

NAME INDEX

- Aiken, H. H., 55, 80, 111
 Amble, O., 20
 Babbage, C., 55, 58, 62, 69 sqq., 74, 79
 Babbage, H. P., 69, 70
 Benken, L., 49
 Booth, A. D., 111, 122
 Born, M., 51
 Brown, G. W., 46
 Bush, V., 6, 8, 14, 26
 Byron, Lord, 69
 Caldwell, S. H., 14, 26
 Crawford, P., 21
 Eckert, J. P., 55, 81
 Fürth, R., 51
 Goldberg, E. A., 66
 Goldstine, H. H., 112, 119
 Gray, T. S., 51
 Haegg, G., 48
 Henry, J., 55
 Hotelling, H., 119
 Jackson, R., 29
 Kelvin, Lord (Sir W. Thomson), 6, 7, 8, 55
 Lovelace, Countess of, 69, 70, 72, 112
 Mauchly, J. W., 55, 81
 McCulloch, W. S., 97
 Menebrea, L. F., 69, 72
 Michel, J. G. L., 20
 Monroe, Miss E., 21
 von Neumann, J., 97, 105, 112, 119
 Paschkis, V., 49
 Pepinsky, R., 48
 Pitts, W., 97
 Porter, A., 13
 Richardson, L. F., 28
 Riemann, B., 41
 Sarjant, R. J., 29
 Southwell, R. V., 33, 119, 120, 127
 Stibitz, G., 59
 Storey, E. S., 48
 Taylor, R., 46
 Thomas, G. B., 46
 Thomson, W., *See* Lord Kelvin.
 Turing, A. M., 97, 102
 Uttley, A. M., 24

SUBJECT INDEX

- Accumulator, 82, 84, 87
 Accuracy, 2
 A.C.E. (Automatic Calculating Engine), 97, 106
 Added-three code for decimal digits, 60
 Adding unit, 9, 66, 74, 82, 87, 104, 105, 110
 Addition, 57, 61, 74, 80, 82, 101, 103
 Addition table, 61
 Address, in an instruction, 68
 Algebra, Boolean, 99
 All-or-none element, 98
 See also "On-off" element.
 Alternative procedures, discrimination between. *See* Conditional selection.
 Analogue machines, *See* Instruments.
 Analyser; differential, harmonic, network, *See* Differential analyser, Harmonic analyser, *and* Network analyser.
 Analytical Engine (Babbage's), 55, 58, 62, 67, 69 sqq., 74, 79, 87, 110
 "And" operation, *See* Logical operations.
 Angle-indicator, electrostatic, 14
 Antilogarithms, 75, 76
 A.R.C. (Automatic Relay Computer), 63
 Arithmetical operations, 57, 61, 65, 87, 103, 112, 113
 Arithmetical unit, 58, 70, 74, 80, 110, 111
 Auxiliary storage, 77, 83, 97
 Backlash, 12
 Ballistics, external, 53, 91
 Ballistics Research Laboratory, 55, 81
 Bell Telephone Laboratories, 46, 55, 80
 Bernoulli numbers, 70, 73
 Binary point, *See* Decimal point.
 Binary representation of numbers, 59
 Bi-quinary code for decimal digits, 80
 Bivac, 97
 Boolean algebra, 99
 Boundary conditions in the solution of differential equations,
 one-point, 24, 122, 123
 two-point, 24, 89, 116, 122, 125
 Boundary-layer equations, 88
 Breakpoint, 114
 Calculating instruments, 1, 44 sqq.
 Calculating machines, 1, 54 sqq.
 See also Desk machines.
 Cambridge University; Mathematical Laboratory, 9, 40, 97
 Carry-over, in addition, 62, 65, 71, 72, 103, 110
 Characteristic-value problems, 126
 Characteristics, of partial differential equations, 38, 41, 129
 Checking, 60, 87, 105
 Cinema integrator, 1, 51
 Clearing, 79, 102, 103, 109
 Clock, 67, 103
 Coded decimal representation of numbers, 59, 75
 Coding, 54, 79, 85, 107, 112
 Complement, 57
 Complex numbers, 47, 80
 Compressible fluids, flow of, 38, 41, 88
 Computer, 58
 See also Arithmetical unit.
 Conditional selection, of instructions, 54, 72, 79, 80, 86, 106, 108, 109, 112
 Conditional transfer, 54
 See also Conditional selection.
 Configuration, of a group of elements, 59, 66, 80
 Continuous variables, 2
 Continuously variable gear, 5
 Control, 54, 57, 58, 67, 71, 79, 80, 81, 83, 106
 Control unit, 54, 70, 79, 87
 Counter, electronic, 81
 Counter, mechanical, 9, 55, 74
 Counting, 2, 61
 Criteria, for conditional selection, 58, 68, 72, 112, 114
 Cumulative adder, 105
 Decimal point, treatment of, 64
 Decimal representation of numbers, 59
 Delay, in serial machine, 99, 103, 110
 Delay element, 99
 Delay line, 67, 95, 102
 Delay-line storage, *See* Storage systems.
 Desk machine, 1, 46, 56, 116
 Destination, 102, 107, 108
 Difference engine (Babbage's), 69
 Differential analyser, 1, 4 sqq.
 electromechanical, 23
 electrical, 24
 mechanical, 1, 4 sqq.
 new, at M.I.T., 15
 set-up, 17
 set-up diagram, 18, 41, 42
 small-scale, 13
 Differential equation, ordinary, 91, 116, 121
 application of digital machines, 26, 91, 124, 125
 mechanical solution, 5, 7
 nature, 4, 24
 step-by-step solution, 87, 121, 123
 See also Boundary conditions.
 Differential equations, partial,
 application of differential analyser, 26 sqq.
 application of digital machines, 26
 elliptic, 33, 127
 hyperbolic, 33, 37, 127
 parabolic, 26, 33, 34, 127
 relaxation methods, 33, 127
 Digital machines, *See* Calculating machines, digital.

