

**IAR C COMPILER FOR
THE 78000 GUIDE**

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ABOUT THIS GUIDE

This guide describes how to install and use the IAR C Compiler for the NEC μ PD78000 family of microprocessors.

This guide is divided into two parts: the first part, *IAR 78000 C Compiler*, describes those aspects of the C compiler that are specific to the 78000. The second part, *IAR C Compiler – General Features*, describes features common to all IAR C Compilers.

IAR 78000 C COMPILER

This part consists of the following chapters:

The *Introduction* describes the main features of the IAR C Compiler, and shows how it fits in with the other IAR development tools.

Getting started then shows how to install the C compiler and its associated files, and explains the function of these files.

Using the C compiler describes how to run the 78000 C Compiler, and gives information about file formats it uses.

The *Tutorial* illustrates how you might use the C compiler to develop a series of typical programs, and illustrates some of the compiler's most important features. It also describes a typical development cycle using the C compiler.

Configuration then describes how to configure the C compiler for different requirements.

Data representation describes how the compiler represents each of the C data types.

78000 language extensions describes the extended keywords, `#pragma` keywords, and intrinsic functions specific to the 78000 C Compiler.

Extended keyword reference then gives reference information about each of the extended keywords.

ABOUT THIS GUIDE

#pragma directive reference gives reference information about the `#pragma` keywords.

Assembly language interface describes the interface between C programs and assembly language routines.

78000 specific command line options summary gives a summary of the additional command line options in the 78000 C Compiler.

78000 specific command line options describes the additional command line options in the 78000 C Compiler.

IAR C COMPILER – GENERAL FEATURES

This part consists of the following chapters:

General command line options summary gives a summary of the C compiler command line options.

General command line options then provides reference information about each command line option.

General C language extensions describes the C language extensions provided for all target processors.

C library functions summary gives an introduction to the C library functions, and summarizes them according to header file.

C library functions reference then gives reference information about each library function.

K&R and ANSI C language definitions describes the differences between the K&R description of the C language, and the ANSI standard.

Finally *Diagnostics* lists the compiler warning and error messages.

ABOUT THIS GUIDE

ASSUMPTIONS

This guide assumes that you already have a working knowledge of the following:

- ◆ The NEC 78000 processor.
- ◆ The 78000 processor assembler language.
- ◆ MS-DOS or UNIX depending on your host system.

It does not attempt to describe the C language itself. For a description of the C language, *The C Programming Language* by Kernighan and Richie is recommended, of which the latest edition also covers ANSI C.

CONVENTIONS

This user guide uses the following typographical conventions:

<i>Style</i>	<i>Used for</i>
computer	Text that you type in, or that appears on the screen.
parameter	What you should type as part of a command.
[option]	An optional part of a command.
<i>reference</i>	A cross-reference to another part of this user guide, or to another guide.

In this guide K&R is used as an abbreviation for *The C Programming Language* by Kernighan and Richie.

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INTRODUCTION

The IAR Micro Series is a range of integrated development tools that support a wide choice of target microprocessors. Amongst these tools are the IAR C Compilers – a family of powerful and fast C compilers.

The IAR C Compiler for the NEC 78000 family of microprocessors offers the standard features of the C language, plus many extensions designed to take advantage of the 78000's specific facilities. The compiler is supplied with the IAR Micro Series Assembler for the 78000, with which it is integrated and shares linker and library manager tools.

KEY FEATURES

The IAR C Compiler for the 78000 offers the following key features:

LANGUAGE FACILITIES

- ◆ Conformance to the ANSI specification.
- ◆ Standard library of functions applicable to embedded systems, with source license option.
- ◆ IEEE-compatible floating-point arithmetic.
- ◆ Powerful extensions for 78000-specific features, including efficient I/O.
- ◆ Generation of fully ROM-compatible code without language restrictions.
- ◆ Linkage of user code with assembly routines.
- ◆ Long identifiers – up to 255 characters.
- ◆ Maximum compatibility with other IAR C Compilers.

INTRODUCTION

PERFORMANCE

- ◆ Very fast compilation.
- ◆ Memory-based design, avoiding temporary files or overlays.
- ◆ Single executable C compiler program file.
- ◆ Extensive type-checking at compile time.
- ◆ Extensive module interface type checking at link time.
- ◆ LINT-like checking of program source.

