THE HISTORY OF COBOL

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Table of Contents

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Introduction to the Information within this Document

This document is intended to provide an online and easily machine readable version of the "History of COBOL" information provided in the following three documents:

Pages XVII-1 - XVII-15 of

ANSIX3.23-1985,

> "American National Standard
> for Information Systems -
>
> Programming Language –
> COBOL"

Pages A-21 – A-22 of

 ANSI X3.23a-1989,

> "American National Standard
> **for Information Systems -**
>
> Programming Language –
> Intrinsic Function Module for COBOL"

Pages B-26 – B-27 of

ANSI X3.23b-1993

> "American National Standard
> **for Information Systems -**
>
> Programming Language –
> Correction Amendment for COBOL"

As "original source" versions of those documents are not currently available to this author, the text has been "cut and pasted" and converted to this format. Therefore, it is possible that the conversion process may have introduced editorial or typographical errors. If you find any, please contact the author so they may be corrected. During the conversion process, no attempt was made to exactly duplicate the appearance of the original text; only the content and meaning was retained.

Additional standardization work has continued for the COBOL programming language since 1993. However, the Standards documents published after that date have not included "History" sections. For more recent information, you may want to view the specific information in the following documents ISO Documents:

- ISO/IEC 19891989:2002, "Information Technology – Programming Languages – COBOL
- ISO/IEC TR 19755:2003, "Information Technology — Programming languages, their environments and system software interfaces — Object finalization for programming language COBOL"
- ISO/IEC TR 24716:2007, "Information technology -- Programming languages, their environment and system software interfaces -- Native COBOL Syntax for XML Support"
- ISO/IEC TR 24717:2009, "Information technology -- Programming languages, their environments and system software interfaces -- Collection classes for programming language COBOL"

In addition to the approved Standards, the latest revision of the full COBOL Standard is a "work in progress". As of the creation of this document, the most recent version of that document is:

- ISO/IEC 1989:20xx FCD 1.0 (E), "Information technology — Programming languages, their environments and system software interfaces — Programming language COBOL," Dated "2010-07-13

Although complete "historical" information is not available for the post-1993 documents, I have included some *BRIEF* information from the introductory portions of those documents. See the section:

> *Post 1993 information*

later in this document

1. THE DEVELOPMENT OF COBOL

1.1 ORGANIZATION OF COBOL EFFORT

On May 28 and 29, 1959, a meeting was held for the purpose of considering both the desirability and the feasibility of establishing a common language for programming of computers in business data processing applications. This meeting was attended by representatives from users, both in private industry and in government, computer manufacturers, and other interested parties. It was agreed that the language must be open-ended and capable of accepting change and amendment, that it should be problem-oriented and machine-independent, and that it should use simple English or pseudo-English and avoid symbolism as far as possible. The Conference on DAta Systems Languages (CODASYL) developed out of this meeting.

The original COBOL specifications resulted from the work of a committee of CODASYL. By September 1959 this committee had specified a framework upon which an effective common business language could be built. The name COBOL which suggests a COmmon Business Oriented Language was adopted for these specifications. The final report of this committee was accepted by the Executive Committee of CODASYL and published in April 1960. The document was titled: "COBOL - A Report to the Conference on Data Systems Languages, including Initial Specifications for a Common Business Oriented Language (COBOL) for Programming Electronic Digital Computers". The language described in this report has since become known as COBOL-60.

1.2 THE COBOL MAINTENANCE COMMITTEE

The Executive Committee of CODASYL recognized that the task of defining the COBOL language was a continuing one and that the COBOL language had to be maintained and improved. To this end, the COBOL Maintenance Committee was created in February 1960. The COBOL Maintenance Committee was charged with the task of answering questions arising from users and implementors of the language and making definitive modifications, including additions, clarifications, and changes to the COBOL language.

In order to devote concentrated attention to publishing a revised and updated COBOL specification, the Executive Committee of CODASYL created a Special Task Group. This Special Task Group completed its task in early 1961 and published the COBOL-61 document in mid-1961.

The next official COBOL publication was also the product of the COBOL Maintenance Committee and was called COBOL-61 Extended which was published in .mid-1963.

1.3 THE COBOL COMMITTEE

In January 1964 the COBOL Maintenance Committee was reorganized into the COBOL Committee consisting of three subcommittees: the Language Subcommittee, the Evaluation Subcommittee, and the Publication Subcommittee.

The Language Subcommittee's function was much the same as was that of the former COBOL Maintenance Committee, namely, the maintenance and further development of COBOL. In addition it carried on liaison with the United States of America Standards Institute (USASI) and the International Organization for Standardization (ISO) in their work concerning the standardization of the COBOL language.

