Purpose: This demo shows the inductive effect of long wires by showing voltage spikes on a power supply with a long lead when steps in current occur (due to switching of an inverter state). This effect disappears when a short lead is used.

Steps:
1. With the long lead in place, show the inverter output (in response to a square wave input) and the power supply voltage (at a point after the lead) on the scope. Note the spikes on the supply voltage, and their correlation to the inverter output switching.
2. Show the noisy output of an inverter with the input tied high, as an example of the effects on other circuits when noise is on the supply.
3. Switch to a short lead, and show that the effects disappear.

Description: Lead Inductor Demo

See schematic diagram next page for more detail

Cite as: Anant Agarwal and Jeffrey Lang, course materials for 6.002 Circuits and Electronics, Spring 2007. MIT OpenCourseWare (http://ocw.mit.edu/), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].
### Oscilloscope Setup

<table>
<thead>
<tr>
<th>CH</th>
<th>V/DIV</th>
<th>OFFSET</th>
<th>MODE</th>
<th>FUNC</th>
<th>VERTICAL</th>
<th>HORIZONTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>on</td>
<td>200mv</td>
<td>1.5</td>
<td>DC</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>on</td>
<td>1</td>
<td>0</td>
<td>DC</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>on</td>
<td>5</td>
<td>9</td>
<td>DC</td>
<td>off</td>
<td></td>
</tr>
</tbody>
</table>

Horizontal: 200 us  
Acquisition: AUTO AUTO 4  
Trigger: CH4

### Waveform Generator Setup

<table>
<thead>
<tr>
<th>UNIT</th>
<th>WAVE</th>
<th>AMP</th>
<th>OFFSET</th>
<th>FREQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG2</td>
<td>Square</td>
<td>2.5</td>
<td>1.25</td>
<td>4 Khz</td>
</tr>
<tr>
<td>FG1</td>
<td>Square</td>
<td>2.5</td>
<td>1.25</td>
<td>100 Hz</td>
</tr>
</tbody>
</table>

Trigger: INT

### Power Supply Setup

<table>
<thead>
<tr>
<th>UNIT</th>
<th>WAVE</th>
<th>AMP</th>
<th>OFFSET</th>
<th>FREQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>+6</td>
<td>+25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+5</td>
<td>-25</td>
</tr>
</tbody>
</table>

Trigger: INT

Cite as: Anant Agarwal and Jeffrey Lang, course materials for 6.002 Circuits and Electronics, Spring 2007. MIT OpenCourseWare (http://ocw.mit.edu/), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].