

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,
LO DISPTST 0 <CR>
- H. DIAL LOADER WILL SELF START PROGRAM.
- I. RESTART PROCEDURE: DEPRESS START 20.

4.

OPERATOR ACTION

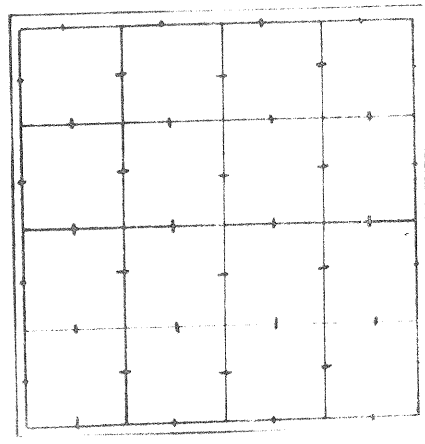
UPON STARTING, THE PROGRAM WILL ALTERNATELY DISPLAY THE THREE PATTERNS, EACH FOR APPROXIMATELY TEN SECONDS.

- 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.


```

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

```

```

/ THE SUBROUTINE BELOW WILL GENERATE 5
/ LINES ACROSS THE SCREEN. THE POINT
/ SPACING IS 4 UNITS
/ THE FIRST LEFT HAND POINT IS
/ 2000, THE LAST RIGHT HAND POINT IN
/ EACH LINE IS 0774.

```

```

/ A GLITCH IS PLACED AT THE HORIZONTAL
/ POINTS OF 100,300,500 AND 700 ON
/ EACH LINE

```

```

91
92 4100 1000 TST1, LDA
93 4101 0000 0 STA I
94 4102 1060 0 /
95 4103 0000 LDA I
96 4104 1020 10
97 4105 0010 STC
98 4106 4134 SET I 2
99 4107 0062 REL
100 4110 0000 0

```


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, /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
192
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

/SET UP INDEX REG,
 /GO DISPLAY SOME POINTS

/DONE ALL POINTS YET

218	4260	6241	JMP	TST2LP
219	4261	6235	JMP	TST2+3
220				

```

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
REL ADA I
200 DIS 3
COM DIS 5
LDA
REL DIS 4
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
7 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 RHCHNG-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
327 4434 0075 SET I 15
328 4435 7771 -6
329 ESF
330 LOOP1, ADD Q2HOR
331 STC 1
332 ADD Q2VER
333 DSC I Q2BETA
334 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 4447 2710
339 4450 1620
340 4451 4000
341 4452 4001
342 4453 2712
343 4454 1770
344 4455 1020
345 4456 0010
346 4457 2001
347 4460 4710
348 4461 0235
349 4462 6437
350 4463 2662
351 4464 0470
352 4465 6511
353 4466 0075
354 4467 7766
355 4470 0011
356 4471 4662
357 4472 2677
358 4473 2661
359 4474 4700
360 4475 2701
361 4476 1120
362 4477 7737
363 4500 4702
364 4501 2707
365 4502 2661
366 4503 4710
367 4504 2711
368 4505 1120
369 4506 7737
370 4507 4712
371 4510 6437
372 4511 0075
373 4512 7771
374
375 4513 0076
376 4514 7737
377 4515 0236
378 4516 6515
379
380 4517 1020
381 4520 0200
382 4521 0004
383 4522 4662
384 4523 2674
385 4524 1620
386 4525 4000
387 4526 4001
388 4527 2676

```

```

BH02, 10
      ADD
      STC
      ADD
      BSE I
      4000
      STC 1
      ADD
      DSC I
      LDA I
      10
      ADD
      STC
      XSK I
      JMP
      ADD
      AZE I
      JMP
      SET I
      -11
      CLR
      STC
      ADD
      ADD
      STC
      ADD
      ADA I
      -40
      STC
      ADD
      ADD
      STC
      ADD
      ADA I
      -40
      STC
      JMP
      SET I
      -6
      /DELAY, SIZE CHANGE NEXT
      SET I
      -40
      XSK I
      JMP
      LDA I
      200
      ESF
      STC
      ADD
      BSE I
      4000
      STC 1
      ADD

```

```

      1
      Q2HOR
      Q4HOR
      /SET HORIZ COORD
      Q4VER
      Q4BETA
      /DSC IN QUAD 4
      /BUMP HORIZ COORD
      1
      Q4HOR
      15
      LOOP1
      LNFLG
      FULSIZ
      15
      LNFLG
      Q2HOR
      HAFFLG
      Q2HOR
      KQ2VER
      Q2VER
      KQ4HOR
      HAFFLG
      Q4HOR
      KQ4VER
      Q4VER
      LOOP1
      15
      /DOO LN 2
      /SET CTR
      /FOR LN 1
      /ENABLE
      /FULL SIZE
      /CHAR
      /SET FLAG FOR LN 1
      /HORIZ COORD