The third official COBOL publication was the product of the COBOL Committee and was called COBOL, Edition 1965.

1.4 THE PROGRAMMING LANGUAGE COMMITTEE

In July 1968 the CODASYL Executive Committee adopted a revised constitution which elevated the former COBOL Language Subcommittee to full committee status having the name of the Programming Language Committee (PLC).

The purpose and objectives of the Programming Language Committee included and extended those of the former COBOL Language Subcommittee. The objectives were to make possible: compatible, uniform, source programs and object results, with continued reduction in the number of changes necessary for conversion or interchange of source programs and data. The Programming Language Committee concentrated its efforts in the area of tools, techniques, and ideas aimed at the programmer.

The Programming Language Committee produced five official COBOL publications which were entitled: CODASYL COBOL Journal of Development 1968, CODASYL COBOL Journal of Development 1969, CODASYL COBOL Journal of Development 1970, CODASYL COBOL Journal of Development 1973, and CODASYL COBOL Journal of Development 1976.

1.5 THE CODASYL COBOL COMMITTEE

In May 1977 the CODASYL Executive Committee approved the redesignation of the CODASYL Programming Language Committee as the CODASYL COBOL Committee. This redesignation was made to represent the responsibility of the committee more accurately.

The CODASYL COBOL Committee produced two official COBOL publications that were called the CODASYL COBOL Journal of Development 1978 and CODASYL COBOL Journal of Development 1981.

2. THE EVOLUTION OF CODASYL COBOL

2.1 COBOL-60

COBOL-60, the first version of the language published, proved that the concept of a common business oriented language was indeed practical.

2.2 COBOL-61

COBOL-61, the second official version of COBOL, was not completely compatible with COBOL-60. The changes were in areas such as organization of the Procedure Division rather than the addition of any major functions. The avowed goal of CODASYL in terms of successive versions of the language was to make changes of an evolutionary rather than revolutionary nature. This version was generally implemented and was the basis for many COBOL compilers.

2.3 COBOL-61 EXTENDED

This version of COBOL was generally compatible with COBOL-61. The term 'generally' must be used, not because of any basic changes in the philosophy or organization of the language, but because certain arithmetic extensions and general clarifications did make the syntax for certain statements and entries different from those in COBOL-61.

COBOL-61 Extended, then, was generally COBOL-61 with the following major additions and modifications:

(1) The addition of the sort feature.
(2) The addition of the report writer option.
(3) The modification of the arithmetics to include multiple receiving fields and to add the CORRESPONDING option to the ADD and SUBTRACT statements.

2.4 COBOL, EDITION 1965

This version of COBOL included COBOL-61 Extended plus certain additions and modifications.

The major changes incorporated in COBOL, Edition 1965, were:

(1) The inclusion of a series of options to provide for the reading, writing, and processing of mass storage files.
(2) The addition of the table handling feature which includes indexing and search options.
(3) The modification of the specifications to delete the requirement for specific error diagnostic messages.
(4) The deletion of the terms "required" and "elective".

2.5 CODASYL COBOL JOURNAL OF DEVELOPMENT 1968

This version of COBOL, published in the CODASYL COBOL Journal of Development 1968, was based on COBOL, Edition 1965, with certain additions and deletions.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1968 were:

(1) The inclusion of inter-program communication and the concept of a run unit.
(2) The elimination of redundant editing clauses and certain data clauses more succinctly expressed by the PICTURE clause.
(3) An improved COPY specification for all divisions except the Identification Division and the elimination of the INCLUDE statement.

(4) The inclusion of a hardware independent means of specifying and testing for page overflow conditions.
(5) The elimination of type 4 abbreviations.
(6) The elimination of the DEFINE statement.
(7) The inclusion of the REMAINDER phrase in the DIVIDE statement.
(8) The deletion of NOTE and REMARKS in favor of a general comment capability for all divisions.
(9) The inclusion of the SUSPEND statement as additional means of controlling graphic display devices.
(10) The inclusion of additional abbreviations.

2.6 CODASYL COBOL JOURNAL OF DEVELOPMENT 1969

This version of COBOL, published in the CODASYL COBOL Journal of Development 1969, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1968 with certain additions and deletions.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1969 were:

(1) The deletion of the EXAMINE statement and the inclusion of a more powerful statement, INSPECT, in its place.
(2) The inclusion of a communication facility to permit input and output with communication devices.
(3) The inclusion of the STRING and UNSTRING statements to facilitate character string manipulation.
(4) Deletion of the CONSTANT SECTION of the Data Division.
(5) The inclusion of a compile time page ejection facility.
(6) The inclusion of a facility to access the system's date and time.
(7) The inclusion of the SIGN clause.

