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IDENTIFICATION

PRODUCT CODE: AC-F001B-MC  
PRODUCT NAME: CXKWFBO GROSS TMNG MOD  
PRODUCT DATE: SEPTEMBER 1978  
MAINTAINER: DEC/X11 SUPPORT GROUP

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1.0      ABSTRACT

"KWF" IS A GROSS TIMING ANALYSIS MODULE THAT USES THE KW11-L LINE CLOCK OPTION TO PERFORM AN OVERALL TIMING ANALYSIS ON THE 2040 PDP11 CONSOLE PROCESSOR SYSTEM OR A DN2X SECONDARY F.E. IT WILL BE CONFIGURED IN THE EXERCISER TO BE THE FIRST MODULE INITIALIZED BY THE MONITOR AND SINCE IT IS A "NBKMOD" IT WILL RUN ONLY ONE PASS AND NEVER RUN AGAIN UNTIL THE EXERCISER IS RESTARTED. ITS PURPOSE IS TO ESTABLISH CONFIDENCE IN THE HARDWARE AFFECTING OVERALL SYSTEM TIMING. IF THE TIMING IS FOUND TO BE WITHIN A PRE-ESTABLISHED, EMPIRICALLY DETERMINED LIMIT, THE MODULE WILL ENABLE USE OF THE SYSTEM TIMER MODULE. IF NOT IT WILL REPORT THE ERROR AND DISABLE USE OF THE SYSTEM TIMER MODULE.

2.0      REQUIREMENTS

HARDWARE:            ANY PDP11/40 OR 11/34A SYSTEM WITH CORE MEMORY AND A KW11-L LINE CLOCK.

STORAGE:: KWF REQUIRES:  
1. DECIMAL WORDS: 355  
2. OCTAL WORDS: 0543  
3. OCTAL BYTES: 1306

3.0      PASS DEFINITION

ONE PASS OF KWF CONSISTS OF A SINGLE PASS THROUGH THE MODULE CODE TO PERFORM THE REQUIRED DIAGNOSIS AND ANALYSIS.

4.0      EXECUTION TIME

ONE PASS OF KWF RUNNING ON AN 11/40 CPU TAKES APPROXIMATELY ONE MINUTE.

NOTE:      THE TIMING INFORMATION IN THE "ENDPAS" MESSAGE FOR THE "KWF" MODULE IS MEANINGLESS SINCE THE TIMER MODULE DOES NOT GET STARTED UNTIL "KWF" REPORTS ITS END OF PASS.

5.0      CONFIGURATION PARAMETERS

DEFAULT PARAMETERS:

DVA: 177546    VCT: 100    BR1: 6    BR2: 0    DVC: 1    SR1: 000037

REQUIRED PARAMETERS:

FOR 50 CYCLE SYSTEMS THE TIMING PARAMETER IN SRI SHOULD BE SET TO 000030. (APPROX)

FOR CPU'S OTHER THAN THE KD11-A, THE VALUE OF SRI WILL HAVE TO BE EMPIRACALLY DETERMINED BY RUNNING THIS MODULE ALONE AND NOTING THE INFORMATION PROVIDED IN THE ERROR PRINTOUT.

FOR AN 1134A 60 CYCLE SYSTEM THE TIMING PARAMETER IN SRI SHOULD BE SET TO 000031.

