

MITSUBISHI CNC

Changes for the Better



Instruction Manual NC Compiler



MELSOFT
Integrated FA Software

Introduction

This instruction manual describes how to use NC Compiler. Incorrect handling may lead to unforeseen accidents, so make sure to read this instruction manual thoroughly before operation to ensure correct usage.

NC Compiler supports the following NC series. Some of the functions are not adapted to the NC Compiler, depending on its series.

Appropriate NC
MITSUBISHI CNC M700V/M70V/M700/M70 series MITSUBISHI CNC E70

Notes on Reading This Manual

- (1) For the specifications of individual machine tools, refer to the manuals issued by the respective machine tool builders. The "restrictions" and "available functions" described by the machine tool builders have precedence over this manual.
- (2) This manual describes as many special operations as possible, but it should be kept in mind that operations not mentioned in this manual cannot be performed.

Precautions for Safety

Always read the specifications issued by the machine tool builder, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use. Understand this numerical controller, safety items and cautions before using the unit. This manual ranks the safety precautions into "DANGER", "WARNING" and "CAUTION".



When the user may be subject to imminent fatalities or major injuries if handling is mistaken.



When the user may be subject to fatalities or major injuries if handling is mistaken.



When the user may be subject to injuries or when property damage may occur if handling is mistaken.


The following signs indicate prohibition and compulsory.

	<p>This sign indicates prohibited behavior (must not do). For example, indicates "Keep fire away".</p>
--	---

	<p>This sign indicates a thing that is compulsory (must do). For example, indicates "it must be grounded".</p>
--	---

The meaning of each pictorial sign is as follows.

 CAUTION	 CAUTION rotated object	 CAUTION HOT	 Danger Electric shock risk	 Danger explosive
 Prohibited	 Disassembly is prohibited	 KEEP FIRE AWAY	 General instruction	 Earth ground

Note that even items ranked as " CAUTION", may lead to major results depending on the situation. In any case, important information that must always be observed is described.

 **DANGER**





Not applicable in this manual.

 **WARNING**

Not applicable in this manual.

 **CAUTION**

1. Items related to product and manual

-  If the descriptions relating to the "restrictions" and "allowable conditions" conflict between this manual and the machine tool builder's instruction manual, the latter has priority over the former.
-  The operations to which no reference is made in this manual should be considered impossible.
-  This manual is compiled on the assumption that your machine is provided with all optional functions. Confirm the functions available for your machine before proceeding to operation by referring to the specification issued by the machine tool builder.
-  In some NC system versions, there may be cases that different pictures appear on the screen, the machine operates in a different way on some function is not activated.

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1. Outline

NC Compiler compiles custom screen software source code for NC, which generates NC Designer and NC Designer2, and source code of APLC function which users specify, and generates feasible execute module on NC equipment.

Operable operating systems for NC Compiler and applicable NC device for execution of the generated codes are as follow.

1.1. Operating Environment

NC Compiler requires the following operating environment.

Item	Details
Model	IBM PC/AT compatible machine(x86)
OS	Windows7 32bit Windows7 64bit Windows8.1 32bit Windows8.1 64bit Windows10 32bit Windows10 64bit • Operable under all privilege (Administrator and Guest). However, installation must be executed by Administrator authorization.
CPU	CPU clock 1GHz or more
Language	Japanese • English
Required memory	2GB or more
Required capacity	100MB or more (Excluded those necessary for operating system operation)
External interface	CD-ROM/DVD DRIVE

1.2. Applicable NC Device

NC Compiler generates an executable module that is feasible on the following NC device.

Model
MITSUBISHI CNC M700V/M70V/M700/M70 series MITSUBISHI CNC E70

Following software can be developed with NC Compiler:

- APLC development for M700V, M70V, M700, M70 and E70
- Custom screen software development for M700VS, M70V, M700, M70 and E70

For custom screen software development of M700VW, please use Microsoft Visual Studio 2010.

Module generated with NC Compiler is exclusive use of MITSUBISHI CNC 700V/M70V/M700/M70 series or MITSUBISHI CNS E70. Do not use on other models.

2. Installation

The following indicates installation procedure for NC Compiler.

2.1. Procedure

Installation must be executed by Administrator authorization.

Execute NC Compiler.exe in the installation CD. Follow the instruction after installer was started. Product ID which is required for installation is included in the package.