2.7 CODASYL COBOL JOURNAL OF DEVELOPMENT 1970

This version of COBOL, published in the CODASYL COBOL Journal of Development 1970, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1969 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1970 were:

(1) The deletion of the RANGE clause.
(2) The inclusion of the INITIALIZE statement.
(3) The inclusion of a debugging facility.
(4) The inclusion of a merge facility.
(5) A complete revision of the report writer function.

2.8 CODASYL COBOL JOURNAL OF DEVELOPMENT 1973

This version of COBOL, published in the CODASYL COBOL Journal of Development 1973, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1970 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1973 were:

(1) A revision and extension to the mass storage facility.

(2) A clarification and extension to the COBOL library facility.

(3) An enhancement of the INSPECT statement.

(4) A revision to the file control entry for a sort or merge file which included the deletion of format 3.

(5) A revision to the RERUN facility.

(6) The removal of the restriction on 77 level-numbers that they must precede 01 level numbers.

(7) The inclusion of a page advancing feature as part of the WRITE statement.

(8) An enhancement of the LINAGE clause to permit specification of margins.

2.9 CODASYL COBOL JOURNAL OF DEVELOPMENT 1976

This version of COBOL, published in the CODASYL COBOL Journal of Development 1976, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1973 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1976 were:

(1) The inclusion of a data base facility which interfaces with the CODASYL Data Description Language Journal of Development.

(2) The inclusion of collating sequence and character set declarations.

(3) The inclusion of a boolean (bit) manipulation facility.

(4) The inclusion of a de-editing facility.

(5) The inclusion of a reference modification facility.

(6) The inclusion of extensions to the file processing capabilities in the Environment and Data Divisions.

(7) The inclusion of the DELETE FILE statement.

(8) The inclusion of the PURGE statement.

(9) The inclusion of a variable length record facility.

(10) The removal of random processing specifications.

(11) The removal of the ALTER statement.

(12) The removal of all numeric paragraph-names and section-names.

(13) The removal of the OPEN REVERSED facility.

(14) The removal of level-number 77.

(15) Realignment of clauses between the Environment and Data Divisions.

(16) An option to omit the FILLER clause.

(17) An enhancement to the table handling facility to allow specification of tables having more than three dimensions.

(18) An enhancement to the DISPLAY statement to allow NO ADVANCING.

(19) An enhancement to the INSPECT statement to simplify data transformation.

(20) The extension of the SORT and MERGE statements to permit multiple file specifications in the GIVING phrase.

(21) The extension of the SORT and MERGE statements to relative and indexed files.

(22) The extension of the use of OPTIONAL to all file organizations.

2.10 CODASYL COBOL JOURNAL OF DEVELOPMENT 1978

This version of COBOL, published in the CODASYL COBOL Journal of Development 1978, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1976 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COB?)L Journal of Development 1978 are:

(1) The inclusion of a facility to specify symbolic-characters and positionally relate them to the native character set or the user-defined alphabet.
(2) The inclusion of an inter-program communication facility to permit communication between constituent programs in a run unit.
(3) The inclusion of a global and external specification for data items.
(4) The inclusion of additional facilities to support structured programming, including implicit and explicit terminators to delimit the scope of statements and the CONTINUE statement.
(5) The inclusion of a multi-branch, multi-join structure, the EVALUATE statement, to cause multiple conditions to be evaluated.
(6) The inclusion of an in-line PERFORM statement capability.
(7) The inclusion of a data base locking facility to maintain data base integrity.
(8) The inclusion of a facility to specify overprinting and character substitution on a receiving communication device or output device.
(9) The inclusion of the current volume pointer to facilitate exact specification of the current physical volume of a sequential file.
(10) The inclusion of a facility for record selection by defined record keys.
(11) The inclusion of the ROLLBACK statement.
(12) The inclusion of the REPLACE statement.
(13) The inclusion of a facility in the SET statement to assign a value to a condition-name.
(14) The inclusion of numeric paragraph-names and section-names.
(15) The inclusion of a facility for transaction oriented communication.
(16) The inclusion of facility to control input-output in separately compiled programs.
(17) The modification of specifications for data base keys, record keys, and realms.
(18) The modification of currency indicators for use in maintaining position during update of a data base.
(19) Modifications to facilitate the compatibility between the COBOL subschema facilities and the CODASYL Data Description Language.
(20) The expansion and clarification of data base status indicators.
(21) The deletion of comment-entries.

2.11 CODASYL COBOL JOURNAL OF DEVELOPMENT 1981

This version of COBOL, published in the CODASYL COBOL Journal of Development 1981, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1978 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1981 are:

(1) The inclusion of a floating point data representation, including literals and editing pictures.
(2) The inclusion of two new usages called BINARY and PACKED-DECIMAL.
(3) A change in the ADVANCING phrase of the WRITE statement to allow positioning anywhere on a logical page.
(4) A change in the REDEFINES clause to allow the redefining item to be either larger or smaller than the item it redefines.
(5) A change to subscripting to allow arithmetic expressions as subscripts and to allow index-names to be used along with arithmetic expressions.

