

Preparation of documents used in electrotechnology —

Part 1: General requirements

The European Standard EN 61082-1:1993 has the status of a
British Standard

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National foreword

This Part of this British Standard has been prepared under the direction of the General Electrotechnical Standards Policy Committee and is the English language version of EN 61082-1:1993 *Preparation of documents used in electrotechnology. Part 1: General requirements* including amendments A1:1995 and A2:1996, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 1082-1:1991 including amendments 1:1995 and 2:1996, published by the International Electrotechnical Commission (IEC).

This British Standard partly supersedes BS 5070-1:1988 which will now be amended to exclude diagrams used in electrotechnology.

IEC 1082 will consist of several Parts as follows:

IEC 1082-1:1991, *General requirements*.

IEC 1082-2, *Function-oriented diagrams* (awaiting publication).

IEC 1082-3, *Connection diagrams, tables and lists* (awaiting publication).

IEC 1082-4, *Installation Documents* (in preparation).

IEC 1082-XX, *Instructions and manuals* (in preparation).

It is envisaged that all Parts of IEC 1082 will be adopted by CENELEC as Parts of EN 61082. British Standards, identical in number and title, will be published as further Parts of BS EN 61082 in due course.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 100, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

English version

Preparation of documents used in electrotechnology Part 1: General requirements

(includes amendment A1:1995 + A2:1996)
(IEC 1082-1:1991 + A1:1995 + A2:1996)

Etablissement des documents utilisés en
électrotechnique
Partie 1: Prescriptions générales
(inclut l'amendement A1:1995 + A2:1996)
(CEI 1082-1:1991 + A1:1995 + A2:1996)

Erstellung von in der Elektrotechnik
verwendeten Dokumenten
Teil 1: Allgemeine Anforderungen
(enthält Änderung A1:1995 + A2:1996)
(IEC 1082-1:1991 + A1:1995 + A2:1996)

This European Standard was approved by CENELEC on 1993-07-06. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1082-1:1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as a European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 61082-1 on 6 July 1993.

This European Standard replaces HD 246.1 S1:1977, HD 246.3 S1:1977 and HD 246.7 S1:1984.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-10-01
- latest date of withdrawal of conflicting national standards (dow) 1994-10-01

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given only for information. In this standard, Annex A is informative and Annex ZA is normative.

Foreword to amendment A1

The text of document 3B(CO)58 + 58A, future amendment 1 to IEC 1082-1:1991, prepared by SC 3B, Documentation, of IEC TC 3, Documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61082-1:1993 on 1994-12-06.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement standard (dop) 1996-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1996-04-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative. Annex ZA has been added by CENELEC.

Introduction to amendment A1

Clause 4.9 specifies the requirements for a consistent simplified presentation of textstrings on electro-technical diagrams for all those cases when separate item designations, terminal and signal designations of different objects are merged together in a single textstring for its presentation. This simplified representation is applied e.g. for all kinds of designations associated with grouping of objects. The same rules should be applied for human readers, and allowing at the same time an unambiguous machine generation and interpretation of those simplifications. This amendment is limited to those requirements shown in IEC 1082 for the presentation of textstrings on symbols and on diagrams conforming to IEC 1082. The simplified presentation of signal designations as specified in IEC 1175, subclause 5.2.3.3, and the requirements for the terminal markings in IEC 445 have been considered.

Foreword to amendment A2

The text of document 3B/169/FDIS, future amendment 2 to IEC 1082-1:1991, prepared by SC 3B, Documentation, of IEC TC 3, Documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 61082-1:1993 on 1996-07-02.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1997-04-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative. Annex ZA has been added by CENELEC.

NOTE IEC 750, which is referred to in this standard, is superseded by IEC 1346-1:1996, which is harmonized as EN 61346-1:1996.

Introduction to amendment A2

Clause 4.10 provides methods for simplified presentations of reference designations formed according to IEC 1346-1 and their interpretation. This amendment is limited to those requirements shown in IEC 1082 for the presentation of reference designations on symbols, diagrams in tables and lists conforming to IEC 1082.

NOTE 1 This amendment uses the term reference designation as defined in IEC 1346-1. This term item designation as defined in IEC 750.

NOTE 2 The general update of IEC 1082-1 due to the revision of IEC 750 by IEC 1346-1 is left to a future revision.

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Section 1. General

1.1 Scope

This International Standard provides general rules and guidelines for the preparation of documents used in electrotechnology, and specific rules and guidelines for certain kinds of documents.

Examples are intended to illustrate a given rule and are not necessarily representative of complete documents.

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 27-1:1971, *Letter symbols to be used in electrical technology — Part 1: General*.

IEC 76-4:1976, *Power transformers — Part 4: Tappings and connections*.

IEC 417:1973, *Graphical symbols for use on equipment — Index, survey and compilation of the single sheets*.

IEC 445:1988, *Identification of equipment terminals and of terminations of certain designated conductors, including general rules of an alphanumeric system*.

IEC 617-1:1985, *Graphical symbols for diagrams — Part 1: General information, general index. Cross-reference tables*.

IEC 617-2:1983, *Graphical symbols for diagrams — Part 2: Symbol elements, qualifying symbols and other symbols having general application*.

IEC 617-3:1983, *Graphical symbols for diagrams — Part 3: Conductors and connecting devices*.

IEC 617-4:1983, *Graphical symbols for diagrams — Part 4: Passive components*.

IEC 617-5:1983, *Graphical symbols for diagrams — Part 5: Semiconductors and electron tubes*.

IEC 617-6:1983, *Graphical symbols for diagrams — Part 6: Production and conversion of electrical energy*.

IEC 617-7:1983, *Graphical symbols for diagrams — Part 7: Switchgear, controlgear and protective devices*.

IEC 617-8:1983, *Graphical symbols for diagrams — Part 8: Measuring instruments, lamps and signalling devices*.

IEC 617-9:1983, *Graphical symbols for diagrams — Part 9: Telecommunications: Switching and peripheral equipment*.

IEC 617-10:1983, *Graphical symbols for diagrams — Part 10: Telecommunications: Transmission*.

IEC 617-11:1983, *Graphical symbols for diagrams — Part 11: Architectural and topographical installation plans and diagrams*.

IEC 617-12:1991, *Graphical symbols for diagrams — Part 12: Binary logic elements*.

IEC 617-13:1978, *Graphical symbols for diagrams — Part 13: Analogue elements*.

IEC 750:1983, *Item designation in electrotechnology* (replaced by IEC 1346-1).

IEC 848:1988, *Preparation of function charts for control systems*.

IEC 1082-2, *Preparation of documents used in electrotechnology — Part 2: Function-oriented diagrams (in preparation)*.

IEC 1175:1993, *Designations for signals and connections*.

IEC 1346-1:1996, *Structuring principles and reference designations — Part 1: Basic rules*.

IEC 1355:1996, *Classification and designation of documents for plants, systems and equipment* (actually 3B/181/FDIS).

IEC/DIS 3B(CO)55, *Information technology — Coded graphic character set for use in the preparation of documents used in electrotechnology and for information interchange¹⁾*.

ISO 31-1:1978, *Quantities and units of space and time*.

ISO 31-2:1978, *Quantities and units of periodic and related phenomena*.

