ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

MEMENTO 1969

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Introduction

By 1959 the growing use of computers, built by several different manufacturers, showed the necessity for standardization in operational techniques, such as programming, and also input and output codes. Such standards would make it possible to use data prepared for, or even by, a computer made by one manufacturer to be used on a computer made by another with the minimum of alteration. Also it would avoid duplication of work in the preparation of, for example, programming languages by several manufacturers.

Though certain National bodies had, before 1960, started work on standards in this field, e.g. paper tape and codes, there did not appear to be collaboration between them, nor between the manufacturers themselves. Different countries may have different requirements, so that it may not be necessary to have the same standards everywhere, but the standards should at least be compatible.

With the object of co-ordinating such work, the Heads of the Companies of longest standing in Europe in the data processing field (Compagnie des Machines Bull, IBM World Trade Europe Corporation and International Computers and Tabulators Limited) sent a joint letter to all the known computer manufacturers within Europe, inviting these companies to send representatives to a meeting. This meeting was held on 27 April 1960, in Brussels, and was attended by the following Companies:

A.E.I. Ltd.
Aktiebolaget Addo
Bo Nyman A B N Aktiebolag
Compagnie des Machines Bull
E.M.I. Ltd.
N.V. Electrologica
Elliott Brothers (London) Ltd./National Cash Register Co. Ltd.
English Electric Co. Ltd.
Facit Electronics A B
Ferranti Ltd.
I B M -W T E C
I C T Ltd.
Leo Computers Ltd.
Ing. C. Olivetti & C. S.p.A.
S. E. A.
Siemens & Halske A G
Standard Elektrik Lorenz A G
Standard Telephones & Cables Ltd.
Telefunken G.m.b.H.
Zuse K G

It was decided that an association of manufacturers should be formed which would be called European Computer Manufacturers Association,

and a Committee was nominated to prepare the formation of the Association and to draw up By-laws and Rules.

By December 1960 the form that the Association would take was fairly well defined and it had been decided that the headquarters should be in Geneva to be near the headquarters of the International Standards Organization and the International Electrotechnical Commission. A meeting was held in Paris at which a draft of the By-laws and Rules was approved, subject to a few minor amendments and approval by a Swiss lawyer. Although the Association was not yet formed, it was evident that it would be formed and there was much work needing to be done. Therefore, three Technical Committees were set up to start work as soon as possible. These Committees were as follows:

TC1–Input and Output Codes Committee
TC2–General Programming Languages Committee
TC3–Symbols for Flow Chart Committee

In May 1961 the Association officially came into being and all those Companies which attended the original meeting became members except that ITT-Europe as the parent company represented Standard Elektrik Lorenz and Standard Telephones & Cables Ltd., and Aktiebolaget Addo represented Bo Nyman ABN Aktiebolag.

Just prior to the official registration of ECMA, it was invited to be represented at a Round-Table Conference to be held in Geneva organized by ISO and IEC to discuss standardization in the general field of computers. This meeting resulted in the formation of TC97 and in the organization of its own Working Groups, and ECMA was asked to become a liaison member.

In the meantime further Technical Committees have been formed:

TC4– Characters for Optical Recognition
TC5– ALGOL
TC6– COBOL
TC7– Magnetic Ink Character Recognition
TC8– FORTRAN
TC9– Data Transmission
TC10–PL/I
TC11–Numerical Control
TC12–Product Safety
TC13–Keyboards
TC14–Paper Sizes
TC15–Data Format
TC16–Disc Packs

The three Committees TC5, TC6, TC8 were formed as it appeared probable that these three programming languages would be used considerably by certain manufacturers and it was most desirable that as far as possible the use of them should be standardized. TC2 were

then concerned with general research in the field of programming languages; they have now accomplished their tasks. So have also TC5 and TC7.

ECMA Standards and Draft Standards (see page 59) are made available without restriction to all interested parties. Indeed, the proposals are intended to be drafts to be considered by ISO and the National Standards organizations, where the final standards will be adopted.

Purpose

The aims of the Association will be clear from the following extract from the By-laws:

To study and develop, in co-operation with the appropriate national and international organizations, as a scientific endeavour and in the general interest, methods and procedures in order to facilitate and standardize the use of data processing systems.

To promulgate various standards applicable to the functional design and use of data processing equipment. Such standards will cover:

1. Codes representing characters, including alphabets, numbers, punctuation marks and special symbols, for input and output.
2. Systems for identifying sequences of characters as data words or instruction words or data records or programs.
3. Definition of terms and syntax used in programming for data processing. The definitions will also be given in languages other than the official English of the Association.
4. A minimum number of programming languages independent of any specific machine, in which to define problems so that they may be solved on data processing equipment.
5. Diagrammatic and symbolic representation of processes on charts.
6. Other appropriate subjects as decided from time to time.

The Association shall be a non-profit-making organization and shall devote itself to no commercial activity whatsoever.

Membership

The Association shall consist of ordinary and associate members and such other classes of members as may be created by the ordinary members at a General Assembly.

Ordinary members shall be companies which in Europe develop, manufacture and market data processing machines or groups of machines used to process digital information for business, scientific

control or other similar purposes. Data processing machines used exclusively for military purposes shall not be considered to be included in the above machines.

These machines or groups of machines shall have all four of the following characteristics:

a. Means for automatic entry of input data.
b. Means for comparing and manipulating, logically and arithmetically, data entered through such input means.
c. Means for automatically carrying out a program controlling all arithmetic, internal data transfer and data output functions of the various machine units comprising the system.
d. Means for automatically altering or modifying the program in accordance both with information received as input and from internal manipulation.

A proposed ordinary member will not be accepted if it holds at least 50 per cent of the capital of an existing ordinary member nor if at least 50 per cent of its capital is held by an existing ordinary member.

No two or more companies, at least 50 per cent of whose capital is held by the same company, which is not a member itself, may be ordinary members but must be represented by one company only.

Applications for ordinary membership will not be accepted unless the proposed member develops, manufactures and markets some major data processing equipment which is not basically a copy of that of an existing ordinary member.

Application for membership shall be made to the Secretary General.

(For associate membership see page 47).

Promulgation of Standards

Promulgation of standards by the Association shall require approval by at least two-thirds of all the ordinary members.

It is not obligatory for members to follow any standard.

All standards when approved shall be made available to all interested parties without restriction (see page 50).