(6) The deletion of the DATA RECORDS clause.

(7) The inclusion of a RECONNECT statement to modify set membership.

(8) The deletion of the ENTER statement and a change to the CALL statement to allow languages other than COBOL to be called.

(9) A change to the use of comma and semicolon to allow them to be used anywhere a space can appear.

(10) The semantics for lowercase letters were defined.

(11) The deletion of the CORRESPONDING option.

(12) The inclusion of an EXIT PERFORM statement.

(13) A change to the COLUMN clause in the report writer.

(14) The inclusion of a PRESENT WHEN clause in the report writer for selective printing.

(15) A change to the continuation of nonnumeric literals which removed the hyphen in the indicator area and added a continuation mark ('I-) at the end of the line containing the literal to be continued.

(16) A change to the reference format to allow a free format representation.

(17) The inclusion of intrinsic functions such as sine and cosine.

(18) The deletion of all label processing.

(19) The deletion of the debug facility (except for debugging lines).

(20) The inclusion of a facility to allow the specification of initial values for table items.

(21) The inclusion of a FETCH statement.

(22) A change to the SORT and MERGE statements which removed all restrictions on transfers of control into and out of input or output procedures.

(23) The inclusion of realm segment locking to enhance data base concurrency.

(24) The deletion of the access control mechanism from the data base facility.

(25) The elimination of the requirement for a paragraph-name after a section-name or at the beginning of a program.

(26) The deletion of key-names from the data base facility.

(27) A change to the intermediate data item to expand it to 20 digits.

(28) The expansion and addition of various file status codes.

2.12 CODASYL COBOL JOURNAL OF DEVELOPMENT 1984

This version of COBOL, published in the CODASYL COBOL Journal of Development 1984, was based on the COBOL specifications in the CODASYL COBOL Journal of Development 1981 with certain additions, deletions, and modifications.

The major changes incorporated in the COBOL specifications within the CODASYL COBOL Journal of Development 1984 are:

(1) The inclusion of a FALSE phrase in the SET statement.

(2) The deletion of the literal phrase from the STOP statement.

(3) The deletion of the SYNCHRONIZED clause.

(4) The inclusion of the WHEN-COMPILED function to return time and date of compilation; the DATE-COMPILED entry was deleted.

(5) The change of boolean operators from AND, EXOR, NOT, and OR to B-AND, B-EXOR, B-NOT, and B-OR.

(6) The inclusion of the NUMVAL, NUMVAL-C, and NUMVAL-F functions.

(7) The revision of the rules for evaluation of arithmetic expressions to enhance compatibility and portability.

(8) The inclusion of the VALIDATE facility.

(9) The inclusion of the ARITHMETIC clause in the OBJECT-COMPUTER paragraph to allow the selection of standard or native arithmetic.

(10) The deletion of the restrictions on the use of explicit scope delimiters and the NOT phrases of conditional statements.

(11) The inclusion of the LESS THAN operator in the START statement.

(12) The inclusion of the COLLATING SEQUENCE clause in the file control entry of an indexed file and the deletion of the CODE-SET clause for indexed files.

(13) The revision of the rules for the READ statement to disallow executing a READ statement after an at end condition is encountered.

(14) The inclusion of the relational operators B-LESS, CONTAINS, and IS CONTAINED IN for boolean items.

(15) The inclusion of in-line comments.

(16) The inclusion of a CLASS clause in the SPECIAL-NAMES paragraph and a class test for a user-defined class.

(17) The inclusion of a WITH STATUS phrase and a WITH ERROR STATUS phrase in the STOP statement.

(18) The restoration of the integer-l TO integer-2 phrase in the RECORD CONTAINS clause; also the inclusion of explicit rules on the implementor-defined aspects of this clause and the absence of a RECORD clause.

(19) The revision of the rules for computing the remainder in the DIVIDE statement.

(20) The deletion of the RERUN clause.

(21) The deletion and revision of several I-O status values.

3. THE STANDARDIZATION OF COBOL

3.1 INITIAL STANDARDIZATION EFFORT

American National Standards Committee on Computers and Information Processing, X3, was established in 1960 under the sponsorship of the Computer and Business Equipment Manufacturers Association. The X3 Committee in turn established the ~3.4 Subcommittee to pursue standards in the area of common programming languages. Subsequently, Working Group X3.4.4 with the title "Processor Specification and COBOL Standards" was established to pursue a COBOL standard.

