

KT11-D

MTP1/MFPI WITH MEM MGT
MD-11-DBKTC-B

EP-DBKTC-B-DL-A
COPYRIGHT © 1977
FICHE 1 OF 1

APR 1977
digital
MADE IN USA

This microfiche card contains a grid of frames. The frames are arranged in approximately 10 rows and 3 columns. Each frame contains a small table or data set, likely representing a portion of a larger document or a specific data record. The text within the frames is too small to be legible, but the overall structure suggests a systematic organization of information.

1-8

801

EOF1DBKTBBSEQ

00010000

770323

PDP10 411

ERHDR1DBKTCBSEQ

00010000

770323

.REM %

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DBKTC-B-D
PRODUCT NAME: MTPI/MFPI WITH MEMORY MANAGEMENT
DATE RELEASED: MARCH, 1977
MAINTAINER: DIAGNOSTIC GROUP

COPYRIGHT 1972, 1977 BY DIGITAL EQUIPMENT CORPORATION
THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT
NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL
EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES
NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS
DOCUMENT.

THE SOFTWARE DESCRIBED IN THIS DOCUMENT IS FURNISHED UNDER A
LICENSE AND MAY ONLY BE USED OR COPIED IN ACCORDANCE WITH
THE TERMS OF SUCH LICENSE.
DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY
FOR THE USE OR RELIABILITY OF ITS SOFTWARE ON EQUIPMENT
THAT IS NOT SUPPLIED BY DIGITAL.

1.0 ABSTRACT

PROGRAM DBKTC TESTS THE MFPI AND MTPI INSTRUCTIONS WITH MEMORY MANAGEMENT ENABLED. THESE INSTRUCTIONS ARE EXECUTED IN ALL COMBINATIONS OF CURRENT MODES AND EQUAL OR LOWER HEIRARCHY PREVIOUS MODES.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11/40 WITH KT11-D (MEMORY MANAGEMENT) OPTION INSTALLED

2.2 STORAGE

PROGRAM STORAGE - THE ROUTINE USES MEMORY 0-17777

3.0 LOADING AND STARTING PROCEDURE

LOAD PROGRAM INTO MEMORY USING ABS LOADER
LOAD ADDRESS 200
PRESS START.
THE PROGRAM WILL LOOP AND RING BELL ON COMPLETION.

4.0 SWITCH SETTINGS

5.0 SUBROUTINE ABSTRACTS

5.1 HLT

THE HLT (HALT) INSTRUCTION IS EXECUTED WHEN AN ERROR IS DETECTED. NOTE THAT THE HLT (HALT) INSTRUCTION TRAPS TO LOC 10 IN USER MODE. IF A HLT (HALT) INSTRUCTION IS EXECUTED IN THESE MODES THE TRAP IS TAKEN AND THE PROGRAM RETURNS TO THE HLT IN KERNEL MODE AND HALTS. NOTE: THE USER STACK POINTER IS NOT AFFECTED. FURTHER TESTING SHOULD NOT BE CONTINUED (BY PRESSING CONTINUE). THE TEST SHOULD BE RESTARTED EITHER AT THE PREVIOUS SCOPE OR AT 200.

5.2 SCOPE

THE SCOPE (EMT) SERVICE ROUTINE STORES IN R1 THE PC OF THE LAST TEST SUCCESSFULLY EXECUTED AND MAY BE USED AS AN AID IN DEBUGGING IF THE PROGRAM 'BOMBS' BECAUSE OF A HARDWARE FAILURE. A BRANCH INSTRUCTION MAY BE INSERTED AT THE SCOPE LOCATION TO THE PREVIOUS SCOPE (EMT) INSTRUCTION TO CONTINUOUSLY LOOP A TEST. ADDITIONALLY THE SCOPE ROUTINE SETS ALL STACK POINTERS TO THEIR INITIAL SETTINGS (SEE SEC 8.2) AND ENTERS EACH TEST IN KERNEL MODE, PREVIOUS KERNEL MODE. ALL TESTS MAY BE RESTARTED AT THE PREVIOUS SCOPE.

6.0 ERRORS

THE TEST HALTS WHEN AN ERROR IS DETECTED AND DISPLAYS THE PC+2 OF THE HLT (HALT) INSTRUCTION IN THE ADDRESS LIGHTS.

6.1 ERROR RECOVERY

PRESS CONTINUE OR RESTART AT 200 OR PREVIOUS SCOPE.

6.2 ERROR LOOPING

TO LOOP ON AN ERROR REPLACE THE HLT INSTRUCTION WITH A BRANCH BACK TO THE PREVIOUS SCOPE. NOTE: IF THE ERROR IS INTERMITTENT THE TEST WILL DROP THROUGH THE HLT AND CONTINUE TO THE NEXT TEST.

6.3 MEMORY MANAGEMENT ABORT ERRORS

IF AN ABORT OCCURS (EXCEPT WHEN A TEST EXPECTS AN ABORT) THE PROGRAM WILL TRAP. THE TRAP SERVICE ROUTINE SAVES THE CONTENTS OF SRD IN LOCATION SSROT, CLEARS SRD, JUMPS TO LOCATION 252 AND HALTS. TO DETERMINE WHICH TEST CAUSED THE ABORT EITHER EXAMINE THE KERNEL STACK OR EXAMINE R1 (R1 CONTAINS THE PC OF THE FIRST INSTRUCTION IN THE TEST).

- 7.0 RESTRICTIONS
- 7.1 STARTING RESTRICTION
NONE
- 7.2 OPERATIONAL RESTRICTION
NONE
- 8.0 MISCELLANEOUS

IF THE PROGRAM HALTS IN THE TRAP/INTERRUPT VECTOR AREA (0-1000), EXAMINE REGISTER 6 (THE KERNEL STACK PTR). R6 CONTAINS THE ADDRESS WHERE THE PC OF THE INSTRUCTION THAT CAUSED THE TRAP ABORT IS STORED. SEE ALSO R1 (R1 SPECIFIES THE LAST TEST COMPLETED).

- 8.1 NOTE THAT THE PROGRAM TAGS EACH MFPI INSTRUCTION UNDER TEST. THE TAG DENOTES CURRENT SPACE, 'PREVIOUS' SPACE. FOR EXAMPLE:

- 1) KU14:
- 2) UUI7:

DENOTE:

- 1) 'CURRENT' KERNEL MODE, 'PREVIOUS' USER MODE
- 2) 'CURRENT' USER MODE, 'PREVIOUS' USER MODE,

NOTE ALSO THAT MEMORY MANAGEMENT IS ENABLED ONLY WHEN THE MFPI/MTPI INSTRUCTION BEING TESTED IS EXECUTED AND IS OFF AT ALL OTHER TIMES.

8.2 STACK POINTER

THE STACK POINTERS ARE INITIALLY SET TO THE FOLLOWING VALUES

KERNEL = 1060
USER = 600

AND ARE RESET TO THESE VALUES AT THE START OF EACH SUBTEST (BY SCOPE).

8.3 PASS COUNT

1000(8) PASSES ARE REQUIRED FOR COMPLETION OF THIS PROGRAM; AT WHICH TIME THE BELL WILL RING AND AN '*' PRINTED AT THE TERMINAL.

8.4 DEBUGGING TIPS

WHEN THE FAILING SUBTEST HAS BEEN ISOLATED, REPLACE THE FIRST WORD OF THE MPI INSTRUCTION WITH A BR SELF (000777), AND START THE SUBTEST AT THE PREVIOUS SCOPE. STOP THE PROGRAM (SINGLE INSTRUCTION) AND RESTORE THE REPLACED INSTRUCTION; USING THE MAINTENANCE CARD SINGLE STEP THE FAILING INSTRUCTION THROUGH EACH MICRO STATE OBSERVING THE FLOW IN THE DATA/ADDRESS LIGHTS. THIS PRACTICE HAS BEEN FOUND TO BE SUCCESSFUL IN FINDING MOST MEMORY MANAGEMENT ERRORS.

8.5 MEMORY MANAGEMENT MEMORY MAP

THE MAPPING OF THE MEMORY MANAGEMENT REGISTERS IS DONE AT THE BEGINNING OF THE PROGRAM BEFORE ANY TESTING IS STARTED. THE USER SHOULD ACQUAINT HIMSELF WITH THE MEMORY MANAGEMENT MAP BEFORE USING THIS PROGRAM.

;

```

204 ;SEGMENTATION TEST. THIS TEST TESTS THE MTPI & MFPI INSTRUCTIONS.
205
206 ;GENERAL REGISTER ASSIGNMENTS
207 000000 R0=%0
208 000001 R1=%1
209 000002 R2=%2
210 000003 R3=%3
211 000004 R4=%4
212 000005 R5=%5
213 000007 PC=%7
214 ;STACK POINTER REGISTERS
215 000006 KSP=%6 ;KERNEL STACK POINTER
216 000006 USP=%6 ;USER STACK POINTER
217
218 ;STATUS REGISTER BIT ASSIGNMENTS
219 000001 C=1 ;CARRY BIT
220 000004 Z=4 ;ZERO BIT
221 000010 N=10 ;NEGATIVE BIT
222 000340 PRTY7=340 ;PRIORITY LEVEL 7
223 000200 PRTY4=200 ;PRIORITY LEVEL 4
224 000000 KM=000000 ;KERNEL MODE
225 140000 UM=140000 ;USER MODE
226 030000 PUM=030000 ;PREVIOUS USER MODE
227
228 ;VECTOR ADDRESSES
229 000010 ERRVEC=10 ;ADDRESS OF ERROR VECTOR
230 000024 PFVEC=24 ;ADDRESS OF POWER FAIL TRAP VECTOR
231 000030 EMTVEC=30 ;ADDRESS OF EMT VECTOR
232 000250 MMVEC=250 ;ADDRESS OF MNGT ERROR TRAP VECTOR
233
234 ;REGISTER ADDRESSES
235 177776 PSW=177776 ;ADDRESS OF STATUS REGISTER
236 177774 SLR=177774 ;ADDRESS OF STACK LIMIT REGISTER
237 177560 TKS=177560 ;ADDRESS OF KEYBOARD CSR
238 177562 TKB=177562 ;ADDRESS OF KEYBOARD BUFFER
239 177564 TPS=177564 ;ADDRESS OF TELEPRINTER CSR
240 177566 TPB=177566 ;ADDRESS OF TELEPRINTER BUFFER
241 177570 DISPLAY=177570 ;ADDRESS OF CONSOL DISPLAY REGISTER
    
```

242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290

001060
000600

177572
177574
177576

177600
177602
177604
177606
177610
177612
177614
177616

177640
177642
177644
177646
177650
177652
177654
177656

172300
172302
172304
172306
172310
172312
172314
172316

172340
172342
172344
172346
172350
172352
172354
172356

; INITIAL STACK POINTER SETTINGS

KPTR=1060
UPTR=600

; BOTTOM OF KERNEL STACK
; USER STACK SETTING

; *****NOTE*****
; THE KERNEL & USER STACK POINTER ARE AT PHYSICAL 1060 & 0600
; *****

; MGMTMENTATION REGISTER ADDRESS ASSIGNMENTS

SRO=177572
SR1=177574
SR2=177576

; ADDRESS OF SEGMENTATION REGISTER SRO
; " " " " SR1
; " " " " SR2

; USER PDR'S

UPDR0=177600
UPDR1=177602
UPDR2=177604
UPDR3=177606
UPDR4=177610
UPDR5=177612
UPDR6=177614
UPDR7=177616

; USER PAR'S

UPAR0=177640
UPAR1=177642
UPAR2=177644
UPAR3=177646
UPAR4=177650
UPAR5=177652
UPAR6=177654
UPAR7=177656

; KERNEL PDR'S

KPDR0=172300
KPDR1=172302
KPDR2=172304
KPDR3=172306
KPDR4=172310
KPDR5=172312
KPDR6=172314
KPDR7=172316

; KERNEL PAR'S

KPAR0=172340
KPAR1=172342
KPAR2=172344
KPAR3=172346
KPAR4=172350
KPAR5=172352
KPAR6=172354
KPAR7=172356

```

291
292
293           000006      ;ACCESS CONTROL FIELD DEFINITIONS (IN PDR)
294                                     RW=6                               ;READ & WRITE
295
296           000000      ;INSTUCTION EQUATES
297           104000      HLT=HALT
298                                     SCOPE=EMT                               ;SCOPE IS AN EMT TRAP INST.
299
300           000000      . = 0
301 000000      000002      . + 2
302 000002      000000      HALT
303 000004      000006      . + 2
304 000006      000000      HALT
305 000010      000012      . + 2
306 000012      000000      HALT
307 000014      000016      . + 2
308 000016      000000      HALT
309 000020      000022      . + 2
310 000022      000000      HALT
311 000024      000026      . + 2
312 000026      000000      HALT
313 000030      000032      . + 2
314 000032      000000      HALT
315 000034      000036      . + 2
316 000036      000000      HALT
317 000040      000042      . + 2
318 000042      000000      HALT
319 000044      000046      . + 2
320 000046      000000      HALT
321 000050      000052      . + 2
322 000052      000000      HALT
323 000054      000056      . + 2
324 000056      000000      HALT
325 000060      000062      . + 2
326 000062      000000      HALT
327 000064      000066      . + 2
328 000066      000000      HALT
329 000070      000072      . + 2
330 000072      000000      HALT
331 000074      000076      . + 2
332 000076      000000      HALT
333 000100      000102      . + 2
334 000102      000000      HALT
335 000104      000106      . + 2
336 000106      000000      HALT
337 000110      000112      . + 2
338 000112      000000      HALT
339 000114      000116      . + 2
340 000116      000000      HALT
341 000120      000122      . + 2
342 000122      000000      HALT
343 000124      000126      . + 2
344 000126      000000      HALT
345 000130      000132      . + 2
346 000132      000000      HALT