Officers

MANAGEMENT:
President: Mr. **P.J. Davous** (Bull)
Vice-President: Dr. **K. Scheidhauer** (AEG-Telefunken)
TREASURER: Mr. **D. Combelic** (ITTE)
EXECUTIVES:
Secretary General: Mr. **D. Hekimi**
Deputy Secretary General: Mr. **J. Besse**

Offices

E C M A Headquarters   Cable: Eucomanufas Geneva
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All correspondence should be addressed to the Secretary General.

Ordinary Members and Official Representatives

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   & Development Ltd
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Co-ordinating Committee

FUNCTION:

To draw up Terms of Reference for the Technical Committees and to co-ordinate their activities. To make recommendations regarding the formation of new committees or the dissolution of old ones.

CHAIRMAN:	Mr. **J. Dubos**	(CII)
MEMBERS:	Mr. **W. Heimann**	(Siemens)
	Mr. **S. I. Nilsson**	(IBM)
	Dr. **J. M. M. Pinkerton**	(ICL)
	Mr. **M. Prennushi**	(Olivetti)
	Mr. **J. van Eybergen**	(Philips-EL)

Protection Rights Committee (PRC)

SCOPE:

To watch the legal situation as it affects the protection of computer programs, as it develops and to report and comment on the facts to the General Assembly.

CHAIRMAN:	Dr. **H. Aspden**	(IBM)
MEMBERS:	Mr. **H. Beekhuis**	(Philips-EL)
	Mr. **R. Bride**	(Honeywell)
	Prof. **U. Draetta**	(GE-ISI)
	Mr. **R. Gallois**	(CII)
	Mr. **D. S. Laughton**	(ICL)
	Mr. **K. J. Lesemann**	(Anker)
	Dr. **S. Ravera**	(Olivetti)
	Mr. **R. G. Robinson**	(NCR)
	Mr. **Ph. Rolland**	(Bull)
	Dr. **W. Rosener**	(AEG-Tfk)
	Mr. **R. Seibert**	(Siemens)
	Mr. **M. E. Sions**	(Ferranti)

Past Presidents

1961-1962	Mr. **C. G. Holland-Martin**	(ICT)
1963-1964	Prof. Dr. **J. Engelfriet**	(EL)
1965-1966	Mr. **M. R. Pedretti**	(IBM-Europe)
1967-1968	Dr. **J. M. M. Pinkerton**	(ICL)

Technical Working Committees

Input and Output Codes Committee TC 1

SCOPE:

Definition of common character sets (including alphabets, numbers, punctuation marks, special symbols and controls) and their coded representation suitable for input/output media and data transmission in order to facilitate interchange of information between DP equipment. To define the implementation of codes on punched tape, punched cards and magnetic tape and to define the physical properties necessary for data interchange.

OUTLINE OF PROGRAM OF WORK:

1. The Input and Output Codes Committee of ECMA takes as a first and main objective participation in the research of common coded character sets applicable to sequential continuous media.
2. Punched-card coding standardization is considered as a second and separate objective.
3. Determination of common sets which shall take into account the European requirements for character, symbol and control representations in data handling and programming, in accordance with computer and auxiliary equipment characteristics.
4. Consideration shall be given in defining the coded character sets to permit possible expansion and contraction.
5. To follow technical development in the field in order to maintain and improve the recommended standards.
6. To maintain liaison with other standard organizations in order to present ECMA proposals to them and to make comments on their proposals.

OFFICERS:

Chairman:	Mr. **A. J. Raphael**	(ICL)
Vice-Chairman:	Mr. **G. Willibald**	(AEG-Tfk)
MEMBERS:	Mr. **M. Ballabeni**	(Olivetti)
	Mr. **C. R. Berry**	(ITTE)
	Mr. **W. F. Bohn**	(IBM)
	Mr. **L. de Bournonville**	(Bull)
	Mr. **J. Dubos**	(CII)
	Mr. **I. Gabrielsson**	(Facit)
	Mr. **W. Heimann**	(Siemens)
	Mr. **L. G. Lauri**	(GE-ISI)
	Mr. **Ph. Léger**	(Sagem)
	Mr. **H. W. Rowbottom**	(NCR)
	Mr. **J. A. Samwel**	(Philips-EL)
	Mr. **J. Schwab**	(Univac)
	Mr. **F. J. J. M. Stollmann**	(Friden)
	Mr. **R. van Biene**	(Honeywell)
	Mr. **L. J. Zeckendorf**	(Philips-EL)

General Programming Languages Committee TC 2

This Committee have accomplished their tasks.

Problem Analysis and Flow Charting Committee TC 3

SCOPE:

To establish appropriate standards for definition, analysis and diagrammatic representation of information processing problems.

OUTLINE OF PROGRAM OF WORK:

1. To maintain the standard ECMA-4 on Flow Charts.
2. To participate in international work on the definition of concepts which should be considered for flow charting.
3. To consider equipment configuration representation and to propose a standard, if felt necessary.
4. To participate in international work on problem definition and analysis.

OFFICERS:

Chairman: —
Vice-Chairman: —

MEMBERS:
Mr.	R. Bargoin	(IBM)
Mr.	B. Jeandidier	(Bull)
Dr.	H. Keiner	(Siemens)
Mr.	H. Niesporek	(AEG-Tfk)
Mr.	E. Paterson	(Honeywell)
Mr.	G. A. Riocreux	(ICL)
Mr.	J. van Eybergen	(Philips-EL)

Optical Character Recognition Committee TC 4

SCOPE:

Definition of a minimum number of character sets legible both to humans and to machines.
Specification of fonts, parameters, measurements and tolerances.
Definition of document specification (size limits, ink, position of printed lines, etc.).

OUTLINE OF PROGRAM OF WORK:

1. By considering European application requirements and the existing projects, establish basic criteria to be considered in the definition of documents and type fonts standard specifications.
2. Evaluate existing projects in the light of the defined criteria, giving careful consideration to the printing and reading problems involved in the implementation of such projects.
3. Establish a minimum number of character sets and type fonts specifying their parameters, measurement methods and tolerances to be recommended as possible standards.
4. Specify a range of document sizes, position of printed lines on documents, paper quality, etc.
5. Review periodically or when appropriate the subjects covered by items 1 to 4 in the light of changes in techniques and requirements.
6. Establish liaison from the beginning with other standard organizations and printers' associations.

