

AMSTRAD CPC / CRTC 0

SHAKER V1.9 OUTPUT

LOGON SYSTEM 2021 / LONGSHOT

More information about CRTC in Amstrad Cpc Crtc Compendium
("con de chat canadien")

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UPDATE VRAM VS CRTIC

CPC SHAKER 1.9 / LONGSHOT, LOGON SYSTEM

(1) UPDATE VRAM VS CRTIC (79 TST)

(F9) MODULE 1

- (2) SKEW DISP ON R0 RUPTURE (5 TST)
 - (3) INTERRUPT DELAY FROM R2 (18 CALC)
 - (4) UPDATE CRTIC R0 TIMING (7 TST)
 - (5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
 - (6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
 - (7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
 - (8) GATE ARRAY PIXELISATION
 - (9) GATE ARRAY INKERISATION (3 TST)
 - (E) GATE ARRAY MODERISATION
 - (R) HSYNC DELAY MODE UPD, UPD R2, LGTH R3 (2.1.0)(3 TST)
 - (T) R2 UPD DURING & AFTER HSYNC (6 TST)
 - (Y) R3 UPD DURING HSYNC (8 TST)
 - (U) R4 & R9 CHECKING
 - (I) VSYNC CONDITIONS (16 TST)
 - (O) R1 STORIES (7 TST)
 - (P) R6 STORIES (11 TST)
 - (0) CRTIC 2 RUMB
 - (CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
 - (CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
 - (COPY) CRTIC 2 OFFSET
 - (DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
- !! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!

| | 0123456789ABCDEF01 | 2222222222222222 | 3333333333333333 | 4444444444444444 |
|--|--------------------|----------------------------|-------------------|------------------|
| | LD(HL),A | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=00, | A=#FF |
| | LD(HL),A | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=01, | A=#FF |
| | LD(HL),A | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=02, | A=#FF |
| | LD(HL),A | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=03, | A=#FF |
| | LD(aaaa),HL | USYNC+6144usec (+ n x 64), | OFFSET PTR=04, | H=#FF L=#55 |
| | LD(aaaa),HL | USYNC+6144usec (+ n x 64), | OFFSET PTR=05, | H=#FF L=#55 |
| | LD(aaaa),HL | USYNC+6144usec (+ n x 64), | OFFSET PTR=06, | H=#FF L=#55 |
| | LD(aaaa),HL | USYNC+6144usec (+ n x 64), | OFFSET PTR=07, | H=#FF L=#55 |
| | LD(aaaa),HL | USYNC+6144usec (+ n x 64), | OFFSET PTR=08, | H=#FF L=#55 |
| | PUSH DE | USYNC+6144usec (+ n x 64), | OFFSET PTR=07, | D=#FF E=#55 |
| | PUSH DE | USYNC+6144usec (+ n x 64), | OFFSET PTR=06, | D=#FF E=#55 |
| | PUSH DE | USYNC+6144usec (+ n x 64), | OFFSET PTR=05, | D=#FF E=#55 |
| | PUSH DE | USYNC+6144usec (+ n x 64), | OFFSET PTR=04, | D=#FF E=#55 |
| | PUSH DE | USYNC+6144usec (+ n x 64), | OFFSET PTR=03, | D=#FF E=#55 |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=00, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=01, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=02, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=03, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=04, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=05, | |
| | LD(HL),#FF | USYNC+6144usec (+ n x 64), | OFFSET PTR HL=06, | |

CRTIC 0, TZSV V 1.1, PG 1

```

000000000000000011111111111111111122222222222222222233333333333333334444444444444444
0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF
|| LD(IX+0),#FF OFFSET PTR IX=07
|| LD(IX+0),#FF OFFSET PTR IX=08
|| LD(IX+0),#FF OFFSET PTR IX=09
|| LD(IX+0),#FF OFFSET PTR IX=0A
|| LD(IX+0),#FF OFFSET PTR IX=0B
|| LD(IX+0),#FF OFFSET PTR IX=0C
|| LD(IX+0),E OFFSET PTR IX=07, E=#FF
|| LD(IX+0),E OFFSET PTR IX=08, E=#FF
|| LD(IX+0),E OFFSET PTR IX=09, E=#FF
|| LD(IX+0),E OFFSET PTR IX=0A, E=#FF
|| LD(IX+0),E OFFSET PTR IX=0B, E=#FF
|| LD(IX+0),E OFFSET PTR IX=0C, E=#FF
|| LD(aaaa),DE OFFSET PTR=07, D=#FF E=#55
|| LD(aaaa),DE OFFSET PTR=08, D=#FF E=#55
|| LD(aaaa),DE OFFSET PTR=09, D=#FF E=#55
|| LD(aaaa),DE OFFSET PTR=0A, D=#FF E=#55
|| LD(aaaa),IX OFFSET PTR=07, IXH=#FF IXL=#55
|| LD(aaaa),IX OFFSET PTR=08, IXH=#FF IXL=#55
|| LD(aaaa),IX OFFSET PTR=09, IXH=#FF IXL=#55
|| LD(aaaa),IX OFFSET PTR=0A, IXH=#FF IXL=#55
|| LD(aaaa),A OFFSET PTR=05, A=#FF
|| LD(aaaa),A OFFSET PTR=06, A=#FF

```

CRTC 0 , TZSV V 1.1, PG 2

```

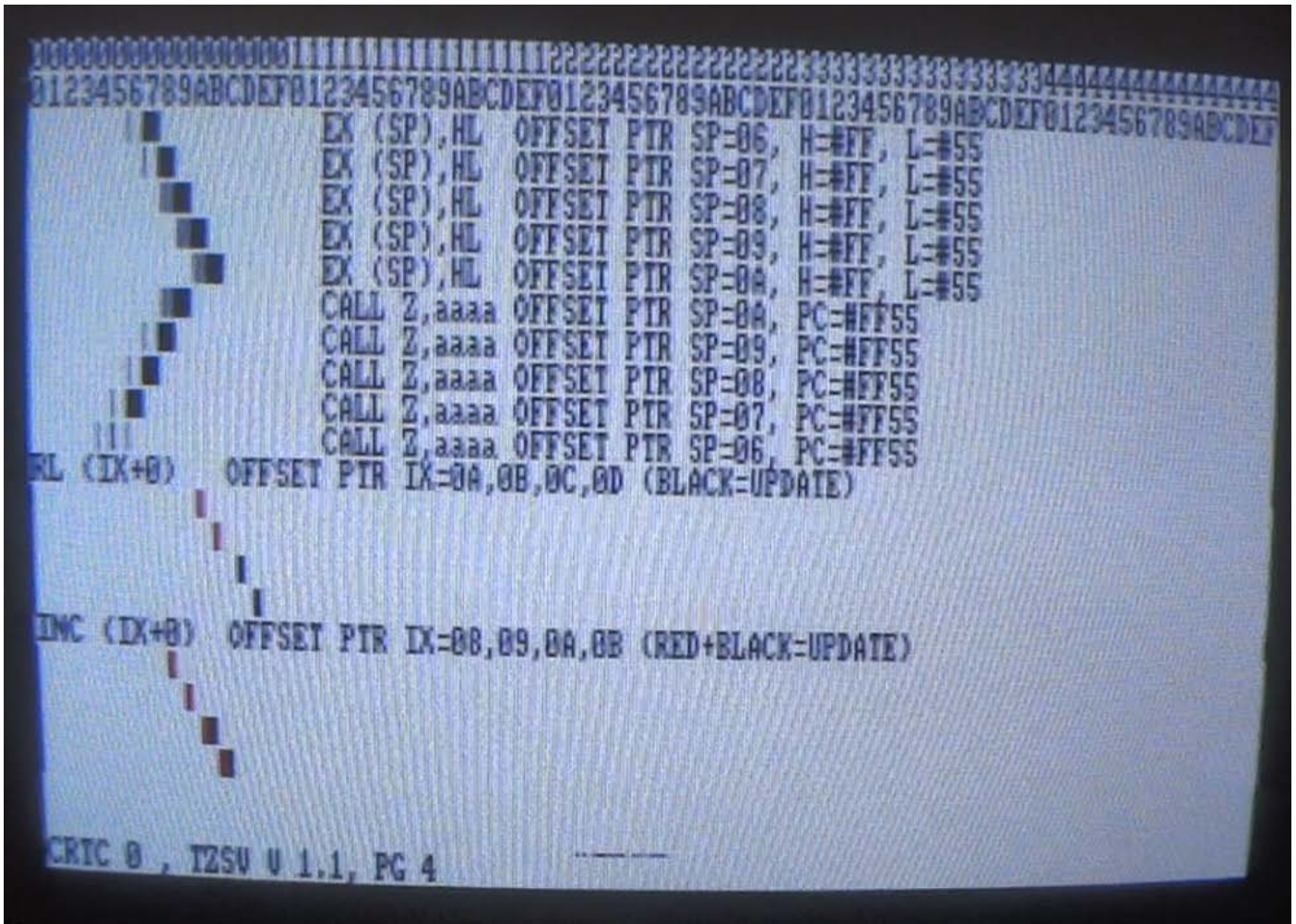
000000000000000011111111111111111122222222222222222233333333333333334444444444444444
0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF
|| LDI OFFSET PTR DE=05, (HL)=#FF
|| LDI OFFSET PTR DE=06, (HL)=#FF
|| LDI OFFSET PTR DE=07, (HL)=#FF
|| LDI OFFSET PTR DE=08, (HL)=#FF
|| LDI OFFSET PTR DE=09, (HL)=#FF
|| RRD OFFSET PTR HL=06, A=#0F
|| RRD OFFSET PTR HL=07, A=#0F
|| RRD OFFSET PTR HL=08, A=#0F
|| RRD OFFSET PTR HL=09, A=#0F
|| RRD OFFSET PTR HL=0A, A=#0F

```

SET 2, (HL) OFFSET PTR HL=04,05,06,07 (RED+BLACK=UPDATE)

HL (HL) OFFSET PTR HL=04,05,06,07 (BLACK=UPDATE)

CRTC 0 , TZSV V 1.1, PG 3

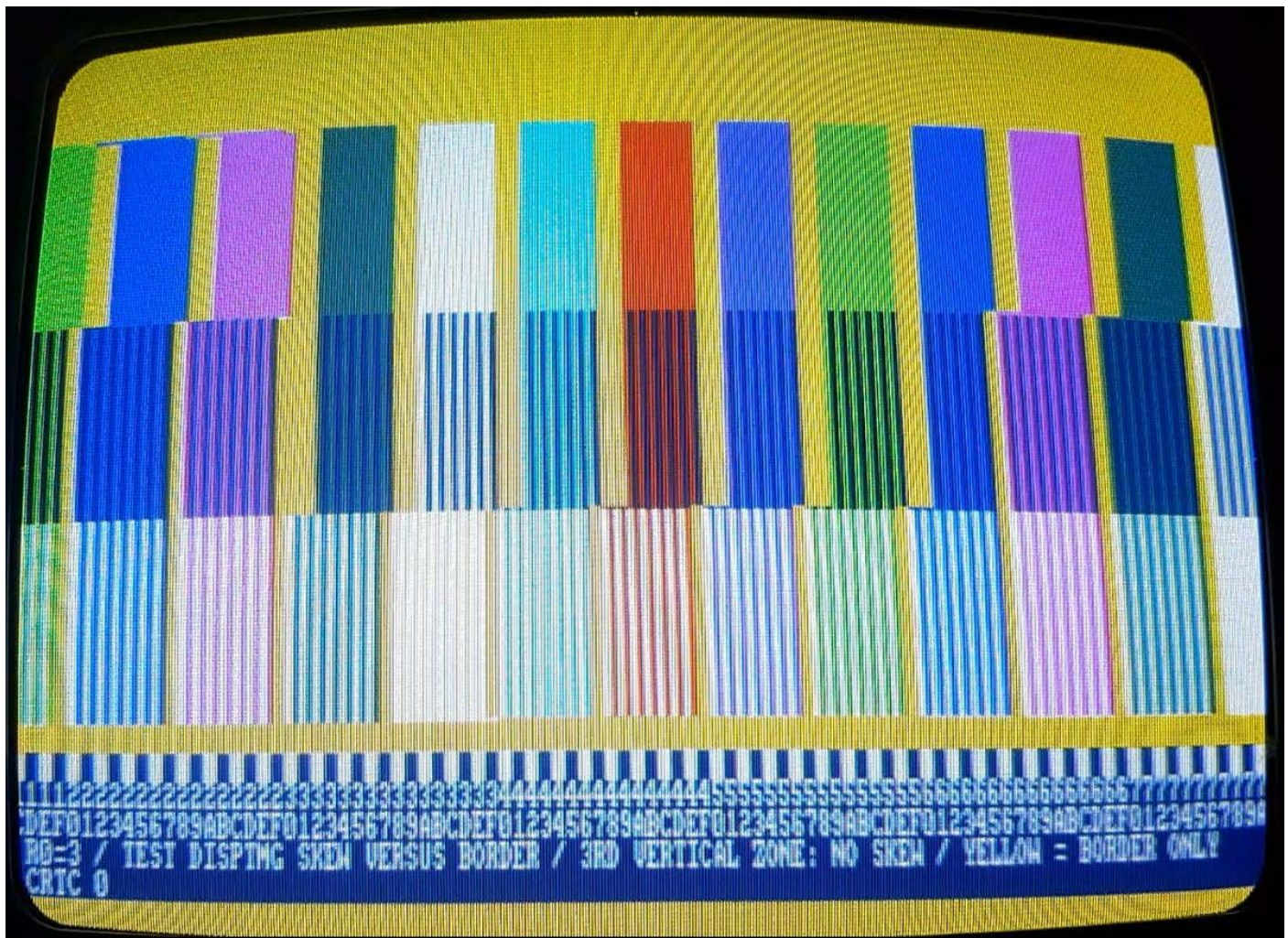


Note : WinApe 2.0 Beta 3 wrong on LDI (page 3) and EX(SP),HL (page 4) (Ok with others instructions)

SKREW DISP ON R0 RUPTURE

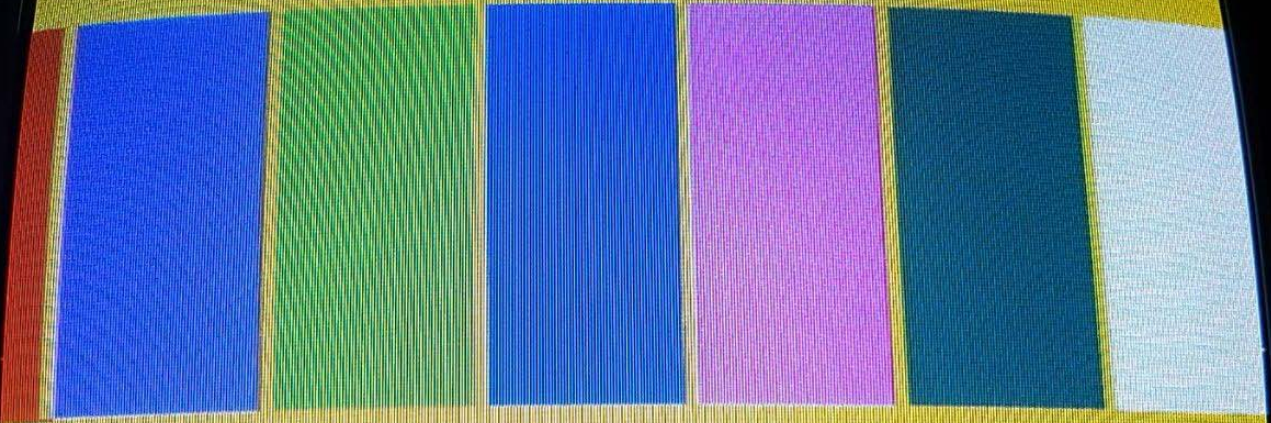
```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKREW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!

(O) CRTIC 2 RUMB
(F0) BOUNGA:CRTIC 2 ZERO!
(F1) INTERLACE VM (27 TST)
```





11122222222222222222333333333333333333333333444444444444444455555555555555556666666666666666777777777777
EDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789AB
RD=? - RWMB NO BORDER BYTE (CRTC 0)
CRTC 0



11122222222222222222333333333333333333333333444444444444444455555555555555556666666666666666777777777777
EDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789AB
RD=? - RWMB NO BORDER BYTE (CRTC 0)
CRTC 0

```
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
CRTC 0 R8 STORIES 2 (R0=63 / R1=64) (REP DISP BUT SAME OPE. R8 STORIES 1D
```

```
CRTC 0 R8 STORIES 1 (R0=R1=63)
66667777777777777777 0000000000000000111111111111111122222222222222223333333333333333444444444444
DEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABC
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#37 (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#38 (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#39 (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#3A (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#3B (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#3C (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#3D (R0=R1=63)
OUT R8,#10/OUT R8,0 (8 us) FROM CO=#3E (R0=R1=63)
```


INTERRUPT DELAY FROM R2

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE VRAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUNI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!
```

```
DELAY BETWEEN HSYNC (C0=R2) AND INTERRUPTION (INT)
WHEN R3=0E, INTERRUPT OCCURS #0F uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0D, INTERRUPT OCCURS #0E uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0C, INTERRUPT OCCURS #0D uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0B, INTERRUPT OCCURS #0C uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0A, INTERRUPT OCCURS #0B uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=09, INTERRUPT OCCURS #0A uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=08, INTERRUPT OCCURS #09 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=07, INTERRUPT OCCURS #08 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=06, INTERRUPT OCCURS #07 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=05, INTERRUPT OCCURS #06 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=04, INTERRUPT OCCURS #05 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=03, INTERRUPT OCCURS #04 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=02, INTERRUPT OCCURS #03 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=01, INTERRUPT OCCURS #02 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=00, INTERRUPT OCCURS #FF uSEC AFTER C0=R2 (#FF=NO INT)

HSYNC DURATION (6=8180 ON CRT 0,3,4)(0=8400 ALL CRT / n=8400 CRT 1,2)
R3 High=6 >> SIZE=80180 uSEC
R3 High=0 >> SIZE=80400 uSEC

DELAY OF 'CALL TO #38' ON INTERRUPTION IS 05 uSEC (RST#38=4 uSEC)

CRTIC 0
```

```

DELAY BETWEEN HSYNC (C0=R2) AND INTERRUPTION (IM2)
WHEN R3=0E, INTERRUPT OCCURS #0F uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0D, INTERRUPT OCCURS #0E uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0C, INTERRUPT OCCURS #0D uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0B, INTERRUPT OCCURS #0C uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=0A, INTERRUPT OCCURS #0B uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=09, INTERRUPT OCCURS #0A uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=08, INTERRUPT OCCURS #09 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=07, INTERRUPT OCCURS #08 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=06, INTERRUPT OCCURS #07 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=05, INTERRUPT OCCURS #06 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=04, INTERRUPT OCCURS #05 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=03, INTERRUPT OCCURS #04 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=02, INTERRUPT OCCURS #03 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=01, INTERRUPT OCCURS #02 uSEC AFTER C0=R2 (#FF=NO INT)
WHEN R3=00, INTERRUPT OCCURS #FF uSEC AFTER C0=R2 (#FF=NO INT)

```

USYNC DURATION (S=8180 ON CRT 0,3,4)(D=8400 ALL CRT / n=8400 CRT 1,2)

R3 High=0 >> SIZE=80180 uSEC

R3 High=0 >> SIZE=80400 uSEC

DELAY OF INTERRUPTION CALL (IM2) IS 07 uSEC

CRTC 0

UPDATE CRTC R0 TIMING

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
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(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC USYNC FROM PPI.PORTB.0=1 !!
```

```
R0=3F / CRTC 10 ON R0 (OUTC,C)
OK: C0=..3F..40..41.. / K0: C0=..3F..00..01..

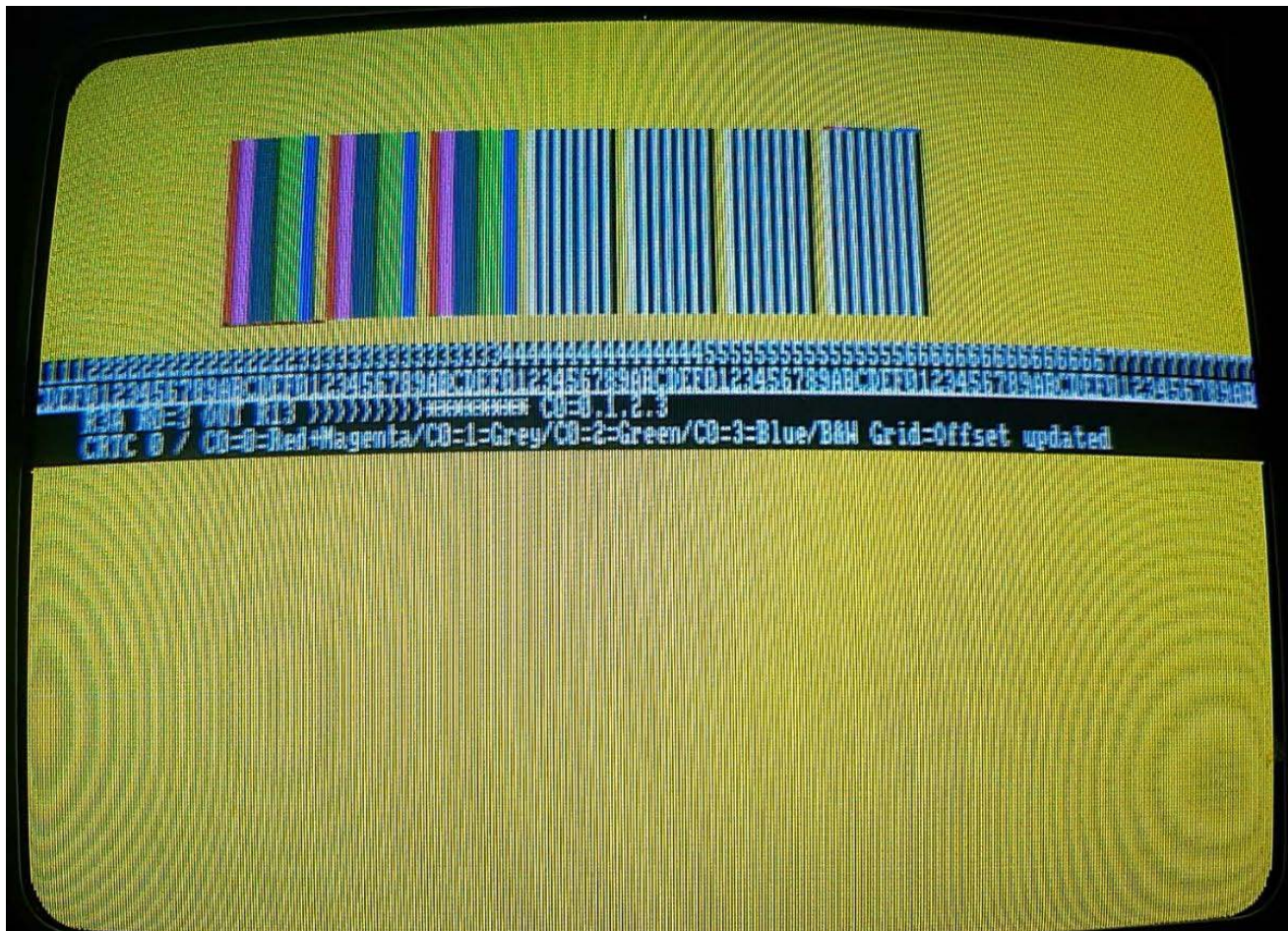
UPDATE R0=7F, OUT ON HCC=39 :OK
UPDATE R0=7F, OUT ON HCC=3A :OK
UPDATE R0=7F, OUT ON HCC=3B :OK
UPDATE R0=7F, OUT ON HCC=3C :OK
UPDATE R0=7F, OUT ON HCC=3D :OK
UPDATE R0=7F, OUT ON HCC=3E :KO
UPDATE R0=7F, OUT ON HCC=3F :KO

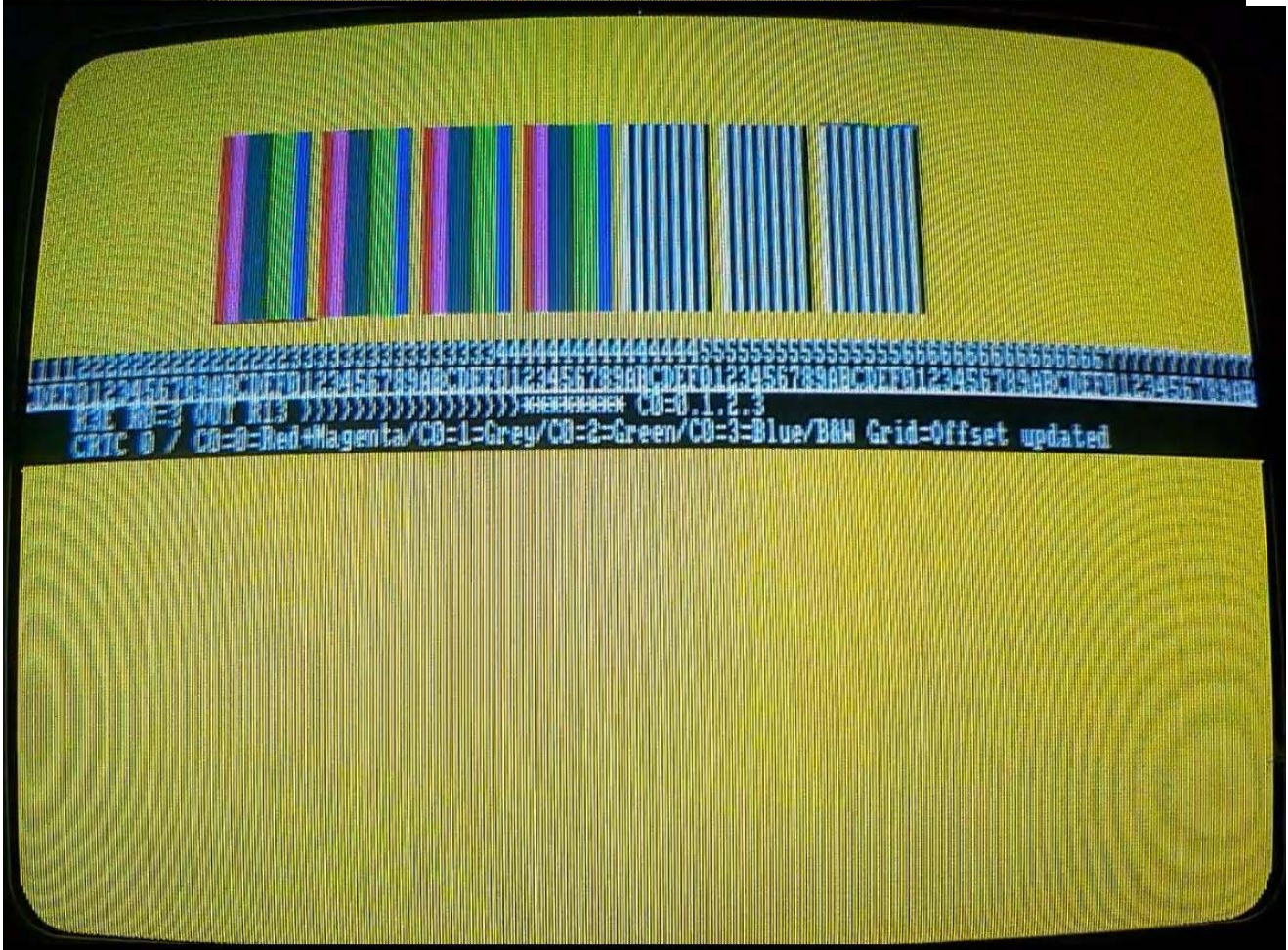
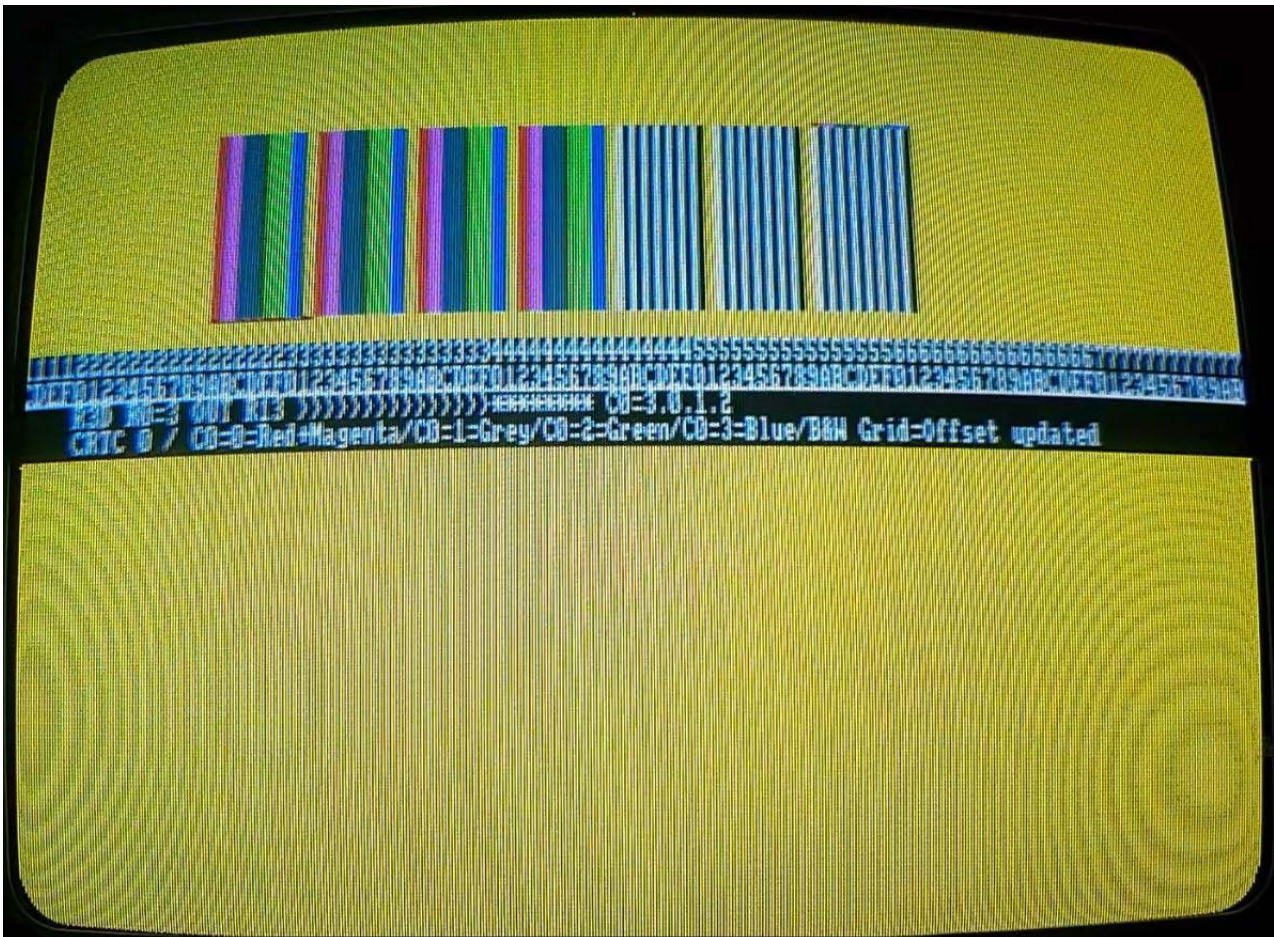
OUTI ON C0vs=#3c:01 (01:IO ON 5TH NOP / 00:IO ON 4TH NOP)
```

