TECHNICAL WRITING
STYLE GUIDE

This handbook is approved for use by all departments and agencies of the Department of Defense.

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Section 1
INTRODUCTION

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How to Use This Style Guide	1	Scope	2

OBJECTIVES AND PURPOSES

This *Technical Writing Style Guide* complements the *Technical Manual Writing Handbook*.

This Style Guide is intended to:

a. Provide an authoritative guide to technical writing style.

b. Include only the most important technical writing style information with emphasis on areas where errors are frequently made.

c. Be easy to read, understand, and use.

The Style Guide does not supplant the official specifications nor any of the standard authorities that apply to instructional technical writing: its rules and suggestions supplement these general-type references by describing specialized applications of established principles, and by making orderly choices among the variations of style found in approved usage.

HOW TO USE THIS STYLE GUIDE

This Style Guide has been prepared using the principles, methods, techniques, and styles recommended both by it and the Handbook.

a. Each topic or subtopic is presented in a one- or two-page module, where possible.

b. Subtopics in each section are positioned as nearly as possible in alphabetic order for ease of location. For example, in section 9, in use of abbreviations or symbols, ditto marks are found before temperature symbols.

c. A concise and to-the-point style is used.

d. Examples of both good and bad usage are provided to clarify borderline cases.

e. Special lists provide ready references. An index to these lists is located inside the front cover.

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f. *Indexing and accessing features* used in this Style Guide allow information to be found quickly:

- Front cover index alined with bleed-to-edge locators for sections
- Overall table of contents that shows scope and organization
- Detailed section table of contents for convenient local use with each section
- Alphabetical subject index
- Index of reference lists located inside the front cover
- Metric conversion tables located inside the back cover
- Specific headings for topic and subtopic

Cross-references in sections, or to other sections, are kept to a minimum. All pertinent information is at one location.

h. Examples and illustrations are placed on the same, or a facing page, with the associated discussion. Page layout is for optimum usability.

i. Page numbering system identifies each page with section number and page number.

The following suggestions will help you use the Style Guide properly:

a. Don't expect this Style Guide to be a complete substitute for any required specification or standard.

b. If a desired rule isn't in one section, look in another applicable section; or look in the index under the most obvious keyword.

c. Look for the little things in using the rules and examples. Such things as precise word usage, proper capitalization, careful spacing, and accurate punctuation are highly important in technical writing.

USER PREREQUISITES

The manual writer must be familiar with the basic principles of modern standard English.

SCOPE

The Style Guide is not intended to be complete nor a comprehensive document on common English usage on any of the topics covered. It is intended only to highlight and summarize the important elements of *technical writing* style as compared to literary writing.

Don't expect to find, for example, all the correct uses of a colon - the Style Guide highlights only specialized uses of the colon valuable in technical writing. The Style Guide concentrates on problem areas in which frequent mistakes are made in technical writing.

Refer to the *U. S. Government Printing Office Style Manual* and any authoritative standard English composition text for additonal style principles.

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Section 2
WORDS

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Idioms and Jargon	1	Excessive Words	2
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Preferred Verbs	2	Use of Shall and Will	3
Words in Titles and Headings	2		

SIMPLE WORDS

Simple words are usually short words of few syllables. Use the simplest common words and phrases which convey the intended meaning.

Bad:	Better:
Atmospheric turbulence passing around the aircraft may affect the control surface.	Air turbulence affects control of the aircraft.

IDIOMS AND JARGON

Use idiomatic English in preference to formal English. Use the jargon of the user wherever it makes the material easier to understand and more interesting.

SPECIFIC WORDS

1. Use a word that is:

   Concrete rather than vague.
   Specific rather than general.
   Familiar rather than formal.

2. Replace vague or blanket words with more precise words. Avoid words or phrases that are subject to interpretation.

   EXAMPLES:

Poor	Better:
As required	hand-tighten
adequate	approximately 8 in.

3. Define key words that may be understood in more than one sense.

4. Guard against a word taking an unintended meaning in its context.

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PREFERRED VERBS

Avoid using verbs that are unfamiliar, vague, or that can be misinterpreted.

EXAMPLES:

Poor:	Better:
Ascertain light is off.	*Be sure* light is off.
Unlock parking brake.	*Release* parking brake.
Set the unit so that it can be seen.	*Position* the unit so that it can be seen.

WORDS IN TITLES AND HEADINGS

Do	*Avoid Using*
Use words that make titles and headings: Brief Accurate Definite (specific) Interesting	The word *General* The word *Miscellaneous* Other non-specific words in titles or headings.
EXAMPLES: Definite (Specific) Interior Painting Chassis dimensions	EXAMPLES: Indefinite (General) Painting General Details

TECHNICAL WORDS

Use only when no other wording conveys the precise meaning.

EXCESSIVE WORDS

1. Avoid wordy writing. It is usually bad writing!

2. Eliminate unnecessary verbs that say nothing

Poor:	Better:
Corrosion *encountered* in the bore interfered with the results *obtained*.	Corrosion in the bore interfered with the results.

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3. Save reader's time by avoiding trite phrases.

For Example:

Instead of	*Use*
For the purpose of	For
Furnish descriptive information	Describe
In the event that	When
Make application	Apply

PRONOUNS: It, This, etc.

1. When repeating a long technical term or word (part, process, principle, etc.) shortly after its first use, use *it, this item, this method,* etc., instead of the difficult or long term.

   Correct: The electrolyte should be checked. It should . . .

2. When using a multiword series, repeat only the distinguishing word or words instead of the total series for each repetition.

   Correct: Diphyenylamine is an *explosive stabilizer* that can be detected by a single test on an alcoholic extract. This *stabilizer* is very . . .

USE OF SHALL AND WILL

- shall - mandatory requirement
- will - mandatory requirement
- should - non-mandatory desire or preferred method
- may - acceptable or suggested method

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Section 3
SENTENCES

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CLARITY

1. Arrange the parts of a sentence so that the meaning is clear on first reading.

2. Make sentences:

   - short
   - simple
   - concise

3. Rewrite sentences that are:

   - confusing
   - awkward
   - illogical
   - obscure

4. Break up long, complex, straggling sentences into several short ones.

5. Don't include words, phrases or clauses that have no direct bearing on the principal thought of the sentence.

6. Don't combine unrelated thoughts in a single compound sentence.

SENTENCE CONSTRUCTION

1. Use one main thought per sentence. Link together several closely related elements in one sentence only if they advance a point or provide an explanation.

Poor:	Better:
Check for lube oil, grease, hydraulic fluid, fuel oil, and water leaks and if leaks are discovered, report condition to organizational maintenance.	Check for leaks of lube oil, grease, hydraulic fluid, fuel oil, and water. If leaks are found, report them to organizaitonal maintenance.

2. Indicate the coordinate rank of ideas by means of parallel structure.

Inconsistent:	Parallel: (Consistent)
Dented or crushed cartridge cases may cause them to jam in the chamber or *extracting problems.*	Dented or crushed cartridge cases may jam in the chamber or *fail to extract.*

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During inspection, look for dents, cracks, burrs, *complete* assemblies, and foreign materials.	During inspection, look for dents, cracks, burrs, *incomplete* assemblies, and foreign materials.

3. Locate modifiers close to the word or phrase they modify. Arrange them in logical order to help the reader know, as he reads, what the modifier applies to. Start with what the reader needs to know first or must remember to enable him to understand the sentence.

Poor:	Better:
The blade should be rotated 360 degrees in a horizontal position slowly inside the turret mount of the forward power station, to engage the rotor.	To engage the rotor, the blade should be rotated slowly 360 degrees in a horizontal position inside the turret mount of the forward power station.
The machinery space lights are controlled by two switches port and starboard near the access ladder.	The machinery space lights are controlled by two switches, one near the port side of the access ladder and one near the starboard side.

4. Make sure the antecedent of a pronoun is immediately clear.

Vague:	Clear:
After connecting the jumper to the relay socket, remove it.	. . . remove the relay.

5. When a noun sequence contains words which look like verbs (but aren't), use *the* or some other construction so the reader understands the word is a noun or adjective.

Confusing:	Better:
Disconnect shaft assembly and intermediate gear box are secured by a disconnect coupling.	The disconnect shaft . . .

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Section 4
PARAGRAPHS

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CONTENTS

1. Each paragraph should deal with only one idea.
2. Include in each paragraph only as much as the reader can easily grasp.
3. Keep paragraphs short - three to five sentences.
4. Use concrete details to make a paragraph interesting and effective.

ORGANIZATION

1. Organize each paragraph around a topic sentence which gives the main idea of its contents.

2. Write sentences in paragraphs in logical order, so the thought progresses logically as the user moves from one sentence to another and from one paragraph to another.

3. Avoid breaking a paragraph down beyond the third subdivision. Breakdowns beyond this get too far from the main paragraph heading and make it hard for the user to understand the organization and subordination.

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Section 5
GRAMMAR

1. Make each verb agree with its subject in number.

   Examples:

   Correct: *A series* of tests *was* completed.
   Correct: *Two assemblies* of the radio *were* removed.

2. Use the active verb form (voice) rather than the passive.

Weak:	Better:
A singular verb *is used* with a singular subject.	*Use* a singular verb with a singular subject.
This procedure *is applicable.*	This procedure *applies.*

3. Use the passive voice properly when:

   a. The object or receiver of the action of the verb is more important than the doer.
   b. The doer of the action is not known.
   c. The emphasis is to be placed on the receiver instead of the doer.

Weak:	Better:
Excessive voltage can ruin the blower motor.	The blower motor can be ruined by excessive voltage.
Three heavy brackets pin down the casing on . . .	The casing is pinned down by three heavy brackets on . . .

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Section 6
PUNCTUATION

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PUNCTUATION RULES

1. Plan word order to require a minimum of punctuation.

2. Use punctuation to aid reading and prevent misreading.

3. When extensive punctuation is necessary for clarity, rewrite the sentence.

APOSTROPHE

Use an apostrophe to indicate:

a. The possessive form of nouns.

EXAMPLE:

The company's proposals were well received

b. Plurals of letters, numerals, and symbols.

EXAMPLES:

7's *'s

a's TO's

BRACKETS

Do not use brackets to avoid parentheses within parentheses in typewritten copy. Rewrite the sentence.

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COLON

Use a colon, if desired, to indicate subtitles.

EXAMPLES:
4-34. LUBRICATION: 156-45-001-A UNIT.

4-35. LUBRICATION: 156-45-001-B UNIT.

Use a colon to indicate material to follow - do not use a semicolon.

COMMA

Use commas

a. Before *and* or *or* in a series of three or more.

EXAMPLE:
a, b, and c

b. To separate five or more digits.

EXAMPLES:
14,560
234,095

c. After introductory phrases and clauses when necessary for clarity or ease of reading.

EXAMPLES:
Using a special tool SP1145-56-02, turn the adjustment arm precisely to the inscribed "O" mark.

In general, applications of this ingenious circuit have not proved successful.

Don't use a comma

a. In numerals of four digits (except when mixed in lists with five or more digits).

EXAMPLES:
3594
4598

b. In common and decimal fractions.

EXAMPLES:
0.625061
3.14159265

c. In part numbers and serial numbers.

d. Between an equipment or part name and its type or part number.

EXAMPLES:
Dummy Load Adapter 480140-100
Electrical clip 919110-15

Between the name of an item and its circuit reference symbol unless the symbol is parenthetic in sense.

EXAMPLES:
The signal is then applied to limiter Q45.
But: Avc action is applied only to the third stage, Q56.

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DASH

Dash - Use a dash when introducing items listed at the end of a sentence.

EXAMPLE:

The unit contains three channels - range-sweepgeneration, range-sweep expansion, and range-sweep limiting.

NOTES

- A colon could have been used instead of the dash.
- For enumerating it is always better to use list format, for example:

  The unit contains three range-sweep channels:

  Generation
  Expansion
  Limiting

ELLIPSIS

DEFINITION: Ellipsis refers to leaving out words that would be necessary to make a sentence grammatically complete; it is used to obtain a concise style.

1. *Minor ellipsis*, use:

   Comma
   Colon
   Dash

   EXAMPLE: (colon)

   Set panel controls as follows:
   POWER: ON
   AZ: 20
   EL: 45
   SCAN: ONE BAR

2. *Major ellipsis* use:

   . . . (3 periods) within a sentence
   . . . . (4 periods) at the end of a sentence

   EXAMPLES:
   Apply . . . lubricant as shown in figure 5-56.
   Use sealing compound type . . . .

3. Use . . . for an intentional omission of an entry in a table if the omission could cause doubt

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PARENTHESES

Use parentheses for

- Making condensed figure/paragraph references.
- Marking parenthetic matter for which separation by commas or dashes is insufficient.
- Letters or numbers appearing within a sentence to designate items of a list. Do not use a single parenthesis for this purpose.

EXAMPLE:

The project is divided into four phases: (1) planning, (2) research, (3) analysis, and (4) documentation.

Don't use parentheses

- Within parentheses.
- To set off a complete sentence within a sentence.

EXAMPLE:

Poor: The mixer (See fig. 5-1.) is a silicon diode.
Better: The mixer (fig. 5-1) is . . .
Or: The mixer is a silicondiode.(See fig. 5-1.)

PERIOD

Use a period

- After an abbreviation that spells an English word.
- In headings and titles in text, after each:

  Paragraph number
  Paragraph heading
  Figure number

- After a parenthetic entry forming a complete sentence (within closing parenthesis).

  EXAMPLE:

  (See fig. 4-5.)

- After each sentence of a:

  NOTE
  CAUTION
  WARNING
  Footnote

Don't use a period after

- An abbreviation (except for a, opposite)
- A symbol in a mathematical expression such as cot (cotangent), sin (sine), tan (tangent).
- Figure title.
- Section number.
- Section title.
- Paragraph number/title in table of contents.
- Figure number/title in list of illustrations.
- Entry in parentheses if it is not a complete sentence.

  EXAMPLE:

  . . . in the rf unit (fig. 4-5) located . . .

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Use a period

- In tabular entries:

  After each tabulation which is a long, complex sentence.

  After any group of words immediately preceding a complete sentence. (Semicolons may be substituted in some cases.)

Don't use a period after

- Each item in a legend or list.

QUOTATION MARKS

Rules for using:

a. Use quotation marks sparingly.

b. Place periods or comas within closing quotation mark.

   EXAMPLE:

   At this point, apply the "sniff," "listen," and "touch" routine.

c. Use quotation marks to enclose the first use of a bit of slang, jargon, or figurative language. Thereafter, if the expression must be used repeatedly, omit the quotation marks.

Use quotation marks

- To enclose a brief direct quotation.
- To enclose titles (sections, paragraphs, figures, etc) when used in references. Preferably make such references without stating the title.

Don't use quotation marks

- For emphasis.
- To enclose titles of technical manuals/ other publications (Underlining may be used.)
- To enclose names of:
  Controls
  Control positions
  Indicating devices
  Test points

  unless required for clarity.

  EXAMPLES:

  Set SELECTOR switch to FM.
  Set FREQ RANGE switch to 5.

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- To designate letters referring to procedural steps as items in a list. Use underlining instead.

  EXAMPLE

  See paragraph 4-2C.

SEMICOLON

Use semicolons to separate:

a. Independent clauses which are internally punctuated with commas.

b. The clauses of a compound sentence where the usual conjunction (and, but, etc) has been omitted.

   EXAMPLE:

   Set BATTERY B switch to OFF; set BATTERY C switch to ON.

c. Groups of similar or related items in run-on lists.

   EXAMPLE:

   Motor brushes, bearings, and wiring; oil-filled capacitors; cable connectors, lacing and sleeving.

d. Tabulated procedural items not forming complete sentences.

e. Short sentences in a relatively simple tabulation.

NOTE

Do not use a semicolon to indicate material to follow - use a colon.

SLANT LINE

Use a slant line (diagonal or virgule) to indicate:

a. An "either-or" numerical relationship in condensed form.

b. "Per" in condensed matter.

   EXAMPLE: 96 m/sec

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SPACING

Space before and after

- A symbol denoting an arithmetical operation.

  EXAMPLE:

  5 + 6 = 11

- A dash used as introduction to a listing.

  EXAMPLE:

  The set contains three controls - power switch, volume control, and temperature indicator.

- Space between an abbreviation/symbol and preceding numeral.

  EXAMPLES:

  25 ma
  3 m
  3.5 g
  4 V

Don't space between

- A symbol of polarity or tolerance and the succeeding number.

  EXAMPLES:

  -12 V
  17 ±3 ma
  25 *(+3, -5) pf*

- A hyphen and the components of a hyphenated word.

  EXAMPLES:

  . . . rust-resistant sealing
  . . .line-of-sight calculation

UNDERLINING

Use underlining on:

a. Titles of other technical manuals/publications.

b. Letters designating items or procedural steps.

EXAMPLES

Delete item c.
See step a.

c. Such items as:

Primary paragraphs headings (in typewritten manuals only).

Unusually important words/phrases.

NOTE

Use underlining sparingly so as not to destroy the highlighting effect. Do not use for emphasis.

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Section 7
USAGE

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DEFINITION

"Usage" means choosing the right:

Word
Expression
Idiom

for each meaning, situation, or occasion. Although usage includes grammar, the Style Guide consideration of grammar is limited to highlighting common violations in technical writing. The emphasis is on "errors" that do not violate a grammatical rule, but are nevertheless contrary to established custom. Where several competing "correct" forms are possible, this section makes some arbitrary choices for standardization. The choices are determined by surveys of current usage in technical manuals, textbooks, and periodicals.

NOTE

If terms used in the manual are uncommon (or common terms with an unusual item-peculiar meaning), explain their meaning in a glossary and in the text the first time they appear.

REFERENCES

1. For further information on usage, see:

American-English Usage by Nicholson

Modern English Usage by Fowler

Webster's New International Dictionary (or its abridgment the *New Collegiate Dictionary*)

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Electronics and Nucleonics Dictionary by Cooke and Markus

Communications-Electronics Terminology AFM100-39, the official word-definition publication

The United States Air Force Dictionary

Any standard textbook of formal grammar (senior high school or higher)

2. Use military terms in accordance with *Joint Chiefs of Staff (JCS) Publication 1* and any authorized dictionary or glossary of military terms.

3. Use terms for automatic electronic test and checkout in accordance with MIL-STD-1309.

NOTE

For cases not covered either by this Style Guide or the standard authorities listed above, determine usage by inspecting recently published technical textbooks or well-edited technical periodicals. Limit this check to publications of about the same level of technical difficulty as the material you are writing. Make certain that your reader can be expected to understand the terms and expressions you select for use.

PREFERRED FORMS

In the following list, generally use the words or expressions in the first column in preference to those in the second column. However, this typical list is based on the most frequently used technical manual applications of the words listed; in non-technical applications, the words given in the second column may be preferred.

Generally Preferred Form	Generally Unpreferred or Incorrect Form
control service	flipper
data is (when th word is synonymous with "information")	data are (not recommended except in formal writing or where plural usage is necessary for correct understanding by reader)
dived	dove
ensure (to make certain)	insure (means, primarily to protect against)
flammable (current USAF preference)	inflammable (former preference)
graticule (used with oscilloscope)	
indexes, appendixes, matrixes	indices, appendices, matrices (acceptable in formal writing)
indicates (on meters)	reads

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lamp lights	lamp (or light) illuminates, light lights
locked on to	locked-on to, locked onto
optimum	most optimum
reinstall (to put back the original item)	replace (to put in a new item in place of the original one)
communication (simple or single type) between stations communications system (multiple service)	Note: Use of singular and plural forms is in a confused state. As a general rule, avoiding using "communications" in a singular sense.
plastic material or materials; a plastic	. . .
plastics (as a single word for plastic materials)	. . .
plastics industry	. . .
plastics engineering	. . .
remove nut (3) securing arm (4) to . . . (or "that secures")	remove nut (3) holding . . .
repairable/unrepairable (as of a defective unit)	reparable/irreparable (this spelling changes the syllable accent)
reticle (used with optical systems)	. . .
servopositioner	actuator
the example (or item) discussed above	said example, said item, etc
to the emitter (pin 2)	to emmiter 2, to emitter (2)
electromagnetic vibrator, synchronous vibrator (see below)	vibrator, chopper (correct in usage defined below)

"Synchronous vibrator": An electromagnetic vibrator that simultaneously interrupts dc voltage and mechanically rectifies the resultant ac voltage after ordinary transformation to higher (or lower) value.

"Chopper": An electromagnetic vibrator that chops an ac or dc voltage for subsequent electronic processing, such as amplification or time sharing. (Based on definitions in Cooke and Markus dictionary.)

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FAMILIAR WORDS

Use the familiar or simple word rather than the unfamiliar or complex one, and the concrete word rather than the abstract - provided the more common word conveys the desired idea accurately to your reader. Use complex or abstract terminology only if there is no simpler way of expressing an idea.

NOTE

Remember that few words have exact synonyms; most of the words in the second column must be used sometimes - in some contexts, they are the preferred forms.

For Simplicity Use:	Rather than:
ask	inquire
before	prior to
check that	determine that
circuit, circuits	circuitry
class	category
concept	philosophy
dry, dried up	desiccsated (desiccant is good basic usage, however)
enough	sufficient
exact, strict	meticulous
go	proceed
happen	materialize
help	assist
include, consist of	comprise
inform	apprise
informed, aware	cognizant
lift, raise	elevate
model, unit, type, variation, modification, alternate unit	configuration* (good word when used according to dictionary definitions)
name, panel name, lettering, callout	nomenclature (often an unnecessary term, except in "official" sense)
necessary, essential	requisite
often, seldom	frequently, infrequently
part	percentage, proportion
partly	partially
regardless	irregardless (always an illiteracy)
separate, distinct	discrete
set off, start, cause	precipitate
stick, stick together	adhere, cohere
stop	cease
sum up, summarize	recapitulate
the (number) unit	the (number) configuration*
totaled, added up to	aggregated
try	attempt, endeavor
watch	observe

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*Configuration = relative distribution or arrangement of parts in a structure, as in an antenna array. This definition, plus that of the dictionary, suggest that use of the term be generally restricted to any organized assortment of physical or geometric parts in which the structural or visual pattern is the significant characteristic.

HOMONYMS

Avoid the inadvertent use of the wrong one of a pair of "sound alikes," referred to as homonyms. The following list may alert you to errors of this type.

bear	bare
complement	compliment
die, dying	dye, dyeing
discreet	discrete
dual	duel
fair	fare
fourth	forth
fuse	fuze
great	grate
hear	here
lead (metal)	led
lie	lye
peel	peal
pour	pore, poor
principal	principle
rite	right
site	sight
sign	sine
stationery	stationary
there	their
threw	through (thru)
to	too, two

MALAPROPS

Avoid inadvertent use of the wrong word. Unless you take care, you may write a grotesquely inappropriate word because of its superficial resemblance to the correct one. Errors of this type are referred to as malaprops (from Mrs. Malaprop, a character in fiction).

Words in both columns are correct but must be used as required by the context.

Intended Word	The Malaprop
alternative	alternate
basic	basal
cellular	cellulose
clean	cleanly
cleaned	cleansed

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cleanness	cleanliness
continuous	continual
creditable	credible
effect	affect
exponential	expotential
fluorescent	florescent
foreword	forward
germanium	geranium
homogeneous	homogenous
hygrometer	hydrometer
incredible	incredulous
intradepartmental	interdepartmental
misadjusted	maladjusted
material	materiel
nonresistive	nonresistant
ordnance	ordinance
precedence	precedents
precipitous	precipitate
proceed	precede
reliable	reliant
respectively	respectfully
reverals	reversion
simulated	stimulated

IDIOMS

Clarify and simplify your writing by correct use of English idiom. An idiomatic expression may not make sense when you pull it apart word for word, or try to translate it literally into some other language, but the complete expression does make sense to any English-speaking person. The meanings of many idioms are precise enough that you can use them in any type of engineering or scientific writing. They are frequently the simplest means of developing accurate concepts in your reader's mind.