OFFICERS:

Chairman:	Mr.	M. Prennushi	(Olivetti)
Vice-Chairman:	Dr.	W. R. Throssell	(ICL)
MEMBERS:	Mr.	G. Adamoff	(Bull)
	Dr.	J. Braunbeck	(AEG-Tfk)
	Mr.	Ch. Cooreman	(CII)
	Dr.	W. Dietrich	(ITTE)
	Mr.	P. A. Holmberg	(Facit)
	Mr.	K. J. Lesemann	(Anker)
	Mr.	M. I. C. Orr	(Wiggins)
	Mr.	E. W. Pattle	(Lamson)
	Mr.	B. Sandifer	(Univac)
	Mr.	P. Schröer	(Siemens)
	Mr.	J. Thierry	(NCR)
	Mr.	A. van Delden	(Philips-EL)
	Mr.	H. van Steenis	(IBM)
	Mr.	M. Zander	(Honeywell)

ALGOL Committee TC 5

This Committee have accomplished their tasks.

COBOL Committee TC 6

SCOPE:

To survey the implementation and usage of COBOL and to participate in the development and standardization of COBOL languages, taking into account the specific European needs.

OUTLINE OF PROGRAM OF WORK:

1. To examine the COBOL reports and standards with a view to eliminating any possible ambiguities.
2. To co-ordinate any work on translation of COBOL formats into European languages.
3. To examine the problems of input/output formats in order to make recommendations which enable compliance with National Standards and usages.
4. To work with the COBOL Committee and any other committees working in the same area with a view to ensuring that European requirements are taken into account in the maintenance of COBOL.
5. To recommend, where appropriate, improvements in the COBOL specifications.
6. To follow closely developments and the establishment of languages related to COBOL.

OFFICERS:

Chairman:	Mrs. **F. Chasles**	(IBM)
Vice-Chairman:	Mr. **J. Bourgain**	(Bull)
MEMBERS:	Mr. **M. Bolognani**	(GE-ISI)
	Mr. **A. S. Cormack**	(NCR)
	Mr. **W. I. Dewson**	(Honeywell)
	Mr. **A. Hoyer**	(AEG-Tfk)
	Mr. **J. M. Kaldenbach**	(Philips-EL)
	Mr. **B. Laursen**	(Burroughs)
	Mr. **P. G. McArdle**	(ICL)
	Dr. **W. Schöniger**	(Univac)
	Mr. **N. Thill**	(CII)

Magnetic Ink Character Recognition Committee TC 7

This Committee have accomplished their tasks.

FORTRAN Committee TC 8

SCOPE:

To consider the ISO and ASA working papers on FORTRAN and subsequent documents to ensure that European requirements are taken into account in order that ECMA members can realize in practice the highest possible degree of interchange of FORTRAN programs.

PROGRAM OF WORK:

1. To examine the available reports with a view to eliminating any ambiguous interpretation.
2. To issue recommendations to the committees working on standardization of FORTRAN on the specific European requirements.
3. To establish a suitable machinery for effective liaison with committees working on the standardization of FORTRAN.
4. To inform periodically the ECMA members on the progress of this standardization.

OFFICERS:

Chairman:	Dr. **W. W. Everling**	(IBM)
Vice-Chairman:	Mr. **K. James**	(ICL)
MEMBERS:	Mr. **H. Bross**	(Univac)
	Mr. **V. Doglioni**	(Honeywell)
	Mr. **J. P. Mourieras**	(Bull)
	Mr. **G. Nannicini**	(GE-ISI)
	Mr. **B. S. Nunn**	(NCR)
	Mr. **P. Rigogne**	(CII)
	Mr. **K. H. Rotthäuser**	(AEG-Tfk)
	Mr. **G. van der Munnik**	(Philips-EL)

Data Transmission Committee TC 9

SCOPE:

The definition of common parameters which will facilitate communication within and between data processing systems using transmission links. The preparation of co-ordinated view-points covering those requirements which are of common interest to both the European computer manufacturers and the telecommunication services.

OUTLINE OF PROGRAM OF WORK:

1. To investigate different data transmission systems (point to point, multipoint, etc.) and decide on those which should be studied in detail with a view to standardization.
2. To study all the parameters of the selected systems and determine those which should be defined as standards to assist in the interchange of data (e.g. message formats, synchronization, etc.). This study shall include error detection-correction.
3. To study the functions and definitions of the transmission control characters in code proposals currently under consideration.
4. To study and make contributions to the work on data communication interfaces currently in progress in other organizations.
5. To maintain liaison with ECMA/TC1 and to co-operate with them in aspects of common interest.
6. To establish and maintain liaison with CCITT and ISO and maintain awareness of the work of these and other organizations on data transmission.
7. To make evaluations of work in progress on data transmission aspects in other organizations before commencing original work of their own.

OFFICERS:

Chairman:	Mr. **F. Serracchioli**	(Olivetti)
Vice-Chairman:	Mr. **J. Houldsworth**	(ICL)
MEMBERS:	Mr. **L. Caro**	(GE-ISI)
	Mr. **C. N. Chemla**	(CII)
	Mr. **L. Durand**	(Bull)
	Mr. **H. Herger**	(Anker)
	Mr. **M. Humbert**	(IBM)
	Mr. **R. F. Kocher**	(Univac)
	Mr. **Ph. Léger**	(Sagem)
	Mr. **B. Lindström**	(ITTE)
	Mr. **D. Matejka**	(AEG-Tfk)
	Mr. **P. O'Brien**	(Honeywell)
	Mr. **J. J. M. Schuit**	(Friden)
	Mr. **J. Schwarz**	(Siemens)
	Mr. **B. J. P. van Berkel**	(Philips-EL)
	Mr. **A. D. Zur Muhlen**	(NCR)

PL/I Committee TC 10

SCOPE:

To study the PL/I language and to proceed with standardization of PL/I.

OUTLINE OF PROGRAM OF WORK:

1. To consider the reports available with a view to eliminating any ambiguous interpretation.
2. To propose improvements which, without modifying the basic philosophy of the language, should ensure the most general implementation, taking also into account specific European requirements.
3. To prepare, as the result of this work, a precise definition of the full language.
4. To consider subsets of the language and to propose, if appropriate, one or more of them, not excluding the full PL/I language, as ECMA Standards.
5. To establish and maintain a mechanism for effective co-operation with, and participation in the work of, other organizations concerned.
6. To inform periodically the ECMA members on the progress of such standardization and co-operation.

