

IDENTIFICATION

PRODUCT CODE: MAINDEC 12-D688-D
PRODUCT NAME: VR12 DISPLAY TEST
DATE CREATED: 9-21-74
MAINTAINER: DIAGNOSTICS GROUP
AUTHOR: DAVE FERRARINI

1. ABSTRACT

THIS PROGRAM TESTS THE PDP-12 DISPLAY SYSTEM BY GENERATING THREE DISTINCT PATTERNS ON THE SCOPE, TWO WITH THE DIS INSTRUCTION AND ONE WITH THE DSC INSTRUCTION.

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-12A OR PDP-12B

2.2 STORAGE

MOST OF LOCATIONS 4000(8) TO 6000(8)

3. LOADING PROCEDURES

3.1 METHOD

- A. MOUNT A DIAL TAPE ON UNIT 0.
- B. SET MODE TO LINC AND DEPRESS I/O PRESET.
- C. SET LSW=701 RSW=7500 AND SSW=0
- D. DEPRESS THE "DO" TOGGLE
- E. DEPRESS START 20.
- F. TO CALL THE PROGRAM FROM DIAL INDEX:
LO DISPTST 0 <CR>
- G. TYPE LINE FEED, LO DISPTST, COMMA, CARRIAGE RETURN,
4. DIAL LOADER WILL SELF START PROGRAM,
1. RESTART PROCEDURE: DEPRESS START 20.

4.

OPERATOR ACTION

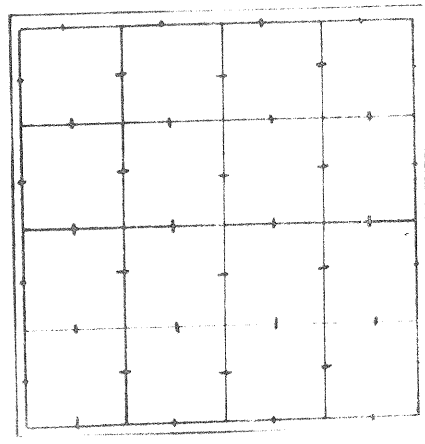
UPON STARTING, THE PROGRAM WILL ALTERNATELY DISPLAY THE THREE PATTERNS, EACH FOR APPROXIMATELY TEN SECONDS.

- A. FREEZE ON CURRENT PATTERN,
STRIKING THE KEY F WILL DIRECT THE PROGRAM TO LOCK INTO THE ROUTINES THAT ARE CONTROLLING DISPLAY OF THE CURRENT PATTERN.
- B. ALTERNATE BETWEEN THREE PATTERNS,
STRIKING ANY KEY BUT F WILL DIRECT THE PROGRAM TO ALTERNATE THE DISPLAY BETWEEN THE THREE PATTERNS. IT SHOULD BE NOTED THAT REQUESTING THE ALTERNATE SEQUENCE WHILE IN ALTERNATE MODE OR THE FREEZE SEQUENCE WHILE IN FREEZE MODE HAS NO EFFECT.
- C. RETURN TO DIAL,
(O) SET SW₀-1, PROGRAM WILL RETURN TO DIAL

5.

PROGRAM DESCRIPTION

A. PATTERN 1
THIS PATTERN GENERATED BY THE DIS INSTRUCTION TAKES THE FOLLOWING FORM.



THIS PERMITS CALIBRATION OF THE SCOPE.

B. PATTERN 2

THE PATTERN GENERATED BY THE DSC INSTRUCTION TAKES THE FOLLOWING FORM:

(QUADRANT 2) CHAN 2 CHAN 1
 HALF SIZE FULL SIZE (QUADRANT 1)

(QUADRANT 3) CHAN 0 CHAN 1
 FULL SIZE HALF SIZE (QUADRANT 4)

THE PATTERN DOES WHAT THE DISPLAY SAYS; ONE HALF OF ONE CHARACTER IS DISPLAYED IN ONE CORNER OF THE SCOPE THEN HALF OF ONE CHARACTER IS DISPLAYED IN THE OPPOSITE CORNER OF THE SCOPE. THE LEFT HALF OF THE CHARACTER IN QUADRANTS 2 AND 4 ARE DISPLAYED FIRST, THEN THE LEFT HALF OF THE CHARACTER IN QUADRANTS 1 AND 3 ARE DISPLAYED. WHEN THE LEFT HALF OF ALL CHARACTERS ON THE SCOPE HAVE BEEN DISPLAYED THE SEQUENCE IS REPEATED FOR THE RIGHT HALF OF THE CHARACTERS.