In December 1962 invitations to an organizational meeting of X3.4.4 were sent to manufacturers and user groups who might be interested in participating in the establishment of a COBOL standard. The first meeting of X3.4.4 was held on January 15-16, 1963, in New York City. This meeting established the objective of the X3.4.4 Working Group to be the production of a document which defined the American standard for COBOL. It was agreed that this standard language was to be based upon the specifications contained in the COBOL publication of CODASYL. To accomplish its work, X3.4.4 was divided into subgroups. One of these subgroups was X3.4.4.4 which was responsible for standard language specifications.

3.2 USA STANDARD COBOL 1968

On August 30, 1966, X3.4.4 completed its work and approved the content and format for a proposed USA Standard COBOL. The proposed USA Standard COBOL was composed of a Nucleus and eight functional processing modules: Table Handling, Sequential Access, Random Access, Random Processing, Sort, Report Writer, Segmentation, and Library. The Nucleus and each of the eight modules were divided into two or three levels. In all cases, the lower levels were subsets of the higher levels within the same module. The minimum proposed standard was defined as the low level of the Nucleus plus the low level of the Table Handling and Sequential Access modules. The highest levels of the Nucleus and the eight modules were defined as the full proposed USA Standard COBOL.

The X3 Committee authorized publication of the proposed USA Standard COBOL for public review and comment from the data processing community. In April 1967 the proposed USA Standard COBOL was published as COBOL Information Bulletin #9 by the Association for Computing Machinery, Special Interest Committee on Programming Languages (SICPLAN) in the SICPLAN Notices.

X3 also authorized that concurrent with publication of the proposed USA Standard COBOL, a letter ballot be taken of the membership of the X3 Committee on the acceptability of the proposed USA Standard COBOL as a USA Standard. The ballots and comments received with the ballots indicated that the X3 members were in favor of the proposed USA Standard COBOL. X3 voted to move the Random Processing module from the body of the proposed USA Standard COBOL to an appendix and to forward the proposed standard on to the Information Processing Systems Standards Board of the USA Standards Institute (USASI). (NOTE: In August 1966 the American Standards Association (ASA) became the USA Standards Institute (USASI); then in the fall of 1969 the USA Standards Institute (USASI) became the American National Standards Institute (ANSI).)

The USA Standard COBOL proposed by X3 was approved by the Information Processing Systems Standards Board of the USA Standards Institute (USASI) on August 23, 1968, as a USA Standard. The specifications of this USA Standard COBOL were published in the USA Standards Institute document X3.23-1968.

3.3 AMERICAN NATIONAL STANDARD COBOL 1974

The American National Standards Technical Committee X3J4 evolved from the X3.4.4 Working Group and its subordinate working groups which included X3.4.4.4. X3J4 was charged with the responsibility for the maintenance of the American National Standard COBOL X3.23-1968 (formerly called the USA Standard COBOL X3.23-1968). This maintenance responsibility also included the revision of the specifications contained in American National Standard COBOL X3.23-1968.

In 1969 X3J4 began the task of preparing a revision of the COBOL standard with the development of criteria against which each candidate for inclusion in the proposed revision was to be matched. In June 1972, X3J4 completed its work and approved the content and format for a draft proposed revision of American National Standard COBOL X3.23-1968. This draft proposed revision was composed of a Nucleus and eleven functional processing modules: Table Handling, Sequential I-O, Relative I-O, Indexed I-O, Sort-Merge, Report Writer, Segmentation, Library, Debug, Inter-Program Communication, and Communication. Each module contains two or three levels with nine modules having a null set as the lowest level. In all cases, lower levels are subsets of the higher levels within the same module. The minimum proposed standard was defined as the low level of the Nucleus plus the low level of the Table Handling and Sequential I-O modules. The full proposed standard was defined as the highest levels of the Nucleus and the eleven processing modules.

The X3 Committee authorized publication of the draft proposed revision of American National Standard COBOL X3.23-1968 for public review and comment from the data processing community. In August 1972 the draft proposed revised X3.23 American National Standard COBOL was published by the X3 Secretariat which is the Computer and Business Equipment Manufacturers Association.

X3 also authorized a letter ballot be taken of the membership of the X3 Committee on the acceptability of the draft proposed revision of American National Standard COBOL X3.23-1968 as an American National Standard. The ballots and comments received with the ballots indicated that the X3 members . were in favor of the draft proposed revised X3.23 American National Standard COBOL. X3 voted to forward the proposed revised X3.23 American National Standard COBOL to the Standards Review Board of the American National Standards Institute.

The revised X3.23 American National Standard COBOL proposed by X3 was approved by the Standards Review Board of the American National Standards Institute (ANSI) on May 10, 1974, as an American National Standard. The specifications of this American National Standard were published in the American National Standards Institute document X3.23-1974.