OFFICERS:

Chairman:	Prof. **C. A. R. Hoare**	(ICL)
Vice-Chairman:		
MEMBERS:	Mr. **M. A. Batey**	(IBM)
	Mr. **M. Irish**	(NCR)
	Mr. **B. Kahan**	(CII)
	Mr. **J. Klunder**	(Philips-EL)
	Mr. **G. Mismasi**	(GE-ISI)
	Mr. **J. P. Mourieras**	(Bull)
	Mr. **H. Schaffer**	(AEG-Tfk)
	Dr. **W. Schöniger**	(Univac)
	Mr. **R. Seipel**	(Honeywell)
	Dr. **H. Wilhelmy**	(ITTE)
	Dr. **J. Witt**	(Siemens)

Numerical Control Committee TC 11

SCOPE:

To study the processes where a computer is involved in passing from a given design to an end-product made by the numerical control of, for example, recording cutting or forming means, moving in one or more dimensions in space (i.e., machine tool, wiring and drafting machines, etc.) and to report on where standardization can be of value.

PROGRAM OF WORK

1. To investigate the different methods at present in use for the above purpose.
2. To identify the stages at which data is transferred to or between equipments in the whole process, and indicate the needs for standardization of codes, media and procedures.
3. To investigate whether any specialized programming languages and data codes or descriptions are necessary.
4. To establish and maintain liaison with ISO TC 97/SC 5/WG 1 and SC 8 and other bodies working in the same field.

OFFICERS:

Chairman:

Vice-Chairman:

MEMBERS:		
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Mr. **M. Maître**	(Bull)
Mr. **A. May**	(Honeywell)
Mr. **H. Mueller-Traut**	(IBM)
Mr. **G. Nees**	(Siemens)
Mr. **N. Shattuck**	(Univac)
Mr. **A. O. Stanesby**	(Ferranti)
Mr.	(AEG-Tfk)

Product Safety Committee TC 12

SCOPE:

To consider national and international safety regulations with a view to establishing appropriate safety recommendations for Data Processing machines or units so that they are intrinsically safe and safe for operating and maintenance personnel.

PROGRAM OF WORK

1. To survey existing national and international standards and recommendations concerned with safety requirements.
2. To study the safety requirements associated with power control and distribution and establish recommendations where appropriate.
3. To consider short circuit and overcurrent protection, grounding, voltage exposure limits, mechanical design, etc., and establish recommendations where appropriate.
4. To establish and maintain liaison with national and international organizations in order to follow developments affecting Product Safety and to present ECMA comments and proposals.

OFFICERS:

Chairman:	Mr. **G. Pause**	(AEG-Tfk)
Vice-Chairman:		

MEMBERS:		
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Mr. **W. Cameron**	(Honeywell)
Mr. **F. Capasso**	(Olivetti)
Mr. **P. Graauw**	(Philips-EL)
Mr. **W. de Kechilava**	(Bull)
Mr. **R. Schäfer**	(Univac)
Mr. **L. Segù**	(GE-ISI)
Mr. **T. W. Simpson**	(NCR)
Mr. **G. Stütz**	(IBM)
Mr. **D. A. Weale**	(ITTE)
Mr. **E. Wilson**	(ICL)

Keyboards Committee TC 13

SCOPE

To define standard layouts for keyboards for the ECMA 7-bit code to be used either locally or remotely with data processing systems, having regard both to existing practices and equipment and to prospective developments in technology and usage.

OUTLINE OF PROGRAM OF WORK

1. To consider the character complements for both data and programs necessary for data processing generally, including commercial and scientific applications.
2. To define the layouts of a minimum number of keyboards needed to satisfy these applications and provide these character sets, including at least one layout providing for all 128 characters of the 7-bit code.
3. To provide in the layouts for control characters necessary for data transmission systems.
4. To propose markings for keytops including those pertaining to non-printing character codes.
5. To establish and maintain liaison with other organizations working in the field to present ECMA proposals to them and to comment on their proposals.

OFFICERS:

Chairman:	Mr. **N. J. Sylvester**	(ICL)
Vice-Chairman:	Mr. **M. Ballabeni**	(Olivetti)
MEMBERS:	Mr. **H. Bubenheim**	(Anker)
	Mr. **E. W. Chapman**	(ICL)
	Mr. **D. Cotto**	(IBM)
	Mr. **J. Dubos**	(CII)
	Mr. **J. V. Evans**	(ITTE)
	Mr. **M. Gauthier**	(Bull)
	Mr. **L. G. Lauri**	(GE-ISI)
	Mr. **Ph. Léger**	(Sagem)
	Mr. **N. E. Poffé**	(Friden)
	Mr. **Th. Thierfelder**	(AEG-Tfk)
	Mr. **H. Wärnberg**	(Facit)
	Mr.	(NCR)

Paper Sizes Committee TC 14

SCOPE

To survey and report on form sizes and layouts in use and proposed, and to recommend the fields ripe for standardization.

OUTLINE OF PROGRAM OF WORK

1. To investigate the work done in ISO/TC95 and elsewhere, on the sizes of forms both in continuous stationery and cut forms for use as output and input, e.g. for OCR.
2. To list the existing sizes of such forms in common use.
3. To establish the dimensional parameters needing to be defined for feeding forms on Data Processing equipment.
4. To schedule the dimensional aspects of high-speed printers, typewriters, printing presses, etc., which affect the paper sizes and/or the formats printed thereon.
5. To maintain liaison with other standard organizations in order to present ECMA proposals and to make comments to their proposals.

OFFICERS:

Chairman:	Mr. **K. K. Lorentz**	(IBM)
Vice-Chairman:	Mr. **S. Battle**	(ICL)
MEMBERS:	Mr. **D. Barquin**	(Bull)
	Mr. **G. B. Green**	(Wiggins)
	Mr. **L. G. Lauri**	(GE-ISI)
	Mr. **P. Ludewig**	(NCR)
	Mr. **L. S. Munck**	(ITTE)
	Mr. **V. H Perriman**	(Lamson)
	Mr. **K. H. Pietsch**	(Siemens)
	Mr. **G. Tosi**	(Olivetti)
	Mr. **A. Uyttenbroek**	(Univac)
	Mr. **A. van Delden**	(Philips-EL)

Data Formats Committee TC 15

SCOPE:

With the primary objective of securing the widest possible compatibility of data, to study its logical and physical structure in general, and the information content of certain commonly occurring items of data and to identify appropriate subjects for standardization of data format.