¹⁾ At present at the stage of draft International Standard

- ISO 31-3:1978, *Quantities and units of mechanics*.
- ISO 31-4:1978, *Quantities and units of heat*.
- ISO 31-5:1979, *Quantities and units of electricity and magnetism*.
- ISO 31-6:1980, *Quantities and units of light and related electromagnetic radiations*.
- ISO 31-7:1978, *Quantities and units of acoustics*.
- ISO 31-8:1980, *Quantities and units of physical chemistry and molecular physics*.
- ISO 31-9:1980, *Quantities and units of atomic and nuclear physics*.
- ISO 31-10:1980, *Quantities and units of nuclear reactions and ionizing radiations*.
- ISO 31-11:1978, *Mathematical signs and symbols for use in the physical sciences and technology*.
- ISO 31-12:1981, *Dimensionless parameters*.
- ISO 31-13:1981, *Quantities and units of solid state physics*.
- ISO 128:1982, *General principles of presentation*.
- ISO 129:1985, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications*.
- ISO 216:1975, *Writing paper and certain classes of printed matter. Trimmed sizes — A and B series*.
- ISO 1219:1976, *Fluid power systems and components — Graphic symbols*.
- ISO 2594:1972, *Building drawings — Projection methods*.
- ISO 3098-1:1974, *Technical drawings — Lettering — Part 1: Currently used characters*.
- ISO 3098-2:1984, *Technical drawings — Lettering — Part 2: Greek characters*.
- ISO 3098-3:1987, *Technical drawings — Lettering — Part 3: Diacritical and particular marks for the Latin alphabet*.
- ISO 3098-4:1984, *Technical drawings — Lettering — Part 4: Cyrillic characters*.
- ISO 3461-2:1987, *Graphical symbols — Part 2: General principles for creation of graphical symbols for use in technical product documentation*.
- ISO 5455:1979, *Technical drawings — Scales*.
- ISO 5457:1980, *Technical drawings — Sizes and layout of drawing sheets*.
- ISO 6428:1982, *Technical drawings — Requirements for microcopying*.
- ISO 7200:1984, *Technical drawings — Title blocks*.

Section 2. Definitions, classification

2.1 Definitions

For the purpose of this International Standard, the following definitions apply.

In the definitions, terms that are defined elsewhere within this clause are shown in *italics*.

2.1.1 Basic terms

The interrelations among some of the terms are illustrated in Figure 1.

2.1.1.1

medium

material on which information is recorded, for example paper, microform, magnetic or optical disk

2.1.1.2

document

information on a data *medium*. Normally, a document is designated in accordance with the type of information and the form of presentation, for example *overview diagram*, *connection table*, *function chart*

NOTE Information may appear in a static manner on paper and microform or dynamically on (video) display devices.

2.1.1.3

drawing (technical)

document presenting information in a graphical manner, which may include text

2.1.1.4

documentation:

- 1) collection of *documents* related to a given subject;
- 2) processing of *documents*.

2.1.2 Forms of the presentation of information

2.1.2.1

pictorial form

graphical presentation depicting the shape, size, etc. of a physical part or assembly, often to scale

2.1.2.2

plan²⁾

drawing showing a horizontal view, section or cut

2.1.2.3

diagram²⁾

graphical presentation depicting, by the use of graphical symbols and outlines with inscriptions, the relations among the components and the parts of a system or of an equipment including the interconnections

2.1.2.4

map²⁾

graphical presentation of an installation with respect to its surrounding topography

2.1.2.5

chart, graph²⁾

graphical presentation describing the behaviour of a system, for example the relations between two or more variable quantities, operations or states

2.1.2.6

table, list²⁾

presentation form using columns and rows

2.1.2.7

textual form

presentation form using text, for example in written instructions and descriptions

²⁾ The term is used with two different meanings: for the form of presentation (as defined) and for the document.

2.1.3 Methods of the representation of components and connections in diagrams

Functionally dependent parts of a component

2.1.3.1 **attached representation**³⁾

representation wherein the parts of a composite symbol are placed together. See Figure 2 and Figure 4

2.1.3.2 **semi-attached representation**⁴⁾

(Usually for components having a mechanical functional linkage.) Representation wherein the symbol is extended with each part placed in the *diagram* to achieve a clear layout of the circuits, the parts being connected by the symbol 02-12-01 of IEC 617 for a functional linkage. See Figure 3 and Figure 5

2.1.3.3 **detached representation**

(For components having a functional linkage.) Representation wherein the symbol is separated into its parts with each part placed in the *diagram* to achieve a clear layout of the circuits, the parts being related by their item designations. See Figure 6 and Figure 7

2.1.3.4 **repeated representation**

(Usually for components having an electrical functional linkage, for example binary logic elements represented by a symbol including a common control block or a common output block.) Representation wherein a complete symbol is shown in two or more places in the *diagram*, the identical item designation for each appearance indicating that the symbols represent only one component. See Figure 8

*Functionally independent*⁵⁾ parts of a component

2.1.3.5 **grouped representation**

representation wherein:

- 1) the symbols for the parts are surrounded by an outline. See Figure 9;
- 2) the symbols for the parts (usually binary logic and analogue elements) are abutted. See Figure 10.

2.1.3.6 **dispersed representation**

representation wherein the symbols for the parts are separated and placed in the *diagram* to achieve a clear layout of the circuits, the parts being related by their item designations. See Figure 11

Circuits

2.1.3.7 **multi-line representation**

representation wherein each connection is represented by a line. See Figure 12

2.1.3.8 **single-line representation**

representation wherein two or more connections are represented by a single line. See Figure 13

2.1.4 Diagram layout methods

2.1.4.1 **functional layout**

layout method wherein the symbols for the components or their parts are placed in the *diagram* so that the functional relations can be easily recognized. See Figure 3, Figure 5, Figure 7, Figure 14, Figure 15 and Figure 16

³⁾ Formerly designated “assembled representation”, which is now deprecated.

⁴⁾ Formerly designated “semi-assembled representation”, which is now deprecated.

⁵⁾ The individual parts of the component may have a common voltage supply connection.

2.1.4.2

topographical layout

layout method wherein the symbols for the components are placed so that their relative positions in the *diagram* correspond to the relative physical locations of the components. See Figure 17 and Figure 18

2.1.5

reference designations

the definitions 3.1, 3.3, 3.7, 3.8, 3.9 and 3.10 of IEC 1346-1 apply

2.2 Classification of documents

2.2.1 Function-oriented documents

2.2.1.1 overview diagram⁶⁾: Relatively simple *diagram*, often using *single-line representation*, showing the main interrelations or connections among the items within a system, sub-system, installation, part, equipment, software, etc. See Figure 14 and Figure 15.

2.2.1.2 block diagram: *Overview diagram* using block symbols predominantly.

2.2.1.3 network map: *Overview diagram* showing a network on a *map*, for example generating and transforming stations and power lines, telecommunication equipment and transmission lines. See Figure 18.

2.2.1.4 function diagram: *Diagram* showing details of the theoretical or ideal operation of a system, sub-system, installation, part, equipment, software, etc. by means of theoretical or ideal circuits without necessarily taking into account the means used for implementation. See Figure 16.

2.2.1.5 logic-function diagram⁷⁾: *Function diagram* that predominantly uses symbols for binary logic elements.

2.2.1.6 equivalent-circuit diagram: *Function diagram* showing equivalent circuits, used as an aid for the analysis and calculation of characteristics or behaviour.

2.2.1.7 function chart: *Chart* describing the functions and behaviour of a control system, using steps and transitions.⁸⁾

2.2.1.8 sequence chart [table]: *Chart [table]* showing the succession of operations or status of the units of a system, the operations or status of the individual units being listed in one direction and the process steps or time being plotted at a right angle to that. See Figure 21.

2.2.1.9 time sequence chart: *Sequence chart* with the time axis plotted to scale.

2.2.1.10 circuit diagram: *Diagram* showing the implementation of the circuits of a system, sub-system, installation, part, equipment, software, etc., depicting parts and connections by means of graphical symbols arranged to show the functions but without necessarily taking into account the physical sizes, shapes, or locations of the items. See Figure 4, Figure 5, and Figure 7.