Remember that reputable idiomatic English is good English. As long as you avoid slang, your reader, regardless of his educational level, is not offended by use of his everyday language.

The following list of representative English idioms will help you recognize others of their kind.

To determine which preposition to use with a given controlling word for correct idiomatic English, look up the controlling word in Nicholson's *American-English Usage* or Webster's *New International Dictionary*. For example, to choose between "identical with" and "identical to," look up "identical."

Approved Idiom	Dressed-up Alternative
airplane (or aircraft) took off	airplane departed from surface of the land
can do without, get along without	can function in the absence of
climb down	descend

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let out	extend (or loosen)
make sure, make certain	ascertain
touching one another (or each other)	so placed that each of the several units touches each of the units external to itself (Note: The *New International Dictionary* requires 70 words to define "one another" and 50 to define "each other." Idiomatic expressions provide remarkably concise meanings.)
roughed out the required maintenance plan	hastily prepared a tentative plan designating the anticipated maintenance operations
take care	apply caution
take into account	consider appropriate precautionary reservations
the lamp (or light) comes on, goes off, goes out (but does not "come in"), lights up, or lights	the lamp (or light) illuminates, extinguishes, incandesces, luminesces, becomes incandescent or nonincandescent
will catch fire	will ignite and burn

SPELLING

Check your spelling. Particularly look out for mistakes in spelling words such as the following:

accommodate	occurred, occurrence, occurring
all right (always two words)	parenthesis (singular), -es (plural)
chassis (singular and plural; not analogous with basis)	procured, procuring
concurred, concurring, concurrence	recommend, recommendation
desiccant	reconnaissance
desirable, undesirable	recurring, recurrent, recurrence
develop (not "develope")	siege
envelops (envelopes are contaners)	seize, seizing
feasible	smooths (not analogous with soothes)
flexibility	surveillance
gauss (for both singular and plural)	too (as in too much, too fast)
incompatible, incompatibility	torquing
its (possessive pronoun)	transferred, preferred, deferred, referred
liaison	trunnion
miniscule	volume (not analogous with column)

If the dictionary lists two or more spellings for the same word, use the first one given, except for spellings recommended for technical writing below:

adapter	Boolean algebra
aging	bus, buses
ax	canceled, canceling
biases, biasing	cannot ("can not" only for emphasis)

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catalog
diagrammed, diagramming
disk (except phonograph disc or anatomical disc)
fulfill, fulfilled, fulfillment
gage (formerly gauge)
gray
gyros, servos, zeros, photos, salvos, (but: echoes)
henrys
judgment
leveled, leveling
louver
mileage
movable, unmovable
percent
practice (noun and verb)
preventive
programmed, programming
sizable
skeptical
skillful
stenciled
tunable
usable, reusable, unusable

PLURALS

The dictionary does not spell out plurals that follow the regular rules. The rules are usually found in the introductory pages of the dictionary. The largest class most English words form plurals simply by adding s (nail, nails) or es (brush, brushes).

PROCEDURES

Use a sentence arrangement that guards against performing procedures in the wrong sequence. For example, if a tool or instrument is needed, provide a reference to that fact at the beginning of the first sentence of the procedural step, or take care of the situation by some other simple means.

EXAMPLES:

- Using special wrench 140-35-20A, tighten . . .
- With volt-ohm-millimeter set at 50 ma dc scale, measure current . . .

TRADE NAMES

When an accurate and easily recognizable standard-item name exists, avoid using a copyright trade name.

If a trademark name must be used, capitalize it.

The following lists a few typical trade names with possible standard-item equivalents.

Trade Name	Standard-Item Name (Or approximation)
Kodak	camera
Selsyn, Autosyn	synchro
Invar	Nonexpanding nickel-alloy steel
Variac, Powerstat	variable autotransformer
Multigraph	multilith press

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Teflon	polytetrafluoroethylene resin insulation Better use the trade name!
Plexiglas	clear acrylic plastic
Electromatic	electric typewriter
Intrafax	facsimile system

UNNECESSARY WORDS/REDUNDANCIES

Avoid indirect, noncommittal, indefinite, or space-filling expressions. Guard against wordy and useless common expressions and sentence openings.

Guard against all types of loose writing. If a word or phrase is unessential, delete the offending expression or rewrite the sentence.

EXAMPLES (POOR USAGE):

- It can be said that . . . .
- It is obvious that . . .
- There are several reasons why . . .
- We must now proceed to . . .
- This is more readily understood in the form . . .
- A small, 2-ounce can of oil . . . (Omit either "small" or 2-ounce.")
- The agency ordered a total of 8000 sets. (Omit "a total of.")

APPLIED TO

Use applied to in preference to fed to in bringing a signal to a particular point.

Use fed to if signal power is consumed by the receiving device, or if the signal is applied to the point through a specified route.

Generally, applied to is adequate for the majority of purposes.

EXAMPLES (CORRECT):

- The sharp negative trigger from the collector of Q1145 is applied to the emitter of inverter Q1146.
- The signal is fed through a filter network to the base (pin 1) . . .
- Between signals, the excess current is fed to dummy-load resistors R19, R20, and R25.

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ARTICLES (a, an, the)

Use	Omit in
As required for clarity.	Procedural steps.
In descriptive type special notations.	Tabular entries.
for precise expression.	Descriptive parenthetical inserts in step-by-step procedures.
In descriptive matter in straight text.	Illustrations.
In introductory descriptions for procedures and inspections.	Terse text.
	Text with illustrations.

Omit before nouns followed by:

Part number
Type number
Circuit reference number
Callout index number

EXAMPLES:

- The TIMING ADJ switch is . . . But: TIMING ADJ switch S45 is . . .
- The signal is applied to the control-grid circuit of shaper Q64 . . .
- GAIN control R46 (3) is located on unit control strip (2).

EXCEPTION: Sometimes clarity may require that you regard the number or symbol as being of a semiparenthetical nature. Thus:

The function of the control tube, Q85, is closely interrelated with that of the control relay, K65.

COMPRISE

The whole of anything comprises its constituent parts; it is not comprised of them. Use the word sparingly, but if you must, do so in the following manner:(See Nicholson's *American-English Usage*.)

CORRECT: The channel comprises a voltage amplifier, a relay tube, and a power-switching relay.

INCORRECT: The channel is comprised of a voltage amplifier, . . . (Use "consists of," "contains," "includes," as appropriate.)

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DUE TO

Avoid using "due to" to modify a word or expression that cannot be grammatically (or idiomatically) modified by it. For example:

INCORRECT: The output potential is maintained at 5.3 v due to the action of limiter Q65.

CORRECT: The output potential is maintained at 5.3 by (or owing to, or because of) the action of limiter Q65.

Use of "due to" should be limited to introducing adjective-type modifiers, that is, modifiers that modify nouns. It should not be used to introduce adverbial modifiers as has been done in the incorrect sentence given above ("due to" modifies "is maintained").

CORRECT: The amplifier modification reduces distortion due to cross-modulation effects.

"Due to" correctly introduces an adjectival phrase that modifies "distortion" - a noun.

JACKS AND PLUGS

Refer to connectors as "jacks" and "plugs" only:

- if they are telephone-type jacks and plugs
- if the connector is designed to accept a test probe.

Refer to other types of connectors as "connectors."

RELAYS

"Energize" (and deenergize) is normally a transitive verb and needs an object; it needs something to energize.

Use	Don't use
. . . relay K . . . is energized	. . . relay K . . . energizes
. . . relay K . . . becomes energized	
. . . contacts of energized relay K . . .	. . . energized contacts of relay K . . .

SHORT CIRCUIT

Prefer	To
"short cricuit" (noun) "short-circuit" (verb)	"short" (colloquial)

Abbreviation: "short." (Use period.)

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SUCH THAT

Avoid using "such that" to modify a word or expression that cannot be grammatically (or idiomatically) modified by it. For example:

INCORRECT: The circuit functions such that the output trigger is delayed by only 0.03 microsecond.
- Correct by changing "such that" to "in such a manner that."

"Such that" can properly introduce only an adjective-type modifier, usually in the form of a dependent clause that modifies a noun. It must not be used in the form of a dependent clause that modifies a noun. It must not be used to introduce an adverbial modifier as has been done in the incorrect example above.

CORRECT: The total resistance is such that current flow is reduced to less than 2 microamperes.
- "Such that" correctly introduces the adjectival clause "current flow is reduced . . ." which modifies the subject "resistance."

SWITCHES AND CONTROLS

1. Button-type switch

Use	Don't use
Press	Depress
Press and Hold	

EXAMPLE:

Press and hold SCOPE TEST switch until a series of dots appears across oscilloscope screen.

2. Continuous-action rotary control with specified dial reading or marking -

Use: "Turn . . . to . . . ."

EXAMPLE:

Turn ATTEN control to 15.3.

3. Turning action when an indicating device must be observed to determine correct adjustment point.

Use: "Adjust . . . for . . . ."

EXAMPLE:

Adjust ATTEN control for -45 dbm on meter M23.

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4. Mechanically fixed or detented positions -

   Use: "Set . . . to . . . ."

   EXAMPLES:

   • Set STEP ADJ control R23)fig. 4-6) to its sixth position (six clicks from full counterclockwise).

   • Set INTERP switch to READ.

5. Unmarked positions -

   Use parenthetical clarification, if possible

   EXAMPLE:

   Set POWER switch (2) to up (on) position.

THRU

Use thru:

a. In numerical or alphabetical sequences.

b. In certain copyright trade names.

In all other cases use through.

Correct	Incorrect
The modification applies only to units with serial numbers 9456 thru 9934.	The signal is applied to the emitter of Q15 thru resistor network R12, R15, and R18.
The power supplies are described in paragraphs 8-34 thru 9-45.	

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Section 8
ABBREVIATIONS AND SYMBOLS

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WHY ABBREVIATIONS AND SYMBOLS?

- To avoid distracting the user and wasting his reading time by needless spelling out of repetitious words or phrases, or abbreviations which have become words. Examples: ac, fm, db, ir, and other commonly used abbreviations.
- To save space and promote clarity in illustrations or tabular format.
- To communicate mathematical concepts or relationships.
- NEVER to make it easier for the writer!

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GENERAL RULES: 1. WHEN IN DOUBT, SPELL IT OUT.

2. HOLD USE TO MINIMUM.

BRIEF SUMMARY OF RULES FOR ABBREVIATIONS AND SYMBOLS

DO's

Authority
MIL-STD-12 - text
USAS Y32.2 - illustrations
Panel nomenclature

Capitalization
Abbr
Use capitals same as if spelled out.
Sym
Use symbols as shown in MIL-STD-12; keep lowercase symbols as given, even if other text is uppercased.

Common abbreviations
Always use for benefit of user.

Consistency
Don't mix in. and inch. If you use in, use ft.
Don't mix Greek and Roman symbols.
Use panel nomenclature spelling throughout manual.

Panel nomenclature
Use exactly as it appears on panel throughout manual

Redundancies
Avoid.
Example: "dc" not "dc current."

Revisions
For major revisions use latest authorized abbr/sym even though older forms appear elsewhere in document (MIL-STD-12).
For minor revisions use existing forms.

DON'Ts

Clarity
Don't use if it could confuse user.
Avoid abbreviations which require period at end of sentence.
Avoid same abbreviation for more than one word.

Hyphens
Don't hyphenate. Noun and adj take same form.

Example: Ensure that ac is being supplied to the ac plug.

Periods
Don't use after a symbol.
Don't use after an abbreviation unless:

1. It spells another English word.

2. It could cause confusion.

3. It's needed for consistency.

Plurals
Don't pluralize.

Possessive
Don't make possessive.

Tense
Don't change to past or future - use the same abbreviation for all tenses.

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Special appreviation/symbols (not listed in above authorities or this style guide)

Spell out on first use.
Introduce when necessary for clarity and ease of understanding or reading.

DEFINITIONS

Abbreviation - A shortened form or abridgment of a word, expression, or phrase used to save space and time. In this style guide essentially two types of abbreviations are considered:

- authorized abbreviations (MIL-STD-12)
- special abbreviations (not in MIL-STD-12)

Symbol - An arbitrary or convenitonal sign or combination of numbers/letters used to represent operations, quantities, elements, relations, or qualities. There are many kinds of symbols:

- single letter - capital/lower case, English/Greek
- number - 1 thru infinity, Arabic/Roman
- sign - arithmetic such as +, -, =
- mathematical
- chemical
- arbitrary - such as those commonly on typewriters
- graphic
- specialized - symbols designed specifically for the subject or project of the manual
- physical characteristics:

Example:

Quantity Symbol	Unit Symbol	Abbreviation of Word
length (l)*	Inch (in)	inch (in.)
potential (V)*	volt (V)	volt (v)

*Quantity symbols should be italics (MIL-STD)12), or underlined.

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Abbreviation versus Symbol

Distinction often depends only on context. Whenever a choice exists between using an abbreviation or a symbol, MIL-STD-12 prefers use of the symbol. (See LOA.)

Example:

12 V dc (V is a symbol; dc is an abbreviation which describes the kind of potential).
not
12 Vdc (Vdc is an abbr.)

(NOTE: Always leave a space between a unit symbol and an abbreviation.)

Mathematical operations are performed only on symbols, not abbreviations.

EXAMPLE:

$$V = at = 5 \frac{in}{s} \times 2\ s = 12 \frac{in}{s}$$

Acronym - An acronym usually starts out as a specialized abbreviation but if it is used long enough, by a wide enough population, it eventually acquires the status of a word. Acronyms may be peculiar to one subject, field of knowledge, usage, or population, or they may acquire general usage - for example, radar (radio detection and ranging) specialized use, or snafu (situation normal - all fouled up) which could be used generally.

Acronyms are subject to word-usage rules - not abbreviation rules. However, be sure your user is familiar with the ones used. If there is doubt, spell each one out on first use and list it in the list of abbreviations or explain it in the glossary. As words, acronyms may be made plural, possessive, hyphenated or adjective use, or changed in tense.

Examples:

Several lasers . . .

. . . radar's range . . .

. . .MTBF-oriented procedures . . .

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TYPES OF ABBREVIATIONS AND SYMBOLS

There are four categories of abbreviations and symbols considered in this style guide. It is necessary to categorize them in order to know how they need to be introduced to the user.

Category	Description	Rules of Introduction
1. Authorized, common	Those in MIL-STD-12 which are used so often their meaning is common knowledge.	May use without explanation or spelling out. (If there is any doubt about the reader understanding it, spell it out the first time used as shown below).
2. Authorized, unfamiliar	Those in MIL-STD-12 which are used infrequently and need to be explained to the user.	Explain/spell out the first time it is used in a manual, or if necessary the first time in each section of the manual. Example: This radio has agc (automatic gain control).
3. Special	Those not in MIL-STD-12 which are unique to the project/manual or Those which differ in spelling from MIL-STD-12. Abbreviations/symbols which may appear in any other style guide, list, or dictionary, but not in MIL-STD-12. Abbreviations/symbols which are panel nomenclature but which differ in spelling from MIL-STD-12. Commercial abbreviations which are different from MIL-STD-12.	Explain or spell out the first time it is used in the manual. List it in the list of special abbreviations and symbols* (LOA) in the manual.
4. Graphic	Symbols which appear in ANSI Y32.2 for use on illustrations and artwork.	Limit use to illustrations. Same rules apply as above, except substitute ANSI Y32.2 for MIL-STD-12.

*Special abbreviations and symbols may be combined in the same table (unless the list is very long and easier to use if abbreviations and symbols are separated.)

AUTHORIZED REFERENCES

The following documents may be used as the source of abbreviations and symbols. Any abbreviations or symbols not authorized by these documents, or spelled differently from the spelling in these documents, must be treated as special abbreviations.

MIL-STD-12 Abbreviations for Use on Drawings, Specifications, Standards, and in Technical Documents (includes literary symbols).

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MIL-STD-12 references the following:

MIL-STD-106 "Mathematical Signs and Symbols for Use in Physical Sciences and Technology"

ANSI Y10.3 "Letter symbols for Concepts in Mechanics of Solid Bodies"

ANSI Y10.5 "Letter Symbols for Quantities Used in Electrical Science and Engineering"

ANSI Y10.19 "Symbols for Units Used in Science and Technology"

Webster's *Third New International Dictionary, Unabridged* for chemical symbols.

ANSI Y32.2 "Graphic Symbols for Electrical and Electronic Diagrams."

General rules for abbreviations and symbols are also given in *U. S. Government Printing Office, Style Manual.*

WHEN NOT TO USE

Convenience:

Abbreviations or symbols should never be used for the convenience of the writer.

Be guided by the rule "When in doubt, spell it out."

Low-Skill-Level Readers:

Common abbreviations and symbols should be used with discretion, depending on the skill or education level of the user.

In general, the lower the skill level to which you are writing, the safer it is to avoid abbreviations and symbols, or explain them the first time they are used.

Typewriter Symbols:

Avoid common typewriter symbols to replace words except were necessary in charts or tables, where the symbol is part of panel or hardware nomenclature, or where it is helpful to the user. That includes:

% percent	' foot, feet
" ditto	" inch inches
Ø phase	/ per
& and	

If condensation of these words is necessary in text, use abbreviations instead of symbols (pct., ft., in., etc).

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WHEN TO USE

Frequency of Use:

Keep use of abbreviations and symbols to a minimum.

Use only for benefit of user to:

- Save his reading itme.
- Maintain status quo with familiar abbreviations he has always used, and may find confusing if spelled out.
- Ensure clarity where space is limited.
- Communicate mathematical ideas.

High-Skill-Level Readers:

If you are writing to pilots or experienced maintenance technicians, do not waste their time by spelling out or explaining common abbreviations or symbols. Such abbreviations as rf, ir, and ac, for example, have almost supplanted the spelled-out versions of these words and have acquired their own shades of meaning. However, if you have doubts as to how common an abbreviation may be, spell it out the first time. In tables and illustrations, abbreviations may be explained in a footnote.

Reader's Need for Special Abbreviations:

If the reader's need indicates a requirement for special abbreviations (not in MIL-STD-12) it may be necessary to obtain a contractual deviation to the manual specifications. Include any special abbreviations (LOA) in the technical manual.

HOW TO USE

Capitalizing Abbreviations (General)

Capitalize abbreviations with the same capitalization you would use if the words were spelled out.

Examples:
Sealed fm circuits cannot be adjusted.
Dc voltage controls . . .
Adjust rc time constant . . .

Capitalizing Abbreviations (Titles)

In titles, capitalize abbreviations in accordance with what would be capitalized if spelled out.

Treat any normally lowercase abbreviation as a single word, and capitalize the first letter only.

Example:
Figure 11-3. +250 V Power Supply Ckt

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HOW TO FORM SPECIAL ABBREVIATIONS

To form special abbreviations, use the letters from the word(s) being abbreviated. Make abbreviations as short as practicable; less than 60 percent of the spelled-out word(s). For example:

One word	Multiword	Compound word
Initial letter b - buoyancy d - deep	Initial letter of each word acb - air circuit breaker bc - between centers	Initial letter of each word egd - electrogasdynamics ls - loudspeaker
First portion galv - galvanize schem - schematic	First portion of each word raddef - radiological defense sonac - sonar nacelle	First portion of each element elhyd - electrohydraulic
First and last portion avn - aviation		
Omission of most vowels (some consonants) intcp - intercept wtrz - winterize		
Substitute letter (established by longstanding practice) xtal - crystal xmtr - transmitter		

HOW TO FORM SPECIAL SYMBOLS

Symbols should be selected from the specifications, including sources listed on page 7. Introducing new symbols may be done only if these sources prove lacking, and then only in accordance with established practice in the applicable field.

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Abbreviations normally uppercased, are uppercased in titles.

Example:
CFE and GFE Units Required

For compound abbreviations (such as age, afc, rf) uppercase each letter unless the meaning requires lowercase.

Example:
AVC Test Points and Controls

Capitalizing Aconyms

When only the first letter of each word is used, use all capitals.

Examples:
APPR - Army package power reactor
STEP - supplemental training and employment program
MDC - maintenance dependenct chart

NOTE

Notice the spelled-out form does not need initial cap. even if the abbreviation has all capitals.

When more than the first letter of some words are used, use lowercase.

Examples:
loran - long-range navigation
sonar - sound navigation ranging
secant - separation control of aircraft by nonsynchronous techniques

When proper names are used on any word which uses more than first letter of any word, use initial cap.

Examples:
Pepco - Potomac Electric Power Co.
Inco - International Nickel Co.
Armco - Arabian-American Oil Co.

Capitalizing Quantity and Unit Symbols

Don't. Not in text; not in illustrations. Use as listed in MIL-STD-12. (MIL-STD-12 gives some unit symbols with a first letter capitalized - - honoring the person from whose name the unit was derived.) Lowercase symbols should remain lowercase even in applications where other lettering is uppercase.

Capitalizing on Illustrations

Generally illustrations are prepared with all uppercase letters. Abbreviations for use on illustrations are given in MIL-STD-12. However symbols lowercased in MIL-STD-12 must

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remain lowercase. The reason for this is that sometimes an uppercase symbol has a different meaning than the lowercase one.

Changes or Revisions

When making changes or revisions to a manual, the specification allows the latest version in effect at the time of revision to be used. However, when this is different from the one in the unchanged parts of the manual, care must be taken that the user is not confused by two versions of the same abbreviation or symbol.

Circuit Reference Symbols

Uppercase circuit reference quantity symbols, such as C, R, L. For abbreviations of the related terms use:

c - capacitance
cap. - capaciter
res. - resistor/resistance
ind - inductor/inductance

In some multiple-letter abbreviations, letter symbols may be used lowercased:

lc - inductance-capacitance
rc - resistance-capacitance
lcr - inductance-capacitance-resistance

Examples:

Lcr design computations . . .
. . . rc time constants . . .

Clarity

Strive for clarity at all times.

Where the same abbreviation could have more than one meaning (cw - continuous wave; cw - clockwise) be sure that it is easily understood as intended. If there is any doubt, spell the words out in full, or if their use is frequent, form a special abbreviation which can be explained so as to leave no ambiguity.

Examples:

clockwise - cw (common)
continuous wave - cnw (special abbreviation)

Consistency in Use

Be consistent in using abbreviations and symbols. Do not indiscriminately mix abbreviations and spelled-out words in similar or parallel constructions. For example, don't abbreviate "inches" and spell out "feet" in similar applications.

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Do not unnecessarily mix Greek and Roman symbols.

Establish standards for abbreviation and symbol usage on a manual or document. Be sure the list is kept current and distributed among all writers on that project.

Consistency in Panel Nomenclature

Panel nomenclature must be written exactly as it appears on the panel, even if it contains abbreviations or symbols not in accordance with MIL-STD-12 and NASI Y32.2. If not in MIL-STD-12 and ANSI Y32.2, treat it as a special abbreviation and spell out first time used.

Example:
Adjust amplitude of signal using SWP C&G (sweep centering and gain) control R19.

Precedence: Panel Nomenclature

If there is a conflict between abbreviations in panel nomenclature (or nomenclature on hardware) and the abbreviations in MIL-STD-12, the panel or hardware nomenclature abbreviation has precedence and may be used throughout the manual. For example, if panel nomenclature is GRD for ground (gnd, MIL-STD-12), you may use "grd" for ground throughout the manual. In that case, list "grd" as a special abbreviation in the list of special abbreviations.

Diagonal (/) (Also called solidus, slash, slant, or virgule.)

May be used as needed with symbols to substitute for "per" or "divided by."

Example:

in/sec - inches per second
m^3/day - cubic meters per day

Diagonal may also:

a. Separate alternatives.

Example:

. . . design for high-speed/high-heat application . . .

b. Separate successive divisions (as months or years) of an extended period of time.

Example:

. . . changes covering 1974/75 . . .

Ditto Marks (")

Not authorized. Avoid them. Most often if you find yoursel repeating information frequently enough to be tempted to use them, it is a sign of poorly organized data. Reorganize.

