

# **PROGRAMMING LANGUAGES:**

## **History and Fundamentals**

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# B

## LANGUAGE SUMMARY

This appendix contains a list of every language specifically listed in the outline, together with the acronym and a very brief description. The chapter (and subsection) in which the language is described is shown and the code numbers of the one or two best references for the language, with the page on which the full citation can be found, are listed. In cases where the best reference is less accessible than a slightly inferior document, both have been given. (It should be obvious that old reports are probably unavailable; they are being listed only for the sake of completeness.)

Languages considered as specialized (and discussed in Chapter IX) have been marked with a †. Languages with a ‡ are of *primarily* historical interest, even though they might still be in use somewhere.

Readers who are interested in contacting specific individuals about a particular language should—with caution—see Sammet [SM68], which is similar (but not identical) to this Appendix. That article contains the names of individuals or organizations to contact for information. Those names have not been included here because they are valid as of the spring of 1968 but not necessarily much beyond that.

A-2 and A-3 †

An early language on UNIVAC for doing mathematical problems.  
Basically a three-address code.

IV.2.1.4 [RR55], p. 301.

ADAM (*A Data Management System*) †

A data-base handling system with facilities for some user defining of source language.

IX.3.2.4 [CY66], p. 703.

- AED** (*Automated Engineering Design* or *ALGOL Extended for Design*) †  
A generalized language system and a set of concepts; includes AED JR., AED-0, and AED-1. Based on ALGOL and an algorithmic theory of language. Provides techniques for building processors for new languages.  
IX.3.4.2 [RD67a], p. 705; [MT00a], p. 705.
- AESOP** (*An Evolutionary System for On-Line Processing*) †  
An on-line query system, based primarily on the use of a display screen and light pen.  
IX.3.2.8 [QA65], p. 704; [UT67], p. 703.
- AIMACO** (*Air Materiel COMmand Compiler*) †  
An improvement and modification of FLOW-MATIC. Supplanted by COBOL.  
V.2.2 [AM58], p. 378.
- ALGOL** (*ALGO*rithmic Language)  
A language developed jointly by people in the United States and Europe. Suitable for expressing solutions to problems requiring numeric computations and some logical processes. Second version, ALGOL 60 (which had a few revisions in 1962) is the current language. It has no officially defined input/output. Revised ALGOL 60 (with input/output specifications added) has been approved for all practical purposes as an ISO Standard.  
IV.4 [NA63], p. 306.
- ALGY** †  
One of the first attempts at an independent language for doing formal algebraic manipulation.  
VII.2.1 [BM61], p. 520.
- ALTRAN**  
An extension to FORTRAN to do formal algebraic manipulation of rational functions. Uses ALPAK subroutines.  
VII.5 [ML66], p. 522; [BW66], p. 522.
- AMBIT** (*Algebraic Manipulation By Identity Translation*)  
A string manipulation language based on a replacement rule involving a pointer.  
VI.9.1 [CQ64], p. 470; [CQ65], p. 470.
- AMTRAN** (*Automatic Mathematical TRANslation*)  
An on-line keyboard system allowing input and output of equations in a seminatural format, and output of graphical and numerical solutions on a scope or typewriter.  
IV.6.11 [RF66], p. 311; [UV67], p. 311.

