

## **Foreword**

This standard is a revision of the Standard Administrative Order (SAO) 399:1980 – “Operator Manuals and Technical Publications for Agricultural Tractors and Machines”. The revision was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Enhancing the Implementation of AFMA Through Improved Agricultural Engineering Standards" which was funded by the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).

This revised standard was reviewed by the Technical Committee for Study 1- Development of Standards for Agricultural Production Machinery and was circulated to various private and government agencies/organizations concerned for their comments and reactions. This standard was presented to the Philippine Society of Agricultural Engineers (PSAE) and subjected to a public hearing organized by the National Agriculture and Fisheries Council (NAFC). The comments and reactions received during the presentation and public hearing were taken into consideration in the finalization of this standard.

This standard has been technically revised in accordance with PNS 01:Part 4:1998 - Rules for the Structure and Drafting of Philippine National Standards. The main changes are listed below:

- title of the standard has been modified in conformity to the format of International Standard; and
- detailed information on the contents and presentation of operator’s manual were included.

In the preparation of this standard, reference was made to International Organization for Standardization (ISO) 3600:1996 – Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Operator’s manuals – Content and presentation.

**Agricultural Machinery – Operator’s Manual – Content and Presentation**

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**1 Scope**

This standard gives guidance for the content and presentation of operator’s manual for tractors and machinery for agriculture.

**2 Definitions**

For the purpose of this standard, the following definitions shall apply:

**2.1****left-hand side**

for mobile machines, it is the side which is on the left when an observer is facing in the normal forward direction of travel of the machine; and for stationary machines, it is the side which is on the left when an observer is facing the machine

**2.2****right-hand side**

for mobile machines, it is the side which is on the right when an observer is facing in the normal forward direction of travel of the machine; and for stationary machines, it is the side which is on the right when an observer is facing the machine

**3 Content of operator’s manual****3.1 Identification of manual**

**3.1.1** Any document drafted in accordance with this standard shall be identifiable as the relevant manual for a specific machine.

**NOTE** This requirement can be achieved by including such information as the identity of the manufacturer, machine model, and publication name on the front cover of the manual.

**3.1.2** Each operator’s manual shall have its own part number and date of issue.

**3.1.3** Each publication should identify the following:

- the name and address of the manufacturer and/or distributor of the machine;
- the name and address of the importer of the machine (if imported);
- the model designation of the machine;
- the name or type of publication;
- the part number or publication number by which the manual may be ordered;

- the printing or publication date;
- the language in which the manual is written.

### **3.2 Categories of information**

**3.2.1** This standard covers all the information that the user of a machine will need. The information in the manual shall be organized in a logical sequence for easy understanding of the user.

**3.2.2** Operator's manual should give safety precautions, controls and operating instructions in the front portion. The extent of information provided will depend on the type of machine and the operator's needs.

**3.2.3** Where the work involved is complex, procedures that are performed only once (for example, initial set-up or installation) may be detailed in a separate publication.

### **3.3 Machine identification**

#### **3.3.1 Model designation and number**

This information enables the operator to identify readily the machine to which the operator's manual belongs.

#### **3.3.2 Serial numbers**

Information that enables the operator to locate and identify the whereabouts of serial numbers and/or codes of the major components of the machine, and any additional information necessary for initial communication with a dealer, shall be provided within the manual.

A section shall be provided in the manual to record this information, and it shall be completed at the time of delivery or installation.

### **3.4 Introduction**

**3.4.1** The introduction shall stress the importance of the information given in the manual.

**3.4.2** The introduction shall explain why the manual has been provided with the machine. It shall also provide the reader with any information that will help him to interpret the manual correctly.

**3.4.3** Each publication should contain a statement advising the reader where to get assistance if items covered in the publication are not understood.

**3.4.4** Attention shall be drawn to the use of the safety alert symbol to highlight information about potential dangers to the user.

### **3.5 Intended use**

This category shall inform the operator of the function for which the machine is designed and, where appropriate, draw attention to ways in which the machine should not be used. If the machine is designed for use in association with other machinery, the information shall state the type of machinery that is suitable for such use.