2.2.1.11 terminal-function diagram: *Diagram* for a functional unit showing the terminals for the interface connections and a description of the internal functions. These may be described by means of a *circuit diagram*, simplified if applicable, a *function diagram*, a *function* or *sequence chart*, or text. See Figure 19 and Figure 20.

2.2.1.12 program diagram [table] [list]: *Diagram [table] [list]* showing in detail program elements, modules and their interconnections, so arranged that the interrelations are clearly recognizable. See Figure 22.

2.2.2 Location documents

2.2.2.1 site plan: *Plan* showing the location, in relation to “setting-out points”, of construction works, service networks, and roadworks, and information on landscape, means of access and general layout of site. See Figure 24.

2.2.2.2 installation drawing [plan]: *Drawing [plan]* showing the location of the components of an installation. See Figure 17, Figure 23, Figure 25, and Figure 26.

⁶⁾ An overview diagram showing a system containing primarily non-electrical devices in the process flow paths is normally designated *(process) flow diagram*.

⁷⁾ Formerly designated “pure logic diagram”, which is now deprecated.

⁸⁾ The corresponding publication is IEC 848.

2.2.2.3 installation diagram: *Installation drawing* showing the connections between items.

See Figure 17.

2.2.2.4 assembly drawing: *Drawing* representing the spatial position and shape of a group of assembled parts, normally to scale.

2.2.2.5 arrangement drawing: *Assembly drawing* simplified or supplemented to give information needed for some particular purpose. See Figure 27 and Figure 30.

2.2.3 Connection documents

2.2.3.1 connection diagram [table]: *Diagram [table]* showing or listing the connections of an installation or equipment.

2.2.3.2 unit connection diagram [table]: *Connection diagram [table]* showing or listing the connections within a constructional unit. See Figure 28.

2.2.3.3 interconnection diagram [table]: *Connection diagram [table]* showing the connections among different constructional units. See Figure 29.

2.2.3.4 terminal connection diagram [table]: *Connection diagram [table]* showing the terminals of a constructional unit and the internal and/or external connections to the terminals. See Figure 31.

2.2.3.5 cable diagram [table] [list]: *Diagram [table] [list]* providing information on cables, such as the identification of the conductors, the location of the ends and, if needed, the characteristics, routes and function. See Figure 32.

2.2.4 Item lists

2.2.4.1 parts list: *List* specifying the items (parts, components, software, equipment, etc.) that constitute an assembly (or sub-assembly) and, if necessary, the reference documents. See Figure 33.

2.2.4.2 spare parts list: *List* specifying the items (parts, components, software, bulk material, etc.) for preventive and corrective maintenance.

2.2.5 Installation-specific documents

Documents giving instructions or information regarding the installation conditions and the supply, delivery, off-loading, erection and testing of a system, installation, equipment or component.

2.2.6 Commissioning-specific documents

Documents giving instructions or information regarding the commissioning and stating prior adjustments, simulation modes, recommended setting values and actions to be taken in order to achieve the development and proper functioning of a system, installation, equipment or component.

2.2.7 Operation-specific documents

Documents giving instructions or information regarding the operation of a system, installation, equipment or component.

2.2.8 Maintenance-specific documents

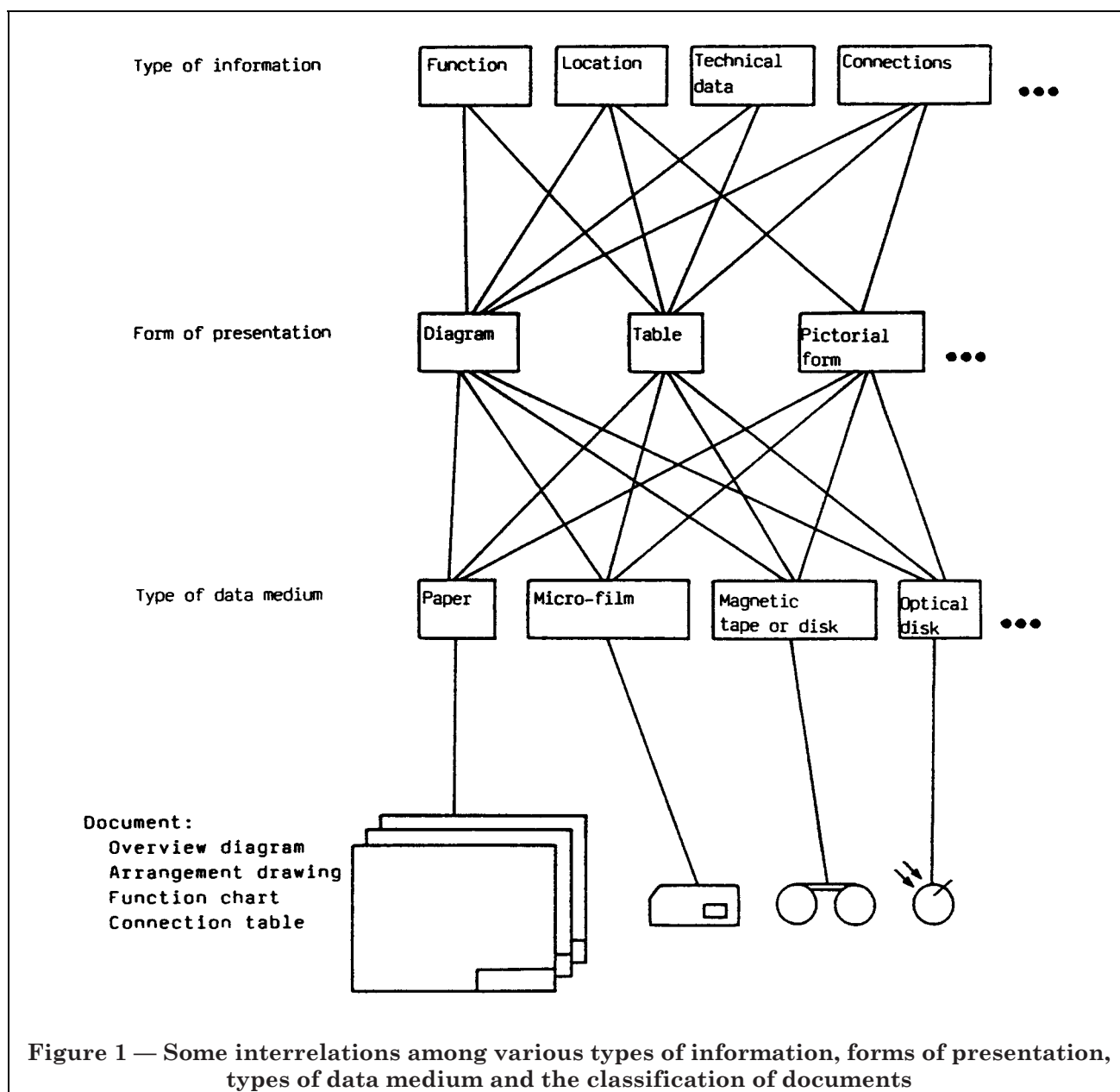
Documents giving instructions or information regarding maintenance procedures, for example in maintenance or service manuals, for a system, installation, equipment or component.

2.2.9 Reliability- and maintainability-specific documents

Documents giving information on the reliability and maintainability of a system, installation, equipment or component.

2.2.10 Other documents

Other documents may be necessary, such as handbooks, guides, catalogues, and drawing and document lists.



