



**i860™ Microprocessor
Object File Utilities
Reference Manual**

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Chapter 1

1.1 Introduction

The i860™ Microprocessor Object File Utilities **lib860**, **dump860**, **name860**, and **size860** facilitate manipulation of Common Object File Format (COFF) files under OS/2. COFF is the standard format for i860 Microprocessor programs. These utilities aid software developers who are using the OS/2 environment to create programs for the i860 Microprocessor. The utilities create and maintain libraries of object files and selectively display the contents of library and object files in a variety of formats useful to software developers.

The i860™ Microprocessor Object File Utilities work on object files that have the i860 microprocessor magic number 0x14C, which identifies files for the i860 Microprocessor; other files are rejected.

Notation and Conventions

gbold	When a name, symbol, or other sequence of characters is used in exactly the same way that it is intended to be entered into a compiler, operating system, or other software product, it is printed in a contrasting type style, gothic bold; for example, dirbase .
<i>gitalic</i>	Gothic italic type indicates a metasymbol that is to be replaced with an item that fulfills the rules for that symbol; for example, <i>objfil</i> is to be replaced by an object-file identifier that fulfills the rules for file names.
[]	Brackets indicate that the arguments or parameters enclosed within them are optional.
[]	Brackets, when printed in the contrasting type style, are required and must be entered as shown.
{ }	One and only one of the enclosed entries must be selected unless the field is also surrounded by brackets, in which case it is optional.
{ }...	At least one of the enclosed entries must be selected unless the field is also surrounded by brackets, in which case it is optional. The items may be used in any order, unless otherwise noted.
...	Ellipses indicate that the preceding argument or parameter may be repeated. When an ellipsis follows a right bracket or brace, the entire unit enclosed by the brackets or braces may be repeated.
.,/\$	Punctuation other than brackets must be entered as shown.

1.2 Introduction

1.2.1 **lib860** Archive and Library Maintenance

The **lib860** program maintains archive files. An archive is a collection of files combined into a single file. An archive can contain any kind of file; however, the primary use of **lib860** is to maintain library files, which are collections of object modules and are used by the Linker.

lib860 [-]{**deprtx**}[**cl**] *arch_file* [*obj_file*]...

- d** Delete the files named in the *obj_file* list from *arch_file*.
- e** List the external symbols from *arch_file*.
- p** Print (display) the contents of each *obj_file* from *arch_file*. If no *obj_file* is given, all file names in *arch_file* are displayed.
- r** Replace each *obj_file* in *arch_file*
- ru** Replace each *obj_file* in *arch_file* if the modification date of *obj_file* is later than its replacement date in *arch_file*.
- t** Display a table of contents of the files in *arch_file*. If no *obj_file* is given, all file names in *arch_file* are listed. If an *obj_file* list is given, the list contains only those members of the *obj_file* list that are in the *arch_file*.
- x** Extract (copy) each *obj_file* from *arch_file*. The *arch_file* is not changed. If no *obj_file* is given, all object files in *arch_file* are extracted.
- c** When **-r** or **-ru** is used and *arch_file* does not exist, a new file is created with the name *arch_file* and a message is displayed, stating that a new file was created. When **c** is used with **-r** or **-ru** the creation message is not displayed.
- l** Use the current directory instead of the default temporary directory for temporary files. The default temporary directory is determined by the C run-time library function **tempnam()**, which determines the temporary directory according to the following order:
 1. The value of the OS/2 environment variable **TMP**, if defined.
 2. The directory specified by **P_tmpdir** in **<stdio.h>**.
 3. The current directory.

1.2.2 dump860 Dump Object File

The **dump860** program displays specified parts of object files.

dump860 [{-options}[modifiers]]... file...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive. The *options* may be one or more of the following:

- a** Display the archive header of each object file contained in each *file* that is an archive.
- c** Display the string table.
- f** Display the file header.
- g** Display the global symbols in the symbol table of each *file* that is an archive. Before each symbol is displayed the file offset of the archive header of the module in which the symbol is defined.
- h** Display the section headers.
- l** Display line-number information.
- o** Display the optional header.
- r** Display the relocation information.
- s** Display section contents.
- t** Display all symbol table entries.
- t index** Display the symbol table entry corresponding to *index*. The index can be determined by using the **-t** option without an *index*.
- +t end_index** Display a range of symbol-table entries. The range begins either with the first entry or with the entry specified by **-t index**; it ends with *end_index*.
- V** Displays the version number of the **dump860** program on the standard error output.
- z name[,line_no]** Display line-number entries for the symbol *name*. If no *line_no* is given, display the information for all line numbers. If *line_no* is given, display the information that corresponds to *line_no*. (A space can be used in place of the comma before *line_no*.) See also the **+z** modifier.

Many of the above options can be used with modifiers, as follows:

- d sec_no** Display information corresponding to the section *sec_no*. The *sec_no* is an integer in the range from one to the total number of sections. It corresponds positionally to the sections displayed by the **-h** option. The **-d** and **+d** modifiers apply to the options **-h**, **-s**, **-r**, and **-l**.