C. PATTERN 3

DISPLAY AN X PATTERN.

THIS PATTERN IS 2 DIAGONAL LINES FROM TOP LEFT CORNER TO BOTTOM RIGHT CORNER, AND FROM BOTTOM LEFT CORNER TO TOP. RIGHT CORNER. THIS PATTERN IS USED TO ADJUST DEFLECTION AMPLIFIERS OF THE VR12.

/DIS TEST VERSION 18
/PDP-12 DISPLAY CONTROL AND SCOPE TEST

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/FERRARINI D.

/POINT DISPLAY PATTERN [DISPAT
/CHARACTER DISPLAY PATTERN [DSCPAT
/DISPLAY X PATTERN [DISP

/6-7-69
/REVISED 8-20-69 RTB
/REVISED 8-29-69 HRL
/REVISED 9-01-70 RAS

SEGMENT 2

4000
4010
4011
4012
4013

*10
Q4BETA, 0
Q3BETA, 0
Q2BETA, 0
Q1BETA, 0

*20

4020
4021
4022
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4032
4033
4034
4035

LDA I
1
STC
SET I
-300
JMP
JMP
JMP
JMP
JMP
JMP
JMP
JMP
JMP

FLAG
17

INCB
CLOCK
DISPAT
400
TST1
TTYOPT
DISPAT=3
DISPAT-1

/TEST INCREMENT THE M.B.
/CHECK CLOCK

/DO DSC TEST
/DO DIS PATTERN

/CHECK TTY OPTIONS
/BACK TO GO

INCB,

4036
4037
4040
4041
4042
4043
4044
4045
4046
4047

LDA
0000
STC
STC
DIS I
LDA
0000
SAE I
0001
HLT

/GET THE RETURN
/ ADDRESS
/SAVE IN EXIT
/CLEAR LOG, 0
/DISPLAY A POINT
/GET THE VALUE IN
/ LOC, 0000
/IS IT EQUAL TO
/ THE EXPECTED
/NO, INCREMENT THE
/MB FAILED AFTER
/A DIS INSTRUCTION
/CLEAR A.C.
/CLEAR S.F.R.
/CLEAR LOC, 0001

4050
4051
4052

CLR
ESF
STC

1

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2
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56 4053 1762 DSC I /DISPLAY A CHARACTER
57 4054 4477 4477 /LOAD THE A.C. WITH
58 4055 1000 LDA /THE VALUE IN LOC, 0001
59 4056 0001 0001 /IS IT EQUAL TO
60 4057 1463 SAE I /THE EXPECTED VALUE?
61 4060 0004 0004 /INCREMENT THE M.B.
62 4061 0000 HLT /FAILED AFTER A
63 /DSC INSTRUCTION
64 /LOAD THE A.C.
65 4062 1020 LDA I /WITH 0200
66 4063 0200 0200 /LOAD S.F.R.
67 4064 0004 ESF /CLEAR A.C. AND
68 4065 0011 CLR /LOC. 0001
69 4066 0001 STC 1 /DISPLAY A CHARACTER
70 4067 1760 1760 DSC I
71 4070 7744 7744 /LOAD THE A.C. WITH
72 4071 1000 LDA /VALUE IN LOC 1
73 4072 0001 0001 /IS IT EQUAL TO
74 4073 1460 SAE I /THE EXPECTED?
75 4074 0010 0010 /NO, INCREMENT THE
76 4075 0000 HLT /MB FAILED AFTER
77 /A DSC INSTRUCTION
78
79 4076 6076 EXMB, JMP
80 4100 *100
81
82 /THE SUBROUTINE BELOW WILL GENERATE 5
83 /LINES ACROSS THE SCREEN. THE POINT
84 /SPACING IS 4 UNITS
85 /THE FIRST LEFT HAND POINT IS
86 /2000, THE LAST RIGHT HAND POINT IN
87 /EACH LINE IS 0774.
88
89 /A GLITCH IS PLACED AT THE HORIZONTAL
90 /POINTS OF 100,300,500 AND 700 ON
91 /EACH LINE
92 4100 1000 LDA
93 4101 0000 0 STA I
94 4102 1060 0 /A
95 4103 0000 0 LDA I
96 4104 1020 10 /
97 4105 0010 10 STC
98 4106 4134 2 REL
99 4107 0062 0 SET I
100 4110 0000 0

```


DIAL10 V003

/DIS TEST VERSION 18

156	4172	0167	167	
157	4173	2134	ADD	REL
158	4174	0142	DIS	2
159	4175	1000	LDA	
160	4176	0002	2	
161	4177	0017	COM	
162	4200	4002	STC	2