```

347	000134	000136	.+2
348	000136	000000	HALT
349	000140	000142	.+2
350	000142	000000	HALT
351	000144	000146	.+2
352	000146	000000	HALT
353	000150	000152	.+2
354	000152	000000	HALT
355	000154	000156	.+2
356	000156	000000	HALT
357	000160	000162	.+2
358	000162	000000	HALT
359	000164	000166	.+2
360	000166	000000	HALT
361	000170	000172	.+2
362	000172	000000	HALT
363	000174	000176	.+2
364	000176	000000	HALT
365	000200	000202	.+2
366	000202	000000	HALT
367	000204	000206	.+2
368	000206	000000	HALT
369	000210	000212	.+2
370	000212	000000	HALT
371	000214	000216	.+2
372	000216	000000	HALT
373	000220	000222	.+2
374	000222	000000	HALT
375	000224	000226	.+2
376	000226	000000	HALT
377	000230	000232	.+2
378	000232	000000	HALT
379	000234	000236	.+2
380	000236	000000	HALT
381	000240	000242	.+2
382	000242	000000	HALT
383	000244	000246	.+2
384	000246	000000	HALT
385	000250	000252	.+2
386	000252	000000	HALT
387	000254	000256	.+2
388	000256	000000	HALT
389	000260	000262	.+2
390	000262	000000	HALT
391	000264	000266	.+2
392	000266	000000	HALT
393	000270	000272	.+2
394	000272	000000	HALT
395	000274	000276	.+2
396	000276	000000	HALT
397	000300	000302	.+2
398	000302	000000	HALT
399	000304	000306	.+2
400	000306	000000	HALT
401	000310	000312	.+2
402	000312	000000	HALT

403	000314	000316	.+2		
404	000316	000000	HALT		
405	000320	000322	.+2		
406	000322	000000	HALT		
407	000324	000326	.+2		
408	000326	000000	HALT		
409	000330	000332	.+2		
410	000332	000000	HALT		
411	000334	000336	.+2		
412	000336	000000	HALT		
413	000340	000342	.+2		
414	000342	000000	HALT		
415	000344	000346	.+2		
416	000346	000000	HALT		
417	000350	000352	.+2		
418	000352	000000	HALT		
419	000354	000356	.+2		
420	000356	000000	HALT		
421	000360	000362	.+2		
422	000362	000000	HALT		
423	000364	000366	.+2		
424	000366	000000	HALT		
425	000370	000372	.+2		
426	000372	000000	HALT		
427	000374	000376	.+2		
428	000376	000000	HALT		
429					
430		000010	.=ERRVEC		
431	000010	000400	.WORD SHLT		;SET USER HALT TRAP
432		000030	.=EMTVEC		
433	000030	000432	.WORD SCOPEA		;SET SCOPE (EMT) TRAP VECTOR
434		000250	.=MMVEC		
435	000250	000462	.WORD MMERR		;SET SEG. ERROR TRAP VECTOR
436					
437					
438		000046	.=46		
439	000046	007730	\$ENDAD		
440		000052	.=52		
441	000052	000000	000000		
442		000200	.=200		
443	000200	000167 000664	JMP START		;GO START TEST

```

444
445          000400          . = 400
446
447          : USER HALT TRAP SERVICE ROUTINE.
448 000400 162716 000002 SHLT: SUB #2, (KSP) ; ADJUST PC
449 000404 005776 000000      TST @ (KSP) ; CHECK IF HLT CAUSED TRAP
450 000410 001404      BEQ SHLTA
451 000412 062716 000002      ADD #2, (KSP) ; RESTORE PC
452 000416 000167 177364      JMP 6 ; GO HALT AT 6
453 000422 042766 140000 000002 SHLTA: BIC #UM, 2(KSP) ; KERNEL MODE ON RETURN
454 000430 000002      RTI ; RETURN
455
456
457          : SCOPE (EMT) SERVICE ROUTINE
458 000432 011601 SCOPEA: MOV (KSP), R1 ; SAVE RETURN ADDRESS IN R1
459 000434 012706 001060      MOV #KPTR, KSP ; SET KERNEL STACK PTR
460 000440 005046      CLR -(KSP)
461 000442 010146      MOV R1, -(KSP)
462 000444 012746 000600      MOV #UPTR, -(KSP)
463 000450 012737 030000 177776      MOV #PUM, @ #PSW ; PREVIOUS USER MODE
464 000456 006606      MTP1 USP ; SET USER STACK PTR
465 000460 000002      RTI ; RETURN & START NEXT TEST
466
467          : SEGMENTATION ERROR SERVICE
468 000462 013767 177572 000312 MMERR: MOV @ #SRO, SSROT ; SAVE SRO
469 000470 005037 177572      CLR @ #SRO
470 000474 000137 000252      JMP @ #MMVEC+2
471
472          001000          . = 1000
473
474 001000 000000 : TAGS
475 001002 000000 ICNT: 0 ; CONTAINS PASS COUNT
476 001004 000000 SSROT: 0 ; CONTAINS SSRO CONTENTS ON ERROR
477 001014 001014 TEMP: 0
478 001014 000000      . = +6
479 001016 000000      FTITLE: 0 ; TITLE FLAG
480      PASCNT: 0
    
```

```

481
482
483      001070
484
485      001070 000240
486      001072 005067 177702
487      001076 005767 177712
488      001102 001043
489      001104 023737 000042 000046
490      001112 001437
491      001114 012700 001146
492      001120 012767 000001 177666
493      001126 105767 176432
494      001132 100375
495      001134 105710
496      001136 001425
497      001140 112067 176422
498      001144 000770
499      001146 005015 052115 044520
500      001154 046457 050106 020111
501      001162 044527 044124 046440
502      001170 046505 046440 047101
503      001176 020054 041104 052113
504      001204 026503 006502 000012
505
506      001212 005037 177776
507      001216 012706 001060
508      001222 104000
509      001224 012737 000462 000250
510      001232 005037 000252
511      001236 000240
512      001240 005037 177572
513      001244 012702 177600
514      001250 012703 000010
515      001254 005022
516      001256 077302
517      001260 012702 177640
518      001264 012703 000010
519      001270 005022
520      001272 077302
521      001274 012702 172300
522      001300 012703 000010
523      001304 005022
524      001306 077302
525      001310 012702 172340
526      001314 012703 000010
527      001320 005022
528      001322 077302
529      001324 012767 073006 170746
530      001332 012767 000006 170754
531      001340 012767 077406 170750
532      001346 012767 000006 176234
533      001354 012767 000006 176230
534      001362 005067 170752
535      001366 012767 000167 170760
536      001374 012767 007600 170754

```

```

      =1070
:START SEGMENTATION TEST-S5
START: NOP
      CLR      ICNT      ;CLEAR PASS COUNT
      TST      FTITLE   ;HAS TITLE BEEN PRINTED?
      BNE      BEGIN    ;YES, SKIP TITLE
      CMP      @#42,@#46 ;ARE WE IN ACT11 AUTOMATIC MODE?
      BEQ      BEGIN    ;YES, SKIP TITLE
      MOV      @TITLE,R0 ;GET MESSAGE ADDRESS
      MOV      @1,FTITLE ;SET FLAG
1$:    TSTB    TPS
      BPL      1$
      TSTB    (0)      ;END OF MESSAGE?
      BEQ      BEGIN   ;YES, GET OVER THE ASCII
      MOVB   (0)+,TPB  ;PRINT CHARACTER
      BR      1$      ;GO DO THE NEXT ONE
TITLE: .ASCIZ <15><12>MTP1/MFPI WITH MEM MAN, DBKTC-B@<15><12>
      .EVEN
BEGIN: CLR      @#PSW      ;KERNEL MODE!!! PREV KERNEL MODE!!
      MOV      @KPTR,KSP ;SET KERNEL STACK PTR
      SCOPE   ;SCOPE SETS UP ALL STACK PTRS
      MOV      @MMERR,@MMVEC
      CLR      @MMVEC+2 ;KERNEL MODE ON SEG ABORT
      NOP     ;CLEAR MEMORY MANAGEMENT REGISTERS
      CLR      @#SRO
      MOV      @UPDR0,R2
      MOV      @10,R3
      CLR      (R2)+
      SOB     R3,-2
      MOV      @UPAR0,R2
      MOV      @10,R3
      CLR      (R2)+
      SOB     R3,-2
      MOV      @KPDRO,R2
      MOV      @10,R3
      CLR      (R2)+
      SOB     R3,-2
      MOV      @KPAR0,R2
      MOV      @10,R3
      CLR      (R2)+
      SOB     R3,-2
      MOV      @73006,KPDRO ;RW,UP 167 BLOCKS
      MOV      @6,KPAR6    ;RW,UP 1 BLOCK
      MOV      @77406,KPAR7 ;RW,UP 200 BLOCKS
      MOV      @6,UPDR4    ;RW,UP 1 BLOCK
      MOV      @6,UPDR5    ;RW,UP 1 BLOCK
      CLR      KPAR0      ;VA=PA=0000-12077
      MOV      @167,KPAR6 ;VA=140000-140077;PA=16700-16777
      MOV      @7600,KPAR7 ;VA=160000-177776,PA=760000-777776

```

B02

DBKTC-B NTPI/NFPI WITH MEMORY MANAGEMENT
DBKTCB.P11 02-FEB-77 09:52

MACY11 27(1006) 02-FEB-77 10:00 PAGE 14

537 001402 012767 000173 176240
538 001410 012767 000172 176234

L.V #173,UPAR4 ;VA=100000-100077/PA=17300-17377
MOV #172,UPAR5 ;VA=120000-120077/PA=17200-17277

```

539
540 ; TESTS KKO-KK16 TEST THE MTP/PI INSTRUCTION KERNEL MODE, PREV KERNEL MODE.
541 ; *****
542 016600 VIRT=16600 ; KERNEL VIRTUAL ADDRESS FOR THESE TESTS
543 016600 PHYS=16600 ; CORRESPONDING KERNEL PHYSICAL ADDRESS
544 ; *****
545
546 ; TEST THAT MTP/PI CAN LOAD A GENERAL REGISTER (R2)
547 001416 005016 CLR (KSP) ; PUT 0 ON KERNEL STACK
548 001420 012702 177777 MOV #-1,R2 ; PRESET REGISTER
549 001424 005237 177572 INC @#SRO ; ENABLE KT11
550
551 KKO: MTP/PI R2 ; R2+(KSP)+
552 001430 006602 MOV PSW,R3 ; SAVE STATUS RESULT
553 001432 016703 176340 CLR @#SRO ; DISABLE KT11
554 001436 005037 177572 CMP @#KPTR+2,KSP ; CHECK THAT STACK POPPED
555 001442 022706 001062 BEQ .+4
556 001446 001401 HLT ; ERROR! INCORRECT STACK PTR
557 001450 000000 HLT ; CHECK STATUS RESULT
558 001452 122703 000004 CMPB @Z,R3 ; CHECK STATUS RESULT
559 001456 001401 BEQ .+4
560 001460 000000 HLT ; ERROR! INCORRECT STATUS RESULT
561 001462 005702 TST R2 ; CHECK RESULT
562 001464 001401 BEQ .+4
563 001466 000000 HLT ; ERROR! INCORRECT RESULT
564 001470 104000 SCOPE
565
566 ; TEST THAT MTP/PI CAN LOAD KERNEL ADDRESS (VIRT)
567 ; DM=1
568
569 001472 005016 CLR (KSP) ; PUT 0 ON KERNEL STACK
570 001474 012702 016600 MOV @VIRT,R2 ; R2=VIRT ADDRESS
571 001500 012737 177777 016600 MOV #-1,@#PHYS ; PRESET DATA
572 001506 005237 177572 INC @#SRO ; ENABLE KT11
573
574 KKI: SCC
575 001512 000277 MTP/PI (R2) ; VIRT+(KSP)+
576 001514 006612 MOV PSW,R3 ; SAVE STATUS RESULT
577 001516 016703 176254 CLR @#SRO ; DISABLE KT11
578 001522 005037 177572 CMP @#KPTR+2,KSP ; CHECK THAT STACK POPPED
579 001526 022706 001062 BEQ .+4
580 001532 001401 HLT ; ERROR! INCORRECT STACK PTR
581 001534 000000 HLT ; CHECK STATUS RESULT
582 001536 122703 000005 CMPB @Z+C,R3 ; CHECK STATUS RESULT
583 001542 001401 BEQ .+4
584 001544 000000 HLT ; ERROR! INCORRECT STATUS RESULT
585 001546 005737 016600 TST @#PHYS ; CHECK RESULT
586 001552 001401 BEQ .+4
587 001554 000000 HLT ; ERROR! INCORRECT RESULT
588 001556 104000 SCOPE
589
590 ; DM=2
591 001560 012737 000000 177776 MOV @0,@#PSW ; KERNEL MODE!!!, PREV KERNEL MODE
592 001566 012716 177777 MOV #-1,(KSP) ; PUT #-1 ON KERNEL STACK
593 001572 012702 016600 MOV @VIRT,R2 ; R2=VIRT ADDRESS
594 001576 005037 016600 CLR @#PHYS ; PRESET DATA
595 001602 005237 177572 INC @#SRO ; ENABLE KT11