CRTC 0

R13 UPDATE IN 4 USEC SCREENS (R0=3)

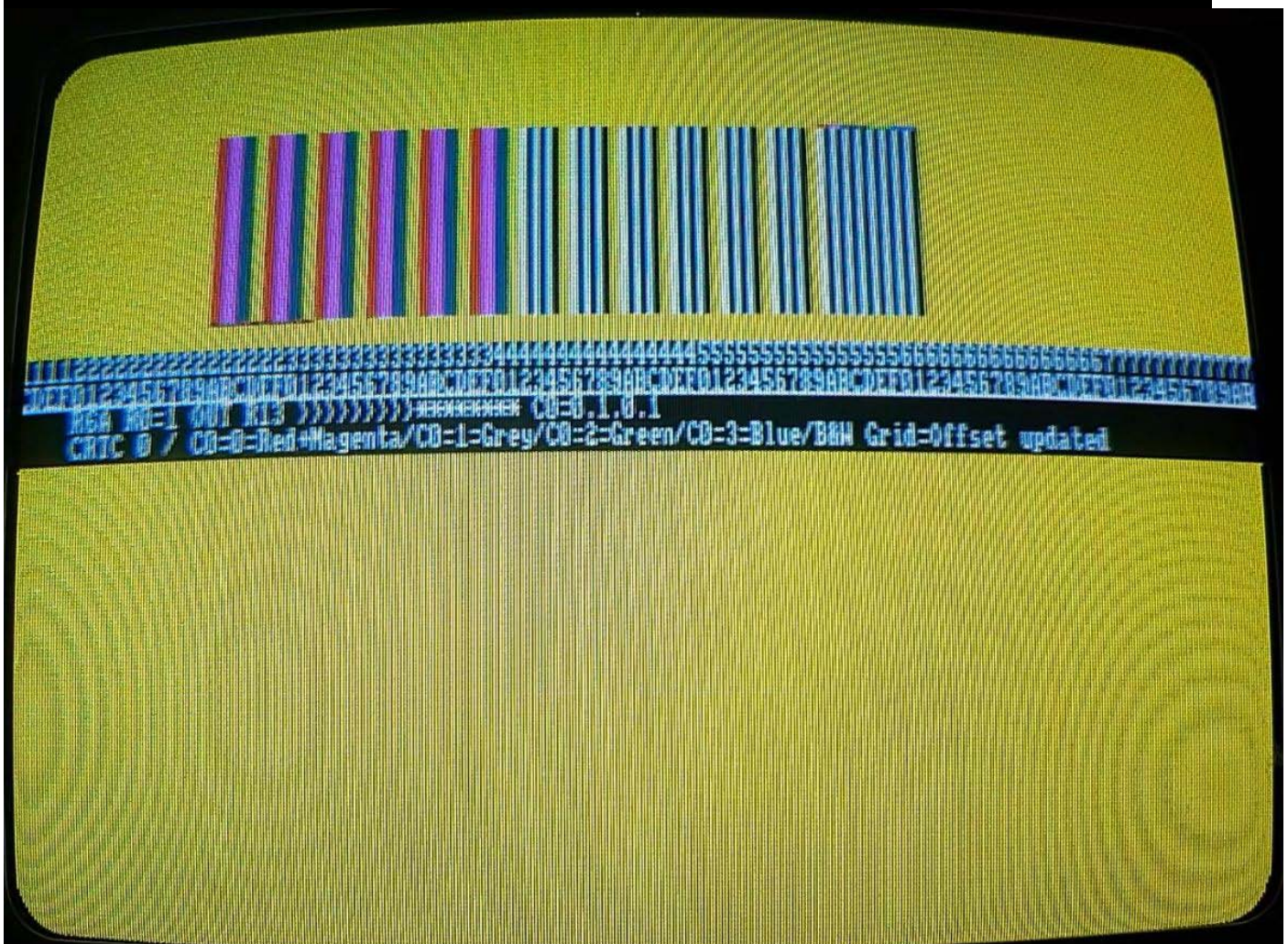
```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE VRAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!
```

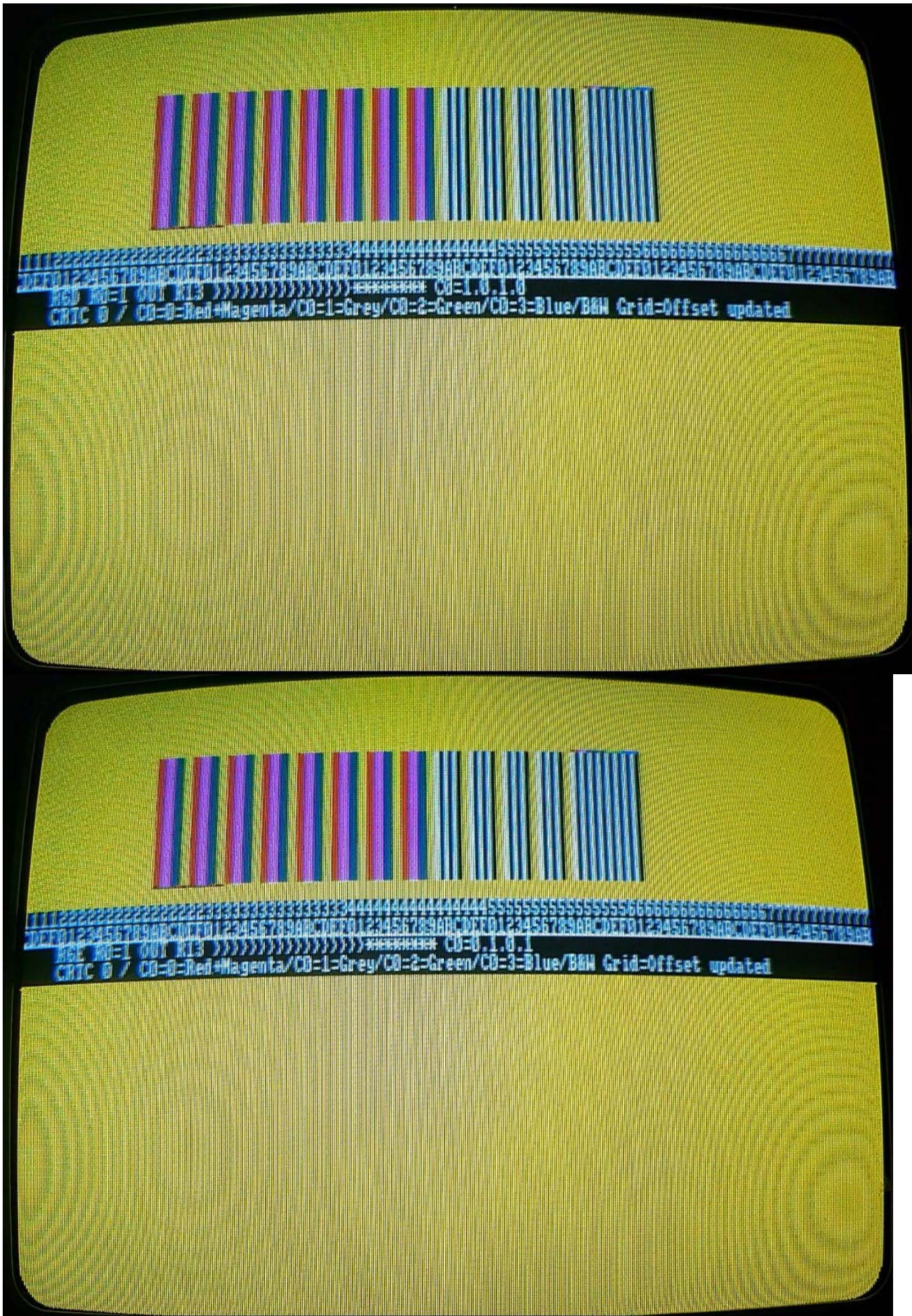




R13 UPDATE IN 2 USEC SCREENS (R0=1)

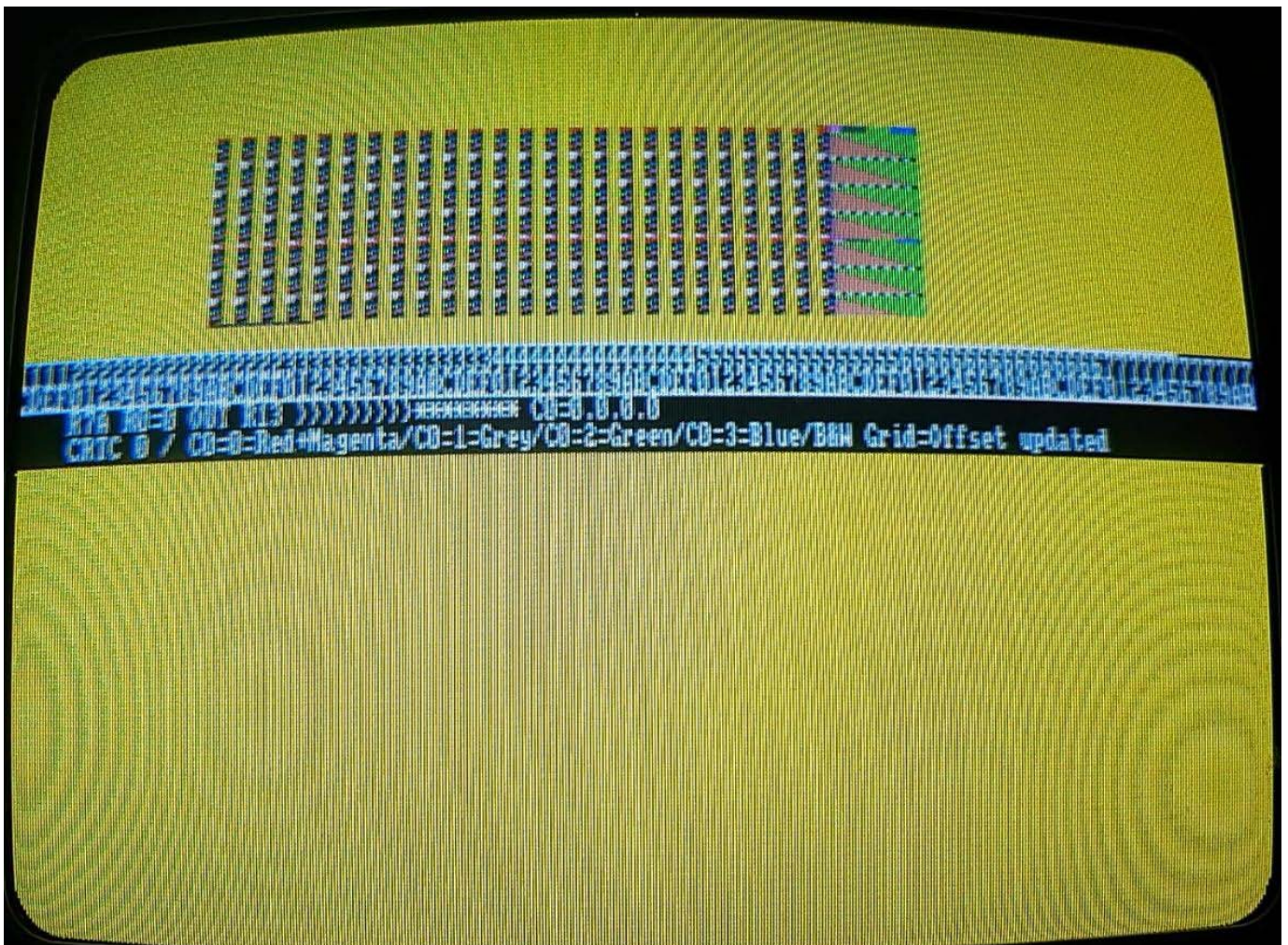
```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE VRAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD, UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUNI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
```

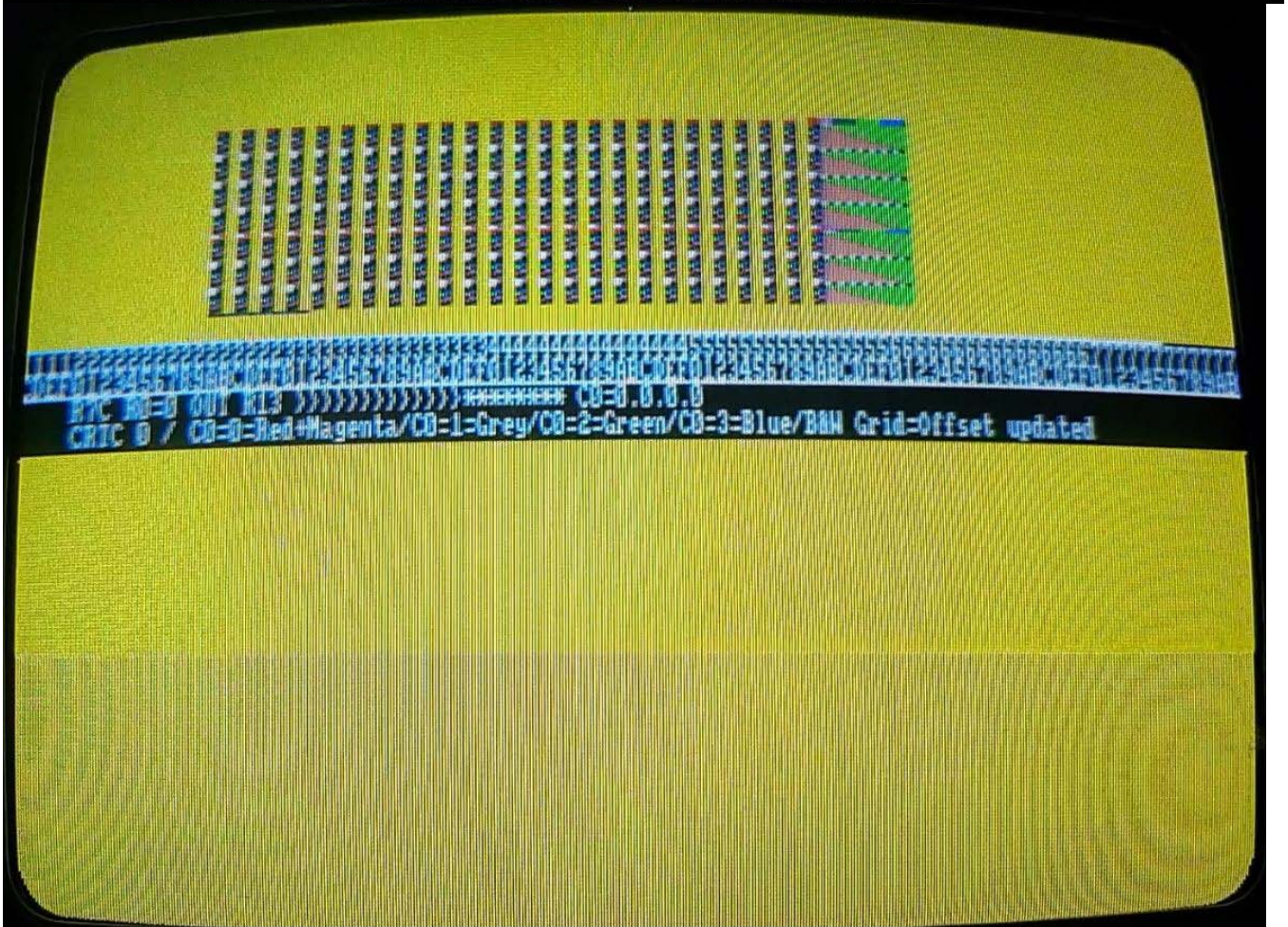
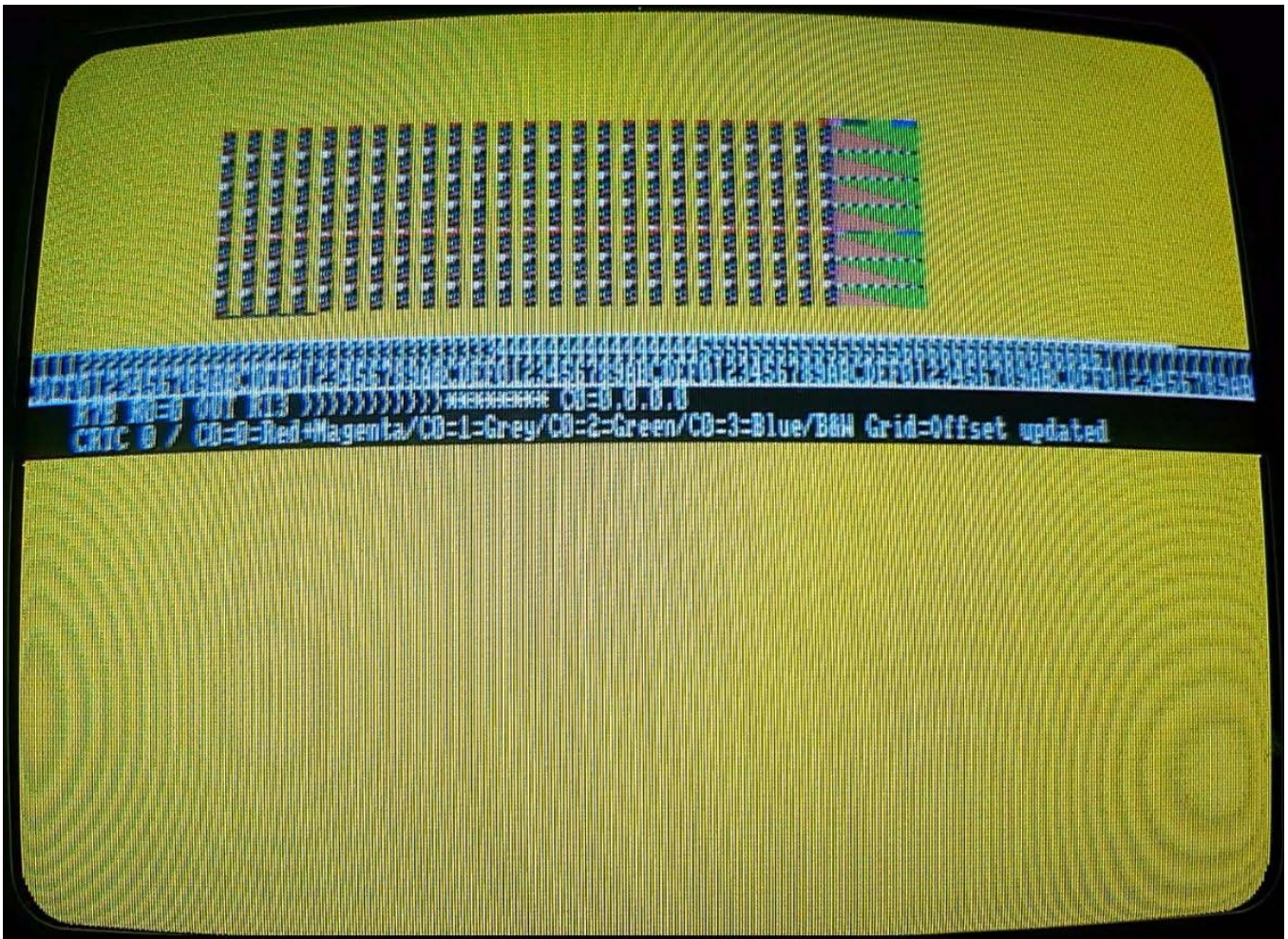