```

```

      /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

```

/DIS TEST VERSION 18 DIAL10 V003 3-SEP-70 8157 PAGE 6-1
389 4530 1773 DSC I Q1BETA /QUAD 1
390 4531 1020 LDA I
391 4532 0020 BH01, 20 /BUMP HORIZ
392 4533 2001 ADD 1


```

442 4614 1020 DSCEND, LDA I
443 4615 0016 NOP
444 4616 4425 STC
445 4617 6641 JMP
446 4620 6402 JMP
447 4621 1000 LDA
448 4622 0000 CLOCK, 0
449 4623 4640 STC
450 4624 7140 JMP
451 4625 1000 LDA
452 4626 0660 FLAG
453 4627 0470 AZE I
454 4630 6640 JMP
455 4631 0237 XSK I
456 4632 6640 JMP
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, 0
465 4641 1000 LDA
466 4642 0000 TTYOPT, 0
467 4643 4657 STC
468 4644 0415 KST
469 4645 6000 JMP
470 4646 0500 IOB
471
472 4647 6036 PMODE
473 KRB
474 LMODE
475 SAE I
476 306
477 JMP
478 CLR
479 STC
480 4654 4660 JMP
481 4655 4657 STC
482 4656 4660 EXIT, 0
483 4657 0000 FLAG, 0
484 4660 0000 HAFFLG, 0
485 4661 0000 LNFLG, 0
486 4662 0000 RHCHNG, 10
487 4663 0010 4
488 4664 0004 10
489 4665 0010 4
490 4666 0004 4
491 4667 0712 Q1GRID, Q4VER
492 4670 0750 Q2GRID, Q4VER+36
493 4671 1006 Q3GRID, Q4VER+74
494 4672 1044 Q4GRID, Q4VER+132
495 4673 0450 KQ1HOR, 450
496 4674 0000 K1HOR, 0
497 4675 0340 KQ1VER, 340
498 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	5064	2241	/RIGHT HALF
627	5065	7710	2241
628	5066	7744	7710
629	5067	7706	7744
630	5070	0000	7706
631	5071	0177	0
632	5072	7710	0177
633	5073	7744	7710
634	5074	0301	7744
635	5075	4044	0301
636	5076	0000	4044
637	5077	4651	0
638	5100	0041	4651
639	5101	6151	0041
640	5102	4145	6151
			4145

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

04ER.

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

G4ER 5102
 Q4GRID 4672
 Q4HOR 4710
 Q4VER 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

BH01 4532
 BH02 4444
 BH03 4542
 BH04 4456
 BV01 4564
 BV02 4477
 BV03 4574
 BV04 4506
 CLOCK 4621
 DISPAT 4031
 DISPX 5103
 DSCEND 4614
 DSCPAT 4405
 EXIT 4657
 EXMB 4076
 FLAG 4660
 FULSIZ 4511
 GL2 4325
 GL2V 4343
 GO 5110
 HAFCHK 4577
 HAFFLG 4661
 INCMB 4036
 K01HOR 4673
 K01VER 4675
 K02HOR 4677
 K02VER 4701
 K03HOR 4703
 K03VER 4705
 K04HOR 4707
 K04VER 4711
 LNFLG 4662
 LNTIME 5104
 LOOP1 4437
 LOOP2 4923
 LP1 4135
 LP2A 4262
 LP2B 4301
 Q1BETA 4013
 Q1GRID 4667
 Q1HOR 4674
 Q1VER 4676
 Q2BETA 4012
 Q2GRID 4670
 Q2HOR 4700
 Q2VER 4702
 Q3BETA 4011
 Q3GRID 4671
 Q3HOR 4704
 Q3VER 4706
 Q4BETA 4010
 Q4EL 5063

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 5 SECONDS

3K CORE USED

BHQ1
 BHQ2
 BHQ3
 BHQ4
 BVQ1
 BVQ2
 BVQ3
 BVQ4
 CLOCKS
 DISPAT
 DISPX
 DSCEND
 DSCPAT
 EXIT
 EXMB
 FLAG
 FULSIZ
 GL2
 GL2V
 GO
 HAFCHK
 HAFFLG
 INCMB
 KQ1HOR
 KQ1VER
 KQ2HOR
 KQ2VER
 KQ3HOR
 KQ3VER
 KQ4HOR
 KQ4VER
 LNFLG
 LNTIME
 LOOP1
 LOOP2
 LP1
 LP2A
 LP2B
 O1BETA
 O1GRID
 O1HOR
 O1VER
 O2BETA
 O2GRID
 O2HOR
 O2VER
 O3BETA
 O3GRID
 O3HOR
 O3VER
 O4BETA
 O4EL
 O4ER

293
 35#
 643#
 443#
 297#
 476
 79#
 453
 372#
 261#
 275#
 648#
 429#
 358
 41#
 440
 495#
 497#
 499#
 502#
 504#
 506#
 508#
 350
 349
 404
 127#
 222#
 239#
 300
 489#
 394
 419
 302
 337
 363
 304
 402
 427
 306
 448#
 38
 645
 39
 647
 447
 479
 481#
 478
 480
 482#
 288
 283
 671
 365
 413
 414
 493#
 356
 371
 428
 167
 236
 258
 389
 415
 496#
 332
 359
 501#
 398
 423
 505#
 343
 411
 421
 422
 430
 435
 484#
 405
 494#
 498#
 503#

483#