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Example:

Bad (Repeated Data) Output	Good Output (V)
15 V	15
17 V	17
19 V	19
22 V	21
...	...

Greek-Letter Symbols

Avoid using Greek capital-letter symbols which are easily confused with English letters. (A, B, E, Z, H, K, M, N, O, P, T, and X.)

A	α	alpha	N	ν	nu
B	β	beta	Ξ	ξ	xi
Γ	γ	gamma	O	o	omicron
Δ	δ	delta	Π	π	pi
E	ε	epsilon	P	ρ	rho
Z	ζ	zeta	Σ	σ	sigma
H	η	eta	T	τ	tau
Θ	θ	theta	Y	υ	upsilon
I	ι	iota	Φ	φ	phi
K	κ	kappa	X	χ	chi
Λ	λ	lambda	Ψ	ψ	psi
M	μ	mu	Ω	ω	omega

Graphic Symbols

Select for illustrations from ANSI Y32.2. If a required graphic symbol is not in ANSI Y32.2, list that symbol in a list of special graphic symbols.

NOTE

Remember that the use of symbols from ANSI Y32.2 is restricted to illustrations or artwork - not accompanying text.

(Self-adhesive preprints of graphic symbols may be used on illustrations in accordance with the same restrictions as for hand-drawn symbols.)

Hyphenation

Do not hyphenate abbreviations when using two or more abbreviations as a compound modifier.

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Examples:

rf variation not r-f variation

dc voltage not d-c voltage

Illustrations Using Abbreviations or Symbols

All the rules for using abbreviations or symbols apply to illustrations as well as text, except in illustrations space is at a premium and more abbreviations or symbols may be required. However, the fact that an abbreviation or symbol has been used on al illustration is no reason for using an abbreviation or symbol in text where space is not a consideration.

MIL-STD-12 gives abbreviations all uppercase for use on illustrations.

In most cases the uppercase and lowercase abbreviations are the same, but not always.

Use symbols as given in MIL-STD-12, uppercase or lowercase. Even in illustrations which have all other letters uppercase, symbols which are lowercase in the specification must remain lowercase. Changing a lowercase symbol to uppercase may change its customary accepted meaning.

Italics

MIL-STD-12 (ANSI Y10.5) requires that symbols for physical quantities (such as F - force, Q - electrical charge, I - electrical current) be written in italics. Since moste typewriters do not have this capability, underlining may be substituted. However, confusion may result. Therefore, it is recommended that abbreviations of physical quantitites be avoided as much as possible by spelling out.

Number

Use "no." as the abbreviation for "number." Use a period to avoid confusion with "no" (the negative). However, check your detail specifications in case another requirement exists.

Parenthetic References

When you can't avoid cross-referencing, abbreviate short references in parentheses.

Examples:

. . . (fig. 3-21) . . .
. . . (para 4-230) . . .

Spell out references which are part of a sentence but not in parentheses.

Examples:

. . . action described in figure 3-21 . . .
. . . description in paragraph 4-230 . . .

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Periods

Do not use a period after an abbreviation unless:

a. The abbreviation spells some other English word.

b. The abbreviation is the last word in a sentence.

c. It may be confusing to the reader without a period.

Examples:

No periods	Periods helpful
sync	ant. cap.
xmtr	coax.
para	in.
cm	pot.
etc	sect.
	fig.
	am.

Exceptions:

- When abbreviations are used as symbols in mathematical expressions, omit all periods.

Examples:

cot (cotangent)
sin (sine)
tan (tangent)

- In pairs, or sets of words, use periods for consistency.

Examples:

long. (longitude)
lat. (latitude)

Suggestion:

Avoid sentences that end with an abbreviation that needs a period because it spells another word. When that happens, rewrite the sentence or spell out the abbreviation. For example, "Check the if." could cause confusion. Better: "Check the if. before . . .", or "check the intermediate frequency."

Plurals

Generally, use an abbreviation in one form only; do not make it plural.

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Examples:

Singular	Plural
1 in.	25 in.
0.5 g (gram)	15 g (gram)
part no. 199820-100	part no. 199820-100, 199820-110, and 199820-120

Exceptions:

- Where space is a problem on a chart or a table, it is permissible to pluralize an abbreviation if it makes the meaning clearer to the user. For example: "remove xtals" or "check rcvr test tgts."
- Some detail specifications require that a plural abbreviation, such as Nos., be used in certain applications. Others require lowercase (no. or nos.). Before using these variations make certain it is actually required.

Possessives

Do not make an abbreviation possessive. Use the same basic form of the abbreviation; the user can supply the possive case mentally if necessary.

Prefixes for Unit Symbols

The symbols for unit prefixes are included in the MIL-STD-12

NOTE

Do not compound prefixes, such as millimicro or megomega; it may cause confusion. Use one prefix only denoting the highest order of magnitude.

Abbreviate the prefix "micro" by using the letter "u" (U in illustrations). MIL-STD-12 authorizes the Greek letter μ, but this symbol is seldom provided on typewriters. It could be supplied by rub-ons from artist's aid sheets, or hand-drawn, but it is best to avoid it by spelling out "micro."

Prefix	Multiple	Symbol for Prefix
tera	10^{12}	T
giga	10^{9}	G
mega	10^{6}	M
kilo	10^{3}	k
hecto	10^{2}	h
deka	10^{1}	da
deci	10^{-1}	d
centi	10^{-2}	c
milli	10^{-3}	m
micro	10^{-6}	μ
nano	10^{-9}	n
pico	10^{-12}	p
femto	10^{-15}	f
atto	10^{-18}	a

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Redundancies

Avoid unintended redundancies when using abbreviations. Remember the word for which teh abbreviation or symbol stands and avoid it directly.

Example, avoid:

	use:
if. frequency	if.
ac current	ac

Exception:

Combinations, in which another modifier separates the abbreviation from its redundancy are permissible, such as:

dc plate curret
ac heating current

Avoit repeating "dc" when a polarity (+ or -) is given with the numberal; or "ac" if the frequency is given. Only when the polarity is irrelevant, or the supply frequency is irrelevant, use "V dc" or "V ac."

Avoid	Use
+28 V dc	+28 V

Spacing

Space abbreviations as shown in MIL-STD-12. Leave a space before and after the abbreviation and other text.
Leave a space between a number and the abbreviation of the unit of measurement which follows:

Examples:

+28 V
25.5 ft
3 g

Leave a space before and after a symbol denoting arithmetic operation.

Example:

5 + 6 = 11

When combining a unit symbol with an abbreviation, leave a space between them.

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Examples:

17° E (17 degrees east)
8 cm w (8 centimeters wide)
14 V dc

Exception:

In mathematical expressions, close the space between g (gravity) and the preceding number 2.5g). In text treat g as an abbreviation and leave space (4.5 g).

Temperature Symbol

The degree symbol may be used together with the designated temperature scale. The degree symbol and the letter for the scale should not be separated, but written together as, for example °C or °F.

NOTES

- The Centigrade temperature scale has been superseded by the Celsius scale; Centigrade is no longer used.

- The degree symbol has been deleted from the Kelvin scale; K stands for degree(s) Kelvin.

Thru/Through

Use "thru" when referring to any series such as serial-number effectivities, page numbers, dates, or consecutive items of any kind.

Example:

. . . . units 19 thru 28 require . . .

For all other applications use "through."

Example:

Pull cable through opening A . . .

Typewritten or Preprinted Symbols

If a manual is prepared on a machine which cannot produce a symbol, such as a Greek letter or ±, the symbol may be spelled out - as "porm" for "plus or minus."

Such usage must be explained the first time it is used in the manual and must be explained as applicable in the manual's foreword, preface, glossary, introduction, or section on how-to-use the manual; and listed in the list of special abbreviations and symbols.

NOTE

Self-adhesive preprints, if used, must be carefully edited to ensure accuracy and completeness.

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Verb Tense

When a verb is abbreviated, use the same abbreviation for al tenses.

Examples:

insp - were inspected
insp - are inspected
insp - will be inspected

NOTE

The above rules of snytax apply to abbreviations and to symbols. They do not apply to acronyms, which are inflected in the same way as word.

Examples:
NSIA's programs . . . (possessive)
. . . applies to all radars.

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Section 9
CAPITALIZATION

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All rules for uppercasing or lowercasing in a manual must be in accordance with the specifications to which the manual is being prepared. Specification requirements vary widely. For example, some require that each figure have a formal number and a title that uses initial caps on each word centered under the illustration, while other specifications permit a lowercase title to be placed on any part of the illustration or no figure title at all. Capitalization is merely a means to an end; any style is acceptable as long as it is:

Used consistently.

Nondistracting.

Helpful to the user.

Prepared in accordance with applicable contractual specification requirements.

The rules given in this section are based on the *U. S. Government Printing Office Style Guide* and on standard English usage.

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WHY AND WHEN CAPITALS?

- Headings.
- The beginning of a statement. (Standard English usage.)
- Distinguishing one particular object from the general class of similar objects (formal identification).
- Avoiding confusion.
- Specification requirements.
- Emphasis.
- Showing respect, when a word is derived from an individual's name.
- On illustrations when equipment for lowercasing is not available.
- Computer output when lowercase printer is not available.

CAPITALIZATION POLICY

Minimize Use of capitals.

Some publishing organizations use capitals liberally whenever a choice of uppercase or lowercase exists. This style guide recommends the opposite: given a choice, lowercase. The policy is called capitalizing down.

A good rule to remember is: if there is not a good reason to capitalize, don't. Personal preference is usually not a good reason because it results in inconsistencies.

Reasons for minimizing use of capitals

a. Government specifications require uppercase for defined special purposes; its unrestricted use for other purposes weakens the impact of the required ones.
b. Emphasis is obtained visually by using contrast. If excessive capitalizing is used, the contrast, and hence the purpose of the capitals, is lost.
c. Lowercase text, particularly if lengthy, results in easier, faster reading.

AUTHORITY FOR CAPITALIZING

Use the *U. S. Government Printing Office Style Manual* as a general guide for capitalizing.

CAPITALIZING ABBREVIATIONS AND SYMBOLS

Capitalize abbreviations in accordance with the same rules that would apply if the words were spelled out.

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Exception:

Some abbreviations are always uppercased in MIL-STD-12.

Never capitalize lowercase symbols! (Capitalizing may change their meaning.)

MODES OF CAPITALIZING

1. All Cap - EVERY LETTER OF EVERY WORD

   a. Computer output (direct pickup)
   When computer output, or other automatically mechanized printed output, is available for direct pickup (photographically) in such formats as equipment lists, wiring lists, signal flow data, all uppercase letters may be used if lowercase printing equipment is not available. When lowercase capability exists, applicable rules for capitalizing should be observed.

   b. Illustrations
   - All text on illustrations may be all cap. if lowercase typing capability is not availab.e
   - All abbreviations on illustrations as shown in column 1 of MIL-STD-12.

   EXCEPTION: If ALL-CAP text contains a lowercase symbol, do not uppercase the symbol: it may change the meaning.

   c. Headings
   - Capitalize as required by specifications.
   - Unless otherwise called out by specifications, one recommended style for capitalizing headings is shown below:

A——————————— PART ONE

AUXILIARY EQUIPMENT

B——————————— CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATING CONTROLS

PRIMARY HEADING

Stand-Alone Heading
Run-in Heading.

a. First-Level Subparagraphs.

(1) Second-Level Subparagraphs.

(a) Third-Level Subparagraphs.

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Use all cap on such manual headings as:

Chapter (B)	Preface	Glossary
Part (A)	Table of Contents	Index
Foreword	List of Tables	Appendixes
	List of Illustrations	

d. Panel Nomenclature
Capitalize control, indicator, and test point nomenclature as shown on the equipment (usually panel nomenclature is all cap).

e. Table Titles
At top of table - use all cap.
At bottom of table - use initial cap.

2. Initial cap - First letter of each important word.

*The following words in headings or titles are not important unless:
they are part of panel nomenclature
they are the first word of a title

articles - a, an the,
short prepositions- at, by, down, for, in, of, on, up, to (unless it is part of an infinitive - e.g., Orders To Stand By)
conjunctions - and, as, but, if, or, nor

a. Acronyms or coined words
Initial - cap proper names in shortened form, when the shortened form contains more than the first letter of any word.

Example: Pepco (Potomac Electric Power Company)

b. Captions
Initial-cap captions or titles of illustrations and tables except when the table title is on top.

Example:

Figure 2-1. Functional Description of the Radar Set

c. Column Headings in tables or charts
Initial-cap all important words.

d. Hyphenated Compounds in Titles
Initial-cap all important words.
Example:
Description of Pulse - Forming Circuits

e. Formal nomenclature
Initial-cap items with specific part or identification number when written in the order below (former nomenclature order).
Test Set TS-23/U
Fire Control System MD-4

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but, lowercase the following:
. . . the TS-23/U signal generator
. . . MD-4 fire control system

f. Formal titles
Initial-cap formal titles of people.
Examples:
The matter was referred to General Miles.
. . . direct your answer to C. P. Adams, Project Manager.

g. Lists of illustrations and tables
Initial-cap all titles included in these lists (i.e., titles of figures, illustrations, diagrams, and tables).

h. Proper nouns
Initial-cap each word in multinoun names.
Examples:
United States Army
U. S. Armed Forces (but armed forces when used in the general sense)

i. References to publications
For user convenience, avoid referencing whenever possible.
When referencing is necessary, capitalize as follows:
- Formal Title - Initial-cap.
Example:
Handbook of Service Instructions for Fire Control System MG-24.

- Informal title - Lowercase
Example:
. . . the handbook of service instructions for the MG-24 fire control system.

j. Table of Contents
Initial-cap titles or headings of paragraphs.

3. First Word Cap - First letter of first word only.

a. Lists, Tables, and Charts
Uppercase the first letter of the first word in:
- Each entry in a legend, table or chart
- Each entry in a tool or equipment list, whether with or without part numbers
- Each item of list format

Example:
The operations include:
Mounting the frame under the chassis
Aligning the lens after disassembly

b. Sentence or Statement
Uppercase the first letter of the first word of each new sentence (or statement having the effect of a sentence), whether in text, keyed text, or tabular format.

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NO CAP - ALL LOWERCASE

Lowercase the following unless required otherwise by specifications or for consistency or some special reason:

a. Letters that designate the following:
- Steps or substeps of a procedure or items in a list
- Parts of an illustration (a, b, etc). Also references to these parts.
- Axes on a graph (designated by x, y, and z)
- Terminals (designated by x, y, and z) unless such letters are part of panel nomenclature

b. Hardware nomenclature
When no panel nomenclature exists, lowercase controls, indicators, and test points, even though they are uppercased on diagrams or illustrations.

c. Informally Used Titles
Lowercase titles without a specific name.

Examples:
commanding officer section head project director chairperson

d. Referencing Informally
- Lowercase names of systems, units, components, tools, fixtures, or test equipment written without a part number, or written in non-formal* order.

Examples:
. . . the E-3 fire control system (non-formal order)
. . . the connecting cable
*In formal order, all items which have panel nomenclature must be wirtten exactly as shown on the nameplate.

- Avoid cross-references to other parts of the manual whenever possible, but if unavoidable, use lowercase:

Examples:
paragraph 4-12
page 6-3

e. Signal Nomenclature
Lowercase in text, even when uppercased on illustrations or diagrams.

SPECIAL CAPITALIZATION RULES

1. Copyright Trade Names

If their use cannot be avoided by using the equivalent standard item name, capitalize names like Xerox, Kodak, Teflon.

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2. Government

Capitalize the word government when referring to the U. S. Government.

Example:

. . . Government - furnished equipment (GFE)

3. Mach

Lowercase mach (for speed of sound) although derived from a person's name.

4. Terms

Unless followed by an identifying number, lowercase such terms as:

contractor - furnished equipment	publication number
engineering order	technical order (TO)
instrument landing system	ground controlled approach

If followed by a specific number, use initial caps.

5. Revision or Change Data

Unless the applicable specification calls for lowercase letters, capitalize letters designating information added by changes or revisions. For example, three pages added between pages 8 and 9 are designated as pages 8A, 8B, and 8C.

Omit capital letters I and O when they may be confused with numbers.

6. Type Styles

Lowercase when referring to type styles (e.g., roman*, italics).
*but Roman numerals.

7. Single-Letter Compound Nouns

Capitalize the single letter in such nouns as:

I-beam X-ray Y-axis

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QUICK-REFERENCE CAP GUIDE

QUICK-REFERENCE CAPITALIZATION GUIDE

Topic	General Rule	Page Ref.
Abbreviations	Cap. same as if words were spelled out.	9*/11, 10/2
Column headings	Initial-cap important words.	4**
Controls, indicators, test points	As shown on equipment. If no panel marking, use lower case.	3,6
Copyright product names	Initial-cap only.	4,7
Divisions of a manual	All-cap, except when referencing; then use lowercase.	3,6
Hyphenated words in titles	Initial-cap important words.	4
Illustrations vs text	Using all cap. on illustrations is not authority for cap. in text.	3,6
Lowercase symbols	Never cap.	2
Unimportant words in titles (usually)	Lowercase.	2
Proper nouns/names	Initial-cap.	4
References —		
Informal, not specifically identified	Lowercase.	6
Not in nameplate order	Lowercase.	6
Formal, specific	Initial-cap.	4
Cross-referencing in manual	Lowercase.	6
Signal names	Lowercase.	6
Table of contents —		
Titles of sections	All-cap.	3
Headings of paragraphs	Initial-cap.	4
Titles of tables —		
On top	All-cap	3
On bottom	Initial-cap	3

*The first digit of a double-digit number identifies another section.
**Single-digit numbers refer to pages in this section.

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Section 10
Compound Words

	Page		Page
Definition	1	Types of Compounds	3
Authority	1	Solid Compounds	3
Compounding	1	Hyphenated Compounds	4
Symbol or Word Stress	1	Separate Words	5
Factors in Compounding	2		

DEFINITION

Compound: A word composed of two or more words joined with a hyphen or written in solid form (wavelength, pulse-width).

A word consisting of various combinations of words, combining forms, or affixes (as Kilohm, subunit, supersearch).

AUTHORITY

Use the *U. S. Government Printing Office Style Manual* as a general guide for compound word forms.

COMPOUNDING

The rules for compounding are not static and are full of exceptions. Word forms constantly undergo modification. For example, two-word forms often have hyphens at first; then, with frequent usage, the hyphen is dropped and the two words become one word. Often the transition is from two-word to one-word form, bypassing the hyphen stage.

Correct current usage for individual compounds is shown in the list of compounds at the end of this section. The authorized GPO *Style Guide* contains a longer list which you should check when necessary to determine a correct form. For each compound used, be sure you are in accord with the following usability rules:

a. Make certain reader does not have to back up and read the compound several times before comprehending it.
b. Be consistent throughout manual.

Syllable or word stress

The compound form can often be determined by where the stress falls when the sentence is read aloud. Usually when the stress falls on the first word, or first syllable of the compound as it precedes the word it modifies, the words are either hyphenated or solid. On the other hand, when the stress falls on the last word or syllable, all words are written without hyphens as separate words (open).

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Examples:

Hyphenated or Solid	Open
We are using up-to-date equipment.	Our equipment is up to date.
Time-of-flight information will determine the program	Information was delayed regarding the time of flight.
Setup of the equipment was completed.	The equipment was set up.
Perform lockon.	Review the procedure so you can lock on to target.

Factors which contribute to hyphenation/compounding rules are:

Relative familiarity
Syllable stress (in reading)
Exact connotation
Word form (noun, adjective, verb)
Special cases

Example:		
crossband	-	solid
cross section	-	open, to prevent tripple "s"
antiaircraft	-	solid
anti-British	-	hyphenated to retain capital "B"
preamplifier	-	solid
Pre-position	-	hyphenated, to avoid confusion with "preposition" (a part of speech)
electroscope	-	solid
electro-optics	-	hyphenated to avoid first reading of "oo" sound
rust resistant	-	open The compound is rust resistant.
rust-resistant	-	hyphenated as adjective. A rust-resistant compound . . .

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TYPES OF COMPOUNDS

Solid Compounds

1. A word root used with a prefix, combining form, or suffix such as:

anti	de	pre
co	in	re

Examples

antijam	deenergize	readjust
coordinate	microinch	reinstall
counterclockwise	preamplifier	wavelike

Exceptions:

pre-World War II	re-creation
un-American	un-ionized

and many others, based on:
clarity
usage
intended meaning
emphasis

2. Two short nouns joined together to make another noun.

Examples:

airship	motorboat
cleanroom	pinhole
darkroom	workweek

3. A noun made up of a short verb and an adverb.

Examples:

breakdown	lockout
countdown	mockup
lockon	throwaway

NOTE: When compounds like these are not used as nouns, they are open (separate words).

Examples:

Rotate . . . to lock on to target.
. . . will cause insulation to break down.

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Exceptions:

cut-in
run-in
tie-in

Hyphenated Compounds

1. Word with duplicate prefix.

   Examples:
   counter-countermeasures
   sub-subgroup
   north-northeast

2. Word prefixed by:

	Examples
ex	ex-employee
self	self-test
quasi	quasi-particle

3. Two-word fraction or number.

   Examples:
   thirty-two
   one-half

4. Word with single-letter modifier (preceding noun or participle).

   Examples:

   x-ray
   y-axis
   I-shaped

5. Modifying phrases or words which precede the word they modify.

   - Present/past participle combined with another word.

     Examples:

     rust-resistant coating
     air-conditioned room
     fire-tested materials

   - Unit modifier (combination of adjectives and nouns which together modify a noun.)

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Examples:

high-frequency-test results
alternating-current output
5-second delay
long-life-sycle system

NOTE: When two or mroe numerical values modify the same unit of measurement, use a hyphen and a space after each number which is remote from the unit. For example:

1. Attach several 3-, 5-, and 6-inch strips.
2. Use only 5- and 10-watt resistors.

- Prepositional phrase, improvised to suit the specific situation.

Examples:
line-of-sight calculations
trial-and-error approach

6. Coordinate forms (equal rank).

Examples:

left-right	receiver-transmitter
east-west	input-output
undervoltage-overvoltage	

7. Compound verb.

Examples:

field-test	die-cast
arc-weld	air-cool
hand-carry	self-test

Separate Words (When to use)

a. Words appear in normal sequence and meaning is clear.

Examples:
digital computer signal
fire control system
oscillator frequency adjustment

b. First word is an adverb ending in "ly."

Example:

carefully arranged program
closely observed target

c. First word of two-word modifier is a comparative or superlative.

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Examples:
higher level decision
better calibrated meter
greatest measured value

d. First two words of three-word modifier are adverbs.

Examples

very well defined area
longer than usual extension
not too distinct noise

e. Compounds are composed of signal/unit nomenclature.

Examples:

time transfer signal
store modified status voltage
high voltage supply unit

f. Modifying words are independent.

Examples:

top round indicator
long extended lever
green cylindrical tube

g. Foreign phrases are used.

Examples:

per diem employee
ex officio member

h. Second element of modifier is a number or letter.

Examples:

class II changes
appendix C pages
point 4 program

i. Chemical, scientific, technical terms are used.

Examples:

carbon monoxide poisoning
methyl bromide solution
photoconductive detector equipment
antireflection coating materials
optical filter wavelength

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j. Confusion could result from use of hyphen, as when a numerical value of compound is preceded by +, - or ±.

Examples:

+28 volt power source (*not* +28-volt power source)
+8° C temperature setting (*not* +8-° C temperature setting)

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Section 11
MATHEMATICS

Objective 1
Problems 1
Mechanics 1
Style Rules 2
Equations 3
Spacing 4
Italics 5

OBJECTIVE

Coverage of mathematical style is primarily directed against the ever-present risk of error in transcribing complex symbolical data from one document, or style, to another.

Formation of numbers and symbols, arrangement and spacing, placement of subscripts and superscripts, and all other details must be foolproof.