No	Attached representation	Description	Comments
1		Relay	May be shown in semi-attached representation (Figure 3) or in detached representation (Figure 6).
2		Pushbutton	
3		Circuit-breaker, operated by hand or motor, with trip-free mechanism, trip coil, over-current and over-load releases.	
4		Transformer with three windings	May be shown in detached representation (Figure 6).
5		Optical coupling device	
6		Multiplexer with storage, quad 2-input	May be shown in repeated representation (Figure 8, Figure 84 and Figure 85).

Figure 2 — Examples of symbols in attached representation

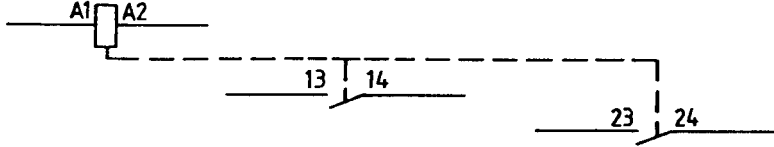
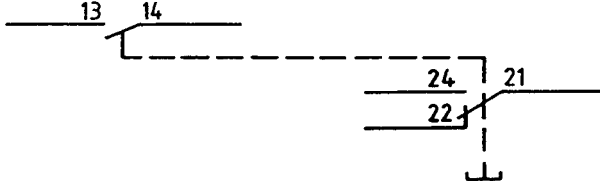
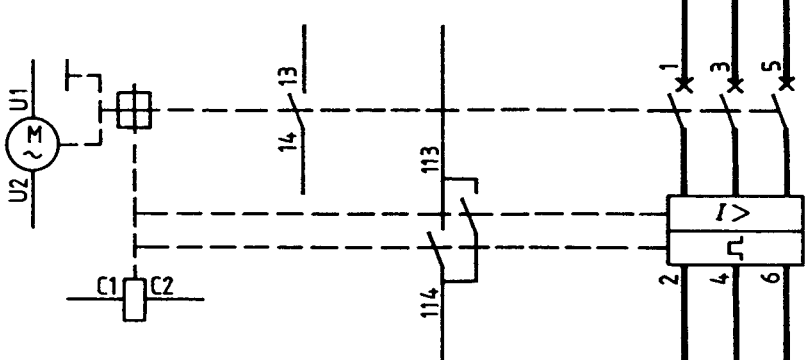
No	Semi-attached representation	Description
1		Relay
2		Pushbutton
3		Circuit-breaker, operated by hand or motor, with trip-free mechanism, trip coil, over-current and thermal over-load releases.

Figure 3 — Examples of symbols in semi-attached representation; the components represented are the same as examples 1–3 of Figure 2

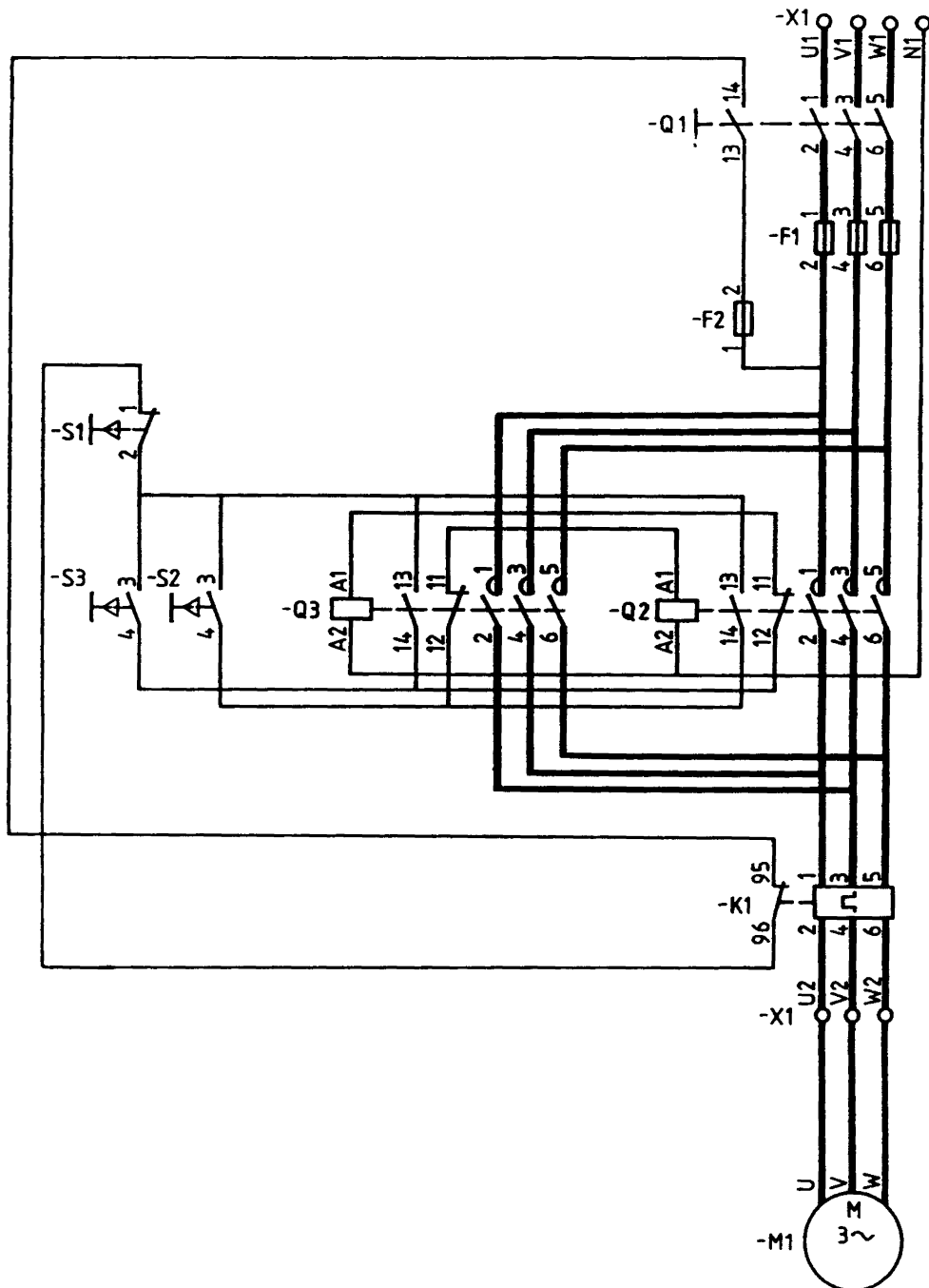


Figure 4 — Example of a circuit diagram using attached representation: a drive system for two directions of rotation