SUBJECT INDEX

137

- Directors, for artillery fire control, 52
 Discrimination, *See* Conditional selection.
 Display, of results, *See* Output.
 Division, 57, 63, 71, 75, 82, 112
 Double-length numbers, 97, 111
 Dynamic storage, 67, 97
- Eckert-Mauchly Computer Corporation, 97
 EDSAC, 97
 EDVAC, 97, 114
 Electronic machines, 55, 81, 87, 94 sqq.
 Electrostatic storage, *See* Storage systems.
 Eniac, 55, 58, 59, 60, 63, 81 sqq., 87, 88, 115, 116
 Equality,
 criterion for conditional selection, 114
 recognition of, 57, 64
 Excitation, 98, 102
 External ballistics, 53, 91
- Finite differences, 21, 69, 123
 Fixed decimal or binary point, *See* Decimal point.
 Floating decimal or binary point, *See* Decimal point.
 Flow diagram, of a calculation, 112
 Fourier synthesis, 47
 Fourier transform, 52
 Function generation, 20, 21
 Functional analysis of digital machine, 97
- Gate, 81, 95, 107, 108
- " h^2 -extrapolation," 28, 30
 Half-adder, 102, 104, 110
 Harmonic analyser, 1, 7, 8
 Harvard Mark I Calculator, 55, 58, 63, 74, 82, 87, 94
 Harvard Mark II Calculator, 55, 80, 81, 87
 Harvard Mark III Calculator, 111
 Harvard University Computation Laboratory, 55
- Heat flow, equations of,
 axially symmetrical, 30
 electrical analogue, 49
 examples of solution, 34, 35, 36
 one-dimensional, 26, 36, 127
 varying thermal properties, 30
- I.B.M. Automatic Sequence-Controlled Calculator, *See* Harvard Mark I Calculator.
 I.B.M. cards, 54, 59, 74, 77, 83, 90
 I.B.M. Company, 55, 87
 I.B.M. equipment, 1
 I.B.M. selective sequence electronic calculator, 56, 87
 Inhibition, 98, 102
 Input, 9, 10, 11, 57, 58, 71, 80, 83
 Institute for Advanced Study, Princeton, N.J., 111
- Instructions, for digital machines, 54, 67, 79, 84, 86, 94, 106
 n -address form, 68, 106, 112
 Instruments (analogue machines), 1, 44 sqq.
 Integral conditions, in solution of differential equations, 24, 122
 Integrator, 1, 48, 51
 Integrating mechanisms, 5, 7
 Integration,
 continuous, 2
 instantaneous, 51
 step-by-step, 87
 Integration formulae, 90
 Integrator,
 electrical, 24
 electromechanical, 23
 mechanical, 5, 6, 10, 16
 Intelligence, 92
 Interpolation, continuous, 21
 Interpolation formula, 22
 Interpolator, 21, 77
 Isograph, 1, 46
 Iterative process, 79, 90, 91, 112, 116
 first-order, 117
 for differential equation, 124, 125, 126
 for division, 57, 63, 112, 118
 for integral equation, 129
 for square root, 58, 63, 118
 second-order, 117
- Judgment, 54, 58, 70, 72, 120
- Linear sequence of instructions, 68
 Logarithms, 75
 Logical operations, 100, 112, 113
- Machines, 1, 54 sqq.
 Machine's-eye-view, 92
 Magnetic storage, *See* Storage systems.
 Major cycle, 97, 103
 Manchester (England), University of, 8, 24, 40, 96
 Massachusetts Institute of Technology, 6, 8
- Master programmer, 86, 90
 Matrix, inversion of, 120
 Meccano differential analyser, 13
 Memory, *See* Storage.
 Minor cycle, 97
 Minor cycle counter, 103, 105
 Multiplication, 21, 57, 63, 66, 71, 75, 82, 97, 110
 Multiplier, 12, 42, 75, 82, 105
- National Physical Laboratory, Mathematics Division, 97
 Network analyser, 46
 Neuron, 98
 "Not" operation, *See* Logical Operations.
 Numbers, representation of, 1, 2, 59, 65