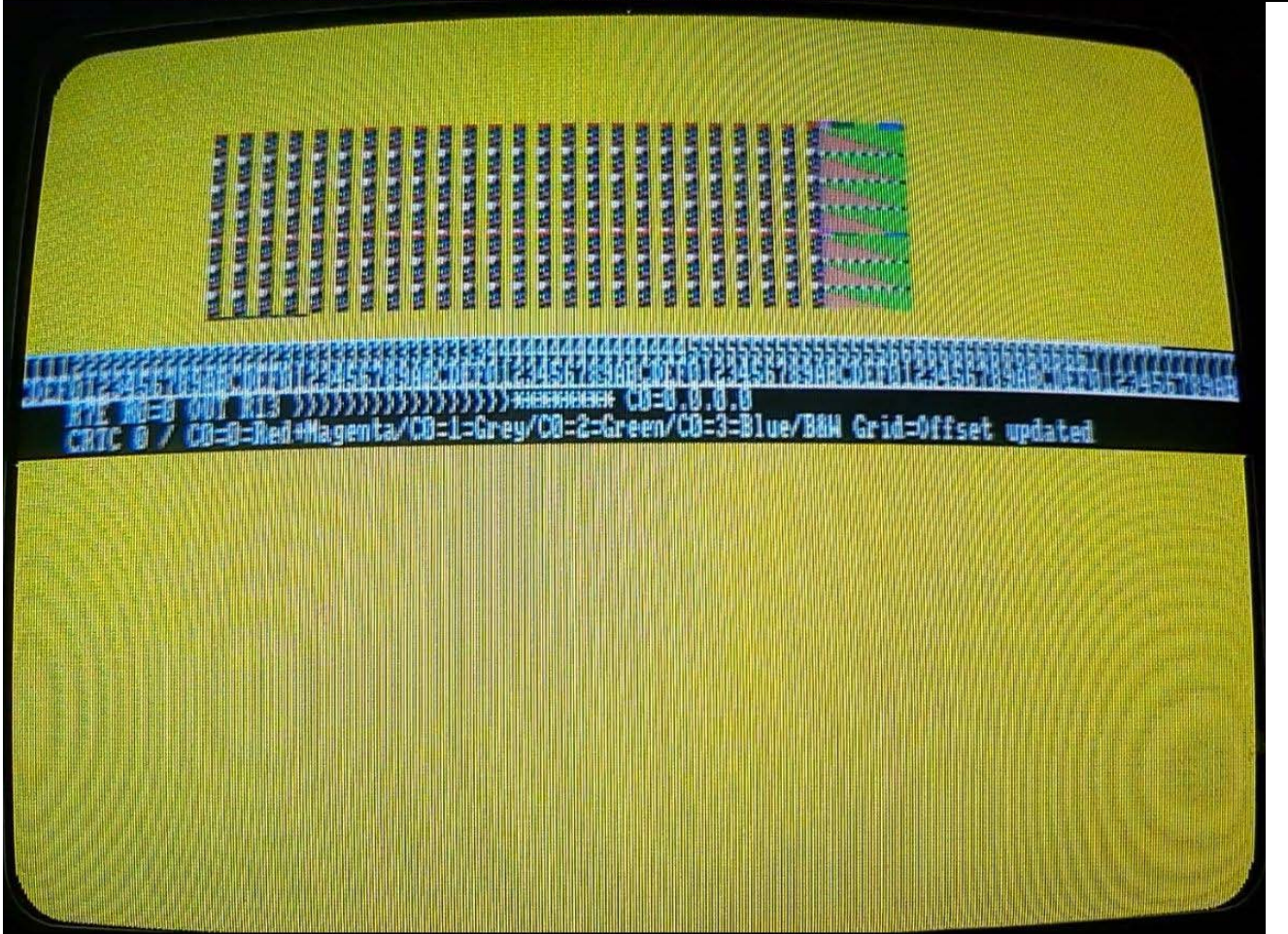
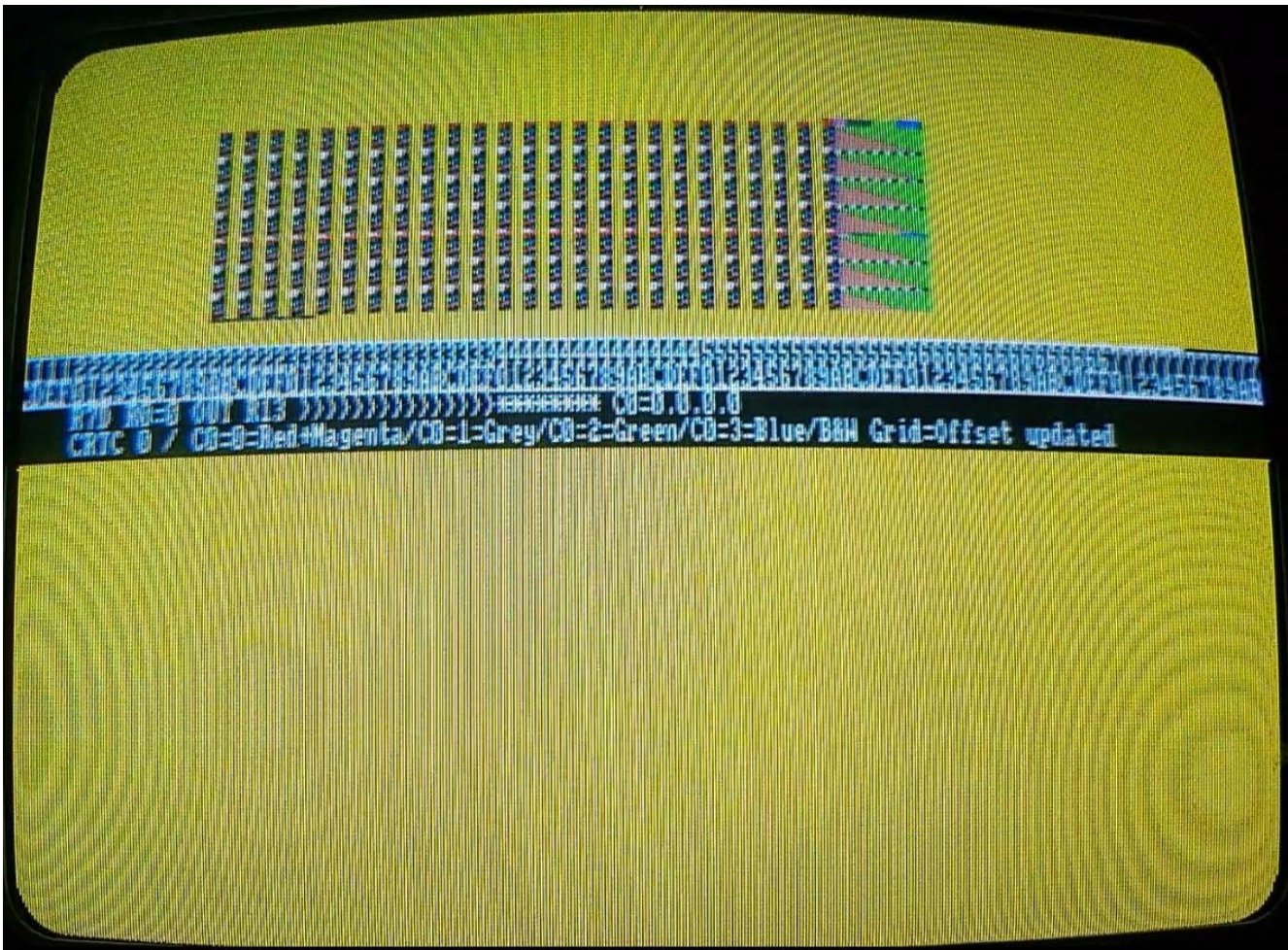


R13 UPDATE IN 1 USEC SCREENS (R0=0)

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
```

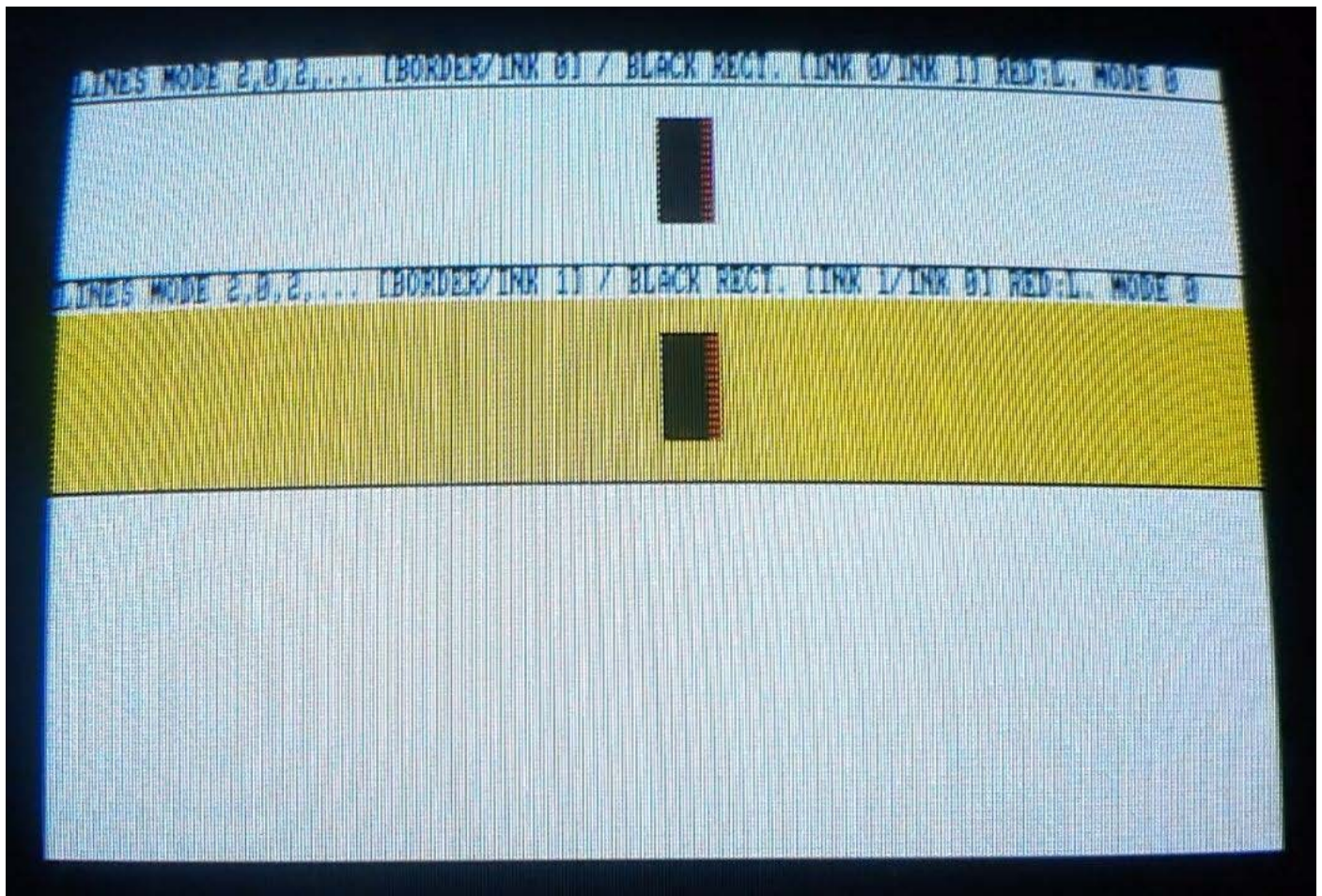






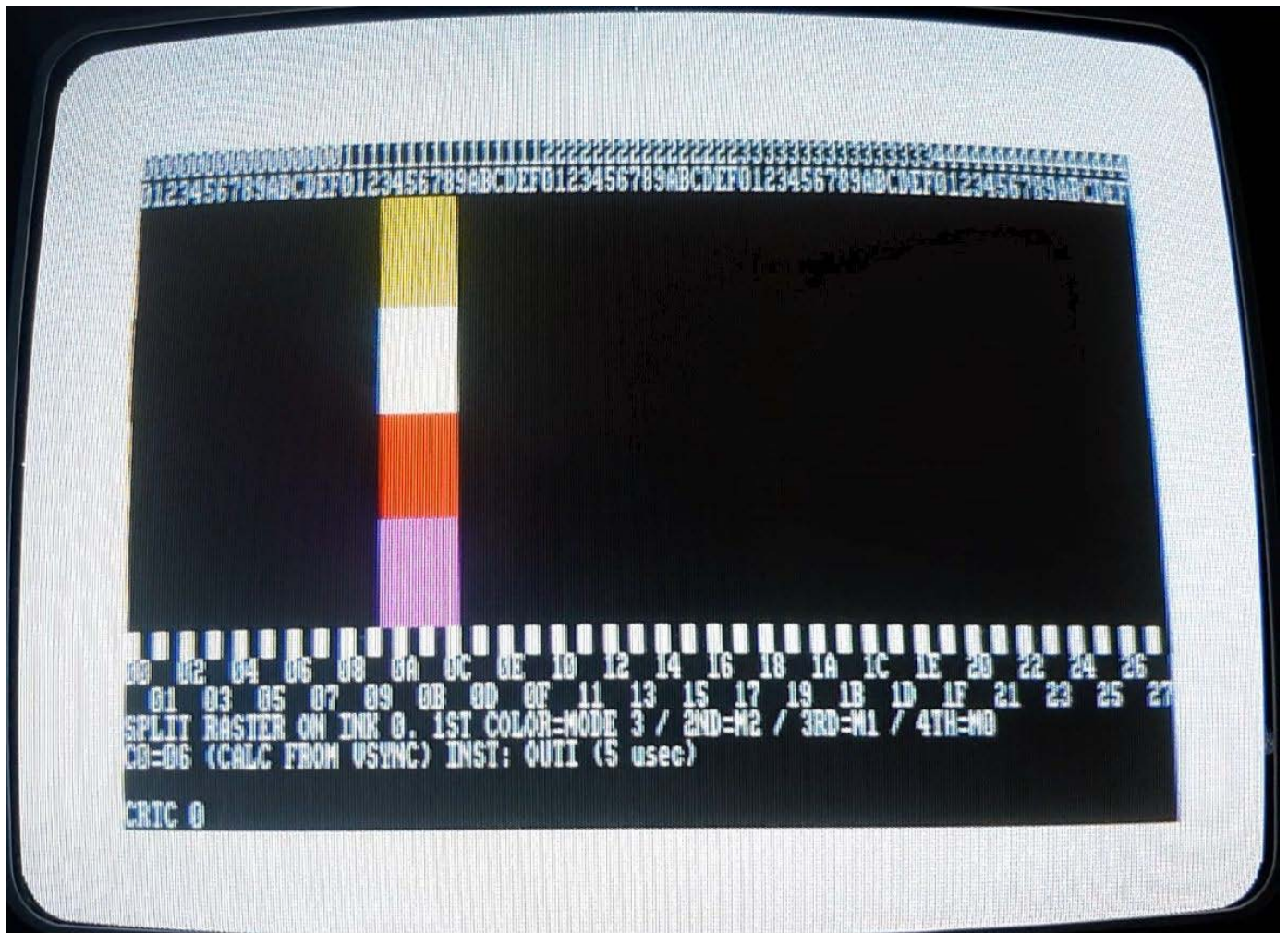
GATE ARRAY PIXELISATION

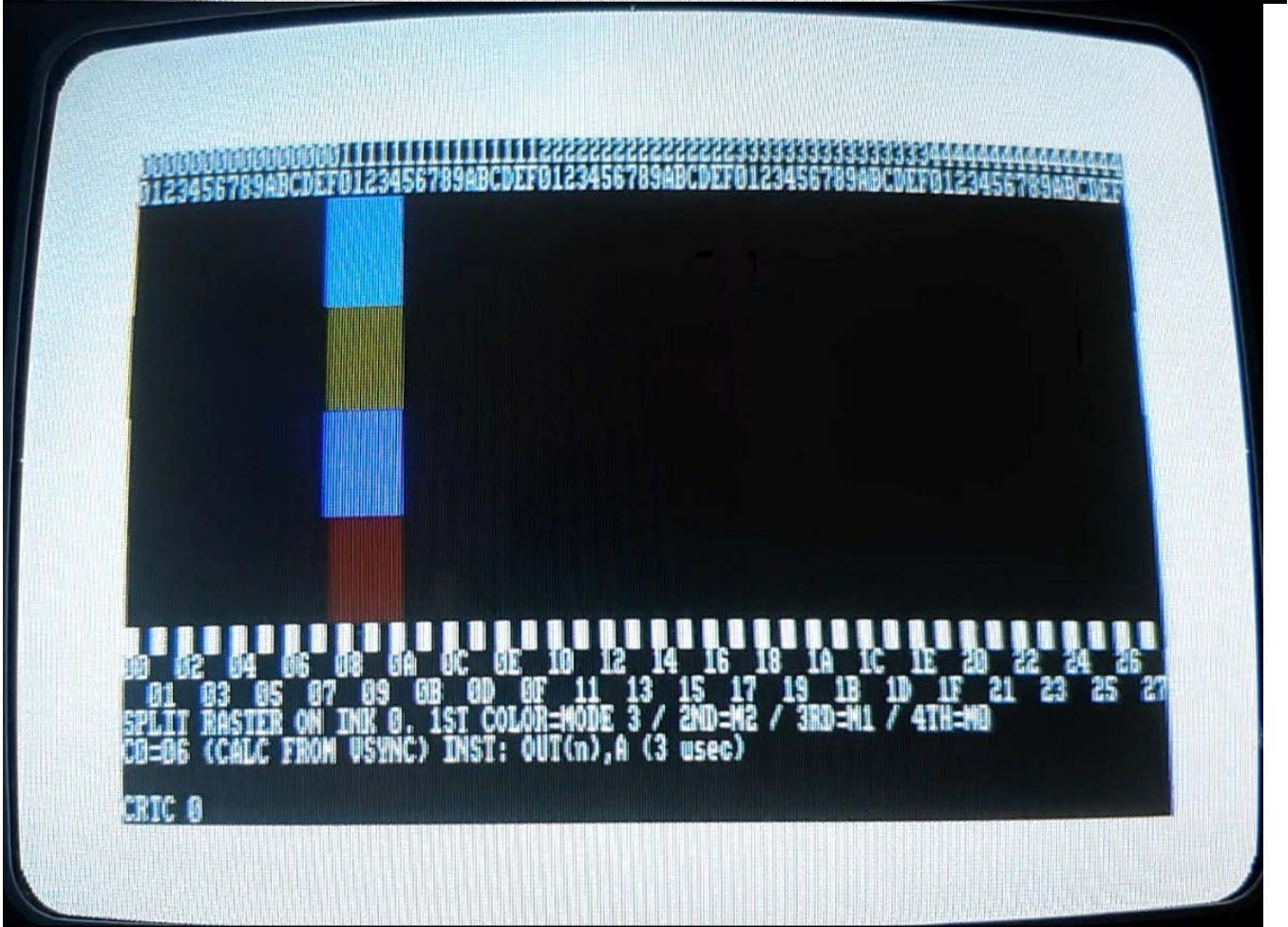
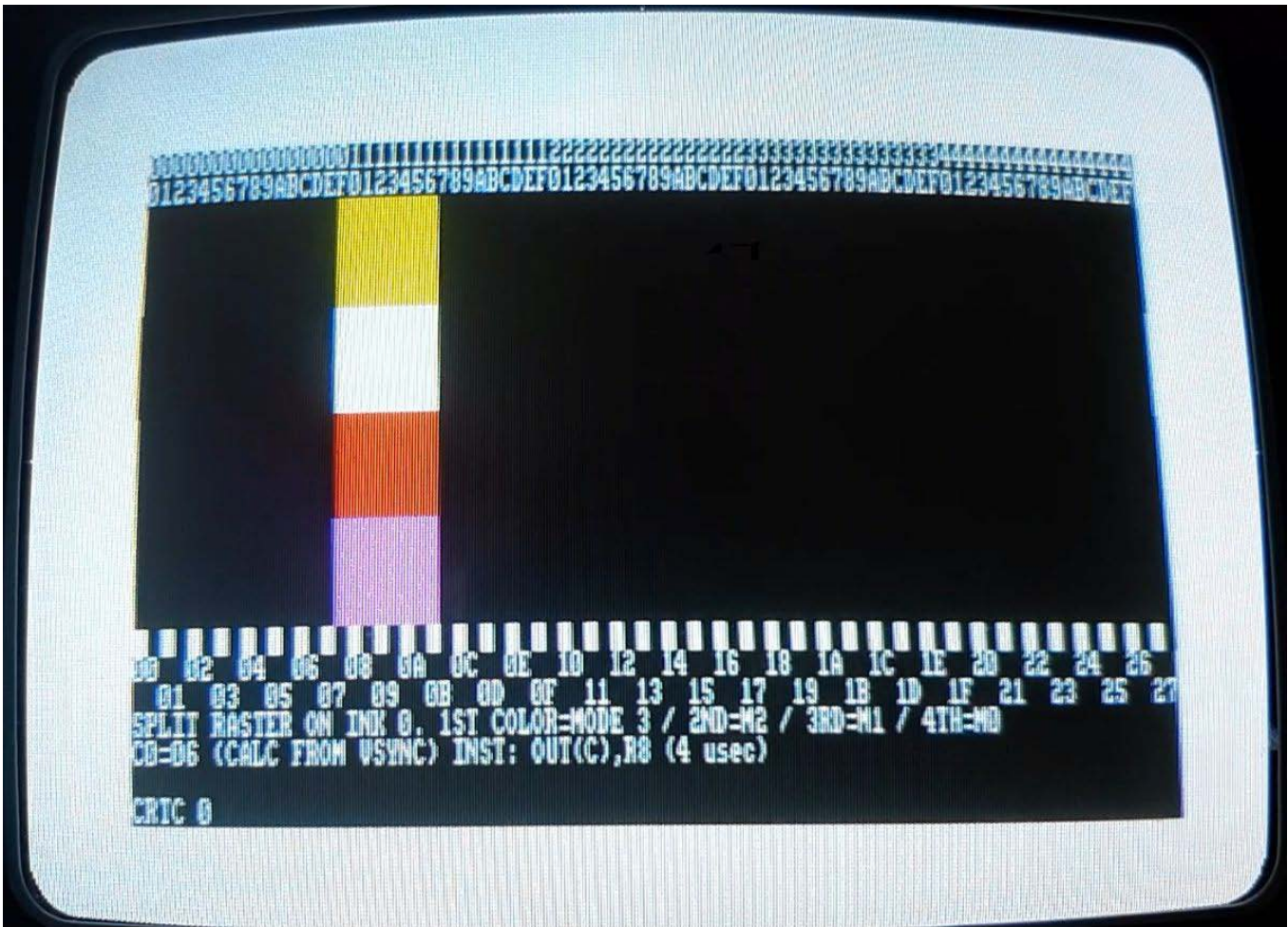
```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUNI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT <> CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
```



GATE ARRAY INKERISATION

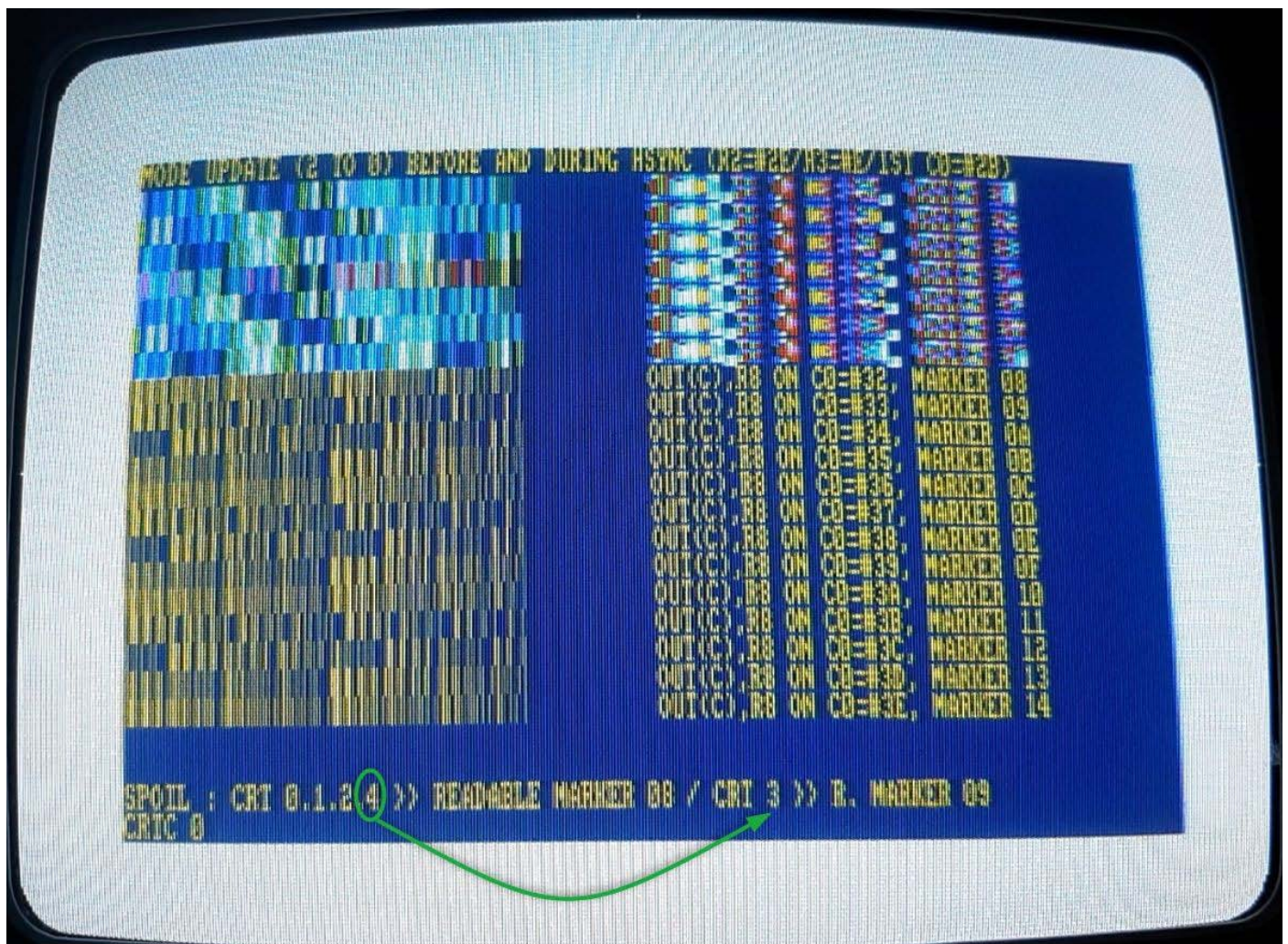
```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT <> CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
```





GATE ARRAY MODERISATION

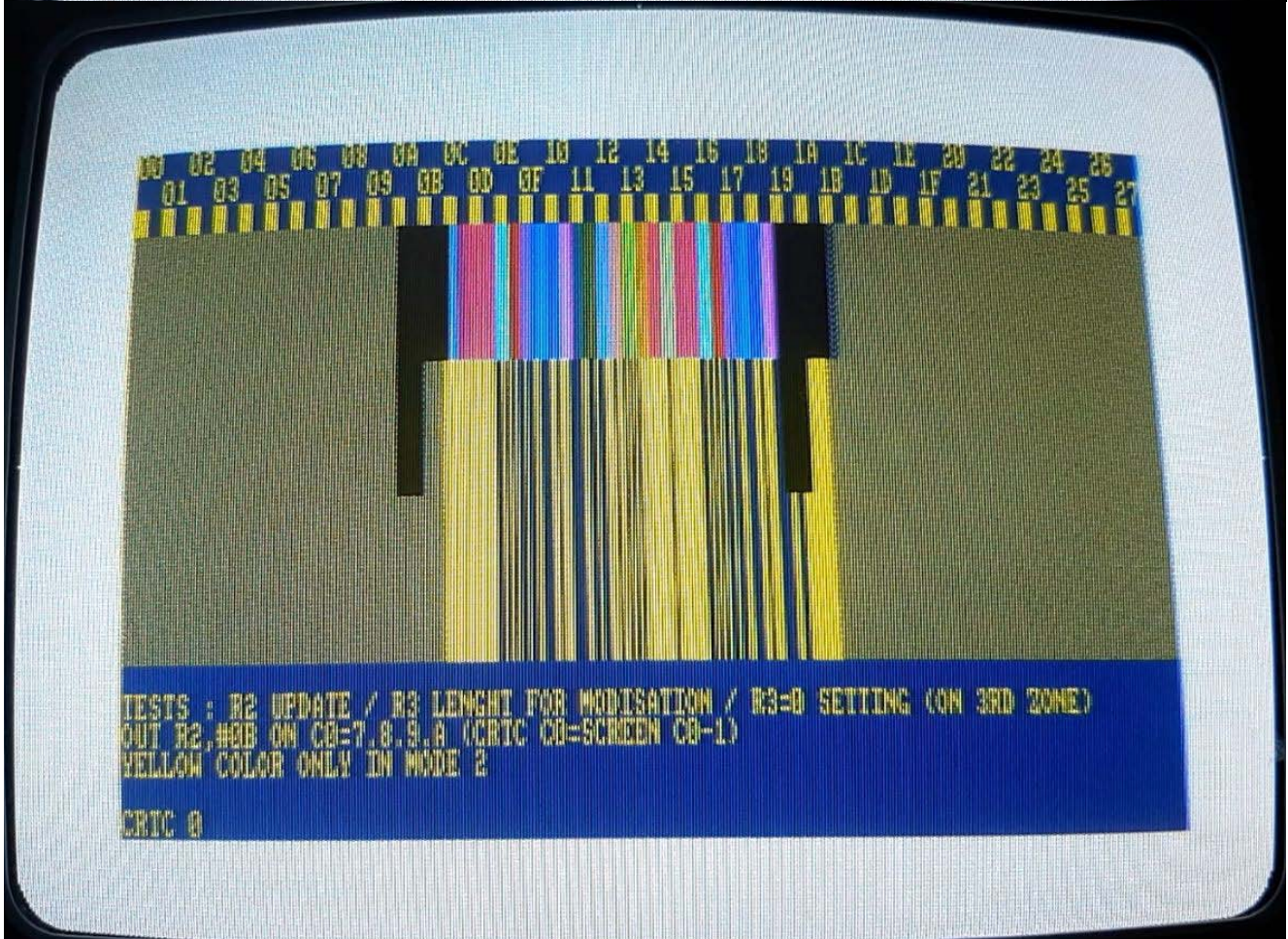
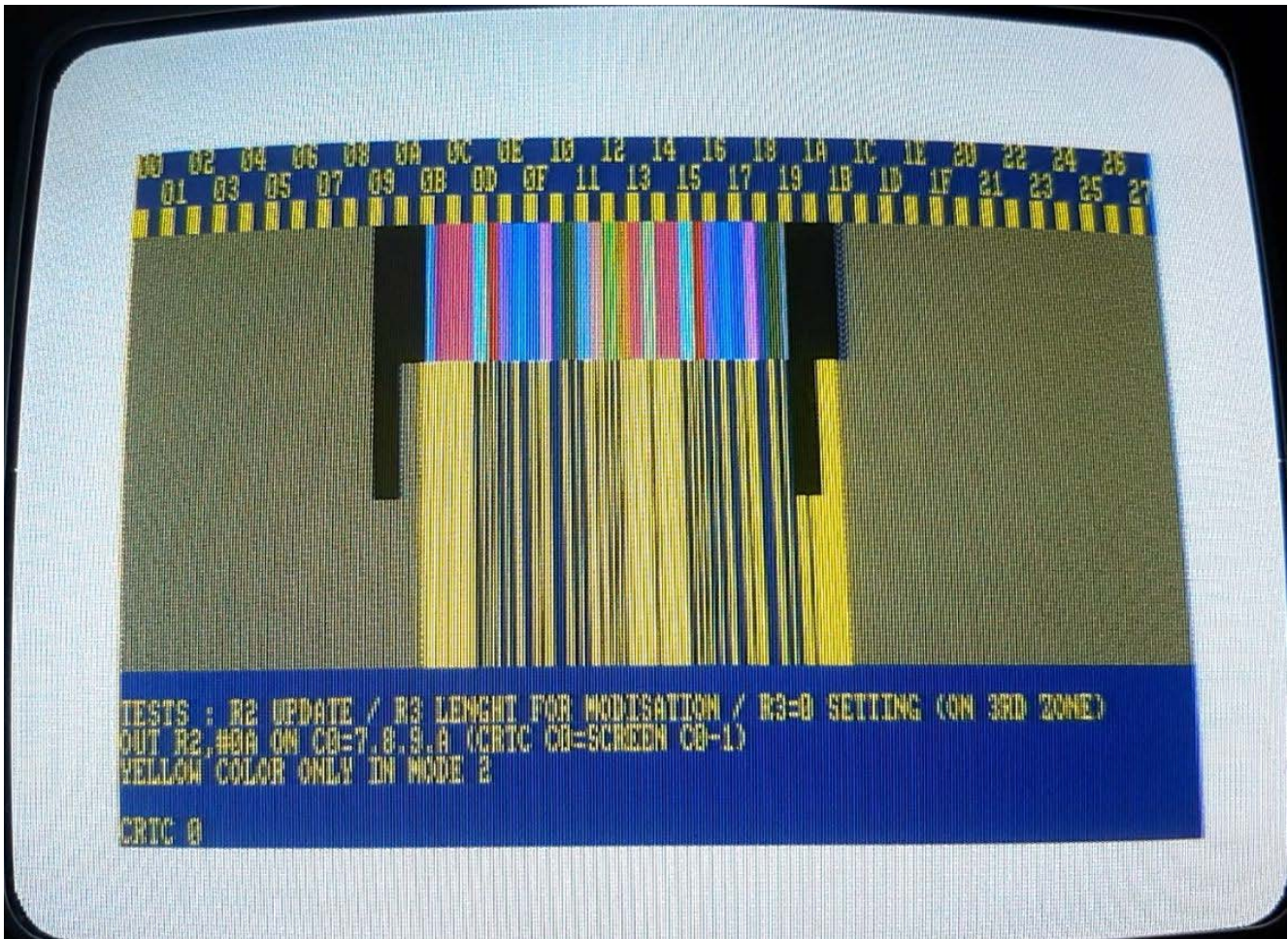
```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```