6.0 DEVICE OPTION SET-UP

NONE REQUIRED

7.0 MODULE OPERATION

- A. VERIFY THAT THE KW11-L MONITOR BIT CAN BE SET BY THE POWER SUPPLY SIGNAL. IF A FAILURE IS DETECTED, REPORT THE ERROR AND DROP THE MODULE.
- B. VERIFY THAT THE KW11-L CAN GENERATE AN INTERRUPT TO THE PROPER VECTOR WHEN ENABLED. IF A FAILURE IS DETECTED REPORT THE ERROR AND DROP THE MODULE.
- C. PERFORM THE TIMING ANALISIS:
  - 1. SYNC THE LINE CLOCK
  - 2. COUNT THE NO. OF ITERATIONS THROUGH A MONITOR "BREAK" LOOP WHILE WAITING FOR AN INTERRUPT.
  - 3. STORE THE COUNT IN A TABLE
  - 4. REPEAT (1) THRU (3) SIXTEEN TIMES TO STORE 16 COUNTS IN THE TABLE
  - 5. SUM ALL ENTRIES IN THE TABLE AND DIVIDE BY 16 TO GET THE AVERAGE.
  - 6. CHECK THAT THE AVERAGE IDS WITHIN LIMITS
  - 7. IF WITHIN TOLERANCE, ENABLE SYSTEM TIMER TO BE ABLE TO RUN AND REPORT END OF PASS.
  - 8. IF NOT WITHIN TOLERANCE, REPORT THE ERROR AND DROP THE MODULE. (SYSTEM TIMER NOT ENABLED TO RUN)

8.0 OPERATOR OPTIONS

"SRI" AND THE CONTENTS OF LOCATION "TOL" MAY HAVE TO BE MODIFIED FOR UNUSAL CASES TO COMPENSATE FOR A PARTICULAR SYSTEM INSTALLATION. [SRI] IS THE AVERAGE TIMER COUNT AND IF FOUND TO BE 000000 THE MODULE ASSUMES A DEFAULT OF "000037" (KD11-A CPU). IF NOT 000000, THE MODULE TAKES THE CONTENTS OF "SRI" AS THE AVERAGE TIME VALUE. THE LOCATION TAGGED "TOL" IS THE ALLOWABLE TOLERANCE AND IS PROGRAM LOADED AS A "3".

9.0 NON-STANDARD PRINTOUTS

IF A TIMING ANALYSIS ERROR IS DETECTED IT IS REPORTED  
VIA AN EXTENDED ERROR PRINTOUT OF FOUR OCTAL NUMBERS:

WWWWW SSSSS HHHHH LLLLL

WHERE:    WWWWW    IS THE WAS AVERAGE  
          SSSSS    IS WHAT THE AVERAGE SHOULD HAVE BEEN  
          HHHHH    IS THE HIGH LIMIT  
          LLLLL    IS THE LOW LIMIT

000000 NBKMOD <KWFB>,177546,100,6,1,1,162
000000 MODULE 41000,KWFB,177546,100,6,1,162
-TITLE KWFB DEC/X11 SYSTEM EXERCISER MODULE
DBXCOM VERSION 6 23-MAY-78
\*\*\*\*\*LIST BIN
000000 BEGIN: -ASCII /KWFB /;MODULE NAME
