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Guide to

Format and content of manuals on operation and maintenance for earth-moving machinery

[ISO title: Earth-moving machinery — Operation and
maintenance — Format and content of manuals]

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- Associated Offices Technical Committee
- Construction Industry Training Board
- Construction Plant-hire Association
- Department of Trade and Industry (Mechanical and Electrical Engineering Division)
- Federation of Civil Engineering Contractors
- Federation of Manufacturers of Construction Equipment and Cranes
- Health and Safety Executive
- Institution of Civil Engineers
- Institution of Highways and Transportation
- Ministry of Defence
- National Coal Board
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National foreword

This British Standard has been prepared under the direction of the Road Engineering Standards Committee and is a revision of BS 6228:1982, published to take into account minor editorial changes made in the 1984 edition of ISO 6750 “*Earth-moving machinery — Operation and maintenance — Format and content of manuals*” published by the International Organization for Standardization (ISO). This revision of BS 6228 thereby remains identical with ISO 6750 and the 1982 edition of BS 6228 is superseded and withdrawn.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Cross-references

International Standards	Corresponding British Standards
ISO 4510:1976	BS 5485:1977 <i>Specification for maintenance and adjustment tools for earth-moving machinery</i> (Identical)
ISO 6165:1978	BS 5718:1979 <i>Glossary of terms for basic types of earth-moving machinery</i> (Identical)
ISO 6405:1982	BS 6309:1982 <i>Specification for symbols for operator controls and for controls other than operator controls for use in earth-moving machinery</i> (Identical) BS 6295 <i>Dimensions and symbols for earth-moving machinery</i>
ISO 6546-1:1982	Part 1:1982 <i>Glossary of terms for base machine</i> (Identical)
ISO 6746-2:1982	Part 2:1982 <i>Glossary of terms for equipment</i> (Identical)
ISO 6749:1984	BS 6197:1985 <i>Methods for preservation and storage of earth-moving machinery</i> (Identical)

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, pages 1 to 16, 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.

0 Introduction

In preparing this International Standard consideration has been given to the fact that drivers, operators and mechanics may have received only a short training in a language in which they are not proficient.

A manual shall therefore

- a) be simple to understand and have adequate explanatory notes;
- b) incorporate the use of internationally recognized symbols;
- c) be easy to use, compact and made of durable hard-wearing material.

1 Scope and field of application

This International Standard establishes guidelines on the general rules necessary for the preparation and presentation of manuals for earth-moving machinery as defined in ISO 6165.

2 References

ISO 4510, *Earth-moving machinery — Maintenance and adjustment tools*.

ISO 6165, *Earth-moving machinery — Basic types — Vocabulary*.

ISO 6405, *Earth-moving machinery — Symbols — Operator controls and others*.

ISO 6746, *Earth-moving machinery — Commercial nomenclature — Definitions of dimensions and symbols — Part 1: Basic machines — Part 2: Equipment*.

ISO 6749, *Earth-moving machinery — Preservation and storage*.

3 Presentation of manuals

3.1 General

The presentation of the manuals is important. They are working tools which should be both convenient and complete.

The text shall be simple and adapted to the category of individuals who will use the manuals with all information being explicit and comprehensive.

The words used shall be explained or defined each time if there is a risk of misunderstanding.

Illustrations, diagrams, graphs and tables shall be used in preference to written text. They shall be clear, simple and be placed adjacent to the corresponding reference.

The terms, definitions, units and symbols shall comply with the relevant International Standards.

Prominence shall be given to safety in operation, routine servicing and maintenance, and field and workshop repairs. All information related to personnel safety should be in bold type and identified by the ISO warning (safety alert) symbol.

Items for the manuals may be included or deleted at a manufacturer's discretion, relative to an individual type of machine and its application.

3.2 Number of books

The manuals should be published as one or more books. A typical arrangement would be:

— Operator manual:	contains those items pertinent to the starting, stopping and operation of the machine.
— Lubrication manual:	contains those items pertinent to the selection and application of fuels, coolants, and lubricants essential to the proper operation of the machine.
— Maintenance manual:	contains those items pertinent to cleaning, replacing, and adjusting that would normally be carried out at the work site.
— Parts manual:	contains the identification of all items supplied as replacement parts.
— Workshop manual:	contains those items pertinent to the removal, disassembly, repair, installation and testing of all machine components that would normally be carried out in a workshop.
— Specification manual:	includes all relevant dimensions and technical data.

The choice of the volume and grouping of the books should be suitable for the type of product, its normal application and personnel requirements. It is often appropriate to split the maintenance and lubrication manuals into sections dealing with individual systems.

While the majority of earth-moving machines are delivered to site ready to work, there are some machines (for example, large hydraulic excavators and heavy bulk haulage units) that involve substantial on-site erection/assembly. For these machines a separate erection manual is recommended.

3.3 Size of books

The pages shall be easily readable and adequately illustrated. Recommended size is A4: 210 mm × 297 mm (8 1/2 in × 11 in). Where appropriate, a smaller sized book may be used.

3.4 Cover of the manuals

The cover and the pages of the manuals shall preferably be made of a material which resists the action of oil, lubricants or water. The cover shall be of an appropriate size to protect the internal pages.

3.5 Preliminary information

The following information shall be given on the front or back cover, or on the first pages of the manuals:

- a) title of manual;
- b) reference number of manual;
- c) designation (type) of machine;
- d) type (model) and/or series of machine;
- e) serial number or numbers of machine, or where appropriate, range of serial numbers covered;
- f) year of manufacture (where appropriate);
- g) name and full address of manufacturer and/or distributor;
- h) table of contents;
- j) alphabetical index may be given at the end of the manual (optional).