HSYNC DELAY ON MODE UPDATE, R2 UPDATE/R3 LENGTH 2 to 0

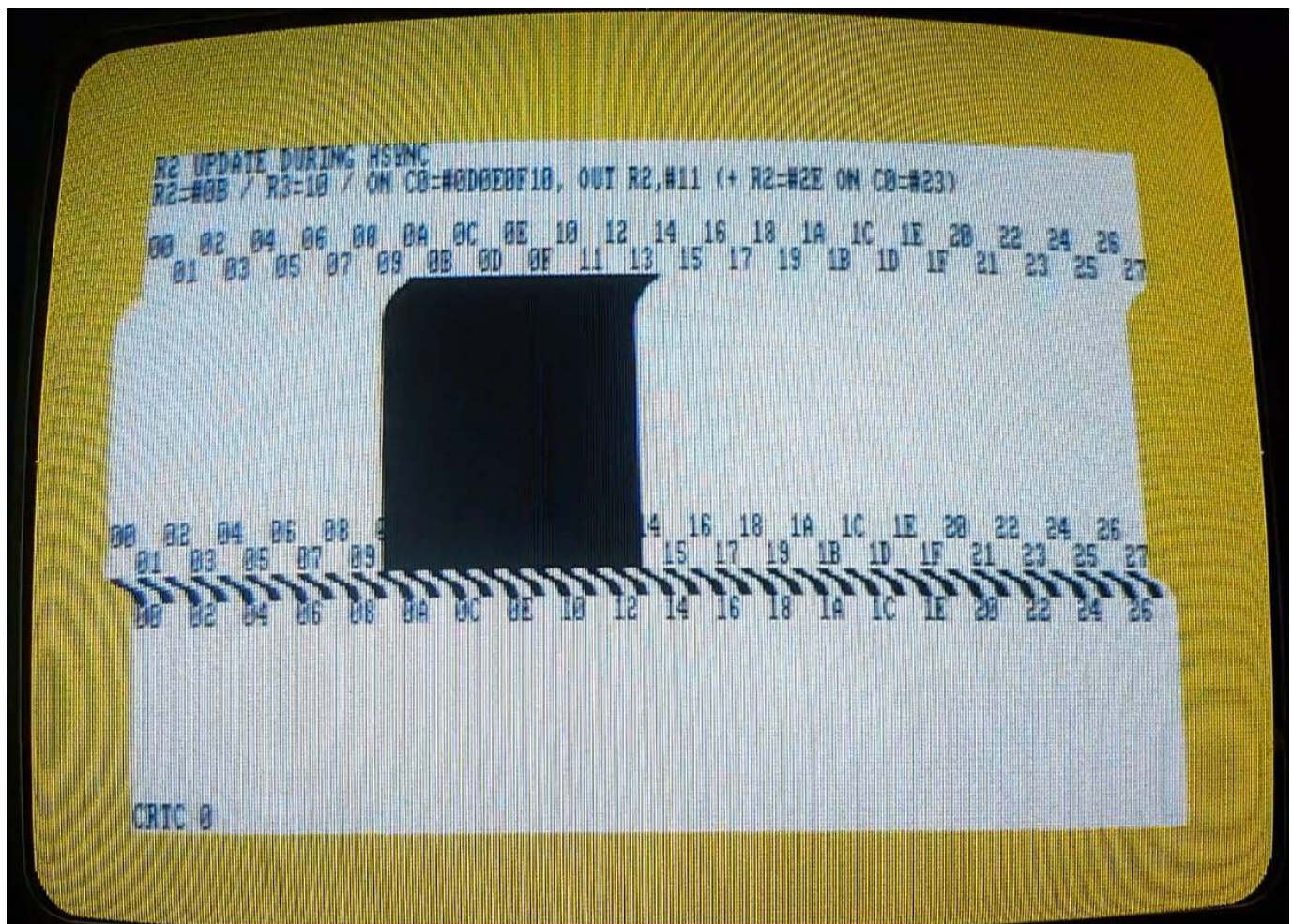
```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2,1,0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT <> CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC USYNC FROM PPI.PORTB.0=1 !!
```





R2 UPDATE DURING & AFTER HSYNC

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC USYNC FROM PPI.PORTB.0=1 !!
```



R2 UPDATE DURING HSYNC
R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R2,#12 (+ R2=#2E ON CB=#23)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R2 UPDATE DURING HSYNC
R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R2,#13 (+ R2=#2E ON CB=#23)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R2 UPDATE DURING HSYNC
R2=#0B / R3=10 / ON C0=#0D0E0F10, OUT R2,#14 (+ R2=#2E ON C0=#23)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R2 UPDATE DURING HSYNC
R2=#0B / R3=10 / ON C0=#0D0E0F10, OUT R2,#15 (+ R2=#2E ON C0=#23)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R2 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON C0=#0D0E0F10, OUT R2,#16 (+ R2=#2E ON C0=#23)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

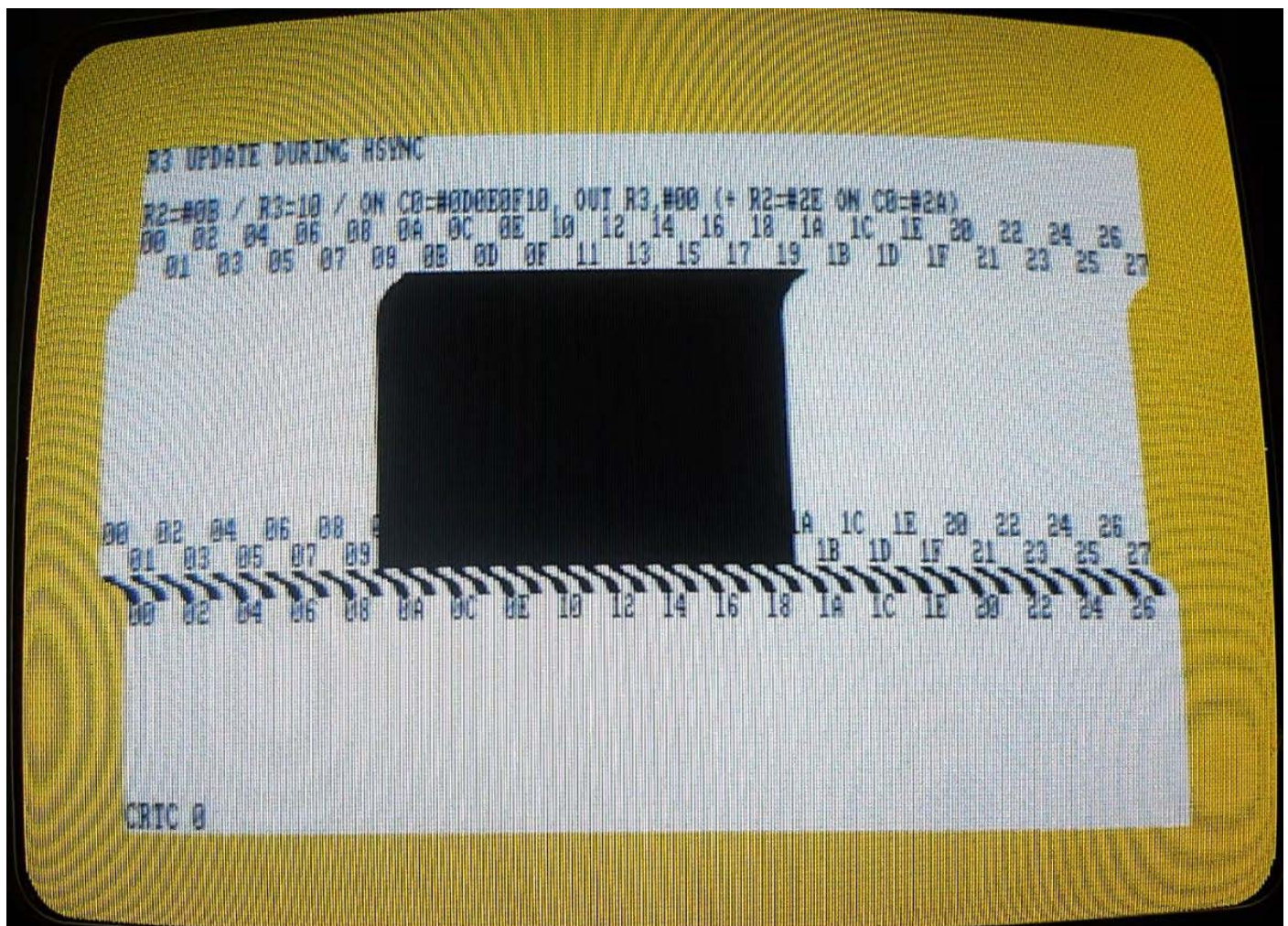
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

CRTC 0

R3 UPDATE DURING HSYNC

```

CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!
    
```



R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#01 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

CRIC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#02 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

CRIC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#03 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#04 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#05 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON CB=#0D0E0F10, OUT R3,#06 (+ R2=#2E ON CB=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R3 UPDATE DURING HSYNC

R2=#0B / R3=10 / ON C0=#0D0E0F10, OUT R3,#07 (+ R2=#2E ON C0=#2A)

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26

CRTC 0

R4 & R9 CHECKING

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```

```
RESULT OF CRT-R4 & R9 CHECK
PREV R9=7 R4=38 >> UPD R9=1 WHEN C9=3 >> C9=0 (OK FOR CRT 3+4 ONLY):xK0x
PREV R9=7 R4=38 >> UPD R4=1 WHEN C4=1 & C9=7 >> C4=0 :xK0x
PREV R9=7 R4=38 >> UPD R4=0 WHEN C4=1 & C9=7 >> C4=2 (Ovf) :OK
PREV R9=7 R4=38 >> UPD R9=0 WHEN C4=1 & C9=0 (UPD FROM C0vsio)(00=Upd Ok)
>>3C=00/3D=00/3E=00/3F=00/00=01/01=01/02=01/03=01/04=01/05=01
PREV R9=7 R4=38 >> UPD R4=1 WHEN C4=1 & C9=7 (UPD FROM C0vsio)(01=C4 Ovf)
>>3C=01/3D=01/3E=01/3F=01/00=01/01=01/02=01/03=01/04=01/05=01
PREV R9=7 R4=1 >> UPD R9=1 WHEN C4=1 C9=7 LASTLINE FROM C8=#29 R2=#2E(01:C9=0)
01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01,01
PREV R9=7 R4=1 >> UPD R4=3 WHEN C4=1 & C9=7 (LAST LINE):01 (00:C4ovf 01:C4=0)
PREV R9=7 R4=1 >> UPD R4=0 WHEN C4=1 & C9=7 (UPD FROM C0vsio)(01:C4=0 00:C4 ovf)
>>3C=01/3D=01/3E=01/3F=01/00=01/01=01/02=01/03=01/04=01/05=01
```

CRTIC 0

VSYNC CONDITIONS

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```

VSYNC MANAGEMENT DURING R3

R3 APPLIED ON ALL VALUES OF C4

```
R2=50, R3=12, R0=63 :V1=#5E, V2=#5F
R2=50, R3=13, R0=63 :V1=#5E, V2=#5F
R2=50, R3=14, R0=63 :V1=#5E, V2=#5F
R2=50, R3=15, R0=63 :V1=#5E, V2=#5F
```

R3 APPLIED ON ALL VALUES OF C4, EXCEPTED WHEN C4=R7 (C9=0)(THEN R3=12)

```
R2=50, R3=12, R0=63 :V1=#5E, V2=#5F
R2=50, R3=13, R0=63 :V1=#5E, V2=#5F
R2=50, R3=14, R0=63 :V1=#5E, V2=#5F
R2=50, R3=15, R0=63 :V1=#5E, V2=#5F
R2=50, R3=15, R0=63 :V1=#5E, V2=#5F ON PREVIOUS LINE
```

VSYNC CONDITIONS IN HSYNC (R2=#2E/R3=14)

```
>> UPD R7=C4 ON C9=0, C0v=#35 PPI.B ON C9=0, C0v=#3A:#5F
>> UPD R7=C4 ON C9=0, C0v=#35 PPI.B ON C9=0, C0v=#3E:#5F
>> UPD R7=C4 ON C9=0, C0v=#35 PPI.B ON C9=1, C0v=#3A:#5F
>> UPD R7=C4 ON C9=0, C0v=#35 PPI.B ON C9=1, C0v=#3E:#5F
```

PPI STATUS 5us BEFORE R7=C4 :#5E

PPI STATUS 5us AFTER UPD R7(>)C4 (R7=C4 BEFORE)(VSYNC CANCEL)(C9=0):#5F

PPI ST C0=46 15 LINES AFTER R7=C4 ON C0vsio=#1E:#5F,5F,5F,5F,5F,5F

CRTIC 0

CRTC 0 PPI USYNC ST. EACH Sus FROM UPD R7=C4,10 ON C0vs=#1E (C4=1,C9=0)
 INI/INC B INST. FROM C0vs=#1E