```

595									
596	001606	006622							
597	001610	005037	177572						
598	001614	005237	016600						
599	001620	001401							
600	001622	000000							
601	001624	022702	016602						
602	001630	001401							
603	001632	000000							
604	001634	005067	176136						
605	001640	104000							
606									
607	001642	012716	177777						
608	001646	012702	001004						
609	001652	012737	016604	001004					
610	001660	005037	016604						
611	001664	005237	177572						
612									
613	001670	006632							
614	001672	005037	177572						
615	001676	005237	016604						
616	001702	001401							
617	001704	000000							
618	001706	104000							
619									
620									
621	001710	005016							
622	001712	012704	016602						
623	001716	012737	177777	016600					
624	001724	005237	177572						
625									
626	001730	006644							
627	001732	005037	177572						
628	001736	022704	016600						
629	001742	001401							
630	001744	000000							
631	001746	005737	016600						
632	001752	001401							
633	001754	000000							
634	001756	104000							
635									
636									
637	001760	012737	000000	177776					
638	001766	012716	177777						
639	001772	012702	001010						
640	001776	012767	016600	177002					
641	002004	005037	016600						
642	002010	005237	177572						
643									
644	002014	006652							
645	002016	005037	177572						
646	002022	005237	016600						
647	002026	001401							
648	002030	000000							
649	002032	005067	175740						
650	002036	104000							

```

651
652
653 002040 012737 000000 177776 ;DM=6
654 002046 005016
655 002050 012702 000002
656 002054 012767 177777 014520
657 002062 005237 177572
658
659 002066 006662 016600 KK6:
660 002072 016700 175700
661 002076 005037 177572
662 002102 022706 001062
663 002106 001401
664 002110 000000
665 002112 122700 000004
666 002116 001401
667 002120 000000
668 002122 005737 016602
669 002126 001401
670 002130 000000
671 002132 104000
672
673
674 002134 012716 177777 ;DM=7
675 002140 012702 000002
676 002144 012737 016600 001010
677 002152 005037 016600
678 002156 005237 177572
679
680 002162 006672 001006 KK7:
681 002166 005037 177572
682 002172 005237 016600
683 002176 001401
684 002200 000000
685 002202 104000
686
687 ;TEST THAT MTPI CAN LOAD KERNEL
688 ;DM=1,PC
689 002204 012716 000403 KK10B:
690 002210 005037 002222
691 002214 005237 177572
692
693 002220 006617 KK10:
694 002222 000000 KK10A:
695
696 002224 005037 177572
697 002230 000765
698 002232 005037 177572
699 002236 104000
700
701 ;DM=2,PC
702 002240 012716 177777
703 002244 005067 000006
704 002250 005237 177572
705
706 002254 006627 KK11:

```

```

MOV #0,@#PSW ;KERNEL MODE!!!,PREV KERNEL MODE
CLR (KSP) ;PUT 0 ON KERNEL STACK
MOV #2,R2 ;LOAD INDEX REGISTER
MOV #-1,PHYS+2 ;PRESET DATA
INC @#SRO ;ENABLE KT11

```

```

MTPI VIRT(R2) ;VIRT+2+(KSP)+
MOV PSW,R0 ;SAVE STATUS RESULT
CLR @#SRO ;DISABLE KT11
CMP #KPTR+2,KSP ;CHECK THAT STACK POINTER POPPED
BEQ .+4
HLT ;ERROR! INCORRECT STACK PTR
CMPB #Z,R0 ;CHECK STATUS RESULT
BEQ .+4
HLT ;ERROR! INCORRECT STATUS RESULT
TST @#PHYS+2 ;CHECK RESULT
BEQ .+4
HLT ;ERROR! INCORRECT RESULT
SCOPE

```

```

MOV #-1,(KSP) ;PUT #-1 ON KERNEL STACK
MOV #2,R2 ;LOAD INDEX REGISTER
MOV #VIRT,@#TEMP+4 ;LOAD ADDRESS
CLR @#PHYS ;PRESET DATA
INC @#SRO ;ENABLE KT11

```

```

MTPI @TEMP+2(R2) ;VIRT+(KSP)+
CLR @#SRO ;DISABLE KT11
INC @#PHYS ;CHECK RESULT
BEQ .+4
HLT ;ERROR! INCORRECT RESULT
SCOPE

```

```

;DM=1,PC
MOV #403,(KSP) ;PUT BR .+10 INST AS DATA ON STACK
CLR @#KK10A ;PUT HALT FOLLOWING MTPI
INC @#SRO ;ENABLE KT11

```

```

MTPI (PC) ;KK10A+(KSP)+
HALT ;ERROR! MTPI DID NOT POP BR .+10
;INTO KK10A
CLR @#SRO ;DISABLE KT11
BR KK10B ;LOOP TEST IF ERROR
CLR @#SRO ;DISABLE KT11
SCOPE

```

```

;DM=2,PC
MOV #-1,(KSP) ;PUT #-1 ON KERNEL STACK
CLR KK11A
INC @#SRO ;ENABLE KT11

```

```

MTPI (PC)+ ;(PC)++(KSP)+

```



```

763 002504 104000
764
765 ;DM=7,PC SCOPE
766 002506 005037 177776 CLR @#PSW ;KERNEL MODE!!!,PREV KERNEL MODE!!
767 002512 012716 177777 MOV #-1,(KSP) ;PUT #-1 ON KERNEL STACK
768 002516 012737 016604 001004 MOV @#VIRT+4,@#TEMP ;LOAD ADDRESS
769 002524 005037 016604 CLR @#PHYS+4 ;PRESET DATA
770 002530 005237 177572 INC @#SRO ;ENABLE KT11
771
772
773 002534 006677 176244 KK15: MTP/PI @#TEMP ;VIRT+4+(KSP)+
774 002540 005037 177572 CLR @#SRO ;DISABLE KT11
775 002544 005237 016604 INC @#PHYS+4 ;CHECK RESULT
776 002550 001401 BEQ .+4
777 002552 000000 HLT ;ERROR INCORRECT RESULT
778 002554 104000 SCOPE
779
780
781 ;CHECK THAT MTP/PI CAN SET STACK PTR
782 002556 012737 000000 177776 MOV #0,@#PSW ;KERNEL MODE!!!,PREV KERNEL MODE
783 002564 005016 CLR (KSP) ;PUT 0 ON KERNEL STACK
784 002566 005237 177572 INC @#SRO ;ENABLE KT11
785
786 002572 006606 KK16: MTP/PI KSP ;KSP+(KSP)+
787 002574 005037 177572 CLR @#SRO ;DISABLE KT11
788 002600 005706 TST KSP ;CHECK STACK PTR
789 002602 001401 BEQ .+4
790 002604 000000 HLT ;ERROR!
791 002606 012706 001060 MOV #KPTR,KSP ;SET KERNEL STACK PTR
792 002612 104000 SCOPE
793
794 ;TESTS KU0-KU16 TEST THE MTP/PI INSTRUCTION KERNEL MODE, PREV USER MODE.
795 ;TEST THAT MTP/PI CAN LOAD A GENERAL REGISTER (R2)
796 002614 012737 030340 177776 MOV @#PUM+PRTY7,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
797 002622 005016 CLR (KSP) ;PUT 0 ON KERNEL STACK
798 002624 012702 177777 MOV #-1,R2 ;PRESET REGISTER
799 002630 005237 177572 INC @#SRO ;ENABLE KT11
800
801 002634 006602 KU0: MTP/PI R2 ;R2+(KSP)+
802 002636 016703 175134 MOV PSW,R3 ;SAVE STATUS RESULT
803 002642 005037 177572 CLR @#SRO ;DISABLE KT11
804 002646 022706 001062 CMP #KPTR+2,KSP ;CHECK THAT STACK POPPED
805 002652 001401 BEQ .+4
806 002654 000000 HLT ;ERROR! INCORRECT STACK PTR
807 002656 122703 000344 CMPB #PRTY7+Z,R3 ;CHECK STATUS RESULT
808 002662 001401 BEQ .+4
809 002664 000000 HLT ;ERROR! INCORRECT STATUS RESULT
810 002666 005702 TST R2 ;CHECK RESULT
811 002670 001401 BEQ .+4
812 002672 000000 HLT ;ERROR! INCORRECT RESULT
813 002674 104000 SCOPE
814 ;TEST MFPI INSTRUCTION KERNEL MODE PREVIOUS KERNEL MODE.
815 ;TEST THAT MFPI CAN GET DATA FROM A GENERAL REGISTER (R3)
816 002676 012767 000340 175072 MOV @#PRTY7,PSW ;KERNEL MODE!!!,PREV KERNEL MODE!!
817 002704 005066 177776 CLR -2(KSP)
818 002710 012703 177777 MOV #-1,R3 ;PRESET GENERAL REGISTER

```

```

819 002714 005237 177572          KKFO:  INC      Q#SRO      ;ENABLE MEMORY MANAGEMENT
820 002720 006503                MFPI      R3          ;-(KSP)+R3
821 002722 016702 175050          MOV      PSW,R2    ;SAVE CC'S
822 002726 005037 177572          CLR      Q#SRO      ;DISABLE MEMORY MANAGEMENT
823 002732 122702 000350          CMPB     #PTY7+N,R2 ;CHECK CC'S
824 002736 001401                BEQ      .+4
825 002740 000000                HLT
826 002742 022706 001056          CMP      #KPTR-2,KSP ;ERROR! INCORRECT CC'S AFTER MFPI
827 002746 001401                BEQ      .+4          ;CHECK THAT STACK WAS PUSHED
828 002750 000000                HLT
829 002752 005216                INC      (KSP)       ;ERROR! INCORRECT STACK PTR
830 002754 001401                BEQ      .+4          ;CHECK RESULT
831 002756 000000                HLT
832 002760 104000                SCOPE
833
834          ;TEST THAT MFPI CAN GET DATA FROM A KERNEL VIRTUAL ADDRESS
835          ;DM=1
836 002762 005067 175010          CLR      PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!
837 002766 005066 177776          CLR      -2(KSP)
838 002772 012702 016600          MOV      #VIRT,R2   ;R2=VIRTUAL ADDRESS
839 002776 012737 177777 016600    MOV      #-1,Q#PHYS ;PRESET PHYSICAL ADDRESS
840 003004 005237 177572          INC      Q#SRO      ;ENABLE MEMORY MANAGEMENT
841 003010 000277                SCC
842 003012 006512                MFPI      (R2)       ;PRESET CC'S
843 003014 016703 174756          MOV      PSW,R3     ;-(KSP)+(R2)
844 003020 005037 177572          CLR      Q#SRO      ;SAVE CC'S
845 003024 122703 000011          CMPB     #N+C,R3    ;DISABLE MEMORY MANAGEMENT
846 003030 001401                BEQ      .+4          ;CHECK CC'S
847 003032 000000                HLT
848 003034 022706 001056          CMP      #KPTR-2,KSP ;ERROR! INCORRECT CC'S
849 003040 001401                BEQ      .+4          ;CHECK THAT STACK WAS PUSHED
850 003042 000000                HLT
851 003044 005216                INC      (KSP)       ;ERROR! INCORRECT STACK PTR
852 003046 001401                BEQ      .+4          ;CHECK RESULT
853 003050 000000                HLT
854 003052 104000                SCOPE
855
856          ;DM=2
857 003054 012767 000000 174714    MOV      #0,PSW     ;KERNEL MODE!!!,PREV KERNEL MODE!!
858 003062 012766 177777 177776    MOV      #-1,-2(KSP)
859 003070 012702 016600          MOV      #VIRT,R2   ;R2=VIRTUAL ADDRESS
860 003074 005037 016600          CLR      Q#PHYS     ;PRESET PHYSICAL ADDRESS
861 003100 005237 177572          INC      Q#SRO      ;ENABLE MEMORY MANAGEMENT
862 003104 006522                MFPI      (R2)+     ;-(KSP)+VIRT
863 003106 005037 177572          CLR      Q#SRO      ;DISABLE MEMORY MANAGEMENT
864 003112 005716                TST      (KSP)       ;CHECK RESULT
865 003114 001401                BEQ      .+4
866 003116 000000                HLT
867 003120 022702 016602          CMP      #VIRT+2,R2 ;ERROR! INCORRECT RESULT ON STACK
868 003124 001401                BEQ      .+4          ;CHECK AUTO INCREMENT
869 003126 000000                HLT
870 003130 005067 174642          CLR      PSW
871 003134 104000                SCOPE
872
873          ;DM=3
874 003136 005067 174634          CLR      PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!

