Rad Survey Efficiency Calculator

The purpose of this calculator is to be used in the field by Bio Environmental Technicians surveying for radiation. Knowing the efficiency of the detector they are using when they are surveying is very important information for the Health Physicists who will later normalize their data and calculate exact radiation levels detected during the survey.

This calculator will guide the technicians on which information to enter that will be important for data collection. It will also differentiate between the types of detectors to determine which calculation is appropriate based on what the technician entered. The calculator will output the final efficiency in percent form.

Things that you will need to know as assumptions:

1. The time is written in military standard.
2. Dates are MM/DD/YYYY
3. Sources remain the same, but activities change due to radiation decay. Half lives are different for each source, therefore each one decays at a different rate. This was not calculated in this assignment.
4. There are 4 sets of equipment that could be used by a surveyor:
   1. Ludlum 2221 with a FIDLER
   2. Ludlum 2221 with a Ludlum 44-10
   3. Ludlum 3 with a Ludlum 44-9
   4. Ludlum 2360 with a Ludlum 43-89
5. The first 3 sets of equipment give a singular output that a singular efficiency can be found with.
6. **General Efficiency** equation is: ((Reading with Source – Background)/Activity of Source)\*100
7. The last set of equipment (2360 and 43-89) gives 2 outputs: an Alpha and a Beta reading. It is necessary to calculate the amount of alpha crossover into the beta reading and the amount of beta crossover into the alpha reading.
8. Also separate efficiency calculations must be completed as well.
9. **Alpha Crosstalk** equation is: ((Beta Reading with Alpha Source – Beta Background)/Alpha reading with Alpha Source)
10. **Beta Crosstalk** equation is: ((Alpha Reading with Beta Source – Alpha Background)/Beta reading with Beta Source)
11. **Alpha Efficiency** equation is: ((Alpha Reading with Alpha Source – Alpha Background)/Alpha Source Activity)\*100
12. **Beta Efficiency** equation is: ((Beta Reading with Beta Source – Beta Background)/ Beta Source Activity)\*100
13. Lastly, a summary of the data and an output with the calculations should print out.

Use the attached excel sheet for sample input data. Follow along as the program prompts you and input exactly what is in the excel worksheet. The excel sheet has 3 sets of data available for each Switch case. The calculations within excel are also active to help see which values went into it.