```

163 4201 1020 LDA I
164 4202 0767 767
165 4203 2134 ADD REL
166 4204 0142 2 DIS
167 4205 6140 JMP LP1+3
168
169 4206 1000 T1GL, LDA /GLITCH GENERATOR
170 4207 0000 0
171 4210 1060 STA I
172 4211 0000 0
173 4212 1020 LDA I
174 4213 0020 20
175 4214 4134 STC
176 4215 6135 JMP REL
177 4216 0011 CLR LPI
178 4217 1020 LDA I
179 4220 7774 7774
180 4221 1200 LAM
181 4222 0134 REL
182 4223 1460 SAE I
183 4224 7774 7774
184 4225 6215 JMP T1GL+7
185 4226 1020 LDA I
186 4227 0010 10
187 4230 4134 STC REL
188 4231 6211 JMP T1GL+3
189
190
191
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193
194 4232 1000
195 4233 0000 0
196 4234 1060 STA I
197 4235 0000 0
198
199 4236 0011 CLR
200 4237 4134 STC
201
202 4240 6262 JMP
203 4241 6301 JMP LP2A
204 4242 1000 LDA LP2B
205 4243 0134 REL
206 4244 1660 BCO I
207 4245 0100 100
208 4246 1560 BCL I
209 4247 7600 7600
210 4250 0470 AZE I
211 4251 6325 JMP GL2
212 4252 1020 LDA I
213 4253 0004 4
214 4254 1140 ADM
215 4255 0134 REL
216 4256 1460 SAE I
217 4257 1000

```

/THIS ROUTINE GENERATES 5 VERTICAL LINES
/AT HORIZONTAL LOCATIONS 0,177,377,577,777.
/GLITCHES ARE DISPLAYED AT VERTICAL LOCATIONS
/177,377,500,700 ON THE LINES.
TST2, LDA

TST2LP, JMP /SET UP INDEX REG,
LDA /GO DISPLAY SOME POINTS
REL

218 4260 6241
219 4261 6235
220

TST2LP
TST2+3

JMP
JMP

```

221 4262 1000 LDA
222 4263 0000 STA I
223 4264 1060 STA I
224 4265 0004 SET I 2
225 4266 0062 SET I 3
226 4267 0000 SET I 4
227 4267 0063 SET I 5
228 4271 0177 SET I 6
229 4272 0064 SET I 7
230 4273 0377 SET I 8
231 4274 0065 SET I 9
232 4275 0577 SET I 10
233 4276 0066 SET I 11
234 4277 0777 SET I 12
235 4300 6265 JMP LP2A+3
236
237

```

/ACTUALLY DISPLAY THE 5 POINTS

```

LP2B, LDA
0 STA I
0 LDA
REL DIS 2
COM DIS 6
LDA ADA I
REL 200
DIS 3
COM 5
LDA REL
REL GL2V
DIS 7
JMP LP2B+3

```

/DISPLAY THE GLITCHES ON THE VERTICAL LINES

```

GL2, LDA
0 STA I
0 SET I 15
-5 LDA I
767 STC GL2V
SET I 7
-5 SET I 10
1 LDA I
767 GL2V,

```

276	4344	1170	ADM I	10
277	4345	0227	XSK I	7
278	4346	6342	JMP	,=4
279				
280	4347	6501	JMP	LP2B
281	4350	1022	LDA I	
282	4351	0004	4	
283	4352	4343	STC	GL2V