- Animated Movie** †  
A language to assist in preparing animated movies.  
IX.2.6.3 [KO64], p. 699.
- APL/360** (*A Programming Language on 360*)  
An on-line version of a subset of APL.  
IV.6.8 [FA67a], p. 310.
- APL** (*A Programming Language*)  
A general but unimplemented language with complex notation and unusual but powerful operations. See also APL/360 and PAT.  
IX.2.3.1 [FA64], p. 694; X.4 [IV62], p. 720.
- APT** (*Automatically Programmed Tools*) †  
A language for numerically controlled machine tools. A USASI standard is being developed.  
IX.2.1.1 [BP63], p. 693; [II67], p. 693.
- B-0** †  
See FLOW-MATIC.
- BACAIC** (*Boeing Airplane Company Algebraic Interpreter Coding System*) †  
One of the early languages for mathematical problems, i.e., a pre-FORTRAN system on the 701.  
IV.2.1.5 [GR55], p. 301.
- BASEBALL** †  
A question-answering system whose data base contains information about baseball.  
IX.3.2.5 [GB61], p. 703.
- BASIC** (*Beginner's All-Purpose Symbolic Instruction Code*)  
A very simple language for use in solving numerical problems developed in an on-line system.  
IV.6.4 [KM67], p. 309.
- BUGSYS** †  
A language for use in preparing animated movies.  
IX.2.6.3 [LL66], p. 699.
- C-10** †  
An improved version of COLINGO.  
IX.3.2.2 [QZ67], p. 702.
- CLIP** (*Compiler Language for Information Processing*) † †  
A language based on ALGOL 58, useful for writing compilers. JOVIAL is an outgrowth of CLIP.  
IX.2.5.2 [IS59], p. 697; [EG61], p. 697.
- CLP** (*Cornell List Processor*)  
An extension of CORC to do list processing.  
VI.9.3.1 [CN65], p. 470.

- COBOL** (*CO*mmon *B*usiness *O*riented *L*anguage)  
An English-like language suitable for business data processing problems. Developed and maintained by a committee of representatives from manufacturers and users. It has been implemented on most computers. A USASI Standard has been approved.  
V.3 [US65], p. 381; [XB67], p. 381.
- COGENT** (*CO*mpiler and *GE*neralized *T*ranslator) †  
A compiler-writing language with strong elements of list processing.  
IX.2.5.4 [RE65], p. 697; [RE65a], p. 698.
- COGO** (*CO*ordinate *GE*ometry) †  
A specialized language for solving coordinate geometry problems in civil engineering.  
IX.2.2.1 [RS64], p. 694; [EI67], p. 694.
- COLASL**  
A language for numerical mathematical problems, based on use of a special typewriter which permits two-dimensional (i.e., natural) input of mathematical expressions.  
IV.7.2 [BQ62], p. 312.
- COLINGO** (*CO*mpile *ON* *LI*ne and *GO*) †  
A formalized English-like query system for command and control applications.  
IX.3.2.2 [SZ65], p. 702.
- COMIT**  
The first significant string-handling and pattern-matching language.  
VI.6 [MT61], p. 468; [MT61a], p. 468.
- Commercial Translator** ‡  
An English-like language for doing business data processing problems. Supplanted by COBOL.  
V.2.3 [IB60a], p. 378.
- Computer Compiler** †  
Proposed language for describing the design of a computer.  
IX.2.3.5 [MX66], p. 695.
- Computer Design** †  
An unimplemented ALGOL-like language for describing the design of a computer.  
IX.2.3.6 [CB65], p. 695.
- CORAL** (*Cl*ass *O*riented *R*ing *A*ssociated *L*anguage)  
A language on the TX-2 for handling certain ring types of lists.  
VI.9.3.2 [RB65], p. 470.
- CORC** (*CO*Rnell *C*ompiler)  
A simple language for use by students in doing mathematical problems.  
IV.8.1 [CN63], p. 313.