3.4 AMERICAN NATIONAL STANDARD COBOL 1985

The American National Standards Technical Committee X3J4 was charged with the responsibility for the maintenance of the American National Standard COBOL x3.23-1974. Thus X3J4 developed and put into effect procedures to handle requests for information and requests for interpretation of the specifications contained in American National Standard COBOL X3.23-1974. X3J4 published information on the specifications contained in American National Standard COBOL X3.23-1974 in COBOL Information Bulletins 17, 18, 19, and 20. These COBOL Information Bulletins were published by the X3 Secretariat which is the Computer and Business Equipment Manufacturers Association.

The maintenance responsibility of X3J4 also included the revision of the specifications contained in American National Standard COBOL X3.23-1974. In 1977 X3J4 began the task of

preparing a revision of American National Standard COBOL X3.23-1974. In June 1981 X3J4 approved the content and format for a draft proposed revision of American National Standard COBOL X3.23-1974. In subsequent years, X3J4 held three public review and comment periods in which comments were received from the data processing community on the content of the draft proposed revision of American National Standard COBOL X3.23-1974. X3J4 reviewed and responded to all comments received during these three public review periods.

In April 1985 X3J4 approved the final version of the draft proposed X3.23 American National Standard COBOL and forwarded the document to the X3 committee for processing. The X3 committee then voted in favor of the acceptability of the draft proposed revision of American National Standard COBOL X3.23-1974 as an American National Standard. This X3 vote also forwarded the proposed revised X3.23 American National Standard COBOL to the Board of Standards Review of the American National Standards Institute.

The revised X3.23 American National Standard COBOL proposed by X3 was approved by the Board of Standards Review of the American National Standards Institute (ANSI) in September 1985 as an American National Standard. The specifications of this American National Standard are published in the American National Standards Institute document X3.23-1985.

35 AMERICAN NATIONAL STANDARD COBOL 1985, ADDENDUM 1

The X3J4 COBOL Technical Committee of the Accredited Standards Committee X3 was charged with the responsibility to develop addenda to American National Standard COBOL X3.23-1985 as a means of adding upward compatible language extensions. In June 1985, x3J4 began the task of preparing the first addendum. Language extensions considered for inclusion in Addendum 1 were taken from the CODASYL COBOL Journal of Development 1984.

In January 1987 X3J4 approved the content and format for the first draft proposed Addendum 1 to American National Standard COBOL x323-1985 and recommended to X3 that it be published for public review and comment. X3J4 held two public review and comment periods in which comments were received from the data processing community on the content of the draft proposed Addendum 1 to American National Standard COBOL X3.23-1985. X3J4 reviewed and responded to ail comments received during these two public review periods.

In October 1988 x3J4 approved the final version of the draft proposed Addendum 1 to American National Standard COBOL X3.23-1985 and forwarded the document to the X3 committee for process& The X3 committee then voted in favor of the acceptability of the draft proposed Addendum 1 to American National Standard COBOL x3.23-1985. This X3 vote also forwarded the proposed Addendum 1 for American National Standard COBOL X3.23-1985 to the American National Standards Institute for final approval.

Addendum 1 to American National Standard COBOL X323-1985 proposed by X3 was approved by the American National Standards Institute on September l.3, 1989 as an addendum to American National Standard COBOL X323-1985. The specifications of this approved Addendum 1 are published in the American National Standards Institute document X3.23A-1989.

3.6 AMERICAN NATIONAL STANDARD COBOL 1985, AMENDMENT 2

The X3J4 COBOL Technical Committee of the Accredited Standards Committee X3 was charged with the responsibility of developing an amendment to ANSI X3.23-1985 as a means of resolving ambiguities and correcting errors found therein. In December 1987, X3J4 began

the task of preparing an amendment to ANSI X3.23-1985. Errors were corrected which were found during the interpretation of ANSI X3.23-1985.

In January 1990 X3J4 approved the content and format for the draft proposed Amendment 2 to ANSI X3.23-1985 and recommended to X3 that it be published for public review and comment. X3J4 held this public review and comment period during which comments were received from the data processing community on the content of the draft proposed Amendment 2 to ANSI X3.23-1985. X3J4 reviewed and responded to all comments received during this public review period.

Additional errors in X3.23-1985 and X3.23a-1989 (the Intrinsic Function Amendment) were identified and corrections were included in the draft proposed Correction Amendment as a result of public review comments. X3J4 agreed that only ambiguities and errors which were identified by October 17, 1990 would be considered for inclusion in the amendment.