000000 MODNAM: -BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE
000000 XFLAG: -BYTE OPEN ;
000000 ADDR: 177546+0 ;1ST DEVICE ADDR.
000000 VECTOR: 100+0 ;1ST DEVICE VECTOR.
000000 BR1: -BYTE PRTV6+0 ;1ST BR LEVEL.
000000 BR2: -BYTE PRTY+0 ;2ND BR LEVEL.
000000 DVID1: -1 ;DEVICE INDICATOR 1.
000000 SR1: OPEN ;SWITCH REGISTER 1
000000 SR2: OPEN ;SWITCH REGISTER 2
000000 SR3: OPEN ;SWITCH REGISTER 3
000000 SR4: OPEN ;SWITCH REGISTER 4
\*\*\*\*\*
000000 STAT: 41000 ;STATUS WORD
000000 INIT: START ;MODULE START ADDR.
000000 SPOINT: MODSP ;MODULE STACK POINTER.
000000 PASCNT: 0 ;PASS COUNTER.
000000 ICOUNT: 0 ;# OF ITERATIONS PER PASS=1
000000 SOFCNT: 0 ;LOC TO COUNT ITERATIONS
000000 HRDCNT: 0 ;LOC TO SAVE TOTAL SOFT ERRORS
000000 SOFPAS: 0 ;LOC TO SAVE TOTAL HARD ERRORS
000000 SVRCS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
000000 SYSCNT: 0 ;LOC TO SAVE HARD ERRORS PER PASS
000000 RANUM: 0 ;# OF SYS ERRORS ACCUMULATED
000000 CONFIG: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000000 RES1: 0 ;RESERVED FOR MONITOR USE
000000 RES2: 0 ;RESERVED FOR MONITOR USE
000000 SVR0: OPEN ;LOC TO SAVE R0.
000000 SVR1: OPEN ;LOC TO SAVE R1.
000000 SVR2: OPEN ;LOC TO SAVE R2.
000000 SVR3: OPEN ;LOC TO SAVE R3.
000000 SVR4: OPEN ;LOC TO SAVE R4.
000000 SVR5: OPEN ;LOC TO SAVE R5.
000000 SVR6: OPEN ;LOC TO SAVE R6.
000000 CSRA: OPEN ;ADDR OF CURRENT CSR.
000000 SBADR: ;ADDR OF GOOD DATA, OR
000000 ACSR: OPEN ;CONTENTS OF CSR.
000000 WASADR: ;ADDR OF BAD DATA, OR
000000 ASTAT: OPEN ;STATUS REG CONTENTS.
000000 ERRTP: ;TYPE OF ERROR.
000000 ASB: OPEN ;EXPECTED DATA.
000000 AWAS: OPEN ;ACTUAL DATA.
000000 RSTRT: RSTRT ;RESTART ADDRESS AFTER END OF PASS
000000 WDT0: OPEN ;WORDS TO MEMORY PER ITERATION
000000 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION
000000 INTI: OPEN ;# OF INTERRUPTS PER ITERATION
000000 IDNUM: 162 ;MODULE IDENTIFICATION NUMBER=162
-REPT SPSIZ ;MODULE STACK STARTS HERE.
-NLIST