```

875	003142	005066	177776		CLR	-2(KSP)	
876	003146	012702	001004		MOV	#TEMP,R2	;LOAD INDIRECT ADDRESS
877	003152	012737	016602	001004	MOV	#VIRT+2,@#TEMP	;LOAD ADDRESS
878	003160	012737	177777	016602	MOV	#-1,@#PHYS+2	;PRESET DATA
879	003166	005237	177572		INC	@#SRO	;ENABLE MEMORY MANAGEMENT
880	003172	006532			MFPI	@(R2)+	;(KSP)+VIRT+2
881	003174	005037	177572	KKF3:	CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
882	003200	005216			INC	(KSP)	;CHECK RESULT
883	003202	001401			BEQ	.+4	
884	003204	000000			HLT		;ERROR! INCORRECT RESULT
885	003206	104000			SCOPE		
886							
887							
888	003210	005067	174562		CLR	PSW	;KERNEL MODE!!!,PREV KERNEL MODE!!
889	003214	012766	177777	177776	MOV	#-1,-2(KSP)	
890	003222	012704	016602		MOV	#VIRT+2,R4	;R4=VIRTUAL ADDRESS+2
891	003226	005037	016600		CLR	@#PHYS	;PRESET PHYSICAL ADDRESS DATA
892	003232	005237	177572		INC	@#SRO	;ENABLE MEMORY MANAGEMENT
893	003236	006544			MFPI	-(R4)	;(KSP)+VIRT
894	003240	005037	177572	KKF4:	CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
895	003244	022704	016600		CMP	#VIRT,R4	;CHECK AUTO-DECREMENT
896	003250	001401			BEQ	.+4	
897	003252	000000			HLT		;ERROR! AUTO-DECREMENT FAILED
898	003254	005716			TST	(KSP)	;CHECK RESULT
899	003256	001401			BEQ	.+4	
900	003260	000000			HLT		;ERROR! INCORRECT RESULT
901	003262	104000			SCOPE		
902							
903							
904	003264	012767	000000	174504	MOV	#0,PSW	;KERNEL MODE!!!,PREV KERNEL MODE!!
905	003272	005066	177776		CLR	-2(KSP)	
906	003276	012700	001006		MOV	#TEMP+2,R0	;R1=INDIRECT ADDRESS
907	003302	012737	016604	001004	MOV	#VIRT+4,@#TEMP	;LOAD ADDRESS
908	003310	012737	177777	016604	MOV	#-1,@#PHYS+4	;PRESET PHYSICAL ADDRESS DATA
909	003316	005237	177572		INC	@#SRO	;ENABLE MEMORY MANAGEMENT
910	003322	006550			MFPI	@-(R0)	;(KSP)+VIRT+4
911	003324	005037	177572	KKF5:	CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
912	003330	005216			INC	(KSP)	;CHECK RESULT
913	003332	001401			BEQ	.+4	
914	003334	000000			HLT		
915	003336	005067	174434		CLR	PSW	
916	003342	104000			SCOPE		
917							
918							
919	003344	012767	000000	174424	MOV	#0,PSW	;KERNEL MODE!!!,PREV KERNEL MODE!!
920	003352	012766	177777	177776	MOV	#-1,-2(KSP)	
921	003360	012702	000002		MOV	#2,R2	;LOAD INDEX REGISTER
922	003364	005037	016602		CLR	@#PHYS+2	;PRESET PHYSICAL ADDRESS DATA
923	003370	005237	177572		INC	@#SRO	;ENABLE MEMORY MANAGEMENT
924	003374	006562	016600		MFPI	VIRT(R2)	;(KSP)+VIRT-2
925	003400	005037	177572	KKF6:	CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
926	003404	022706	001056		CMP	#KPTR-2,KSP	;CHECK STACK PTR
927	003410	001401			BEQ	.+4	
928	003412	000000			HLT		;ERROR! INCORRECT STACK PTR
929	003414	005716			TST	(KSP)	;CHECK RESULT
930	003416	001401			BEQ	.+4	

```

931 003420 000000          HLT                ;ERROR! INCORRECT RESULT
932 003422 005067 174350  CLR                PSW
933 003426 104000          SCOPE
934
935                ;DM=7
936 003430 005067 174342  CLR                PSW                ;KERNEL MODE!!!,PREV KERNEL MODE!!
937 003434 005066 177776  CLR                -2(KSP)
938 003440 012702 177774  MOV                #-4,R2                ;LOAD INDEX REGISTER
939 003444 012737 016600 001004  MOV                @VIRT,@TEMP          ;LOAD ADDRESS
940 003452 012737 177777 016600  MOV                #-1,@PHYS          ;CLEAR PHYSICAL ADDRESS DATA
941 003460 005237 177572          INC                @SRO                ;ENABLE MEMORY MANAGEMENT
942 003464 006572 001010  KKF7: MFPI         @TEMP+4(R2)          ;-(KSP)+VIRT
943 003470 005037 177572          CLR                @SRO                ;DISABLE MEMORY MANAGEMENT
944 003474 005216          INC                (KSP)              ;CHECK RESULT
945 003476 001401          BEQ                .+4
946 003500 000000          HLT                ;ERROR! INCORRECT RESULT
947 003502 104000          SCOPE
948
949                ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
950                ;DM=0,PC
951 003504 005067 174266  CLR                PSW                ;KERNEL MODE!!!,PREV KERNEL MODE!!
952 003510 012706 001060  MOV                #KPTR,KSP          ;SET KERNEL STACK PTR
953 003514 005066 177776  CLR                -2(KSP)
954 003520 005237 177572  INC                @SRO                ;ENABLE MEMORY MANAGEMENT
955 003524 000277          SCC
956 003526 006507  KKF10: MFPI         PC                ;-(KSP)+PC
957 003530 016702 174242  MOV                PSW,R2              ;SAVE CC'S
958 003534 005037 177572  CLR                @SRO                ;DISABLE MEMORY MANAGEMENT
959 003540 122702 000001  CMPB               #C,R2              ;CHECK CC'S
960 003544 001401          BEQ                .+4
961 003546 000000          HLT
962 003550 022706 001056  CMP                #KPTR-2,KSP        ;CHECK STACK PTR
963 003554 001401          BEQ                .+4
964 003556 000000          HLT                ;ERROR! STACK NOT PUSHED
965 003560 022716 003530  CMP                #KKF10+2,(KSP)    ;CHECK THAT PS WAS PUSHED ON THE STACK
966 003564 001401          BEQ                .+4
967 003566 000000          HLT                ;ERROR! PC NOT PUSHED ON THE STACK
968 003570 104000          SCOPE
969
970
971
972                ;DM=3,PC
973 003572 012767 000000 174176  MOV                #0,PSW              ;KERNEL MODE!!!,PREV KERNEL MODE!!
974 003600 005066 177776          CLR                -2(KSP)
975 003604 012737 177777 016600  MOV                #-1,@PHYS
976 003612 005237 177572          INC                @SRO                ;ENABLE MEMORY MANAGEMENT
977 003616 006537 016600  KKF11: MFPI         @VIRT              ;-(KSP)+VIRT
978 003622 005037 177572          CLR                @SRO                ;DISABLE MEMORY MANAGEMENT
979 003626 005216          INC                (KSP)              ;CHECK RESULT
980 003630 001401          BEQ                .+4
981 003632 000000          HLT                ;ERROR! INCORRECT RESULT
982 003634 104000          SCOPE
983
984                ;DM=6,PC
985 003636 012767 000340 174132  MOV                #PRTY7,PSW          ;KERNEL MODE!!!,PREV KERNEL MODE!!
986 003644 012766 177777 177776  MOV                #-1,-2(KSP)

```

```

987 003652 005037 016600 CLR @#PHYS ;PRESET PHYSICAL ADDRESS DATA
988 003656 005237 177572 INC @#SR0 ;ENABLE MEMORY MANAGEMENT
989 003662 006567 012712 KKF12: MFPI VIRT ;-(KSP)+VIRT
990 003666 005037 177572 CLR @#SR0 ;DISABLE MEMORY MANAGEMENT
991 003672 005716 TST (KSP) ;CHECK RESULT
992 003674 001401 BEQ .+4
993 003676 000000 HLT ;ERROR! INCORRECT RESULT
994 003700 104000 SCOPE
995
996 ;DM=7,PC
997 003702 005067 174070 CLR PSW ;KERNEL MODE!!!,PREV KERNEL MODE!!
998 003706 005066 177776 CLR -2(KSP)
999 003712 012737 016604 001004 MOV #VIRT+4,@#TEMP ;LOAD ADDRESS
1000 003720 012737 177777 016604 MOV #-1,@#PHYS+4 ;PRESET DATA
1001 003726 005237 177572 INC @#SR0 ;ENABLE MEMORY MANAGEMENT
1002 003732 000277 SCC
1003 003734 006577 175044 KKF13: MFPI @TEMP ;-(KSP)+VIRT+4
1004 003740 016702 174032 MOV PSW,R2 ;SAVE CC'S
1005 003744 005037 177572 CLR @#SR0 ;DISABLE MEMORY MANAGEMENT
1006 003750 122702 000011 CMPB #N+C,R2 ;CHECK CC'S
1007 003754 001401 BEQ .+4
1008 003756 000000 HLT ;ERROR! INCORRECT CC'S
1009 003760 005216 INC (KSP) ;CHECK RESULT
1010 003762 001401 BEQ .+4
1011 003764 000000 HLT ;ERROR! INCORRECT RESULT ON STACK
1012 003766 104000 SCOPE
1013
1014 ;DM=1,PC
1015 003770 012766 177777 177776 MOV #-1,-2(KSP)
1016 003776 005237 177572 INC @#SR0 ;ENABLE MEMORY MANAGEMENT
1017 004002 006517 KKF14: MFPI (PC) ;PUSH NEXT WORD ON THE STACK
1018 004004 000400 KKF14A: BR .+2 ;THIS DATA GOES ONTO THE STACK
1019 004006 005037 177572 CLR @#SR0 ;DISABLE MEMORY MANAGEMENT
1020 004012 023716 004004 CMP @#KKF14A,(KSP) ;CHECK DATA ON THE STACK
1021 004016 001401 BEQ .+4
1022 004020 000000 HLT ;ERROR! INCORRECT DATA ON STACK
1023 004022 104000 SCOPE
1024
1025
1026 ;TEST THAT KERNEL CAN LOAD USER ADDRESS (VIRT)
1027 ;DM=1
1028
1029 ;*****
1030 120000 VIRT=120000 ;USER VIRTUAL ADDRESS FOR THESE TESTS
1031 017200 PHYS=17200 ;CORRESPONDING PHYSICAL ADDRESS
1032 ;*****
1033
1034 004024 012737 030000 177776 MOV #KM+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1035 004032 005016 CLR (KSP) ;PUT 0 ON KERNEL STACK
1036 004034 012702 120000 MOV #VIRT,R2 ;R2=VIRT ADDRESS
1037 004040 012737 177777 017200 MOV #-1,@#PHYS ;PRESET DATA
1038 004046 005237 177572 INC @#SR0 ;ENABLE KT11
1039
1040 KUI: SCC
1041 004054 006612 MTPi (R2) ;VIRT+(KSP)+
1042 004056 016703 173714 MOV PSW,R3 ;SAVE STATUS RESULT