OUTLINE OF PROGRAM OF WORK:

1. To adopt definitions of such concepts as format, data item, logical hierarchy, subject, value, representation, etc.
2. To establish a standard way of describing logical hierarchy and its representation and to establish methods of obtaining items and their information content taking full account of existing work.
3. To identify certain frequently occurring categories of subjects, e.g. numbers, dates, etc. whose format might be standardized.
4. To propose limitations on the complexity of formats, e.g. length of a number, number of levels of data, etc. for other categories of items than those of 3. above.
5. To study the limitations placed on data formats by the principal programming languages, and how these limitations interact.
6. To study the limitations placed on data formats by the various physical media and equipment, and how these interact.
7. To establish and maintain liaison with other active groups concerned with format standardization for both general and specific applications.

OFFICERS:

Chairman:	Mr. **G. A. Gibson**	(ICL)
Vice-Chairman:	Mr. **G. Zitzwitz**	(IBM)
MEMBERS:	Mr. **O. Bondi**	(CII)
	Mr. **A. Bowers**	(ICL)
	Mr. **A. Curti**	(Olivetti)
	Mr. **L. Durand**	(Bull)
	Mr. **L. G. Lauri**	(GE-ISI)
	Mr. **C. McCulloch**	(Honeywell)
	Mr. **K. W. Ott**	(ITTE)
	Dr. **G. Richter**	(AEG-Tfk)
	Mr. **G. G. Sipkes**	(NCR)
	Dr. **J. Witt**	(Siemens)
	Mr. **L. J. Zeckendorf**	(Philips-EL)

Disk Packs Committee TC 16

SCOPE

To identify and standardize the minimum number of parameters necessary to ensure exchangeability of both replaceable disk packs and the information recorded thereon.

OUTLINE OF PROGRAM OF WORK

1. To review the extent to which existing designs allow physical interchangeability and to list the relevant parameters.
2. To propose the corresponding ranges of values for these parameters.
3. To review the interchangeability of data offered by existing practice listing the relevant factors.
4. To propose corresponding values and procedures for ensuring interchangeability of data.
5. In pursuing the above to give priority to establishing standards for the 6 disk packs.
6. To maintain liaison with other standard organizations in order to present ECMA proposals and to make comments on their proposals.

OFFICERS:

Chairman:

Vice-Chairman:

MEMBERS:	Mrs. **A. Righenzi**	(Bull)
	Mr. **R. Berr**	(Siemens)
	Mr. **F. Cavalli**	(GE-ISI)
	Mr. **G. Fiorentino**	(Clivetti)
	Mr. **J. Herbert**	(IBM)
	Mr. **F. Hummel**	(ITTE)
	Mr. **L. Märtin**	(AEG-Tfk)
	Mr. **Y. Pinault**	(CII)
	Mr. **H. W. Rowbottom**	(NCR)
	Mr. **R. E. Sheppard**	(ICL)
	Mr. **T. Stones**	(Honeywell)
	Dr. **K. Uhl**	(BASF)
	Mr. **G. L. Walther**	(Philips-EL)

Representatives

BY-LAWS OF THE ASSOCIATION

Art. 1 CONSTITUTION AND HEAD OFFICE

1.1 An association to be known as "European Computer Manufacturers Association", abbreviated ECMA, has been constituted according to these By-Laws and Articles 60 et seq. of the Swiss Civil Code.

1.2 The Headquarters of the Association is in Geneva.

Art. 2 PURPOSE

2.1 The purpose of the Association is:

2.1.1 To study and develop, in cooperation with the appropriate national and international organizations, as a scientific endeavour and in the general interest, methods and procedures in order to facilitate and standardize the use of data processing systems.

2.1.2 To promulgate various standards applicable to the functional design and use of data processing equipment. Such standards will cover:

1. Codes representing characters, including alphabets, numbers, punctuation marks and special symbols, for input and output.

2. Systems for identifying sequences of characters as data words or instruction words or data records of programs.

3. Definition of terms and syntax used in programming for data processing. The definitions will also be given in languages other than the official English of the Association.

4. A minimum number of programming languages independent of any specific machine, in which to define problems so that they may be solved on data processing equipment.

5. Diagrammatic and symbolic representation of process on charts.

6. Other appropriate subjects as decided from time to time.

2.2 The Association shall be a non-profit-making organization and shall devote itself to no commercial activity whatsoever.

Art. 3 MEMBERSHIP

3.1 The Association shall consist of ordinary members and such other classes of members as may be created by the ordinary members at a General Assembly.

3.2 The ordinary members shall consist of those organizations listed in Schedule 1 and of any organizations fulfilling the qualifications set forth under Article 3.3 and 3.4 of the present By-Laws, and which have been accepted under Article 4.

3.3 Ordinary members shall be companies which develop, manufacture and market in Europe data processing machines or groups of machines used to process digital information for business, scientific, control or other similar purposes. Data processing machines used exclusively for military purposes shall not be considered to be included in the above machines.

3.4 These machines or group of machines shall have all four of the following characteristics:

a. Means for automatic entry of input data.

b. Means for comparing and manipulating logically and arithmetically, data entered through such input means.

c. Means for automatically carrying out a program controlling all arithmetic, internal data transfer and data output functions of the various machine units comprising the system.

d. Means for automatically altering or modifying the program in accordance both with information received as input and from internal manipulation.

3.5 A proposed ordinary member will not be accepted if it holds at least 50 per cent of the capital of an existing ordinary member nor if at least 50 per cent of its capital is held by an existing ordinary member.

3.6 No two or more companies, at least 50 per cent of whose capital is held by the same company, which is not a member itself, may be ordinary members but must be represented by one company only.

3.7 Applications for ordinary membership will not be accepted unless the proposed member develops, manufactures and markets some major data processing equipment which is not basically a copy of that of an existing ordinary member.

3.8 Additional classes of members which may be established according to Article 3.1 shall have such qualifications and be entitled to such rights and privileges and have such obligations as shall be determined at a General Assembly by a majority of two thirds of all the ordinary members.

3.9 Associate Members

3.9.1. A company may be admitted as associate member which has interest and experience in Europe in matters related to one or more of the TCs of the Association. No company qualifying for ordinary membership can be elected associate member.