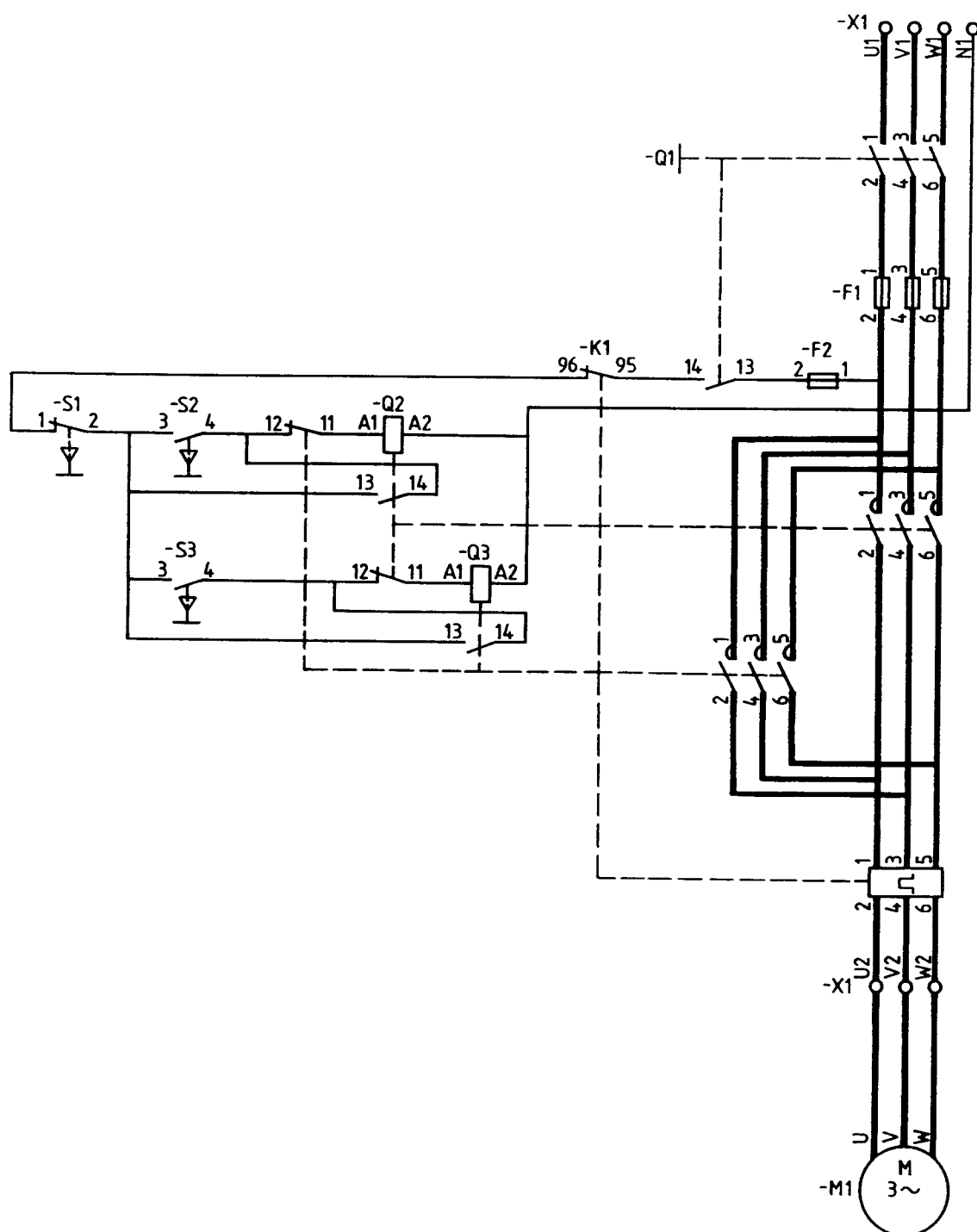


Figure 5 — Example of a circuit diagram using semi-attached representation; the same drive system as in Figure 4

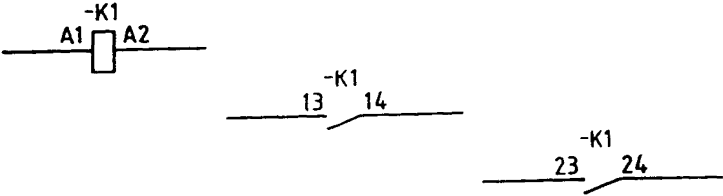
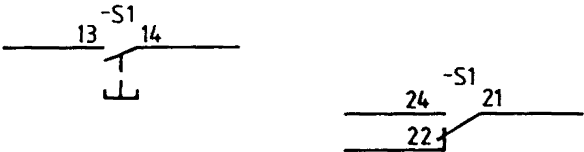
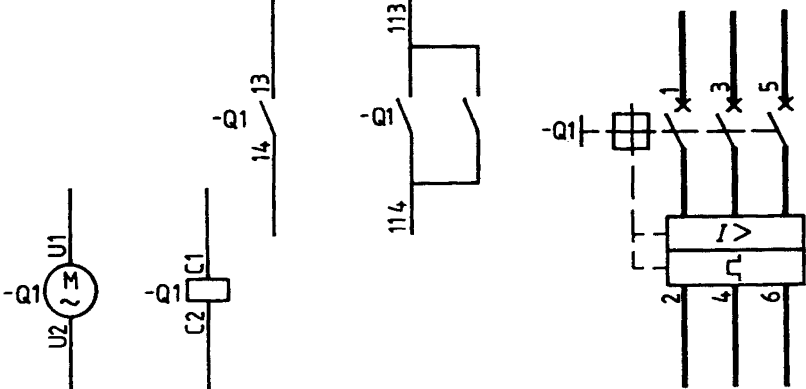
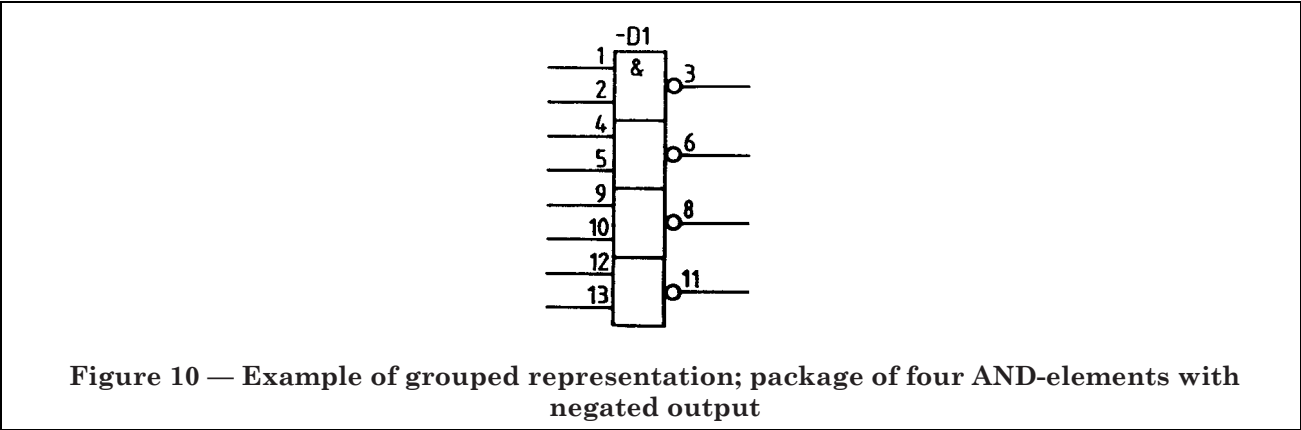
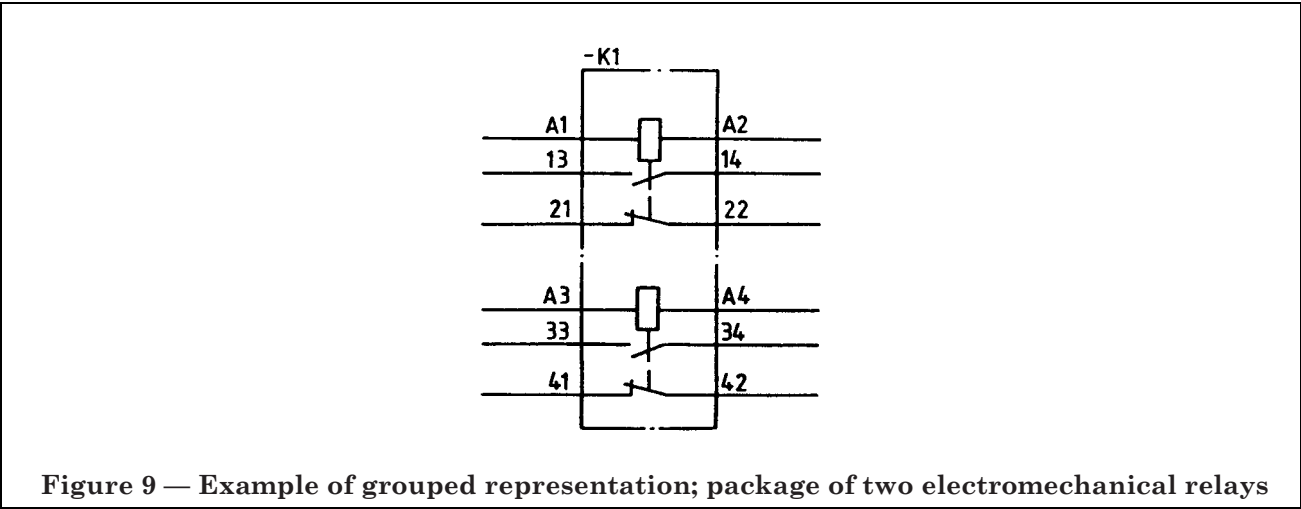
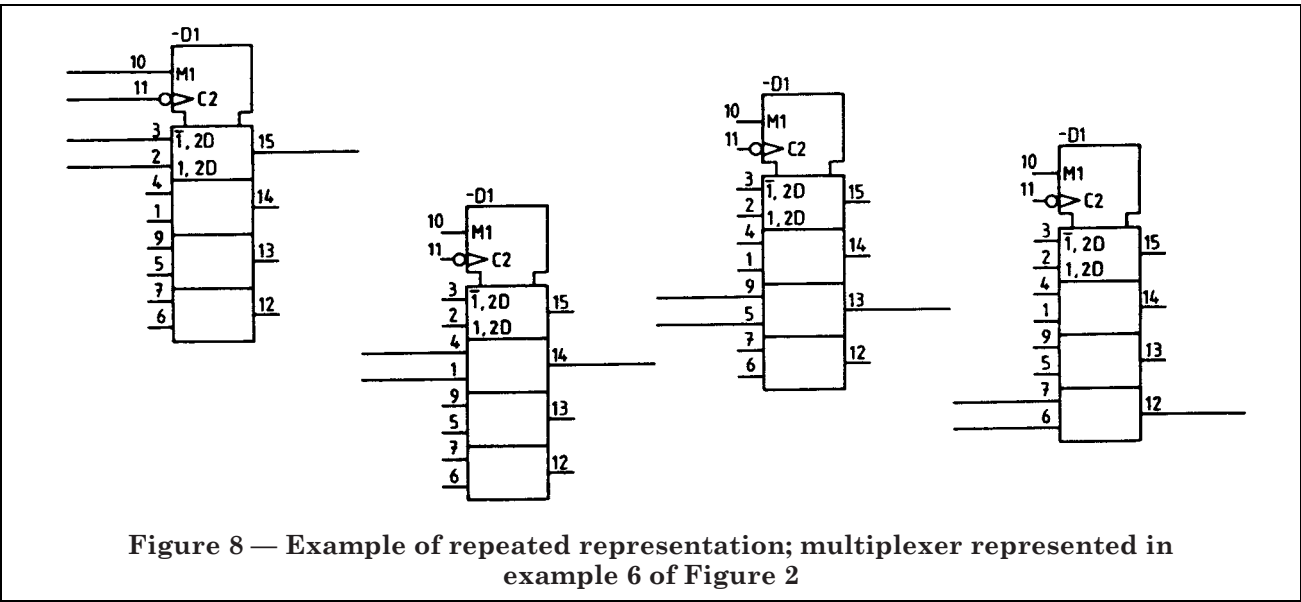
No	Detached representation	Description
1		Relay
2		Pushbutton
3		Circuit-breaker, operated by hand or motor, with trip-free mechanism, trip coil, over-current and thermal overload releases.
4		Transformer with three windings
5		Optical coupling device

