 687 | 698 | 702 | 705 | 719 | 724 | 727 | 743 | 746 | 749 | 762 | 765 |
| | | 768 | 787 | 790 | 793 | 810 | 813 | 816 | 834 | 837 | 840 | 859 | 862 | 865 |
| | | 878 | 881 | 885 | 901 | 913 | 928 | 931 | 941 | 953 | 968 | 971 | 980 | 989 |
| | | 1006 | 1009 | 1012 | 1015 | 1029 | 1032 | 1046 | 1049 | 1052 | 1061 | 1063 | 1065 | 1075 |
| | | 1080 | 1089 | 1092 | 1095 | 1098 | 1107 | 1112 | 1115 | 1118 | 1128 | 1133 | 1136 | 1153 |
| | | 1156 | 1160 | | | | | | | | | | | |
| ICNT | 001000 | 254# | 259# | 1162# | 1163 | | | | | | | | | |
| IM = | 100000 | 224# | 975 | 978 | | | | | | | | | | |
| IMI = | 040000 | 225# | 984 | 987 | | | | | | | | | | |
| IOTVEC= | 000020 | 198# | 280# | 281# | 308# | | | | | | | | | |
| KM = | 000000 | 226# | 261 | 290 | 343 | 360 | 396 | 406 | 553 | 602 | 905 | 993 | 1013 | 1019 |
| | | 1036 | 1056 | 1143 | | | | | | | | | | |
| KPTR = | 000500 | 210# | 258 | 264 | 279 | 293 | 296 | 299 | 336 | 346 | 353 | 363 | 393 | 409 |
| | | 412 | 463 | 473 | 484 | 494 | 554 | 566 | 573 | 631 | 637 | 640 | 692 | 735 |
| | | 744 | 752 | 763 | 827 | 835 | 868 | 876 | 897 | 899 | 906 | 918 | 936 | 939 |
| | | 946 | 958 | 994 | 1004 | 1007 | 1020 | 1037 | 1044 | 1057 | 1085 | 1090 | 1144 | 1151 |
| KSP =% | 000006 | 184# | 258# | 264# | 279# | 299 | 336# | 353# | 393# | 463# | 465# | 473 | 484# | 486# |
| | | 494 | 554# | 555# | 566 | 573# | 574# | 575# | 576 | 603# | 631# | 632# | 637 | 678# |
| | | 692# | 693# | 735# | 736# | 744 | 747# | 752# | 753# | 763 | 766 | 827# | 828# | 835 |
| | | 838 | 868# | 897# | 898 | 906# | 907# | 909# | 911 | 918# | 919# | 926 | 936# | 937 |
| | | 946# | 947# | 949# | 951 | 958# | 959# | 966 | 994# | 995# | 998# | 999# | 1001 | 1007 |
| | | 1010 | 1020# | 1021# | 1037# | 1038# | 1044 | 1057# | 1058# | 1085# | 1090 | 1093 | 1096 | 1144# |
| | | 1145# | 1147# | 1148# | 1150# | 1151 | 1158 | | | | | | | |
| LOGIC | 006144 | 244 | 1175# | | | | | | | | | | | |
| LOGICE | 006154 | 1173 | 1179# | | | | | | | | | | | |
| LOGICT | 006134 | 1172# | | | | | | | | | | | | |
| N = | 000010 | 234# | 466 | 491 | 513 | 660 | 700 | 722 | 741 | 760 | 785 | 857 | 1047 | |
| PC =% | 000007 | 181# | 1060# | 1073# | | | | | | | | | | |
| PKM = | 000000 | 228# | 261 | | | | | | | | | | | |
| PRTY3 = | 000140 | 189# | 412 | | | | | | | | | | | |
| PRTY4 = | 000200 | 190# | 396 | 398 | 406 | | | | | | | | | |
| PRTY7 = | 000340 | 191# | 282 | 296 | 371 | 382 | 394 | 846 | 857 | 869 | | | | |
| PSM = | 177776 | 203# | 261 | 268# | 270 | 271# | 282# | 286# | 288 | 289# | 302# | 304# | 314# | 317# |
| | | 319 | 321# | 337# | 339# | 341 | 342# | 354# | 356# | 358 | 359# | 370# | 371# | 374# |
| | | 382# | 389# | 394# | 398# | 401# | 403 | 405# | 420# | 447# | 452# | 462# | 466# | 469 |
| | | 483# | 487# | 490 | 503# | 510 | 512# | 526# | 533 | 537# | 551# | 553# | 559 | 560# |
| | | 562# | 582# | 588 | 590# | 600# | 602# | 606# | 608# | 615# | 621# | 630# | 646# | 653# |
| | | 656# | 672# | 676# | 699 | 709# | 712# | 720 | 721# | 740 | 755# | 759 | 775# | 782 |
| | | 784# | 794# | 798# | 805 | 807# | 821# | 823# | 831 | 844# | 846# | 854 | 856# | 871# |
| | | 874 | 875# | 896# | 905# | 917# | 922# | 924# | 935# | 945# | 957# | 962# | 964# | 975# |
| | | 976 | 977# | 984# | 985 | 986# | 993# | 1003 | 1019# | 1026 | 1036# | 1043 | 1056# | 1069# |