### **3.6 Content**

A content list shall be provided to identify the main categories of information in the manual and where they can be found. The content list shall be presented clearly and simply; it shall begin on a right-hand page. Page numbers for the beginning of each main category shall be clearly shown.

### **3.7 Safety notes and warnings**

#### **3.7.1 General**

This category shall draw the operator's attention to potential hazards associated with the use, movement, transport, cleaning, clearing blockages and maintenance of the machine. It is important also to state the precautions to be taken to minimize or avoid any hazards.

Safety information should also be included in other sections of operator's manual whenever an operating procedure may result in personal injury or damage to machinery if not observed carefully.

#### **3.7.2 Safety signs**

Safety signs that appear on the equipment shall be reproduced in legible size in the operator's manual, either in the appropriate section of the text relative to the point of use, or in the safety section, or in separate safety sign section. Text that explains the meaning of a safety sign should be included in the operator's manual if the safety sign itself does not contain a written message. A safety sign may appear in more than one section of the manual.

Other relevant information about safety signs includes:

**3.7.2.1** Information on the location of each safety sign on the machine or equipment;

**3.7.2.2** Instructions on the need to keep safety signs clear and visible on the equipment;

**3.7.2.3** Instructions to replace safety signs if they are missing or illegible;

**3.7.2.4** Instructions that new equipment components installed during repair shall include the current safety signs specified by the manufacturer and shall be affixed to the replacement component;

**3.7.2.5** Instructions on how to obtain replacement safety signs

#### **3.7.3 Hazards**

It is essential that any known hazards relating to the use of the machine, and any restrictions for its use by classes of persons (such as children) be clearly stated.

### **3.8 Operating information**

This category shall provide the operator with logical instructions for the effective operation of the machinery. Operating information should include the general specifications and description of the machine or equipment, identification of controls, instructions for proper operation of machine, and troubleshooting information. A performance curve (if applicable) shall be provided.

### **3.9 Accessories and attachments**

This category shall inform the operator of any choice of authorized accessories and attachments and how they affect the safety, operation, and maintenance of the machine.

### **3.10 Maintenance instructions**

#### **3.10.1 General**

This category shall provide information to the operator in light of the resources likely to be available to him. Maintenance instructions should be divided into logical groups appropriate to the machinery such as checks, inspections, and tests; other routine maintenance tasks; and fault diagnosis and correction.

The manual should be confined to maintenance tasks within the capability of the operator. Such tasks may include cleaning, clearing blockages, replenishment, lubrication, external visual examination, simple tests, and correction of minor deterioration.

The designer of the machinery should consider the maintenance work necessary to keep it running "as designed" and make a decision as to which information is to be included in the operator's manual and which information is more suited to a workshop or technical manual.

#### **3.10.2 Maintenance schedules**

Where maintenance tasks are required to be carried out at specific intervals (such as time, distance, running hours, completed operations) they should be summarized in tabular form with further details, if necessary, in the text. Where maintenance times vary according to individual conditions of operation (such as checking and replenishing coolant) this should be stated.

#### **3.10.3 Specialized tasks**

Where maintenance tasks require specialist knowledge or resources, this shall be stated. If any work carried out by an authorized person would affect the warranty on the machinery, it is important that this be stated.

#### **3.10.4 Details of maintenance work**

The instructions for each task should include details of dismantling and reassembly procedures and identification of replacement parts, materials, tools, test equipment and services required. It is important that the warnings of the possible hazards and information about safety precautions are given. For example, if a ballasted rear wheel is to be removed from a tractor, there is a potential stability hazard both during removal and subsequent temporary storage; the manual should identify this potential hazard and give instructions for safe removal of the wheel and its temporary storage.

### **3.11 Storage**

This category shall provide the operator with instructions and information, including precautions to be taken and any tools or special equipment required, to prepare the machinery for storage. A list of storage requirements should be provided, including information about supplies and services needed, periodic inspections, tests, limitations on storage life, etc. Procedures for preparing the machinery for use after storage should also be given.