Figure 6 — Examples of symbols in detached representation; the components represented are the same as in examples 1–5 in Figure 2





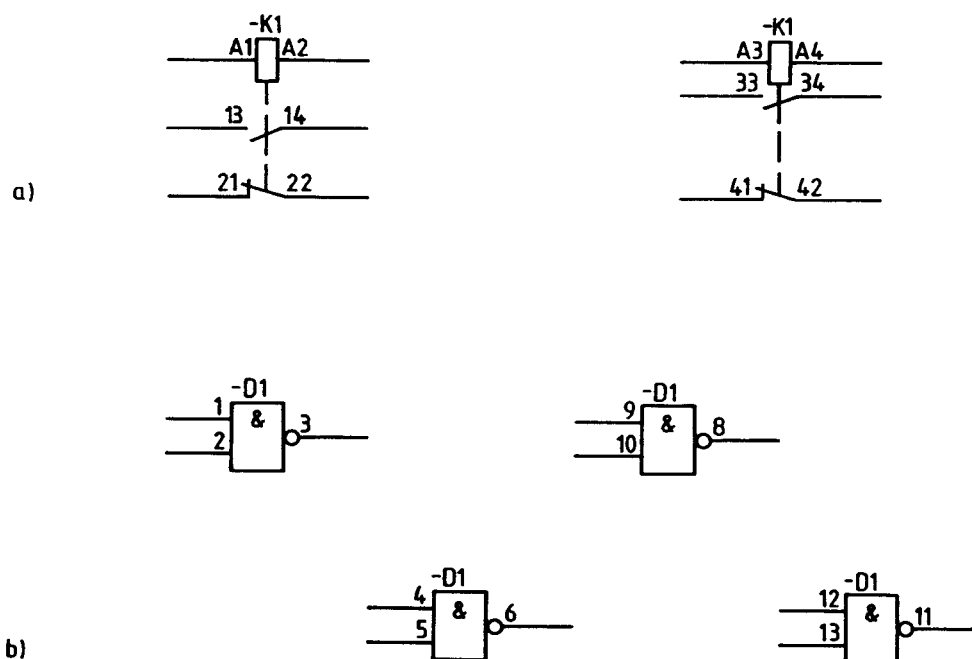


Figure 11 — Example of dispersed representation; the components represented in a) are the same as in Figure 9, those represented in b) are the same as in Figure 10