| | | | |
|--------|--------|-------|------|
| T111AA | 005722 | 1127# | 1134 |
| T112 | 005772 | 1142# | |
| T12 | 001352 | 333# | |
| T12A | 001410 | 334 | 341# |
| T12AA | 001402 | 339# | 346 |
| T13 | 001442 | 351# | |
| T13A | 001474 | 352 | 358# |
| T13AA | 001466 | 356# | 363 |
| T15 | 001640 | 392# | |
| T15A | 001720 | 395 | 403# |
| T15AA | 001710 | 400# | 409 |
| T17 | 002002 | 419# | |
| T17A | 002030 | 424# | |
| T17B | 002042 | 424 | 426# |
| T17C | 002062 | 427 | 429# |
| T17D | 002112 | 432 | 434# |
| T17E | 002134 | 435 | 438# |
| T17ERR | 002234 | 421 | 452# |
| T17F | 002154 | 439 | 441# |
| T17G | 002206 | 442 | 446# |
| T17X | 002242 | 451 | 454# |
| T18 | 001534 | 369# | |
| T19 | 001576 | 381# | |
| T21 | 002256 | 461# | |
| T22 | 002340 | 482# | |
| T25 | 002422 | 502# | |
| T26 | 002512 | 525# | |
| T30 | 002602 | 550# | |
| T31 | 002676 | 572# | |
| T31C | 002722 | 581# | |
| T32A | 002774 | 599# | |
| T35 | 003044 | 614# | |
| T36 | 003104 | 629# | |
| T36A | 003142 | 633 | 637# |
| T36AA | 003140 | 636# | 640 |
| T40 | 003164 | 645# | |
| T40A | 003234 | 650 | 655# |
| T40AA | 003226 | 653# | 663 |
| T41 | 003310 | 671# | |
| T41A | 003356 | 674 | 682# |
| T41B | 003376 | 690# | |
| T41BB | 003426 | 691 | 698# |
| T43 | 003454 | 708# | |
| T43A | 003526 | 711 | 719# |
| T44 | 003574 | 734# | |
| T45 | 003650 | 751# | |
| T5 | 001070 | 278# | |
| T5A | 001134 | 280 | 288# |
| T5AA | 001126 | 286# | 293 |
| T50 | 003734 | 773# | |
| T51 | 004034 | 796# | |
| T52 | 004132 | 820# | |
| T54 | 004234 | 843# | |
| T57 | 004352 | 867# | |
| T57A | 004456 | 870 | 888# |
| T57AA | 004406 | 874# | 876 |