4. INTERNATIONAL STANDARDIZATION OF COBOL

4.1 IS0 RECOMMENDATIONR -1989-1972 FOR COBOL

Throughout the COBOL standardization activity of the X3J4 (formerly X3.4.4) Committee, close liaison was maintained with the various international groups. As a result, American National Standard COBOL X3.23-1968 complied with the IS0 (International Organization for Standardization) recommendation for COBOL.

The IS0 recommendation for the COBOL programming language was drawn up by the Technical Committee ISO/TC 97, Computers and Information Processing, the Secretariat of which is held by the American National Standards Institute (ANSI). As a result of a six-year development period, the IS0 recommendation reflected the requirements of the international data processing community. The primary objective was to reflect a language rich enough to allow description of a wide variety of data processing problems and to reflect accurately the requirements of the member bodies of the International Organization for Standardization (ISO). Great care was also taken to ensure as far as possible identical interpretation with respect to the national COBOL standards known to be under development.

The draft IS0 Recommendation for COBOL was circulated to all the IS0 member bodies for inquiry in July 1970. The draft was approved, subject to a few modifications of an editorial nature, by all but one of the IS0 member bodies. The draft IS0 Recommendation for COBOL was then submitted to the IS0 Council, which accepted it as an IS0 Recommendation in 1972. The resulting IS0 Recommendation was called IS0 Recommendation R-1989-1972 for COBOL.

4.2 IS0 STANDARD 1989-1978 FOR COBOL

During X3J4's work on the revision of American National Standard COBOL X3.23-1968, close and continuous liaison was maintained with the international COBOL community. This culminated in February 1972 with a meeting of representatives of X3J4, European Computer Manufacturers Association Technical Committee 6 (ECMA TC 6), and several IS0 (International Organization for Standardization) member organizations to review the proposed changes and to resolve any differences of opinion that existed concerning the technical content of the proposed revision.

The draft revision of IS0 Standard 1989 for COBOL was circulated to all the IS0 member bodies for inquiry. This revised IS0 Standard 1989 was accepted by the IS0 Council in 1978. The resulting IS0 Standard was called IS0 Standard 1989-1978 for COBOL.

4.3 IS0 STANDARD 1989-1985 FOR COBOL

During X3J4's work on the revision of American National Standard COBOL x3.23-1974, close and continuous liaison was maintained with the international COBOL community through ISO/TC 97/SC 5 COBOL Experts Group (CEG). The draft proposed revision of American National Standard COBOL X3.23-1974 was presented to ISO/TC 97/SC 5 in October 1981 as a proposed revision of IS0 1989-1978, Programming Language - COBOL. ISO/TC 97/SC 5 unanimously approved a resolution to send the proposed revision of IS0 1989-1978 COBOL to the central secretariat for registration as a draft proposal and for circulation to SC 5 primary members for a comment period closing February 13, 1982.

The draft revision of IS0 Standard 1989 for COBOL was circulated to all the IS0 member bodies for inquiry. This revised IS0 Standard 1989 was accepted by the IS0 Council in 1985. The resulting IS0 Standard was called IS0 Standard 1989-1985 for COBOL.

4.4 IS0 STANDARD 1989-1985F OR COBOL, ADDENDUM 1

At its meeting in Vienna, Austria, in February 1984, IS0 Technical Committee 97, Subcommittee 22, Working Group 4 on COBOL resolved to propose addenda for upward compatible language extensions to IS0 Standard 1989-1985 for COBOL. The purpose of proposing addenda of upward compatible language extensions instead of embarking immediately on a revision to Standard COBOL was to provide the language enhancements in a more timely manner, e.g., in a two to five year time frame rather than a five to ten year, or longer, time frame. At this same meeting ISO/TC97/SC22 Working Group 4 recommended that the United States be requested to provide draft documents for the addenda, The recommendations of ISO/TC97/SC22 Working Group 4 were approved and the work of developing the addenda was assigned to x3J4.

During X3I4's work on Addendum 1 for Standard COBOL, close and continuous liaison was maintained with the international community through ISO/IBC JTCl/SC22 Working Group 4. The draft document was presented for review and comment to ISO/IBC JTCl/SC22 in March 1987 as a draft proposed Addendum 1 to IS0 Standard 1989-1985 for COBOL. ISO/IBC JTCl/SC22 unanimously approved a resolution to send the proposed Addendum 1 to IS0 Standard 1989-1985 for COBOL to the Central Secretariat for registration as a draft international standard @IS). The DIS Addendum 1 to IS0 Standard 1989-1985 for COBOL was circulated to all the IS0 member bodies for inquiry. Addendum 1 to IS0 Standard 1989-1985 for COBOL was accepted by the IS0 Council.