- CPS** (*CO*nversational *P*rogramming *S*ystem)  
An on-line PL/I-like extended subset.  
IV.6.5 [JB67a], p. 309.
- Culler-Fried**  
An on-line system for doing mathematics, based on the use of a special keyboard for ease in building up arbitrary combinations of operations. Normally known by the names of the developers.  
IV.6.9 [CU67], p. 311.
- DAS** (*D*igital *A*nalog *S*imulator) †  
A language to provide representations of the components in an analog computer.  
IX.2.4.4 [GL64], p. 696.
- DATA-TEXT** (Harvard) †  
A language for use by social scientists in doing their numerical computations and analyses.  
IX.2.6.4 [HD67], p. 699.
- DEACON** (*D*irect *E*nglish *A*ccess and *CO*Ntrol) †  
A query system with fairly natural English input for command and control applications.  
IX.3.2.6 [CJ66], p. 703.
- DIALOG**  
An on-line system for doing numerical mathematical computations by using a light pen pointing at a screen to create the program.  
IV.6.10 [CS67], p. 311.
- DIAMAG**  
An on-line extension of ALGOL.  
IV.4.5.6 [AU67], p. 304.
- DIMATE** (*De*pot *I*nstalled *M*aintenance *A*utomatic *T*est *E*quipment) †  
Contains a language to assist in conducting automatic equipment tests.  
IX.2.6.5 [SD66], p. 699.
- DOCUS** (*D*isplay *O*riented *C*omputer *U*se *S*ystem) †  
An on-line system based entirely upon push buttons, with responses shown on the scope.  
IX.3.3.4 [CF66], p. 704.
- DSL/90** (*D*igital *S*imulation *L*anguage on 7090) †  
An addition to FORTRAN which provides representation of blocks, switching functions, and function generators similar to those available with an analog computer.  
IX.2.4.5 [QP66], p. 696.
- DYANA** (*D*Ynamics *A*Nalyzer) † ‡  
One of the early specialized languages. Used for describing vibrational and other dynamics systems.  
IX.2.4.2 [OZ58], p. 696; [TD58], p. 696.

**DYNAMO** †

One of the first discrete simulation languages.

IX.3.1.2 [PG63], p. 699.

**DYSAC** (*Digitally Simulated Analog Computer*) †

A language to provide representation of a number of analog computer components.

IX.2.4.3 [HJ63], p. 696.

**English**

The concept of using a natural language (e.g., English) as a programming language.

X.5 [HL66], p. 720; [TH66], p. 720.

**Extended ALGOL**

A specific set of additions to ALGOL.

IV.4.5.8 [QG66], p. 306.

**473L Query** †

A formalized English-like query system for use in the Air Force 473L system.

IX.3.2.3 [BL65], p. 703.

**FACT** (*Fully Automatic Compiling Technique*) ‡

An English-like language suitable for business data processing. Largely supplanted by COBOL.

V.2.4 [HO61], p. 379.

**FLAP**

A program to do symbolic mathematics.

VII.6 [MB67], p. 522.

**FLOW-MATIC** ‡

The first English-like language for doing business data processing; implemented on UNIVAC I. Supplanted by COBOL.

V.2.1 [RR59a], p. 378.

**FORMAC** (*FORmula MANipulation Compiler*)

Originally an extension of FORTRAN to do formal algebraic manipulation. PL/L-FORMAC uses similar concepts and makes many improvements and additions.

VII.3 [BZ64], p. 520; [IB65c], p. 521; [IB67c], p. 521.

**Formula ALGOL**

An extension of ALGOL which provides basic operations for doing formal algebraic manipulation, list processing, and string manipulation.

VIII.5 [PR66], p. 602.

**FORTRAN** (*FORmula TRANslator*)

The first language to be used widely for solving numerical problems. Originally developed by IBM on the 704, it has existed in many versions and has been implemented on almost all computers of most manufacturers. The first language to become a USASI Standard. There are actually two standards: Basic FORTRAN and FORTRAN, which correspond approximately to what are known as FORTRAN II and FORTRAN IV, respectively.

IV.3 [AA66], p. 302; [AA66a], p. 302; [CC64], p. 302.

**FORTRANSIT** (*FORmula TRANslator Internal Translator*) ‡

A subset of FORTRAN which was translated into IT on the IBM 650.

IV.2.2.3 [IB57a], p. 301.

**FSL** (*Formal Semantics Language*) †

A language for use in defining semantics needed for compiler writing.

IX.2.5.7 [FJ64], p. 698; [FJ66], p. 698.

**GAT** (*Generalized Algebraic Translator*) ‡

An improved version of IT.

IV.2.2.3 [GM00], p. 301.

**GECOM** (*GEneralized COMpiler*) ‡

A language with a syntax similar in spirit to that of COBOL, but with some facilities from ALGOL added.

V.2.5 [GZ61], p. 379.

**GPL** (*Generalized Programming Language*)

A relatively new attempt at defining a general language, also containing self-extending capabilities; similar in spirit to ALGOL.