PROBLEMS

Errors in printed copy are often due to the unclear or inconsistent style practices of the rough-draft writer, or the failure of the writer to proofread such copy at every stage of transcription.

MECHANICS

1. Make every detail of each mathematical symbol or expression unmistakably clear, regardless of how well the symbol or expression may be known in engineering. The item will be taken literally as you write it by the typist, and printer.

2. Supplement your original draft with oral or written instructions, as necessary, to take care of all forseeable problems.

3. Hold the use of mathematical expressions to a minimum controlled by the real needs of your reader. Never use a mathematical expression, except of the most elementary type, if simple English words can be used as a good substitute.

4. Don't use mathematics in technical manuals as a form of shorthand aimed only at the convenience of the writer; direct necessary mathematical treatments toward making data clearer to the reader.

5. Generally write mathematical expression by hand; this method gives you better control over style, aymbology, and typography.

   If an expression is to be written by you in a space left open in the typed draft, make this fact clear to the typist in each instance. Indicate the amount of horizontal and vertical space you will require (inches or typewriter spaces).

6. Avoid use of uppercase letter when it is your intention that lowercase be used in the final copy.

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STYLE RULES

1. Make certain that all expressions that are included in a single line are free from ambiguity. Use parentheses where necessary.

   EXAMPLES:

   Ambiguous: . . . channel output signal gt/V sin L is applied . . .
   Clear: . . . channel output signal (gt/V) sin L is applied . . .
   Clear: . . . channel output signal $\frac{gt}{V}$ sin L . . .

2. Don't try to crowd complex or hard-to-read expressions into single lines of type. Increase the line spacing to accommodate a horizontal-line division indication, as in the third example above.

NOTE

Generally prefer the style in which the horizontal division line is fully extended, so as to make gt sin L read gt sin L, except where an item such as gt has a significance that requires its retention in the separated form.

V V V

3. Center and indent any complex or hard-to-read expression in a clear space between the lines of text. If a series of such expressions is to be written, start them at the typed-area margin or indent them in any consistent manner. Center and indent any important expression, regardless of complexity, to introduce or emphasize it.

   EXAMPLE:

   The value of the cutoff wavelength c is

$$\lambda c = \left(\frac{90°}{\theta_1 + \theta_2}\right) \lambda co$$

   where co = **2a cutoff wavelength without ridges and and satisfy the approximate equation**

$$\cot \theta_2 + (b_1/b_2) \cot \theta_1 = 0.$$

4. Punctuate mathematical equations in much the same manner as text, but don't use the customary commas to set off nonrestrictive expressions placed in a cleared space between line sof text.

   EXAMPLE:
   Figure 8-12 shows that the described condition

$$E_c + \frac{E_b}{\mu} = 0$$

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exists when the grid of V35 is just sufficiently negative to neutralize the attracting power nof the plate at the cathode.

(The commas that would be required in an equivalent "nonrestrictive" situation in text are omitted)

5. Use terminal periods after expressions at the end of sentences, except when the terminal arrangement of the expression is such that use of a period would be meaningless or confusing to the reader.

EXAMPLE:

The equivalent circuit (fig. 4-23) shows that

Amplification in middle range of frequencies $\left.\right\} \quad \frac{e_o}{e_s} = \mu n.$

6. Don't introduce an expression with a colon (:) unless the words "as follows", "the following," or the like are also used.

EXAMPLE:

The impedance formed by the reactance in series with resistor R7 is

$$Z = \sqrt{R^2 + (\omega L - \frac{1}{\omega C})^2}$$

(The terminal period is omitted for clarity.

7. Avoid use of the slant bar in writing any but the simplest mathematical expressions, particularly in a typeset book.

EQUATIONS

1. When a long expression must be carried over to a succeeding line, divide the expression at one of the following points:

Set the first portion of the equation flush with the left margin of the allotted area and thee second portion flush with the right margin of that area.

a. Just before an equals sign (=) in an equation.

b. Just before a plus (+) or minus (-) sign separating elements of comparable rank.

c. Just before a multiplication sign (x). Use this type of multiplication indication whenever line interruption is necessary at a multiplication point.

EXAMPLES:

$$18r + 6f - 11g + 30f(r - 1) + 33fg$$
$$= 30f(r + 14g(r^2 + f^2)$$

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. . . in this circuit the plate current is given by the equation

$$I_p = a_1(E_g + \frac{E_p}{\mu}) + a_2(E_g + \frac{E_p}{\mu})^2 + a_3(E_g + \frac{E_p}{\mu})^3$$

2. 2. In a series of equations, aline the major equals signs.

EXAMPLE:

Solution: Since $P = EI$

the line current is $I = \frac{P_L}{E_L} = \frac{21,400}{230} = 93.0$ amp

and the field current is $I_f = \frac{E_L}{R_f} = \frac{230}{100} = 2.3$ amp.

3. Make any enclosing symbol, such as parentheses ( ) or braces { }, just wide enough to aline with the highest and lowest points of the matter enclosed.

Similarly, make any dividing or covering element, such as the horizontal division symbol (_____) or the top of the radical sign $\sqrt{\quad}$, must wide enough to aline with the right and left outer edges of the matter divided or covered.

EXAMPLES:

The input impedance is determined by

$$Z_1' = Z_1 \left[m(1-m)\frac{(K-1)^2}{K} + 1\right].$$

The frequency of peak attenuation, f_∞, is

$$f_\infty = \sqrt{\frac{f_0^2}{1-m^2}} = \frac{(15 \times 10^3)}{1-(0.6)^2} = 18.75 \text{ kHz}.$$

4. Use parentheses, brackets, and braces in the following order to set off parts of an equation:

$$\{[(\quad)]\}$$

SPACING

Leave one space before and after:

The symbols +, -, x (*times*, +, -, , , =.

Trigonometric-function abbreviations (sin, cos, tan, etc).

Fractions not directly enclosed by parentheses or brackes.

Omit space between:

A trigonometric-function abbreviation and an exponent ($\sin^2$, $\cos^3$).

Sympols +, -, + and number indicating at polarized value or a tolerance (+ V, 120 +3 V ac).

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Omit space before:

punctuation marks
subscripts
superscripts
exponents
reciprocals

(a^2 F^3, D')

ITALICS

Use italics

Letters used as mathematical symbols in typeset mathematical expressions.

Don't use italics

Circuit reference symbols (R, C., . . .) used tc designate specific electrical parts.

Letters used to spell:

words
abbreviations
units of measurement

Arabic numerals

Operation symbols

+, -, [ ], ( )
(Don't slant these.)

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Section 12
NUMERALS

	Page		Page
Spell Out Numerical Quantities	1	Hyphen	3
Use Numerals	3	Slant Line	4
Don't Repeat Spelled-out Number as a Numeral	3	Zero	4

NOTE

See the *Writing Handbook* for information on Measurements and Tolerances.

SPELL OUT NUMERICAL QUANTITIES

Spell out numerical quantities under the following circumstances:

a. Numbers under 10 in text matter unless they are:

- Followed by a unit of measurement, time, or quantity
- Used in series with other items expressed as numerals.

NOTE

Rule includes ordinal numbers - first, second, etc.

EXAMPLES

The unit contains four missiles.

The unit contains 4 missles and 11 rockets.

Each Missile is 4 feet 1 inch long.

The seventh stage is not biased.

Timing is controlled by the 11th and 12th relay stages.

b. A number that must appear at the beginning of a sentence or heading. It is preferable to rephrase the sentence/heading.

EXAMPLES:

Wrong: 19 units were shipped.
Better: *Nineteen units were shipped.*
Rephrased: The factory shipped 19 units.

c. A number of less than 100 immediately preceding another number.

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EXAMPLES:

The order consisted of nineteen 8-pound units.

But

The order consisted of 119 8-pount units.

d. A number in an indefinite expression.

EXAMPLES:

. . . a thousand and one possible trouble symptoms . . .

. . . the systems to be produced in the early sixties . . .

NOTE

Use of the words nearly, about, around, approximately, etc, doesn't make an expression "indefinite" in the sense referred to above. Write "approximately 8 inches," not "approximately eight inches."

e. A fraction that stands alone in a sentence or is followed by "of a," "of the," etc.

EXAMPLES:

Installation took one-fourth of the allowed time; alignment, three-fourths.

The adjustment group did three-fourths of the work within 8 hours.

Only one-fourth of an inch now remains of the material.

f. Round numbers (hundred, thousand, million, etc), unless they

- They are used in a series which includes precise numbers.
- They precede a unit of:

  Measurement

  Time

  Quantity

- The spelled-out form is clearer.

EXAMPLES:

. . . a hundred missiles . . .

. . .100 missiles and 42 interceptors . . .

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. . .100 feet,100 years, 42 percent . . .

. . . one trillion dollars . . .

. . . 15 trillion dollars (or $15 trillion) . . .

USE NUMERALS for the following:

a. Any numercial expression of 10 or more (except as indicated above).

b. Expressing units of:

Measurement
Time
Quantity

regardless of magnitude.

EXAMPLES:

9 inches
1 year
55 quarts

c. Phase rating of power source - except for the expression "single-phase" power.

EXAMPLE:

The system provides 3-phase power.

DON'T REPEAT spelled-out number as a numeral.

Except for required use in a legal or quasi-legal document, don't repeat a spelled-out number as a numeral. (A Government regulation may require such a dual listing of numbers in specific instances.)

EXAMPLES:

Wrong: The launcher has four (4) missiles installed.

Right: The launcher has four missiles installed.

HYPHEN

To indicate a range of numbers occurring in condensed data, use a hyphen between the limit numbers. (The hyphen then means "thru.") If ambiguity is possible, spell out "thru."

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EXAMPLES:

1-4 feet
pages 264-381
the 1950-1960 period

2. Omit the hyphen in unit modifiers in which the numerical value of the compound is preceded by +, -, or ±.

EXAMPLES:

the +28 volt power supply

But

the 28-volt dc and 29-volt ac power sources.

3. Omit hyphens with abbreviations or symbols.

EXAMPLES:

the 28V power supply

the 28 V dc and 29 V ac power sources

SLANT LINE

To indicate in a concise manner that either one number or another applies, use a slant line between the numbers. If required for clarity, explain this usage the first time it appears in a given application. Be careful the slant line cannot be interpreted as "per" or "divided by."

EXAMPLES:

GAR-1/2 missiles (meaning either GAR-1 or GAR-2 missiles)

ZERO

Use a zero before the decimal point for any decimal number less than one; treat such a number as singualr grammatically.

EXAMPLES:

0.15 inch or 9.9547 centimeter
But 1.0001 inches

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Section 13
CROSS-REFERENCING

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SCOPE

Cross-referencing pertains to directing the reader from one place in a manual to another as follows:

a. To pertinent information in another place in the same manual. This includes from text to illustration/tables and vice versa.

b. To other volumes of the same manual.

c. To other publications.

POLICY

Cross-referencing should be kept to the minimum because it makes a manual difficult and time-consuming to use.

METHODS FOR MINIMIZING CROSS-REFERENCING

1. When information is short and consecutive, make it part of the paragraph in which it is introduced.

2. Use "above" or "below" when cross-reference is to paragraphs closely preceding or following.

3. Repeat cross-referenced material appearing in any other publication when the material is short (less than two pages, or can be condensed to two pages).

4. In text with illustrations place text and illustration on the same page or facing pages.

5. In unit manuals, use the words "from system" or "to system" whenever possible, to minimize cross-referencing.

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NOTE

When cross-referencing cannot be avoided, limit it to:

Same manual
Another volume of same manual
Publications available to technician (which have a recorded distribution to his organization.)

ACCURACY

Do everything possible to ensure accuracy of all cross-references in the manuscript and in the final copy. Check each cross-reference directly. Following any change or correction in the manuscript, recheck each cross-reference that could possibly be affected.

When a change or revision has been made to a manual, recheck all cross-references, including those in portions of the manual that were otherwise not changed or revised. Check cross-references to other:

Parts	Paragraphs	Illustrations	Volumes
Chapters	Subparagraphs	Zone numbers	Pages
Sections	Procedures	Tables	Technical manuals
Subsections	Procedural steps	Charts	Legend index numbers

CROSS-REFERENCING MECHANICS

Same Manual or Another Volume of Same Manual

1. If material is numbered, cross-reference by applicable number of:

Part	Paragraph	Illustration
Chapter	Subparagraph	Table
Section	Procedure	Chart
Subsection	Procedural step	

2. If material is unnumbered, cross-reference by name or title of applicable:

Paragraph	Illustration
Subparagraph	Table
Procedure	Chart

This to be used only if cross-reference can be clearly understood and easily located

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Other Documents

NOTES

- Don't cross-reference specifications or standards for essential information concerning procedure performance.

- Don't make cross-reference to publications of a temporary nature or to those unavailable because they are limited to certain organizations or activities.

1. Cross-reference other publications by identifying numbers.

2. Cross-reference Government specifications and standards by basic number as listed in the Department of Defense, Index of Specifications and Standards (DODISS).

STYLE

Parenthetic, Short Cross-reference

1. Within a sentence, use:

   Type of format -

fig para	abbreviated
section appendix chapter	spelled out

   followed by applicable reference number.

   EXAMPLES:

   1-3. MODES OF OPERATION.
   The E-99 fire control system (fig. 1-4) provides the following modes of operation:

   r. Perform preliminary adjustments (para 4-6).

   s. Perform rf sensitivity adjustment (para 4-11 thru 4-15).

   12-13. The test unit is manufactured in two forms - - protable and rack-mounted. The portable form (fig. 12-9a) is usually provided on initial procurements. A space is left available in the test position rack for th eother type (fig. 12-9b), which may be procured on special order.

2. Between sentences, write a complete sentence, using "see" followed by the cross-reference. (Place closing period inside closing parenthesis.)

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EXAMPLES:

8-32. In making the following adjustment, observe the genral rules for performing operations of a critical nature. (See para 8-5 thru 8-8.) The adjustments will fail if . . .

6-31. TIMING SECTION. The timing section of the remote-station sychronizer (503 unit) is identical with that used in the local synchronizer (003 unit). (See para 6-9.) The 503 unit is .

NOTE

Don't use complete sentence-type cross-references within another sentence or preceding the terminal period of a sentence. Within a sentence:

Change:

(See fig. 6-1.) to (fig. 6-1)

or to ". . . as shown in figure 6-1."

Parenthetic, Long Cross-reference

In text spell out all cross-reference categories such as figure, paragraph, section, etc.

EXAMPLE:

23-8 . . . (For a detailed discussion of the control circuit, see paragraph 19-23.)

Non-Parenthetic Cross-reference

In text, spell out all cross-reference categories such as figure, paragraph, section, etc.

EXAMPLES:

8-45. . . . The procedure for making the adjustment is shown in figure 8-23.

1-1. PURPOSE OF EQUIPMENT. Radar Set AN/APG-99, shown in figure 1-1, performs the following functions:

a. . . .
b. . . .

With Tables and Charts

1. In simple tabular listings (parts, tools, legends) be brief and concise - (fig. 1-4) or (para 4-6).

EXAMPLES:

crimping tool (fig. 3-8)
special pliers (fig. 3-0)
special wrench (fig. 3-10)

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NOTE

If "see" must be used for clarity, do not capitalize; do not use terminal period: (see fig. 3-8). This rule does not apply to text.

2. If many items contain cross-references, a separate column may be used for them; entries then should not use parentheses.

EXAMPLE:

Item	Fig.
crimping tool	3-8
special pliers	3-9
special wrench	3-10
. . .	. . .

With Illustrations Using Figure Numbers

1. For index (callout) numbers:

a. Use format: 34, figure 2-6.

index number first — figure

When a general cross-reference to figure number is provided at the beginning of the paragraph, use index number only.

EXAMPLE:

Rotate cam (6) . . .

b. When several cross-references in a paragraph refer to the same figure, indicate figure number in first cross-reference only. This cross-reference applies until the sequence is broken by a cross-reference to a different page or figure number.

2. Figures placed in the manual for general reference purposes may be referred to in blocks.

EXAMPLE:

A schematic diagram is provided for each unit. (See figure. 12-1 thru 12-56.) These diagrams are arranged in order of . . .

3. Make illustration zone cross-reference as follows: . . .
(zone 2B, fig. 7-8) . . .

Omit the sheet number if the cross-reference includes a zone number (or numbers).

Omit the figure number in a cross-reference to another zone in the same figure: . . . (zone 4C) . .

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In Headings

1. Parenthetic cross-reference in subordinate* paragraph heading:

*Stand-alone, secondary heading (not followed by run-in text).

10-34. RF AMPLIFICATION SECTION. (See fig. 10-16.)

• • • • •

23-34. MODULATION SELECTION AND CONTROL SECTION. (See fig. 23-12)

NOTE

A boldface primary heading should not be followed by cross-reference.

2. Use parenthetic cross-reference in run-in secondary paragraph heading:

   a. Place period after heading.

   b. Make cross-reference a complete sentence.

      EXAMPLE:

      42-8. AGC CHANNEL V4, V5, V7, and V9. (See fig. 42-9.)
      The agc channel develops the voltage that . . .

3. Where heading is followed immediately by steps of a procedure or items of a list - make cross-reference a complete sentence:

      12-6. REMOVAL OF RF UNIT.
(See fig. 15-13.)

      a. Set PWR switch (5) to OFF.

Underlining

In cross-referencing to lowercase letters indicating:

a. Steps of a procedure

b. Portions of an illustration

c. Items in a list

Underline the designated letters for:

a. Italics in typeset manual

b. Emphasis in typewritten manual

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EXAMPLE:

Garbled: Repead step as if adjustment is needed.

Improved: Repeat step as if adjustment is needed

Better: If adjustment is needed, repeat step as.

Placement of cross-references

1. When using a cross-reference in a sentence, or between sentences, place the cross-reference following the first word or phrase to which the reference is exactly applicable (but maintain a readable sequence of words). Avoid both ambiguity and unnecessary awkwardness.

   Misleading: The two transmitters of the system (fig. 2-18) are mounted in forced-air-cooled cabinets. The illustration depicts the units partly withdrawn from the cabinets to show the locking mechanism.

   Correct: The two transmitters (fig. 2-18) of the system . . .

   Or: Figure 2-18 depicts the transmitters partly withdrawn from their cabinets to show the locking mechanism.

2. Place cross references to the right, or below, figure titles.

3. Don't regard cross-references used with figure titles as part of the title. Don't, for example, include the cross-reference with the figure title in the front matter.

Style below figure:	Style in front matter:
Figure 1-3. Installation Requirements (See table 1-5).	Figure Page 1-3. Installation Requirements 1-12

Repetition of Complete Cross Reference

Within a paragraph, regard a given complete cross-reference as applying until a new cross-reference appears; this permits use of the simplified form: (1), (5), etc. If you then wish to return to some other cross-reference, repeat that cross-reference in full.

EXAMPLE:

a. Set PWR switch (5, fig. 7-2) to ON.
b. Set RNG switch (4) to 200 MI.
c. Connect test probe (17, fig. 7-3) to TEST jack (2).

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Section 14
NOMENCLATURE

Page

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DEFINITIONS

Nomenclature: Nomenclature refers to names assigned to items in agreement with an organized designation system.

Name + part/type/model number = nomenclature

EXAMPLES:

Power Supply 448102-100

Power Supply 448102-100 and 448102-200

Power supply (when it identifies a specific unit)

NOTES

- Hereinafter, the term "part number" is assumed to encompass part, type, and model numbers.
- Names of units are nomenclature even without part numbers. However, names of such common items as "resistor," "switch," etc, are not nomenclature.

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Official and regularly assigned names of the following are nomenclature:

Test instruments	Indicating devices
Tools	Controls
Fixtures	Control positions
Circuits	Test Points
Signals	

Military Nomenclature: Systems and units procured by the Government may sometimes be assigned military nomenclature.

Descriptive name + coded type number = military nomenclature

NOTE

Military nomenclature, if assigned, takes priority over manufacturer's nomenclature. (It may appear in lieu of the manufacturer's nomenclature on the nameplate, with the manufacturer's nomenclature on the same nameplate, or on a separate nameplate on the equipment.)

CHOICE OF NOMENCLATURE

Military Nomenclature Assigned

If military nomenclature has been assigned, use it to the exclusion of manufacturer's (contractor's) nomenclature. However, a set of simplified nomenclature can be adopted providing it is cross-referenced to military nomenclature.

The cross-reference index, such as a list of equipment supplied, should include simplified names based on official ones. The simplified names may then be adopted and used consistently throughout the remainder of the manual, or sets of manuals.

If no military nomenclature assignments are planned, or the assignments are delayed, use the manufacturer's (contractor's) nomenclature.

No Military Nomenclature Assigned

In the absence of official military nomenclature, assign unit nomenclature from the following sources (arranged in the order of precedence). Simplified nomenclature may be established in this case also.

a. The nameplate.

b. The identification plate (nameplate) drawing.

c. Top assembly drawing for the unit.

d. The master index.

e. The schematic diagram.

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Nomenclature Below Unit Level

For assemblies, modules, subassemblies, or parts, assign nomenclature per title block of manufacturer's assembly drawing, except convert modifiers to straight-reading sequence.

In text, simplify drawing title names by omitting secondary modifiers, but be sure clarity and consistency are maintained.

Omit part numbers for items below unit level unless numbers are:

Needed for clarity.
Required for specification.

Common Names and Manufacturer's Names Without Part Numbers

For precise identification of common names or official manufacturer's names used without part numbers, clarify any such name by following it with a parenthetical, simplified "unit" number derived from the full part or assembly number, and the word "unit."

EXAMPLE:

"Horizontal Situation Indication 464080-100 (080 unit) . . . The 080 unit . . ."

NOTE

Thoroughly explain the simplified unit identification method to the reader.

Use any such simplified unit name-and-number identification method whenever required, particularly in:

Section titles
Paragraph headings
Figure titles
First mention of unit in text

COST CONSIDERATIONS

To avoid unnecessary change and revision costs, limit the use of complete part, type, and model numbers to the:

Titlepage
Introductory description
Introductory artwork
List of equipment supplied
List of test equipment and special tools required

Thereafter use the name portion of the nomenclature, or a consistent adaptation of that portion, unless the number is required to distinguish between like items.

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RULES FOR USING NOMENCLATURE

Consistency

Keep nomenclature consistent within publication and within a series of related publications. Don't call an item one name in one portion of a manual and another in some other portion.

Straight-Reading Sequence

Where nomenclature selected from manufacturer's engineering sources or from a Government agency is listed in inverted form, rearrange the nomenclature in straight-reading sequence (unless otherwise specified in contract or specification).

EXAMPLE:

Converter, angle data = angle data converter
(inverted form) (straight-reading sequence)

Straight-reading sequence should be used:

On title page
Throughout manual

If a "complete" military nomenclature is used, write it as listed in the official source document, except convert it to straight-reading sequence. This is required for clarity and readability of the text.

Don't insert explanatory modifiers not present on the nameplate; if such modifiers are needed, add them parenthetically, in lowercase, following the complete nomenclature.

EXAMPLES:

INCORRECT:	Power Suppler (indicator) PP-34/APG-45
CORRECT:	Power supply PP-34/APG-45 (indicator power supply)
CORRECT (title page):	POWER SUPPLY PP-34/APG-45 (INDICATOR POWER SUPPLY)

Articles (a, an, the)

Omit the article preceding nomenclature that includes the part number unless the article is required for clarity.

EXAMPLES:

The instructions for Flight Data Computer 446-46-0001-1 are given in paragraph 21-8.

The faulty units include Receiver-Control C-1683/ARR-44.

Using special socket wrench 586-50-3A, install the . . .

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Manufacturer's Part Number

Don't refer to subunits or parts by manufacturer's part number unless:

This is the only means of obtaining clarity.

Such identification is required by the controlling specification.

Multiple Components With Identical Basic Names

When two or more components have identical basic names, include appropriate descriptive modifiers in the common-name nomenclature assignments.