### **3.12 Handling, reception, transportation, assembly and installation**

#### **3.12.1 General**

This category shall contain technical information and instructions for handling, reception, transportation, assembly, installation, and initial set-up of the machinery (unless this will be carried out by the dealer).

It should also describe machine disassembly for transport and subsequent reinstallation in another location or different environment.

Information on handling, reception, transportation, assembly, and installation may be either contained in a separate publication or included in the operator's manual. A separate publication is usually appropriate for more complex machines.

#### **3.12.2 Reception**

Unpacking instructions should be given and attention drawn to any specific points that need care or special treatment, unless this will be carried out by the dealer. Lifting points, slings, spreaders, etc. should be specified.

#### **3.12.3 Transportation**

Instructions for preparing the machinery for transportation, including precautions and information about the tools required, should be included. A list of requirements should be provided and procedures for preparing the product for use after transportation should be given.

#### **3.12.4 Installation**

Detailed instructions should be given about the operations necessary to install the machine and to bring it to full working condition. Where necessary, reference should be made to performance specifications and to acceptance inspection and testing. Externally provided services (such as air, electricity, gas, water, and fuel) should be specified and methods of connections detailed. It is important to emphasize any precautions that must be taken before connecting services.

### **3.12.5 Initial set-up**

Procedures for the initial set-up of the machine should be detailed in full. Any special tools or testing and calibration equipment should be listed.

### **3.12.6 Environment**

The required environment for handling, installation and storage should be stated.

### **3.12.7 Hazards**

It is important that specific notes on hazards and safety precautions should be included where appropriate. If applicable, information on fire prevention and chemical or other contamination should be included.

## **3.13 Specifications**

This category shall include all relevant dimensions and technical data necessary to assist the operator achieve a higher standard of operational performance and reliability. Where applicable, the relevant national or International Standards to which the machine or its component parts have been built should be stated.

If two or more machines are linked to form a system in which their functioning is interdependent, the technical specifications of the interface should be provided.

## **3.14 Dismantling and disposal**

This category shall inform the operator of the action to be taken on the completion of the useful life of the machine or its parts, with instructions on dismantling and disposal. It is essential to include warnings of any hazards and safety precautions to be taken during dismantling and disposal.

## **3.15 Warranty**

It is important that manufacturers draw the operator's attention to any action which may invalidate the warranty.

## **3.16 Alphabetical index**

A document of more than 32 pages should have an alphabetical index. The index should be placed at the end of the manual.

### **3.17 Parts list**

**3.17.1** Where no separate parts list or catalogue exists, a parts list shall be included within the operator's manual. When included, a parts list should contain sufficient information (such as part number and description) for each item so that the correct replacement part can be obtained. Sources of supply should be indicated. Ratings, dimensions, and recognized standards should be quoted for items such as bolts, nuts, seals, and O-rings.

**3.17.2** Parts lists should indicate those replacement assemblies, and parts which the operator is expected to identify. Parts lists should be illustrated, where applicable, or refer to suitable illustrations elsewhere, so that each item can be located. If it is impossible or inadvisable to dismantle an assembly or to replace an individual part of an assembly, the constituent parts should not be listed.

## **4 Presentation of operator's manual**

### **4.1 General considerations**

This clause provides guidance on presentation which is applicable to operator's manual.

#### **4.1.1 Paper size**

A5 format is suitable for most cases, although 1/3 A4 format is adequate for simpler machinery and equipment. A4 format is recommended for complex machines to allow coverage with an acceptable number of pages. A4 format is also suitable for static equipment where there is no storage problem.

NOTE A5 (210 mm x 148 mm) and A4 (297 mm x 210 mm)

#### **4.1.2 Protection**

For initial shipment, the manual should be sealed inside a transparent, water-and-oil-resistant plastic envelope.

