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 NEWSLETTER

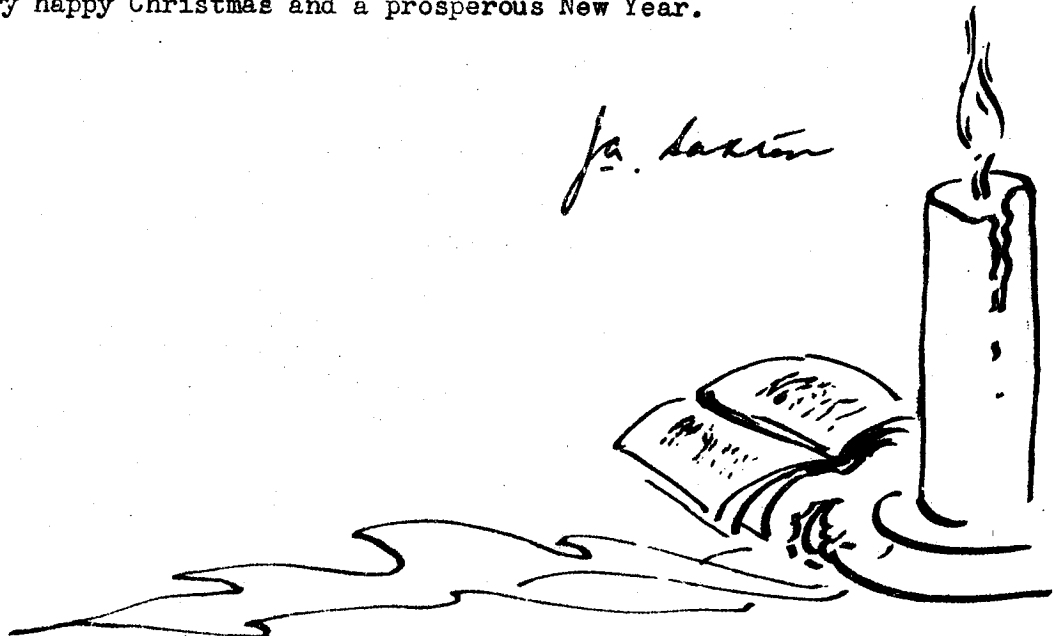
No. 92

December, 1968 ✓

Another year has passed, a year in which the Station has been called on to bear its share of the Nation's frustration and disappointments, but a year nevertheless in which we have a number of satisfying achievements to our credit. ESRO I was successfully launched carrying two R.S.R.S. experiments which are working well, the Chilbolton aerial has been restored to use, we have had considerable success in our rocket research, new light has been shed on ionospheric predictions using satellite observations, laser studies of both the ionosphere and troposphere have gone well and we have embarked, jointly with the Post Office, on a major investigation of millimetre wave propagation which promises to be both scientifically fruitful and of practical importance.

Despite continuing difficulties we can confidently and with optimism look forward to further success in our work in the year ahead; so it is without the least misgiving that I wish all members of the staff and their families a very happy Christmas and a prosperous New Year.

*J. A. Saxton*



### Overseas Service

Do staff appreciate the many perils associated with service overseas? Take Cyprus, for instance. The last week in September can provide a distinct change in the pattern of one's dedicated life - and it's not the autumn weather setting in and the dropping of daytime maxima to the lower eighties that is the cause. No, it's the Annual Wine Festival in Limassol which provides the distraction. It's held in the Municipal Gardens as a Tourist Attraction - though the local residents manage to display a passing interest - lasts around a week and involves an entrance fee of 1s.

For those who forget to take their own bottles or glasses, the organisers have shown sympathy. Both can be purchased for a nominal sum immediately one has passed through the turnstiles and, armed with these, the "programme of research" can begin. The different wine producing firms have their individual stands and display their products in rows of attractive bottles each one of which appears to be bottomless - if one can judge by the numbers of samples poured and absorbed. The descriptive programme does, in fact, list amongst the attractions of the Festival the "free tasting of Commandaria, Table Wines, Sherries, Port-type Wines, Muscat and Malaga" while another entry states that "Red and White, dry and sweet, wines are offered free". Now the purpose of the bottle one has purchased becomes obvious!! It is said that hollow legs are beneficial, at least on this one occasion, as no restrictions are made on the number of samples required to savour the full bouquet of a particular wine.