EXAMPLES:

Nameplate:

Power Supply 49901-100

Common name:

low-voltage power supply

Nameplate:

Power Supply 49902-100

Common name:

high-voltage power supply

Controls and Indicators With Panel Nomenclature

In all references to controls, control positions, test points, and indicating devices having panel or chassis nomenclature, write the nomenclature exactly as it appears on the panel or chassis.

Don't enclose such nomenclature in quotation marks unless required for clarity.

If correction or clarification of spelling or of an abbreviation is necessary, make the correction parenthetically the first time the item is referred to. If variations of panel nomenclature exist, as may be the case with units of standard test equipment, include at NOTE explaining that the panel names are typical and may vary slightly from one unit to another.

EXAMPLES:

Set MASTER switch to OFF.

Turn EL SCAN control to HOR.

Set OPER switch to SP.

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Set TEST switch S1801 (3) to position A.

Adjust SIG XTAL CUR ADJ (signal crystal current adjustment) for 3 ma on XTAL CUR meter M1.

In instructions involving controls and indicators with panel nomenclature, identify these items by panel name only. Omit the circuit reference symbol (R105, C56, etc) unless:

The instruction requires the operator to refer to an illustration showing the reference symbol.

The reference symbol itself appears on the panel.

EXAMPLES:

Set OPR CONTROL switch to REM.

Set OPR CONTROL switch S54 (fig. 4-6) to REM. ← When the reference symbol is part of the panel nomenclature or a suitable reference is given.

Controls and Indicastors Without Panel Nomenclature

If the control or indicator is unmarked on the panel, reference to cirucit reference symbol (reference designator) may be necessary. Make sure the reader knows how to identify the item physically.

Multiple Controls and Indicators With Same Panel Nomenclature

If there are two or more controls or indicators with identical panel nomenclature, the circuit reference symbol is necessary. Make sure the reader knows how to identify the intended item.

EXAMPLE:

Set OPR CONTROL switch S54 (3) to REM.

Set OPR CONTROL switch S76 (6) to ADD.

Controls and Indicators in Procedures

In procedures involving controls and indicators with functional names only (no panel names), identify these items both by functional name (lowercase) and reference symbol. Omit the functional name after first mention of the item if doing so doesn't impair clarity.

Upon re-referring to such an item after a space involving a step or two (depending on length of steps), again use both identifiers.

Include references to illustrations that show the reference symbols, observing all applicable rules. Make certain that the control can be identified physically

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EXAMPLES:

Adjust horizontal centering control R67 to center the sweep trace on screen.

If a suitable figure reference has appeared earlier.

Set attenuator switch S23 (fig. 8-12) to give output indication of 8 dbm on DBM meter M16. Advance S23 from this position, one step at a time, until . . .

Location Data

To give locations of controls and indicators, particularly in procedures, use parenthetic or simplified unit numbers.

EXAMPLES:

Set controls of 2A7 unit . . .

Set SYNC SELECT control (888 unit) to position 8.

[888] SYNC SELECT control: set to position 8.

Condensing Nomenclature in Tables and Illustrations.

Omit unit name.
Use simplified unit number only.

In Theory and Descriptive Material

Clarify control nomenclature that includes special (unapproved) abbreviations by spelling out the complete words in parentheses following the first use of the nomenclature, and thereafter as required for clarity.

EXAMPLE:

The amplitude is adjusted by SWP C & C (sweep centering and gain) control R1608.

Don't use stock numbers, part numbers, and SMR (source, maintenance, and recoverability) codes in text unless necessary for clarity.

In Congested Material

Use the military type number or the manufacturer's type or part number as a modifier with the name following the type number. A clearly abbreviated form, or the entire part number may be used. Write the name all lowercase.

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EXAMPLES:

Military nomenclature:

Pulse Generator Set AN/UPM-15

Modifier use:

the UPM-15 pulse generator set, the AN/UPM-15 pulse generator set, or the UPM-15

Company nomenclature:

Rocket Control Power Supply 464087-161

Modifier use:

. . . the 464087-161 rocket control power supply . . . . or . . . the III rocket control power supply (087-161 unit) . . . (to distinguish unit from another variation).

In Tabulations

The AN military type numbers may themselves be used as nouns. However, first make certain that the unit or system has been clearly identified by more formal nomenclature. Either the complete type number, or a clearly identifiable abbreviated form, may be so used.

EXAMPLES:

AN nomenclature:

Insulation Test Set AN/PSM-1A

Noun use:

the AN/PSM-1A, or the PSM-1a

As long as clarity is maintained, this rule may also be applied to manufacturer's model, type, or part numbers. For a straight "numerical" part number, usually include the word "unit," "circuit," "modification," "version," etc after the number.

EXAMPLES:

The Model 650 (or the Model 650 vtvm) . . .
The 630-A voltohmmeter differs from the 630-PL in that the . . .
The 463080-120 circuit differs in . . .

In Maintenance Manual Procedures

Use the applicable repair parts breakdown to determine the nomenclature of assemblies, subassemblies, and parts called out.

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In using repair parts list nomenclature, omit secondary modifiers where these contribute nothing to clarity. Quite often (particularly when index numbers are used), you can reduce the nomenclature to the basic noun - nut (3), bolt (7), screw (31), etc.

When using functional nomenclature for an item, show the repair parts list nomenclature (basic noun and any essential modifiers) first, and then, parenthetically, the functional name. If the item is something other than a control, retain the basic identical noun.

EXAMPLES

Parts list:

Resistor, variable R103

Maintenance manual legend:

Variable resistor R103 (AZ PHASE control)

Maintenance manual text:

the AZ PHASE control . . . or . . . AZ PHASE control R103

In Artwork

Follow all of the above rules for the selection and use of nomenclature. Avoid the use of stock numbers and part numbers wherever possible. Try to limit their use to tables and legends.

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Section 15
REFERENCES TO STANDARDS

	Page		Page
Government specifications and Standards	1	Manual Specification or Contract Number	2
Manufacturer's Specification for Materials	1		

GOVERNMENT SPECIFICATIONS AND STANDARDS

1. If an official Government specification exists for a material you are referring to, you must identify the material by Government specification number rather than the manufacturer's number. (See the *Department of Defense (DOD) Index of Specifications and Standards* for applicable specification number of materials such as lubricants, sealing compounds, abrasives, etc.) In addition to the Government specification number, include the applicable military service's part number or NSN (National stock number) whenever possible in the list of materials.

2. If you can't otherwise determine a number from the *DOD Index of Specifications*, obtain the information from the procuring agency.

3. When a Government specification or standard is referred to, use only the basic number, omitting any revision-letter suffix unless reference to a specific revision is essential.

   EXAMPLE:

   Revised issue number:
   Military Specification MIL-H-16005C

   Reference in manual
   Military Specification MIL-H-16005

4. On the first reference, and as required for clarity, precede any Government specification or standard number with identification of the originating branch of the Government or with identification of coverage. Thereafter reference may be limited to the type number of the specification.

First reference: ". . . solvent (Federal Specification P-S-661) . . ."

Subsequent references: ". . . P-S-661 solvent . . ."

MANUFACTURER'S SPECIFICATIONS FOR MATERIALS

a. Avoid references to manufacturer's specifications for materials, if possible.

b. If the correct Government specification can't be identified, or doesn't exist, refer to the material by its exact commercial designation, plus the words "or equivalent" (if valid). Check this designation carefully.

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MANUAL SPECIFICATION OR CONTRACT NUMBER

Don't refer to the manual specification or contract number used in the manual, unless this is required by the contract or the controlling specification.

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Section 16
TABLES

	Page		Page
Definitions	1	General Notes , References Etc.	2
Table	1	Layout	2
Chart	1	Style	3
Authority	1	Front Matter	3
When to Use Tables and Charts	1	Possible Problems with Tables	4
Headings	2		

DEFINITIONS

Table: Technically, a table does not contain artwork.

Chart: When artwork is included in a table, the term chart usually applies.

For purposes of technical manuals, the use of artwork with tabular material is encouraged wherever it makes the material easier to use or understand. The terms table and chart and the associated requirements may be used interchangeably.

Consider tables to be a type of illustration.

AUTHORITY

The U. S. Government Printing Office Style Manual should be used as a general guide for the style and format of tables and tabular material.

WHEN TO USE TABLES AND CHARTS

Use tables, charts, and other illustrations instead of text in sentence-paragraph format wherever possible, particularly for:

- Statistical data (equipment supplied, equipment characteristics, test equipment and special tools, operating and adjustment controls, etc)
- Wiring data
- Procedures
- Special abbreviations
- Condensed alinement and adjustment data, or inspection standards
- Voltage and resistance data
- Mathematical data
- Computer data
- Test data, test sequences
- Physical descriptions
- Maintenance schedules
- Any similar data

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NOTE

For continuous-type data where interpolation is necessary for a specific desired value, use a graph instead of a chart or table.

HEADINGS

1. Provide a concise heading to identify the specific content of each tabular column.

2. When column entires contain measurable quantities, include the unit of measure in the heading.

NOTE

If there are several different units of measure in the same column:

- Reorganize the data to group same units together, if possible.
- Place units of measure next to each entry.

3. If a column is subdivided, provide subheadings for the secondary columns. Don't subdivide secondary columns; reorganize the table instead.

4. Repeat the column headings for each sheet of the tabulation. However, if two sheets of tabulation are printed on facing pages in "landscape" view, the column headings may be omitted on the second sheet, so that the entries then run continuously across both pages.

GENERAL NOTES, REFERENCES, ETC.

1. When table title is at the top:

   Place a general NOTE, CAUTION, or WARNING, or other general reference applicable to the entire tabulation, between the table title and the top of the ruled form.

2. When table title is not at the top:

   Place general notations below the enclosure used for the column headings and above the first tabular entries. Place a horizontal rule below the space occupied by the introductory general data.

3. Make any general introductory table, figure, or paragraph reference in the tabulation in the form of a NOTE.

4. Place a NOTE, CAUTION, or WARNING at any required point in the tabulation. If necessary to conserve space, spread the information across more than just the column or columns to which it applies, providing the application of the information is clear to the reader.

LAYOUT

1. Keep the tabular layout neat and well balanced. A skillfully arranged table or chart is similar in many ways to a skillfully composed piece of artwork. Check each tabulation visually to ensure proper layout.

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2. Keep the material in the various columns of a tabulation reasonably well balanced. If crowding occurs in a column, rearrange the layout to provide greater horizontal space at that point.

3. Avoid lengthy special notations in a column, which cause long blank spaces in adjacent columns. If possible, spread the notation over more than one column as indicated above.

4. Avoid columns which are blank or in which relatively few entries are made. When there are relatively few entries in a column, it is better to use notes, or include the information in another column. Consider reorganization of data.

STYLE

1. Observe the principle of parallel construction in relating column entires to the related column heading.

2. Except where required for clarity, omit the articles (a, an, the) in all tabular entries.

3. If necessary for condensing in tabulations, use elliptical (grammatically incomplete) types of expression to reduce wordage. Make certain that this method preserves clarity and that methods of condensing are consistent within each tabulation.

   EXAMPLES:

   POWER: ON; AS: 20; EL: 45; SCAN: ONE BAR.

   (Note: The colons indicate the ellipses. The complete wording is: Set POWER switch to ON; set AS switch to 20; etc.)

4. Use three spaced dots (. . .) at any point in the tabulation where an entry is not required, but might be expected by the reader. This assures the reader that an entry has not been accidentally omitted.

   Omit the spaced periods in instances where no reader could reasonably expect an entry.

5. Order row entries in some logical, correct sequence. If technically correct, alphabetize them.

6. Limit ruled lines in a table to those actually required, for example, to separate columns vertically and isolate column headings.

FRONT MATTER

In front-matter listings of formal tabulations identified as figures, make certain that each listing makes clear that a tabulation, rather than an illustration, is involved. Whenever this clarification is necessary, add the word chart or table in parentheses following the title.

Don't regard this parenthetic word as part of the title for this application. Don't include either word parenthetically in the title accompanying the actual tabulation.

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Make certain that production personnel understand that these two parenthetic words are not to appear in the titles in the body of the manual.

EXAMPLES

(Excerpts from typical List of Illustrations)

Number	Title	Page
	• • •	
12-9	Interconnection and Wiring Table (12 Sheets)	12-24
	• • •	
7-3	Typical Voltage and Resistance Measurements (Chart)	7-26
	• • •	

POSSIBLE PROBLEMS WITH TABLES

1. Difficulty in visually following a row across the width of the table, particularly when one column entries are blank.

   POSSIBLE SOLUTIONS:

   a. Move columns closer together.
   b. Increase vertical spacing between lines (leading).
   c. Reorganize data to reduce width of table.
   d. Use dot leaders between columns.
   e. Use horizontal lines betwen rows, or groups of rows.
   f. Use a double space to separate groups.
   g. Use three spaced dots (. . .) for blank entries.

2. Difficulty in reading because column headings blend in with column data.

   POSSIBLE SOLUTIONS:

   Highlight column headings by:

   a. A box around headings.
   b. Underlining.
   c. Boldface type.
   d. Larger type in headings than in entries.
   e. Different margins from column content.

3. Difficulty in reading numerical data in columns.

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POSSIBLE SOLUTIONS:

Aline numerical data:
a Decimal numbers on the decimal point.
b. Scientific notation on the operation symbol.
c. All other numerical data flush right.

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Section 17
GRAPHS

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DEFINITIONS

Graphs are pictorial means used to present variable information.

A graph is a diagram (as a series of points, a line, a curve, or an area) that represents the variation of a variable in comparison with that of one or more other variables.

USE OF GRAPHS

Graphs should be used as tools to reduce the amount of text in a technical manual as frequently as feasible. Graphs should be used wherever possible to replace, supplement, or simplify text in technical manuals. They should be designed for maximun clarity, usability, and understandability.

Graphs should be used instead of tables on continuous-type data where interpolation is required.

To provide background information and stimulate interest, it is usually desirable for graphs to present extreems (or total capability of the equipment) even if that information is not required for operational use.

Common Problems with Using Graphs.

1. Complex, hard-to-understand presentation of information.
2. Too much information given on a single graph.
3. Graphs too small, or improperly scaled, for good legibility.
4. Data lines too close together to be easily read.
5. Improper use of shading and crosshatching.

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Good Practices for Effective Graphs

1. Keep the essential message clear; use simple presentations.
2. Use single-line presentations instead of multi-line presentations, provided information is within readable or usable tolerance.
3. Make use of the maximum image area.
4. Draw data lines at least ⅛ inch apart.
5. Continue the two outside lines of a series of converging lines to a point, intersection, or end of the graph. Discontinue the other lines in a series when they converge to ⅛ inch separation.
6. Avoid crosshatching over grid patterns. Use shading or coloring instead, or omit the grid pattern in the area containing the crosshatching.
7. Avoid reverse printing (white lettering on black background), except if it will be used in dark-adaptive ambient where reflectivity may be improved by white lettering.
8. Provide instructions (complete with illustration if necessary) for using complex graphs.
9. Orient the axis naturally (for example: height on the vertical axis).

TYPES OF GRAPHS

Conventional

These may be:

Linear - describing a straight line - Type A

Curvilinear - describing a curved line - Type B

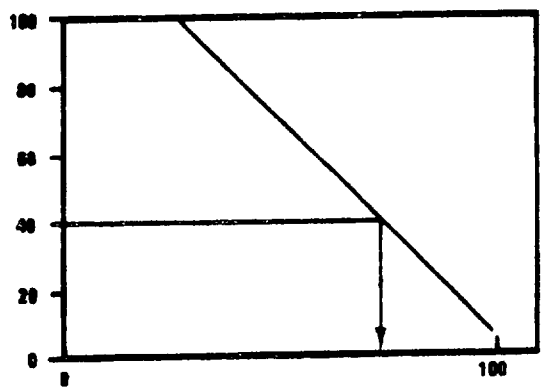
Types A and B may be used separately, or in combination to present total information.

Type B shows how an additional parameter may be introduced by using multiple traces.

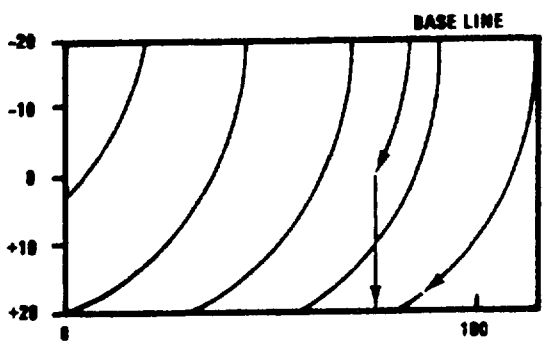
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Combining A and B allows additional parameters/interrelationships to be shown between two sets of data.

TYPE A GRAPH, Straight line



TYPE B GRAPH, Curved line



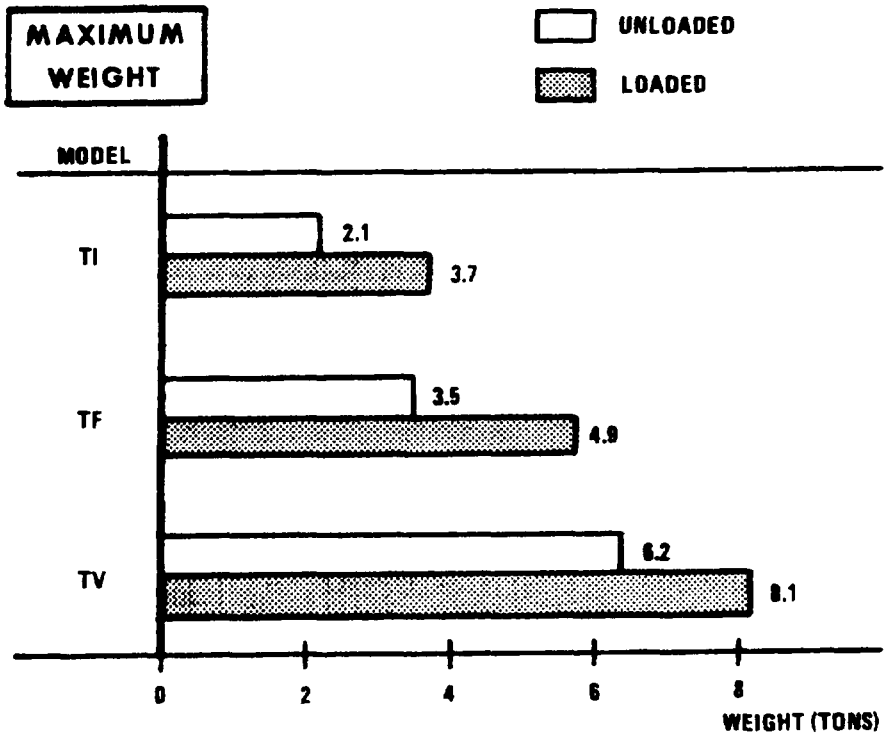
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Bar Graphs

Bar graphs may be either vertical or horizontal. Bar graphs can be used to present tabular data in an easy-to-read visual form.

They are used best for discrete data where interpolation is not necessary, and should replace tables whenever possible.

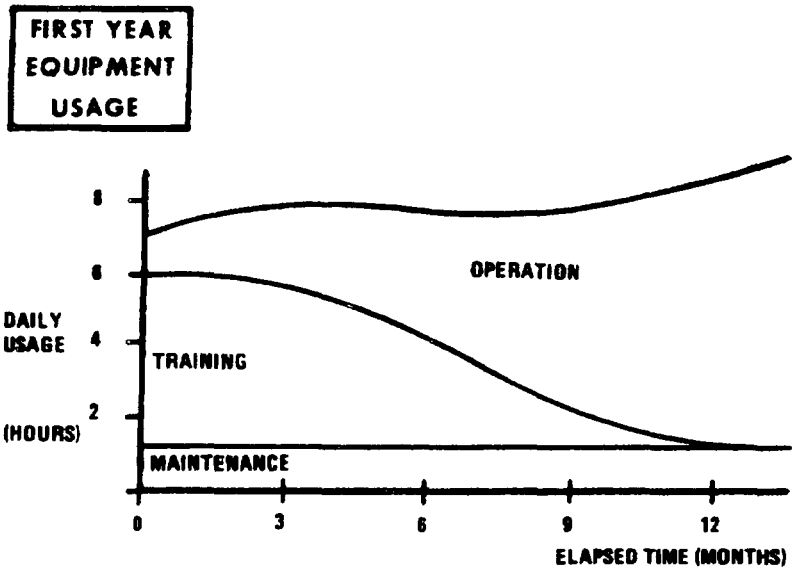
The example below shows horizontal orientation.



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Stack Graphs

Stack graphs show the relative magnitudes of two or more variables. The components may be graphically stacked to form either a fixed or varying total.



Nomographs

A nomograph is usually complex and an easy source of errors. Nomographs should normally not be used. (Nomographs are alinement graphs that enable determination, by the aid of a straightedge, of the value of a dependent variable when the values of two independent variables are known.)

Other Types

There are many other types of graphs which may be used. The criteria for selecting any of these should be based on:

a. Clarity in providing desired information.

b. Ease of use.

The user must be able to extract the desired data accurately and as quickly as possible.

GRAPH CONSTRUCTION

A graph should be labeled, lettered, and numbered so that it can be read while holding the manual in the same position required to read the text. Scales, baseline, parameters, lettering, and numbering should be in bolder print than the minor and intermediate grid lines.

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Scale:

A graph in final format in the manual should be to as small a scale as possible with all detail easily legible.

Title Block:

The title block should contain at least:

a. Descriptive title

The descriptive title should be boxed and placed in top left corner. (Be sure it clears the binding of the manual and is clearly visible.)

b. Equipment model

Not necessary in title block if data applies to all models. (However, a statement to this effect should be included in the introductory paragraph.)

c. Example of how to use graph, if not obvious.

Acceptable methods to show an example of how to use the graph in title block are:

(1) Place a miniature reporduction of the graph at the top center of the title block. Baselines, parameters, guidelines, dashed lines, and arrows should be used judiciously to provide the example desired, simplified by not including grid patterns and numerals.

(2) Include example on the graph using a dashed line followed by the values used in a sample problem in the text. The problem should be illustrated so that the dashed lines remain clear of the graph area normally used.

NOTE

Refer to the applicable technical content specification for deviations or additions to title block contents.

The title block should:

a. Be placed above the graph.

b. Not exceed in area the top quarter of the total image area.

c. Contain all the information required to use the graph.

Limitations and Restrictions:

1. Scales, curves, and guidelines for each parameter should bracket the lowest value to the limit value for that parameter specified in the manual, and should also extend to the next major unit for that parameter.

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2. The lines may be extended to higher units if there is an anticipated increase in the limit value of the parameter specified in the manual, provided the increased limit does not change the basic data.

3. Limit lines should be included and labeled to represent any limitations or restrictions on the equipment or accessories, or any other limitation because of unsatisfactory or impractical equipment characteristics.

Baseline:

On Type B graphs, place baseline at the entry point.

Interception of Lines:

Interception of lines at an angle of less than 30 degrees should be avoided.

Deflector Lines:

Deflector lines may be placed in the graph.

Graph Entry:

Use single graph entries whenever possible. Double entries should be used only when single entries cannot be used.

Grids:

Item	Standard
Grid interval	0.3 inch (0.1 inch minimum)
Gridline width	0.015 - 0.0125 inch
Gridline spacing	Maximum: 20 gridlines per inch Minimum: 5 gridlines per inch

NOTE

Grid spacing may vary from graph to graph so that the full image area of a page can be used.

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Item	Standard
Grid scale	Each minor grid unit should represent an easily calculable fraction of the major units such as: 0.05 0.1 0.2 0.5 not 0.4 or 0.125 if the major unit is divided into 10 minor units.
Transfer scale if graph extends to a following page	Entrance scale on new page should match exit scale on previous page.
Gridline frequency	Major (heavy) - every 10 units Intermediate - every 5 units (accented) Minor - each 1/10 unit between major lines

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Section 18
FOOTNOTES

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APPLICATION

In technical manuals, footnotes are generally limited to use in tables, charts, and illustrations. Notations in text should usually be in the form of NOTES, CAUTIONS, and WARNINGS.