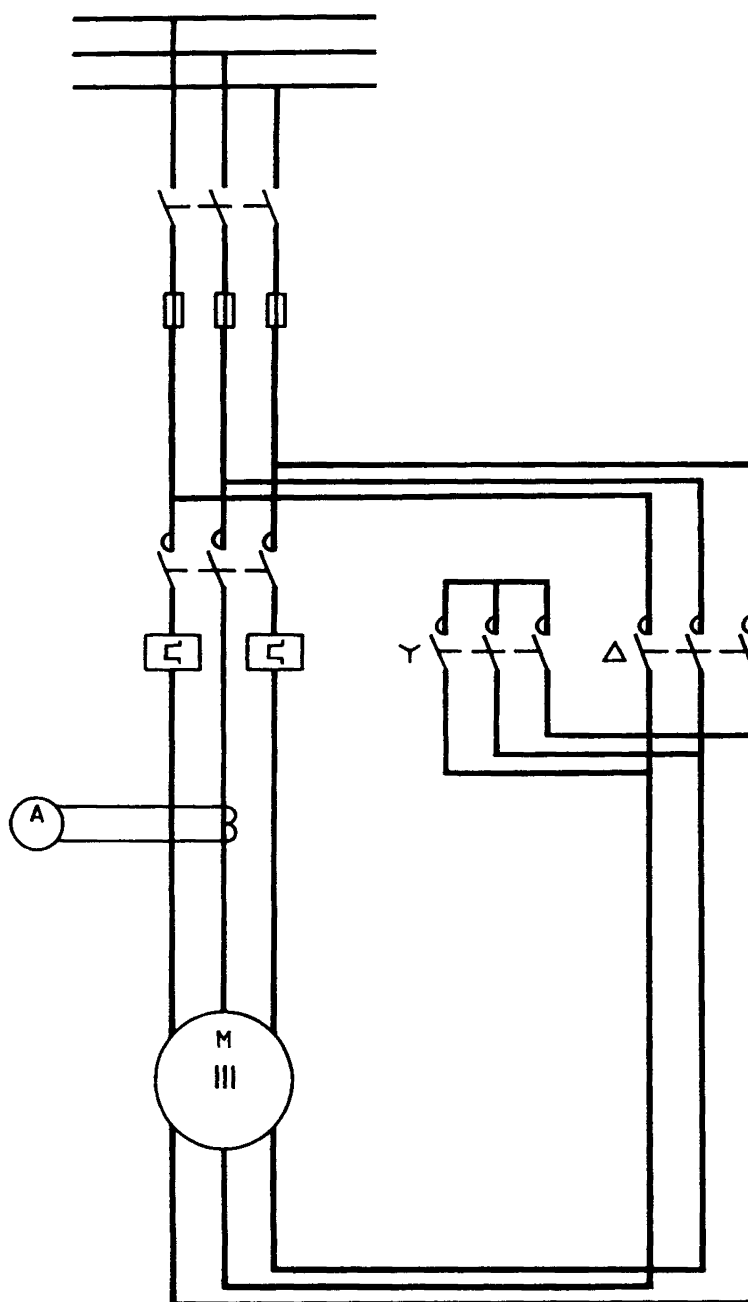


Figure 12 — Example of connections in multi-line representation; star-delta starter

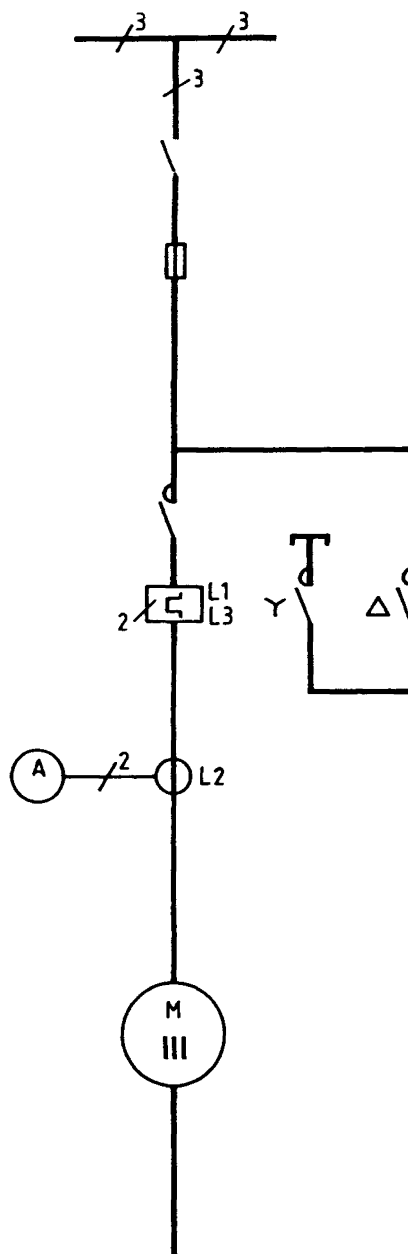
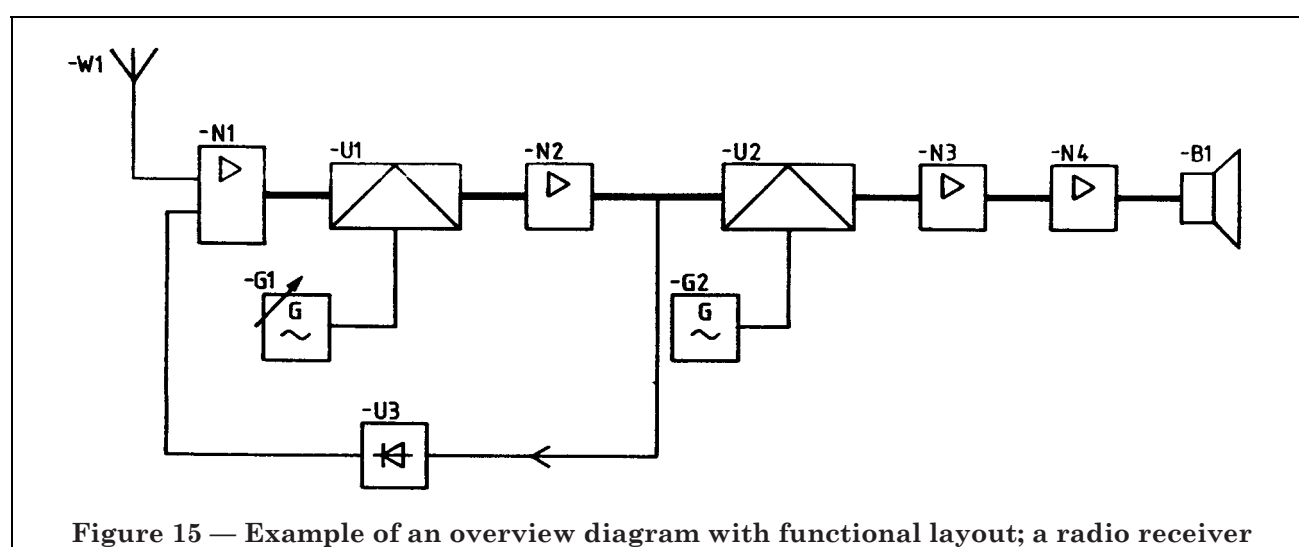
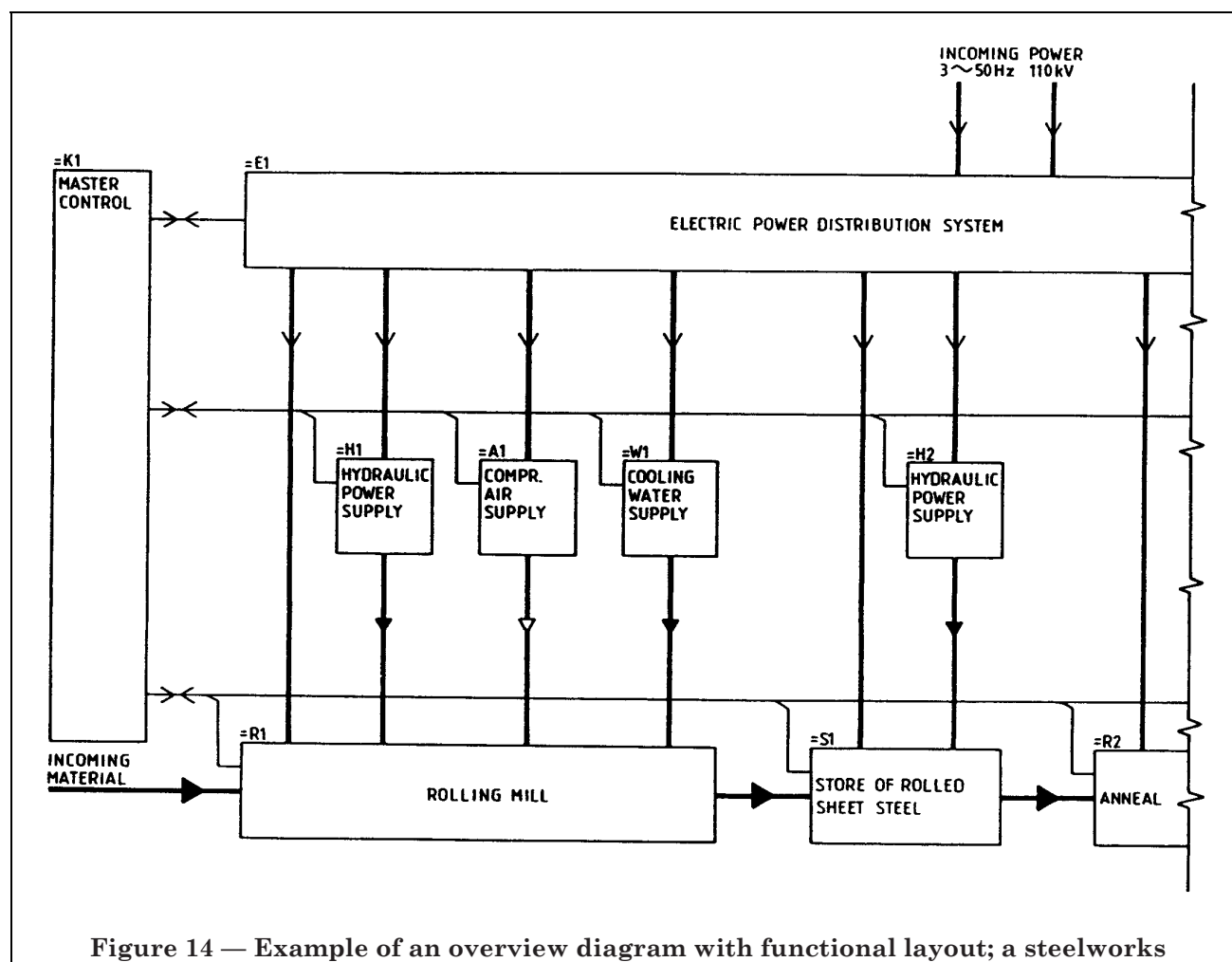


