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# Australian Standard
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1989 ed.

# GRAPHICAL SYMBOLS FOR GENERAL ENGINEERING
# MACHINE ELEMENTS



**1101 Graphical symbols for general engineering**
**Part 4—1989 Machine elements** A4 31pp G
*(In Update Service 56)*

Establishes the graphical symbols for machine elements for kinematic diagrams for use in all branches of industry. Definitions of key words used in this field are also given. The symbols are given in sections including those for motion of links, links and connections of their components, kinematic pairs, linkages and links, friction and gear mechanisms, cam mechanisms, Geneva and ratchet mechanisms, couplings and brakes, and miscellaneous mechanisms and their components.

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Association of Consulting Engineers, Australia

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AUSTRALIAN STANDARD

# GRAPHICAL SYMBOLS FOR GENERAL ENGINEERING

# Part 4 MACHINE ELEMENTS

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# PREFACE

This standard was prepared by the Association's Committee on Technical Drawing. To a large extent it is an endorsement of ISO 3952/3, Kinematic Diagrams—Graphic Symbols. Symbols described in Section 2 are identical with those internationally agreed within the ISO.

This standard gives the definitions and symbols recommended for use in engineering drawings involving machine elements and kinematic diagrams. It also describes basic symbols and the principles on which they are based and illustrates some representative examples of complete kinematic diagrams. Composite symbols can be devised by a combination of basic symbols. Symbols are identified by a basic 4 digit number (with extensions where appropriate), which includes the number of this Part, the number of the relevant table, and the number of the symbol itself.

This standard makes reference to the following Australian standards:

AS 1100 Drawing Practice
Part 1—Definitions
Part 2—Abbreviations and Symbols

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STANDARDS ASSOCIATION OF AUSTRALIA

# Australian Standard
# for
# GRAPHICAL SYMBOLS FOR GENERAL ENGINEERING

## PART 4—MACHINE ELEMENTS

## SECTION 1. SPECIFICATION

**1.1 SCOPE.** This standard establishes the graphical symbols for machine elements of kinematic diagrams for use in all branches of industry. Its purpose is to simplify the preparation of such diagrams and facilitate their execution and understanding. The symbols established by this standard are suitable for use in technical documentation, as well as in technical and educational literature.

**1.2 DEFINITIONS.** For the purpose of this standard, the following definitions apply:

NOTE: For definitions applicable to general drawing practice see AS 1100, Part 1.

*Cam*—a member (in a mechanism) which, by means of a profile on it engaging a follower, can convert an input motion, usually a steady rotation, to an output motion, usually either oscillating or reciprocating.

*Clutch*—a form of shaft coupling designed for quick and frequent engagement or disengagement.

*Coupling*—the whole combination of component links and pairs serving to connect two members together in such a way as to allow a certain prescribed freedom of movement between them.

*Crank*—an arm, integral with a rotating shaft, carrying at or near its outer end a kinematic pair so that, by means of other jointed members, a rotating input can be converted to an output, usually either oscillating or reciprocating; or *vice versa*.

*Degree of freedom*—when applied to a rigid body or mechanism under some form of constraint, the degrees of freedom are equal to the number of additional parameters required to locate the body or mechanism in a given frame of reference.

*Dwell*—a member in a mechanism or machine undergoes dwell when, during regular motion, it remains stationary for a substantial portion of the cycle of its movement.

*Gear*—a rotatable toothed machine element used to transmit motion (usually between two rotating shafts) to another toothed machine element by successively engaging teeth.

*Higher pair*—a kinematic pair in which the contacting elements on the two members (or links) are in general not congruent, the contact between elements accordingly being at a point (or points), along a straight line (or straight lines), or along a curve (or curves).

*Kinematics*—that branch of mechanics which is limited to a study of displacements in a mechanism together with successive derivatives (most commonly velocities and accelerations, both relative and absolute) of components of the mechanism.

*Kinematic pair*—a joint (between two links) provided by physical contact between specified regions of the surfaces on the two members.

*Link*—a member (usually rigid) connected or in contact with other members (links) in a mechanism.

*Link mechanism*—a system of links whose function is to transmit, control or constrain relative movement.

*Lower pair*—a kinematic pair in which the contacting elements on the two members (or links) are substantially congruent over the regions of contact thereby allowing surface-contact over regions of the elements.

*Oscillating motion*—motion back and forth between limits about a pivot (turning pair).

*Pawl*—a pivoted catch, engaging with a ratchet wheel or rack to prevent reverse motion, or to convert its own reciprocating motion into an intermittent rotary or linear motion.

*Ratchet*—a wheel which has regular teeth (usually 'saw-teeth' which are steeper at the trailing face than at the leading face), enabling it to be turned intermittently through the medium of a pawl which remains in contact with the ratchet wheel.

*Reciprocating motion*—rectilinear motion, back and forth between limits.

**1.3 ABBREVIATIONS.** Where brevity and conservation of space are necessary, abbreviations may be used in accordance with AS 1100, Part 2. Terms should not be abbreviated where their use may lead to misinterpretation or confusion.

**1.4 ALTERNATIVE SYMBOLS.** Where alternative permissible symbols are specified, only one form of the symbol shall be used on a particular diagram or series of drawings.

**1.5 PROPORTION AND SIZE OF SYMBOLS.** The proportions and relative sizes of symbols should conform to the symbols shown in Section 2 except where it is desirable or necessary to vary the proportion or relative size to give a symbol prominence or for space limitations or other appropriate reason. Where the proportions or relative size of a symbol varies, the degree of variation shall be such that the symbol remains unique and readily recognizable.

NOTE: Precise dimensions and proportions of graphical symbols are difficult to specify. The size of the symbols and characters used in this standard is regarded as the minimum desirable for reproduction. The size of the symbol used will depend on the size and detail required in the drawing.