```

    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
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    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
    SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF SF
  
```

CRTC 2 - GHOST USYNC - OUT R7,C4=1 IN HSYNC (C0inst=R2=46), THEN...
 EVENT: OUT R7,16/OUT R7,1 ON C4=1,C9=0,C0inst=10,18:PPI.B=#FF
 EVENT: OUT R7,2 ON C4=2,C9=0,C0inst=5 : PPI.B=#FF
 EVENT: OUT R7,3 ON C4=3,C9=1,C0inst=34:PPI.B=#FF

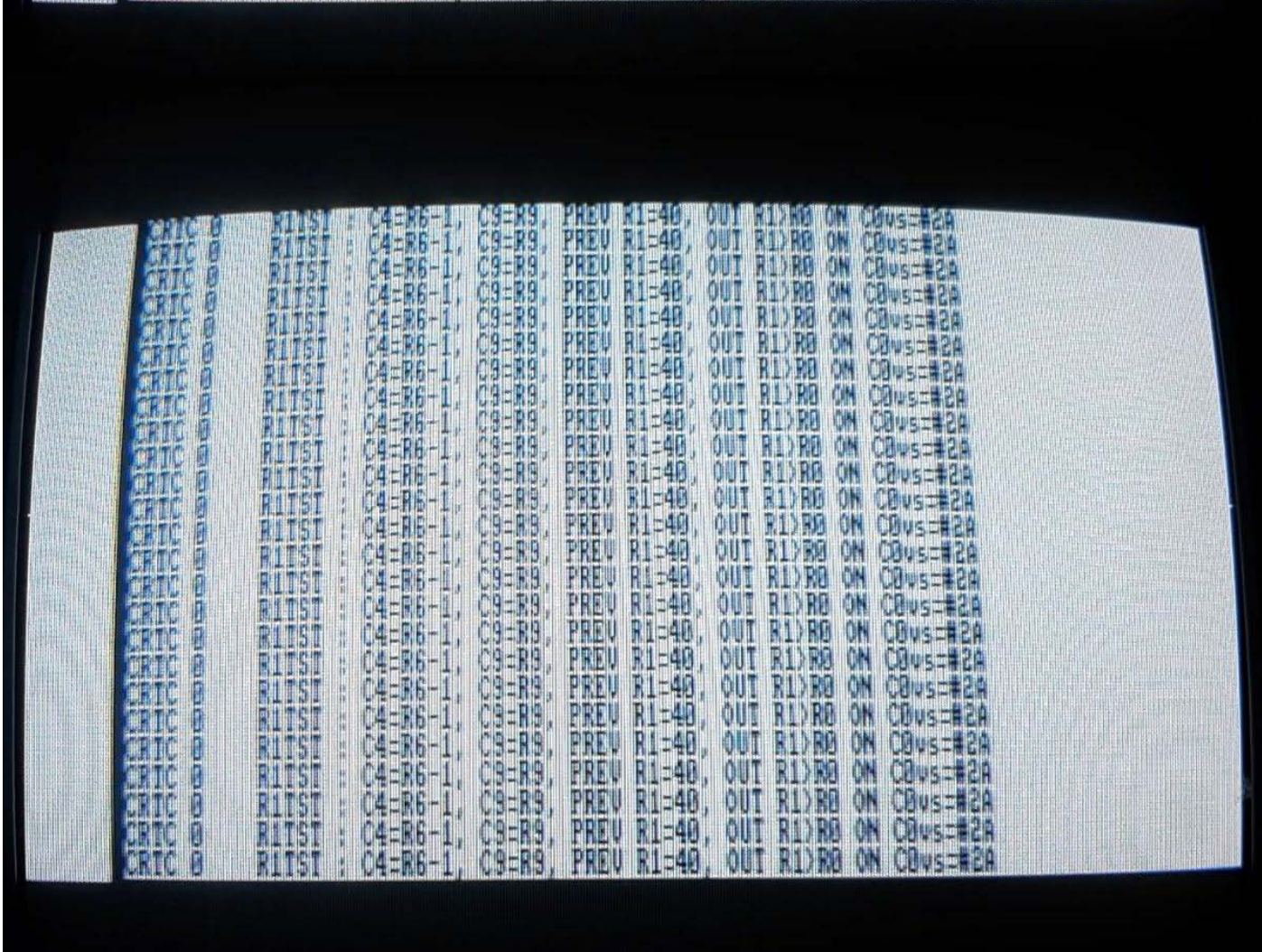
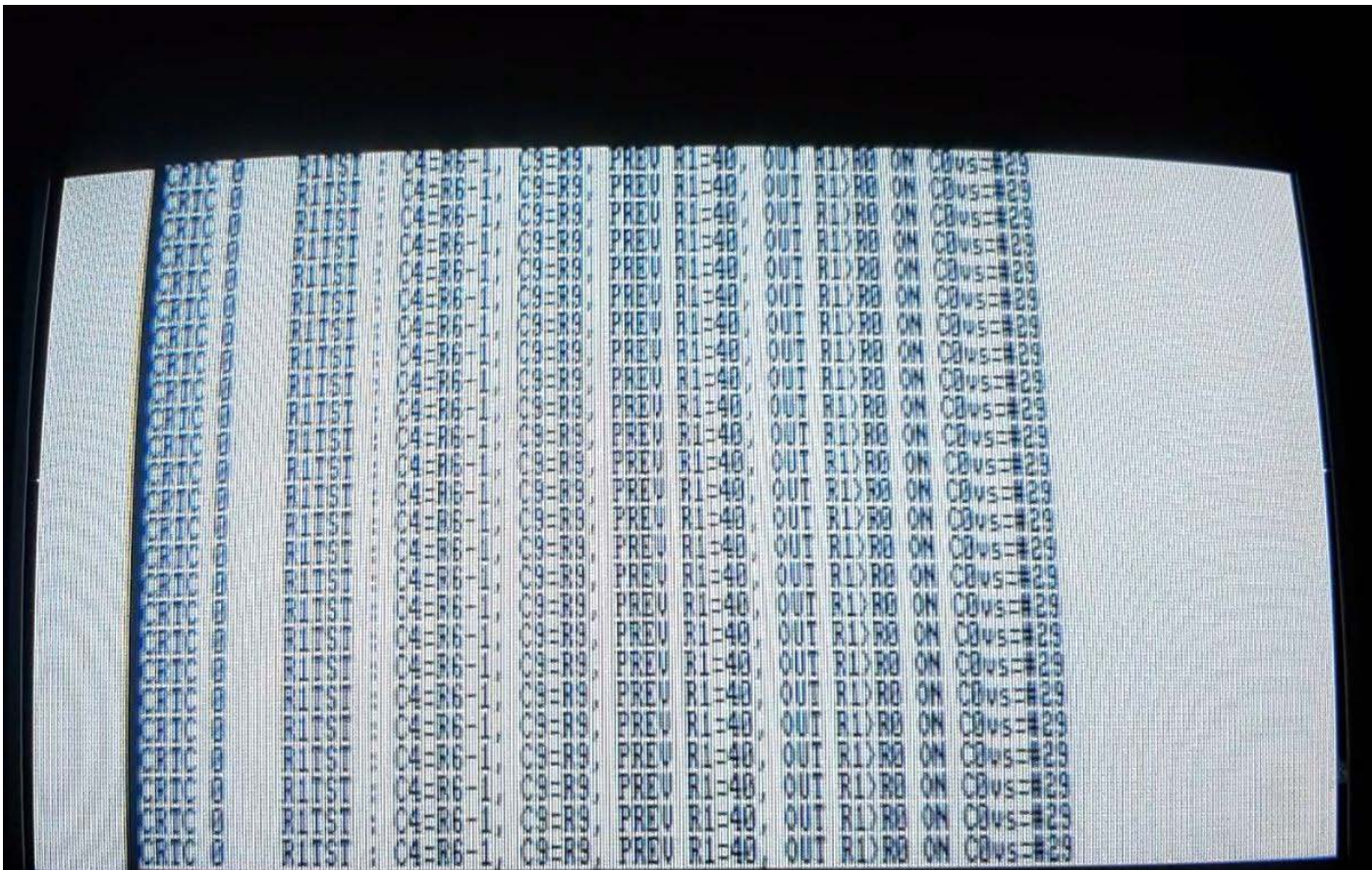
R1 STORIES

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!
```



CRTC 0 R1 STORIES
STORY 2 : R1 > 00 WHEN C9=R9 & C9<R9
PROCESS : UPDATE R1 ON 16 LINES (64 x 7, 40 (C9=7))+(40 x 7, 64(C9=7))
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27
(L1)AT #C000+(5x80)
(L2)AT #C000+(8x80)
(L2)AT #C000+(6x80)
(L3)AT #C000+(7x80)

CRTC 0 R1 STORIES
STORY 3 : R1=0 EFFECT (EACH LINE : 4 x OUT R1,0/OUT R1,40)
PROCESS : UPDATE R1=0 FOR 4x8 Lines FROM C0=3C, C0=3D, C0=3E, C0=3F
00 02 04 06 08 0A 0C 0E 10 12 14 16 18 1A 1C 1E 20 22 24 26
01 03 05 07 09 0B 0D 0F 11 13 15 17 19 1B 1D 1F 21 23 25 27

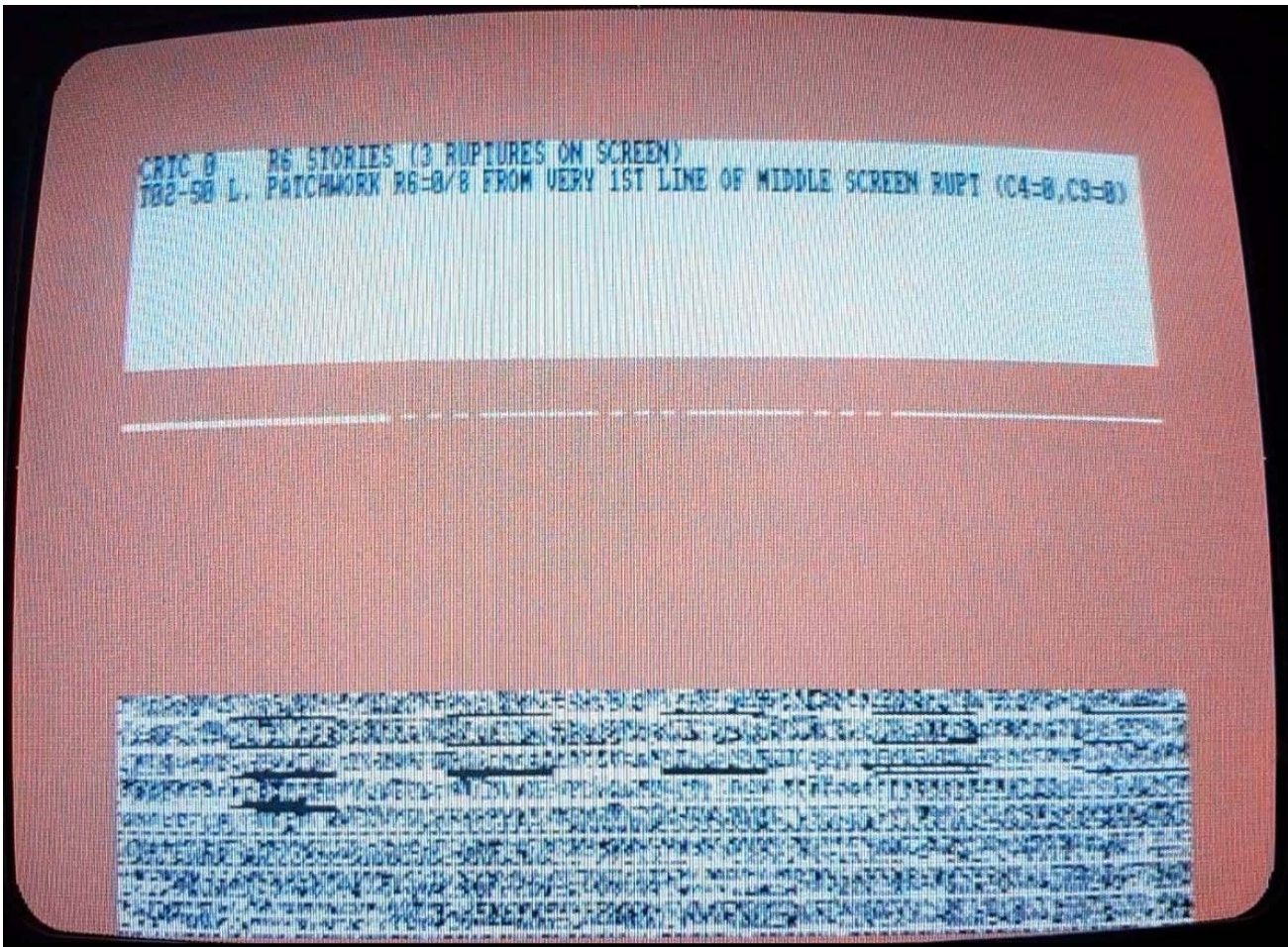
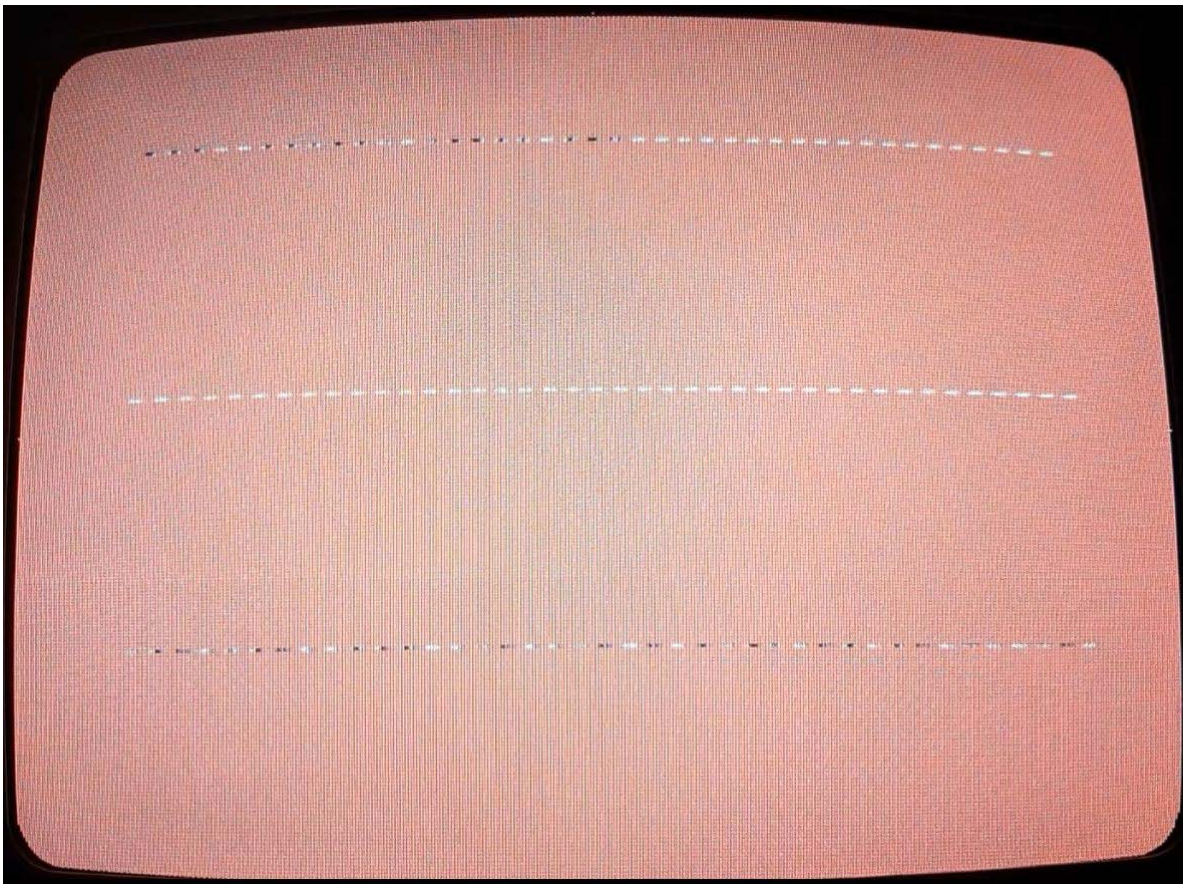


R6 STORIES

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC USYNC FROM PPI.PORTB.0=1 !!
```



CRTC 0 R6 STORIES (3 RUPTURES ON SCREEN)
T01-R6=0 IN 5 SEC. (PRESS SPACE, OR WAIT 4 SEC IN AUTO MODE)



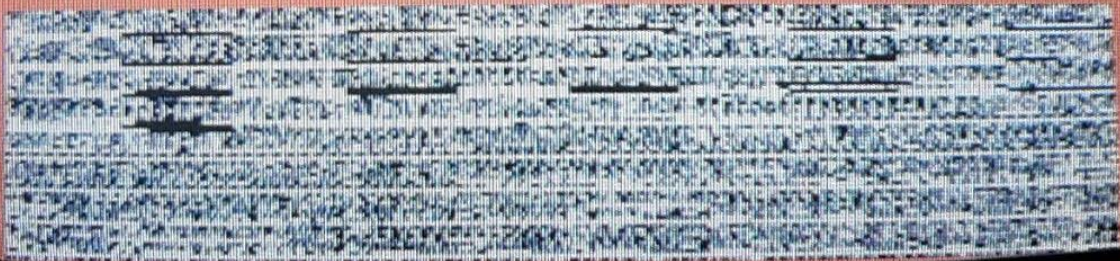
CRTC 0 R6 STORIES (3 RUPTURES ON SCREEN)
T03-50 L. PATCHWORK R6-0/8 FROM 2ND LINE OF MIDDLE SCREEN RUPTURE (C4-0,C9-1)



CRTC 0 R6 STORIES (3 RUPTURES ON SCREEN)
T04-1ST LINE IN DISPLAY AREA : SEQUENCE R6-0/R6-8/ WHEN R1)R0



CRTC 0 R6 STORIES (3 RUPTURES ON SCREEN)
T86-58 L FROM 2ND LINE IN DISP AREA : PATCHWORK R6=0/R6=8 WHEN R1>R0



CRTC 0 R6 STORIES -AGAIN-
T86A-0M C4=3/C8=8 PATCHWORK R6=9/25 IN DISP AREA FOR 64 LINES

CRIC 0 R6 STORIES -AGAIN-
T06A-0M C4=9/C9=0 PATCHWORK R6=9/25 IN DISP AREA FOR 64 LINES

CRIC 0 R6 STORIES -AGAIN-
T06B-0M C4=9/C9=1 PATCHWORK R6=9/25 IN DISP AREA FOR 64 LINES

CRTC 0 R6 STORIES -AGAIN-
R6=0 ON C4=9/C9=1 PATCHWORK R6=8/25 IN DISP AREA FOR 64 LINES

CRTC 0 R6 STORIES -LAST LINE-
R6=0/FF FROM C0=2 ON C4=R4, C9=0..7, PREVIOUS R6=R4+1

..7, PREVIOUS R6=R4+1

CRTC 0 R6 STORIES -LAST LINE-
R6=0/FF FROM C0=2 ON C4=R4, C9=0

CRTC 0 R6 STORIES -LAST LINE-
R6=0/FF FROM CB=2 IN U.ADJ ZONE (R5=16) (C4=fnc(CRTC)) PREVIOUS R6=R4+3

CRTC 0 R6 STORIES -LAST LINE-
R6=0/FF FROM CB=2 IN U.ADJ ZONE

(R5=16) (C4=fnc(CRTC)) PREVIOUS R6=R4+3

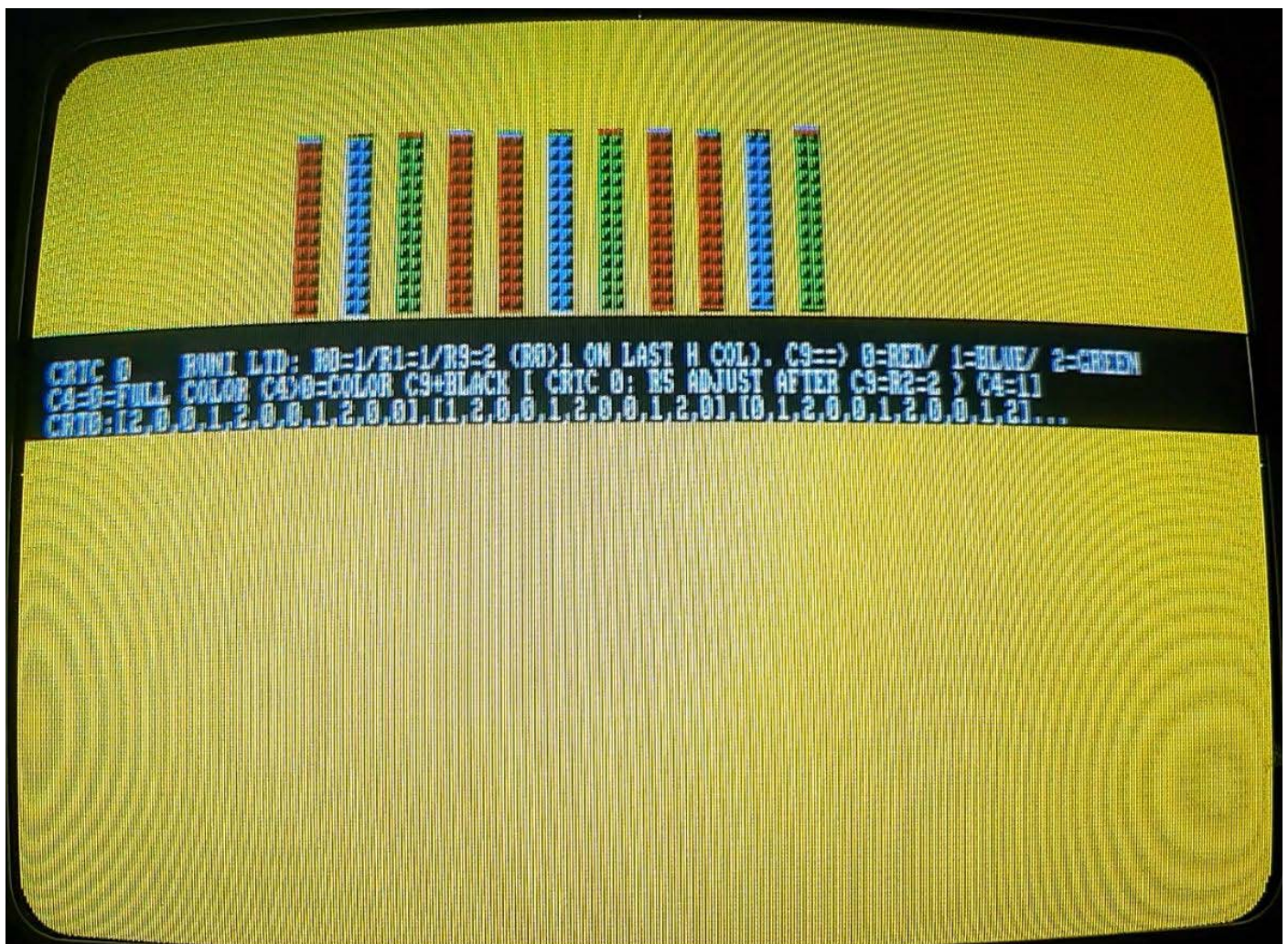
CRTC 0 R6 STORIES -LAST LINE-
R6=R4+1/FF FROM CB=2 IN U.ADJ ZONE (R5=16) (C4=fnc(CRTC)) PREVIOUS R6=R4+3

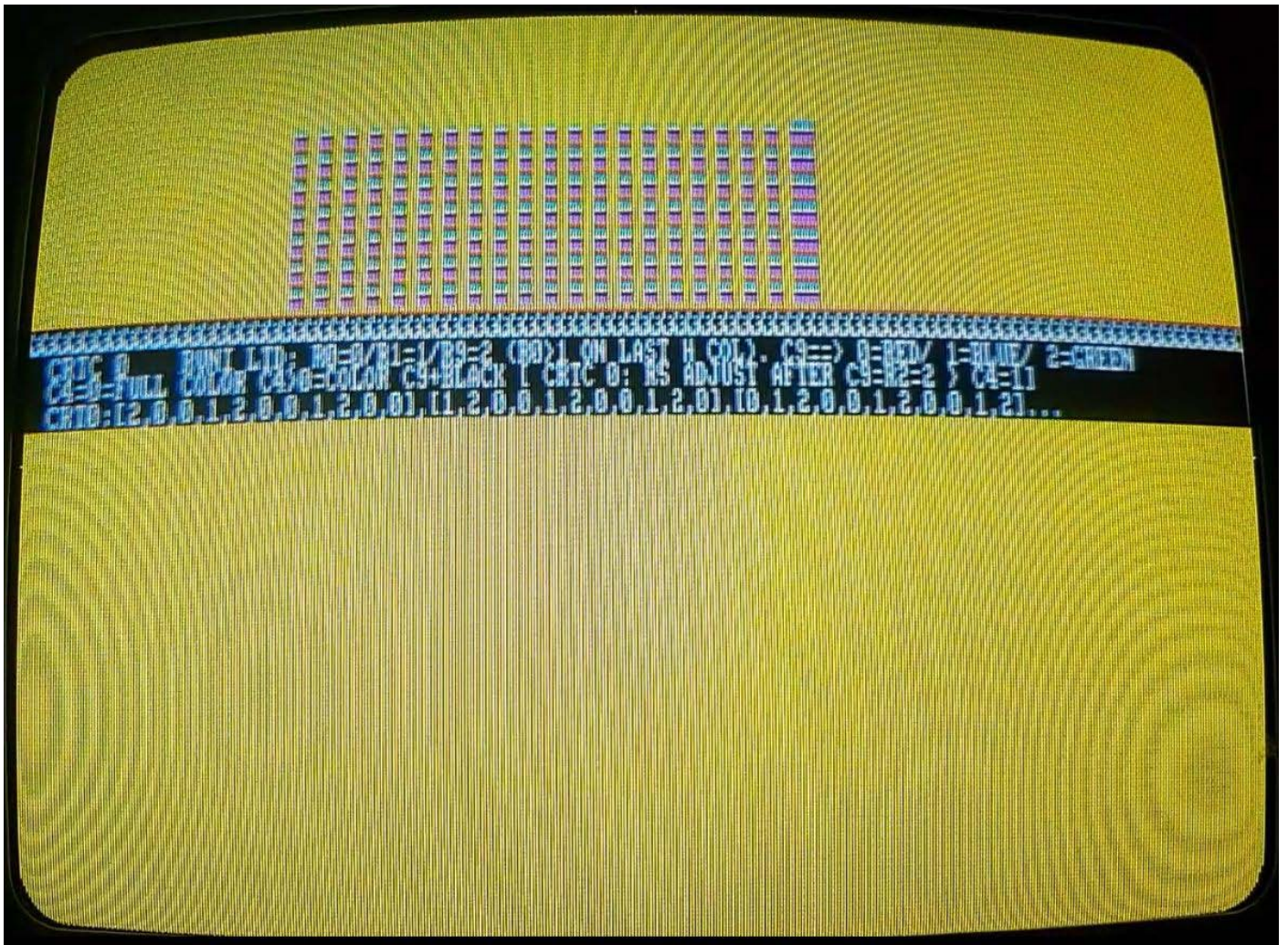
CRTC 0 R6 STORIES -LAST LINE-
R6=R4+1/FF FROM CB=2 IN U.ADJ ZONE

(R5=16) (C4=fnc(CRTC)) PREVIOUS R6=R4+3

RVNI (NON INVISIBLE VERTICAL RUPTURE)

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RVNI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT <> CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```

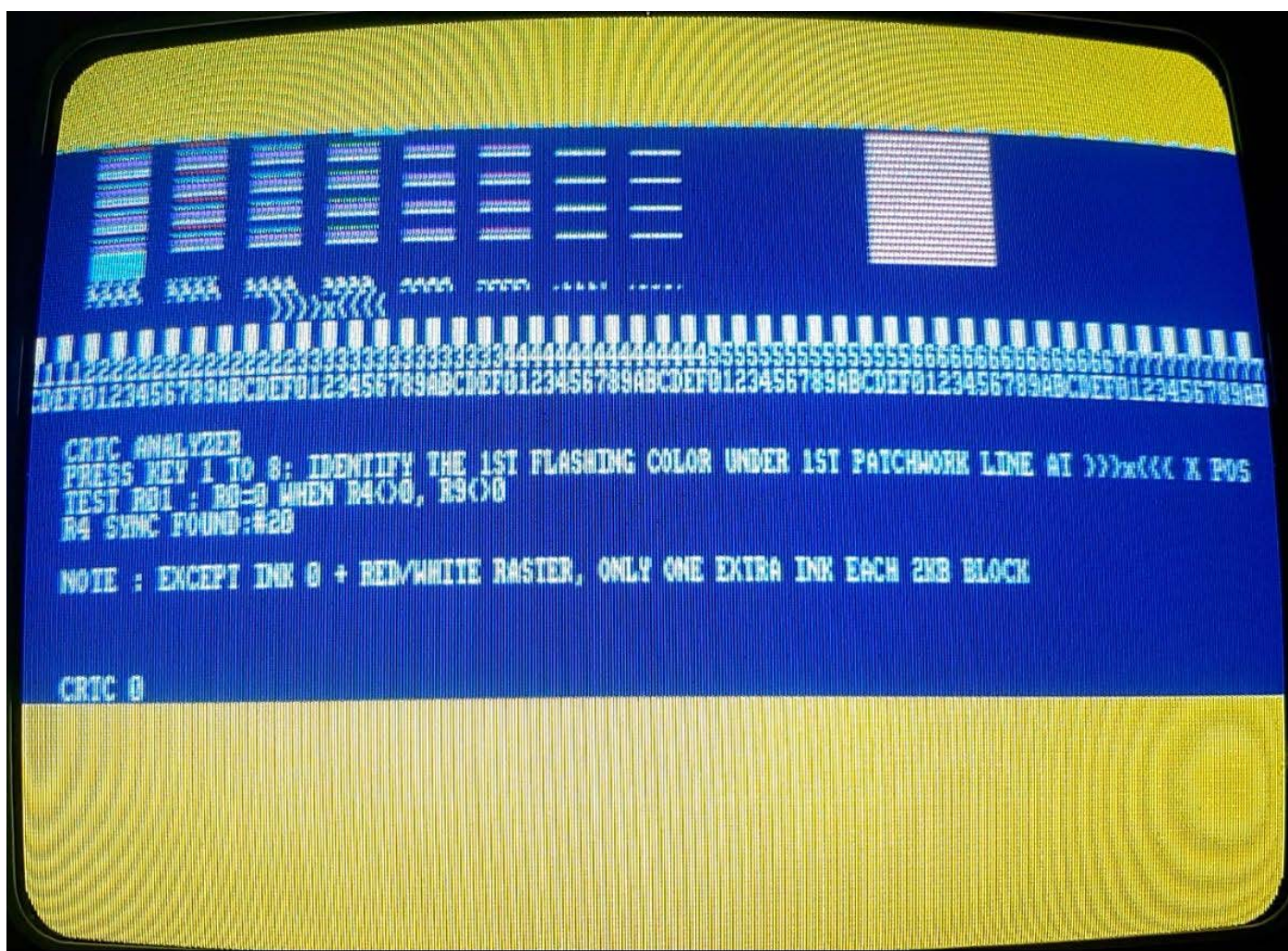




ANALYZER / FORCED STABILISATION ON R0=0

```

CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!
    