#### **4.1.3 Front cover**

The front cover should be made from a stiff, durable material, and be the same size as the pages of the manual. A cover of greater stiffness than the pages is generally appropriate, although a paper cover of the same stiffness as the pages is acceptable for small manuals.

#### **4.1.4 Rear cover**



The rear cover should be of the same material and size as the front cover. If appropriate, there should be a pocket inside for storage of a separate parts list.

#### **4.1.5 Binding**

Any type of binding which provides substantial anchorage for the pages, while allowing the text to be accessed without damage, may be used.

#### **4.1.6 Divider leaves**

Major subjects or categories of information may be conveniently indicated for rapid reference by divider leaves, which may be ordinary card or printed in color to attract attention.

#### **4.1.7 Notes**

One or two blank pages at the back of the manual for notes on individual conditions are always useful.

### **4.2 Presentation of the text**

#### **4.2.1 General**

The manual should be written in a style and language which can be readily understood by the operator. Manuals shall be available in the language of each country where the machine is sold.

Where the manufacturer presents instructions concurrently in more than one language, the number of languages should be restricted to allow easy use of the manual. The number of languages to be presented depends upon the complexity of the machine. The more complex the machine, the fewer languages should be used. Manuals may be translated to different dialects.

#### **4.2.2 Author**

The author could be generally conversant with agriculture and engineering but need not be an expert on the machine in question. He or she should have some knowledge of technical writing principles. It is also useful if the author has operated the machine or is otherwise familiar with its operation.

#### **4.2.3 Level of text**

When developing the text, it should be assumed that the reader (operator) has only minimal prior knowledge of the machine and its operation.

#### **4.2.4 Style of text**

Text should be brief and simple. Related data should be grouped together in a logical order. Sentences should be short and direct. References to time intervals should be specific. Paragraphs should be short and relate to one topic only; accepted standards of grammar and usage should be maintained.

Instructions should be positive and given in the imperative. Extensive use of negative statements is not good practice psychologically; negatives should therefore be used only sparingly. The active voice should be used for descriptive discussion.

#### **4.2.5 Checking**

The draft should be carefully checked for typographical errors, technical accuracy, and ease of understanding.

### **4.3 Typographic design**

#### **4.3.1 General**

Page layout should be designed for easy reading. Line length and type size are interrelated.

#### **4.3.2 Paper**

The paper should be good quality white paper that is sufficiently opaque to prevent information printed on one side of the sheet from making information printed on the other side difficult to read.

#### **4.3.3 Color**

Where colored paper is used, the contrast between the paper and the ink should not be appreciably less than that provided by black ink on white paper. Where colored inks are used, consideration should be given to the relationship with the color of the paper, the increased cost, and the effect on methods of reproduction.

#### **4.3.4 Reproduction**

Reproduction copies should be clean, clear, and durable. Such copies may be produced by lithography, by xerography, by laser printing or by letterpress. Inks should produce a dense, sharp image.

#### **4.3.5 Type size**

Ideally, the type size should be such that the main text will not be less than 10 points.

#### **4.3.6 Margins**

The margins should be wide enough to allow for binding. Inner margins (left-hand on odd-numbered pages, right-hand on even-numbered pages) should be 10 mm to 15 mm to allow clear readability when the bound manual is open. Outer margins (right-hand on odd-numbered pages, left-hand on even-numbered pages) should be sufficient (6 mm to 10 mm) to ensure that page content is not cut during the printing and binding process. Top and bottom margins should be equal to inner margins.

#### **4.3.7 Columns**

Text on A4 format paper should usually be presented in a single column. On larger page sizes, two columns should be used, although a single-column format is also acceptable.

#### **4.3.8 Headings**

Headings should be used consistently throughout the manual to provide a systematic method of presentation. Headings should be in larger type size than the text and in a bolder typeface or an alternative color. Levels of headings can be differentiated by the use of varying weights or typographical fonts, upper case and lower case letters, and by underlining. To avoid confusing the reader, the number of levels should be kept to a minimum; normally three levels are sufficient.

### **4.4 Text conventions**

#### **4.4.1 General**

Consistent forms of language, spelling, numbering, symbols, etc. shall be used throughout the manual.