```

1043	004062	005037	177572		CLR	2#SRO	;DISABLE KT11
1044	004066	022706	001062		CMP	#KPTR+2,KSP	;CHECK THAT STACK POPPED
1045	004072	001401			BEQ	.+4	
1046	004074	000000			HLT		;ERROR! INCORRECT STACK PTR
1047	004076	122703	000005		CMPB	#Z+C,R3	;CHECK STATUS RESULT
1048	004102	001401			BEQ	.+4	
1049	004104	000000			HLT		;ERROR! INCORRECT STATUS RESULT
1050	004106	005737	017200		TST	2#PHYS	;CHECK RESULT
1051	004112	001401			BEQ	.+4	
1052	004114	000000			HLT		;ERROR! INCORRECT RESULT
1053	004116	104000			SCOPE		
1054							
1055							
1056	004120	012737	030000	177776	MOV	#PUM,2#PSW	;KERNEL MODE!!!,PREV USER MODE!!
1057	004126	012716	177777		MOV	#-1,(KSP)	;PUT #-1 ON KERNEL STACK
1058	004132	012702	120000		MOV	#VIRT,R2	;R2=VIRT ADDRESS
1059	004136	005037	017200		CLR	2#PHYS	;PRESET DATA
1060	004142	005237	177572		INC	2#SRO	;ENABLE KT11
1061							
1062	004146	006622					
1063	004150	005037	177572		CU2:	MTP1	(R2)+
1064	004154	005237	017200		CLR	2#SRO	;DISABLE KT11
1065	004160	001401			INC	2#PHYS	;CHECK RESULT
1066	004162	000000			BEQ	.+4	
1067	004164	022702	120002		HLT		;ERROR! INCORRECT RESULT
1068	004170	001401			CMP	#VIRT+2,R2	;CHECK AUTO-INCREMENT
1069	004172	000000			BEQ	.+4	
1070	004174	005067	173576		HLT		;ERROR! AUTO-INCREMENT FAILED
1071	004200	104000			CLR	PSW	
1072							
1073	004202	012737	030340	177776	MOV	#PUM+PRTY7,2#PSW	;KERNEL MODE!!!,PREV USER MODE!!
1074	004210	012716	177777		MOV	#-1,(KSP)	;PUT #-1 ON KERNEL STACK
1075	004214	012702	001004		MOV	#TEMP,R2	;LOAD INDIRECT ADDRESS
1076	004220	012712	120004		MOV	#VIRT+4,(R2)	;LOAD ADDRESS
1077	004224	005037	017204		CLR	2#PHYS+4	;PRESET DATA
1078	004230	005237	177572		INC	2#SRO	;ENABLE KT11
1079							
1080	004234	006632					
1081	004236	005037	177572		CU3:	MTP1	2(R2)+
1082	004242	005237	017204		CLR	2#SRO	;DISABLE KT11
1083	004246	001401			INC	2#PHYS+4	;CHECK RESULT
1084	004250	000000			BEQ	.+4	
1085	004252	104000			HLT		;ERROR! INCORRECT RESULT
1086							
1087							
1088	004254	012737	030000	177776	MOV	#KM+PUM,2#PSW	;KERNEL MODE!!!,PREV USER MODE!!
1089	004262	005016			CLR	(KSP)	;PUT 0 ON KERNEL STACK
1090	004264	012704	120002		MOV	#VIRT+2,R4	;LOAD ADDRESS
1091	004270	012737	177777	017200	MOV	#-1,2#PHYS	;PRESET DATA
1092	004276	005237	177572		INC	2#SRO	;ENABLE KT11
1093							
1094	004302	006644					
1095	004304	005037	177572		CU4:	MTP1	-(R4)
1096	004310	022704	120000		CLR	2#SRO	;DISABLE KT11
1097	004314	001401			CMP	#VIRT,R4	;CHECK AUTO-DECREMENT
1098	004316	000000			BEQ	.+4	
					HLT		;ERROR! AUTO-DECREMENT FAILED

1099	004320	005737	017200		TST	@#PHYS		;CHECK RESULT
1100	004324	001401			BEQ	.+4		
1101	004326	000000			HLT			;ERROR! INCORRECT RESULT
1102	004330	104000			SCOPE			
1103								
1104								
1105	004332	012737	030000	177776	MOV	#PUM,@#PSW		;KERNEL MODE!!!,PREV USER MODE!!
1106	004340	012716	177777		MOV	#-1,(KSP)		;PUT #-1 ON KERNEL STACK
1107	004344	012702	001010		MOV	#2,R2		;LOAD INDIRECT ADDRESS
1108	004350	012767	120000	174430	MOV	#VIRT,@#TEMP+2		;LOAD ADDRESS
1109	004356	005037	017200		CLR	@#PHYS		;PRESET DATA
1110	004362	005237	177572		INC	@#SRO		;ENABLE KT11
1111								
1112	004366	006652			KU5:	MTP1	@-(R2)	;VIRT+(KSP)+
1113	004370	005037	177572		CLR	@#SRO		;DISABLE KT11
1114	004374	005237	017200		INC	@#PHYS		;CHECK RESULT
1115	004400	001401			BEQ	.+4		
1116	004402	000000			HLT			;ERROR! INCORRECT RESULT
1117	004404	005067	173366		CLR	PSW		
1118	004410	104000			SCOPE			
1119								
1120								
1121	004412	012737	030000	177776	MOV	#PUM,@#PSW		;KERNEL MODE!!!,PREV USER MODE!!
1122	004420	005016			CLR	(KSP)		;PUT 0 ON KERNEL STACK
1123	004422	012702	000002		MOV	#2,R2		;LOAD INDEX REGISTER
1124	004426	012767	177777	012546	MOV	#-1,PHYS+2		;PRESET DATA
1125	004434	005237	177572		INC	@#SRO		;ENABLE KT11
1126								
1127	004440	006662	120000		KU6:	MTP1	VIRT(R2)	;VIRT+2+(KSP)+
1128	004444	016700	173326		MOV	PSW,R0		;SAVE STATUS RESULT
1129	004450	005037	177572		CLR	@#SRO		;DISABLE KT11
1130	004454	022706	001062		CMP	#KPTR+2,KSP		;CHECK THAT STACK POINTER POPPED
1131	004460	001401			BEQ	.+4		
1132	004462	000000			HLT			;ERROR! INCORRECT STACK PTR
1133	004464	122700	000004		CMPB	#Z,R0		;CHECK STATUS RESULT
1134	004470	001401			BEQ	.+4		
1135	004472	000000			HLT			;ERROR! INCORRECT STATUS RESULT
1136	004474	005737	017202		TST	@#PHYS+2		;CHECK RESULT
1137	004500	001401			BEQ	.+4		
1138	004502	000000			HLT			;ERROR! INCORRECT RESULT
1139	004504	104000			SCOPE			
1140								
1141								
1142	004506	012737	030000	177776	MOV	#KM+PUM,@#PSW		;KERNEL MODE!!!,PREV USER MODE!!
1143	004514	012716	177777		MOV	#-1,(KSP)		;PUT #-1 ON KERNEL STACK
1144	004520	012702	000002		MOV	#2,R2		;LOAD INDEX REGISTER
1145	004524	012737	120000	001010	MOV	#VIRT,@#TEMP+4		;LOAD ADDRESS
1146	004532	005037	017200		CLR	@#PHYS		;PRESET DATA
1147	004536	005237	177572		INC	@#SRO		;ENABLE KT11
1148								
1149	004542	006672	001006		KU7:	MTP1	@TEMP+2(R2)	;VIRT+(KSP)+
1150	004546	005037	177572		CLR	@#SRO		;DISABLE KT11
1151	004552	005237	017200		INC	@#PHYS		;CHECK RESULT
1152	004556	001401			BEQ	.+4		
1153	004560	000000			HLT			;ERROR! INCORRECT RESULT
1154	004562	104000			SCOPE			

```

1155
1156 ;TEST THAT MTPI CAN LOAD USER
1157 ;DM=0,PC
1158 004564 012737 030000 177776 MOV #KM+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1159 004572 012716 00460E MOV #KU10A,(KSP) ;PUT NEW PC ON STACK AS DATA
1160 004576 005237 177572 INC @#SRO ;ENABLE KT1!
1161
1162 004602 006607 KU10: MTPI PC ;PC+(KSP)+
1163 004604 000000 HLT ;ERROR! MTPI DID NOT LOAD NEW PC
1164 004606 005037 177572 KU10A: CLR @#SRO ;DISABLE KT1!
1165 004612 104000 SCOPE
1166
1167 ;DM=2,PC
1168 004614 012737 030000 177776 MOV #KM+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1169 004622 012716 177777 MOV #-1,(KSP) ;PUT #-1 ON KERNEL STACK
1170 004626 012767 004646 173414 MOV #KU11A,MMVEC ;LOAD SEG ERR VECTOR
1171 004634 005237 177572 INC @#SRO ;ENABLE KT1!
1172
1173 004640 006627 KU11: MTPI (PC)+ ;(PC)++(KSP)+, SHOULD ABORT
1174 004642 000000 HLT ;ERROR! DID NOT ABORT AND PC DID NOT
1175 ;AUTO-INCREMENT
1176 004644 000000 HLT ;ERROR! DID NOT ABORT
1177 004646 005037 177572 KU11A: CLR @#SRO ;DISABLE KT1!
1178 004652 022706 001056 CMP #KPTR-2,KSP ;CHECK THAT STACK PTR WAS PUSHED TWICE
1179 004656 001401 BEQ .+4 ;ERROR! INCORRECT STACK PTR ON ERROR ABORT
1180 004660 000000 HLT
1181 004662 012767 000462 173360 MOV #MMERR,MMVEC
1182 004670 104000 SCOPE
1183
1184 ;DM=3,PC
1185 004672 012737 030000 177776 MOV #PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1186 004700 012716 177777 MOV #-1,(KSP) ;PUT #-1 ON KERNEL STACK
1187 004704 005037 017260 CLR @#PHYS
1188 004710 005237 177572 INC @#SRO ;ENABLE KT1!
1189
1190 004714 006637 120000 KU12: MTPI @#VIRT ;VIRT+(KSP)+
1191 004720 016700 173052 MOV PSW,R0 ;SAVE STATUS RESULT
1192 004724 005037 177572 CLR @#SRO ;DISABLE KT1!
1193 004730 122700 000010 CMPB #N,R0 ;CHECK STATUS RESULT
1194 004734 001401 BEQ .+4
1195 004736 000000 HLT ;ERROR! INCORRECT STATUS RESULT
1196 004740 005267 012234 INC PHYS ;CHECK RESULT
1197 004744 001401 BEQ .+4 ;ERROR! INCORRECT RESULT
1198 004746 000000 HLT
1199 004750 005067 173022 CLR PSW
1200 004754 104000 SCOPE
1201
1202 ;DM=4,PC
1203 004756 012737 030000 177776 MOV #KM+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1204 004764 005016 CLR (KSP) ;PUT 0 ON KERNEL STACK
1205 004766 016702 000012 MOV KU13,R2 ;SAVE MTPI INSTRUCTION
1206 004772 012767 005010 173250 MOV #KU13A,MMVEC ;LOAD SEG ERR VECTOR
1207 005000 005237 177572 INC @#SRO ;ENABLE KT1!
1208
1209 005004 006647 KU13: MTPI -(PC) ;-(PC)+(KSP)+
1210 005006 000000 HLT ;ERROR! FAILED TO ABORT

```

```

1211 005010 005037 177572          KU13A: CLR      @#SRO          ;DISABLE KT11
1212 005014 010267 177764          MOV      R2,KU13 ;RESTORE INSTRUCTION
1213 005020 012767 000462 173222  MOV      @MMERR,MMVEC
1214 005026 104000          SCOPE
1215
1216          ;DM=6,PC
1217 005030 012737 030340 177776  MOV      @PUM+PRTY7,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1218 005036 005016          CLR      (KSP) ;PUT 0 ON KERNEL STACK
1219 005040 012767 177777 012136  MOV      #-1,PHYS+4
1220 005046 005237 177572          INC      @#SRO ;ENABLE KT11
1221
1222 005052 000277          SCC
1223 005054 006667 112724          KU14: MTP/PI VIRT+4 ;VIRT+4+(KSP)+
1224 005060 016703 172712          MOV      PSW,R3 ;SAVE STATUS RESULT
1225 005064 005037 177572          CLR      @#SRO ;DISABLE KT11
1226 005070 022706 001062          CMP      @KPTR+2,KSP ;CHECK THAT STACK PTR POPPED
1227 005074 001401          BEQ     .+4
1228 005076 000000          HLT
1229 005100 122703 000345          CMPB    @PRTY7+Z+C,R3 ;ERROR! INCORRECT STACK PTR
1230 005104 001401          BEQ     .+4 ;CHECK STATUS RESULT
1231 005106 000000          HLT
1232 005110 005737 017204          TST     @#PHYS+4 ;ERROR! INCORRECT STATUS RESULT
1233 005114 001401          BEQ     .+4 ;CHECK RESULT
1234 005116 000000          HLT
1235 005120 104000          SCOPE ;ERROR! INCORRECT RESULT
1236
1237          ;DM=7,PC
1238
1239 005122 012737 030000 177776  MOV      @KM+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1240 005130 012716 177777          MOV      #-1,(KSP) ;PUT #-1 ON KERNEL STACK
1241 005134 012737 120004 001004  MOV      @VIRT+4,@#TEMP ;LOAD ADDRESS
1242 005142 005037 017204          CLR      @#PHYS+4 ;PRESET DATA
1243 005146 005237 177572          INC      @#SRO ;ENABLE KT11
1244
1245 005152 006677 173626          KU15: MTP/PI @#TEMP ;VIRT+4+(KSP)+
1246 005156 005037 177572          CLR      @#SRO ;DISABLE KT11
1247 005162 005237 017204          INC      @#PHYS+4 ;CHECK RESULT
1248 005166 001401          BEQ     .+4
1249 005170 000000          HLT
1250 005172 104000          SCOPE ;ERROR INCORRECT RESULT
1251
1252
1253          ;CHECK THAT MTP/PI CAN SET USER STACK PTR & PUSH DATA ONTO USER STACK
1254 005174 012737 030000 177776  MOV      @PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
1255 005202 012746 120000          MOV      @VIRT,-(KSP)
1256 005206 005046          CLR      -(KSP) ;PUT DATA ON THE STACK
1257 005210 012746 120000          MOV      @VIRT,-(KSP)
1258 005214 012737 177777 017200  MOV      #-1,@#PHYS ;PRESET STACK DATA
1259 005222 005237 177572          INC      @#SRO ;ENABLE KT11
1260
1261 005226 006606          KU16: MTP/PI USP ;USP+(KSP)+
1262 005230 006636          MTP/PI @#(KSP)+ ;VIRT+(KSP)+
1263 005232 005037 177572          CLR      @#SRO ;DISABLE KT11
1264 005236 106506          MFPD    USP ;GET USER STACK PTR
1265 005240 022716 120000          CMP      @VIRT,(KSP) ;CHECK THAT MTP/PI USP SET USER STACK PTR
1266 005244 001401          BEQ     .+4