```





R5 SCANNER (for CRTC 1)

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
(O) CRTC 2 RUMB
(F0) BOUNGA:CRTC 2 ZERO!
(F1) INTERLACE VM (27 TST)
```

TEST FOR CRTC 1

R5 STORIES / INTERACTIVE TEST

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```

TEST FOR CRTIC 1

OFFSET UPDATE

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!
```

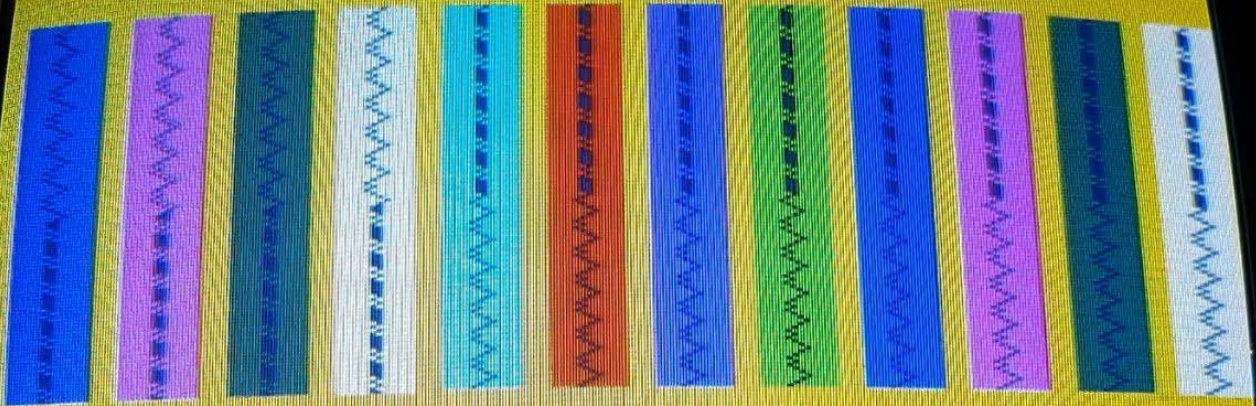
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UPD R12 ON C0vec=#3F

CRTC 0 UPD R12/R13=#1000 CRT 2 ON C4=R4=1, C9=7, R1=#28
UPD R12 ON C0vec=#00
CRTC 0 UPD R12/R13=#1000 CRT 2 ON C4=R4=1, C9=7, R1=#28
UPD R12 ON C0vec=#00

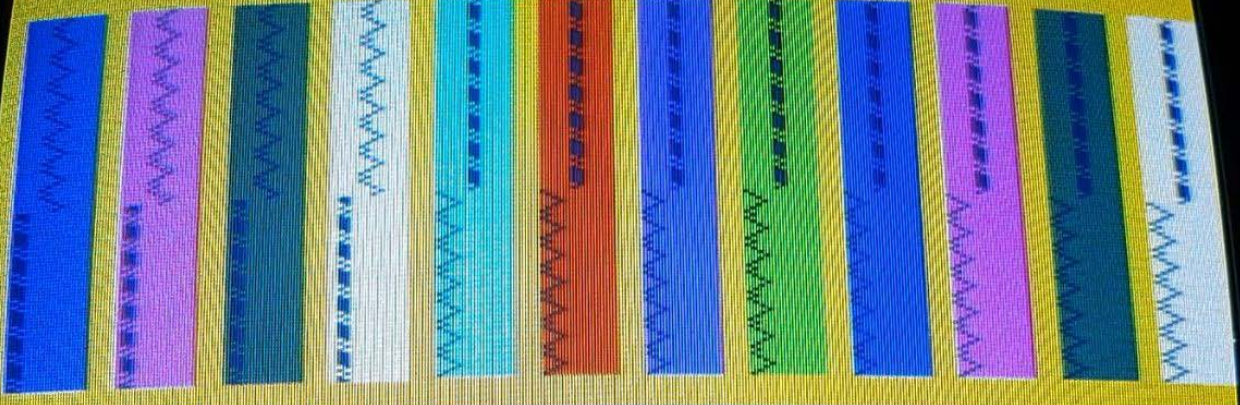
« RVMB »

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC VSYNC FROM PPI.PORTB.0=1 !!

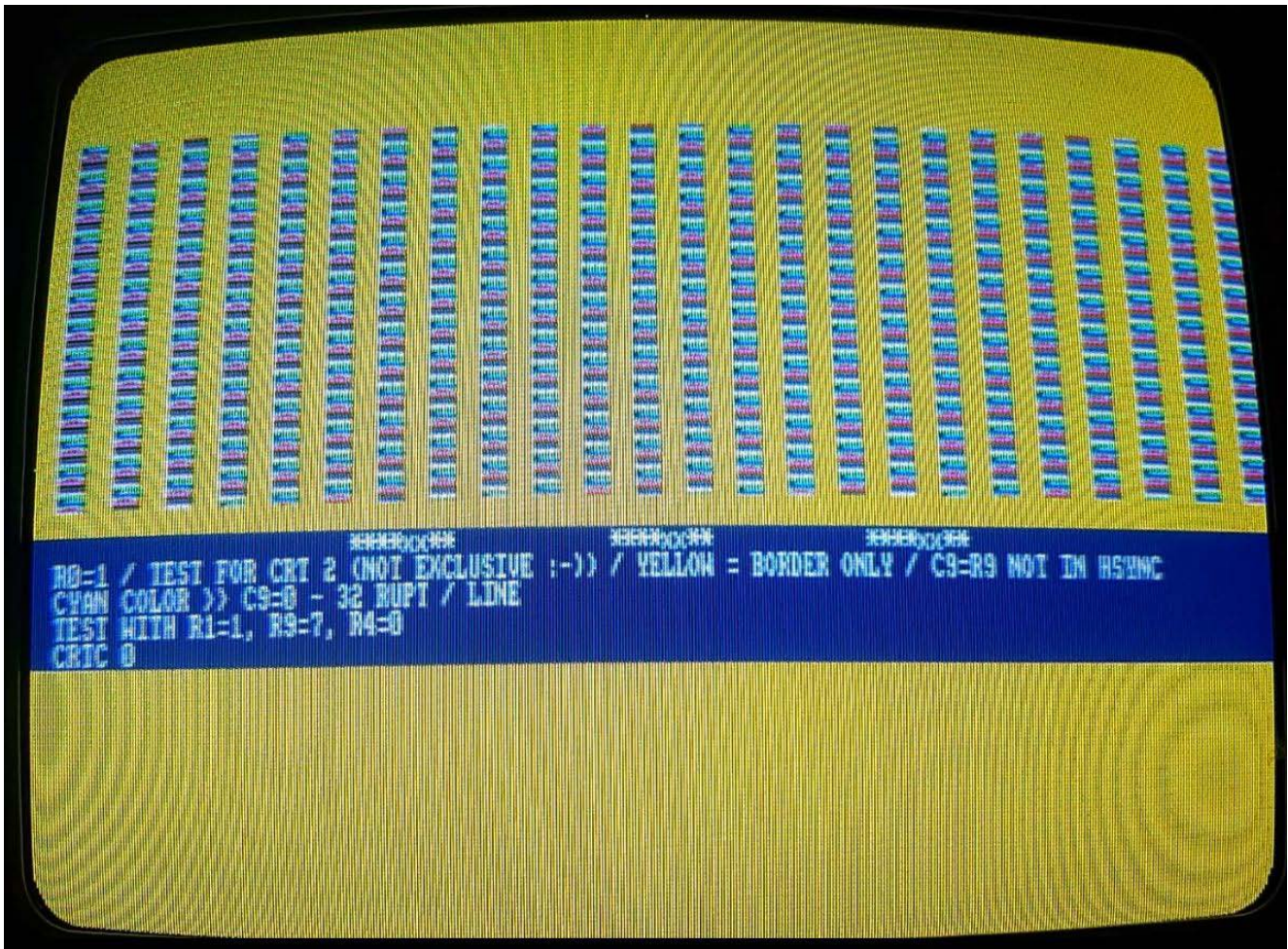
(0) CRTIC 2 RVMB
(F0) BOUNGA: CRTIC 2 ZERO!
(F1) INTERLACE VM (27 TST)
```

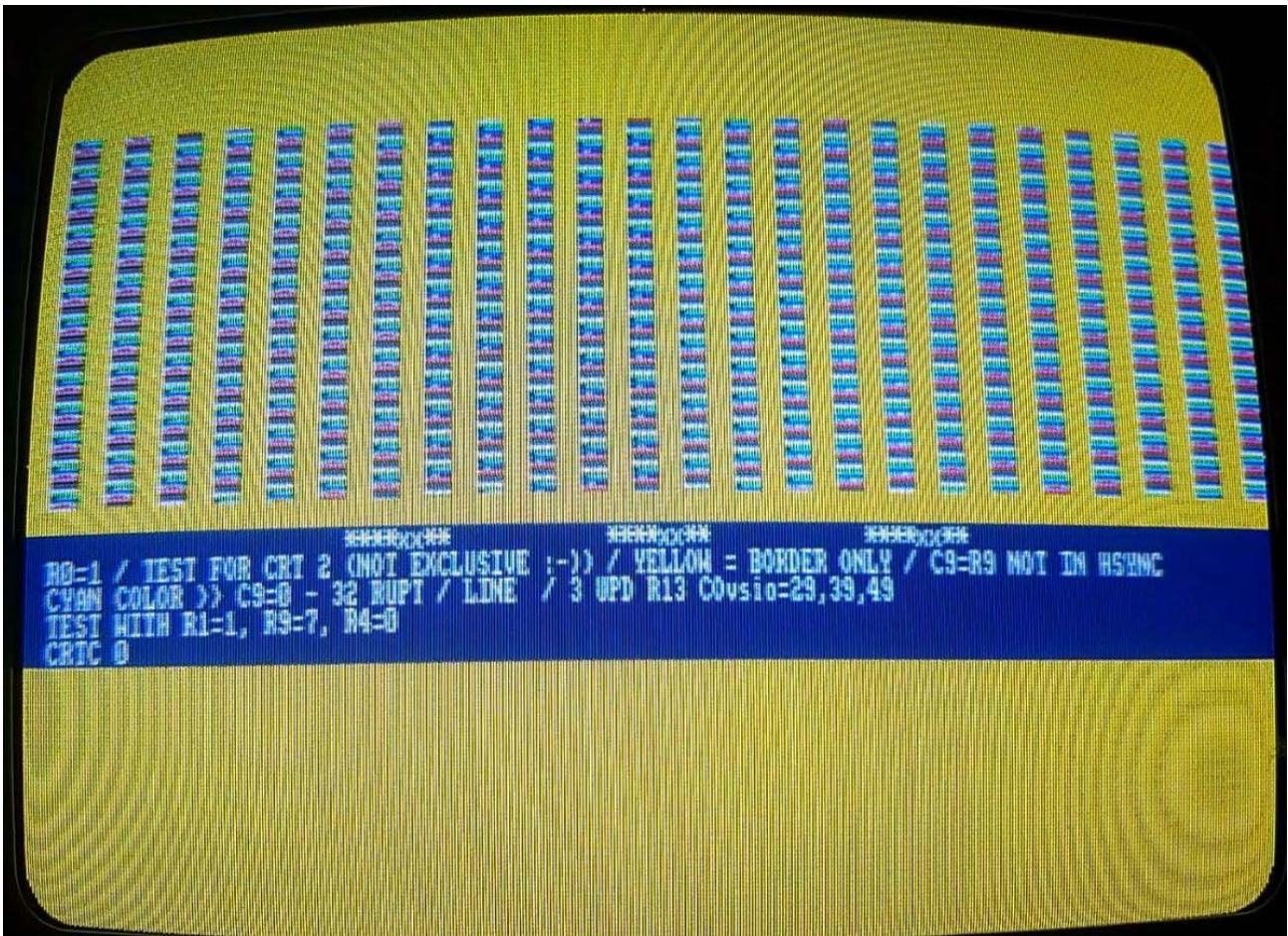


RD=3 / TEST FOR CRT 2 (NOT EXCLUSIVE :-)) / YELLOW = BORDER ONLY / C9-R9 NOT IN HSYNC
CYAN COLOR >> C9=0 - 16 RUPT / LINE
TEST WITH R1=3, R9=7, R4=120
CRIC 0



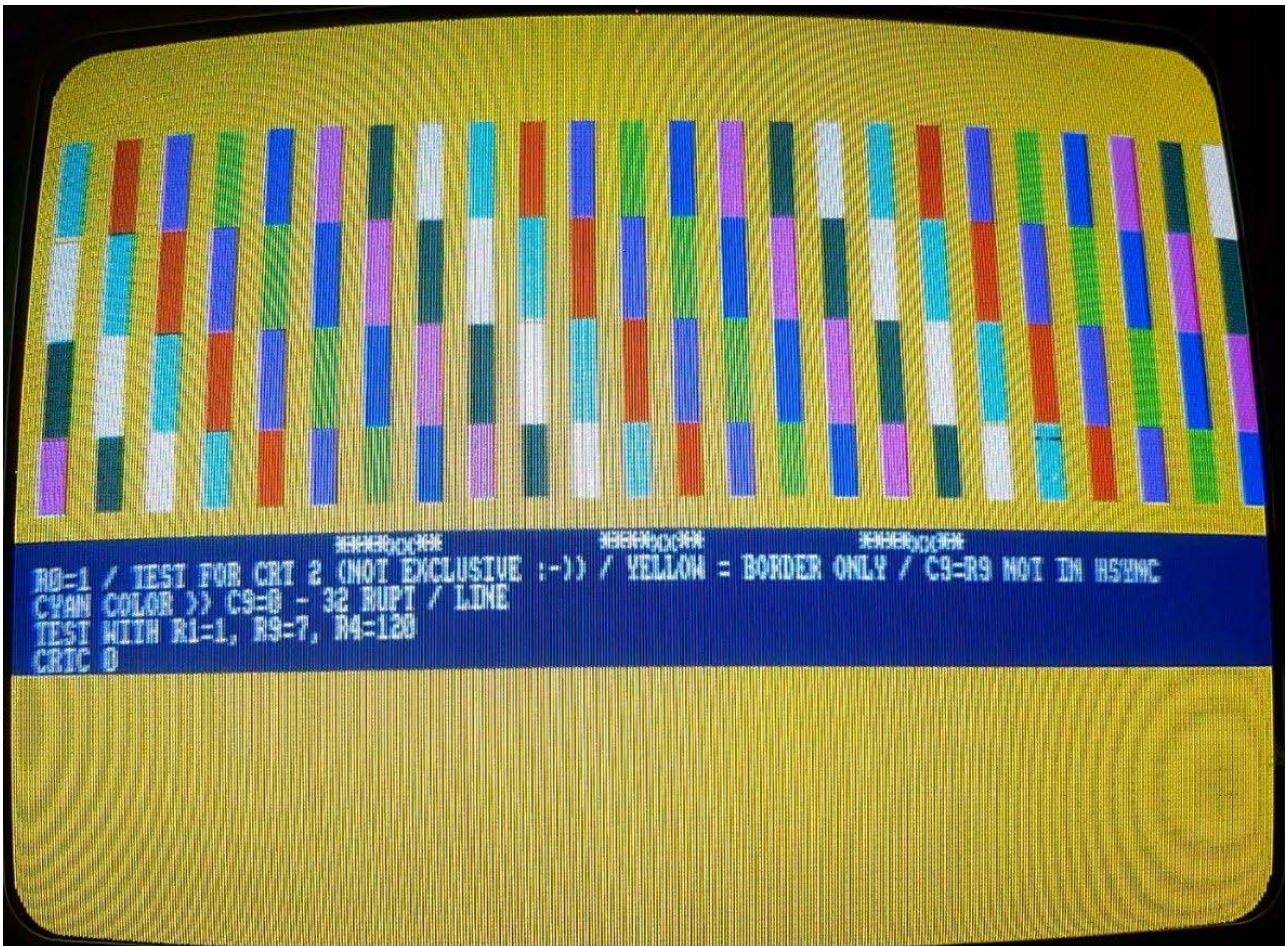
RD=3 / TEST FOR CRT 2 (NOT EXCLUSIVE :-)) / YELLOW = BORDER ONLY / C9-R9 NOT IN HSYNC
CYAN COLOR >> C9=0 - 16 RUPT / LINE
TEST WITH R1=3, R9=7, R4=120
CRIC 0





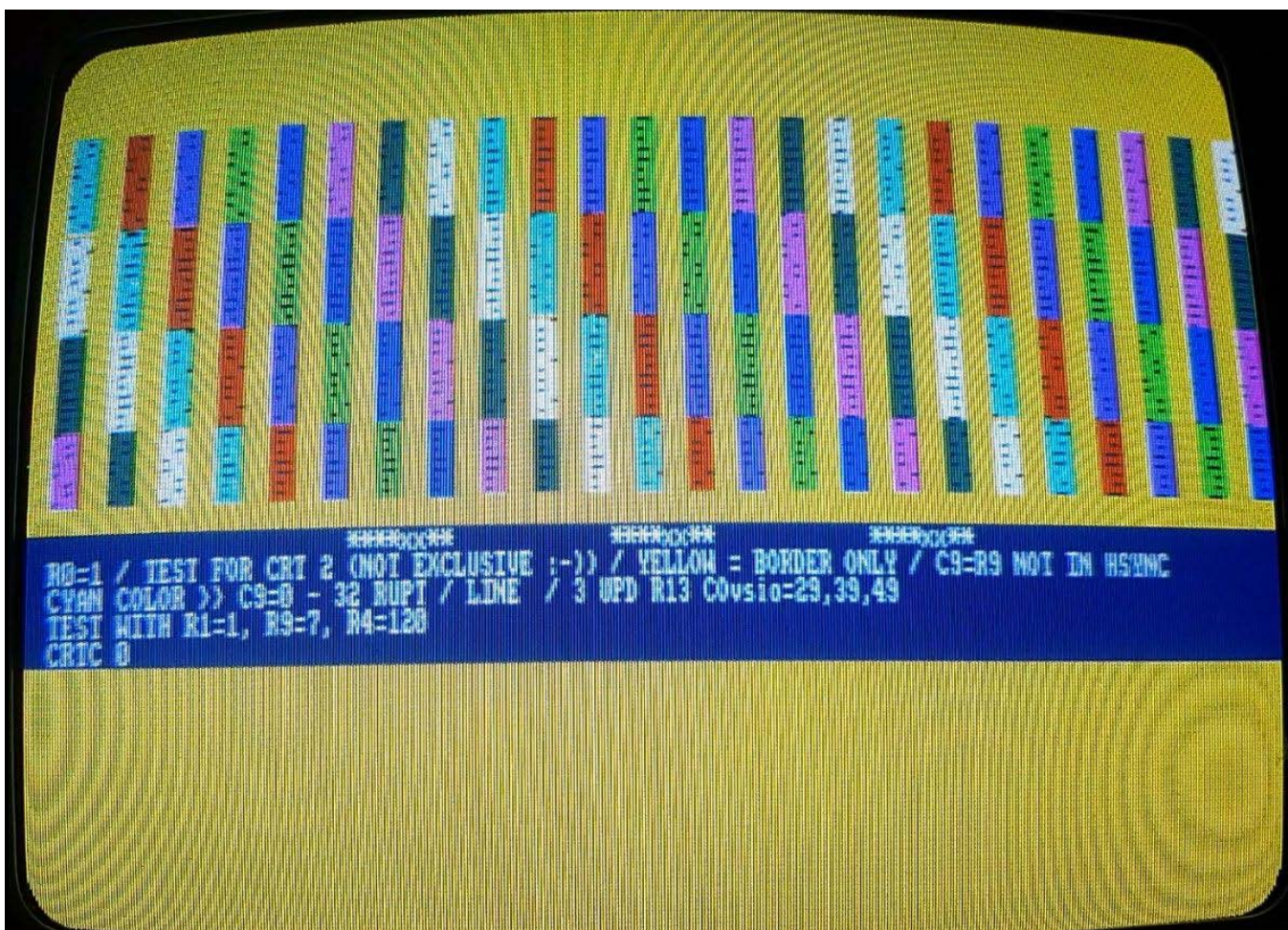












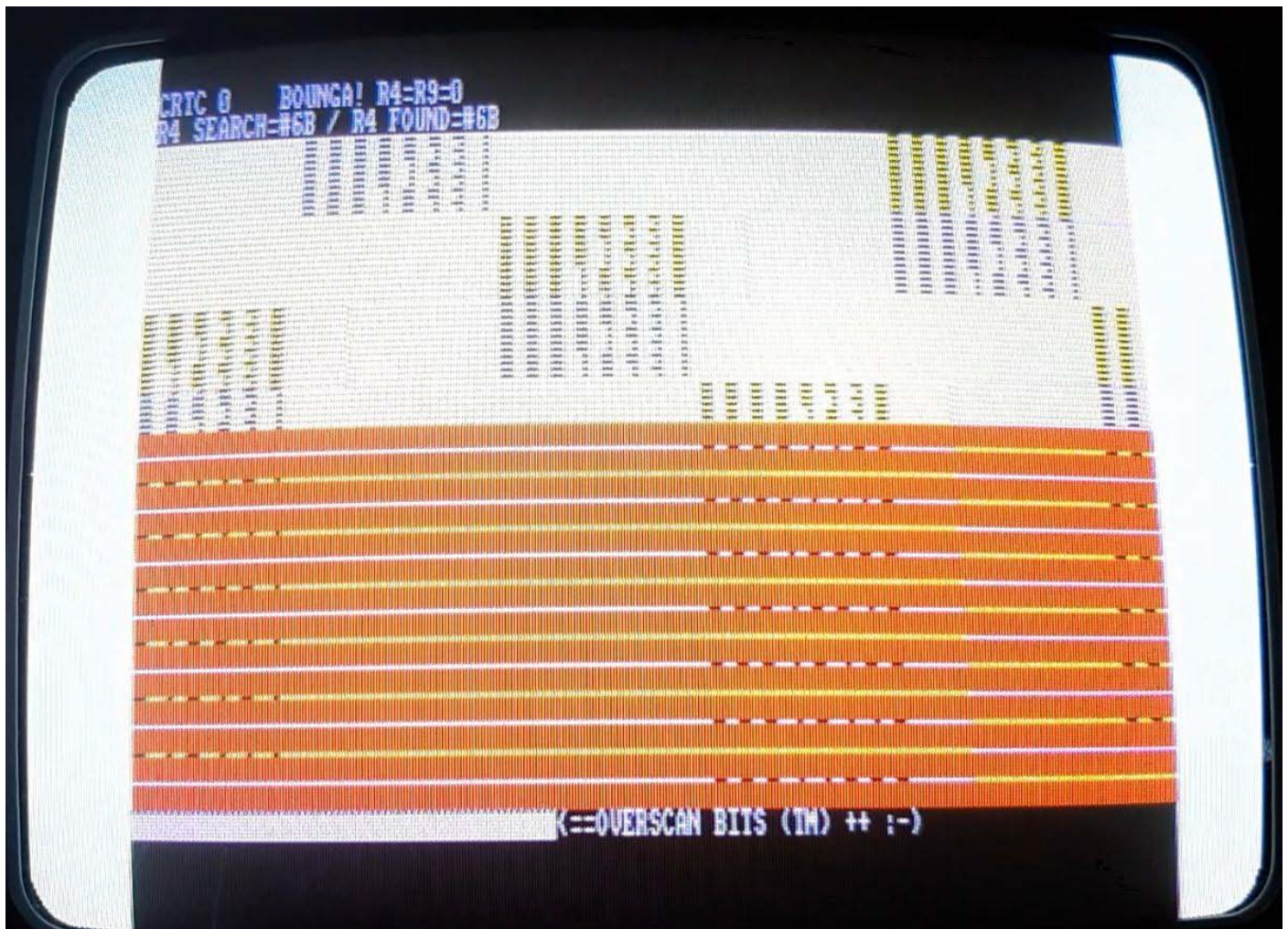




BOUNGA : CRTC 2 R4=R9=0 FORCED

```
CPC SHAKER 1.8 / LONGSHOT. LOGON SYSTEM
(1) UPDATE URAM VS CRTC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) VSYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT <> CRTC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTC VSYNC FROM PPI.PORTB.0=1 !!
```

```
(0) CRTC 2 RUMB
(F0) BOUNGA:CRTC 2 ZERO!
(F1) INTERLACE VM (27 TST)
```