As used in this section, the term "footnotes" includes "notes" on illustrations.

AUTHORITY

See the *U. S. Government Printing Office Style Manual* for general guidance on style and format of footnotes.

IN TABULAR MATERIAL

When to Use

1. Use footnotes sparingly.

2. Use footnotes only for explanations or references that don't logically belong within the tabulation proper.

3. Use footnotes to refer to specific items in the tabulation. A notation that applies to the entire tabulation, or to some sizeable portion of it, should be written as a NOTE, CAUTION, or WARNING.

Where to Place

1. Place all footnotes at the end of the tabulation, below the ruled box enclosing the final sheet of a table or within the final ruled box of a tabular figure.

2. If placing the footnotes at the end of the tabulation is not desirable in some particular instance, make references on a page-by-page basis by use of the following symbols (in the sequence indicated):

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* asterisk	‡ double dagger
** double asterisk	§ section mark
† dagger	‖ parallels

3. If the list of symbols in inadequate for the desired number of footnotes on any page, change the symbols of the tabulation to superior numbers.

NOTES

When required by unusual circumstances, special footnote symbols or arrangement may be used, provided their purpose is obvious or is clearly explained.

Style

1. Make each footnote concise and clear. Maintain parallel construction of similar items.

2. Make certain that all footnotes are referred to at the proper points in the tabulation. Mark the point of reference with superior numbers (numbers placed above the line). Place each reference number to the right of the item affected. In the footnote itself, place the number above the line and one space to the left of the notation.

3. Place the reference number or symbol after any punctuation mark (except the dash, or sometimes, the closing parenthesis). Place the number or symbol before or after the closing parenthesis depending on whether the reference does, or does not, pertain to the parenthesized item only.

EXAMPLES:

Reference numbers in table:	Resultant footnotes:
a. Air compressor[1]	[1] Air compressor supplied by Larson Associates.
b. Control box, [2] switch assembly, relay assembly	[2] Control box supplied by Steelcraft, Inc.

4. Don't use a period after the superior number.

5. Use a period after each footnote, regardless of whether or not the footnote is a complete sentence.

6. Keep footnote reference numbers and symbols in the sequence of their initial appearance. Don't, for example, place the initial reference to the fourth footnote ahead of that to the third footnote, except if necessary for incorporation of a change.

7. Generally, start a new series of symbols for each affected page, but his arrangement may be varied if the situation requires some other clear arrangement.

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8. If you must refer to a given footnote more than once on a page (for symbols) or in the complete tabulation (for superior numbers), reuse the original symbol or number for each repetition.

9. Don't use superior numbers in tabulations of mathematical matter in which these numbers could be mistaken for exponents. Use reference symbols or, if desired, superior, lowercase reference letters. In tabulations of other types of mathematical matter, use superior numbers unless this method impairs clarity.

10. The flag-symbol method described for notes in illustrations ( ) may also be used in complex tabular charts where superscript numerals might be overlooked by the reader.

IN ILLUSTRATIONS

1. Observe all applicable rules of this Style Guide in writing notes in illustrations. Rules concerning punctuation, word usage, abbreviations, and nomenclature, as used in preparation of condensed matter, apply to the writing of notes.

2. Don't use notes on an illustration if the application of the note isn't relevant to the manual. (For example, delete manufacturer's fabrication data on schematic diagrams.)

3. Use footnotes in illustrations for material that doesn't logically form part of the artwork proper or of the lettering on the art.

4. Maintain consistency of note style from one illustration to another. Don't confuse your reader by introducing needlessly different styles.

General Notes (Complex Illustrations)

1. In a relatively complex illustration for general reference (schematic, functional diagram, etc), ordinarily identify the footnotes with the heading NOTES (singular NOTE). Punctuate the heading with a colon (:) and place the heading as shown below:

NOTES:

1. ALL RESISTOR VALUES IN OHMS.

2. LOCATIONS OF TERMIANAL DESTINATIONS SHOWN ON WIRING DIAGRAM.

2. Place the notes within the crop-marked area in any reasonably conspicuous spot (not necessarily at the "foot" of the illustration).

3. Label the notes with Arabic numerals. Except for numerals enclosed in flag symbols, punctuate each numeral with a period; don't set the numbers above the line.

4. If a note applies to one or more specific point in the artwork, enclose the numeral with a flag symbol ( ), or similar device, with its apex to the right, pointing toward the note. Use similar symbols, as applicable, in the artwork, with the apex of each flag symbol pointing toward the affected item.

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5. Make certain that the point of reference is identified.

6. Use sketches, such as those showing circuit variations, as required, in any applicable notes.

General Notes (Simple Illustrations)

In a relatively simple illustration, or an illustration providing procedures or principles of operation or maintenance, generally show notes in a more emphatic style than those on complex illustrations. Don't necessarily number such notes, but place them and word them to obtain concise, clear meaning.

EXAMPLE:

RELAY DATA

Relay	Energized
K901	When ACTION switch is pressed.
K902	When ant. is not against limit.
K903	When SEARCH button is pressed.

Multiple-Sheet Illustrations

1. For multiple-sheet illustration, initially place all notes on the first sheet. In the initial, complete list, place the general notes ahead of the flag notes. Arrange the flag notes in the order of their appearance on subsequent sheets.

   Exception:

   If a given flag note occupies excessive space, its appearance on the first sheet may be limited to a reference, such as ( ) SEE SHEET 4.

   Exception:

   In a highly congested logic tree, or other complex chart, a number of brief flag notes may be run in series across the bottom of the sheet.

2. Repeat each flag note on any subsequent sheet to which it pertains.

3. Repeat each explanatory "legend" on each sheet to which it pertains.

4. Don't repeat ordinary general notes on subsequent sheets.

Changes and Revisions

1. When a note is added by a change, place it at the bottom of the list. It is not necessary to rearrange or renumber the notes except as required for clarity.

2. When a change upsets the initial placement, rearrangement of notes is not necessary for a general revision (reissue), except as required for clarity.

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EDITING

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DEFINITION

Editing: Checking manuscript for technical accuracy, conformity to a particular standard of data presentation, and clerical accuracy. Editing is also required to bring a manuscript into the form required for production to obtain a satisfactory final product.

Editing includes doing whatever is necessary to make the manuscript a good-quality, usable product conforming with the specification, contractual and style-guide standards. The editor is responsible for checking all inaccuracies, all violations of the style guide, all violations of specificaitons or applicable deviations to the specification. Editing includes checking for:

- Technical accuracy.
- Technical consistency.
- Adherhence to security regulations, both in marking and routing of classified manuals.
- Consistency of any portion of manuscript with other portions of same book or of related and referenced books.
- Adherence to rules of the style guide and customs of professional technical writing.
- Correctness and completeness of front matter.

Editing also includes:

- Correcting defect and inaccuracies revealed by edit.
- Clearing up any questionable items of information.
- Rewriting as necessary to improve readability, comprehensibility, or usability.
- Marking manuscript copy to ensure an accurate typing and printing job.
- Proofreading to ensure that the final copy adheres to the input and the editing of the manuscript.

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HOW A WRITER CAN FACILITATE EDITING

In addition to technically accurate and complete manuscript content, there are some simpl precautions which the writer can take to greatly facilitate the mechanics of editing. Some o these are:

Avoid overcrowding a page.
- Double - or triple-space between lines.
- Double-double space between paragraphs.
- Leave wide margins. Leave at least 1-inch margin on left side so that no information ca get lost in punching holes or binding pages.

Write legibly.
- Form letters and numbers or symbols recognizably.
- Use adequate pressure on writing tool.
- Place date in position it is intended to be.
- Use standard edit marks as necessary; rewrite if necessary.

Number pages in sequence

Use one side of page only.

Use same size sheets for all entries (8½ x11). Small notepaper may get lost; flaps which nee to be lifted on larger sheets become tattered and illegible, and may be overlooked ir typing.

By comparison of cost to writer's or editor's time, paper is cheap. Adequate blank space on a page can save time and help ensure understandability of edit. An already overcrowded page which needs heavy edit is a potential source of errors and misunderstandings.

SUGGESTIONS TO THE EDITOR

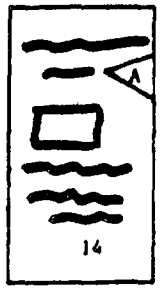
1. NEVER blank out or erase original input so that it can no longer be referred to. If you have second thoughts about your edit and wish to unedit it, the use of correction tape on edit is acceptable. However, DO NOT use nontransparent correction tape on manuscript original input. Also, if you have totallyrewrittena page, DO NOT throw away the original page. There is always a chance that you may have misunderstood the writer's reason for his version and it may be necessary to go back to it. If it is destroyed that becomes impossible.

2. Perform editing in a different color or a different line weight of writing tool than the original manuscript. It should stand out conspicuously from the manuscript for clarity and easy recheck by the original writer. The color and intensity of changes or corrections should be capable of producing legible copies on copying machines available. Yellow wax pencil is helpful for identifying areas checked on schematics or diagrams.

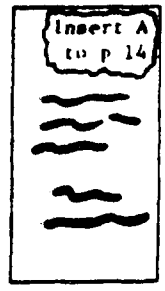
3. Don't overcrowd editing so that it is difficult to understand what goes where. It saves time and errors in the end to rewrite a line or a sentence with the desired changes. (This is particularly pertinent where the manuscript has been single-spaced.) Be liberal with rewriting your desired version as an insert on an additional page, placed before the page to which it applies. On the mnauscript page use a caret to show where the insert belongs as shown below.

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Marked original page



Insert page



DESIRABLE EDITOR ATTITUDES

Be reader conscious. Think usability. All writing problems must be solved with maximum provision for the needs of the user. At all times ensure maximum readability and comprehensibility as a basic requirement for whoever your readers may be.

Be skeptical. Take nothing for granted. Don't be unduly impressed with apparent authenticity of either source material supplied or the manuscript. Be alert for discrepancies; clear up all questionable items.

Be objective. Have a substantial reason or authority for every change you suggest. Do not make changes on the basis of merely personal preference, or on the basis of what you may think is "conventional" practice. Because it has been done this way for umpteen years does not necessarily mean it is better than the writer's input - - unless it is inconsistent with other parts of the manual or other manuals and may cause confusion. An editor's preferences may be not better than those of the original writer and changing only results in waste of time.

Be accurate and consistent. Avoid substituting a new set of mistakes or inconsistencies for those orignially present.

Be well informed. An editor should be an expert in:

- Good grammar
- Style-guide rules
- Standard editing marks
- Security regulations and contractual requirements
- Specifications and deviations applicable
- Technical aspects of equipment or system involved

If the editor is not an expert in all these subjects, then he should take steps to become one.

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Be alert for alternatives

If one edit of a manuscript is not satisfactory to the writer, don't revert to the original version without further effort. A large number of accurate alternative wordings and arrangements may be found which satisfy both writer and editor. Remember that the manuscript is basically the writer's responsibility and he must also be happy with the final version. It is, in turn, the writer's responsibility to make sure that the edit does not inadvertently change the meaning of the technical data.

REFERENCES FOR EDITING

U. S. Government Printing Office Style Manual, including *Word Division*, Supplement
Webster's *New International Dictionary*
Nicholson's *A Dictionary of American-English Usage*, Oxford University Press
Specificaitons or deviations as applicable
Project-specific style guide or usage list
Panel nomenclature

PROOFREADING

Proofreading of final copy should be a challenge to the writer, the editor, the typist, the illustrator. The goal of 100-percent correspondence with input (manuscript and edit) is difficult but with sufficient concentration and systematic application it can be achieved within a reasonably close tolerance.

Proofreading is unique to each manual, but in general includes checking for correspondence in:

Spelling
Uppercasing and lowercasing
Punctuating
Hyphenating
Spacing
Indenting
Formatting
Sequencing
Placing illustrations
Paginating
Alining information in tabular materials (vertically and horizontally)
Editing
Separating words correctly
Checking running heads and feet
Collating

When proofreading final copy, be careful to preserve the final page and use whatever method has been set up for corrections on that manual. These may include:

- Overlays
- Blue pencil
- Attached notes
- Margin markings
- Copies

If editing of final copy is necessary, editing should be performed on copies of the final copy so that a record of changes from the manuscript and draft is available.

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Methods of proofreading.

Proofreading can be done in various ways:

a. By 100-percent comparison between manuscript and final copy - line by line, word by word, carefully observing every letter, every space, every punctuation mark. This type of proofreading is suitably performed by someone not familiar with the contents of the manual, as a typist or other person with training in objective observation and comparison. This method is best done by placing the manuscript and the copy side by side and using a ruler on each to pace the corresponding lines or elements.

b. By mechanical scanning for completeness. For example, if the manuscript contains a table which in column two has 17 entries, count the number of entries in that column in final copy. This method points out omissions quickly and might be used as a check when skimming as described in method 3.

c. By skimming the items of critical importance on a page - panel nomenclature, numerical values, tolerances, procedural instructions, critical information. This type of proofreading should be reserved for the writer who is thoroughly familiar with the content and capable of selecting the items of criticality.

d. By careful reading of final copy and spot-checking against input. This type of proofreading could be done by the writer or by an editor thoroughly familiar with the subject of the content and capable of understanding the technical intricacies of the text.

e. By two people - one reading out loud the manuscript, item by item; the other following in the final copy for compliance with the revision being read. For text, this type of proofreading is time-consuming and inefficient because it takes time to enunciate properly and concentration to listen and observe attentively. However, for long columns of numbers, wiring lists, or symbols, where correspondence from manuscript to final copy is necessarily checked in very short time intervals, the two-people appraoch for proofreading is recommended.

f. By all of above methods, or any combination of them.

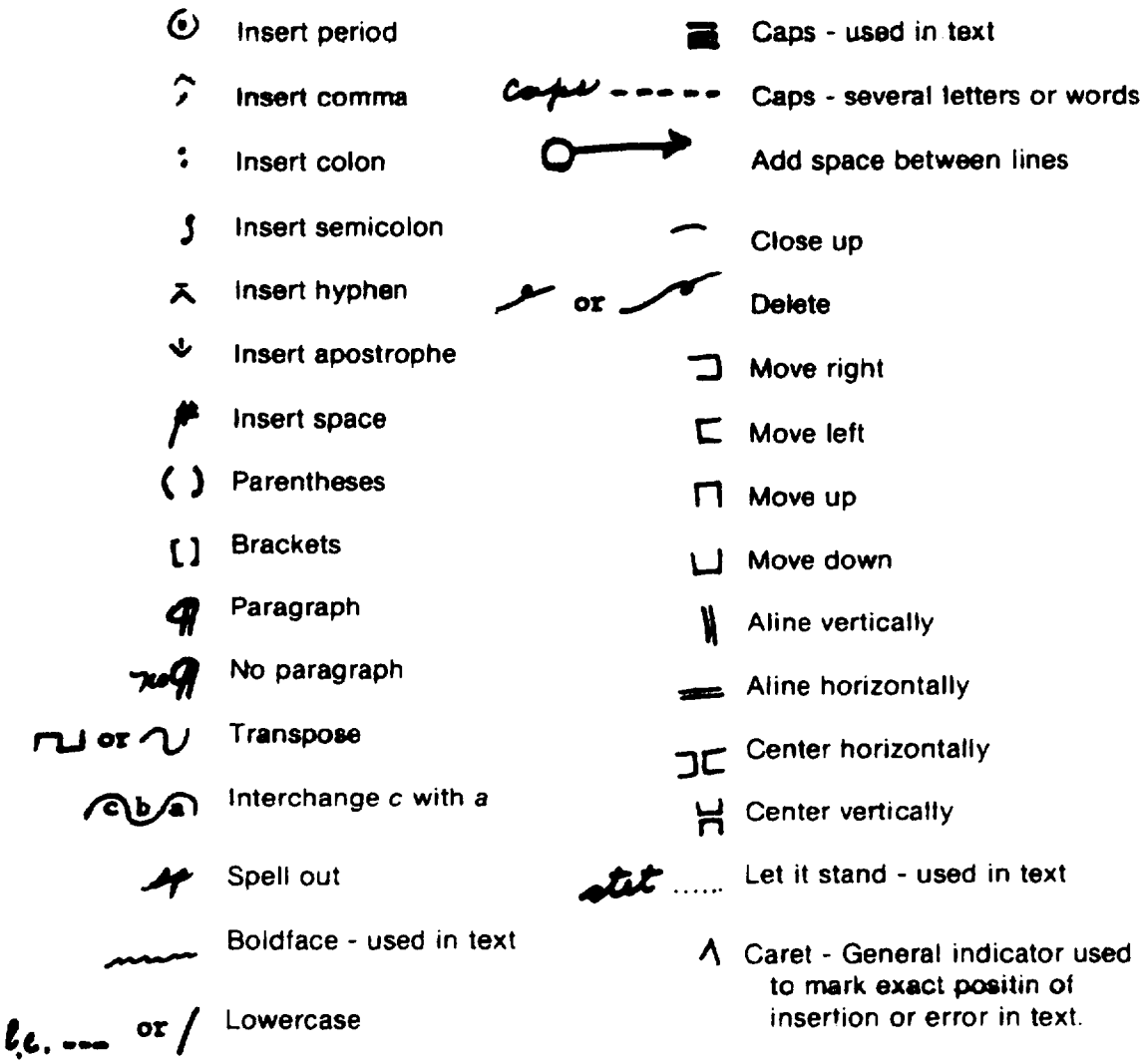
Iterations of proofreading

The first proofreading is to compare the final copy with original manuscript. When discrepancies are found, these are corrected (using the proper edit marks) and the manual is resubmitted to production for corrections. the correcitons may be made by mortising (cut and paste), or by retyping. this type the correction of errors is checked against the marked copy, plus any new errors generated by retyping. This process continues until all errors have been satisfactorily corrected in accordance with instructions.

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EDIT MARKS

BRIEF SUMMARY OF EDIT AND PROOFREADER'S MARKS



Insert period	Caps - used in text
Insert comma	Caps - several letters or words
Insert colon	Add space between lines
Insert semicolon	Close up
Insert hyphen	Delete
Insert apostrophe	Move right
Insert space	Move left
Parentheses	Move up
Brackets	Move down
Paragraph	Aline vertically
No paragraph	Aline horizontally
Transpose	Center horizontally
Interchange *c* with *a*	Center vertically
Spell out	Let it stand - used in text
Boldface - used in text	Caret - General indicator used to mark exact positin of insertion or error in text.
Lowercase	

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STANDARD EDIT MARKS

The following chart gives the edit marks most commonly used. If you need additional ones, consult the GPO Style Manual or Webster's New Collegiate Dictionary. Remember the purpose of edit marks is to communicate the desired changes; the more clearly the mark is written, the more likely others are to understand your change correctly. Strive for clarity in marking a manuscript.

Edit Change	Symbol	Examples/Precautions/Remarks
Add a period	⊙	Circle is necessary so dot is not overlooked.
Move a period to new position		Like this: ...remove cable connectors from component ⊙ Not this: ...remove cable connectors. from component
Change period to a comma	,	. . .
Change period to a colon	⁘	Add dot above period.
Change period to a semicolon	⁏	Change period to comma, add period above comma. Do not add comma below period because it may be overlooked when typist uses a mechanical paper holder.
Add a comma	⸴	Add directly. Do not use long curved line that can be mistaken for parenthesis.
Add a hyphen	⸗	Use caret so edit is clearly visible. Like this: receiver⸗transmitter Not this: receiver-transmitter
Add parentheses	( )	Insert directly, neatly, like this: Remove setscrew (9) that locks adjustment nut (10) in place.
Add quotation marks	❛ ❜	Insert directly like this: The circuit provides a corrective "jizzle" voltage.
Add apostrophe	⸌	Use caret downward like this: Operator's indicator
Add word(s)	⸉	Use caret to show place of new word (or words) like this: In the first setting of the switch the . . .

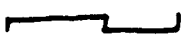
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Edit Change	Symbol	Examples/Precautions/Remarks
Delete word(s), part of words, or punctuation marks	or (depending on space available)	Run the deletion mark through the unwanted items like this: ...and depression of the GYRO ERECT button before closing the . . . Not either of these: ...and depress GYRO ERECT button before closing the . . . ...and depression of the GYRO ERECT button before closing the . . .
Close up space (long space)		When several words have been deleted and no new words substituted, show the new spacing, like this: To install 12A1, and 12A2, two men are required.
Close up space (short space)		cut off, one word cut off, delete hyphen, one word preceding, delete extra letter and close up space.
Substitute new word (s)		Delete unwanted words and indicate with a caret where the wanted word goes, like this: In this setting, the breaker protect serves as an overload protection device for the control circuit wiring . . . Be careful to put the substituted words where they will be noticed during typing. Not like this: In this setting, the breaker serves as an protect overload protection device for the control circuit wiring . . .
Add a lengthy piece of text	Use separate 8-1/2 x 11 sheet	Insert new sheet ahead of pages to be changed. Do not: • Attach a flap that must be raised to read text underneath. • Use the back side of any sheet. Both of these practices may cause typing errors.

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Edit Change	Symbol	Examples/Precautions/Remarks
Correct a spelling		Delete misspelled word and write correct spelling like this: separate ~~seperate~~ Where space is limited, correct letter only, like this: separate momentarily Do not write over a letter, like this: separate momentarily or put the correction below where it is less easily noticed, like this: separate
Indicate place for illustration/ table	(approximate) (as close as possible)	Fig. 2-3 = "place figure 2-3 near here, as convenient." Fig. 2-3 = figure 2-3 must be placed here."
Indicate place for incorporating added insert on separate page		 Show exact placement of INSERT X. Each insert should be identified by its own letter, to keep it distinct from other inserts.
Change lowercase to capital	or caps	Use triple line under letter(s) if few letters are involved, like this: Set oper switch to stby. Use dotted line and "caps" if a longer series of words needs to be capitalized, like this: Section IX Reassembly and Testing of Component
Lowercase a letter		Resistor
Lowercase all caps	lc	SENSITIVITY lc first letter to remain cap. SENSITIVITY lc first letter also lowercased
Insert space between letters/words/dashes		cutoff and the make into two words horizontal and vertical steering channels required for alignment particularly after maintenance. (Space before and after dash.)

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Edit Change	Symbol	Examples/Precautions/Remarks
Add space between lines		X to indicate number of lines to be left blank SECTION IX REASSEMBLY AND TESTING OF COMPONENT 9-1. REASSEMBLY.
Change position of letters/punctuation		section - to get section "lock - to get "lock."
Change position of words		For consecutive words like: Fault procedure isolation for: Fault isolation procedure.
		For separated words like elevation and azimuth to get azimuth and elevation.
		Be careful not to do this: elevation and azimuth which would read "azimuth elevation and"
Change sequence of lines		S2 ON. S3 OFF.
Move data to left		5-1. Remove dust, dirt, and lint from all parts and wiring with a clean, dry brush. Remove grease or oil smudges from all electrical parts with a clean, lint-free cloth.
Move data to right		5-1. Remove dust, dirt, and lint from all parts and wiring with a clean, dry brush. Remove grease or oil smudges from all electrical parts with a clean, lint-free cloth.
Center data/heading		SECTION IX REASSEMBLY AND TESTING OF UNIT
Move data up		System completely inoperative or unstable in operation System in warmup mode 1 J201 J304 Connect multimeter for d-c voltage
Move data down		
Start new paragraph		SAFETY WIRING. Replace safety wiring through clamp screws around motor B3901(1),. . .
Combine two paragraphs		8-19. SAFETY WIRING. Replace safety wiring through clamp screws around motor 901(1), . . .

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Edit Change	Symbol	Examples/Precautions/Remarks
Align margin		1-5. MODES OF OPERATION. The system has three basic modes of operation: 1-6. AUTOMATIC SEARCH. During search, the antenna . . . 1-7. MANUAL SEARCH. After a target has been selected during automatic search, manual search . . .

