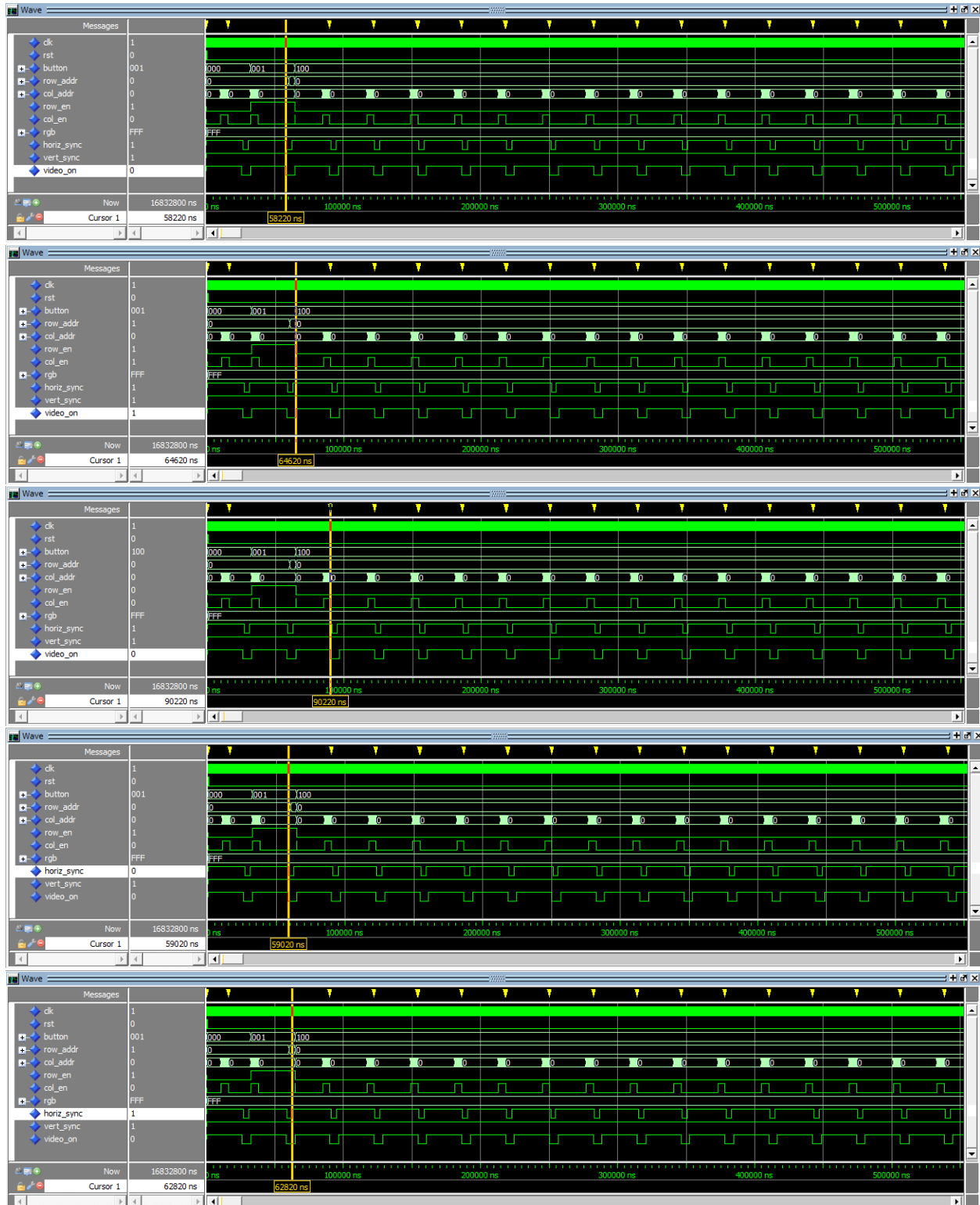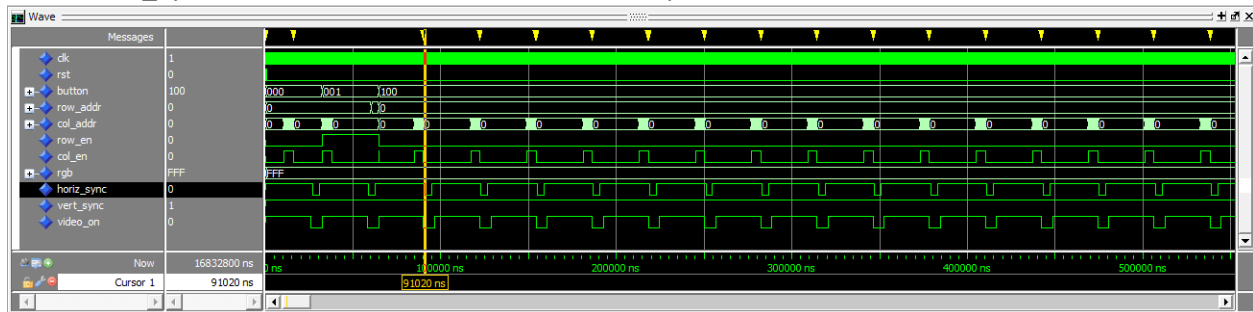# Decoders & ROM

Note: The yellow marks refer to a warning about the vector being truncated, but this is not an issue. Since the counts (10-bit vectors) are used by the row and column decoders, which produce 6-7-bit vectors, the warning is present, but this is a necessary truncation for forming the ROM address.

Note: Horiz_Sync width = 62820-59020 = 3800ns ≈ 3.77µs

Note: Time between Horiz_Sync's = 91020-59020 = 32000 ≈ 31.77µs

Note: The full simulation log is not show simply because of the length of the simulation and the warnings throughout.



```