INTERLACE VM

```
CPC SHAKER 1.8 / LONGSHOT, LOGON SYSTEM
(1) UPDATE URAM VS CRTIC (14 TST)
(2) SKEW DISP ON R0 RUPTURE (5 TST)
(3) INTERRUPT DELAY FROM R2 (18 CALC)
(4) UPDATE CRTIC R0 TIMING (7 TST)
(5) R13 UPDATE IN 4 USEC SCREENS (R0=3) (5 TST)
(6) R13 UPDATE IN 2 USEC SCREENS (R0=1) (5 TST)
(7) R13 UPDATE IN 1 USEC SCREENS (R0=0) (5 TST)
(8) GATE ARRAY PIXELISATION
(9) GATE ARRAY INKERISATION (3 TST)
(E) GATE ARRAY MODERISATION
(R) HSYNC DELAY MODE UPD,UPD R2, LGTH R3 (2.1.0)(3 TST)
(T) R2 UPD DURING & AFTER HSYNC (6 TST)
(Y) R3 UPD DURING HSYNC (8 TST)
(U) R4 & R9 CHECKING (6 TST (IN PROGRESS))
(I) USYNC CONDITIONS (16 TST)
(O) R1 STORIES (7 TST)
(P) R6 STORIES (11 TST)
(RETURN) RUMI LTD
(CAPS) ANALYZER / FORCED STAB CRTIC 0 R0=0 (4 CONF)
(CTRL) R5 SCANNER / (TAB) R5 STORIES (INTERACTIVE)
(COPY) CRTIC 2 OFFSET
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTIC CNT (<) CRTIC CAR DISPLAY
!! REF C0vs=0 DEFINED FROM CRTIC USYNC FROM PPI.PORTB.0=1 !!

(O) CRTIC 2 RUMB
(F0) BOUNGA: CRTIC 2 ZERO!
(F1) INTERLACE VM (27 TST)
```

```
CRTIC 0 INTERLACE VIDEO MODE
CALC WITH R6=#19:
R8=3 ON LINE 0 : FRAME SIZE=#2720 usec (R9=6)(R7=0)
R8=3 ON LINE 1 : FRAME SIZE=#2740 usec (R9=6)(R7=0)
R8=3 ON LINE 2 : FRAME SIZE=#2720 usec (R9=6)(R7=0)
R8=3 ON LINE 3 : FRAME SIZE=#2B40 usec (R9=6)(R7=0)
R8=3 ON LINE 4 : FRAME SIZE=#2B20 usec (R9=6)(R7=0)
R8=3 ON RASTER LINE 2 / R8=0 ON LINE 43 / FRAME SIZE=#3C00 usec (R9=6)(R7=0)
CALC WITH R6=#7F:
R8=3 ON LINE 0 : FRAME SIZE=#2740 usec (R9=6)(R7=0)
R8=3 ON LINE 1 : FRAME SIZE=#2720 usec (R9=6)(R7=0)
R8=3 ON LINE 2 : FRAME SIZE=#2740 usec (R9=6)(R7=0)
R8=3 ON LINE 3 : FRAME SIZE=#2B20 usec (R9=6)(R7=0)
R8=3 ON LINE 4 : FRAME SIZE=#2B40 usec (R9=6)(R7=0)
R8=3 ON RASTER LINE 2 / R8=0 ON LINE 43 / FRAME SIZE=#3C00 usec (R9=6)(R7=0)
R7=#18, BEFORE R6
CALC WITH R6=#19:
R8=3 ON LINE 0 : FRAME SIZE=#1800 usec (R9=6)(R7=0)
R8=3 ON LINE 1 : FRAME SIZE=#1800 usec (R9=6)(R7=0)
R8=3 ON LINE 2 : FRAME SIZE=#1800 usec (R9=6)(R7=0)
R8=3 ON LINE 3 : FRAME SIZE=#1C00 usec (R9=6)(R7=0)
R8=3 ON LINE 4 : FRAME SIZE=#1C00 usec (R9=6)(R7=0)
R8=3 ON RASTER LINE 2 / R8=0 ON LINE 43 / FRAME SIZE=#2280 usec (R9=6)(R7=0)
```


CRTC 0 INTERLACE VIDEO MODE

R9 UPDATE DELAY + 0 FRAME DELAY

R8=3 ON C8=0, C8=#3D : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C8=0, C8=#3E : FRAME SIZE=#2740 usec (R9=6)
R8=3 ON C8=0, C8=#3F : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C8=L, C8=#00 : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C8=L, C8=#01 : FRAME SIZE=#2740 usec (R9=6)

R9 UPDATE DELAY + 0 FRAME DELAY

R8=3 ON C9=0, C9=#3D : FRAME SIZE=#2740 usec (R9=6)
R8=3 ON C9=0, C9=#3E : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C9=0, C9=#3F : FRAME SIZE=#2740 usec (R9=6)
R8=3 ON C9=L, C9=#00 : FRAME SIZE=#2740 usec (R9=6)
R8=3 ON C9=L, C9=#01 : FRAME SIZE=#2720 usec (R9=6)

R9 UPDATE DELAY + 1 FRAME DELAY

R8=3 ON C9=0, C9=#3D : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C9=0, C9=#3E : FRAME SIZE=#2740 usec (R9=6)
R8=3 ON C9=0, C9=#3F : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C9=L, C9=#00 : FRAME SIZE=#2720 usec (R9=6)
R8=3 ON C9=L, C9=#01 : FRAME SIZE=#2740 usec (R9=6)

DELAY FOR EVEN+ODD FRAME (E/O R6=50/50, 7E/50, 50/7E, 7E/7E)

R8=3 ON LINE 0 : FRAME SIZE=#9C60 usec (R9=6)(R7=0)
R8=3 ON LINE 0 : FRAME SIZE=#9C40 usec (R9=6)(R7=0)
R8=3 ON LINE 0 : FRAME SIZE=#9C20 usec (R9=6)(R7=0)
R8=3 ON LINE 0 : FRAME SIZE=#9C20 usec (R9=6)(R7=0)

INTERLACE C4/C9 COUNTERS

CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM

- (1) INTERLACE C4/C9 COUNTERS
- (2) INTERLACE CRTC 2 C9 STRANGER THING
- (3) FAKE USYNC ON CRTC 2
- (4) CRTC 2 FIND C0 MIN
- (5) CRTC 2 RLAL
- (6) CRTC 1 BUG OUTI R0

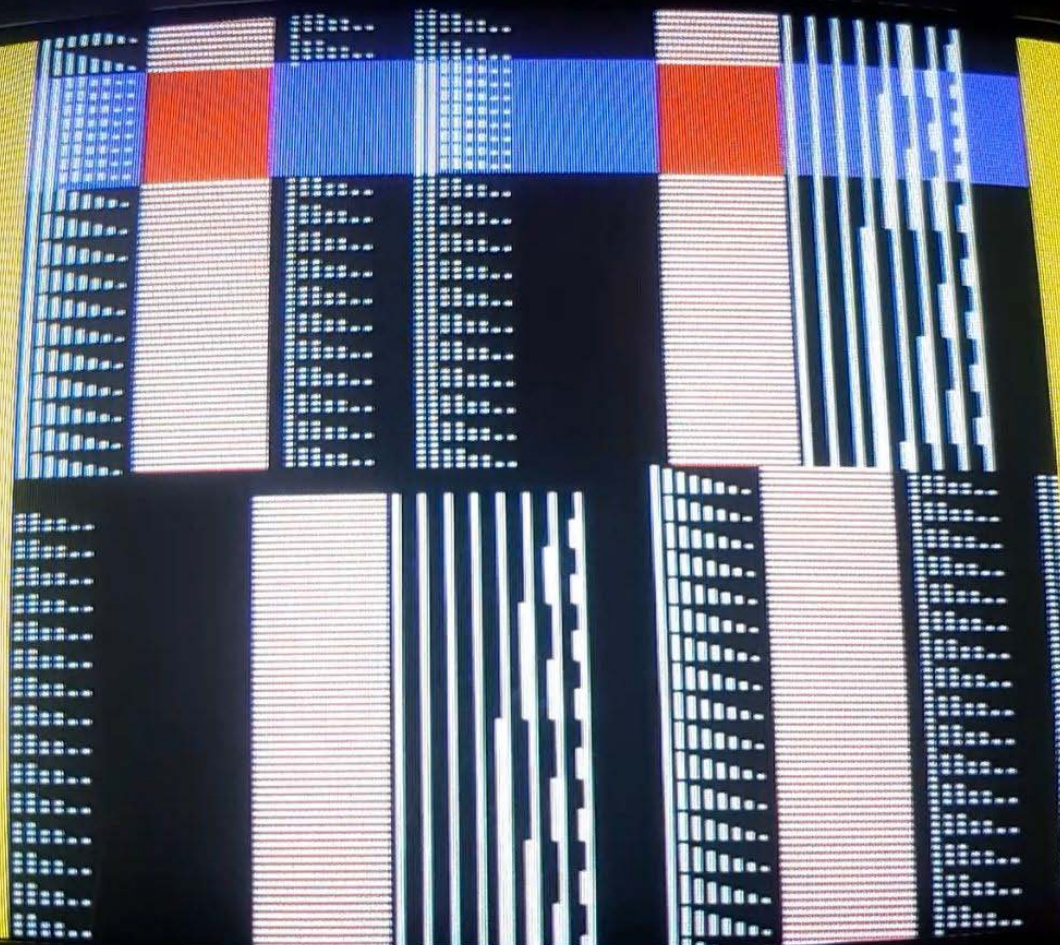
(S) BE00 CHECK (CRTC 1)

(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!

CRTC 0 INTERLACE ON TESTS - C4/C9 COUNTING IN ION PERIOD (MOVE ZONE)

NEXT SCREEN : C4=6, C9=0 >> UPD R9=6, R8=3 (+3105)
EXIT ION MODE ON C9=0 >> UPD R9=7, R8=0

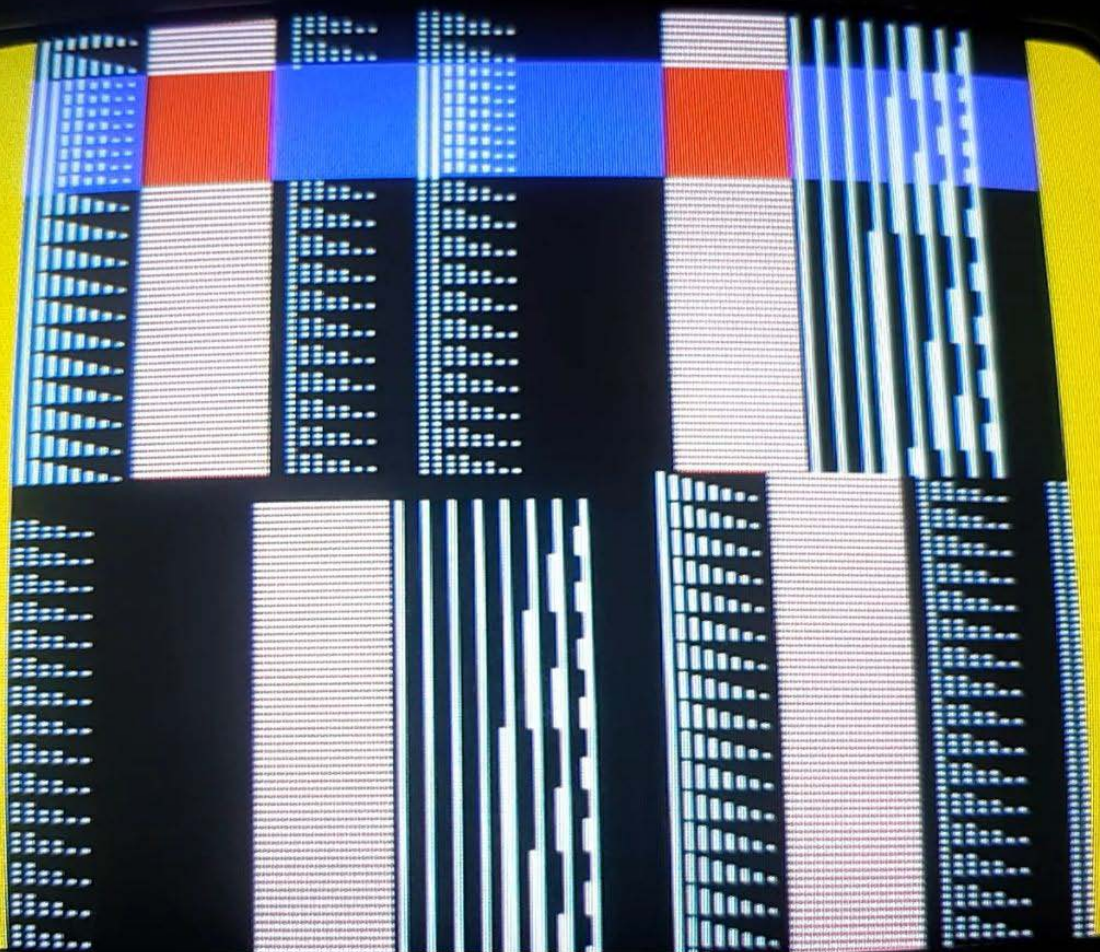
AUTOSYNC ON PREVIOUS SCREEN TEST: R4=#hex R5=#hex



CRTC 0 INTERLACE VM TESTS - C4/C9 COUNTING IN IVM PERIOD (KNOVE ZONE)

NEXT SCREEN : C4=6, C9=0 >> UPD R9=6, R8=3 (+310S)
EXIT IVM MODE ON C9=0 >> UPD R9=7, R8=0

AUTOSHMC ON PREVIOUS SCREEN TEST: R4=0xx R5=0xx



CRTC 0 INTERLACE VM TESTS - C4/C9 COUNTING IN IVM PERIOD (MANUE ZONE)

NEXT SCREEN : C4=6, C9=1 >> UPD R9=6, R8=3 (+3105)
EXIT IVM MODE ON C9=0 >> UPD R9=7, R8=0

AUTOSYNC ON PREVIOUS SCREEN TEST: M4=M2A R5=H08

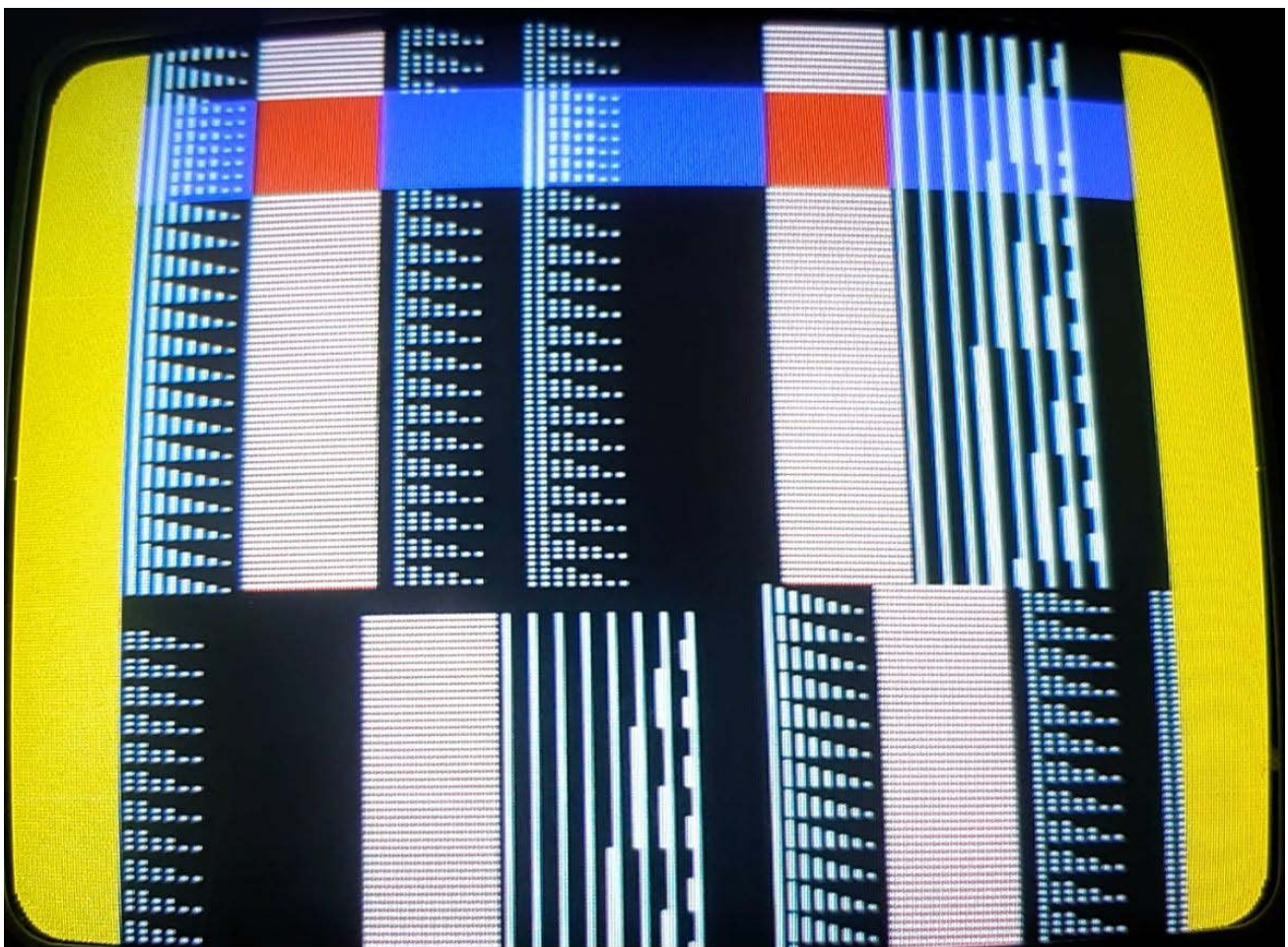


CRTC 0 INTERLACE VM TESTS - C4/C9 COUNTING IN IVM PERIOD (MAGNIFY 20X)

