

irsim example: Two to four decoder

```
| 2 to 4 decoder consisting of two inverters
| and four NAND gates
| Nodes:
|   D1  High order input
|   D0  Low order input
|   Out3 Output == 0 if D1,D0 == 1,1
|   Out2 Output == 0 if D1,D0 == 1,0
|   Out1 Output == 0 if D1,D0 == 0,1
|   Out0 Output == 0 if D1,D0 == 0,0

| Provide both true and complement of D0 and D1
n D0 D0Bar GND
p D0 Vdd   D0Bar

n D1 D1Bar GND
p D1 Vdd   D1Bar

| Out3 assert (== 0) if D1,D0 == 1,1
n D0 Z3   GND
n D1 Out3 Z3
p D0 Vdd  Out3
p D1 Vdd  Out3

| D1,D0 = 1,0
n D0Bar Z2   GND
n D1   Out2 Z2
p D0Bar Vdd  Out2
p D1   Vdd  Out2

| D1,D0 = 0,1
n D0   Z1   GND
n D1Bar Out1 Z1
p D0   Vdd  Out1
p D1Bar Vdd  Out1

| D1,D0 = 0,0
n D0Bar Z0   GND
n D1Bar Out0 Z0
p D0Bar Vdd  Out0
p D1Bar Vdd  Out0
```

Two to four decoder: irsim test commands

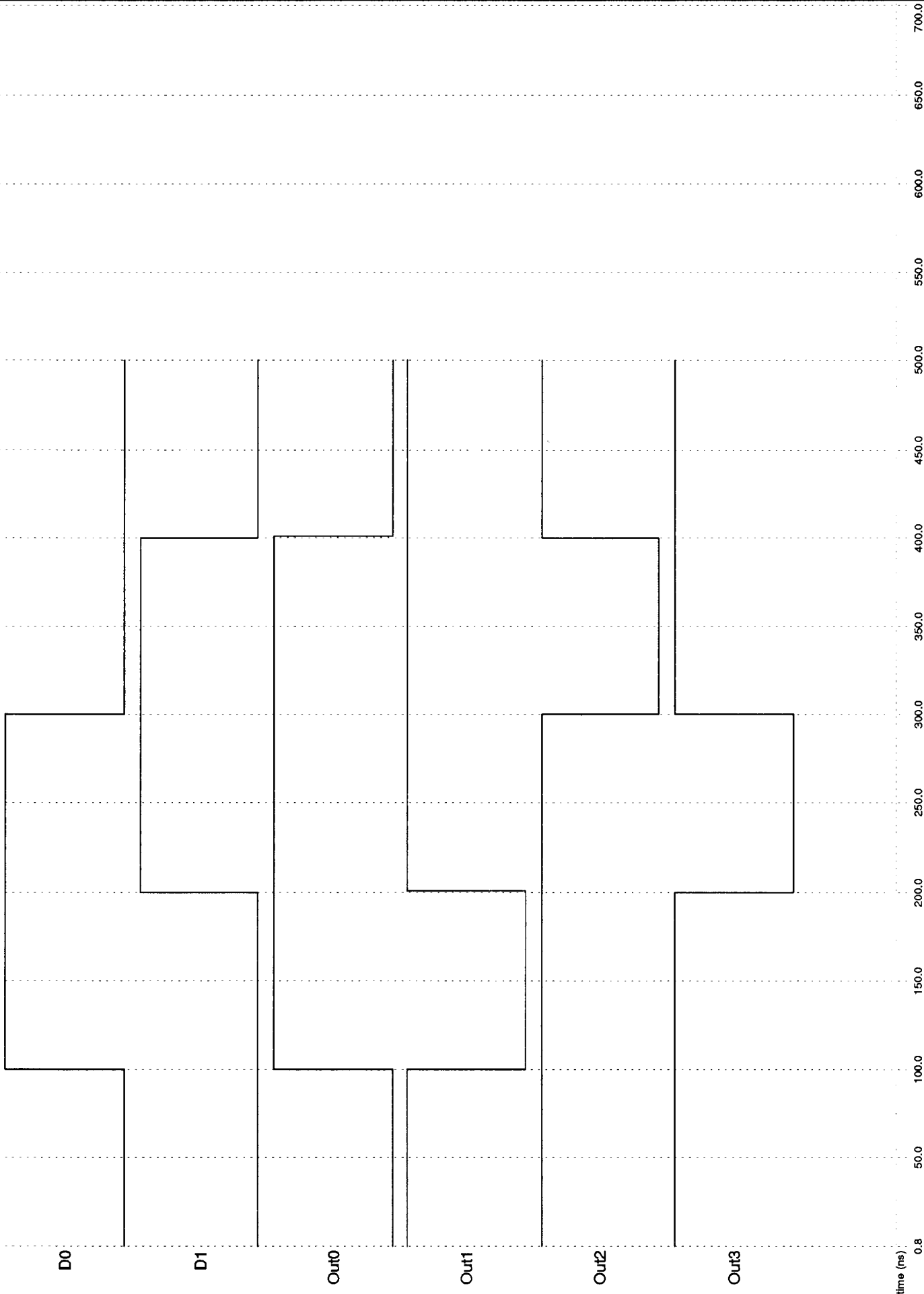
```
| Start-up X-window analysis display
ana D0 D1 Out0 Out1 Out2 Out3
| Watch nodes on terminal, too
w Out3 Out2 Out1 Out0 D0 D1
| Take decoder through four input states

l D1 D0
s
h D0
s
h D1
s
l D0
s
l D1
s
```

Note use of analysis window

Two to four decoder: irsim test run

```
32 > script decode2.script
Script started on Wed Aug 14 14:08:11 1991
16 > irsim decode2
*** IRSIM version 8.6 ***
14 nodes; transistors: n-channel=10 p-channel=10
parallel txtors:none
irsim> @ decode2.test
D1=0 D0=0 Out0=0 Out1=1 Out2=1 Out3=1
time = 100.0ns
D1=0 D0=1 Out0=1 Out1=0 Out2=1 Out3=1
time = 200.0ns
D1=1 D0=1 Out0=1 Out1=1 Out2=1 Out3=0
time = 300.0ns
D1=1 D0=0 Out0=1 Out1=1 Out2=0 Out3=1
time = 400.0ns
D1=0 D0=0 Out0=0 Out1=1 Out2=1 Out3=1
time = 500.0ns
irsim> q
17 > ^D
script done on Wed Aug 14 14:08:30 1991
```



time (ns)

0.0 50.0 100.0 150.0 200.0 250.0 300.0 350.0 400.0 450.0 500.0 550.0 600.0 650.0 700.0