MASSACHVSETTS INSTITVTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science

6.002 – Electronic Circuits
6 November 2001

Quiz #2 Announcement

Quiz 2 will be held in the evening of Wednesday, 14 November 2001, in Walker Memorial Gymnasium (Room 50-340) from 7:30 to 9:30 PM. The exam will cover material from Monday, 1 October 2001 through material from the recitation on Friday, 2 November 2001.

The memo attached to this announcement was found yesterday with a pile of blueprints at a local construction site. While the 6.002 staff denies any knowledge of the circumstances described therein, it may have some bearing on the upcoming quiz. We suggest that you bring it with you to the quiz as there will not be extra copies available in Walker.

You may bring this handout and no more than one page of additional notes with you to the quiz. A calculator may prove useful.

Minutes of the Facilities Committee

Members present:

Mr. Lem E. Tweakit, electrical design

Mr. Willy Crankit, mechanical design

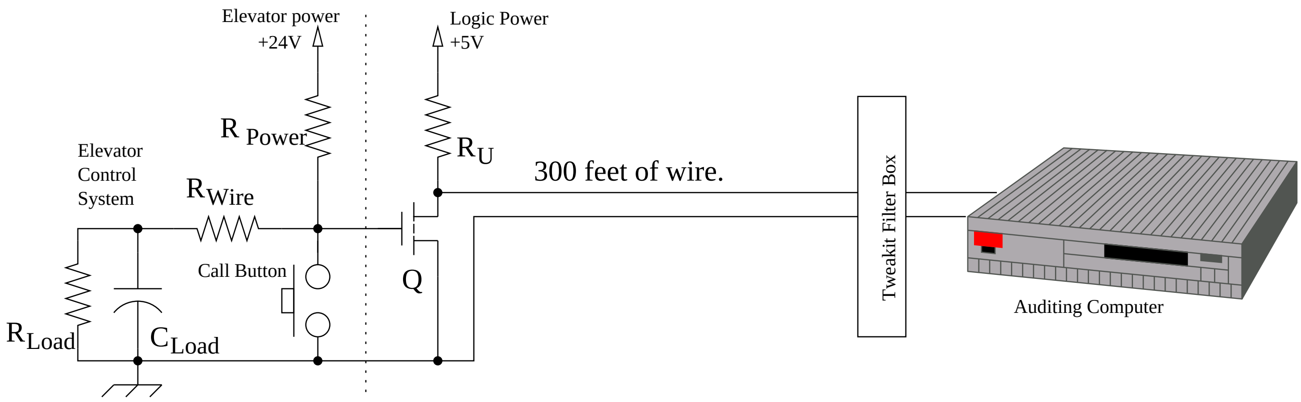
Mr. Ben Bitdiddle, computer systems

Prof. Ann A. Logue, departmental representative

It has become apparent that the elevator system for the new Statov-Dee Art Center, being designed by Frank Lee Gehrloose for the EECS department, is getting out of hand.

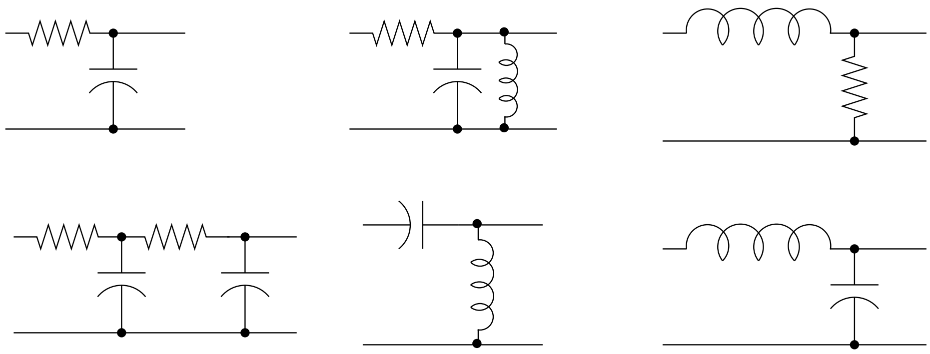
There seem to be a number of problems, all arising from the fact that the elevator controller is interfaced to a high-performance computer system that will be auditing the use of the elevators.

The interface must deliver a clean digital signal from the call buttons to the computer. One problem is that the elevator power supply is 24 volts, but the computer must not have more than a 5-volt signal at its input. As you know, for computer TTL inputs the logic is specified to have $V_{IH} = 2$ volts and $V_{IL} = 0.8$ volts. To accomplish this translation, Mr. Bitdiddle suggested a simple MOSFET circuit. In the circuit shown below, the section to the left of the dotted line is under the control of the elevator company. The parts labeled $\mathrm{R_{Load}}$, $\mathrm{R_{Power}}$, $\mathrm{R_{Wire}}$, and $\mathrm{C_{Load}}$ are just a model for the unknown circuitry that the elevator company provides. The values we have are $\mathrm{R_{Load}} = 1000\ \Omega$, $\mathrm{R_{Power}} = 1000\ \Omega$, and $\mathrm{C_{Load}} = 100\ \mu\mathrm{F}$. We do not yet know the exact value of $\mathrm{R_{Wire}}$, but it cannot be very large. Mr. Bitdiddle's addition is the transistor Q and the resistor R_U.



Unfortunately, as currently designed, the system is painfully sensitive to the 60 Hz hum and noise coming from the high-current circuits of the elevator motors. It may also be badly affected by the radio noise that will certainly be present in the building due to the large number of wireless devices that we expect everyone to be using in the next few years. The noise is picked up on the long wire connecting the translator to the computer room. Mr. Tweakit suggested that we construct a filter box to clean up the signal before it enters the computer, as indicated on the figure.

There were a number of suggestions for an appropriate filter for this system, but we have not yet examined them to see what will work. Some of the proposals are shown below:



After some discussion Professor Logue promised that she would arrange to have her staff of about 300 top engineers help us with these problems on the evening of November 14.