ECE 445 Project Presentation

Project 7
Thomas Satrom
Jeremy Pessin
Objective

- 50W guitar amplifier
  - Contains entire 1W tube amplifier
  - Switching power supply & power amplifier
- 2 x 10" loudspeaker cabinet
  - Inward-tilted speakers for wide horizontal dispersion
- Lightweight materials
Project Design
Head Design

Cyclops Man
Tube Amplifier Stages

Tube Preamp Stage

Tube Power Amp Stage
Head Design

Guitar Input → Solid State Pre-amp → Gain & Tone Controls → Tube Amp → Resistive Load & Volume Control → Class D Power Amp → Speaker Cabinet

Power Supply
Head Construction

- **INPUT JACK**
- **GAIN & TONE CONTROLS**
- **RESISTIVE LOAD & VOLUME CONTROL**
- **POWER SUPPLY**
- **SOLID STATE PREAMP**
- **TUBE AMP**
- **CLASS D POWER AMP**
- **OUTPUT JACK**
# Head Results

## Power Supply Results

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Acceptable Range</th>
<th>Actual Voltage</th>
<th>Acceptable Ripple (p-p)</th>
<th>Actual Ripple (p-p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+250V</td>
<td>(+245V, +290V)</td>
<td>+272V</td>
<td>&lt;15V</td>
<td>2.08V</td>
</tr>
<tr>
<td>+18V</td>
<td>(+13V, +30V)</td>
<td>+18.3V</td>
<td>&lt;8V</td>
<td>0.26V</td>
</tr>
<tr>
<td>-18V</td>
<td>(-30V, -13V)</td>
<td>-20.8V</td>
<td>&lt;8V</td>
<td>0.01V</td>
</tr>
<tr>
<td>+12.6V</td>
<td>(+11.3V, +13.9V)</td>
<td>+13.24V</td>
<td>&lt;6V</td>
<td>1.63V</td>
</tr>
</tbody>
</table>
## Head Results

### Audio Path Results

<table>
<thead>
<tr>
<th>Stage</th>
<th>Expected Maximum Voltage Gain</th>
<th>Actual Maximum Voltage Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid State Preamp</td>
<td>34</td>
<td>34.4</td>
</tr>
<tr>
<td>Gain &amp; Tone Controls</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Tube Amp, Transformer, Resistive Load &amp; Volume Control</td>
<td>10.7</td>
<td>2.6</td>
</tr>
</tbody>
</table>
Head Results

Tube Amplifier Input and Output Traces

Onset of Distortion

Significant Distortion
Cabinet Design

Sætyr Music
Speaker Selection

Jensen Neo 10 -100
Cabinet Materials

XPS sheet 3/4"

2k 2x2 twill Carbon Fiber
Cabinet Configuration

![Diagram of cabinet configuration with a speaker baffle and port, angled at 145°.](image)
Directivity Simulations
CAD Model of Cabinet
Initial Construction
Finalized Cabinet
Questions?