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- +d** *end_sec_no* Display information corresponding to the range of sections from section one or from the section specified by **-d** to *end_sec_no*.
- n** *sec_name* Display only information that corresponds to the section *sec_name*. This *modifier* can be used with the options **-h**, **-l**, **-r**, **-s**, and **-t**.
- p** Do not display column headings.
- u** Underline the name of the object file in headings.
- v** Display the information in symbolic rather than numeric form. When **-v** is used with **-s**, data are displayed in 32-bit groups.
- +z** *end_line_no* Display a range of line-number entries for the label specified by **-z**. The range begins either with the first line-number entry or with the line number specified by **-z** *name*, *line_no*. It ends with *end_line_no*. This modifier applies only to the **-z** option.

1.2.3 name860 Display Names in Object File

The **name860** program displays the symbol table of object files.

name860 [-o|x|d][-v/n][-hefupr TV] *file*...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive.

- e Display external and static symbols only.
- f Display the full symbol-table contents, including the normally hidden symbol such as **.text**, **.data**, and **.bss**.
- h Do not display column headings.
- n Display symbols in the order of their names.
- o Display numbers in octal. The default is decimal.
- p Display symbol information in a compact form that is easily parsed. The information for each symbol has the form:

value code symbol

... where *code* is **U** (undefined), **A** (absolute), **T** (text segment), **D** (data segment), **B** (bss segment), **S** (user-defined segment), **R** (register), **F** (file), or **C** (common). If the symbol is local, the *code* is shown in lowercase.

- r Prefix each line with the name of the object or archive file.
- T Truncate long symbols to fit within the column. A truncated symbol is shown with an asterisk (*) as the last displayed character.
- u Display only undefined symbols.
- V Display the version of the **name860** program on the standard error output.
- v Display symbols in the order of their values.
- x Display numbers in hexadecimal. The default is decimal.

1.2.4. **size860**Display Section Sizes in Object File

The **size860** program displays the size of object files.

size860 [-v] [-o|x|d] [-n] [-f] *file*...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive. The *options* may be one or more of the following:

- n Include NOLOAD sections in the size.
- f Create a full display, showing the section name along with the section size.
- o Display numbers in octal. The default is decimal.
- x Display numbers in hexadecimal. The default is decimal.
- v Display the version of the **size860** program on the standard error output.

Chapter 2

2.1 Introduction

The i860™ Microprocessor Object File Utilities **ar860**, **dump860**, **nm860**, and **size860** facilitate manipulation of Common Object File Format (COFF) files under UNIX and AIX. COFF is the standard format for i860 Microprocessor programs. These utilities aid software developers who are using the UNIX and AIX environment to create programs for the i860 Microprocessor. The utilities create and maintain libraries of object files and selectively display the contents of library and object files in a variety of formats useful to software developers.

The i860™ Microprocessor Object File Utilities work on object files that have the i860 microprocessor magic number 0x14C, which identifies files for the i860 Microprocessor; other files are rejected.

Notation and Conventions

bold	When a name, symbol, or other sequence of characters is used in exactly the same way that it is intended to be entered into a compiler, operating system, or other software product, it is printed in a contrasting type style, gothic bold; for example, as860 .
<i>italic</i>	Gothic italic type indicates a metasympol that is to be replaced with an item that fulfills the rules for that symbol; for example, <i>objfil</i> is to be replaced by an object-file identifier that fulfills the rules for file names.
[]	Brackets indicate that the arguments or parameters enclosed within them are optional.
[]	Brackets, when printed in the contrasting type style, are required and must be entered as shown.
{ }	One and only one of the enclosed entries must be selected unless the field is also surrounded by brackets, in which case it is optional.
{ }...	At least one of the enclosed entries must be selected unless the field is also surrounded by brackets, in which case it is optional. The items may be used in any order, unless otherwise noted.
...	Ellipses indicate that the preceding argument or parameter may be repeated. When an ellipsis follows a right bracket or brace, the entire unit enclosed by the brackets or braces may be repeated.
.,/\$	Punctuation other than brackets must be entered as shown.

2.2 Description of Utilities

2.2.1 ar860 Archive and Library Maintenance

The **ar860** program maintains archive files. An archive is a collection of files combined into a single file. An archive can contain any kind of file; however, the primary use of **ar860** is to maintain library files, which are collections of object modules and are used by the Linker.

ar860 [-](deprtx)[cl] *arch_file* [*obj_file*]...