The Festival is, of course, the culmination of the grape growing season but, without a visit to the vineyards near picking time it is difficult to visualize the enormity of the crop and the care lavished on it during the six month growth period. Table varieties are especially well cared for and approval of the sugar content must be made by a Cyprus Government Inspector before picking and packing is permitted. Export shipments to Europe increase rapidly and this year were completed by early September.

Wine varieties are even more important and a common sight are the three and five ton lorries loaded to the brim with grapes of all types on their way to the wine factories for processing. This transport is the reason for the very unusual road warning signs which appear "Caution! Roads Slippery with Grape Juice" - a warning which is superfluous if one has the bad luck to drive up a hill road behind one of these lorries. Perhaps a slight feeling of doubt is engendered

/in the

in the hardened drinker when the lorry is seen to join a long queue of similarly loaded vehicles at the wine factory; in the foremost lorry two men stand knee-deep amongst the grapes shovelling them into the factory with garden forks.

For those with a mathematical bent, it is interesting to note that over a growing area in Cyprus of about 120 square miles, every square yard produces a pound of grapes with a total of more than 125,000 tons for the Island production. More than 4,000 tons of table varieties are exported, and a further 40,000 tons are used in wine manufacture providing more than 3 million gallons of wine. Statistics report that the remainder of the crop is consumed locally as grapes, sultanas or in local wine production.

All of which brings me back to the wine tasting - I really must try and drag myself off this bench in these Municipal Gardens. After all, the much televised Lord Boothby managed to tour the Stands, and presumably sample, while I was touring round - he still looked sober. Perhaps I'm just not used to this gay life!

L. T. J. MARTIN

THE CONTRIBUTIONS OF EDESEL MURPHY TO THE UNDERSTANDING OF THE  
BEHAVIOUR OF INANIMATE OBJECTS

D. L. Klipstein

Abstract :- Consideration is given to the effects of the contributions of Edsel Murphy to the discipline of electronics engineering. His law is stated in both general and special form. Examples are presented to corroborate the author's thesis that the law is universally applicable.

I Introduction

IT HAS LONG BEEN the consideration of the author that the contributions of Edsel Murphy, specifically his general and special laws delineating the behaviour of inanimate objects, have not been fully appreciated. It is deemed that this is, in large part, due to the inherent simplicity of the law itself.

It is the intent of the author to show, by references drawn from the literature, that the law of Murphy has produced numerous corollaries. It is hoped that by noting these examples the reader may obtain a greater appreciation of Edsel Murphy, his law, and its ramifications in engineering and science.

As is well known to those versed in the state-of-the-art, Murphy's Law states that "If anything can go wrong, it will". Or, to state it in more exact mathematical form :

/equation (1)

1 + 1 λπ 2

(1)

where λπ is the mathematical symbol for hardly ever.

Some authorities have held that Murphy's Law was first expounded by H. Cohen when he stated that "If anything can go wrong, it will - during the demonstration". However Cohen has made it clear that the broader scope of Murphy's general law obviously takes precedence.

To show the all-pervasive nature of Murphy's work, the author offers a small sample of the application of the law in electronics engineering.

## II General Engineering

- II.1 A patent application will be preceded by one week by a similar application made by an independent worker.
- II.2 The more innocuous a design change appears the further its influence will extend.
- II.3 All warranty and guarantee clauses become void on payment of invoice.
- II.4 The necessity of making a major design change increases as the fabrication of the system approaches completion.
- II.5 Firmness of delivery dates is inversely proportional to the tightness of the schedule.
- II.6 Dimensions will always be expressed in the least usable term. Velocity, for example, will be expressed in furlongs per fortnight.
- II.7 An important Instruction Manual or Operating Manual will have been discarded by the Receiving Department.
- II.8 Suggestions made by the Value Analysis group will increase costs and reduce capabilities.
- II.9 Original drawings will be mangled by the copying machine.

## III Mathematics

- III.1 In any given miscalculation, the fault will never be placed if more than one person is involved.
- III.2 Any error that can creep in, will. It will be in the direction that will do the most damage to the calculation.
- III.3 All constants are variables.
- III.4 In any given computation, the figure that is most obviously correct will be the source of error.
- III.5 A decimal will always be misplaced.
- III.6 In a complex calculation, one factor from the numerator will always move into the denominator.