```

284 4353 0235 XSK I 15
285 4354 6336 JMP GL2V=5
286 4355 6262 JMP LP2A
287 4356 6330 JMP GL2+3
288
289
290 4400 *400
291 4400 0077 SET I 17
292 4401 0000 0
293 4402 6621 JMP CLOCK
294 4403 6405 JMP DSCPAT
295 4404 7103 JMP DISPX
296
297 4405 0075 DSCPAT, SET I 15
298 4406 0666 01GRID-1
299 4407 1035 LDA I 15
300 4410 4013 STC Q1BETA
301 4411 1035 LDA I 15
302 4412 4012 STC Q2BETA
303 4413 1035 LDA I 15
304 4414 4011 STC Q3BETA
305 4415 1035 LDA I 15
306 4416 4010 STC Q4BETA
307
308 /HAFFLG=0 WHEN DISPLAYING LEFT HALF OF PATTERN
309 /#4 WHEN DISPLAYING RIGHT HALF
310 STC HAFFLG
311 SET I 7
312 RCHNG-1
313 SET I 14
314 -4
315 /IN RIGHT HALF PASS NOP BELOW WILL BE REPLACED BY ADA I 7
316 /LEFT AND RIGHT HALF SEQUENCES ARE STAGGERED BY A CONSTANT
317 /#20 FOR FULL SIZE CHARACTERS, 10 FOR HALF SIZE
318 RH1,
319 LDA I 15
320 STA I 15
321 LDA I 15
322 STA I 15
323 XSK I 14
324 JMP RH1-1
325 STC LNFLG
326 4434 0075 SET I 15
327 4435 7771 -6
328 ESF
329 4436 0004 LOOP1,
330 4437 2700 ADD Q2HOR
331 4440 4001 STC 1
332 4441 2702 ADD Q2VER
333 4442 1772 DSC I Q2BETA
334 4443 102 LDA I

```

/RESET HORIZONTAL POSITION
/GO BACK

/PUT GRID PATTERN ADDR FOR
/EACH QUAD IN 4 RETAS

/INITIALIZE ARGUMENTS

/THERE ARE
/4 QUADRANTS
/LEFT AND RIGHT HALF SEQUENCES ARE STAGGERED BY A CONSTANT
/#20 FOR FULL SIZE CHARACTERS, 10 FOR HALF SIZE
/PTR FOR HORIZ COORD

/HORIZ ARGUMENT
/PTR FOR VERT COORD
/VERT ARGUMENT
/DONE ALL QUADRANTSJ
/NO
/#0 WHEN DOING LN 2 ;N
/E, 0 WHEN DOING LN 1
/THERE ARE 6 CHAR ON LN 1

/ENABLE HALF SIZE CHARS
/SELECT CHAN 0 AND
/SET HORIZ COORD
/VERT COORD TO AC
/DSC IN QUAD 2
/BUMP HORIZ COORD TO

```

334 4444 0010
335 4445 2001
336 4446 4702
337 4447 2710
338 4450 1620
339 4451 4000
340 4452 4001
341 4453 2712
342 4454 1770
343 4455 1020
344 4456 0010
345 4457 2001
346 4460 4710
347 4461 0235
348 4462 6437
349 4463 2662
350 4464 0470
351 4465 6511
352 4466 0075
353 4467 7766
354 4470 0011
355 4471 4662
356 4472 2677
357 4473 2661
358 4474 4700
359 4475 2701
360 4476 1120
361 4477 7737
362 4500 4702
363 4501 2707
364 4502 2661
365 4503 4710
366 4504 2711
367 4505 1120
368 4506 7737
369 4507 4712
370 4510 6437
371 4511 0075
372 4512 7771
373 4513 0076
374 4514 7737
375 4515 0236
376 4516 6515
377 4517 1020
378 4520 0200
379 4521 0004
380 4522 4662
381 4523 2674
382 4524 1620
383 4525 4000
384 4526 4001
385 4527 2676
386 4528 2676
387 4529 2676
388 4530 2676

```

```

BH02, 10
ADD 1
STC Q2HOR
ADD Q4HOR
BSE I
4000
STC 1
Q4VER
Q4BETA
ADD 1
Q4HOR
STC 15
LOOP1
LNFLG
FULSIZ
15
LNFLG
Q2HOR
HAFFLG
Q2HOR
KQ2VER
ADA I
-40
STC
ADD
ADD
ADD
STC
ADD
ADA I
-40
STC
Q4VER
LOOP1
JMP 15
-6
/DELAY, SIZE CHANGE NEXT
SET I 16
-40
XSK I 16
JMP -1
LDA I
200
ESF
STC LNFLG
ADD Q1HOR
BSE I
4000
STC 1
Q1VER

```