#     Time: 16730220 ns   Iteration: 1   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16762180 ns   Iteration: 2   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16762220 ns   Iteration: 1   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16794180 ns   Iteration: 2   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16794220 ns   Iteration: 1   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16826180 ns   Iteration: 2   Instance: /decoders_tb/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#     Time: 16826220 ns   Iteration: 1   Instance: /decoders_tb/u_col_decoder
# ** Note: SIMULATION FINISHED!
#     Time: 16832780 ns   Iteration: 0   Instance: /decoders_tb

VSIM 35>
```
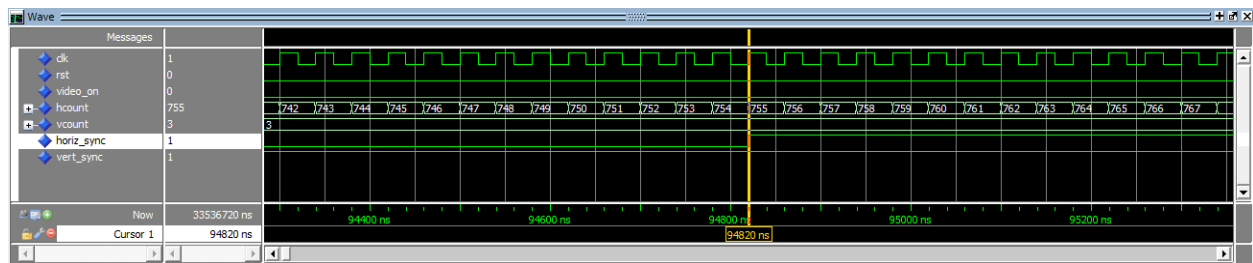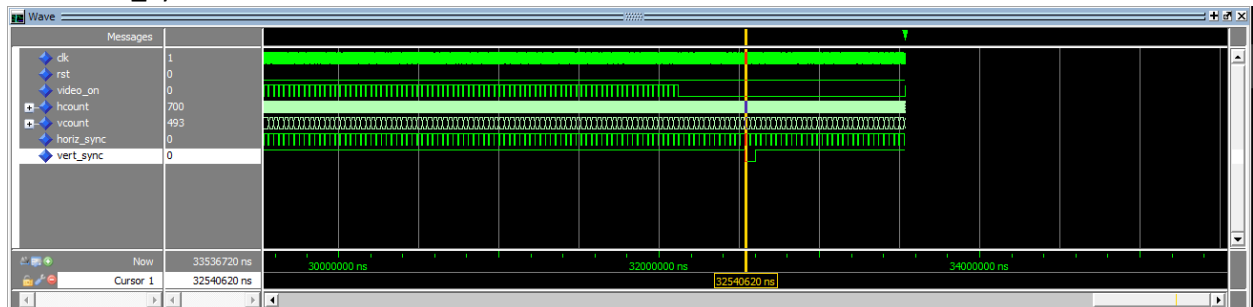
VGA_sync_gen
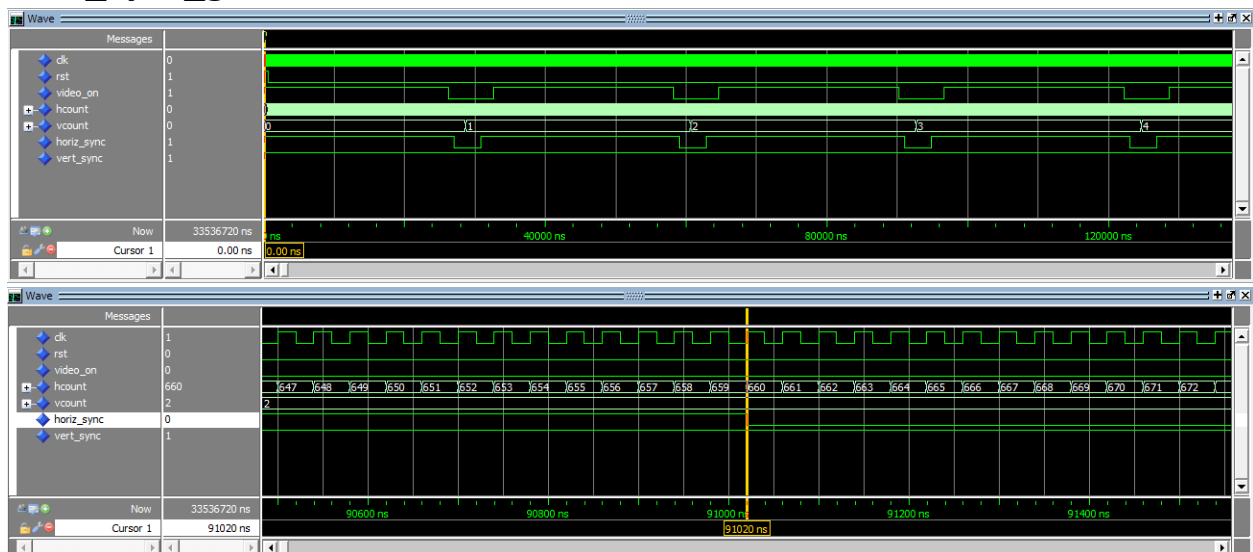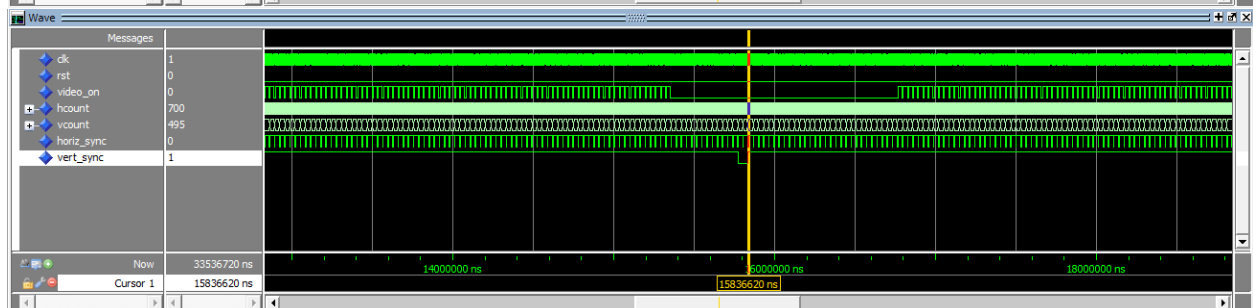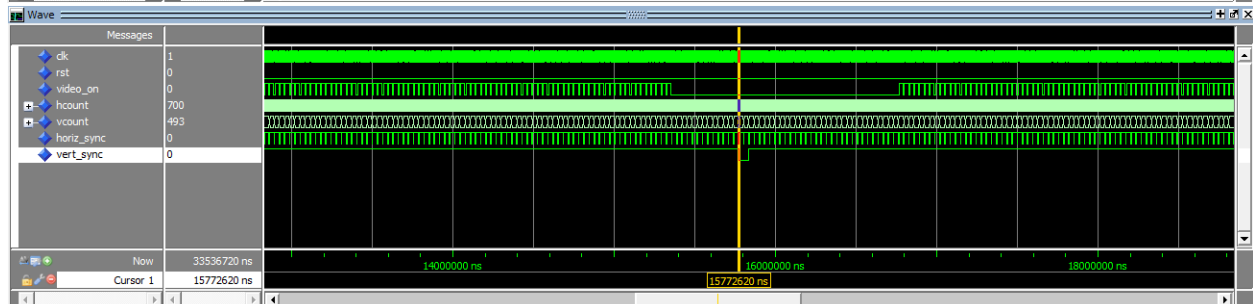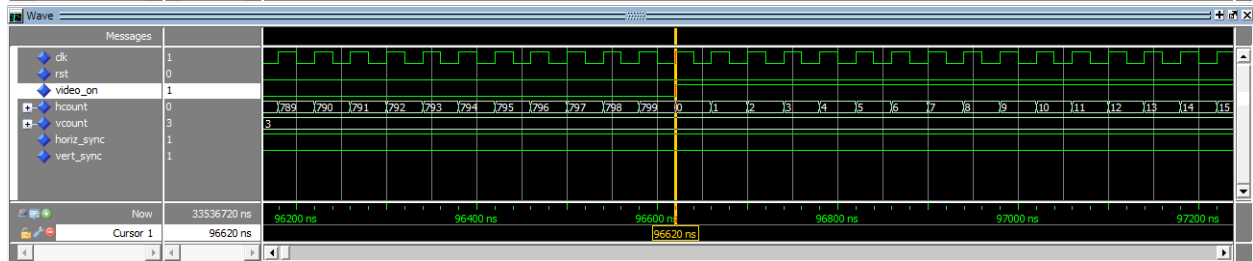
Note: Vert_Sync width = 15836620-15772620 = 64000ns

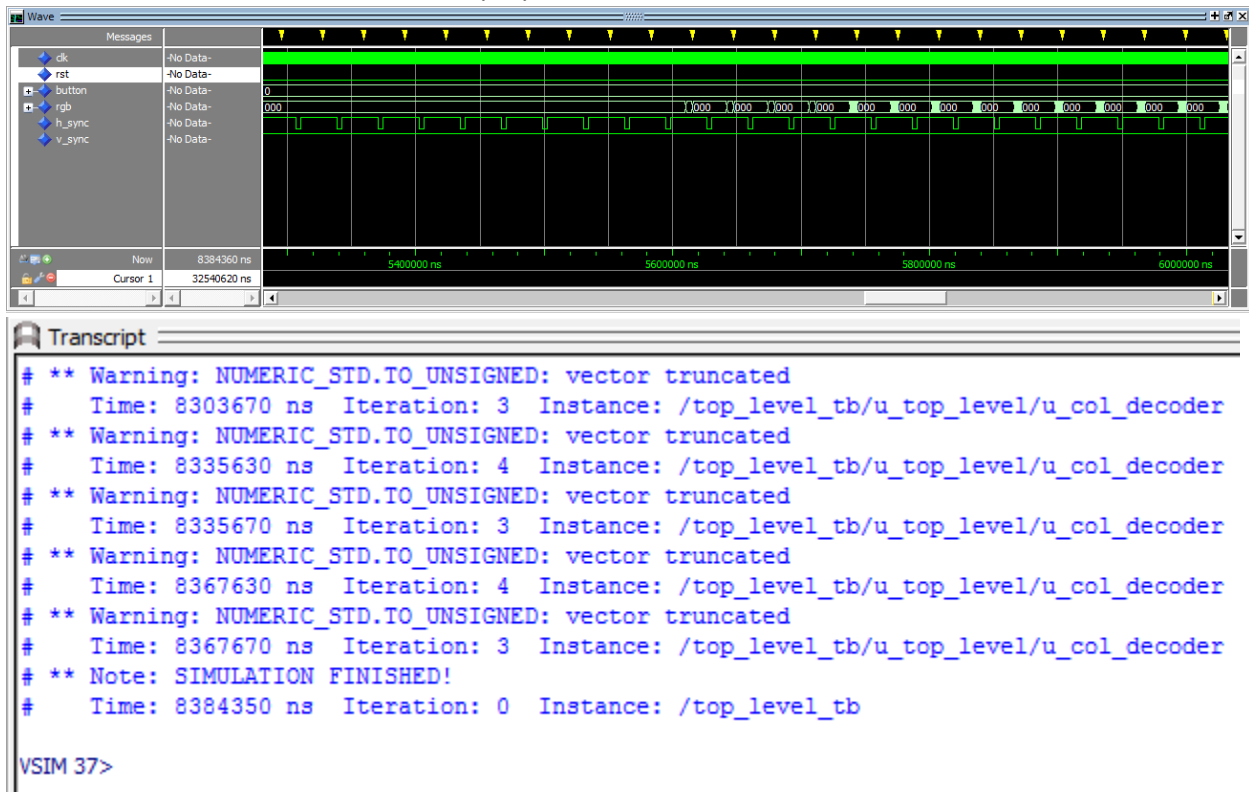Note: Time between Vert_Sync's = 32540620-15772620 = 16768000ns ≈ 16.6ms

```
VSIM 16> run -all
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 0  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 0  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 0  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">=": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 0  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 2  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 2  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 2  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Warning: NUMERIC_STD.">=": metavalue detected, returning FALSE
#    Time: 0 ps  Iteration: 2  Instance: /vga_sync_gen_tb/u_vga_sync_gen
# ** Note: SIMULATION FINISHED!
#    Time: 33536700 ns  Iteration: 0  Instance: /vga_sync_gen_tb

VSIM 17>
```

top_level

Note: Yellow tick marks serve the same purpose here as the with the decoders.


```
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#    Time: 8303670 ns  Iteration: 3  Instance: /top_level_tb/u_top_level/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#    Time: 8335630 ns  Iteration: 4  Instance: /top_level_tb/u_top_level/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#    Time: 8335670 ns  Iteration: 3  Instance: /top_level_tb/u_top_level/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#    Time: 8367630 ns  Iteration: 4  Instance: /top_level_tb/u_top_level/u_col_decoder
# ** Warning: NUMERIC_STD.TO_UNSIGNED: vector truncated
#    Time: 8367670 ns  Iteration: 3  Instance: /top_level_tb/u_top_level/u_col_decoder
# ** Note: SIMULATION FINISHED!
#    Time: 8384350 ns  Iteration: 0  Instance: /top_level_tb

VSIM 37>
```