3.9.2 A prospective associate member shall declare the TCs in whose work it proposes to take part.

3.9.3 The restrictions of Articles 3.5 and 3.6 of the By-Laws shall apply to associate members.

3.9.4 Associate members shall be admitted by simple majority of ordinary members.

3.9.5 An associate member is entitled fully to participate in the work of the authorized committees and receive all relevant papers. In addition, it may be authorized to participate in the work of such other committees as may be decided in General Assembly.

3.9.6. Art. 4.1 of the Rules applies to associate members. Representatives of the associate members shall have the right to take part in the discussions at the General Assembly relevant to the TCs in which they participate. However, they have no vote in the General Assembly.

3.9.7. Associate membership shall be terminated in the cases listed in Art. 5.1; Art. 5.2 to 5.5 also apply.

3.9.8 The membership fee for associate members is one half of the fee for ordinary members. Rules 8.2 and 8.3 apply to associate members.

Art. 4 ACCEPTANCE OF NEW MEMBERS

4.1 Application for membership shall be made to the Secretariat.

4.2 Decisions on compliance with conditions shall be made by a two-thirds majority of all the ordinary members.

4.3 When it has been decided that the conditions are complied with, the applicant shall be admitted to the relevant class of membership.

Art. 5 TERMINATION OF ORDINARY MEMBERSHIP

5.1 Ordinary membership shall be terminated in the following cases:

a. Withdrawal upon written notice given to the Secretary General, to take effect on receipt.

b. The company ceasing to exist.

c. The conditions for membership set forth in Articles 3.5 and 3.6 of the present By-Laws no longer being complied with.

d. In the opinion of two-thirds of all the ordinary members the conditions set forth in Articles 3.3, 3.4 and 3.7 no longer being complied with.

e. By expulsion for violation of By-Laws and Rules or for any other conduct prejudicial to the interest and correct functioning of the Association.

5.2 No member may be expelled for failure to adhere to one or several agreed standards.

5.3 Any proposal to expel a member must be backed by at least one-fifth of all the ordinary members. The proposal to expel must be on the agenda for the General Assembly at which it is to be discussed so as to give the member the opportunity to present its case.

5.4 A two-thirds majority of all the ordinary members is necessary to expel a member. Such expulsion will become effective 15 days after notification by registered mail.

5.5 Notwithstanding Article 4.3 a member which has been expelled can only be re-admitted on a two-thirds majority of all ordinary members.

Art. 6 STRUCTURE

6.1 The Association shall consist of:
a. The General Assembly.
b. The Management.

6.2 The General Assembly of the ordinary members shall be the highest authority of the Association. It shall control the Association and appoint and control its Management.

6.3 The Management shall consist of a President and a Vice-President. The Management shall be discharged by the President or, if circumstances require, by the Vice-President.

6.4 The President and the Vice-President shall be individuals elected for one year by the ordinary members at a General Assembly. Only representatives of ordinary members can be nominated. The President and the Vice-President can be re-elected any number of times provided that neither serves more than two consecutive years.

6.5 The President shall, through his signature, commit the Association in any business or transaction directly connected with the purpose of the Association.

6.6 There shall be a Treasurer whose duty shall be determined by the General Assembly. The Rules set out in 6.4 shall apply to this office.

Art. 7 GENERAL ASSEMBLY

7.1 The President will each year call at least two ordinary General Assemblies of the ordinary members. Written notice of the time and place of the Assembly shall be given at least thirty days before the date of the Assembly. The Agenda and supporting documents for the Assembly shall be circulated at least fifteen days before the Assembly.

7.2 Unless otherwise restricted by these By-Laws or the Rules of the Association, any action required or permitted to be taken at an Assembly may be taken without a meeting, provided that no ordinary member opposes such a procedure within 20 days from the mailing date.

7.3 Special General Assemblies for any purpose or purposes unless otherwise prescribed by these By-Laws or the Rules of the Association, may be called by the President, and shall be called by him, at the request in writing of at least one-fifth of all the ordinary members. Such request shall state the purpose or purposes of the proposed assembly. The business transacted at any special assembly shall be limited to the purposes stated in the notice.

7.4 Written notice of Special General Assemblies stating the time, place and object thereof, shall be given to each ordinary member at least twenty days before the date of the Assembly and shall include the agenda and supporting documents for the Assembly.

7.5 A majority of all the ordinary members must be present or represented by proxy at any General Assembly, in order to constitute a quorum for transaction of the business except as otherwise provided by these By-Laws or the Rules of the Association.

7.6 Unless otherwise prescribed by these By-Laws or the Rules of the Association, the vote of the majority of the members present or represented by proxy shall decide any question.

Art. 8 PROMULGATION OF STANDARDS

8.1 Promulgation of standards by the Association shall require approval by at least two-thirds of all the ordinary members.

8.2 It is not obligatory for members to follow any standard.

8.3 All standards when approved shall be made available to all interested parties without restriction.

Art. 9 AD HOC COMMITTEES

9.1 The General Assembly may delegate authority for specific purposes to ad hoc committees. The tasks, terms of reference and membership of these committees will be adopted if a majority of all the ordinary members assent.

9.2 Unless otherwise decided at the time of its appointment each ad hoc committee may co-opt additional members should it so desire.

9.3 No ad hoc committee may meet for more than one year without being reappointed.

Art. 10 SECRETARIAT

10.1 There shall be a permanent Secretariat of the Association responsible to the General Assembly.

10.2 A Secretary General shall be appointed by the General Assembly and shall be responsible for the operation of the Secretariat.

Art. 11 TECHNICAL WORKING COMMITTEES

11.1 Technical working committees will be formed by the Secretary General when so decided at a General Assembly.

11.2 Any ordinary member may participate in any technical working committee.

Art. 12 FISCAL YEAR

12.1 The fiscal year shall commence on January 1 and end on December 31. Exceptionally, the first fiscal year shall commence the day of incorporation and end on December 31, 1961.

Art. 13 FINANCE

13.1 The annual budget of the Association shall be approved by at least two thirds of the ordinary members present or represented at an ordinary General Assembly.

13.2 The Association shall be financed by an equal levy on all ordinary members. The fees are set by the ordinary members during an ordinary General Assembly and based on the current year budget. Such fees shall be used to finance the activity of the Association and its administrative expenses and shall not be returnable.

13.3 The Secretary General will be responsible for expenditures within the budget.

13.4 The President may authorize expenditures outside the budget to an amount not exceeding 10 per cent of the corresponding item in the current year budget. Any expense above this must be approved by the ordinary members.

