

EECE 690/890

Digital Radio Hardware Design

Team 4 Assignment 3

Due: Thurs 10/29/98

Introduction

This is the third in a series of assignments designed to guide you through the tasks needed to complete the audio/digital/power circuit design, layout, and mechanical engineering tasks.

Attached to this assignment is an additional page giving a preview of future tasks that will need to be completed before the CDR. You are encouraged to work ahead if you can. This will ease your workload when things like tests stack up in other classes in the coming weeks.

EDA/Mechanical Design Engineer 1 Tasks

- ♦ Work with digital PLD and software designers to determine pin assignments on the PLD and uC, and connections to the ADPCM codec
- ♦ Review the data sheets for the uC and the PLD chip and generate a preliminary schematic of these circuits. Use the pin assignments above and work with teams 2 and 3 to determine what clock circuits/crystals will be needed.
- ♦ Get information on the audio circuits generated by your teammate in the last assignment.
- ♦ Create a complete schematic of the digital board. Show all components that will be on the board, including the circuits above, the voltage regulators, the LCD and audio circuits, and connectors for interfacing to the handset, ringer, battery, RF board, switches, and LCD. Be sure to include the test/diagnostic switches defined in Team 3's latest assignment. (Talk to team 3 about this).
- ♦ Do initial "floorplanning" (component placement diagram for digital PC board). You may start with a 5x8 inch board outline, but should make your final design smaller than this if possible. The goal in component placement is to minimize board size. This is usually accomplished by placing major components (e.g. ICs and connectors) that have the most connections to each other close together, and orienting them to avoid the need for traces to cross other traces.

Your deliverables are listed below:

- ♦ Your schematic diagram.
- ♦ Your preliminary layout floorplan.

EDA/Mechanical Design Engineer 2 Tasks

- ♦ Work with the RF team to get their schematics, parts lists, and layout designs.
- ♦ Work with your teammate to create a ***complete*** list of all IC sockets, connectors, and other special parts that will be needed on the digital board and within the phone enclosure.
- ♦ Work with Steve and Joe downstairs to locate as many parts as possible in the EE shop's stock in order to reduce costs.
- ♦ Update your team's parts list with the items above that were not available in the EE shop, and that therefore need to be ordered.
- ♦ Locate footprints for all the parts in the Professional version of PCBoards layout software, place the footprints on a page, label each with its name from the library, and print out the layout page for reference by yourself and your teammate.

Your deliverables are listed below:

- ♦ Your final parts list in a form suitable for giving to Steve downstairs for ordering.
- ♦ Your page of footprints.

Team 3 Future Assignments

The following gives an overview of the tasks remaining after task 3.

EDA/Mechanical Design Engineer 1

- ♦ Do digital circuit board layout. (Do this on paper first! Then enter the design in the Layout program - This will help keep you flexible and allow you to try several options.)
- ♦ Check the layout against the schematic by printing each out and highlighting nets (one at a time) on each to be sure they match.

- ♦ Do a final check, in conjunction with members of other teams to be sure nothing in the design has changed! Check the layout again!
- ♦ Generate Gerber and Drill files.
- ♦ Confirm that the tools called out in the generated files are acceptable to our PC board fabricator, and if not, modify them.
- ♦ View the photoplot and drill files in a third-party Gerber viewer to be sure it was generated correctly.
- ♦ Prepare the files for sending to the fabricator. (We may need to merge both the RF and digital layouts into a single design to lower fab cost, but this can be done with cut-and paste at the end).

EDA/Mechanical Design Engineer 2

- ♦ Enter RF layout
- ♦ Check the layout against the RF team's schematic by printing each out and highlighting nets (one at a time) on each to be sure they match.
- ♦ Finalize your mechanical drawings and provide to EE shop for fabrication.

- ♦ Do a final check, in conjunction with members of other teams to be sure nothing in the design has changed! Check the layout again!
- ♦ Generate Gerber and Drill files.
- ♦ Confirm that the tools called out in the generated files are acceptable to our PC board fabricator, and if not, modify them.
- ♦ View the photoplot and drill files in a third-party Gerber viewer to be sure it was generated correctly.
- ♦ Prepare the files for sending to the fabricator. (We may need to merge both the RF and digital layouts into a single design to lower fab cost, but this can be done with cut-and paste at the end).