RTL Inverter Pulse Response

- Simple inverter made with 2N2222A BJT
- Emitter grounded
- Collector connected to +5 by 1KΩ resistor
- Base connected to input with 1KΩ resistor
- Output at collector
- This is a follow-up to Experiment 12, where you were asked to do this in the lab.

*Measure performance and compare with SPICE simulation*
Test Pulse Setup

- Input pulse with 5 ns rise time connected to breadboard with terminated 50 Ω coaxial cable
- Oscilloscope has 200 MHz bandwidth
The RTL Inverter on the Breadboard

- Some care taken to reduce stray capacitance due to breadboard
Response for 5V 50 ns Pulse

- 50 ns per division horizontal scale
- 5 V, 50 ns input pulse starts at leftmost vertical division
- Note rapid “fall” time (turn on), extended interval before rise (turn off), slower rise time than fall time
• This is for 5 V input pulse
• Note long storage time due to excess charge in base
• The simulation shows reasonable agreement with the measurement
Schottky transistor added between base and collector prevents saturation.
• This is for a 2.5 V input pulse (and no Schottky diode)
• Note the reduced storage time and shorter output pulse
• Faster response can be achieved with a fast switching transistor
  and by avoiding saturation with Schottky diode (as on previous slide).