CODE GENERATION

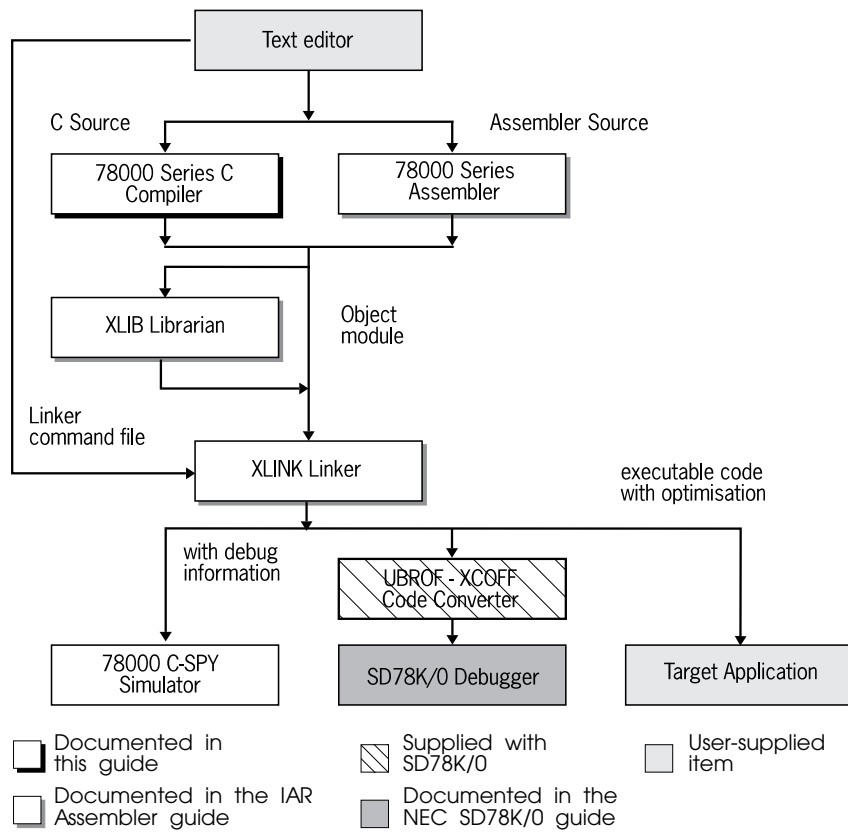
- ◆ Selectable optimization levels for code speed and size.
- ◆ Comprehensive output options, including relocatable binary, ASM, ASM + C, XREF, etc.
- ◆ Easy-to-understand error and warning messages.
- ◆ Compatibility with C-SPY high-level debugger, simulator and emulator driver.
- ◆ Support for over 20 emulator formats.

TARGET SUPPORT

- ◆ Small and banked memory models.
- ◆ Flexible variable allocation, including SFR, SFRP, and BIT types.
- ◆ Interrupt functions requiring no assembly language.
- ◆ A `#pragma` directive to maintain portability while using 78000 extensions.

DEVELOPMENT SYSTEM STRUCTURE

The following diagram shows how the IAR C Compiler is used as part of a complete Micro Series development system:



The text editor may be any standard ASCII editor, such as WordStar, BRIEF, PMATE, or EMACS. The C compiler accepts C source files and produces code module files, normally in the IAR proprietary Universal Binary Relocatable Object Format (UBROF).

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These code modules pass to the linker, XLINK, where they may be combined with modules created with the Assembler, and library modules either supplied as standard or created previously by the user using the library manager, XLIB. XLINK and XLIB are supplied and documented as part of the IAR Assembler package.

The output of XLINK is either debuggable code for use in the C-SPY Debugger or an alternative one, or final executable code for use in the target application. This executable code is in any one of many standard formats for use in emulators, EPROM or ROM.

GETTING STARTED

INSTALLATION

This chapter shows you how to install all files from the installation disks supplied, describes the installed files themselves, and lists the file extensions used by the system.

You should have at least 3 MB of disk space available to install the ICC78000 C Compiler package.