Figure 13 — Example of connections in single-line representation; same star-delta starter as in Figure 12



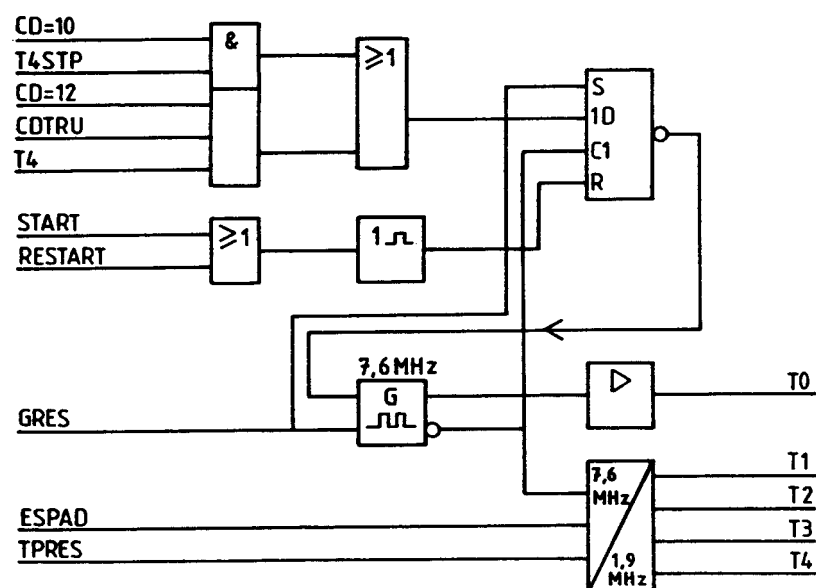


Figure 16 — Example of a logic-function diagram; timing-pulse generator equipment

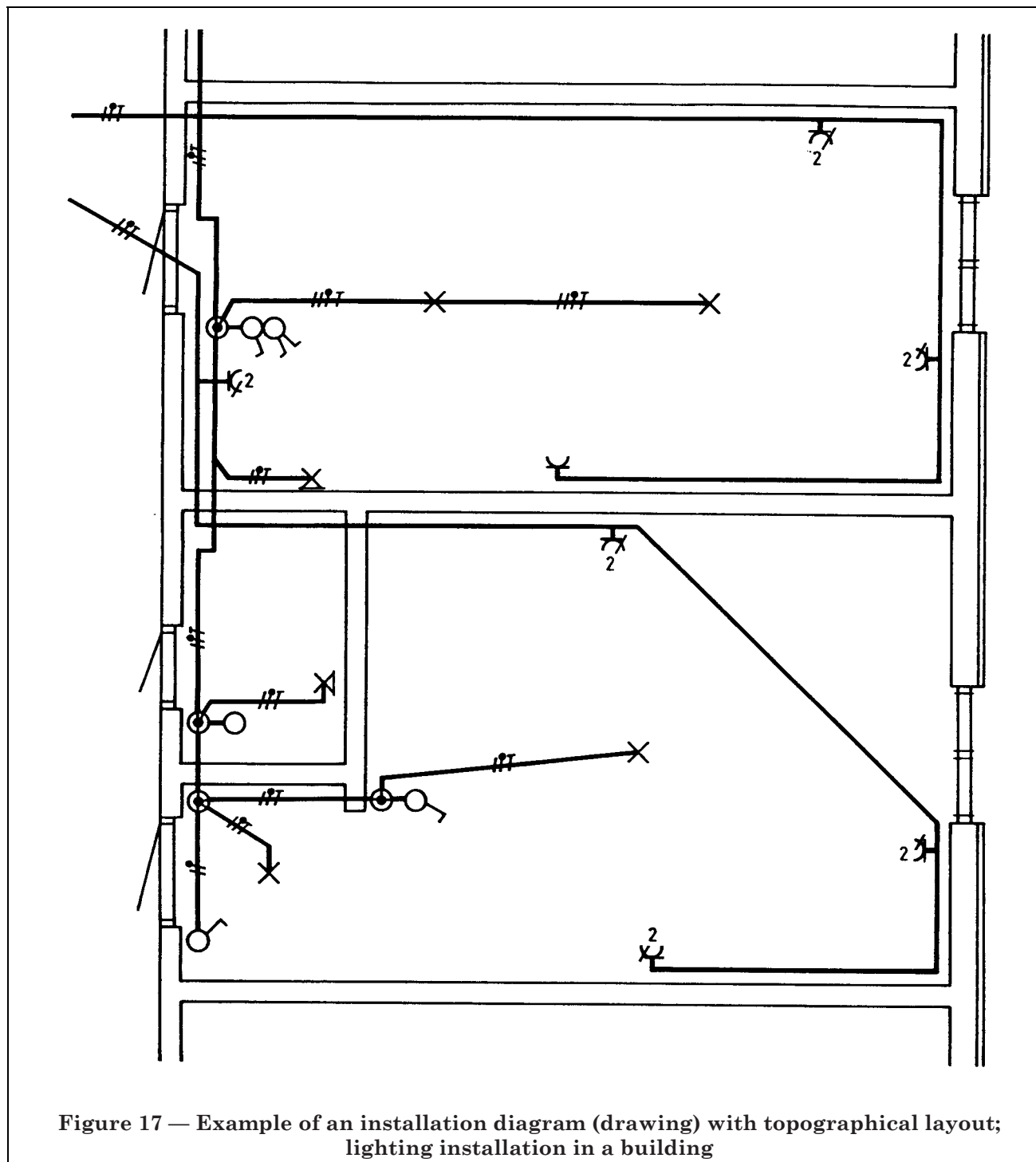


Figure 17 — Example of an installation diagram (drawing) with topographical layout; lighting installation in a building