IV Prototyping and Production

- IV.1 Any wire cut to length will be too short.
- IV.2 Tolerances will accumulate unidirectionally toward maximum difficulty of assembly.
- IV.3 Identical units tested under identical conditions will not be identical in the field.
- IV.4 The availability of a component is inversely proportional to the need for that component.
- IV.5 If a project requires  $n$  components, there will be  $n-1$  units in stock.
- IV.6 If a particular resistance is needed, that value will not be available. Further, it cannot be developed with any available series or parallel combination.
- IV.7 A dropped tool will land where it can do the most damage. (Also known as the law of selective gravitation.)
- IV.8 A device selected at random from a group having 99% reliability, will be a member of 1% group.
- IV.9 When one connects a 3-phase line, the phase sequence will be wrong.
- IV.10 A Motor will rotate in the wrong direction.
- IV.11 The probability of a dimension being omitted from a plan or drawing is directly proportional to its importance.
- IV.12 Interchangeable parts won't.
- IV.13 Probability of failure of a component, assembly, subsystem or system is inversely proportional to ease of repair or replacement.
- IV.14 If a prototype functions perfectly, subsequent production units will malfunction.
- IV.15 Components that must not and cannot be assembled improperly will be.
- IV.16 A d.c. meter will be used on an overly sensitive range and will be wired in backwards.
- IV.17 The most delicate component will drop.
- IV.18 Graphic recorders will deposit more ink on humans than on paper.
- IV.19 If a circuit cannot fail, it will.
- IV.20 A fail-safe circuit will destroy others.
- IV.21 An instantaneous power-supply crowbar circuit will operate too late.
- IV.22 A transistor protected by a fast-acting fuse will protect the fuse by blowing first.

- IV.23 A self-starting oscillator won't.
- IV.24 A crystal oscillator will oscillate at the wrong frequency - if it oscillates.
- IV.25 A pnp transistor will be an npn.
- IV.26 A zero-temperature-coefficient capacitor used in a critical circuit will have a TC of  $-750 \text{ ppm}/^{\circ}\text{C}$ .
- IV.27 A failure will not appear till a unit has passed Final Inspection.
- IV.28 A purchased component or instrument will meet its specs long enough, and only long enough, to pass Incoming Inspection.
- IV.29 If an obviously defective component is replaced in an instrument with an intermittent fault, the fault will reappear after the instrument is returned to service.
- IV.30 After the last of 16 mounting screws has been removed from an access cover, it will be discovered that the wrong access cover has been removed.
- IV.31 After an access cover has been secured by 16 hold-down screws, it will be discovered that the gasket has been omitted.
- IV.32 After an instrument has been fully assembled, extra components will be found on the bench.
- IV.33 Hermetic seals will leak.

#### V Specifying

- V.1 Specified environmental conditions will always be exceeded.
- V.2 Any safety factor set as a result of practical experience will be exceeded.
- V.3 Manufacturers spec. sheets will be incorrect by a factor of 0.5 or 2.0, depending on which multiplier gives the most optimistic value. For salesman's claims these factors will be 0.1 or 10.0.
- V.4 In an instrument or device characterized by a number of plus-or-minus errors, the total error will be the sum of all errors adding in the same direction.
- V.5 In any given price estimate, cost of equipment will exceed estimate by a factor of 3.
- V.6 In specifications, Murphy's Law supersedes Ohm's.

(With acknowledgements to Measurement Control Devices, U.S.A.)  
(and thanks to Mr. J. W. Murray, Chilbolton)

/Staff News

STAFF NEWS

Congratulations to :

Frank Bennett on gaining his M.Sc.

Welcome to :

Mrs. E. W. W. Carroll C.O. (Perm.) (Transfer from Scottish  
Development Department)

Mrs. V. Pullen Typist II (Part time)

P. J. Brain S.A. (Perm.)

P. A. Vanzeebroeck Ex. worker grade 4 (Chilbolton)

Mrs. B. T. Baker Canteen Assistant (Part time)

Resignations :

Mrs. M. A. Jardine C.A. (Part time)

R. B. Bent S.S.O. (Perm.) (18 months special leave  
without pay)

J. A. Smith S.A. (Non-perm.)

Other Changes :

G. M. Webb A.E.O. (Moved to Dr. Bryant's group  
from Dr. Burrows)

J. A. Rae S.A. (Moved to Dr. Hall's group from  
Dr. Burrows)