Pin	Voltage	
	Indication	Meter Scale
1	310	0-1200
2	0.5	0-3
3	6.3 V ac	0-12
3-4	11	0-300
4	6.3 V ac	0-12
4-3	11	0-300
5	230	0-300
6	0	0-3
7	300	0-1200

1 → 1
7 → 7
10 → 10
527 → 527
1100 → 1100

Query possible error, inconsistency		Arrow pointing to questioned item.
Delete an edit	----- stet (let it stand)	Place dotted line under item to be left in original form, like this: . . . , as shown in figure 5-4, which makes it read: . . . , as shown in figure 5-4. NOTE Avoid confusion by using "stet" one time only; do not change back and forth. If necessary, rewrite final version.
Convert to boldface		L U B R I C A T I O N becomes **LUBRICATION**

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Edit Change	Symbol	Examples/Precautions/Remarks
Convert to list style	list	Whenever enumerating three or more items, the list style is preferred. Example: The front panel contains a handle, two elapsed-time meters, and two indicator lamps. This becomes: The front panel contains: handle two elapsed-time meters two indicator lamps This can be further "improved" to: The front panel contains: (two) elapsed-time meters (two) indicator lamps which then reads: The front panel contains: handle elapsed-time meters (two) indicator lamps (two)
Close up space between lines		REASSEMBLY AND TESTING 9-1. Reassembly.

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Section 20
LEXICON

The following list of familiar words (item 1) and preferred verbs (item 2) shall be used as a guide to simplify readability and comprehensibility of the manuals. These words should be used wherever possible. However, additional words may be used as needed by the intended user or peculiarities of the equipment. The procuring activity must approve the use of added words. Mandatory words, i.e., nomenclature and technical designations, are not included.

1. Familiar Words.

A	after	aloud	apron
	afternoon	already	are
a	afterward	also	area
able	again	always	aren't
abnormal	against	ammunition	arise
aboard			
about	age	among	arithmetic
	aged	amount	arm
above	ago	an	armful
absent	agree	and	army
accept	ahead	another	arose
access			
accident	aid	answer	around
	aim	any	arrange
accord	air	anybody	arrive
accordance	aircraft	anyhow	arrow
account	airfield	anyone	article
acre			
across	airplane	anything	as
	airport	anyway	
act	airship	anywhere	aside
action	airy	apart	ask
active	alarm	apiece	assemble
add			
addition	alike	appear	associate
	all	appearance	at
additional	allow	application	attach
address	almost	apply	attack
advantage	alone	approach	attempt
afar			
affect	along	approximate	attend

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attention
auto
automatic
automatically
automobile

available
away

awhile
ax

B

back
background
backward
bad
badge

bag
bake
baking
balance
ball

balloon
band
bandage
bang
bank

bar
bare

barrel

base
basement
basic
basis
basket

bat
batch

bath
bathe
battle
battleship
bay

be
beach
bead
beam
bean

beat
became
because

become
becoming
been
before

began
begin
beginning
begun

behind
believe
bell
belong
below

belt
bench
bend
beneath
bent

beside
best
bet
better

between

big
bill

bin
bind
bit
bite
biting

bitter
black
blackboard
blade
blank

blanket
blast
blaze
bleed
blew

blind
blindfold
block
blood
blot

blow
blue
board
boat
bob

body
boil

bolt
bond

book
boom
boot
borrow

both
bottle
bottom
bought
bounce

bow
bowl
box
boxcar
brake

branch
brass
break
breath

breathe
breeze
brick
bridge
brief

bright
brightness
bring
broad
broadcast

broke
brook
broom
brought
brown

brush
bubble
bucket
buckle
bud

build
building
built
bulb

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bullet
bump
bunch
bundle
burn

burst
bury
bus
bush
bushel

business
busy
but
butt
button

buzz
by
bypass

C

cab
cabinet
cage
calendar
call

came
camp
can
canal
candle

cannon
cannot
can't
canyon
cap

cape
captain
card
cardboard

careful
careless
carelessness
carload
carpet

carriage
carry
cart
carve
case

catch
catcher
caterpillar
caught
cause

caution
cautious
cave
ceiling
cell

cellar
center
central
certain
chain

chair
chalk
chance
change
chapter

charge
chart
chase
chatter
cheat

check
checkers
cheek
chest

chew
chief
chill
chimney
chin

chip
choice
choose
chop
chose

churn
circle
clang
clap
class

classify
claw
clay
clean
clear

clearance
clerk
click
cliff
climb

clip
clock
close
cloth
clothes

clothing
cloud
club
clump
coast

coat
cold
collar
collect

collection
color
column
combat
come

coming
command
commander
common
company

compare
complete
compress
condition
conduct

conductor
cone
confuse
confusion
connect

connection
consist
constant
contain
container

continue
cook
cool
copper
copy

cord
cork
corner
correct
cost

cot
cotton
cough
could

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couldn't
count
counter
country
course

court
cover
crack
cradle
cramp

crank
crash
crawl
creek
creep

crept
crew
crewmember
cross
crowd

crown

crumble
crush
crust

cube
cuff
cup
cupful
cure
curl

curtain
curve
cushion
cut
cutting

D

dab

daily
dam
damage
damp
danger

dare
dark
dart
dash
date

dawn
day
daybreak
daytime
dead

deaf
deal
death
decide
deck

decrease
deed
deep
defeat
defend

defense
degree
delay
delight
deliver

depart
depend
deposit
describe
desert

deserve
desire
desk

destroy
detach
dew
dial
diamond

diameter
did
didn't
die
difference

different
difficult
difficulty
dig
dim

dip
direct
direction
dirt
disable

disadvantage
disassemble
discover
discard
discharge

disconnect
discontinue
dish
dislike
dismiss
distance

distribute
ditch
dive
diver
divide

do
dock
does

doesn't
dolly
done
don't
door

doorknob
doorstep
dot
double
down

downstairs
downtown
dozen
drag
drain

drank
draw
drawer
drew
dried

drift
drill
drink
drip
drive

driver
drop
drove
drown
drowsy
drug

drum
drunk
dry
duck
due

dug
dull
dumb

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dump
during
dust
duty
dwell
dwelt

E

each
ear
early
earn
earth

east
easy
edge
effect
effort

eight
eighteen
eighth
eighty
either

elbow
electric
electrical
electricity
eleven

else
elsewhere
emergency
empty
end

enemy
engine
engineer
enough
enter

entire
entrance
envelope
equal
equip
equipment
erase

error
escape
especially
estimate
eve

even
evening
ever
every
everybody

everyday
everyone
everything
everywhere
exact

examination
examine
except
exchange
excited

excuse
exercise
exit
expect
explain

extra
eye

F

face
facing
fact
factory
fail
failure
faint
fair
fake
fall

false
fan
far
faraway
fare

far-off
farther
fashion
fast
fasten

fastener
fault
fear
feather
fed

feed
feel
feet
fell
fellow

felt
female
fence
few
field

fifteen
fifth
fifty
fight
figure

file
fill
film
final
finally
find
fine
finger
finish

fire
firearm
firing
first
fist

fit
five
fix
flag
flake

flame
flap
flash
flashlight
flat

flesh
flew
flies
flight
flip

flip-flop
float
flood
floor
flop

flow
flutter
fly
foam
fog

foggy
fold
follow

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foot
for
force
forehead
forest

forget
forgot
fork
form
fort

forth
forty
forward
fought
found

fountain
four
fourteen
fourth
frame

free
freedom
freeze
freight
frequent

fresh
fried
friend

frighten

frog
from
front
frost
froze

fuel
full
fur
furnish

further
future
fuzzy

G

gain
gallon
game
gang
garage

garbage
gas
gasoline
gate
gather

gave
gear
general
gentle
get

getting
giant
give
giving
glance

glass
gleam
glide
glove
glow

glue
go
goes
goal
gold

gone
good
got
govern

government
grab
grade
grain
grand

grasp
grass
grave
gravel
gray

grease
great
green
greet

grew
grind
groan
ground
group

groove
grove
grow
growth
guard

guess
guidance
guide
gulf
gum

gun
gunpowder

H

habit
had
hadn't
hail
hair

hairpin
half
hall
halt
hammer

hand
handful
handle
handwriting
hang

happen
harbor
hard
hardly
hardship

hardware
harm
harness
has
hasn't

haste
hasty
hat
hatch
hatchet

haul
have
haven't
having
he

head

health
heap

hear
heard
heart
heat

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heavy
heel
height
held

helmet
help
helpful
hem

here
here's

hickory
hid

hidden
hide
high
highway
hill

hillside
hilltop
hilly
him
himself

hind
hinge
hint
hip
hire

hiss
history
hit
hitch

holddown
hold
hole
hollow

home
honk
hood
hoof
hook

hoop
hop
horizontal
horn
hose

hot
hound
hour
how
however

howl
hug
huge
hum
hump

hundred
hung
hunk
hunt
hurried

hurry
hurt
hush
hut

I

I
ice
icy
I'd
idea

ideal
idle
if

ill
I'll
I'm
immediate
importance

important
impossible
improve
in
inaction

inactive
inch
include
income
increase

indeed
indicate
indication
indoors
information

injure
injury
ink
inlet
input

insect
insert
inside
inspect

inspection
instant
instead
instruct
instruction

intake
intend
interested
interesting
into

invite
iron
is
island
isn't

it
item
its
it's
itself

I've
ivory

J

jacket
jack
jail
jam
jar

jaw
jelly
jerk
jet
jig

job
jockey
join
joint
journey

judge
jug
jump

junk

just

K

keen

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keep
kept
kettle
key
kick

kill
kind
kit
kite
knee

kneel
knew
knife
knit
knives

knob
knock
knot
know
known

L

lace

ladder
laid
lake

lame
lamp
land
lane
language

lantern
lap
lard
large
lash

last
latch

late
laundry
lay
lazy
lead

leader
leaf
leak
lean
leap

learn
least
leather
leave
leaving

led
left
leg
lend
length

lengthen
less
lesson
let
let's

letter
letting
level
lever
library

lice
license
lick
lid
lie

life
lift
light
lightning

like
likely
liking
limb
lime

limit
limp
line
lip
list

listen
lit
little
live
lively

living
load
loaf
loan
loaves

locate
location
lock
locomotive
log

lone
long
look
lookout
loop

loose
loosen
lose
loss
lost

lot
loud
low
lower

lumber
lump
lying

M

machine
machinery
made
magazine
mail

mailbox
main
major
make
making

male

manager
manner
many

map
maple
marble
march
mark

mask
mast
master
mat
match

mate
material
matter
mattress
maximum

may
maybe
me
meal

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mean
meant
measure
meat
mechanical

meet
melt
member
men
mend

mess
message
met
metal
method

middle
midnight
might
mile
milk

mill
miller
million
mind
mine

miner
minimum
minor
mint
minute

mirror
misfit
misplace
miss
mistake

misty
mitt
mitten
mix

mixture
moment
month
moon
moonlight

mop
more
morning
moss
most

motion
motor
mount
mountain
mouth

move
movement
moving
mow
much

mud
muddy
mug
mule
multiply

must
my
myself

N

nail
name
narrow
nation
national

navy
near
nearby
nearly

neat
necessary
neck
need
needle

needn't
neither
nest
net
neutral

never
new
next
nickel
night

nine
nineteen
ninety
no
nobody

nod
noise
noisy
non
noon

nor
normal
north
nose
not

note
nothing
notice
now
nowhere

number
numeral
numerical
numerous

nurse
nut

O

oak
oar
obey
observe
ocean

occur
o'clock
odd
of
off

offer
office
officer
often
oil
old

old-fashioned
omit
on
once

one
only
onward
open
openings

opposite
or
orange
order
ordinary

ore
organ
other
otherwide
ought

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our
ourselves
out
outdoors
outfit

outlet
outline
output
outside
outward

oven
over
overall
overalls
overcoat

overcome
overhead
overhear
overheat
overload

overnight
oversize
overtighten
overturn
own

P

pace
pack
package
pad
page

pail
pain
paint
painting
pair

pale
pan
pane
panel
paper
paragraph
park

part
particular
partner
pass
passenger

past
paste
pat
patch
path

patter
pave
pavement
paw
pay

payment
pea
peace
peak
pear
peck

peculiar
pedal
peg
pen

pencil
people
per
percent
perhaps

period
permit
person
phone

pick
picture
piece
pile
pilot

pin
pine
pink
pint
pipe

pistol
pit
pitch
place
plain

plan
plane
plant
plate
platform

platter
play
plenty
plow
plug
pocket

point
poison
poke
pole

police

pond
pool
poor

pop
popped
portion
possible

post
pot
pound
pour
powder

power
practice
prepare
present
press

pressure
prevent
prick
print
probable

probably
problem
prompt
proper
protect

protection
prove
public
puddle
puff
pull

pump
punch
pupil
pure

purple
purpose
purposely
push
put
putting

Q

quality

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quantity
quart
quarter
question
quick

quiet
quit
quite

R

race
rack
radar
radiator
radio

rag
rail
railroad
railway
rain

rainbow
raise
rake
ram
ran

rang
rap
rapid
rapidly
rate

rather
rattle
raw
ray
reach

read
reader
reading
ready

real
really
reap
rear
reason

reassemble
rebuild
receive
recess
record

red
reduce
refer
refuse
regular

regulation
remain
remedy
remember
remind

removal
remove
repack
repaint
repair

repeat
report
request
reset
responsible

rest
result
return
reverse
review

rib
ribbon
rich
rid

riddle
ride
riding
rifle
right

rim
ring
rip
ripe
rise

rising
river
road
roadside
roar

rock
rocket
rod
rode
roll

roller
roof
room
root
rope

rose
rot
rotten
rough
round

route
row
rowboat
rub
rubbed

rubber
rubbish
rug
rule

rumble
run
rung
runner
running

runoff
runout
runaway
rush
rust

S

sack
saddle
safe
safety
said

sail
salt
same
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sash
sat
satisfactory

save
savings
saw
say
scab

scale
scales
school
schoolroom
scorch

score
scrap

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scrape	settlement	shot	skip
scratch	seven	should	skirt
scream	seventeen	shoulder	sky
screen	seventh	shouldn't	slam
screw	seventy	shout	slap
screwdriver	several	shovel	slate
scrub	sew	show	slave
sea	shade	shower	sled
seal	shadow	shut	sleep
seam	shady	sick	sleeve
search	shake	side	slept
season	shaking	sidewalk	slice
seat	shall	sideways	slid
second	shape	sight	slide
secret	share	sign	slight
secure	sharp	silence	sling
see	shave	silent	slip
seed	shear	silk	slipped
seek	shed	sill	slippery
seem	sheet	silver	slit
seen	shelf	similar	slow
seesaw	shell	simple	small
select	shield	since	smell
self	shift	sing	smoke
send	shine	single	smooth
sense	shining	sink	snail
sent	shiny	sip	snap
sentence	ship	sir	snapping
separate	shipment	sit	snow
separation	shut	site	snug
serial	shock	sitting	so
series	shoe	situation	soak
serious	shone	six	soap
serve	shook	sixteen	sod
service	shoot	sixth	soft
serviceable	shop	sixty	soil
set	shore	size	soldier
setting	short	skim	sole
settle	shortage	skin	solid

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solve
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something
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sort

sound
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south
space
spade

spare
spark
speak
spear
special

speech
speed
spike
spill
spin

splash
spoil
spoke
spoon
spot

spread
spring
sprinkle
square
squeak

squeeze
stable
stack
stage

stair
stake
stall
stamp
stand

star
stare
start
starve
state

station
stay
steamer
steel
steep

steeple
steer
stem
step
stepping

stick
stiff
still
sting
stir

stitch
stock
stocking
stone
stood

stool
stoop
stop
stopped
stopping

store

storm
story

stove
straight
straighten
strange
strap

straw
stream
street
strength
stretch

strict
string
strip
stripes
strong

stuck
study
stuff
stump
stung

subject
substance
substitute
such
suck

sudden
suffer
suggest
suggestion
suit

sum
summary
summer
sun
sunk

sunlight
sunny
sunrise
sunset

sunshine
suppose
sure
surface
surplus

swallow
swam
swamp
swat
sweep

sweet
swell
swept
swift
swim

swimming
swing
switch
sword

T

tab
table
tablespoon
tablet
tack

tag
tail
tailor
take
taking

talk
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temperature
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toolbox

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toothpick
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tractor
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trail
trailer
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transport
transportation
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tumble

tune
tunnel
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twelve
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twice
twig
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umbrella
uncover
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unfinished
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United States

unimportant
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unsafe
unsatisfactory
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upside
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useful

useless
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V

valley
value
valuable
various
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vent
vertical
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view
village
vine
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volume

W

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wagon
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Y

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2. Preferred Verbs.

Verbs	*Definitions*	*Examples*
Add	To put more in.	Add water to the battery.
Adjust	1. To bring to a specified position or state.	1. Adjust the micrometer to the given measurements.
	2. To bring to a more statisfactory state; to manipulate controls, levers, linkages, etc., to return equipment from an out-of-tolerance condition to an in-tolerance condition.	2. Adjust cable tension using the turnbuckles.
Advance	To move forward; to move ahead.	Advance the throttle.
Aid	To give help or support to; to assist.	Aid man B to lift the load.
Alert	To warn; to call to a state of readiness or watchfulness; to notify (a person) of an impending action.	Alert personnel that area will be cleared.
Aline	To bring into line, to line up; to bring into precise adjustment, correct relative position, or coincidence.	Aline slot in turnbuckle barrel with slot in cable terminal.
Allow	1. To permit, to give opportunity to.	1. Allow the sediment to settle out.
	2. To allot or provide for.	2. Allow a 2-inch slack in the rope.
Apply	1. To lay or spread on.	1. Apply sealant to gap between the windshield and the aircraft structure.
	2. To energize.	2. Apply power or load.
Arrange	To group according to quality, value, or other characteristics; to put in proper order.	Arrange components by size from smallest to largest.
Assemble	To fit and secure together the several parts of; to make or form by combining parts.	Assemble a jet engine in accordance with specified procedures.
Assign	To apportion to for a specific purpose or to particular persons or things; to appoint to a duty.	Assign the various maintenance tasks to technicians.
Assist	To give support or help; to aid.	Assist man B to lift the antenna.

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Verbs	*Definitions*	*Examples*
Assure	To make someone sure or certain, to inform positively.	Assure other technicians that all warning lights are off.
Attach	To join or fasten to.	Attach electrical leads to the multimeter.
Back off	To cause to go in reverse or backward.	Back off nut to the nearest castellation.
Balance	To equalize in weight, height, number, or proportion.	Balance aircraft so that it is stable.
Be sure	To confirm that a proper condition exists, to find out with certainty.	Be sure that the light is off.
Be careful	To exercise caution, to take care.	Be careful not to inhale the fumes of the solvent.
Bend	To turn or force from straight or even to curved or angular; or to force back to an original straight or even position.	Bend wire until it lies flat against the turnbuckle wall.
Bleed	To extract or let out some or all of a contained substance from.	Bleed off tank air pressure.
Blow	To send forth air, particularly from the lungs through the mouth.	Check for obstructions by disconnecting the hose at the air inlet and blowing through it.
Break	1. To separate into parts with suddenness or violence. 2. To pull away.	1. Never break safety wire to release air pressure. 2. Break the bead of the wire.
Calibrate	To determine accuracy, deviation, or variation by special measurement or by comparison with a standard.	Calibrate torque handles at least once each month so that the accuracy can be depended upon.
Cap	To provide with a covering; to install or provide with a device for closing off the end of a tube which has a male fitting.	Cap all lines which have exposed male fittings.
Catch	To prevent from falling to the ground, to capture.	Catch any fluid drippings in a pan.
Center	1. To adjust so that axes coincide.	1. Center the nose wheel of the aircraft.
	2. To place in the middle of.	2. Center the pointer on the dial.

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Verbs	*Definitions*	*Examples*
Change	To replace with another comparable item; to substitute serviceable equipment for malfunctioning, wornout, or damaged equipment.	Change the switch contact points.
Charge	To restore the active materials in a storage battery by the passage of a direct current through in the opposite direction to that of the discharge.	Charge the battery for a short time before making a specific gravity check.
Check	1. To confirm or establish that a proper condition exists; to ascertain that a given operation produces a specified result; to examine for satisfactory accuracy, safety or performance; to confirm or determine measurements by use of visual or mechanical means.	1. Check that the light is off.
	2. To perform a critical visual observation or check for specific conditions; to test the condition of.	2. Check the components for wear, deterioration or defects.
Check out	To perform specified operations to verify operational readiness of a subcomponent, component, subsystem, or system,	Checkout the landing gear.
Choke	To enrich the fuel mixture of a motor by partially shutting off the air intake of the carburetor.	Choke engine as required to start.
Clamp	To fasten or press two or more parts together so as to hold them firmly.	Clamp the tensiometer to the cable by releasing the handle slowly.
Clean	To wash, scrub, or apply solvents to; remove dirt, corrosion, or grease.	Clean petroleum products from oxygen equipment.
Clear	1. To move people and/or objects away from.	1. Clear the area.
	2. To open the throttle of an idling engine to free it from carbon.	2. Clear the engine.
Close	1. To block against entry or passage; to turn, push, or pull in the direction in which flow is impeded.	1. Close the valve.

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Verbs	*Definitions*	*Examples*
	2. To set a circuit breaker into the position allowing current to flow through.	2. Close the circuit breaker.
Coat	To cover or spread with a finishing protecting layer.	Coat battery cables with grease.
Code	To put into the form or symbols of a system used to represent words; to mark with identifying symbols.	Color code equipment parts.
Collect	To bring together into one body or place; to accumulate.	Collect the required hand tools.
Compare	To examine the character or qualities of two or more items to discover resemblances or differences.	Compare the readings from protractor and template.
Conduct	To lead, manage, or direct.	Conduct the class in proper servicing procedures.
Connect	1. To bring or fit together so as to form a unit, to couple keyed or or matched equipment items.	1. Connect the torquemeter to the socket wrench.
	2. To attatch or mate (an electrical device) to a service outlet.	2. Connect the soldering iron to the service power outlet.
Control	To exercise restraining or directing influence over, to fix or adjust the time, amount, or rate of.	Control electrical current generation and distribution.
Correct	To make or set right; to alter or adjust so as to bring to some standard or required condition.	Correct any error before proceeding with activity.
Cover	To protect or shelter by placing something over or around.	Cover tires whenever maintenance is done on the aircraft.
Crack	To open slightly (the throttle) of an aircraft engine preparatory to starting the engine.	Crack and lock the throttle to ⅛ open.
Crimp	To compress or deform a connection barrel around a cable to make an electrical connection.	Crimp a connector on the yellow wire.

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Verbs	*Definitions*	*Examples*
Cut	To divide into parts using a sharp instrument such as a scissors or knife.	If the prongs of the cotter pin are too long, they should be cut to proper length.
Cycle	To operate an item through its entire range.	Cycle the landing gear from the up position to the down (locked) position and back to the original position.
Destroy	To ruin, demolish, or put out of existence; to make unfit for further use.	Destroy used hydraulic fuel containers.
Disassemble	To take to pieces; to take apart to the level of the next smaller unit or down to all removable parts.	Disassemble the No. 1 engine.
Disconnect	1. To sever the connection between; to separate keyed or matched equipment parts.	1. Disconnect the bleedair hose from the leading edge anti-icing system.
	2. To detach or separate (an electrical device) from a service outlet.	2. Disconnect the soldering iron from the service power outlet.
Disengage	To release or detach interlocking parts, to unfasten; to set free from an inactive or fixed position.	Disengage the parking brake.
Dispose of	To get rid of.	Dispose of unused hydraulic fluid left in the can.
Drain	To draw off (liquid) gradually or completely.	Drain servicing hose after removing it from the filter valve.
Dry	To cause to be free from water or liquid.	Dry bearings with low-pressure air.
Enter	1. To go or come in.	1. Enter the aircraft through the troop doors.
	2. To put on record.	2. Enter the data on the form.
Erect	To put up by fitting together.	Erect a special maintenance stand.
Examine	To perform a critical visual observation or check for specific conditions; to test the condition of.	Examine the component for wear, deterioration or defects.

