

THE LAWS OF J. EDSSEL MURPHY

In today's institutes of higher education, students learn Ohm's Law, Kirchoff's Law, and other engineering necessities. However, a more basic, infinitely more important law is never mentioned. Everyone at some time or another encounters Murphy's Law. Often these encounters leave the victim shocked and bewildered. Our purpose is to prepare the younger people for future encounters and to show them they are not alone.

J. Edsel Murphy and his contributions have never been fully appreciated. A victim of his own law, Murphy was destined for a place in the Engineering Hall of Fame when something went wrong. The mere discovery of the Law was not his most important contribution, but more important was its impact and universal application.

Murphy's Law as first recorded states "If anything can go wrong it will". Expressed in more exact mathematical terms, this would be $1 + 1/\infty$ where ∞ is the symbol for hardly ever is. The first known expansion of Murphy's Law occurred when H. Shizel stated "If anything can go wrong, it will-during the demonstration". The following examples, collected through personal experience and conversations with various associates are presented here.

IN THE AREA OF MATHEMATICS:

1. All constants are variables.
2. Any error that can creep in will.
3. A decimal will always be misplaced.
4. In any miscalculation, if more than one person is involved, the fault will never be placed.
5. In a complex calculation one factor from the denominator will always move into the numerator.
6. Any error that does occur will be in the direction to cause the greatest error.
7. In any set of calculations the most obviously correct figure will be wrong.

GENERAL ENGINEERING PRINCIPLES

1. An important operating or instruction manual will be lost or misplaced.
2. Original drawings will be destroyed by the copying machine.
3. Dimensions will always be expressed in the least usable terms. An example would be furlongs per fortnight to denote velocity.
4. All warranty and guarantee statements become void upon payment of the invoice.
5. The less important a change of design appears, the more its influence will be felt.
6. The closer a system is to completion, the greater the need for a major change.

SPECIFICATIONS AND DOLLARS

1. Cost of equipment will exceed any given estimate by a factor of 2.8 or more.
2. Budgets and timetables which have been set as the result of experience will be exceeded.
3. Manufacturers spec sheets will be incorrect by a factor of 0.6 or 2.5, whichever gives the most optimistic value.
4. Salesmen's claims on estimated costs will be incorrect by factors of .1 or 10.
5. Specified environmental conditions will be exceeded.
6. In any instrument which is characterized by a number of plus or minus errors, the total error will be the sum of all errors adding in the same direction. Cancellation of errors does not occur.

IN THE SHOP

1. A dropped tool will land where it will do the most damage. This is sometimes known as the law of selective gravitation.
2. After an instrument has been fully assembled, extra parts will be found on the bench.
3. If a particular resistance value is needed, that value will not be available. In addition, it cannot be developed with any parallel or series combination of available resistors.
4. Identical units, which have been tested under identical conditions, will not be identical in use.
5. The more delicate the component, the greater the probability that it will be dropped.
6. Interchangeable parts won't.
7. That which should amplify will oscillate, and that which should oscillate will only amplify.
8. A fail-safe circuit will destroy others.

11. After the last of 35 mounting screws has been removed from an access cover, it will be discovered that the wrong cover has been removed.
12. After an access cover has been secured by the last of 35 holddown screws, it will be discovered that the gasket has been left own.
13. Any wire that has been cut to premeasured length will be too short.
14. The possibility that a dimension will be omitted from a drawing is directly proportional to its importance.
15. If N components are needed for a project, N-1 will be in stock.
16. A failure will not appear until a unit passes a final inspection.
17. The probability of failure of a component or assembly is inversely proportional to its ease of repair or replacement.
18. Any device randomly selected from a group having 99% reliability will be from the 1% group.
19. Any carton thrown away before assembly is guaranteed to contain at least two essential parts.

MISCELLANEOUS

1. During a final exam the ni-cads in your calculator will go dead.
2. If you use a slide-rule, you will drop and break the cursor within the first five minutes of the exam.
- 3.

Additional examples were to be included in this list, but in accordance with Murphy's Law, the notes and references have been misplaced. These will invariably be found after the printing of the article.