

# ENGINEERING PHYSICS

## 300 Level Laboratories

### Laboratory Exercise 6

#### Using the 8255 card

##### Exercise 6.1 - The waveform generator

This exercise is outlined in the old notes as exercise 6.4. The final goal of this exercise is the same as in that exercise. The only major change is in the use of the function **ioperm** to get i/o permissions. This is necessary under Linux as it is a multi-user operating system and special permissions have to be gained by a program before it is allowed to gain i/o permissions for a port.

As for previous function calls, there are two options. The standard C library function, `ioperm`, may be called with arguments passed on the stack, or, you may use a kernel interrupt (int 80h) and pass the arguments in registers. To find out what arguments are to be passed, look at the man page entry for `ioperm`. Note that if you are using int 80h then a full list of interrupt numbers may be found in the file `/usr/include/asm/unistd.h`

Once you have written your program, and successfully assembled and linked it to make an executable, you will still need to do some work to make it run. This is because i/o permissions can only be granted to the root user, or to a program set up to run with the same permissions as the root user. To have your program run with root permissions you use the **chown** and **chmod** commands to set the suid bit to 4. For instance, the command

```
chown root prog_name
```

changes the owner of `prog_name` to root. Now typing

```
chmod 4755
```

changes the permissions of this program to `rwx` for root, `r_x` for members of the group and for all other users (`755`), while the leading 4 tells the operating system that when this program runs it is to have the same rights as the owner of the program.

To make the above changes to ownership and permissions you have to already be the root user. On all the third year computers the root password is `3rdyrlab`. To become the root user use the **su** command.

##### Exercise 6.2 - d/a and a/d

This exercise is the same as the old exercise 6.5, with only the changes noted in earlier exercises needing to be made.