Art. 14 DISSOLUTION

14.1 In the event of the dissolution of the Association, its assets are first used to discharge its liabilities. Any balance of liability shall be borne by the members in proportion to their annual fees. Any surplus funds remaining after the liabilities have been discharged will be distributed to those which are members at the date of dissolution in proportion to their total contributions to the Association.

Art. 15 AMENDMENTS

15.1 The By-Laws and any Rules that may be adopted by the General Assembly can only be modified at an ordinary or special General Assembly. The proposed amendments must be included in the agenda and notified to the members according to the provisions of Articles 7.1 and 7.4.

15.2 Amendments shall require two-thirds approval of all the ordinary members.

Art. 16 LITIGATION

16.1 Any dispute arising during the life of the Association or during its dissolution either between the members of the Association and its Management or between the members and the Association or between the members themselves as a consequence of the Association's activity shall be decided upon by the Courts of the Canton de Genève. Swiss law is applicable in all cases.

RULES OF THE ASSOCIATION

1. LANGUAGE

1.1 The English language, as written in the United Kingdom, will be the official language of the Association.

2. SYSTEM OF MEASUREMENTS

2.1 The metric system of measurements will be used.

3. MINIMUM PERIOD OF MEMBERSHIP

3.1 There is no minimum period of membership.

4. REPRESENTATION OF MEMBERS

4.1 Each member shall designate the name of one of its officers or executives who shall represent them in General Assemblies and who shall have full authority to commit the member on all matters concerning the Association. Members shall notify the Association of any changes in their representation.

5. GENERAL ASSEMBLIES

5.1 Representatives may invite additional individuals from their respective member company to participate in an advisory capacity at a General Assembly.

5.2 The members entitled to attend and vote at a General Assembly may be represented by a proxy. A written proxy shall be established indicating the item or items of the agenda to which it is restricted.

5.3 The President or in his absence the Vice-President shall preside at all General Assemblies. In absence of both, the members present or represented by proxy shall elect a Chairman for that particular meeting.

6. CO-ORDINATING COMMITTEE

6.1 An ad hoc Committee consisting of individuals elected by the General Assembly will be set up under the name of Co-ordinating Committee, whose terms of reference will be as follows:

   6.1.1 To prepare terms of reference for new Technical Working Committees in accordance with the rules for the formation of a Technical Working Committee.

   6.1.2 To nominate a provisional Chairman and Vice-Chairman for each new Technical Working Committee.

   6.1.3 To review from time to time the terms of reference given to Technical Working Committees.

   6.1.4 To have every six months meetings with all Chairmen of Technical Working Committees at which the progress of the TCs will be reviewed and co-ordinated.

   6.1.5 To make recommendations to the members of ECMA regarding the formation, reorganization or dissolution of Technical Working Committees.

7. TECHNICAL WORKING COMMITTEES

7.1 Formation of Technical Working Committees:

   7.1.1 Technical Working Committees will be formed by the Secretary General when so decided at a General Assembly.

   7.1.2 Any proposal for the setting up of a TC must give the suggested terms of reference, including the scope, and be sent to the Secretary General (SG).

   7.1.3 The CC shall nominate a provisional Chairman and Vice-Chairman.

   7.1.4 The SG shall then convene the first meeting of the TC.

7.2 Operating procedures of TC—Rules and recommendations for the Technical Committees:

   7.2.1 All members of ECMA are entitled to send one or more representatives to any TC, but no member Company may have more than one vote. These representatives must be employees of the member Company. Anyone else can attend a meeting only at the special invitation of the Committee as a whole.

   7.2.2 Voting shall be by simple majority of member Companies present at the meeting.

   7.2.3 It is recommended that in the course of its ordinary work the TC should not use voting unless it is impossible to make progress without a vote.

   7.2.4 The provisional Chairman and Vice-Chairman nominated by the CC shall act for an initial period which shall be not less than 6 months from the date of the first meeting and which shall include the first 3 meetings.

7.2.5 At the first meeting of the TC which takes place after the end to the initial period, a definitive Chairman and Vice-Chairman shall be elected.

7.2.6 The Chairman and Vice-Chairman, having been elected, shall hold office for a term of 12 months. They shall be eligible for re-election, subject to a maximum consecutive term of office of 3 years.

7.2.7 Meetings of the TCs shall be conducted by the Chairman, according to the By-Laws and Rules of ECMA. The SG shall act as Secretary at all TC meetings. The Vice-Chairman shall assist the SG and shall act for the SG if the latter is unable to attend.

7.2.8 Agenda for meetings of the TCs shall be prepared by the Chairman and the SG taking into account suggestions made by members of the Committee. The Agenda shall be circulated to all members 3 weeks before each meeting; at the opening of the meeting it can be modified if wanted and must be approved.

7.2.9 The SG shall be responsible for the preparation of minutes of the meetings.

7.2.10 The minutes shall be distributed by the SG within 3 weeks to all members of the TC, to the Chairmen of all TCs, to the official representatives of the member companies, and to the members of the CC.

7.2.11 The first item on the agenda of each TC shall be the amendment and approval of the minutes of the preceding meeting. The minutes, after approval, shall constitute the official record of the meeting of a TC.

7.2.12 Any suggestions for the amendment of terms of reference of TCs should be addressed to the SG for discussion between the TC Chairman and the CC.

7.2.13 The Chairman is responsible for the preparation of a semi-annual report for each TC. He will be assisted by the Vice-Chairman and the SG in this task and the report will be submitted to the General Assembly. The report will contain a description of the results achieved to date and an outline of the work to be carried out during the next year.

7.2.14 This report will be circulated to all members of the TC for approval.

7.2.15 Any member of a TC has the right to ask for a minority report to be submitted if he so desires.

7.2.16 The work of all TCs will be discussed every 6 months at a meeting of the Chairmen of TCs with the CC and the SG at which meetings the semi-annual report will be represented.

7.2.17 First priority in discussion at the meetings of the TCs must be given to items on the agenda.

7.2.18 Under no circumstances should any technical contribution be decided upon at a TC meeting unless it has been circulated to all Committee members at least 3 weeks before the meeting.

7.2.19 In the interest of economy and efficiency, alternate meetings will be held in Geneva.

7.3 Task Groups

7.3.1 Technical committees may form Task Groups for the accomplishment of specific tasks within the scope of the committee.