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Verbs	*Definitions*	*Examples*
Extend	To cause to be drawn out to fullest length.	Extend the main landing gear.
Fabricate	To construct from standardized parts.	Fabricate rig pins from 0.25 inch rod.
File	To rub smooth or cut away with a file (i.e., a tool with cutting ridges for forming or smoothing surfaces).	File one end of the rod to a point.
Fill	To put into as much as can be held or conveniently contained.	Fill oil and deicing tanks.
Find	1. To discover or determine by search; to indicate the place, site, or limits of.	1. Find the No. 9 fitting.
	2. To discover by study or experiment; to investigate and decide.	2. Find the amount of tension on a cable by following specified procedures.
Flush	To pour liquid over or through; to wash out with a rush of liquid.	Drain and flush the hydraulic system if it has been serviced with a wrong fluid.
Fold	To lay one part over another part of, to reduce the length of bulk by doubling over.	Fold sides of curtain on creases.
Follow	To accept as authority, to obey; to conform with directions or rules.	Follow directions.
Form	To give a particular shape to; to shape or mold into a certain state; to make up.	Form the compound so that it will fill the hole completely.
Furnish	To supply what is needed, to equip.	Furnish a flashlight for man B.
Go to	To proceed to; to transport oneself to a given destination.	Go to the control pedestal and position switches appropriately.
Ground	To connect a current, wire, or a piece of electrical equipment to a land or other specified surface.	Ground the servicing cart.
Guard	To protect from danger, to defend.	Guard the area while maintenance is taking place.

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Verbs	*Definitions*	*Examples*
Guide	To manage or direct the movement of.	Guide the maintenance stand safely to its new position.
Hand	To give, pass, or transmit with the hands.	Hand the refueling hose to the technician stationed on the wing.
Handle	To manipulate (load, turn, raise, etc.) objects and equipment manually or with specially designated equipment, such as hoists.	Handle charger cylinders carefully.
Hang	To fasten to some elevated point without support from below, to suspend.	Do not hang tools on projecting parts of the aircraft.
Help	To give support, aid, or assistance to.	Help man B lift the load.
Hold	To have or keep in the grasp.	Hold the power switch in position until the voltmeter stabilizes.
Identify	1. To establish the identity of.	1. Identify components by name and function.
	2. To determine the classification of a supply item.	2. Identify the component to be ordered from supply.
Idle	To run an aircraft engine under reduced power without sufficient power being developed for movement of the aircraft.	Idle the engine for 5 minutes at 800 rpm.
Improve	To make greater in amount or degree; to make better.	Improve procedures whenever feasible.
Indicate	To point out.	Indicate which dial should be monitored.
Inflate	To fill with a given amount of gas or air.	Inflate tire to desired pressure.
Inform	To make known to; to give notice, or report the occurrence of.	Inform man B that the brakes have been set.
Insert	To put thrust in, into, or through.	Insert a wire through the hole in the turnbuckle.
Inspect	To perform a critical visual observation or check for specific conditions, to test the condition of.	Inspect the components for wear, deterioration or defects.

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Verbs	*Definitions*	*Examples*
Install	1. To perform operations necessary to properly fit an equipment unit into the next larger assembly or system.	1. Install fuel manifold.
	2. To place and attach.	2. Install nuts on bolts.
Insure	To make certain, to ensure.	Insure that the area is clear of unnecessary personnel and equipment.
Investigate	To observe or study by close examination and systematic inquiry.	Investigate the cause of the breakdown.
Isolate	To use test equipment to identify or select a source of trouble.	Isolate the source of the malfunction using pressure gages.
Jack	To use one or more jacks (i.e., mechanisms for exerting pressure to lift all or part of an aircraft).	Jack and level the aircraft in accordance with specified procedures.
Join	To bring or fit together so as to form a unit; to couple keyed or matched equipment items.	Join the torquemeter to the socket wrench.
Keep	To remain, to continue in a place.	Keep away from the danger area.
Kick	To strike against with a foot.	Kick the wheel lightly if the strut binds.
Latch	To catch with a device which holds a door when closed, even if not bolted.	Close and latch the aft petal doors.
Leave	1. To go away from, depart.	1. Do not leave the area until this activity is complete.
	2. To allot or provide for.	2. Leave a 2-inch slack in the rope.
Let	To permit; to give opportunity to.	Let the engine stabilize.
Level	To cause an aircraft to become even or parallel with the plane of the horizon.	Jack and level the aircraft in accordance with specified procedure.
Lift	To move or cause to be moved from a lower to a higher position; to elevate.	Lift the spoiler control lever to the ARMED position.
Light	To cause to illuminate.	Light the field indicator light.

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Verbs	*Definitions*	*Examples*
Listen	To pay attention to sound.	Listen to the engine while it is operating.
Load	To place in or on a means of conveyance; to place cargo or aircraft components on an airplane or other vehicle.	Load and secure aircraft components on specified truck.
Locate	1. To find, determine, or indicate the place, site, or limits of.	1. Locate the No. 9 fitting.
	2. To set or establish in a particular spot, to station.	2. Locate the test equipment so that it can be seen by both technicians.
Lock	To hold fast or inactive; to fix.	Lock the throttle after it has been properly set.
Look for	To visually search for.	Look for cracks, security, corrosion, and damage during inspection of wheels and tires.
Loop	To make into the form or shape of a loop (i.e., a fold, or doubling of line leaving an aperture between the parts through which another line can be passed).	Loop the wire.
Loosen	To release from restraint, to cause to become less tight fitting.	Loosen the locknut on the relief valve.
Lower	To cause to move down; to depress as to direction.	Lower the exhaust stack into the stowed position.
Lubricate	To put lubricant on specified locations.	Lubricate the wheel bearings.
Maintain	1. To hold or keep in any particular state or condition, especially in a state of efficiency or validity.	1. An aircraft mechanic maintains aircraft.
	2. To sustain or keep up.	2. Maintain standard forms on power plant operation.
Make	To carry out or cause to occur.	Make corrections where necessary.
Mark	To label; to provide with an identifying or indicating symbol.	Mark each component before removing it.
Mate	To join or fit together, to couple.	Mate the torquemeter to the socket wrench.

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Verbs	*Definitions*	*Examples*
Measure	To determine the dimensions, capacity, or amount by use of standard instruments or utensils.	Measure voltage drop across each unit of resistance.
Mix	To combine or blend into one mass.	Never mix oxygen with other gases.
Modify	To alter or change somewhat the form or qualities of.	A jet engine mechanic modifies turbofan engines.
Move	To change the location or position of.	Move and position a B-4 maintenance stand.
Notify	To make known to; to give notice or report the occurrence of.	Notify man B that the brakes have been set.
Observe	1. To conform one's actions or practice to.	1. Observe precautions.
	2. To visually take note of, to pay attention to.	2. Observe the indicator for changes in airspeed.
Obtain	1. To get or find out by observation or special procedures.	1. Obtain a reading on the outside circle of the tensiometer.
	2. To gain or attain.	2. Obtain the necessary supplies before starting on maintenance.
Open	1. To move from closed position; to make available for passage by turning in an appropriate direction.	1. Open the valve.
	2. To make available for entry or passage by turning back, removing, or clearing away.	2. Open the trap door.
	3. To disengage or pull.	3. Open the appropriate circuit breakers.
Operate	To control equipment in order to accomplish a specific purpose.	Operate crew stands and auxiliary power equipment.
Order	1. To requisition or request from supply.	1. Order three cans of appropriate solvent.
	2. To group according to quality, value, or other characteristics.	2. Order components by size from smallest to largest.

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Verbs	*Definitions*	*Examples*
Organize	To arrange elements into a whole of interdependent parts; to form into a coherent unity; to integrate.	Organize the activities of the assisting technicians.
Overhaul	The act of disassembling equipment units down to all removable parts; cleaning; critically inspecting, repairing, restoring, and replacing where necessary; assembling, adjusting, alining, recalibrating, and verifying operational readiness by test or checkout; and packaging for transportation storage.	Overhaul the No. 2 engine.
Pack	To fill completely with grease.	Pack the bearings.
Paint	To apply color or pigment (suspended in suitable liquid) to the surface of.	Paint all exposed surfaces.
Park	To bring (an aircraft) to a stop and leave it standing for a time, usually without pilot, in a specified area.	Park the aircraft between the yellow lines.
Patch	To mend, cover, or fill up a hole or weak spot in.	Patch the tubes where necessary.
Perform	To do, carry out, or bring about; to reach an objective.	Perform a periodic inspection on the landing gear.
Place	To put or set in a desired location or position.	Place the test equipment so that it can be seen by both technicians.
Plan	To devise or project the achievement of.	Plan the day's schedule for the technicians.
Plug	To provide with a device for closing off the end of a tube which has a female fitting.	Plug all lines which have exposed female fittings.
Plug in	To attach or mate (an electrical device) to a service outlet.	Plug in the soldering iron at the service power outlet.
Position	To put or set in given place; to locate.	Position the test equipment so that it can be seen by both technicians.
Prepare	1. To make ready; to arrange things in readiness.	1. Prepare the surface for paint.

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Verbs	*Definitions*	*Examples*
	2. To prepare or make ready for a maintenance activity.	2. Prepare the Trunnion Shaft Kit for removal of the MLG shock strut.
Pre-set	To put in a desired position, adjustment or condition beforehand.	Pre-set tension indicator dial to size of cable being checked.
Press	To act upon through thrusting force exerted in contact.	Press the blower start button.
Preasurize	To apply pressure within by filling with gas or liquid.	Pressurize the booster hydraulic system.
Prevent	To keep from happening or existing.	Prevent oil from spilling over on components.
Process	To submit to a series of actions or operations leading to a particular end.	Process the forms so they will be compatible with new recording methods.
Provide	To supply what is needed, to equip.	Provide a flashlight for man B.
Pull	To exert force upon an object so as to cause motion toward the force.	Pull out knob no. 6 on the oxygen servicing cart.
Pump	1. Raise or lower by operating a device which raises, transfers, or compresses fluids by suction, pressure, or both.	1. Pump up the ramp several inches.
	To move up and down, or in and out, as if with a pump handle.	2. Pump engine primer knob.
Puncture	To pierce with pointed instrument or object.	Be careful not to puncture tube while probing the inside of it.
Purge	1. To free of sediment or trapped air by flushing or bleeding.	1. Purge fuel tanks.
	2. To remove fuel or fuel vapors from engine by motorizing engine with fuel switch off.	2. Purge engines.
Push	1. To press against with force so as to cause motion away from the force.	1. Push the blower start button.
	2. To move away or ahead by steady pressure.	2. Push the servicing cart toward the aircraft.

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Verbs	*Definitions*	*Examples*
Put	1. To place in or through.	1. Put a wire through the hole in the turnbuckle.
	2. To place or set in a desired position or location.	2. Put the test equipment where it can be seen by both technicians.
	3. To deposit or leave.	3. Put tools out on the bench.
	4. To lay or spread on or in.	4. Put sealant in the gap between the windshield and the aircraft structure.
Raise	To move or cause to be moved from a lower to a higher position, to elevate.	Raise the spoiler control lever to the ARMED position.
Read	To interpret the meaning of by visual observation.	Read the ammeter.
Readjust	To adjust again, to move back to a specified condition; to bring back to an in-tolerance condition.	Readjust the voltage after performing an operational check of the system.
Ready	To prepare for a maintenance activity.	Ready the Trunnion Shaft Kit for removal of the MLG shock strut.
Reassemble	To refit and secure together the parts after they have been taken apart.	Reassemble component before installation on aircraft.
Recap	To cap again; to replace a covering; to reinstall a fitting for closing the end of a tube.	Recap the filler valve.
Recognize	To perceive to be something previously known or designated.	A jet engine mechanic recognizes troubles through evaluation of engine operational checks.
Recommend	To urge the acceptance or use of.	Recommend procedure changes where appropriate.
Recondition	To renew; to bring or put back into good condition.	Recondition the pilot's and copilot's seats.
Reconnect	To rejoin or refasten that which has been separated.	Reconnect aft pistons to forward pistons.
Record	To set down in writing.	Record maintenance time on appropriate form.

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Verbs	*Definitions*	*Examples*
Reduce	To cause to be diminished in strength, density, or value.	Reduce pump flow.
Refuel	To put fuel into the tanks of (an aircraft) again.	Refuel the system as outlined in applicable technical manuals.
Regulate	To fix or adjust the time, amount, or rate of; to exercise restraining or directing influence over.	Regulate electrical current generation and distribution.
Reject	To refuse to have, use, or take for some purpose.	Reject components which show excessive wear.
Release	1. To set free from an inactive or fixed position; to unfasten or detach interlocking parts.	1. Release the parking brake.
	2. To let go of.	2. Release tensiometer handle.
	3. To set free from restraint or confinement.	3. Release pressure.
Relieve	To ease or set free of a burden; to partially release.	Relieve hydraulic pressure before working on a system.
Remove	1. To perform operations necessary to take an equipment unit out of the next larger assembly or system.	1. a. Remove bleed air shutoff valves. b. Remove bolts from nuts.
	2. To take off or eliminate.	2. Remove paint.
	3. To take or move away.	3. Remove jacks.
	4. To take off devices for closing off the end of a tube.	4. Remove caps (plugs) from all hydraulic lines.
Repair	To restore damaged, wornout, or malfunctioning equipment to a serviceable, usable, or operable condition.	Repair engine by replacing parts and removing defects.
Repeat	To make, do, or perform again.	If keys do not engage lugs, remove wheel assembly and repeat procedure.
Replace	1. To restore to a former place or position.	1. Replace covers on jacks.

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Verbs	*Definitions*	*Examples*
	2. To substitute serviceable equipment for malfunctioning, wornout, or damaged equipment.	2. Replace the switch contact points.
Report	1. To describe as being in a specified state.	1. Report when ready.
	2. To make known to; to give notice, or report the occurrence of.	2. Report to man B that the brakes have been set.
Request	To ask for.	Request further information if necessary.
Reset	To put back into a desired position, adjustment, or condition.	Reset the field after performing an operational check of the generator.
Retract	To draw up against, or into, the aircraft.	Retract the landing gear.
Return	To bring, send, or put back to a former or proper place.	Return the horizontal stabilizer to the neutral position.
Review	To examine again; to go over, or examine critically or deliberately.	Review procedures which have not been performed for more than two months.
Rework	To reprocess for further use; to revise.	Rework the report forms.
Rig	To assemble, adjust, and aline the major components of an aircraft (i.e., airfoils or other surfaces); to fit out (an aircraft) with control cables, bracing cables, pulleys, turnbuckles, etc.	Rig and adjust the mechanical linkage in the flight control system.
Rinse	To cleanse (as from soap used in washing) by clear water.	Rinse the battery after cleaning it with soda water solution.
Rotate	To cause to revolve about an axis or center.	Rotate the door handle counterclockwise until latches retract.
Route	To send by a selected course of travel; to divert in a specified direction.	Route the memo to all affected personnel.
Rub	To move along the surface of a body with pressure.	Rub hands around connections.

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Verbs	*Definitions*	*Examples*
Safeguard	To provide a technical contrivance to prevent accident; to comply with precautionary measures or stipulation.	Safeguard technical manuals.
Safety	1. To secure an aircraft part against loosening from vibration.	1. Safety the lock nut on the relief valve.
	2. To use safety wire to make an aircraft component fast, safe, or secure against loosening from vibration.	2. Safety the bolts with wire.
	3. To use a cotter pin to make an aircraft component fast, safe, or secure against loosening from vibration.	3. Safety the bolt with a cotter pin.
Safety wire	To use safety wire to make an aircraft component fast, safe, or secure against loosening from vibration.	Safety wire the bolts.
Salvage	To rescue or save (as from discard, wreckage, or ruin).	Salvage fuel which is drained from tanks.
Scan	To make a wide, sweeping search of; to look through or over hastily.	Scan the flight engineer's panels before beginning maintenance activity.
Schedule	To appoint, assign, or designate for a fixed future time; to make a timetable of.	Schedule maintenance activities for the day.
Screw	1. To attach, fasten, or close by means of a screw.	1. Screw the ram safety lock to the ram.
	2. To attach by means of a twisting motion in the proper direction.	2. Screw in jack pad.
	3. To attach screws by means of a twisting motion in the proper direction.	3. Screw in twelve screws around cover.
Scrub	To clean with hard rubbing.	Scrub all metal parts with a white powder deposit on them.
Secure	1. To make fast or safe.	1. Load and secure components on trucks.

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Verbs	*Definitions*	*Examples*
	2. To safe (with safety wire or cotter pin) to make aircraft component fast or safe or to keep it from loosening during vibration.	2. a. Secure bolts with safety wire. b. Secure the bolt with a cotter pin.
Select	To take by preference or fitness from a number or group; to pick out, to choose.	Select a battery cell and insert hydrometer nozzle in the cell.
Service	To perform such operations as clean-up, lubrication, and replenishment to prepare for use.	Service each battery cell to only ⅜ inch above the plates.
Set	1. To put a switch, pointer, or knob into a given position; to put equipment into a given adjustment, condition a mode.	1. Set PWR switch to ON.
	2. To put or place in a desired orientation or location.	2. Set the test equipment so that it can be seen by both technicians.
Set up	To prepare or make ready for a maintenance activity.	Set up the Trunnion Shaft Kit for removal of the MLG shock strut.
Shake	To move or cause to move to and fro in a quick, jerky manner.	Shake the container so that the paint will be well mixed.
Shut down	To perform operations necessary to cause an equipment to cease or suspend operation.	Shut down the air conditioning.
Signal	To notify or communicate by signals (i.e., a prearranged sign, notice, or symbol conveying a command, warning, direction, or other message).	Signal the pilot to move the aircraft to the left.
Simulate	To give the appearance or effect of.	Simulate doppler radar signals.
Slide	To cause to move in a smooth manner over a surface.	Slide the stand in close enough to do the work.
Specify	To name or state explicitly or in detail.	Specify the manufacturer's number of the multimeter.
Spill	To cause or allow to fall, flow, or run out.	Be careful not to spill battery acid on clothing, hands.

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Verbs	*Definitions*	*Examples*
Spin	To cause to revolve.	Spin wheel by hand until a bearing drag is noticed.
Spray	To apply with a device which disperses a jet of finely divided liquid.	Spray the fuselage and tail sections moving from center to ends.
Start	To perform actions necessary to set into operation, to set going, to begin.	Start the powered AGE.
Stay	To remain, to continue in a place.	Stay away from the danger area.
Stop	To perform actions necessary to cause an equipment to cease or suspend operation.	Stop the air conditioning.
Store	To deposit or leave in a specified place for future use.	Store the wheel covers after maintenance activity is completed.
Stow	To deposit or leave in a specified place for future use.	Stow the wheel covers after maintenance activity is completed.
Strike	To deliver or aim a blow or thrust; to hit.	Strike the designated spot with a hammer.
Submit	To make available, to offer.	Submit request for modification of procedures.
Suggest	To propose as desirable or fitting; to offer for consideration.	Suggest any changes which might be helpful.
Supervise	To oversee; to have or exercise the charge of.	Supervise the repair of the engines.
Support	To hold up or provide a foundation or props for.	Support the elevator at both ends.
Synchronize	To cause to happen at the same time.	Synchronize the activities of man A and B.
Tag	To provide with an identifying or indicating symbol with, or as if with, a tag (i.e., a cardboard, plastic, or metal marker used for identification or classification); to label.	Tag each hydraulic line before removing it.
Take	1. To get into or carry in one's hands or one's possession.	1. Take supplies out to the aircraft.

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Verbs	*Definitions*	*Examples*
	2. To get or find out by observation or special procedures.	2. Take a reading on the outside circle of the tensiometer.
Tap	To strike lightly.	Tap the eye of the cotter pin to seat it.
Test	To perform specified operations to verify operational readiness of a component, subcomponent, system, or subsystem.	Test the true airspeed indicator.
Throw	To move (a switch) so as to make or break a connection.	Throw switch to ON position.
Tie	To fasten, attach, or close by means of a line or cord.	Tie mooring ropes to tie points under wing and on nose.
Tighten	1. To perform necessary operations to fix more firmly in place.	1. Tighten all screws.
	2. To apply a specified amount of force to produce a rotation or twisting motion to fix more firmly in place.	2. Tighten the nut to a torque value of 1000 inch-pounds.
Tilt	To cause to slope, lean, or incline.	Tilt maintenance stand backwards until wheels contact the ground.
Torque	To apply a specified amount of force to produce a rotation or twisting motion to fix more firmly in place.	Torque the nut to 1000 inch-pounds.
Tow	To pull along (an aircraft) by means of a towing vehicle and tow bar.	Tow aircraft to the washrack.
Trace	To follow or study out in detail or step by step.	Visually trace the wiring diagram.
Transfer	To convey or cause to pass from one place to another.	Transfer fuel and oil from one place to another.
Transmit	1. To convey or cause to pass from one place to another.	1. Transmit fuel and oil from one place to another.
	2. To send out a signal by radio waves or wire.	2. Transmit message to control tower.

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Verbs	*Definitions*	*Examples*
Transport	1. To convey or cause to pass from one place to another.	1. Transport fuel and oil from one tank to another.
	2. To carry by hand or in a vehicle or hoist, or in a container, etc.	2. Transport landing gear to shop on dolly.
Trim	1. To free of excess or extraneous matter by, or as if by, cutting.	1. Trim patch to fit.
	2. To adjust (a jet engine) to compensate for wear.	2. Trim the no. 1 engine.
Troubleshoot	To localize, isolate, and correct the source of a malfunction or breakdown.	Troubleshoot the landing gear control circuit.
Tune	To adjust for precise functioning.	Tune the transmitter maximum output.
Turn	To cause to revolve about an axis or center.	Turn the door handle counterclockwise until latches retract.
Turn off	To shut off or stop the flow of by, or as if by, moving a control to its OFF position.	Turn off power to the signal generator.
Turn on	To cause to flow or operate by, or as if by, moving a control to its ON position.	Turn on power to the signal generator.
Uncap	To remove a device for closing off the end of a tube with a male fitting.	Uncap and unplug all hydraulic lines.
Unlock	To set free from an inactive or fixed position, to unfasten, to detach interlocking parts.	Unlock the parking brake.
Unplug	1. To detach or separate (an electrical device) from a service outlet.	1. Unplug the soldering iron.
	2. To remove a device for closing off the end of a tube with female fittings.	2. Unplug and uncap all hydraulic lines.
Unscrew	1. To loosen or withdraw by turning in the proper direction.	1. Unscrew the jack pad.
	2. To draw the screws from.	2. Unscrew 12 screws around cover.

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Verbs	*Definitions*	*Examples*
Unwind	To cause to uncoil or unroll.	Unwind hoses from hose rack.
Use	To put into action or service; to avail oneself of; to carry out a purpose or action by means of.	Use only antimagnetic fasteners.
Verify	1. To confirm or establish that a proper condition exists.	1. Verify that the light is off.
	2. To establish the truth or accuracy of.	2. Verify the readings before recording them.
Wait	To suspend activity in a sequence of activities until a given condition occurs or a given time has elapsed.	Wait 5 minutes before performing the next task.
Wash	To cleanse by, or as if by, the action of liquid; to remove (dirt) by rubbing or drenching with liquid.	Wash the battery with a cleaning solution and a stiff brush.
Watch	To visually take note of, to pay attention to in order to check on action or change.	Watch the indicator for changes in airspeed.
Wire	To provide with wire, to use wire on.	Wire the circuit.
Withdraw	To take back, away, or out.	Withdraw the bar magnet from the center of the coil.
Wrap	To wind, coil or twine so as to encircle or cover something.	Wrap the wire around the terminal.
Zero	To bring to a desired level or null position.	Zero the protractor to the surface.

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