INSTALLATION UNDER MS-DOS

- ◆ Ensure your system has MS-DOS 2.11 or higher.
- ◆ Insert the installation disk into the floppy disk drive and type:

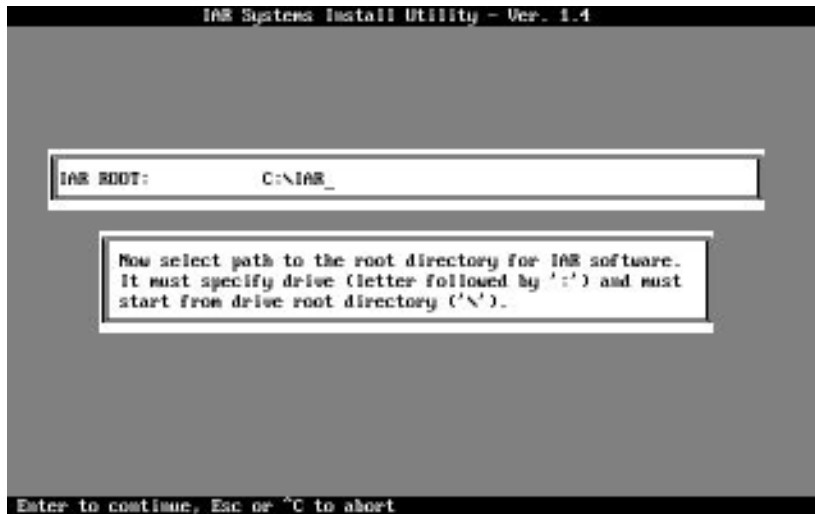
A:\INSTALL

The startup screen is displayed:



GETTING STARTED

- ◆ Press . You will then be prompted to enter the path for installing the IAR subdirectories and files:



By default the files are installed in C:\IAR.

- ◆ Edit the path, or press to use the default.

The installation program then decompresses the contents of the installation disks, prompting you for each additional disk.

GETTING STARTED



When decompression is complete, you will see a display of the default paths for each sub-directory into which the files will be installed.

You may edit any of the paths to suit your requirements. You will not normally need to do this, and this guide assumes you have chosen the defaults.

◆ Press to proceed.

If you already have some IAR files on the same paths, for example because you are upgrading an existing installation, you will be asked for confirmation before installation proceeds.

The final stage of installation is to manually modify your `autoexec.bat` file. Since the modifications are version-dependent, they are documented in the text file `autoexec.iar` on the directory path you chose (by default, `C:\iar\autoexec.iar`). Open your `autoexec.bat` file and the `autoexec.iar` file in a text editor, follow the instructions in `autoexec.iar` file, and save the modified `autoexec.bat` file.

GETTING STARTED

INSTALLATION UNDER WINDOWS

The IAR C Compiler may be used in an MS-DOS window under Windows. Using an MS-DOS window, follow the instructions given in *Installation under MS-DOS*, page 1-5.

INSTALLATION UNDER UNIX

Follow the separate printed installation documentation supplied with the delivery media.

READ-ME FILES

Your installation includes a number of ASCII-format text files containing recent additional information. Using the default pathnames, they are:

C:\iar\etc\newclib.doc	Documentation of additional C library functions.
C:\iar\icc78000\icc78000.doc	General information about the C compiler.
C:\iar\icc78000\global.doc	General information about the global optimiser.

There are further files associated with the assembler, linker, library manager, and any tools that have been installed separately, such as C-SPY. These are listed in their own guides.

Before proceeding it is recommended that you read all of these files.

INSTALLED FILES

The IAR C Compiler and associated tools use sub-directories and file extensions to make management and operation of them as efficient as possible. This chapter describes these uses and all the IAR files. It refers to the following MS-DOS program files:

GETTING STARTED

<i>Function</i>	<i>Filename</i>	<i>Where it is documented</i>
78000 C Compiler	icc78000	This guide
78000 Assembler	a78000	<i>IAR 78000 Assembler</i> guide.
IAR Linker	xlink	<i>IAR Linker & Librarian</i> guide.
IAR Librarian	xlib	<i>IAR Linker & Librarian</i> guide.
C-SPY Simulator	cs78000	<i>Using C-SPY</i> guide.

The default installation procedure creates the following directories in `c:\iar`:

Executable files

The `c:\iar\exe` subdirectory holds the MS-DOS executable program files. These correspond to the IAR commands such as the command to run the compiler.

The installation procedure includes an addition to the `autoexec.bat` PATH statement, directing MS-DOS to search the `exe` sub-directory for command files. This allows the user to issue an IAR command from any directory.

For details of the contents, see *Exe files*, page 1-11.

Miscellaneous files

The `c:\iar\etc` sub-directory holds miscellaneous files such as read-me files and example sources.

For details of the contents, see *Etc files*, page 1-11.

Source files

The `c:\iar\icc78000` sub-directory holds source files for configuration to the target environment and program requirements, as described in *Configuration*, page 1-43.

For details of the contents, see *ICC78000 files*, page 1-12.