7.3.2 At least two members of the committee should agree to take an active part in the work of the Task Groups.

7.3.3 Terms of reference of the Task Group shall be included in the minutes of the meeting of the Technical Committee at which the Task Group has been formed.

7.3.4 Task Groups shall report at each meeting to the committee on their activities; these reports shall appear in the minutes of the committee.

8. MEMBERSHIP FEES

8.1 The membership fees shall be based on an estimate for the current year's operating expenses with adjustments for any deviation between the estimated and actual for the preceding years. Although the Association shall be non-profit-making, reserves may be accumulated if so decided by the General Assembly.

8.2 Every ordinary member on the date of the General Assembly which decides on the budget for the following fiscal year, shall pay the full annual fee for that year.

8.3 Any new member shall pay the full annual fee for the fiscal year in which it is admitted as member.

9. OPERATING EXPENSES

9.1 Operating expenses of the Association shall consist of salaries, travel and office expenses of the Secretariat and publication costs.

9.2 Expenses of members including those connected with ad hoc and Technical Working Committees are not part of the operating expenses of the Association.

9.3 The Secretary General of ECMA is responsible to the Treasurer for the operating expenses of the Association.

9.4 The General Accounting of the Secretariat will be reviewed once a year by an Auditor appointed by the Treasurer and approved by the General Assembly.

CODE OF CONDUCT IN PATENT MATTERS

1. POLICY

General Declaration:

The General Assembly of ECMA shall not approve recommendations of Standards which are covered by patents when such patents will not be licensed by their owners on a reasonable and non-discriminatory basis.

1.1 In case the proposed Standard is covered by issued patents of ECMA members only:
Members of the General Assembly are asked to state the Company licensing policy with respect to these patents.

1.2 In case the proposed Standard is covered by issued patents by non ECMA members: A written statement from the patentee is required, according to which he is prepared to grant licences on a reasonable, non-discriminatory basis.
The General Assembly and/or the Management shall decide in this case which steps must be undertaken in order to obtain such a statement.

1.3 In case the proposed Standard is covered by patent applications of ECMA members (which is not known, neither during the work of the TC nor at the time of the vote in the General Assembly):

1.3.1 Each member of the TCs and/or of the General Assembly of ECMA will determine whether any proposed standard may be covered by any patent for which his company has a pending application, if such a patent application exists, his continued participation to the relevant committee will imply that such a patent, when obtained later, will be made available from his company for licensing on a reasonable, non-discriminatory basis.

1.3.2 Each member of the TCs and/or of the General Assembly of ECMA will determine whether any proposed standard may be covered by any patent for which his company has a pending application; if such a patent application exists, the favourable vote of the Company to the General Assembly will imply that such a patent, when obtained later, will be made available from his company for licensing on a reasonable, non-discriminatory basis.

1.4 In case the proposed Standard is covered by patent applications of third parties (which is not known during the work of the TC nor at the time of the vote in the General Assembly):

In this case practically nothing can be done at the time of the vote. When afterwards said patents are issued, it should be tried to obtain reasonable, non-discriminatory licences. If this proves to be impossible, the standard will have to be cancelled.

2. PROCEDURE

2.1 The questions related to protective rights are in the competence of the General Assembly of ECMA and should not be discussed at the TC level.

2.2 With each draft standard submitted four months ahead of a General Assembly, the Secretary General shall ask, by registered mail, all members to state within two months whether they claim any issued protective rights covering the subject matter of the proposed standard, and/or have knowledge of such rights of third parties.

2.3 Replies to this request will be circulated in due time before the General Assembly.

2.4 Where an answer is not received from a Company the General Assembly may proceed to a vote on the assumption that this Company will act in accordance with the General Declaration, that is to license possible relevant issued patents on a reasonable and non-discriminatory basis.

Adopted at the General Assemblies of March 29, 1963 and June 2, 1966.

PUBLICATIONS

Free copies of all documents listed under A and C are available upon request

A. **ECMA Standards** (Blue cover)

ECMA-2 — Standard for a Subset of ALGOL 60 — ECMALGOL (April 1964)

ECMA-3 — Standard for the CMC7 Printed Image Specification, 2nd Edition (Sept. 1966)

ECMA-4 — Standard for Flow Charts, 2nd Edition (Sept. 1966)

ECMA-5 — Standard for Data Interchange on 7 Track Magnetic Tape, 2nd Edition (Dec. 1966)

ECMA-6 — Standard for a 7 Bit Input/Output Coded Character Set (April 1965)

ECMA-8 — Standard for the Nominal Character Dimensions of the Numeric OCR-A Font (April 1965)

ECMA-9 — Standard for FORTRAN (April 1965)

ECMA-10 — Standard for Data Interchange on Punched Tape (Nov. 1965)

ECMA-11 — Alphanumeric Character Set OCR-B for Optical Recognition (Nov. 1965)

ECMA-12 — Standard for Data Interchange on 9 Track Magnetic Tape at 31,5 bit per mm (800 bpi) (Nov. 1967)

ECMA-13 — Standard for Magnetic Tape Labelling (Nov. 1967)

ECMA-14 — Standard Rules for the Definition of 4 Bit Sets Derived from the ECMA 7-Bit Coded Character Set (Nov. 1967)

ECMA-15 — Printing Specifications for Optical Character Recognition (May 1968)

ECMA-16 — Basic Mode Control Procedures for Data Communication Systems using the ECMA 7 Bit Code (May 1968)

ECMA-17 — Standard for Graphic Representation of the Control Characters of the ECMA 7-Bit Coded Character Set for Information Interchange (Nov. 1968)

ECMA-18 — Standard for Printing Line Position on Single Line Documents (Nov. 1968)

B. **Withdrawn ECMA Standards**

ECMA-1 — Standard for a 6 Bit Input/Output
   Character Code   (March 1963)
ECMA-7 — Standard for a 7 Bit Code in Punched
   Cards   (April 1965)

C. **Other Documents** (White cover)

Drawings of the ECMA Light Transmission Meter (April 1965)

Comments and Notes on the Standard ECMA-3 for
   the Printed Image of the CMC7 Font, 2nd Edition (Feb. 1967)

COBOL Translations   (Nov. 1965)

A Set of I/O Procedures for ECMALGOL   (Jan. 1967)

Notes on Instruments and Measuring Methods
   related to the ECMA Standard for Printing
   Specifications for OCR (ECMA-15)   (Aug. 1968)