THE TRUNCATION OF TRUTH-FUNCTIONAL CALCULATION

DESMOND PAUL HENRY

§1 The precise determination of those combinations of truth-values which verify a sentence (Δ) of the two-value propositional calculus normally requires the exhaustive serial consideration of 2^n such combinations when Δ involves n variables. Hereunder are enunciated principles which obviate the invariable necessity for such consideration, without at the same time sacrificing exactitude of calculation.

PART I. *Theses on Abbreviational Arrays*

§2.1 In this Part theses of the two-value propositional calculus will be expressed in a notation designed for the problem in hand.

§2.2 The 2^n possible combination of truth-values of n variables may be generated by reducing to the scale of 2 the integers 0 to $2^n - 1$, and adding 0's leftwards where necessary so that each resulting number has n digits: then, assuming that "1" and "0" represent the truth-constants "true" and "false" respectively, and that "p", "q" etc., alphabetically ordered, are the propositional variables used, the successive application to p of the series of values given in the unit places of those equivalents (i.e. $0, 1, 0, 1, \ldots$) and of the series given in the radix place (i.e. $0, 0, 1, 1, \ldots$) to q, and so on, ensures that no combination is neglected. In respect of a given Δ the successive outcomes of such allocations may be recorded by means of a row of 2^n digits (called a "selector") each corresponding (from left to right) to the combinations of truth-values given by 0 to $2^n - 1$ (in that order) in the scale of 2; e.g. for $n = 3$, a 1-digit in the right-hand (2^nth) place indicates that Δ has the value 1 for the set of truth-values given by $2^n - 1$ in the scale of 2, viz, 1, 1, and 1, for p, q and r respectively. The explicitation of rules for the economical determination of selectors, as thus described, corresponding to sentences involving large numbers (e.g. > 6) of

Received December 4, 1960