- d** Delete the files named in the *obj_file* list from *arch_file*.
- e** List the external symbols from *arch_file*.
- p** Print (display) the contents of each *obj_file* from *arch_file*. If no *obj_file* is given, all file names in *arch_file* are displayed.
- r** Replace each *obj_file* in *arch_file*
- ru** Replace each *obj_file* in *arch_file* if the modification date of *obj_file* is later than its replacement date in *arch_file*.
- t** Display a table of contents of the files in *arch_file*. If no *obj_file* is given, all file names in *arch_file* are listed. If an *obj_file* list is given, the list contains only those members of the *obj_file* list that are in the *arch_file*.
- x** Extract (copy) each *obj_file* from *arch_file*. The *arch_file* is not changed. If no *obj_file* is given, all object files in *arch_file* are extracted.
- c** When **-r** or **-ru** is used and *arch_file* does not exist, a new file is created with the name *arch_file* and a message is displayed, stating that a new file was created. When **c** is used with **-r** or **-ru** the creation message is not displayed.
- l** Use the current directory instead of the default temporary directory for temporary files. The default temporary directory is determined by the C run-time library function **tempnam()**, which determines the temporary directory according to the following order:
 1. The value of the UNIX and AIX environment variable **TMP**, if defined.
 2. The directory specified by **P_tmpdir** in **<stdio.h>**.
 3. The current directory.

2.2.2 dump860 Dump Object File

The **dump860** program displays specified parts of object files.

dump860 [{-options}[modifiers]]... file...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive. The *options* may be one or more of the following:

- a** Display the archive header of each object file contained in each *file* that is an archive.
- c** Display the string table.
- f** Display the file header.
- g** Display the global symbols in the symbol table of each *file* that is an archive. Before each symbol is displayed the file offset of the archive header of the module in which the symbol is defined.
- h** Display the section headers.
- l** Display line-number information.
- o** Display the optional header.
- r** Display the relocation information.
- s** Display section contents.
- t** Display all symbol table entries.
- t *index*** Display the symbol table entry corresponding to *index*. The *index* can be determined by using the **-t** option without an *index*.
- +t *end_index*** Display a range of symbol-table entries. The range begins either with the first entry or with the entry specified by **-t *index***; it ends with *end_index*.
- V** Displays the version number of the **dump860** program on the standard error output.
- z *name*[*line_no*]** Display line-number entries for the symbol *name*. If no *line_no* is given, display the information for all line numbers. If *line_no* is given, display the information that corresponds to *line_no*. (A space can be used in place of the comma before *line_no*.) See also the **+z** modifier.

Many of the above options can be used with modifiers, as follows:

- d *sec_no*** Display information corresponding to the section *sec_no*. The *sec_no* is an integer in the range from one to the total number of sections. It corresponds positionally to the sections displayed by the **-h** option. The **-d** and **+d** modifiers apply to the options **-h**, **-s**, **-r**, and **-l**.

-
- +d** *end_sec_no* Display information corresponding to the range of sections from section one or from the section specified by **-d** to *end_sec_no*.
- n** *sec_name* Display only information that corresponds to the section *sec_name*. This *modifier* can be used with the options **-h**, **-l**, **-r**, **-s**, and **-t**.
- p** Do not display column headings.
- u** Underline the name of the object file in headings.
- v** Display the information in symbolic rather than numeric form. When **-v** is used with **-s**, data are displayed in 32-bit groups.
- +z** *end_line_no* Display a range of line-number entries for the label specified by **-z**. The range begins either with the first line-number entry or with the line number specified by **-z** *name*, *line_no*. It ends with *end_line_no*. This modifier applies only to the **-z** option.

2.2.3 nm860n Display Names in Object File

The **nm860** program displays the symbol table of object files.

nm860 [-o|x|d][-v/n][-hefupr TV] file...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive.

- e** Display external and static symbols only.
- f** Display the full symbol-table contents, including the normally hidden symbol such as **.text**, **.data**, and **.bss**.
- h** Do not display column headings.
- n** Display symbols in the order of their names.
- o** Display numbers in octal. The default is decimal.
- p** Display symbol information in a compact form that is easily parsed. The information for each symbol has the form:

value code symbol

...where *code* is **U** (undefined), **A** (absolute), **T** (text segment), **D** (data segment), **B** (bss segment), **S** (user-defined segment), **R** (register), **F** (file), or **C** (common). If the symbol is local, the *code* is shown in lowercase.

- r** Prefix each line with the name of the object or archive file.
- T** Truncate long symbols to fit within the column. A truncated symbol is shown with an asterisk (*) as the last displayed character.
- u** Display only undefined symbols.
- V** Display the version of the **nm860** program on the standard error output.
- v** Display symbols in the order of their values.
- x** Display numbers in hexadecimal. The default is decimal.

2.2.4. **size860**Display Section Sizes in Object File

The **size860** program displays the size of object files.

size860 [-v] [-o|x|d] [-n] [-f] *file*...

Each *file* may be either an object file or an archive file. When an archive file is specified, a display is created for each object file in the archive. The *options* may be one or more of the following:

- n Include NOLOAD sections in the size.
- f Create a full display, showing the section name along with the section size.
- o Display numbers in octal. The default is decimal.
- x Display numbers in hexadecimal. The default is decimal.
- V Display the version of the **size860** program on the standard error output.