```

```

1267 005246 000000          HLT          ;ERROR! MTPI USP FAILED
1268 005250 005737 017200  TST          @#PHYS    ;CHECK THAT MTPI @ (KSP)+ PUT THE
1269 005254 001401          BEQ          .+4       ;CORRECT DATA ONTO THE USER STACK
1270 005256 000000          HLT          ;ERROR! MTPI @ (KSP)+ FAILED
1271 005260 022706 001056  CMP          #KPTR-2,KSP ;CHECK KERNEL STACK PTR AFTER TEST
1272 005264 001401          BEQ          .+4
1273 005266 000000          HLT          ;ERROR! INCORRECT KERNEL STACK PTR
1274 005270 104000          SCOPE
1275                                     ;TEST MFPI INSTRUCTION KERNEL MODE PREVIOUS USER MODE
1276                                     ;TEST THAT MFPI CAN GET DATA FROM A GENERAL REGISTER (R1).
1277 005272 012767 030000 172476 MOV          #PUM,PSW   ;KERNEL MODE!!!,PREV USER MODE!!
1278 005300 012766 177777 177776 MOV          #-1,-2(KSP)
1279 005306 005000          CLR          R0       ;PRESET REGISTER
1280 005310 005237 177572  INC          @#SRO     ;ENABLE MEMORY MANAGEMENT
1281 005314 000277          SCC          ;PRESET CC'S
1282 005316 006500          MFPI        R0       ;-(KSP)+(R1)
1283 005320 016704 172452  MOV          PSW,R4   ;SAVE CC'S
1284 005324 005037 177572  CLR          @#SRO     ;DISABLE MEMORY MANAGEMENT
1285 005330 122704 000005  CMPB        #Z+C,R4 ;CHECK CC'S
1286 005334 001401          BEQ          .+4
1287 005336 000000          HLT          ;ERROR! INCORRECT CC'S
1288 005340 022706 001056  CMP          #KPTR-2,KSP ;CHECK THAT STACK PTR WAS PUSHED
1289 005344 001401          BEQ          .+4
1290 005346 000000          HLT          ;ERROR! INCORRECT STACK PTR
1291 005350 005716          TST          (KSP)   ;CHECK RESULT
1292 005352 001401          BEQ          .+4
1293 005354 000000          HLT          ;ERROR! INCORRECT RESULT
1294 005356 005067 172414  CLR          PSW
1295 005362 104000          SCOPE
1296
1297                                     ;TEST THAT MFPI CAN GET DATA FROM A KERNEL VIRTUAL ADDRESS
1298                                     ;DM=1
1299 005364 012767 030000 172404 MOV          #KM+PUM,PSW ;KERNEL MODE!!!,PREV USER MODE!!
1300 005372 005066 177776  CLR          -2(KSP)
1301 005376 012702 120000  MOV          #VIRT,R2  ;R2=VIRTUAL ADDRESS
1302 005402 012737 177777 017200 MOV          #-1,@#PHYS ;PRESET PHYSICAL ADDRESS
1303 005410 005237 177572  INC          @#SRO     ;ENABLE MEMORY MANAGEMENT
1304 005414 000277          SCC          ;PRESET CC'S
1305 005416 006512          MFPI        (R2)     ;-(KSP)+(R2)
1306 005420 016703 172352  MOV          PSW,R3   ;SAVE CC'S
1307 005424 005037 177572  CLR          @#SRO     ;DISABLE MEMORY MANAGEMENT
1308 005430 122703 000011  CMPB        #N+C,R3  ;CHECK CC'S
1309 005434 001401          BEQ          .+4
1310 005436 000000          HLT          ;ERROR! INCORRECT CC'S
1311 005440 022706 001056  CMP          #KPTR-2,KSP ;CHECK THAT STACK WAS PUSHED
1312 005444 001401          BEQ          .+4
1313 005446 000000          HLT          ;ERROR! INCORRECT STACK PTR
1314 005450 005216          INC          (KSP)   ;CHECK RESULT
1315 005452 001401          BEQ          .+4
1316 005454 000000          HLT          ;ERROR! INCORRECT RESULT
1317 005456 104000          SCOPE
1318
1319                                     ;DM=2
1320 005460 012767 030000 172310 MOV          #PUM,PSW   ;KERNEL MODE!!!,PREV USER MODE!!
1321 005466 012766 177777 177776 MOV          #-1,-2(KSP)
1322 005474 012702 120000  MOV          #VIRT,R2  ;R2=VIRTUAL ADDRESS

```

1323	005500	005037	017200		CLR	@#PHYS	; PRESET PHYSICAL ADDRESS
1324	005504	005237	177572		INC	@#SRO	; ENABLE MEMORY MANAGEMENT
1325	005510	006522		KUF2:	MFPI	(R2)+	; -(KSP)+VIRT
1326	005512	005037	177572		CLR	@#SRO	; DISABLE MEMORY MANAGEMENT
1327	005516	005716			TST	(KSP)	; CHECK RESULT
1328	005520	001401			BEQ	+.4	
1329	005522	000000			HLT		; ERROR! INCORRECT RESULT ON STACK
1330	005524	022702	120002		CMP	#VIRT+2,R2	; CHECK AUTO INCREMENT
1331	005530	001401			BEQ	+.4	
1332	005532	000000			HLT		; ERROR! AUTO INCREMENT FAILED
1333	005534	005067	172236		CLR	PSW	
1334	005540	104000			SCOPE		
1335							
1336							
1337	005542	012767	030000	172226	MOV	#KM+PUM,PSW	; KERNEL MODE!!!,PREV USER MODE!!
1338	005550	005066	177776		CLR	-2(KSP)	
1339	005554	012702	001004		MOV	#TEMP,R2	; LOAD INDIRECT ADDRESS
1340	005560	012737	120002	001004	MOV	#VIRT+2,@#TEMP	; LOAD ADDRESS
1341	005566	012737	177777	017202	MOV	#-1,@#PHYS+2	; PRESET DATA
1342	005574	005237	177572		INC	@#SRO	; ENABLE MEMORY MANAGEMENT
1343	005600	006532		KUF3:	MFPI	@(R2)+	; -(KSP)+VIRT+2
1344	005602	005037	177572		CLR	@#SRO	; DISABLE MEMORY MANAGEMENT
1345	005606	005216			INC	(KSP)	; CHECK RESULT
1346	005610	001401			BEQ	+.4	
1347	005612	000000			HLT		; ERROR! INCORRECT RESULT
1348	005614	104000			SCOPE		
1349							
1350							
1351	005616	012767	030000	172152	MOV	#KM+PUM,PSW	; KERNEL MODE!!!,PREV USER MODE!!
1352	005624	012766	177777	177776	MOV	#-1,-2(KSP)	
1353	005632	012704	120002		MOV	#VIRT+2,R4	; R4=VIRTUAL ADDRESS+2
1354	005636	005037	017200		CLR	@#PHYS	; PRESET PHYSICAL ADDRESS DATA
1355	005642	005237	177572		INC	@#SRO	; ENABLE MEMORY MANAGEMENT
1356	005646	006544		KUF4:	MFPI	-(R4)	; -(KSP)+VIRT
1357	005650	005037	177572		CLR	@#SRO	; DISABLE MEMORY MANAGEMENT
1358	005654	022704	120000		CMP	#VIRT,R4	; CHECK AUTO-DECREMENT
1359	005660	001401			BEQ	+.4	
1360	005662	000000			HLT		; ERROR! AUTO-DECREMENT FAILED
1361	005664	005716			TST	(KSP)	; CHECK RESULT
1362	005666	001401			BEQ	+.4	
1363	005670	000000			HLT		; ERROR! INCORRECT RESULT
1364	005672	104000			SCOPE		
1365							
1366							
1367	005674	012767	030000	172074	MOV	#PUM,PSW	; KERNEL MODE!!!,PREV USER MODE!!
1368	005702	005066	177776		CLR	-2(KSP)	
1369	005706	012701	001006		MOV	#TEMP+2,R1	; R1=INDIRECT ADDRESS
1370	005712	012737	120004	001004	MOV	#VIRT+4,@#TEMP	; LOAD ADDRESS
1371	005720	012737	177777	017204	MOV	#-1,@#PHYS+4	; PRESET PHYSICAL ADDRESS DATA
1372	005726	005237	177572		INC	@#SRO	; ENABLE MEMORY MANAGEMENT
1373	005732	006551		KUF5:	MFPI	@-(R1)	; -(KSP)+VIRT+4
1374	005734	005037	177572		CLR	@#SRO	; DISABLE MEMORY MANAGEMENT
1375	005740	005216			INC	(KSP)	; CHECK RESULT
1376	005742	001401			BEQ	+.4	
1377	005744	000000			HLT		
1378	005746	005067	172024		CLR	PSW	

```

1379 005752 104000 SCOPE
1380
1381 ;DM=6
1382 005754 012767 030000 172014 MOV #PUM,PSW ;KERNEL MODE!!!,PREV USER MODE!!
1383 005762 012766 177777 177776 MOV #-1,-2(KSP)
1384 005770 012702 000002 MOV #2,R2 ;LOAD INDEX REGISTER
1385 005774 005037 017202 CLR @#PHYS+2 ;PRESET PHYSICAL ADDRESS DATA
1386 005000 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1387 006004 006562 120000 KUF6: MFPI VIRT(R2) ;-(KSP)+VIRT-2
1388 006010 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1389 006014 022706 001056 CMP #KPTR-2,KSP ;CHECK STACK PTR
1390 006020 001401 BEQ .+4
1391 006022 000000 HLT ;ERROR! INCORRECT STACK PTR
1392 006024 005716 TST (KSP) ;CHECK RESULT
1393 006026 001401 BEQ .+4
1394 006030 000000 HLT ;ERROR! INCORRECT RESULT
1395 006032 005067 171740 CLR PSW
1396 006036 104000 SCOPE
1397
1398 ;DM=7
1399 006040 012767 030000 171730 MOV #KM+PUM,PSW ;KERNEL MODE!!!,PREV USER MODE!!
1400 006046 005066 177776 CLR -2(KSP)
1401 006052 012702 177774 MOV #-4,R2 ;LOAD INDEX REGISTER
1402 006056 012737 120000 001004 MOV #VIRT,@#TEMP ;LOAD ADDRESS
1403 006064 012737 177777 017200 MOV #-1,@#PHYS ;CLEAR PHYSICAL ADDRESS DATA
1404 006072 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1405 006076 006572 001010 KUF7: MFPI @TEMP+4(R2) ;-(KSP)+VIRT
1406 006102 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1407 006106 005216 INC (KSP) ;CHECK RESULT
1408 006110 001401 BEQ .+4
1409 006112 000000 HLT ;ERROR! INCORRECT RESULT
1410 006114 104000 SCOPE
1411
1412 ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
1413 ;DM=0,PC
1414 006116 012767 030000 171652 MOV #KM+PUM,PSW ;KERNEL MODE!!!,PREV USER MODE!!
1415 006124 005066 177776 CLR -2(KSP)
1416 006130 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1417 006134 000277 SCC
1418 006136 006507 KUF10: MFPI PC ;-(KSP)+PC
1419 006140 016702 171632 MOV PSW,R2 ;SAVE CC'S
1420 006144 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1421 006150 122702 000001 CMPB #C,R2 ;CHECK CC'S
1422 006154 001401 BEQ .+4
1423 006156 000000 HLT
1424 006160 022706 001056 CMP #KPTR-2,KSP ;CHECK STACK PTR
1425 006164 001401 BEQ .+4
1426 006166 000000 HLT ;ERROR! STACK NOT PUSHED
1427 006170 022716 006140 CMP #KUF10+2,(KSP) ;CHECK THAT PC WAS PUSHED ON THE STACK
1428 006174 001401 BEQ .+4
1429 006176 000000 HLT ;ERROR! PC NOT PUSHED ON THE STACK
1430 006200 104000 SCOPE
1431
1432
1433 ;DM=3,PC
1434