| | | | | | | | | | | | | | | | | | | |
|--------|-----------|------|------|-------|-------|-------|------|-------|------|-------|------|------|------|------|--|--|--|--|
| T57EX | 004462 | 887 | 890# | | | | | | | | | | | | | | | |
| T60 | 004464 | 895# | | | | | | | | | | | | | | | | |
| T62 | 004512 | 904# | | | | | | | | | | | | | | | | |
| T65 | 004552 | 916# | | | | | | | | | | | | | | | | |
| T66 | 004642 | 934# | | | | | | | | | | | | | | | | |
| T7 | 001242 | 311# | | | | | | | | | | | | | | | | |
| T7A | 001302 | 312# | 319# | | | | | | | | | | | | | | | |
| T7AA | 001274 | 317# | 322 | | | | | | | | | | | | | | | |
| T70 | 004670 | 944# | | | | | | | | | | | | | | | | |
| T73 | 004730 | 956# | | | | | | | | | | | | | | | | |
| T74 | 005020 | 974# | | | | | | | | | | | | | | | | |
| T75 | 005050 | 983# | | | | | | | | | | | | | | | | |
| T76 | 005100 | 992# | | | | | | | | | | | | | | | | |
| UM | = 140000 | 223# | 268 | 272 | 282 | 296 | 302 | 313 | 314 | 321 | 325 | 337 | 354 | 382 | | | | |
| | | 394 | 412 | 420 | 443 | 503 | 513 | 526 | 537 | 551 | 560 | 582 | 591 | 600 | | | | |
| | | 606 | 615 | 646 | 651 | 656 | 660 | 712 | 721 | 775 | 784 | 785 | 798 | 807 | | | | |
| | | 808 | 844 | 856 | 857 | 871 | 875 | 879 | 922 | 924 | 962 | 964 | 1019 | 1078 | | | | |
| UPTR | = 000700 | 1101 | 1103 | 1109 | 1116 | 1122 | 1125 | 1130 | | | | | | | | | | |
| | | 211# | 283 | 305 | 315 | 322 | 397 | 422 | 504 | 516 | 527 | 540 | 555 | 563 | | | | |
| | | 583 | 616 | 617 | 622 | 648 | 657 | 660 | 663 | 715 | 776 | 788 | 799 | 801 | | | | |
| | | 811 | 814 | 850 | 860 | 919 | 921* | 926 | 929 | 959 | 961* | 966 | 969 | 995 | | | | |
| USP | = %000006 | 997# | 1004 | 1070 | 1102 | 1110 | 1123 | 1131 | 1145 | 1158 | | | | | | | | |
| | | 185# | 283# | 303 | 315# | 320 | 397# | 422* | 430# | 504* | 505* | 511 | 527* | 528* | | | | |
| | | 534 | 552# | 557* | 561 | 583# | 584# | 586* | 589 | 601# | 604* | 607 | 616# | 617* | | | | |
| | | 618# | 620 | 648# | 649# | 655 | 715# | 716# | 776* | 777* | 783 | 799* | 800# | 806 | | | | |
| | | 850# | 851# | 855 | 908# | 910 | 920* | 923 | 925 | 948# | 950 | 960# | 963 | 965 | | | | |
| | | 996# | 1000 | 1070* | 1071# | 1102* | 1108 | 1123* | 1129 | 1146* | 1157 | | | | | | | |
| V | = 000002 | 232# | 487 | | | | | | | | | | | | | | | |
| YELPTR | = 001000 | 212# | | | | | | | | | | | | | | | | |
| Z | = 000004 | 233# | 470 | 487 | 537 | 591 | 832 | 879 | 1013 | 1027 | | | | | | | | |
| . | = 006160 | 237# | 242 | 243# | 245# | 249# | 251# | 256# | 262 | 273 | 291 | 294 | 297 | 300 | | | | |
| | | 306 | 323 | 315# | 344 | 347 | 361 | 364 | 376 | 386 | 407 | 410 | 413 | 449 | | | | |
| | | 471 | 474 | 477 | 492 | 495 | 498 | 514 | 517 | 520 | 538 | 541 | 544 | 564 | | | | |
| | | 567 | 577 | 592 | 595 | 610 | 623 | 638 | 641 | 658 | 661 | 664 | 667 | 681 | | | | |
| | | 683 | 686 | 697 | 701 | 704 | 718 | 723 | 726 | 742 | 745 | 748 | 761 | 764 | | | | |
| | | 767 | 765 | 789 | 792 | 809 | 812 | 815 | 833 | 836 | 839 | 858 | 861 | 864 | | | | |
| | | 877 | 880 | 884 | 900 | 912 | 927 | 930 | 940 | 952 | 967 | 970 | 979 | 988 | | | | |
| | | 1005 | 1008 | 1011 | 1014 | 1028 | 1031 | 1045 | 1048 | 1051 | 1062 | 1064 | 1079 | 1091 | | | | |
| | | 1094 | 1097 | 1111 | 1114 | 1117 | 1132 | 1135 | 1152 | 1155 | 1159 | 1168 | 1171 | | | | | |

| | | | | | | | |
|--------|------|------|-----|------|------|------|------|
| RTS | 436 | | | | | | |
| SCC | 294 | 556 | 802 | 1024 | 1059 | 1072 | 1087 |
| SEC | 506 | 679 | 738 | | | | |
| SPL | 355 | | | | | | |
| TRAP | 444 | 873 | | | | | |
| TST | 476 | 543 | 594 | 609 | 838 | 1010 | 1030 |
| TSTB | 1167 | 1170 | | | | | |
| .ABS | 156 | | | | | | |
| .END | 1180 | | | | | | |
| .REN | 3 | | | | | | |
| .REPT | 238 | | | | | | |
| .TITLE | 155 | | | | | | |

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

#DFKTDA,DFKTDA,SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DFKTDA.P11
RUN-TIME: 3 7 1 SECONDS
RUN-TIME RATIO: 25/13=1.9
CORE USED: 7K (13 PAGES)

D03

Dealer License 9 Records, 22 1/2, 119 disk reads, 2 disk writes, 2 pages
[Illegible text and graphical elements]