.WORD 0
.LIST
.ENDR
000224\*
MODSP:
\*\*\*\*\*
- GLOBL CLOCK,CLOCKL,CLOCKP,LCLEAR,PCLEAR ;MONITOR AND TIMER MODULE LOCATIONS
232 000224\* 132767 000001 000000G START: BITB #BIT0,CLOCK ;USING A KW11-L TIMER ?
233 000232\* 001006 000000 000000G BNE IS ;BR IF YES
234 000234\* 132767 000002 000000G BITB #BIT1,CLOCK ;USING THE KW11-P TIMER ?
235 000242\* 010101 000000\* BNE IS ;BR IF YES
236 000250\* 016700 000000\* ENDS,BEGIN
237 000254\* 012767 000000G 1S: MOV CLOCKL,RO ;GET POINTER TO TIMING INFORMATION
238 000262\* 004095 000000G MOV LCLEAR,TCLEAR ;SET PROPER JSR ADDR
239 000264\* 016700 000000G BR JS ;CONTINUE
240 000270\* 012767 000000G 2S: MOV CLOCKP,RO ;GET POINTER TO TIMING INFORMATION
241 000276\* 005720 000000G MOV PCLEAR,TCLEAR ;SET PROPER JSR ADDR
242 000300\* 005010 000000G 3S: TST (R0)+ ;POINT TO LOCATION CONTAINING "TIME"
243 000302\* 047777 000000G CLR (R0) ;INIT RUN TIME = 000000
244 000306\* 005767 177504 JSR PC,STCLEAR ;CLEAR MODULE PASSTIME TABLE IN CLOCK MODULE
245 000312\* 001003 000000G BNE RSTRY ;DOES SR1 SPECIFY A TIME ?
246 000314\* 012767 000037 177474 MOV #37,SR1 ;BR IF IT DOES
247 ;DEFAULT TO 37(9) - KD11-A CPU
248 000322\* 016767 177460 RSTRT: MOV ADDR,CSRA ;SAVE KW11-L ADDRESS
249 000330\* 016700 177454 MOV VECTOR,RO ;GET VECTOR ADDRESS
250 000334\* 012770 001174\* MOV #KWINT,(R0)+ ;STEER KW INTR'S TO KWINT
251 000344\* 005077 177436 MOV UR1,(R0)
252 CLR @ADDR
253 ;VERIFY THAT KW MONITOR BIT (BIT07) CAN BE SET BY PCWER SUPPLY SIGNAL
254 \*\*\*\*\*
255 000350\* 005005 KWDT1: CLR R5 ;INIT TIMER
256 000352\* 104407 000000\* 1S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR...
257 000356\* 104407 000000\* BREAKS,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
258 000362\* 005305 DEC R5 ;COUNT TIMER
259 000364\* 001377 BNE IS ;BR UNTIL TIMER = 0
260 000366\* 022777 BEQ KWDT2 ;DID MONITOR BIT SET?
261 000374\* 001415 BEQ KWDT2 ;BR IF YES
262 000376\* 017767 177404 177476 MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
263 000404\* 012767 000025 177474 MOV #25,ERRTP
264 \*\*\*\*\*
265 000412\* 104405 000000\* 000000 HRDRS,BEGIN,NULL ;KW11-L MONITOR BIT WON'T SET
266 \*\*\*\*\*
267 000420\* 105067 000000G CLRB CLOCK ;DISABLE ALL TIMING CHECKS
268 000424\* 104410 000000G ENDS,BEGIN
269 ;VERIFY THAT KW11-L CAN GENERATE AN INTERRUPT PROPERLY
270 \*\*\*\*\*
271 000430\* 005067 000566 KWDT2: CLR KWFLG1 ;CLEAR SOFTWARE INTR. FLAG
272 000434\* 005005 CLR R5 ;INIT TIMER
273 000436\* 052777 000100 177342 BIS #100,@ADDR ;SET LKCSR INTR ENAB