```

```

1435 006202 012767 030000 171566      MOV      #PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
1436 006210 005066 177776      CLR      -2(KSP)
1437 006214 012737 177777 017200      MOV      #-1,@#PHYS
1438 006222 005237 177572      INC      @#SRO      ;ENABLE MEMORY MANAGEMENT
1439 006226 006537 120000      KUF11: MFPI @#VIRT    ;-(KSP)+VIRT
1440 006232 005037 177572      CLR      @#SRO      ;DISABLE MEMORY MANAGEMENT
1441 006236 005216      INC      (KSP)      ;CHECK RESULT
1442 006240 001401      BEQ     .+4
1443 006242 000000      HLT
1444 006244 104000      SCOPE      ;ERROR! INCORRECT RESULT
1445
1446      ;DM=6,PC
1447 006246 012767 030340 171522      MOV      #PUM+PRTY7,PSW ;KERNEL MODE!!!,PREV USER MODE!!
1448 006254 012766 177777 177776      MOV      #-1,-2(KSP)
1449 006262 005037 017200      CLR      @#PHYS      ;PRESET PHYSICAL ADDRESS DATA
1450 006266 005237 177572      INC      @#SRO      ;ENABLE MEMORY MANAGEMENT
1451 006272 006567 111502      KUF12: MFPI VIRT     ;-(KSP)+VIRT
1452 006276 005037 177572      CLR      @#SRO      ;DISABLE MEMORY MANAGEMENT
1453 006302 005716      TST     (KSP)      ;CHECK RESULT
1454 006304 001401      BEQ     .+4
1455 006306 000000      HLT
1456 006310 104000      SCOPE      ;ERROR! INCORRECT RESULT
1457
1458      ;DM=7,PC
1459 006312 012767 030000 171456      MOV      #KM+PUM,PSW   ;KERNEL MODE!!!,PREV USER MODE!!
1460 006320 005066 177776      CLR      -2(KSP)
1461 006324 012737 120004 001004      MOV      #VIRT+4,@#TEMP ;LOAD ADDRESS
1462 006332 012737 177777 017204      MOV      #-1,@#PHYS+4 ;PRESET DATA
1463 006340 005237 177572      INC      @#SRO      ;ENABLE MEMORY MANAGEMENT
1464 006344 000277      SCC
1465 006346 006577 172432      KUF13: MFPI @TEMP     ;-(KSP)+VIRT+4
1466 006352 016702 171420      MOV      PSW,R2      ;SAVE CC'S
1467 006356 005037 177572      CLR      @#SRO      ;DISABLE MEMORY MANAGEMENT
1468 006362 122702 000011      CMPB   #N+C,R2      ;CHECK CC'S
1469 006366 001401      BEQ     .+4
1470 006370 000000      HLT
1471 006372 005216      INC      (KSP)      ;ERROR! INCORRECT CC'S
1472 006374 001401      SEQ     .+4      ;CHECK RESULT
1473 006376 000000      HLT
1474 006400 104000      SCOPE      ;ERROR! INCORRECT RESULT ON STACK
1475
1476 006402 012767 030000 171366      MOV      #KM+PUM,PSW   ;KERNEL MODE!!!,PREV USER MODE!!
1477 006410 012716 120000      MOV      #VIRT,(KSP)
1478 006414 005037 017200      CLR      @#PHYS
1479 006420 005237 177572      INC      @#SRO      ;ENABLE MEMORY MANAGEMENT
1480 006424 006576 000000      KUF14: MFPI @#(KSP)  ;-(KSP)+VIRT
1481 006430 005037 177572      CLR      @#SRO      ;DISABLE MEMORY MANAGEMENT
1482 006434 005737 001056      TST     @#KPTR-2    ;CHECK DATA ON THE STACK
1483 006440 001401      BEQ     .+4
1484 006442 000000      HLT
1485 006444 104000      SCOPE      ;ERROR! INCORRECT DATA ON THE STACK
1486
1487      ;BEGIN TESTING IN USER MODE
1488      ;NOTE: ALL HLT (HALT) INSTRUCTIONS WILL TRAP TO LOC 10. THE PROGRAM WILL
1489      ;ALLOW THE TRAP,ADJUST THE PC AND RETURN TO THE HLT IN KERNEL MODE. THE
1490      ;USER STACK POINTER IS NOT AFFECTED BY THIS TRAP. THE USER STACK POINTER

```

```

1491                ; IS AT PHYSICAL 0600.
1492
1493 006446 012706 000600          MOV      #UPTR,USP      ;SET USER STACK PTR
1494 006452 000240          USRTST: NOP          ;BEGIN TESTS IN USER MODE
1495 006454 012767 077406 171116  MOV      #77406,UPDR0  ;RW,UP 200 BLOCKS
1496 006462 012767 077406 171126  MOV      #77406,UPDR7  ;RW,UP 200 BLOCKS
1497 006470 012767 007600 171160  MOV      #7600,UPAR7
1498
1499                ;TESTS UU0-UU6 TEST THE MTPI INSTRUCTION IN USER MODE, PREV USER MODE.
1500                ;TEST THAT MTPI CAN LOAD A GENERAL REGISTER (R2)
1501 006476 012737 170340 177776  MOV      #UM+PUM+PTY7,@#PSW ;USER MODE!!!,PREV USER MODE!!
1502 006504 005016          CLR      (USP)
1503 006506 012702 177777          MOV      #-1,R2      ;PRESET REGISTER
1504 006512 005237 177572          INC      @#SRO      ;ENABLE KT11
1505
1506                UU0:  MTPI      R2      ;R2+(USP)+
1507 006520 016703 171252          MOV      PSW,R3      ;SAVE STATUS RESULT
1508 006524 005037 177572          CLR      @#SRO      ;DISABLE KT11
1509 006530 022706 000602          CMP      #UPTR+2,USP ;CHECK THAT STACK POPPED
1510 006534 001401          BEQ     .+4
1511 006536 000000          HLT
1512 006540 122703 000344          CMPB    #PTY7+Z,R3  ;ERROR! INCORRECT STACK PTR
1513 006544 001401          BEQ     .+4          ;CHECK STATUS RESULT
1514 006546 000000          HLT
1515 006550 005702          TST     R2          ;ERROR! INCORRECT STATUS RESULT
1516 006552 001401          BEQ     .+4          ;CHECK RESULT
1517 006554 000000          HLT
1518 006556 104000          SCOPE ;ERROR! INCORRECT RESULT
1519
1520
1521                ;TEST THAT USER CAN LOAD USER ADDRESS (VIRT)
1522
1523                ;*****
1524                120000          VIRT=120000 ;USER VIRTUAL ADDRESS FOR THESE TESTS
1525                017200          PHYS=17200  ;CORRESPONDING PHYSICAL ADDRESS
1526                ;*****
1527
1528                ;DM=2
1529 006560 012737 170000 177776  MOV      #UM+PUM,@#PSW ;USER MODE!!!,PREV USER MODE!!
1530 006566 012716 177777          MOV      #-1,(USP)
1531 006572 012702 120000          MOV      #VIRT,R2    ;R2=VIRT ADDRESS
1532 006576 005037 017200          CLR      @#PHYS     ;PRESET DATA
1533 006602 005237 177572          INC      @#SRO      ;ENABLE KT11
1534
1535                UU1:  MTPI      (R2)+  ;VIRT+(USP)+
1536 006610 005037 177572          CLR      @#SRO      ;DISABLE KT11
1537 006614 005237 017200          INC      @#PHYS     ;CHECK RESULT
1538 006620 001401          BEQ     .+4
1539 006622 000000          HLT
1540 006624 022702 120002          CMP      #VIRT+2,R2 ;ERROR! INCORRECT RESULT
1541 006630 001401          BEQ     .+4          ;CHECK AUTO-INCREMENT
1542 006632 000000          HLT
1543 006634 005067 171136          CLR     PSW
1544 006640 104000          SCOPE ;ERROR! AUTO-INCREMENT FAILED
1545
1546 006642 012737 170000 177776  ;DM=4  MOV      #UM+PUM,@#PSW ;USER MODE!!!,PREV USER MODE!!

```

```

1547 006650 005016          CLR      (USP)
1548 006652 012704 120002    MOV      #VIRT+2,R4      ;LOAD ADDRESS
1549 006656 012737 177777 017200  MOV      #-1,@#PHYS     ;PRESET DATA
1550 006664 005237 177572          INC      @#SRO          ;ENABLE KT11
1551
1552 006670 006644          UU2:    MTPI     -(R4)      ;VIRT+(USP)+
1553 006672 005037 177572          CLR      @#SRO        ;DISABLE KT11
1554 006676 022704 120000          CMP      #VIRT,R4     ;CHECK AUTO-DECREMENT
1555 006702 001401          BEQ      .+4
1556 006704 000000          HLT
1557 006706 005737 017200          TST      @#PHYS      ;ERROR! AUTO-DECREMENT FAILED
1558 006712 001401          BEQ      .+4          ;CHECK RESULT
1559 006714 000000          HLT
1560 006716 104000          SCOPE
1561
1562
1563 006720 012737 170000 177776 ;DM=6    MOV      #UM+PUM,@#PSW ;USER MODE!!!,PREV USER MODE!!
1564 006726 005016          CLR      (USP)
1565 006730 012702 000002          MOV      #2,R2        ;LOAD INDEX REGISTER
1566 006734 012767 177777 010240  MOV      #-1,PHYS+2    ;PRESET DATA
1567 006742 005237 177572          INC      @#SRO        ;ENABLE KT11
1568
1569 006746 006662 120000          UU3:    MTPI     VIRT(R2) ;VIRT+2+(USP)+
1570 006752 016700 171020          MOV      PSW,RO       ;SAVE STATUS RESULT
1571 006756 005037 177572          CLR      @#SRO        ;DISABLE KT11
1572 006762 022706 000602          CMP      #UPTR+2,USP ;CHECK THAT STACK POINTER POPPED
1573 006766 001401          BEQ      .+4
1574 006770 000000          HLT
1575 006772 122700 000004          CMPB    #Z,RO        ;CHECK STATUS RESULT
1576 006776 001401          BEQ      .+4
1577 007000 000000          HLT
1578 007002 005737 017202          TST      @#PHYS+2    ;ERROR! INCORRECT STATUS RESULT
1579 007006 001401          BEQ      .+4          ;CHECK RESULT
1580 007010 000000          HLT
1581 007012 104000          SCOPE
1582
1583
1584
1585 007014 012737 170000 177776 ;TEST THAT MTPI CAN LOAD PC
1586 007022 012716 007036 ;DM=0,PC MOV      #UM+PUM,@#PSW ;USER MODE!!!,PREV USER MODE!!
1587 007026 005237 177572          INC      @#SRO        ;PUT NEW PC ON STACK AS DATA
1588
1589 007032 006607          UU4:    MTPI     PC        ;PC+(USP)+
1590 007034 000000          HLT
1591 007036 005037 177572          UU4A:   CLR      @#SRO  ;ERROR! MTPI DID NOT LOAD PC
1592 007042 104000          SCOPE
1593
1594
1595 007044 012737 170000 177776 ;DM=3,PC MOV      #UM+PUM,@#PSW ;USER MODE!!!,PREV USER MODE!!
1596 007052 012716 177777          MOV      #-1,(USP)
1597 007056 005037 017200          CLR      @#PHYS
1598 007062 005237 177572          INC      @#SRO        ;ENABLE KT11
1599
1600 007066 006637 120000          UU5:    MTPI     @#VIRT   ;VIRT+(USP)+
1601 007072 016700 170700          MOV      PSW,RO       ;SAVE STATUS RESULT
1602 007076 005037 177572          CLR      @#SRO        ;DISABLE KT11

