Extra Credit
Op-Amp Circuits

You can receive extra credit the second ¼ of the semester by building simple oscillator circuits found in the *Engineer’s Mini-Notebook* on Op-Amp Circuits by Forrest M. Mims. There are two small circuits. One creates a square wave pulse and one generates a sine wave. You can get extra credit on the second quiz, ONE of the experiments for this part of the course (4 or 5), OR the second project. The points available are as follows:

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Points on Experiment</th>
<th>Points on Project 2</th>
<th>Points on Quiz 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>square wave</td>
<td>3</td>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td>sine wave</td>
<td>3</td>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td>cutoff</td>
<td>50</td>
<td>25</td>
<td>100</td>
</tr>
</tbody>
</table>

You can build only one circuit or you can build both. Since there are two different circuits, you can apply each towards a different grade. Fill out one sheet for each circuit. YOU MUST do the project as an individual. Your points will be applied towards your grade on an individual basis. These circuits are not difficult, so it is unlikely that it will take more than one open shop to build one of them.

**Ground Rules:**
1) We will provide you with a protoboard.
2) The two circuits and some basic instructions are included on the following page.
3) Build your circuit using components from your kit. If you do not have a particular component, ask the staff.
4) Demonstrate that it generates the appropriate output.
5) Have a staff member sign the attached sheet.
6) Return the protoboard. (If you are not finished, we will store the board for you and return it when you wish to continue.)
7) YOU MUST tell the staff member what you would like to apply the extra credit towards at the time s/he signs the sheet.
Extra Credit

Names of Participant(s):___________________________________________________

Section ____________  Group ____________

Circuit built ____________

Apply Towards:_________________________________________________________

Points ____________ (Points per circuit: quiz = 5, project = 1.5, experiment = 3)

Protoboard returned ____________

Staff Signature ________________________________________________________