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283 000444 042777 000200 177334 1$: BIC #200,@ADDR ;CLEAR MONITOR BIT
284 000452 005767 000544 ;TST KWFLG1 ;DID KW11-L INTR OCCUR
285 ;BNE 7F ;BR IF NOT
286 000460 104477 000000 ;BREAK$,BEGIN ;TEMPORARY RETURN TO MONITOR....
287 000464 104407 000000 ;BREAK$,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
288 000470 005305 ;DEC R5 ;COUNT TIMER
289 000472 011367 ;BNE 1S ;BR IF NO TIMEOUT
290 000474 011767 177306 177400 ;MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
291 000502 005077 177300 ;CLR @ADDR ;CLEAR INTR ENAR
292 000506 012767 000023 177372 ;MOV #23,ERRTYP
293 ;*****
294 000514 104405 000000 000000 ;HDRERS,BEGIN,NULL ;KW11-L FAILED TO INTR ON TIME
295 ;*****
296 000522 105067 000000G ;CLRB CLOCK ;DISABLE ALL TIMING CHECKS
297 000526 104410 000000 ;ENDS,BEGIN ;
298 000532 032777 000100 177246 2$: BIT #100,@ADDR ;DID INTR SERVICE CLEAR BIT 06?
299 000540 001417 ;BEQ KWDT3 ;BR IF YES
300 000542 011767 177240 177332 ;MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
301 000550 005077 177236 177324 ;CLR @ADDR ;CLEAR LKCSR
302 000554 012767 000023 ;MOV #23,ERRTYP
303 ;*****
304 000562 104405 000000 000000 ;HDRERS,BEGIN,NULL ;KW11 INTR SERVICE FAILED TO CLR BIT06
305 ;*****
306 000570 105067 000000G ;CLRB CLOCK ;DISABLE ALL TIMING CHECKS
307 000574 104410 000000 ;ENDS,BEGIN ;
308 ;
309 ;-----
310 ;GROSS TIMING ANALYSIS ROUTINE - PERFORMS GROSS CPU/MEMORY TIMING ANALYSIS
311 ;-----
312 ;USING THE KW11-L
313 ;-----
314 ;
315 000600 004767 000332 ;KWDT3: JSR PC,CLRTAB ;GO CLEAR LOOP COUNTERS TABLE
316 000604 012701 001246 ;MOV #CTRAB,R1 ;R1 POINTS TO LOOP COUNTERS TABLE
317 000610 005067 000406 ;KWSYNC: CLR KWFLG1 ;INIT SOFTWARE INTR. FLAG
318 000614 005000 ;CLR R0 ;INIT TIMER
319 000618 005077 000100 177162 1$: CLR @ADDR ;ENABLE INTRS
320 000624 005767 000372 ;TST KWFLG1 ;INTR OCCUR YET?
321 000630 100425 ;BMI 2S ;BR IF YES
322 000632 104407 000000 ;BREAK$,BEGIN ;TEMPORARY RETURN TO MONITOR....
323 000636 104407 000000 ;BREAK$,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
324 000642 005300 ;DEC R5 ;COUNT TIMER
325 000644 001367 ;BNE 1S ;BR IF NO TIMEOUT
326 000646 011767 177134 177226 ;MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
327 000654 005077 177232 ;CLR @ADDR ;CLEAR OUT LKCSR
328 000660 012767 000023 177220 ;MOV #23,ERRTYP
329 ;*****
330 000666 104405 000000 000000 ;HDRERS,BEGIN,NULL ;KW11-L TIMEOUT
331 ;*****
332 000674 105067 000000G ;CLRB CLOCK ;DISABLE ALL TIMING CHECKS
333 000700 104410 000000 ;ENDS,BEGIN ;
334 000704 005067 000312 2$: CLR KWFLG1 ;INIT SOFTWARE INTR FLAG
335 000710 005000 ;CLR R0 ;INIT LOOP COUNTER
336 000712 005077 000100 177066 3$: BIT #100,@ADDR ;ENABLE KW11-L INTRS
337 000720 005767 000276 ;TST KWFLG1 ;INTR OCCUR YET?
338 000724 100425 ;BMI 4S ;BR IF YES
339 000726 104407 000000 ;BREAK$,BEGIN ;TEMPORARY RETURN TO MONITOR....
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339 000732 104407 000000 ;BREAK$,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
340 000736 005200 ;INC R0 ;COUNT ONE PASS THRU BREAK LOOP
341 000740 001367 ;BNE 3S ;BR IF NO TIMEOUT
342 000742 011767 177040 177132 ;MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
343 000750 005077 177032 ;CLR @ADDR ;CLEAR OUT LKCSR
344 000754 012767 000023 177124 ;MOV #23,ERRTYP