IV.4.5.7 [GW00], p. 305.

**GPSS** (*General Purpose Systems Simulator*) †

A language for discrete simulation problems based on a block diagram approach.

IX.3.1.3 [IB67i], p. 700; [HK65], p. 700.

**GRAF** (*GRaphic Additions to FORTRAN*) †

A language which adds a graphic data-type to FORTRAN to facilitate the use of graphics on the computer.

IX.3.3.1 [HW67], p. 704.

**Graphic Language** †

A specific language for specifying graphic operations.

IX.3.3.3 [UZ67], p. 704.

**ICES** (*Integrated Civil Engineering System*) †

A generalized system for civil engineering, including specific languages (e.g., COGO) and some facilities for defining new languages.

IX.2.2.3 [RS65], p. 694; [RS67a], p. 694.

IDS (*Integrated Data Store*)

An extension to COBOL to permit data to be represented in ringtype-lists.

V.4.1.1 [QJ64], p. 381.

## Information Algebra

An abstract and theoretical approach to defining data processing; it has not been implemented.

X.3 [CC62], p. 719.

IPL-V (*Information Processing Language V*)

The fifth version of a language to do list processing, in which the instructions are conceptually at an assembly language level.

VI.3 [NW65], p. 466.

IT (*Internal Translator*) †

An early language used for mathematical computations on the 650.

IV.2.2.3 [PR57], p. 302.

JOSS (*JOHNNIAC Open Shop System*)

One of the first on-line systems for doing numerical computations.

IV.6.2 [JC64], p. 308; [UJ67a], p. 308.

JOVIAL (*Jules' Own Version of IAL*)

A language containing facilities for numerical computations and some data processing. Most widely used for command and control applications.

VIII.3 [PE66a], p. 599; [SH63], p. 599.

## Klerer-May

A language for numerical mathematical problems, based on the use of a special typewriter which permits two-dimensional (i.e., natural) input of mathematical expressions.

IV.7.5 [KL65a], p. 313; [KL65b], p. 313.

L<sup>0</sup> (*Bell Telephone Laboratories' Low-Level Linked List Language*)

A list processing language which allows the user to define the types and sizes of his lists.

VI.4 [KO66], p. 467.

## Laning and Zierler †

One of the first systems to allow fairly normal mathematical expressions as input. It ran on the Whirlwind computer at M.I.T. at least as early as 1953.

IV.2.1.3 [LA54], p. 301.

LDT (*Logic Design Translator*) †

A language for writing logic equations for a computer from the information contained in the systems diagram and instruction repertoire of the machine.

IX.2.3.3 [PC64], p. 695.

## Lincoln Reckoner

An on-line system on the TX-2 to do mathematical computations with high level matrix operations provided.

IV.6.7 [SW66], p. 310.

LISP 1.5 (*LISt Processing*)

A sophisticated and theoretically oriented language for doing list processing. LISP 1 and LISP 1.5 differ significantly from LISP 2.

VI.5 [BY66], p. 467; [WE67], p. 468.

## LISP 2

An ALGOL-like language which includes facilities and many concepts from LISP 1.5.

VIII.6 [AH66a], p. 602.

LOLITA (*Language for the On-Line Investigation and Transformation of Abstractions*)

An addition to one of the Culler-Fried systems to permit symbol manipulation.

VI.9.3.4 [QK67], p. 470.

LOTIS (*LOGic, TIMing, Sequencing*) †

A language for describing a computer by describing the structure and behavior of its data flow.

IX.2.3.2 [QY64], p. 695.

MAD (*Michigan Algorithm Decoder*)

A language for doing numerical computations which has a fast compiler.

IV.5.2 [UM66], p. 308.

## MADCAP

A language for numerical mathematical problems and set theoretic operations, based on the use of a special typewriter which permits two-dimensional (i.e., natural) input of mathematical expressions.

IV.7.3 [WS63], p. 312.

## Magic Paper

An on-line system on a specialized computer configuration for doing certain types of formal algebraic manipulations.

VII.7.1 [CL66], p. 522.