```

1603	007102	122700	000010		CMPB	#N,R0	;CHECK STATUS RESULT
1604	007106	001401			BEQ	.+4	
1605	007110	000000			HLT		;ERROR! INCORRECT STATUS RESULT
1606	007112	005267	010062		INC	PHYS	;CHECK RESULT
1607	007116	001401			BEQ	.+4	
1608	007120	000000			HLT		;ERROR! INCORRECT RESULT
1609	007122	005067	170650		CLR	PSW	
1610	007126	104000			SCOPE		
1611							
1612							;DM=7,PC
1613	007130	012737	170000	177776	MOV	#UM+PUM,@#PSW	;USER MODE!!!,PREV USER MODE!!
1614	007136	012716	177777		MOV	#-1,(USP)	
1615	007142	012737	120004	001004	MOV	#VIRT+4,@#TEMP	;LOAD ADDRESS
1616	007150	005037	017204		CLR	@#PHYS+4	;PRESET DATA
1617	007154	005237	177572		INC	@#SRO	;ENABLE KT11
1618							
1619	007160	006677	171620		UU6: MTPI	@TEMP	;VIRT+4+(USP)+
1620	007164	005037	177572		CLR	@#SRO	;DISABLE KT11
1621	007170	005237	017204		INC	@#PHYS+4	;CHECK RESULT
1622	007174	001401			BEQ	.+4	
1623	007176	000000			HLT		;ERROR INCORRECT RESULT
1624	007200	104000			SCOPE		
1625							
1626	007202	012767	170000	170566			;TEST MFPI INSTRUCTION USER MODE PREVIOUS USER MODE
1627	007210	012703	177777		MOV	#UM+PUM,PSW	;USER MODE!!!,PREV USER MODE!!
1628	007214	005237	177572		MOV	#-1,R3	;PRESET GENERAL REGISTER
1629	007220	006503			INC	@#SRO	;ENABLE MEMORY MANAGEMENT
1630	007222	016702	170550		UUFO: MFPI	R3	;-(USP)+R3
1631	007226	005037	177572		MOV	PSW,R2	;SAVE STATUS AFTER MFPI
1632	007232	022702	170010		CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
1633	007236	001401			CMP	#UM+PUM+N,R2	;CHECK STATUS AFTER MFPI
1634	007240	000000			BEQ	.+4	
1635	007242	022706	000576		HLT		;ERROR! INCORRECT STATUS AFTER MFPI
1636	007246	001401			CMP	#UPTR-2,USP	;CHECK THAT STACK WAS PUSHED
1637	007250	000000			BEQ	.+4	
1638	007252	005216			HLT		;ERROR! INCORRECT STACK PTR
1639	007254	001401			INC	(USP)	;CHECK RESULT
1640	007256	000000			BEQ	.+4	
1641	007260	104000			HLT		;ERROR! INCORRECT RESULT
1642					SCOPE		
1643							;TEST THAT MFPI CAN GET DATA FROM A USER VIRTUAL ADDRESS
1644							;DM=2
1645	007262	012767	170000	170506	MOV	#UM+PUM,PSW	;USER MODE!!!,PREV USER MODE!!
1646	007270	012766	177777	177776	MOV	#-1,-2(USP)	
1647	007276	012702	120000		MOV	#VIRT,R2	;R2=VIRTUAL ADDRESS
1648	007302	005037	017200		CLR	@#PHYS	;PRESET PHYSICAL ADDRESS
1649	007306	005237	177572		INC	@#SRO	;ENABLE MEMORY MANAGEMENT
1650	007312	006522			UUFO: MFPI	(R2)+	;-(USP)+VIRT
1651	007314	005037	177572		CLR	@#SRO	;DISABLE MEMORY MANAGEMENT
1652	007320	005716			TST	(USP)	;CHECK RESULT
1653	007322	001401			BEQ	.+4	
1654	007324	000000			HLT		;ERROR! INCORRECT RESULT ON STACK
1655	007326	022702	120002		CMP	#VIRT+2,R2	;CHECK AUTO INCREMENT
1656	007332	001401			BEQ	.+4	
1657	007334	000000			HLT		;ERROR! AUTO INCREMENT FAILED
1658	007336	005067	170434		CLR	PSW	

```

1659 007342 104000 SCOPE
1660
1661 ;DM=4
1662 007344 012767 170000 170424 MOV #UM+PUM,PSW ;USER MODE!!!,PREV USER MODE!!
1663 007352 012766 177777 177776 MOV #-1,-2(USP)
1664 007360 012704 120002 MOV #VIRT+2,R4 ;R4=VIRTUAL ADDRESS+2
1665 007364 005037 017200 CLR @#PHYS ;PRESET PHYSICAL ADDRESS DATA
1666 007370 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1667 007374 006544 UUF4: MFPI -(R4) ;-(USP)+VIRT
1668 007376 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1669 007402 022704 120000 CMP #VIRT,R4 ;CHECK AUTO-DECREMENT
1670 007406 001401 BEQ .+4
1671 007410 000000 HLT ;ERROR! AUTO-DECREMENT FAILED
1672 007412 005716 TST (USP) ;CHECK RESULT
1673 007414 001401 BEQ .+4
1674 007416 000000 HLT ;ERROR! INCORRECT RESULT
1675 007420 104000 SCOPE
1676
1677 ;DM=6
1678 007422 012767 170000 170346 MOV #UM+PUM,PSW ;USER MODE!!!,PREV USER MODE!!
1679 007430 012766 177777 177776 MOV #-1,-2(USP)
1680 007436 012702 000002 MOV #2,R2 ;LOAD INDEX REGISTER
1681 007442 005037 017202 CLR @#PHYS+2 ;PRESET PHYSICAL ADDRESS DATA
1682 007446 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1683 007452 006562 120000 UUF6: MFPI VIRT(R2) ;-(USP)+VIRT-2
1684 007456 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1685 007462 022706 000576 CMP #UPTR-2,USP ;CHECK STACK PTR
1686 007466 001401 BEQ .+4
1687 007470 000000 HLT ;ERROR! INCORRECT STACK PTR
1688 007472 005716 TST (USP) ;CHECK RESULT
1689 007474 001401 BEQ .+4
1690 007476 000000 HLT ;ERROR! INCORRECT RESULT
1691 007500 005067 170272 CLR PSW
1692 007504 104000 SCOPE
1693
1694 ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
1695 ;DM=3,PC
1696 007506 012767 170000 170262 MOV #UM+PUM,PSW ;USER MODE!!!,PREV USER MODE!!
1697 007514 005066 177776 CLR -2(USP)
1698 007520 012737 177777 017200 MOV #-1,@#PHYS
1699 007526 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1700 007532 006537 120000 UUF11: MFPI @#VIRT ;-(USP)+VIRT
1701 007536 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1702 007542 005216 INC (USP) ;CHECK RESULT
1703 007544 001401 BEQ .+4
1704 007546 000000 HLT ;ERROR! INCORRECT RESULT
1705 007550 104000 SCOPE
1706
1707 ;DM=6,PC
1708 007552 012767 170340 170216 MOV #UM+PUM+PRTY7,PSW ;USER MODE!!! PREV USER MODE!!
1709 007560 012766 177777 177776 MOV #-1,-2(USP)
1710 007566 005037 017200 CLR @#PHYS ;PRESET PHYSICAL ADDRESS DATA
1711 007572 005237 177572 INC @#SRO ;ENABLE MEMORY MANAGEMENT
1712 007576 006567 110176 UUF12: MFPI VIRT ;-(USP)+VIRT
1713 007602 005037 177572 CLR @#SRO ;DISABLE MEMORY MANAGEMENT
1714 007606 005716 TST (USP) ;CHECK RESULT

```

1715 007610 001401
 1716 007612 000000
 1717 007614 104000
 1718
 1719
 1720
 1721 007616 005067 170154
 1722 007622 005767 171170
 1723 007626 001410
 1724 007630 005267 171144
 1725 007634 026727 171140 001000
 1726 007642 001402
 1727 007644 000167 171342
 1728 007650 005267 171142
 1729 007654 012767 000007 167704
 1730 007662 105767 167676
 1731 007666 100375
 1732 007670 012767 000052 167670
 1733 007676 105767 167662
 1734 007702 100375
 1735 007704 012767 000177 167654
 1736 007712 105767 167646
 1737 007716 100375
 1738 007720 013702 000042
 1739 007724 001405
 1740 007726 000005
 1741 007730 004712
 1742 007732 000240
 1743 007734 000240
 1744 007736 000240
 1745 007740 000167 171124
 1746
 1747 000001

BEQ .+4
 HLT ;ERROR! INCORRECT RESULT
 SCOPE
 ;*****IMPORTANT NOTE*****
 ;NO CODE ALLOWED BETWEEN 16600-17776
 END: CLR PSW
 TST PASCNT ;FIRST PASS?
 BEQ DONE ;YES, SKIP ITERATIONS THIS TIME
 INC ICNT ;INCREMENT PASS COUNT
 CMP ICNT, #1000
 BEQ DONE
 JMP BEGIN
 DONE: INC PASCNT ;TO ENABLE ITERATIONS ON LATER PASSES
 MOV #7, TPB ;RING BELL
 TSTB TPB
 BPL .-4
 MOV #52, TPB ;PRINT '*' FOR PASS INDICATION
 TSTB TPB
 BPL .-4
 MOV #177, TPB ;OUTPUT NULL CHARACTER
 TSTB TPB
 BPL .-4
 MOV #42, R2 ;MONITOR LOAD?
 BEQ DONE1 ;NO, CONTINUE
 RESET
 SENDAD: JSR 7, (2) ;RETURN TO MONITOR
 NOP
 NOP
 NOP
 DONE1: JMP START ;RESTART
 .END

BEGIN	001212	KK12	002320	KUF10	006136	PASCNT	001016	UPAR7	= 177656
C	= 000001	KK13	002404	KUF11	006226	PFVEC	= 000024	UPDR0	= 177600
DISPLA	= 177570	KK14	002440	KUF12	006272	PHYS	= 017200	UPDR1	= 177602
DONE	007650	KK15	002534	KUF13	006346	PRTY4	= 000200	UPDR2	= 177604
DONE1	007740	KK16	002572	KUF14	006424	PRTY7	= 000340	UPDR3	= 177606
EMTVEC	= 000030	KK2	001606	KUF2	005510	PSW	= 177776	UPDR4	= 177610
END	007616	KK3	001670	KUF3	005600	PUM	= 030000	UPDR5	= 177612
ERRVEC	= 000010	KK4	001730	KUF4	005646	RW	= 000006	UPDR6	= 177614
FTITLE	001014	KK5	002014	KUF5	005732	SCOPE	= 104000	UPDR7	= 177616
HLT	= 000000	KK6	002066	KUF6	006004	SCOPEA	000432	UPTR	= 000600
ICNT	001000	KK7	002162	KUF7	006076	SHLT	000400	USP	= %000006
KKFO	002720	KM	= 000000	KU0	002634	SHLTA	000422	USRTST	006452
KKF1	003012	KPAR0	= 172340	KU1	004054	SLR	= 177774	UUF0	007220
KKF10	003526	KPAR1	= 172342	KU10	004602	SRO	= 177572	UUF11	007532
KKF11	003616	KPAR2	= 172344	KU10A	004606	SR1	= 177574	UUF12	007576
KKF12	003662	KPAR3	= 172346	KU11	004640	SR2	= 177576	UUF2	007312
KKF13	003734	KPAR4	= 172350	KU11A	004646	SSROT	001002	JUF4	007374
KKF14	004002	KPAR5	= 172352	KU12	004714	START	001070	UUF6	007452
KKF14A	004004	KPAR6	= 172354	KU13	005004	TEMP	001004	UU0	006516
KKF2	003104	KPAR7	= 172356	KU13A	005010	TITLE	001146	UU1	006606
KKF3	003172	KPDR0	= 172300	KU14	005054	TKB	= 177562	UU2	006670
KKF4	003236	KPDR1	= 172302	KU15	005152	TKS	= 177560	UU3	006746
KKF5	003322	KPDR2	= 172304	KU16	005226	TPB	= 177566	UU4	007032
KKF6	003374	KPDR3	= 172306	KU2	004146	TPS	= 177564	UU4A	007036
KKF7	003464	KPDR4	= 172310	KU3	004234	UM	= 140000	UUS	007066
KKO	001430	KPDR5	= 172312	KU4	004302	UPAR0	= 177640	UU6	007160
KK1	001514	KPDR6	= 172314	KU5	004366	UPAR1	= 177642	VIRT	= 120000
KK10	002220	KPDR7	= 172316	KU6	004440	UPAR2	= 177644	Z	= 000004
KK10A	002222	KPTR	= 001060	KU7	004542	UPAR3	= 177646	SENDAD	007730
KK10B	002204	KSP	= %000006	MMERR	000462	UPAR4	= 177650	.	= 007744
KK11	002254	KUFO	005316	MMVEC	= 000250	UPAR5	= 177652		
KK11A	002256	KUF1	005416	N	= 000010	UPAR6	= 177654		

. ABS. 007744 000

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0MULE:DBKTCB,MULE:DBKTCB/SOL=DSKZ:SYSMAC.SML,MULE:DBKTCB.P11
RUN-TIME: 7'9.1 SECONDS
RUN-TIME RATIO: 91/16=5.4
CORE USED: 31K (61 PAGES)