NEXT SCREEN : C4=6, C9=2 >> UPD R9=6, R8=3 (+3105)
EXIT IVM MODE ON C9=0 >> UPD R9=7, R8=0

AUTOSYNC ON PREVIOUS SCREEN TEST: R4=02A R5=000

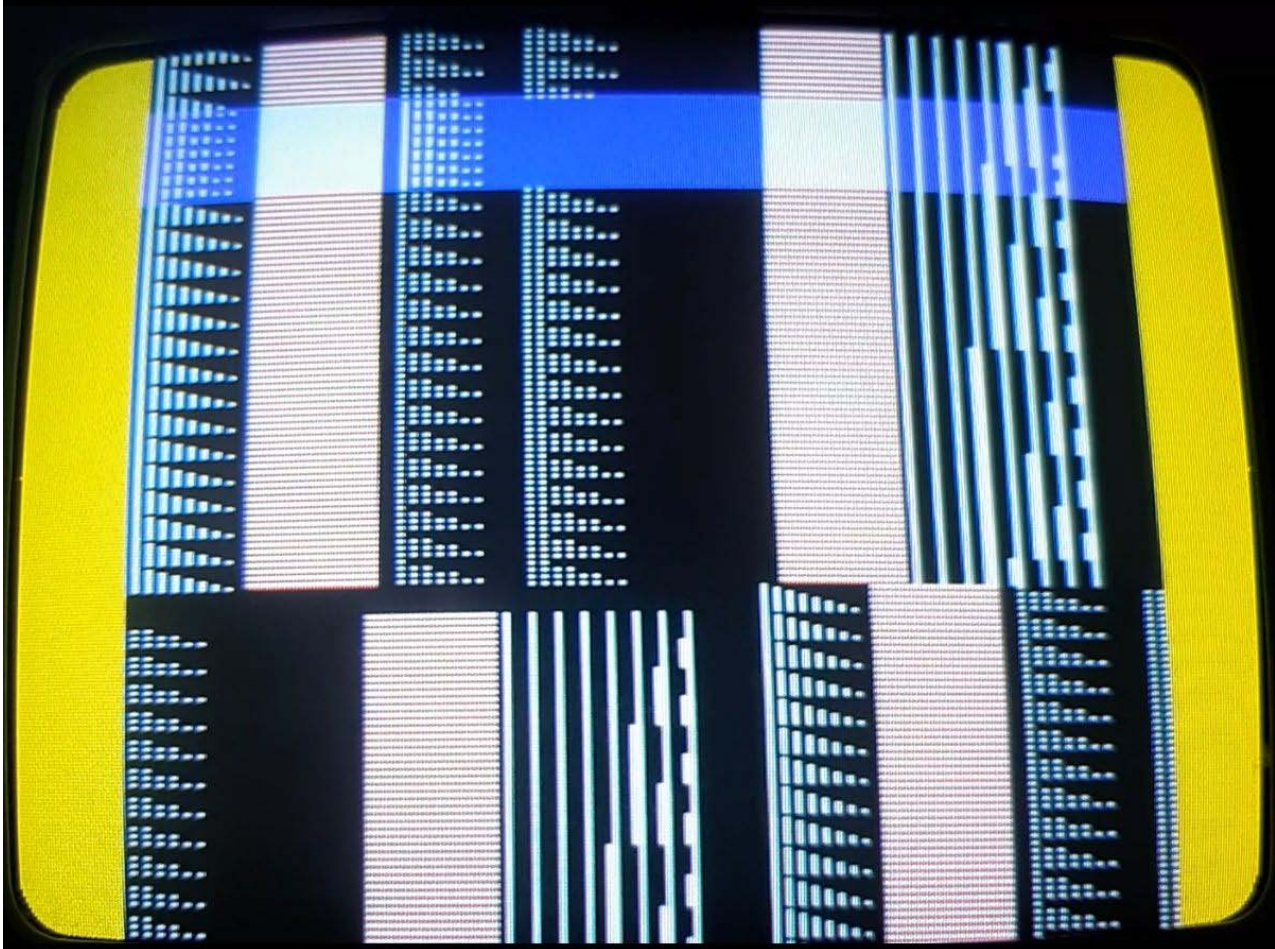


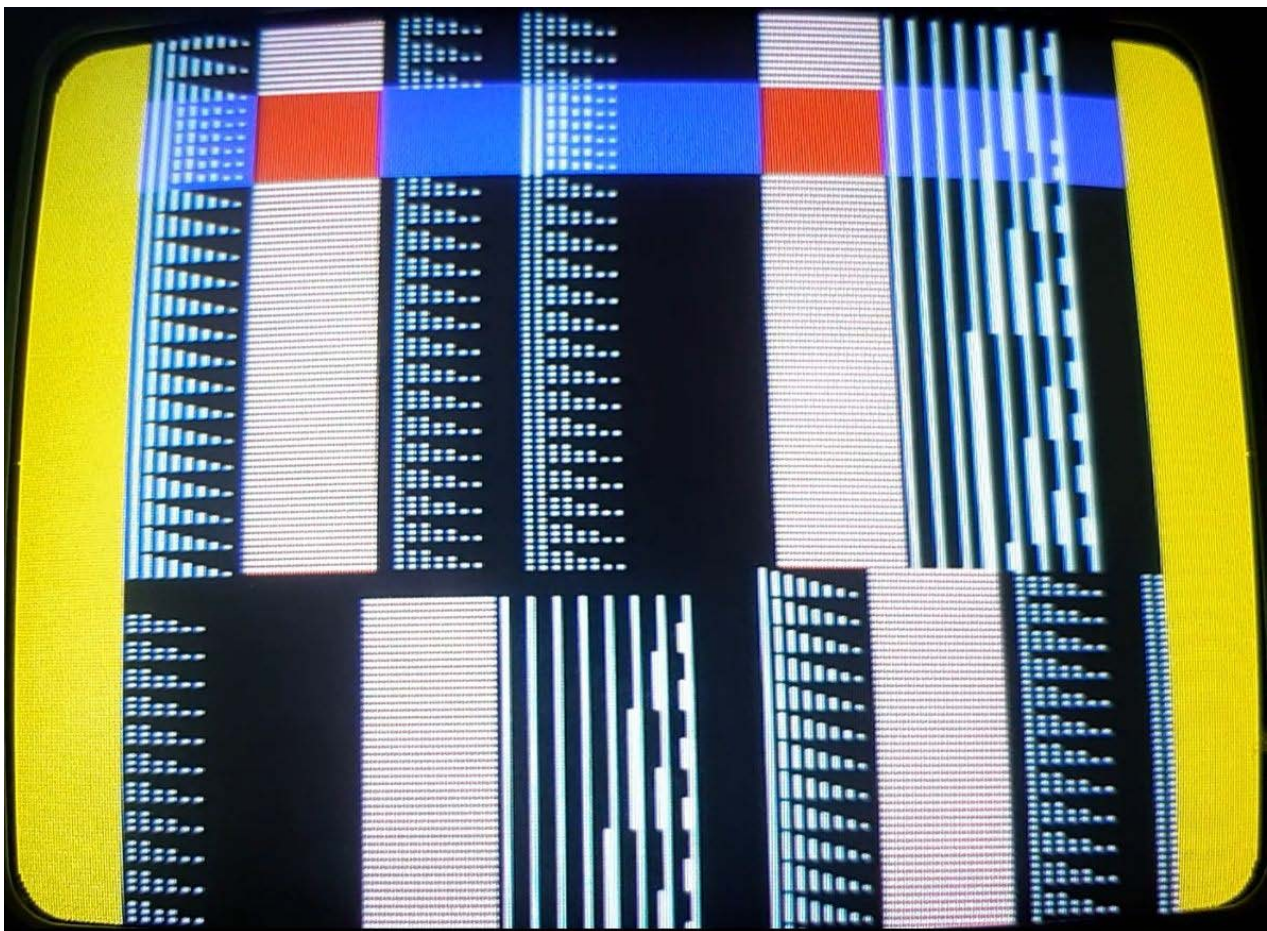


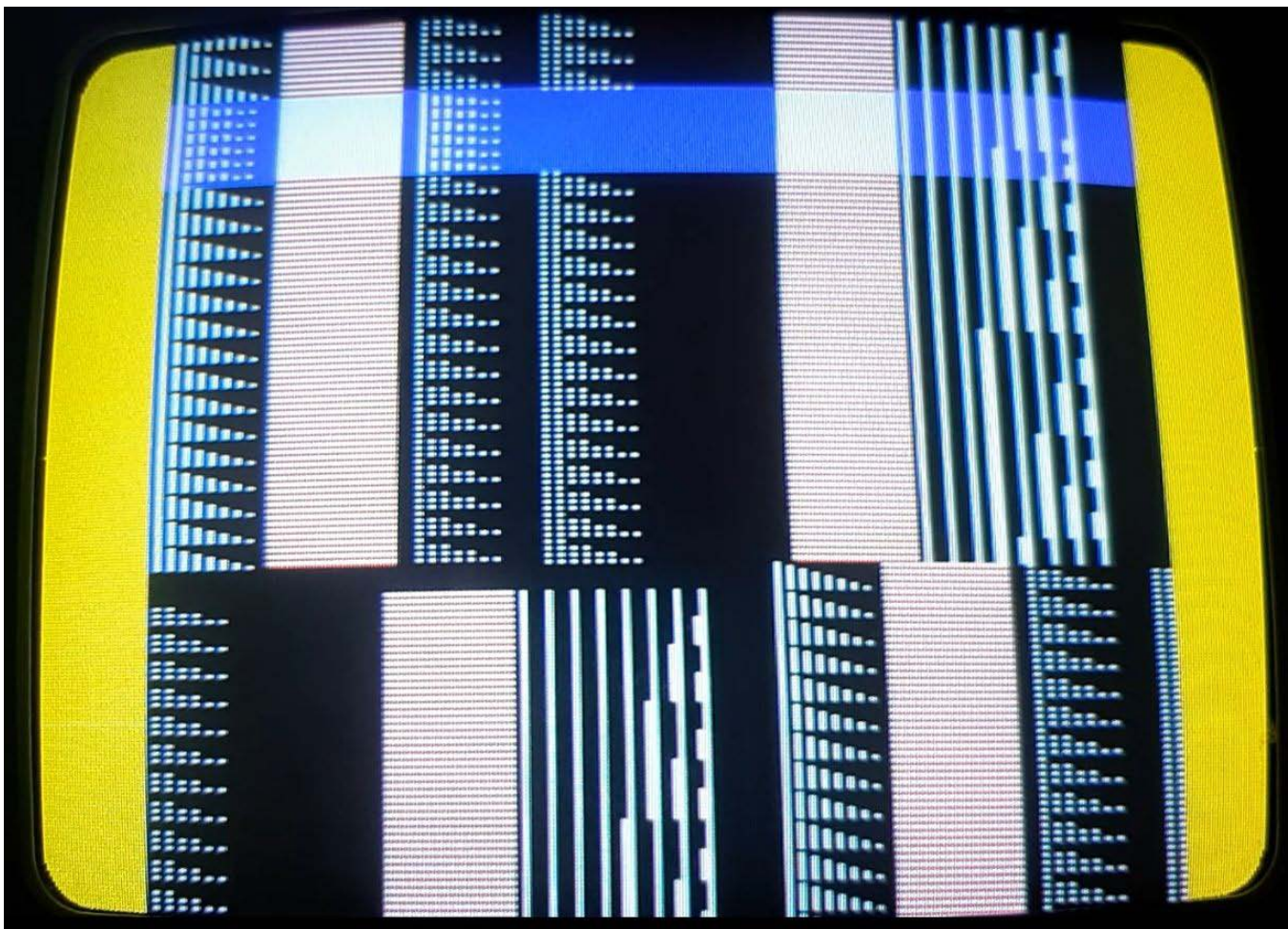
CRIC 0 INTERLACE VM TESTS - C4/C9 COUNTING IN IVM PERIOD (REMOVE ZONE)

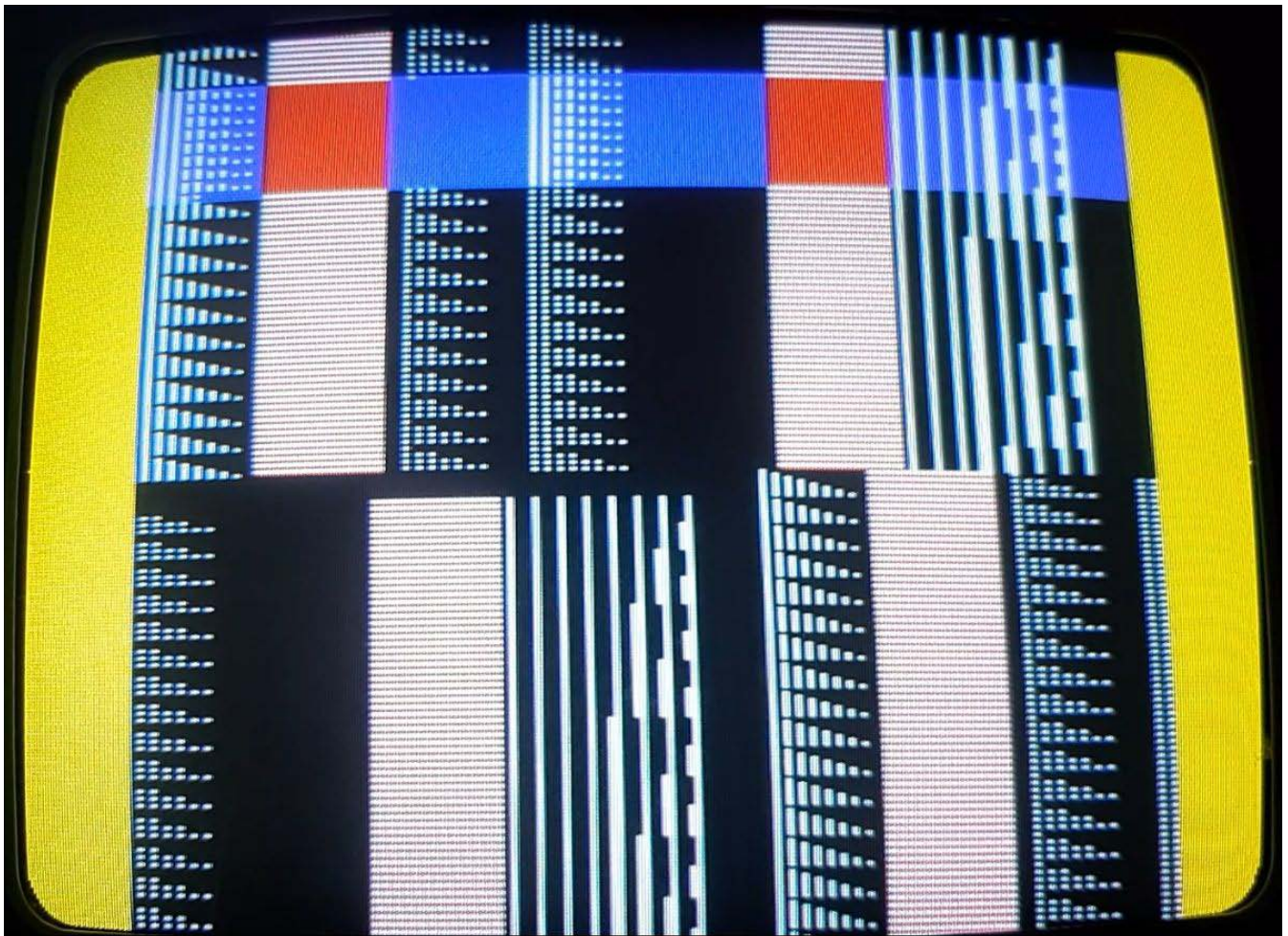
NEXT SCREEN : C4=6, C9=5 >> UPD R9=6, R8=3 (+3105)
EXIT IVM MODE ON C9=0 >> UPD R9=7, R8=0

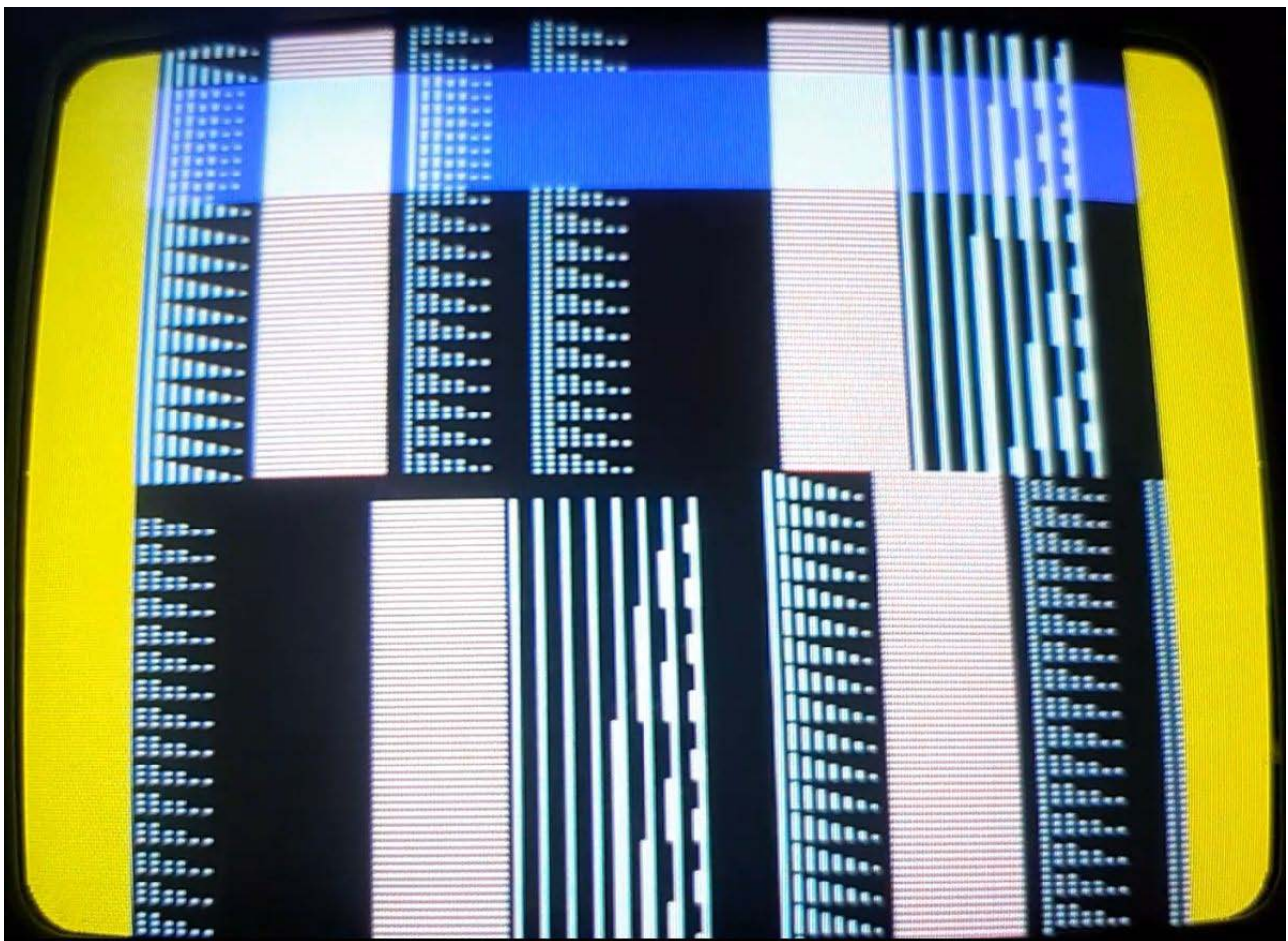
AUTOSHMC ON PREVIOUS SCREEN TEST: R4=#26 R5=#00

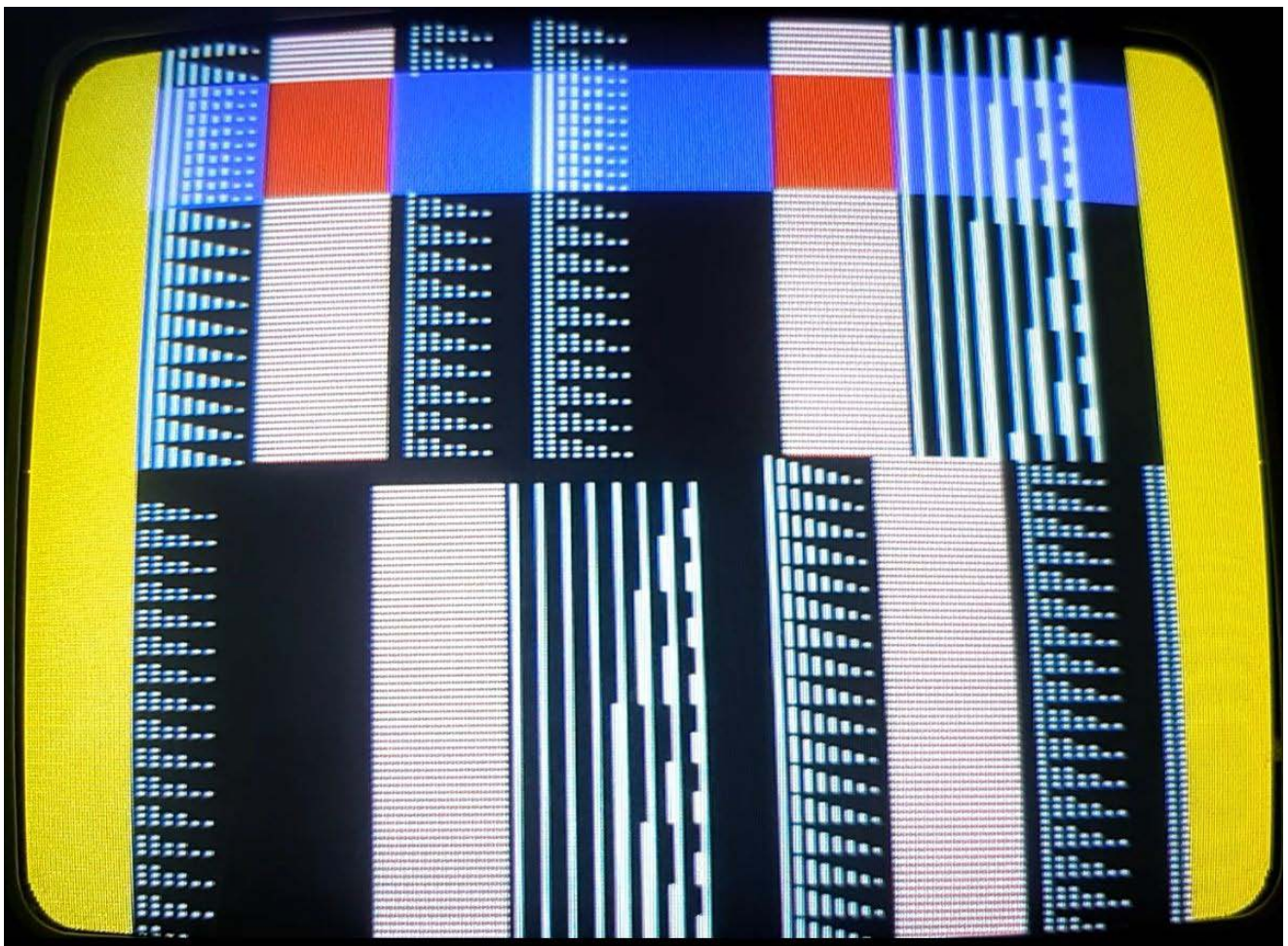
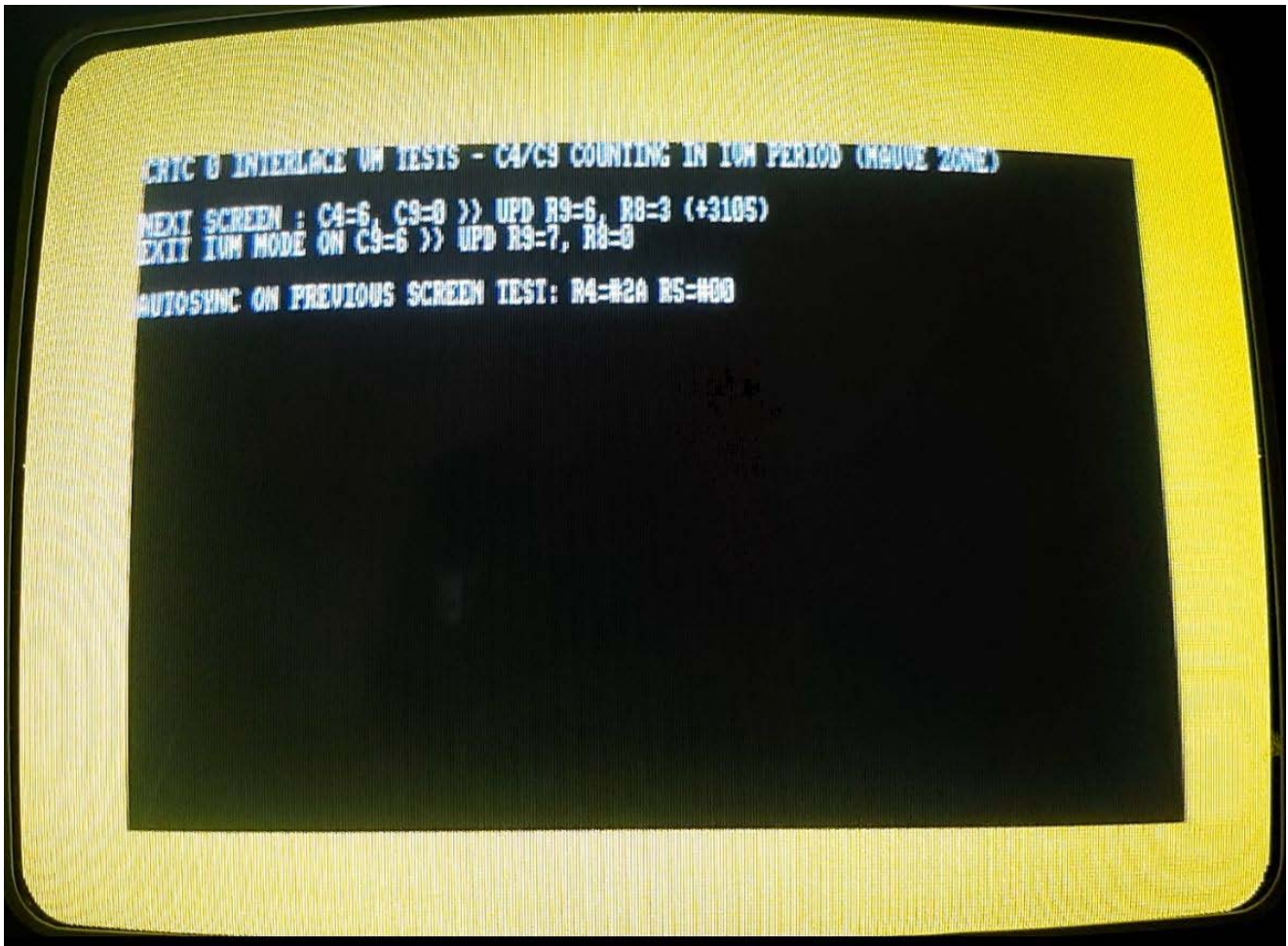












INTERLACE CRTC 2 C9 STRANGER THING

```
CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM  
(1) INTERLACE C4/C9 COUNTERS  
(2) INTERLACE CRTC 2 C9 STRANGER THING  
(3) FAKE USYNC ON CRTC 2  
(4) CRTC 2 FIND C0 MIN  
(5) CRTC 2 RLAL  
(6) CRTC 1 BUG OUTI R0
```

```
(S) BE00 CHECK (CRTC 1)
```

```
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY  
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!
```

TEST FOR CRTC 2

FAKE VSYNC ON CRTC 2

CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM

- (1) INTERLACE C4/C9 COUNTERS
- (2) INTERLACE CRTC 2 C9 STRANGER THING
- (3) FAKE VSYNC ON CRTC 2
- (4) CRTC 2 FIND C0 MIN
- (5) CRTC 2 RLAL
- (6) CRTC 1 BUG OUTI R0

(S) BE00 CHECK (CRTC 1)

(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC VSYNC SET PPI.PORTB.0=1 !!

TRYING FAKE VSYNC VIA PPI PORT B MIDDLE SCREEN
FAKE VSYNC OK IF VSYNC BLACK BAND

CRTC 0

CRTC 2 FIND C0 MIN

CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM

- (1) INTERLACE C4/C9 COUNTERS
- (2) INTERLACE CRTC 2 C9 STRANGER THING
- (3) FAKE USYNC ON CRTC 2
- (4) CRTC 2 FIND C0 MIN
- (5) CRTC 2 RLAL
- (6) CRTC 1 BUG OUTI R0

(S) BE00 CHECK (CRTC 1)

(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!

TEST FOR CRTC 2

CRTC 2 - 1 LINE RUPTURE

CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM

- (1) INTERLACE C4/C9 COUNTERS
- (2) INTERLACE CRTC 2 C9 STRANGER THING
- (3) FAKE USYNC ON CRTC 2
- (4) CRTC 2 FIND C0 MIN
- (5) CRTC 2 RLAL
- (6) CRTC 1 BUG OUTI R0

(S) BE00 CHECK (CRTC 1)

(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!

TEST FOR CRTC 2

CRTC 1 - BUG OUTI R0

CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM

- (1) INTERLACE C4/C9 COUNTERS
- (2) INTERLACE CRTC 2 C9 STRANGER THING
- (3) FAKE USYNC ON CRTC 2
- (4) CRTC 2 FIND C0 MIN
- (5) CRTC 2 RLAL
- (6) CRTC 1 BUG OUTI R0

(S) BE00 CHECK (CRTC 1)

(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<) CRTC CAR DISPLAY
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!

TEST FOR CRTC 1

CRTC 1- BE00 CHECK

```
CPC SHAKER 1.8 - ADDITIONAL MODULE / LONGSHOT. LOGON SYSTEM  
(1) INTERLACE C4/C9 COUNTERS  
(2) INTERLACE CRTC 2 C9 STRANGER THING  
(3) FAKE USYNC ON CRTC 2  
(4) CRTC 2 FIND C0 MIN  
(5) CRTC 2 RLAL  
(6) CRTC 1 BUG OUTI R0
```

```
(S) BE00 CHECK (CRTC 1)
```

```
(DEL) RUN ALL TEST (4 SEC EACH) / Z80A SYNC ON CRTC CNT (<>) CRTC CAR DISPLAY  
!! REF C0=0 DEFINED FROM THE MICROSEC WHEN CRTC USYNC SET PPI.PORTB.0=1 !!
```

TEST FOR CRTC 1