```

/DONE A LN?
/NO
/DONE 2 LNS?
/YES GO TO FULL SIZE CHARS
/THERE ARE 11
/CHARS IN LN 2
/SET LNFLG
/TO EXIT ON NEXT CHK
/RESET HORIZ
/AND VERT
/COORD
/FOR LN 2
/D00 LN 2
/SET CTR
/FOR LN 1
/ENABLE
/FULL SIZE
/CHAR
/SET FLAG FOR LN 1
/HORIZ COORD

```

```

/SET HORIZ COORD
/DSC IN QUAD 4
/BUMP HORIZ COORD

```


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389 4530 1773 DSC I Q1BETA /QUAD 1
390 4531 1020 LDA I /BUMP HORIZ
391 4532 0020 BH01, 20
392 4533 2001 ADD 1


```

442 4614 1020 DSCEND, LDA I
443 4615 0016 NOP
444 4616 4425 STC
445 4617 6641 JMP RHI
446 4620 6402 JMP TTYOPT
447 4621 1000 JMP DSCPAT-3
448 4622 0000 CLOCK, LDA
449 4623 4640 STC
450 4624 7140 JMP RTNJMP
451 4625 1000 JMP SNSOPT
452 4626 0660 FLAG LDA
453 4627 0470 AZE I
454 4630 6640 JMP RTNJMP
455 4631 0237 XSK I
456 4632 6640 JMP RTNJMP
457
458
459 4633 1000 LDA
460 4634 0640 RTNJMP
461 4635 1120 ADA I
462 4636 0001 1
463 4637 4640 STC
464 4640 0000 RTNJMP, LDA
465 4641 1000 TTYOPT, LDA
466 4642 0000 0
467 4643 4657 STC
468 4644 0415 KST
469 4645 6000 JMP EXIT
470 4646 0500 IOB 0
471
472 4647 6036 PMODE
473 KRB
474 LMODE
475 SAE I
476 306
477 JMP EXIT-1
478 CLR
479 4654 4660 STC
480 4655 4657 JMP FLAG
481 4656 4660 STC
482 4657 0000 EXIT, 0
483 4660 0000 FLAG, 0
484 4661 0000 HAFFLG, 0
485 4662 0000 LNFLG, 0
486 4663 0010 RHCHNG, 10
487 4664 0004 4
488 4665 0010 10
489 4666 0004 4
490 4667 0712 Q1GRID, Q4VER
491 4670 0750 Q2GRID, Q4VER+36
492 4671 1006 Q3GRID, Q4VER+74
493 4672 1044 Q4GRID, Q4VER+132
494 4673 0450 KQ1HOR, 450
495 4674 0000 K1HOR, 0
496 4675 0340 KQ1VER, 340
497 4676 0000 Q1VER, 0

```

/RESTORE NOP
/FOR NEXT LEFT HALF SEQ.

/CHK OPTIONS

/CHK FOR ALTERNATING SEQ.

/WHICH SEQ.?

/FREEZE SEQ IGNORE CLOCK

/TICK CLOCK AND

/REFRESH SCOPE

/SAVE RTN JMP

/HAVE TTY OPTIONS BEEN REQUESTED?

/NO RTN

/YES GET CHAR

/F FREEZES THE

/CURRENT PATTERN

/ANY OTHER KEY ALTERNATES

/FREEZE ON CURRENT PATTERN

/RY SETTING FLAG TO 0

/SET FLAG .NE. TO 0

/ADDR -1 OF GRID PATTERNS

3-SEP-70

DIAL10 V003

/DIS TEST VERSION 1B

497	4677	0010	K02HOR, 10
498	4700	0000	G2HOR, 0
499	4701	0340	K02VER, 340

610	5046	1077	1077
611	5047	4477	4477
612	5050	3077	3077
613	5051	0000	0
614	5052	2101	2101
615	5053	1077	1077
616	5054	4477	4477
617	5055	0177	0177
618	5056	4477	4477
619	5057	0000	0
620	5060	5121	5121
621	5061	7741	7741
622	5062	4543	4543
623	5063	4577	4577

04EL,

624			
625			
626			
627	5064	2241	
628	5065	7710	
629	5066	7744	
630	5067	7706	
631	5070	0000	
632	5071	0177	
633	5072	7710	
634	5073	7744	
635	5074	0301	
636	5075	4044	
637	5076	0000	
638	5077	4651	
639	5100	0041	
640	5101	6151	
	5102	4145	
			04ER, 4145

/A
/L
/F
/SPACE
/S
/1
/2