4 Contents of the operator manual

This manual shall cover at least the topics specified in 4.1 to 4.4.7. Where appropriate, cross-reference to other parts of the manuals should be made so that the same information is not repeated unnecessarily.

4.1 Machine data

The following information relevant to operation of the machine shall be included:

- a) a general view of the machine and its attachments (drawings or photographs) of sufficient size to be quite clear, showing nomenclature of major components, their functions, locations and relationships with the whole machine (lubrication, filling and drain points are included in the lubrication manual; see 5.2);
- b) operating instructions;
- c) the prime mover (power plant);
- d) illustration showing the location of the different serial numbers (chassis, engine, winch, etc.);
- e) the location of the hour-meter (illustration);
- f) layout of instrument panel and position of operator's controls (illustration).

4.2 General safety rules

Typical of the items which shall be included are the following:

- a) regarding the machine (for example, chocking the wheels, greasing shall not be carried out when the engine is running);
- b) regarding the site (for example, do not stop machine on a slope which is liable to collapse);
- c) regarding securing the machine to prevent accidental setting in motion, engine starting, etc.;
- d) regarding working clothes (for example, wear a safety helmet, do not wear oil stained or damaged garments).

4.3 Operator's controls

The following information shall be included:

- a) description of the operator's controls and direction of movement;
- b) layout of the controls with respect to the operator at his post;
- c) identification of instrumentation;
- d) identification of all symbols used (see ISO 6405).

4.4 Operation and use

4.4.1 General

The information given under this heading should be edited under the assumption that it may be read by an operator who has only recently completed his training. Therefore, repeat instructions generally considered as known, but easily forgotten, such as:

- a) do not rest your foot on the clutch pedal;
- b) do not speed engine when it is cold.

Earth-moving machinery is often exported and the risk exists that the manual will not be translated. Therefore, use a large number of photographs, diagrams and views in perspective to facilitate comprehension. Wherever possible, manuals should always be translated into the language of the country of use.

The information in 4.4.2 to 4.4.7 shall be included.

4.4.2 Commissioning, starting and stopping

Give all the useful information regarding the different preliminary checks, the instructions and the safety controls that must precede putting a new machine (or where applicable a used machine) into operation such as:

- a) list of the checks and verifications to be performed prior to starting the machine:
 - fluid levels and inspection for leaks;
 - loose, worn and missing parts;
 - removal of built-up material on tracks, axles, etc.;

- tyre pressure and condition of tracks, etc.;
- b) sequential order of operations to start the engine:
 - position of the controls;
 - starting the engine at various ambient temperatures and in adverse climatic conditions;
- c) sequential order of operations to stop the machine:
 - operations to halt machine;
 - operations to park machine (positions of controls and attachments);
 - period of idling;
 - operations to stop engine;
 - locking.

4.4.3 Daily operation

The role of different operating controls and how to use them, as follows:

- a) list of checks and verifications to be performed prior to operating the machine:
 - instrumentation checks (oil pressure, etc.);
 - warm-up;
 - functional checks (steering, brakes, etc.);
- b) list of checks and verifications to be performed while operating the machine:
 - instrumentation checks;
 - function of warning devices;
 - operator safety warnings;
- c) advice on efficient operation:
 - safety precautions (see 4.2);
 - selection of gears;
 - steering;
 - operation of attachments;
 - operation techniques;
 - stopping and parking;
 - operating adjustment (for example, dozer angle);
 - daily precautions after work.

4.4.4 Mounting and dismounting of equipment and attachments

Include only those items that an operator can handle. Attachments requiring the assistance of skilled workshop mechanics are included in the workshop manual (see clause 8):

- a) operation to be performed;
- b) necessary tool kit;
- c) precautions to be taken.

4.4.5 Movement of machine between work sites

Indicate matters of specific relevance, for example:

- a) driving on the road (for example, follow the traffic regulations with respect to construction machinery);
- b) method of loading and securing for transportation by road vehicle, railway truck or other modes of transport;
- c) method of slinging, including sling points;
- d) method of towing (see 6.4).

4.4.6 Special conditions of use

Emphasize precautions necessitated by hazards likely to be encountered, of which the following are typical:

- a) precautions to be taken during cold weather:
 - refer to lubrication manual regarding lubricants, hydraulic fluids, coolants, etc.;
 - special precautions (for example, electrical equipment, starting motor, etc.);
 - operations to warm up machine;
- b) precautions to be taken during hot weather;
- c) precautions to be taken for use in water, mud etc.;
- d) precautions to be taken for use in dusty atmospheres;
- e) precautions to be taken for other special conditions, for example, high altitude or corrosive atmospheres, etc.

4.4.7 Preservation and storage

Brief guidance shall be given to enable machine users to store machines for short periods in the field. Typical information would be:

- a) replace and secure all weatherproof covers;
- b) change all lubricants and fluids that may have deteriorated with use;
- c) check anti-freeze properties or drain fluid as appropriate;
- d) check that storage site is not subject to flooding or other natural hazards;
- e) wherever practicable run prime movers and operate all motions at regular intervals;
- f) for guidance on storage for longer periods, refer to ISO 6749.

5 Contents of the lubrication manual

This manual shall cover at least the topics specified in 5.1 to 5.4. Where appropriate, cross-reference to other parts of the manuals should be made so that the same information is not repeated unnecessarily.