MAP (*Mathematical Analysis Without Programming*)

An on-line system (under CTSS) for doing numerical computation; it has certain higher level mathematical operations (e.g., integrate) and considerable dialogue with the user.

IV.6.6 [KP66], p. 309; [KP66a], p. 310.

## MATHLAB

An on-line system for doing certain types of formal algebraic manipulation.

VII.4 [EN65], p. 521.

**MATH-MATIC (AT-3) ‡**

A language developed on UNIVAC, around the same time as FORTRAN, to do mathematical computations. Supplanted by FORTRAN.  
IV.2.2.1 [RR60], p. 301.

**Matrix Compiler † ‡**

An early language to do matrix computations on the UNIVAC.  
IX.2.6.1 [MF57], p. 698.

**META 5 †**

A language for syntax-directed compiling.  
IX.2.5.5 [OP66], p. 698.

**MILITRAN †**

A discrete simulation language particularly oriented toward military applications.  
IX.3.1.6 [YC64], p. 700.

**MIRFAC (Mathematics In Recognizable Form Automatically Compiled)**

A language for mathematical problems, based on a specialized typewriter to permit two-dimensional (i.e., natural) input of mathematical expressions.  
IV.7.4 [GK63], p. 312; [GK67], p. 312.

**NELIAC (Navy Electronics Laboratory International ALGOL Compiler)**

A language for doing numerical computation and some logical processes. The compilers are written largely in NELIAC.  
IV.5.1 [HS62], p. 307.

**OCAL (On-Line Cryptanalytic Aid Language) †**

A language for use in doing cryptanalysis.  
IX.2.6.2 [ED66], p. 698.

**OMNITAB**

A very simple language containing some operations which are the same as those on a desk calculator and some which are at a high mathematical level (e.g., matrix inversion).  
IV.8.2 [HR66], p. 313.

**OPS (On Line Process Synthesizer) †**

A system under CTSS containing a discrete simulation language, among other facilities.  
IX.3.1.8 [YP65], p. 701; [YP66], p. 701.

**PAT (Personalized Array Translator)**

A small subset of APL.  
IV.6.8 [HH64], p. 310.

**PENCIL (Pictorial ENCodIng Language) †**

A language in an on-line system for use with simple data structures to display line drawings.  
IX.3.3.2 [VD67], p. 704.

**PL/I**

A language suitable for doing problems involving both numerical scientific computations and business data processing. It combines the most significant concepts from previous languages in the individual areas.

VIII.4 [IB66b], p. 601; [IB67d], p. 601; [IB67f], p. 601.

**PRINT (PRe-edited INTerpreter) ‡**

An early language on the 705 for doing mathematical computations.  
IV.2.1.6 [IB56a], p. 301.

**Proposal Writing**

An extension of FORTRAN to facilitate the preparation of proposals.  
IV.3.6.1 [CT64], p. 302.

**Protosynthes †**

A question-answering system whose data base is English text.  
IX.3.2.7 [SE64], p. 703.

**QUIKTRAN**

An on-line version of FORTRAN with some restrictions, but with added facilities for debugging.  
IV.6.3 [IB67e], p. 309.

**SFD-ALGOL (System Function Description—ALGOL) †**

An extension of ALGOL to permit descriptions of synchronous systems.  
IX.2.3.7 [PN66], p. 695.

**Short Code ‡**

Appears to be the first attempt at a higher level language for mathematical problems. Ran on UNIVAC I. Really allows a string of parameters for each operation.  
IV.2.1.1 [RR52], p. 300.

**SIMSCRIPT †**

A language for doing discrete simulation problems.  
IX.3.1.4 [MA63], p. 700.

**SIMULA (SIMulation Language) †**

An extension to ALGOL to do discrete simulation.  
IX.3.1.7 [DH66], p. 701.

**Simulating Digital Systems †**

A language with a flavor like that of FORTRAN, for describing the logical design of digital computers.  
IX.2.3.4 [MZ65], p. 695.

**SNOBOL**

A string-handling and pattern-matching language.  
VI.7 [FB66], p. 469; [GF68], p. 469.