#### **4.4.2 Terminology**

Terminology should be consistent throughout the manual. Names and part numbers shall be used consistently in all technical information. Technical terms that require specialized knowledge should be avoided except where no other terms convey the intended meaning.

If a manual uses an appreciable number of words, phrases, or abbreviations that may be unfamiliar to the reader, a glossary should be provided or reference made to appropriate documents. Alternatively, if only a small number of terms are used, explanatory notes may accompany the first use of each term, either in parentheses (round brackets) or as a footnote.

#### **4.4.3 Glossaries, abbreviations, signs and symbols**

Glossaries should explain words or phrases that may be unfamiliar to the reader and needs a specialized knowledge. Abbreviations should not be used unless a list of those used, together with their meanings, is included. Abbreviations should terminate in a full stop. Symbols for units of measurement shall remain the same in both singular and plural forms and shall not be followed by a full stop except at the end of a sentence.

#### **4.4.4 Upper case letters**

Words set in upper case letters should be used sparingly. It is usually better to use bold lower case letters to emphasize key words or phrases. When referring to controls which have identifying titles on them (for example, STOP control) then upper case letters can be used.

#### **4.4.5 Spelling**

Spelling should conform to standard practice for the language in which the manual is published and should be consistent throughout the manual.

#### **4.4.6 Measurements and quantities**

All measurements and quantities should be expressed in the International System of units (SI units) followed, where appropriate, by an equivalent alternative in parentheses.

#### **4.4.7 Numbers**

All numbers shall be written in Arabic numerals. The only exception is when a sentence starts with a number; in such cases, the sentence should be reordered to move the number from the beginning of the sentence, or, if this proves impossible, the number may be expressed in words.

Numbers consisting of more than four digits (except dates) should be shown in group of three, counting from the decimal marker to the left: for example, 21 000. This practice will void confusion in areas where a comma is used as a decimal marker.

#### **4.4.8 Left-hand and right-hand**

Left-hand and right-hand should not be abbreviated in the text, except in charts. For static or unusual equipment, these terms should be defined. Clockwise and counterclockwise require an explanation of the direction of view.

### **4.5 Illustrations**

#### **4.5.1 General**

Illustrations with supporting text are, in general, a “user-friendly” way of presenting technical information; good illustrations provide relief in what may be a difficult document for the reader.

When a manual is likely to be translated into a foreign language, it is important that no words appear on the illustrations. Use numbers, letters or symbols on the illustration, with an explanation for each number, letter or symbol used in the text of the manual.

Illustrations should be provided with a descriptive caption. Illustrations should be as simple as possible with no superfluous information.

Illustrations should be reviewed in detail for consistency throughout the manual and for agreement with general engineering and technical writing practices.

Where an illustration appears in the text of a manual, it should be referred to as a “figure”. Components should be identified in illustrations by numbers or letters, which can then be referred to in the text.

#### **4.5.2 Position**

Illustrations in the body of the text should be either adjacent, or as close as possible, to the related text. If repeated reference to a diagram is made from different parts of the text, consideration should be given to the use of a foldout diagram. Where possible, illustrations should be presented in portrait format for easy reading. If, because of its size, an illustration is presented in landscape format, then the top of the illustration should be on the left side of the page.

#### **4.5.3 Use of color**

Color should be used only if it is necessary to clarify complicated diagrams. Techniques such as shading, cross-hatching, and screening should be used in preference to color. If color is used, primary colors are preferable. If black-and-white illustrations in a manual appear in colored form elsewhere (for example, in colored wall charts or transparencies) the manual should make use of distinctive shading patterns to delineate the different colors consistently.

#### **4.5.4 Limitations of color**

Color blindness, microfilming, photocopying, possible confusion of colors when seen in poor or colored light, cost and difficulties of reproduction should be taken into account when the possibility of using color is considered. These considerations apply particularly to safety notices.