```

641 5103 0077
642 5104 6377
643 5105 6621
644 5106 7110
645 5107 6023
646 5110 0073
647 5111 0377
648 5112 0074
649 5113 7400
650 5114 0075
651 5115 7000
652 5116 0061
653 5117 0000
654 5120 1020
655 5121 7776
656 5122 1140
657 5123 0013
658 5124 0161
659 5125 1020
660 5126 0001
661 5127 1020
662 5130 0001
663 5131 1140
664 5132 0014
665 5133 0141
666 5134 0235
667 5135 7120
668 5136 6641
669 5137 7105
670 5140 0440
671 5141 6007
672 5142 0075
673 5143 0701
674 5144 0076
675 5145 7300
676 5146 0643
677 5147 6015
678
679
680
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```

/THIS ROUTINE DISPLAYS X PATTERN

```

DISPX, SET I 17
LNTIME, -1400
      JMP CLOCK
      JMP GO
      JMP DISPAT=6
GO,   SET I 13
      SET I 14
      SET I 15
      SET I 1
      XPATRN, LDA I
      -1
      ADM
      13
      DIS I 1
      LDA I
      1
      LDA I
      1
      ADM
      14
      DIS
      XSK I
      JMP
      JMP
      JMP SNS
      JMP
      JMP
      JMP
      SET I 15
      RCG
      SET I 16
      7300
      LDF
      JMP

```

```

/BACK TO DIAL?
/NO, RETURN
/YES, SET UP SEQUENCE

```

/BACK TO DIAL

/END

0000
0100
0200
0300
0400
0500
0600
0700

1000
1100
1200
1300
1400
1500
1600
1700

2000
2100
2200
2300
2400
2500
2600
2700

3000
3100
3200
3300
3400
3500
3600
3700

DIAL10 V003

/DIS TEST VERSION 1B

G4ER 5102
 G4GRID 4672
 G4HOR 4710
 G4VER 4712
 REL 4134
 RH1 4425
 RHCHNG 4663
 RTNJMP 4640
 SNSOPT 5140
 T1GL 4206
 TST1 4100
 TST1LP 4111
 TST2 4232
 TST2LP 4241
 TTYOPT 4641
 XPATRN 5120

4532
 4444
 4542
 4456
 4564
 4477
 4574
 4506
 4621
 4031
 5103
 4614
 4405
 4657
 4076
 4660
 4511
 4325
 4343
 5110
 4577
 4661
 4036
 4673
 4675
 4677
 4701
 4703
 4705
 4707
 4711
 4662
 5104
 4437
 4923
 4135
 4262
 4301
 4013
 4667
 4674
 4676
 4012
 4670
 4700
 4702
 4011
 4671
 4704
 4706
 4010
 5063

BH01
 BH02
 BH03
 BH04
 BV01
 BV02
 BV03
 BV04
 CLOCK
 DISPAT
 DISPX
 DSCEND
 DSCPAT
 EXIT
 EXMB
 FLAG
 FULSIZ
 GL2
 GL2V
 GO
 HAFCHK
 HAFFLG
 INCNB
 K01HOR
 K01VER
 K02HOR
 K02VER
 K03HOR
 K03VER
 K04HOR
 K04VER
 LNFLG
 LNTIME
 LOOP1
 LOOP2
 LP1
 LP2A
 LP2B
 Q1BETA
 Q1GRID
 Q1HOR
 Q1VER
 Q2BETA
 Q2GRID
 Q2HOR
 Q2VER
 Q3BETA
 Q3GRID
 Q3HOR
 Q3VER
 Q4BETA
 Q4EL

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 5 SECONDS

3K CORE USED