345 ;*****
346 000762 104405 000000 000000 ;HDRERS,BEGIN,NULL ;KW11-L TIMEOUT
347 ;*****
348 000770 105067 000000G ;CLRB CLOCK ;DISABLE ALL TIMING CHECKS
349 000774 104410 000000 ;ENDS,BEGIN ;
350 001000 010021 4$: MOV R0,(R1)+ ;SAVE LOOP COUNT IN TABLE
351 001002 022701 ;CMP #CTRAB+4,R1 ;END OF TABLE ?
352 001006 001300 ;BNE 5S ;GO DO IT AGAIN
353 001010 004767 ;JSR PC,TIMAVG ;GO COMPUTE TABLE AVERAGE
354 001014 010003 ;MOV R0,R3 ;R3 CONTAINS AVERAGE COUNT
355 001016 016701 176774 ;MOV SR1,R1 ;GET WHAT AVERAGE COUNT SHOULD BE
356 001022 010102 ;MOV R1,R2 ;PUT IT IN R2 TOO
357 001024 006701 000170 ;ADD TOL,R1 ;R1 CONTAINS HIGH LIMIT COUNT
358 001030 166702 000164 ;SUB TOL,R2 ;R2 CONTAINS LOW LIMIT COUNT
359 001034 160301 ;SUB R3,R1 ;LESS THAN HIGH LIMIT?
360 001036 103406 ;SUB R2,R3 ;GREATER THAN LOW LIMIT?
361 001040 160203 ;BCC 5S ;BR IF NOT
362 001042 103404 ;RCS ;
363 001044 104413 000000 ;ENDITS,BEGIN ;MONITOR SHALL TEST END OF PASS
364 ;
365 001050 000167 177246 ;JMP RESTRT ;
366 001054 105067 000000G ;CLRB CLOCK ;DISABLE USING THE TIMER MODULE
367 001060 060001 ;ADD R0,R1 ;RESTORE HIGH LIMIT
368 001062 011704 001236 ;MOV #TIMES,R4 ;POINT TO SAVE AREA
369 001066 010024 ;MOV R0,(R4)+ ;SAVE WAS COUNTER AVERAGE
370 001070 016724 176722 ;MOV SR1,(R4)+ ;SAVE SHOULD BE COUNTER AVERAGE
371 001074 010124 ;MOV R1,(R4)+ ;SAVE HIGH LIMIT
372 001076 010224 ;MOV R2,(R4)+ ;SAVE LOW LIMIT
373 001100 011767 176702 176774 ;MOV @ADDR,ACSR ;SAVE CONTENTS OF LKCSR
374 001106 005067 176774 ;CLR @ADDR ;
375 ;*****
376 001112 104405 000000 001224 ;HDRERS,BEGIN,KWMSG ;PRINT COUNTER INFORMATION
377 ;*****
378 001120 104410 000000 ;ENDS,BEGIN ;
379 ;
380 ;-----
381 ;GENERAL PURPOSE UTILITY ROUTINES
382 ;-----
383 ;
384 ;-----
385 ;INTERRUPT SERVICE ROUTINE
386 ;-----
387 001124 005077 176656 ;KWINT: CLR @ADDR ;CLEAR OUT LKCSR
388 001130 005167 000066 ;COM KWFLG1 ;SET SOFTWARE INTR. FLAG
389 001134 000002 ;RTI ;RETURN TO MAINLINE
390 ;
391 ;-----
392 ;ROUTINE TO CLEAR LOOP COUNTER TABLE
393 ;-----
394 001136 012701 001246 ;CLRTAB: MOV #CTRAB,R1 ;POINT TO FIRST TABLE ENTRY
395 001142 005021 1$: CLR (R1)+ ;CLEAR ONE WORD
```







XX XX KK KK WW WW FFFFFFFF BBBBBBBB 000000  
XX XX KK KK WW WW FFFFFFFF BBBBBBBB 000000  
XX XX KK KK WW WW FF BBBBBBBB BB 00 00  
XX XX KK KK WW WW FF BBBBBBBB BB 00 0000  
XX XX KK KK WW WW FF BBBBBBBB BB 00 0000  
XX XX KK KK WW WW FFFFFFFF BBBBBBBB 00 00 00  
XX XX KK KK WW WW FFFFFFFF BBBBBBBB 00 00 00  
XX XX KK KK WW WW FF BBBBBBBB BB 0000 00  
XX XX KK KK WWW WWW FF BBBBBBBB BB 00 00  
XX XX KK KK WWW WWW FF BBBBBBBB BB 00 00  
XX XX KK KK WW WW FF BBBBBBBB BB 000000  
XX XX KK KK WW WW FF BBBBBBBB 000000

SSSSSSSS FFFFFFFF QQQQQQ  
SSSSSSSS FFFFFFFF QQQQQQ  
SS FFFF QQ QQ  
SS FFFF QQ QQ  
SS FFFF QQ QQ  
SSSSSS FFFFFFFF QQ QQ  
SSSSSS FFFFFFFF QQ QQ  
SS FFFF QQ QQ  
SS FFFF QQ QQ  
SSSSSSSS FFFFFFFF QQQQ QQ  
SSSSSSSS FFFFFFFF QQQQ QQ

\*\*\*\*\*  
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\*START\* User BEAUSGEL (400 2043) Job XKWFB0 Seq. 7423 Date 23-Oct-78 17:12:16 Monitor IPC-F 603 [6R8] \*START\*  
/T0ML21-4:BEAUSG — Distribution to ML21-4, slot 132  
File: CUFF:XKWFB0.SEG<057>[400,2043] Created: 12-Oct-78 16:48:00 Printed: 23-Oct-78 17:13:14  
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