#### **4.5.5 Clarity**

Simple line illustrations or good quality photographs provide the best clarity of reproduction. Shading should be used only if it contributes to the information given in the drawing; decorative shading should be avoided.

#### **4.5.6 Scale**

If an indication of scale is required, it should be given in a form which is independent of the reproduced size of the drawing. It is sometimes possible to indicate scale by including in the illustration a ruled measure or some object of known size.

#### **4.5.7 Balance between text and illustrations**

Illustrations and text should complement each other and should be prepared together to shorten and simplify the subject matter. Illustrations should always appear adjacent to the related text.

A modular approach may be used which links text and illustrations closely together in logical blocks, groups, or modules, each covering one topic.

#### **4.5.8 Charts**

Information which is required frequently, or which is easier to explain in flow form should be included as charts. These should be accompanied by a glossary of abbreviations, symbols, and any unfamiliar terms.

#### **4.5.9 Tables**

Tables should be presented with the minimum number of lines required for clarity. Tables should preferably appear at the appropriate point in the body of the text. Alternatively, tables may be collected together at the end of the relevant text or form a separate supplementary document. A title and number shall be provided for each table.

### **4.6 Instructions**

#### **4.6.1 General**

Instructions identified as WARNING, CAUTION, and IMPORTANT should be used to emphasize important points in the manual. WARNING and CAUTION are used for safety-related information where personal injury may be involved. IMPORTANT is used for instructions when machine damage is involved. "NOTE" is used for supplementary information.

#### **4.6.2 Warning and Caution**

Instructions identified as WARNING and CAUTION emphasizes important safety points where personal injury may be involved. These instructions call attention to instructions which need to be followed precisely to avoid a hazardous situation.

WARNING and CAUTION instructions should be placed immediately before the text to which they apply and should be signaled in the left-hand margin by the safety alert symbol. These instructions should be placed in prominent positions that relate directly to any illustrations to which they apply. The appropriate heading should always be included and set in bold upper case type.

#### **4.6.3 Important**

Instructions identified as IMPORTANT call attention to instructions which must be followed precisely to avoid damaging the product, process, or its surroundings.

These instructions should be worded or located to indicate their point of application and be set to the same measure (column or page width) as the related text. The heading should always be included and set in bold type.

#### **4.6.4 Notes**

Instructions identified as NOTE present supplementary information. These instructions should be worded or located to indicate their point of application and be set to the same measure (column or page width) as the related text. The heading should always be included and set in bold type.

### **4.7 Numbering of pages, figures and tables**

#### **4.7.1 General**

Arabic numerals should normally be used for all numbering of pages, figures, and tables within the manual. Blocks of text (such as clauses and subclauses, divisions and subdivisions, or paragraphs and subparagraphs) may also be numbered.

#### **4.7.2 Page numbering**

Page numbers should be visually separate from the text. The numbering system should be designed to make selection of the correct page as simple as possible. In short manuals, pages should be numbered consecutively throughout the manual. In long manuals, pages should be numbered consecutively within each main division. It may be helpful to identify pages by the number of the main division followed by a hyphen and then the page number: for example, “Page 7-12” is the twelfth page of section 7.

#### **4.7.3 Numbering of figures and tables**

Figures, tables, and other non-textual material should be cross-referenced to the corresponding text to eliminate confusion. If such cross-referencing cannot be achieved, figures and tables should be numbered consecutively in the same manner as pages. In other words, if each section is page-numbered separately, the first figure in section 1 should be “Figure 1-1”; the third figure in section 2 should be “Figure2-3”, and so on. Figure and table numbers should have a prefix (“Figure” or “Table”) to distinguish them from page numbers.

### **4.8 References and index**

#### **4.8.1 References**

Different sequences of numbering should be used for footnotes and for references cited in the text: for example, letters or symbols for one and numerals for the other. Reference numberings, letters, and symbols should be printed as superscripts or, if on the line, in parentheses or square brackets immediately following the relevant word or phrase in the text.

#### **4.8.2 Index**

The index should include all major topics covered by the manual and indicate the page number where the indexed information is located.