Electrical Calculator

# Intro and Setup

This project is to develop a tool to help with calculating electrical conduit sizing and loss percentage in electrical wire runs.

This program requires you to be able to run JAVA programs, to install Java on your computer make sure that you install the latest version of java's development and can run java programs. Or you can download a java compiler such as JGrasp if you want to use this, and this will also allow you to run the JAVA program.

If you are using the command prompt to use these java programs, javac File\_Name.java will compile your program and java File\_Name will run the file. If you are sure you have downloaded the correct version of java and when you type javac it is unrecognizable then follow the steps [here](https://stackoverflow.com/questions/7709041/javac-is-not-recognized-as-an-internal-or-external-command-operable-program-or). This will walk you through the correct setting to allow you to work with java in your command prompt.

This project is broken up into three separate files Conduit\_Calculator.java, Conduit\_Calculator.java, and Line\_Loss.java. You will need to compile all three of these files to create .class files before you are able to run program. The only program you must run is Electrical\_Calculator because this program is the program that contains the main function.

When Electrical\_Calculator is started it will ask you to the name the file you want to export your data to. You can name the file anything you want if it ends in .txt, for example HarbourReach.txt. Then it will ask you if want to calculate the minimum size conduit for your runs if you select yes, the conduit size portion will start.

# Conduit Sizing

The conduit sizing works in two ways, if the conduit is new it calculates the minimum sized conduit you are allowed given the wires and cables you put into it, if it is an existing conduit then it determines if this conduit is already full based on regulation or if it there is still room to put more wires and cables through it. The calculator will ask you the name of the run to start and you can name it anything you like if it is a single word. Then it will ask you the schedule of the run, here you must answer either 40 or 80. Then it will ask you if the conduit is new or existing and you must choose one of these options. If you answer existing, then it will ask you to give the size of the conduit and give you a list of allowed conduits. Once you pick one of those options it moves you to wires section.

The next few sections are pretty much the same except for small differences. First the calculator will ask if you want to add any wires to your conduit, if you say yes it will ask you what kind and give options for wires you may choose, then it will ask you how many of these types of wires and you can put as many as you want in. This allows the calculator the calculate the total area of these wires and add it calculating sum of area for your conduit. You do not have to worry about ground wire because it is automatically calculated and added to the area. It then will ask if you want to add more wires and you can answer yes or no, if you answer yes then you will repeat the process if you answer not then you will move on to multicables. The multicables process is almost identical to the wires process except it will ask you what gauge is the multicable between 12 or 14. After multicables are finished you will move onto fiberoptic cables then circuit cables. Circuit cables and fiberoptic cables are identical to the wire process. At the end it will ask if there is any miscellaneous wire or cables that were not listed and if there is to add the area to that wire or cable manually because it was not listed, and we do not currently have information on that wire. Once this is finished if the conduit is new the calculator will print the min size of your conduit, the combined area of the wire and the percentage this area fills of the conduit, if the conduit is existing it will tell you if the conduit is filled or not and the percentage that is currently filled.

At the end it will ask if you want to calculate another conduit, if you answer yes you will repeat the process and if you answer no, then you will move onto the Line Loss section.

# Line Loss

The line loss section is much simpler than the conduit sizing because there are just less variables involved. When this section is started it will ask if you want to calculate the line loss percentage for different branches if you answer yes, the calculator will begin if you answer no, then the program will end.

The calculator first asks for the name of the branch, I suggest naming it by the sheet the branch is seen on and the branch you have labeled it for example UT-01-A. Then it will ask you for the total voltage for this branch which will need to be answered with an integer. It will then ask if you want to add a segment to this branch, if answered yes it will ask you for the length, amp load, and wire type for this segment. After this segment is finished it will ask if you want to add another, if you answer yes, the process repeats if you answer no, then it prints the branch name, its total voltage, and how many segments there are. It then prints each individual segment’s line loss and loss percentage with the accumulative loss percentage. And finally prints the total percentage loss for this branch. Once this is over it will ask if you want to calculate a new branch and if you answer yes, the process will repeat but if you say no then the program will end.

# Conclusion

Once the program is ended you can look at your .txt file in the same directory that you store the java files. Here you will see that both the conduit section and line loss section are separated by headers and within each section see all the information printed for you. In the conduit sizing section, you will see all the new runs and their proposed minimum size and for the existing conduits you will see if it is filled to standard and the percentage filled for the conduit. For the line loss you will the individual segment line loss and line loss percentage plus the total line loss percentage for the branch.

This program will hopefully simplify the calculating of different electrical problems and give easy access to the results of these calculations. It is also much more flexible than the spreadsheet built before because you can add as much data as you seem necessary which allows for this to be used on bigger or smaller projects and is not limited by how many excel cells I program.