4.5 IS0 1989:1985/Amd.2:1994

In February 1987, the convener of IS0 Technical Committee 97, Subcommittee 22, Working Group 4 on COBOL, forwarded to the SC22 Secretariat the results of a letter ballot to subdivide the COBOL project and produce an amendment to IS0 1989:1985 to resolve identified ambiguities and correct identified errors. At the same time ISO/TC97/SC22 Working Group 4 recommended that the United States be requested to provide draft documents for the amendment. The recommendations of ISO/TC97/SC22 Working Group 4 were approved and the work of developing the amendment was assigned to X3J4.

During X3J4's work on Amendment 2, close and continuous liaison was maintained with the international community through ISO/IEC JTCl/SC22 Working Group 4. The draft document was presented for review and comment to ISO/IEC JTCl/SC22 in March 1990 as a draft proposed Amendment 2 to IS0 1989:1985 for COBOL. In October 1990, ISO/IEC JTCl/SC22 Working Group 4 for COBOL approved a resolution to revise the draft document in response to international comments. Working Group 4 for COBOL agreed that only ambiguities and errors which were identified by October 17, 1990 would be considered for inclusion in the amendment.

Post 1993 information

The following information is extracted from the introductory material of later Standards and publications.

ISO/IEC 19891989:2002

Can be purchased for 30 or 40 USD from:

http://www.techstreet.com/standards/INCITS_ISO_IEC/1989_2002?product_id=1095105

This first edition of ISO/IEC 1989 cancels and replaces ISO 1989:1985, which has been technically revised. It incorporates Amd.1:1992 and Amd.2:1994. This edition introduces the following significant technical enhancements:

— features for object-oriented programming
— additional features for detection and reporting of exceptions
— a boolean data type for bit handling and boolean operations
— native binary and floating-point data types
— a national character data type for processing multiple-octet coded character sets
— cultural adaptability, multilingual features, and tailoring for a given local language or culture
— increased portability of arithmetic
— free-form source and library text
— compiler directives for portable specification of processing options
— conditional compilation
— an enhanced report writer
— features for data validation
— several enhancements to the CALL statement, including recursion
— improved interoperability with other programming languages
— user-defined functions
— a screen handling facility
— file sharing and record locking
— support for ISO/IEC 10646-1 and ISO/IEC 10646-2 for data interchange

ISO/IEC TR 19755:2003 - Object finalization for programming language COBOL

Can be purchased for 80 CHF from

http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=35354

This Technical Report specifies a feature for finalizing objects in COBOL. The feature is considered to be immature and not ready for standardization. The decision was made to publish the specification in a Type 2 Technical Report so that implementations can be undertaken on an experimental basis. The experience gained is expected to result in an improved specification that can progress to standardization.

 …

The purpose of object finalization is to free resources that will not otherwise be freed by the normal garbage collection process. Examples include files that are open, temporary work files, database connections, TCP/IP socket interfaces, and network connections.

ISO/IEC TR 24716:2007 Native COBOL Syntax for XML Support

See:

   http://www.cobolstandard.info/j4/files/07-0005.doc

This Technical Report provides extensions so that COBOL can process XML documents as easily as it can read files. The new syntax to process XML documents:

   a. Is based on the familiar approach used with COBOL I/O support
   b. Provides Document Object Model (DOM) style parsing
   c. Handles multiple input sources to handle XML in an extremely flexible manner
   d. Reads, updates, and writes XML documents
   e. Checks that XML documents are well-formed
   f. Provides an optional validity check of an XML document against a schema or Document Type Definition (DTD).

ISO/IEC TR 24717:2009 Collection classes for programming language COBOL

See:

   http://www.cobolstandard.info/j4/files/07-0048.pdf

This Technical Report specifies the interfaces and behavior of a common class library for managing sets of object references in COBOL. The purpose of this Technical Report is to promote a high degree of portability in implementations of the class library, even though some elements are subject to trial before completion of a final design suitable for standardization.

ISO/IEC 1989:20xx FCD 1.0 (E), "Information technology — Programming languages, their environments and system software interfaces — Programming language COBOL

A version from July 13, 2010 can be downloaded from:

   http://www.open-std.org/jtc1/sc22/open/n4600.html

Look for the item:

   4561   ISO/IEC FCD 1989, Information technology - Programming Languages, their environments and system software interfaces - Programming Language COBOL

COBOL began as a business programming language, but its present use has spread well beyond that to a general purpose programming language. Significant enhancements in this final committee draft International Standard include:

   — Dynamic-capacity tables
   — Function pointers
   — Any-length elementary items
   — Increased size limit on nonnumeric literals
   — Enhanced locale support in functions
   — Support for industry standard floating-point formats
   — Support for industry-standard arithmetic rules
   — Support for multiple rounding options
   — Structured constants
   — Support for industry standard date and time formats
   — Parametric polymorphism, also known as method overloading