- "On-off" elements, 59, 70
See also All-or-none elements.
 Operating Instructions, *See* Instructions.
 "Or" operation, *See* Logical operations.
 Orders, for digital machines, *See* Instructions.
 Organisation.
 of a calculation, 57, 72, 86, 88, 90, 112, 115
 of a machine, 56, 67, 97, 108
 Output, 9, 11, 57, 58, 77, 80, 83

 Paper tape, *See* Punched tape.
 Parallel (simultaneous) operation, 62, 65
 Parallel machines, 109, 110
 See also Harvard Mark I Calculator and Eniac.
 Partial differential equations, *See* Differential equations, partial.
 Pennsylvania, University of; Moore School of Electrical Engineering, 81
 Photoelectric integrator, 51
 Planimeter, 1, 6
 Programmed decimal or binary point, *See* Decimal point.
 Programming, 54, 69, 107, 109, 112
 Pulse counter, 103
 Pulse generator, 82, 95
 Pulse period, 99
 Pulses, electrical, 1, 59, 60, 65, 81, 95, 99
 Punched cards, *See* I.B.M. cards.
 Punched tape, 14, 75, 79, 80, 81, 87

 Reeves Instrument Corp., New York, 24
 Regenerative connections, 20
 Register, 83, 108, 111
 Relaxation methods, 33, 119, 127
 Relay circuits, 14, 55, 59, 99
 Relay interpolator, 80
 Relay machines, 80
 Relay register, 80, 83
 Relays, electrical, 14, 59, 66, 74, 80
 Repetition, of a sequence of operations, 72, 79, 86, 114
 Reproducing punch, 90
 Residual, 120
 Riemann's transformation, for waves of finite amplitude, 41
 Rounding-off errors, 45, 116, 119, 120, 124

 Scale-of-ten, *See* Decimal.
 Scale-of-two, *See* Binary.
 Sequence control, *See* Control.
 Serial machines, 97
 Serial (successive) operation, 62, 65
 Shifting, 83, 110

 Sign,
 criterion for conditional selection, 72
 recognition of, 57, 64
 treatment of, in digital machines, 64
 Simultaneous carry-over, in addition, 62, 71, 72, 110
 Simultaneous equations,
 differential, 30, 122, 126
 linear algebraic, 44, 119
 non-linear algebraic, 42, 122
 Sines, 75, 77
 Slide-rule, 2
 Sorter, 91
 Sound waves of finite amplitudes, 41
 Source, 102, 107, 108
 Speed of operation, 71, 90, 94, 115
 Square root, 57, 63, 82
 Static storage, 66, 74, 82, 109
 Steepest descent, 121
 Stepper, 86
 Stimulus, 98
 Storage, in digital machines, 54, 57, 58, 66, 67, 75, 84, 102
 Storage capacity, 71, 83, 87, 90, 91, 94, 117
 Storage element, 102
 Storage locations, 67, 68
 Storage systems, 94
 delay line, 94, 95, 97
 electronic, 82
 electrostatic, 95, 96, 111
 magnetic, 94, 96, 111
 mechanical counter, 74
 relay, 55, 80
 Store, 70, 74
 Subsequences of operations, 80, 88
 Subtraction, 57
 Switch, 75, 84, 86, 87, 114
 Switching circuits, 99

 Tabular data, 57, 71, 74
 Taylor series, 123
 Testing, 60
 Threshold, 98
 Time-lag, 11
 Torque amplifier, 10
 Transfer, 57, 58, 71, 106, 113
 Trigger circuit, 102
 Tubes, electronic, 60, 66, 95, 99

 Univac, 97, 114

 Variation methods, 121, 126
 Velodyne, 23

 Word, 97, 99, 103, 115