**SOL (Simulation Oriented Language) †**

A language for doing discrete simulation problems.  
IX.3.1.5 [KN64], p. 700; [KN64a], p. 700.

## Speedcoding ‡

One of the early attempts at a higher-level language for mathematical problems on the 701. Really allows a string of parameters following an operation code.

IV.2.1.2 [BS54a], p. 300.

## SPRINT

An approach to list processing which involves direct action on an operand stack.

VI.9.3.3 [KC67], p. 470.

STRESS (*STR*uctural Engineering Systems Solver) †

A specialized language useful for solving structural analysis problems in civil engineering.

IX.2.2.2 [FE64], p. 694; [FE65], p. 694.

STROBES (*Shared Time Repair Of Big Electronic Systems*) †

A language for communicating with the computer hardware for purposes of testing.

IX.2.6.5 [QU65], p. 699.

## Symbolic Mathematical Laboratory

An on-line system (under CTSS) to do formal algebraic manipulations, based on major use of a display screen and light pen.

VII.7.2 [ZB67], p. 522.

## TMG †

A syntax-directed compiling language.

IX.2.5.3 [MZ65a], p. 697.

TRAC (*T*ext Reckoning And Compiling)

A string manipulation language involving nested functions and macro facilities.

VI.8 [ME66], p. 469.

TRAN DIR (*TRAN*slation *DIR*ector) †

A syntax-directed compiling language.

IX.2.5.6 [DE64], p. 698.

## TREET

A list processing language which embodies many of the LISP concepts but in an easier notation.

VI.9.2 [HA67], p. 470.

UNCOL (*UN*iversal Computer Oriented Language)

The concept of using a language intermediate between a programming language and machine language to minimize the number of compilers to be written.

X.2 [QR58], p. 719; [QR58a], p. 719.

## UNICODE †

A language (similar to MATH-MATIC) on the 1103 to do mathematical problems. Supplanted by FORTRAN.

IV.2.2.2 [RR59], p. 301.

NAME AND  
SYSTEM INDEX

This index contains names of people, organizations, systems, and languages. Page numbers shown in **bold face** represent a significant discussion, rather than just casual mention. Page numbers in *italics* for the major languages specify the location of the Sample Program for that language. Other *italic* page numbers indicate the existence of a bibliographic citation that is not referenced from the text or is not within an obvious subheading in the Reference Lists. Note that authors are *not* included in this index; they appear in the Author List in Appendix A.

- A**
- A-0, 6, 12, 132  
 A-1, 6, 132  
 A-2 and A-3, 5, 6, 129, **132**, 134, 137, 316, 322, 753  
 A-3 (*see* A-2 and A-3)  
 Abrahams, P., 590  
 Abrams, P. S., 247  
 ACM, 173, 542, 638  
   Collected Algorithms, 176  
   *Communications*, 175, 176, 181, 335, 345, 472  
   Programming Languages Committee, 176, 180  
 SICPLAN Notices, 58, 341, 530, 548, 739  
 SICSAM, 65  
 ADAM (IBM), 718  
 ADAM (MITRE), **667-668**, 753
- ADAPT, 606  
 AED, 244, 605, 641, **680-683**, 754  
   AED-0, 651, 680-682  
   AED-1, 682-683  
   AEDJR, 682  
 Aerospace Industries Association, 606  
 AESOP, 461, **670-674**, 678, 754  
 AIMACO, 314, 323, **324**, 331, 754  
 Air Force, 525, 665  
   Materiel Command, 324, 330, 605  
 ALCOR (*see* ALGOL, subsets)  
 ALGOL, 22, 39, 45, 48, 53, 56, 58, 75, 82, 84, 92, 103, 104, 134, 143, 144, 152, 153, 154, **172-196**, 178, 205, 208, 229, 245, 294, 328, 329, 330, 335, 340, 344, 388, 400, 454, 501, 541, 542, 543, 544, 582, 583-589, 592-598, 621, 623, 625, 638, 651, 656-658, 680, 719, 723, 754