“Destination folder” which was designated during installation is described as <INSTALLDIR> in this manual.

3. Environment Setting

Environment setting is required to carry out NC Compiler. There are 2 methods for environment setting. Select a method to suit your usage pattern.

3.1. Method to use batch file

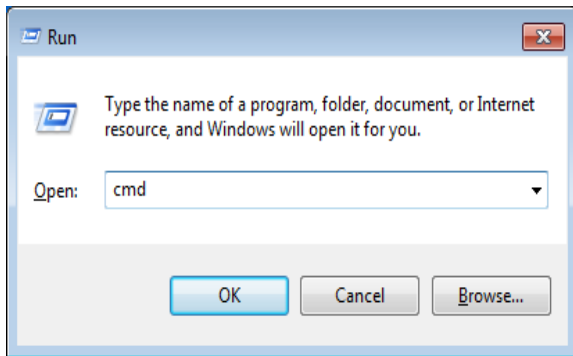
Execute the batch file to set environment variables which are necessary to execute NC Compiler.

When cygwin environment is used other than NC Compiler on the same computer, the batch file is also valid to install NC Compiler2 since NC Compiler2 is also in cygwin environment.

Start Command Prompt with the following operation.

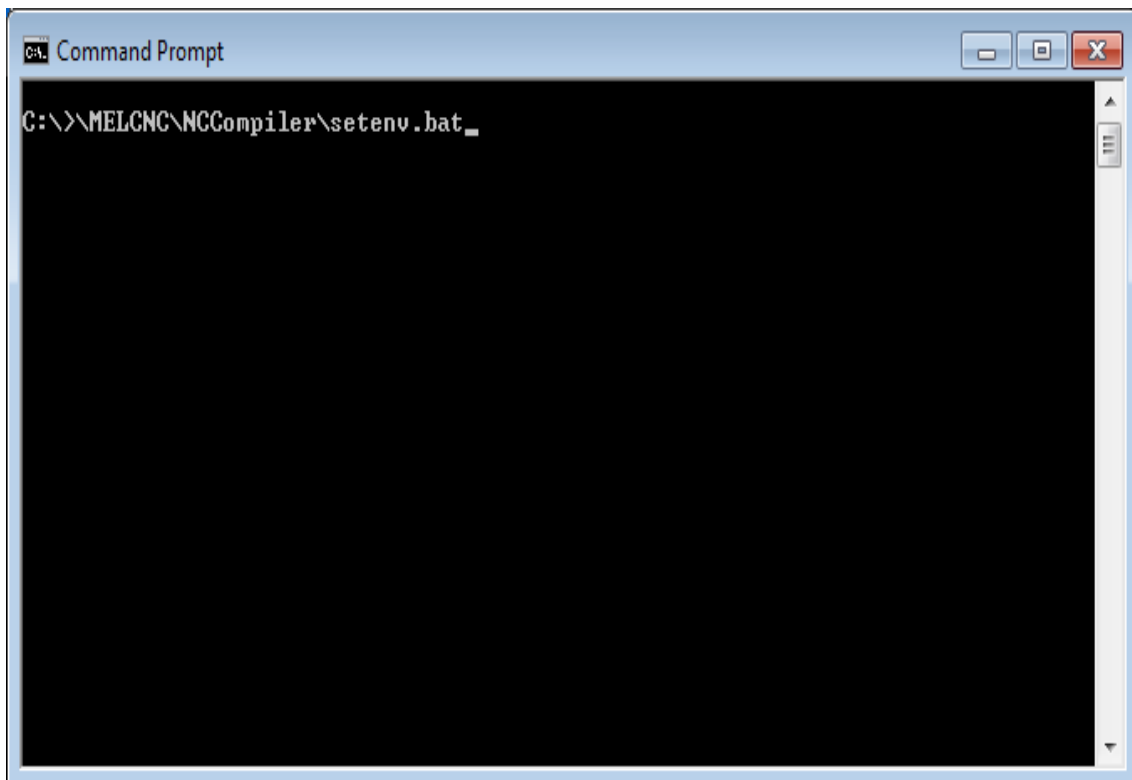
Select Start menu → Accessories → Command Prompt.

Or press "Window key + R" to open the Run dialog, type cmd, and then press OK to start Command Prompt.

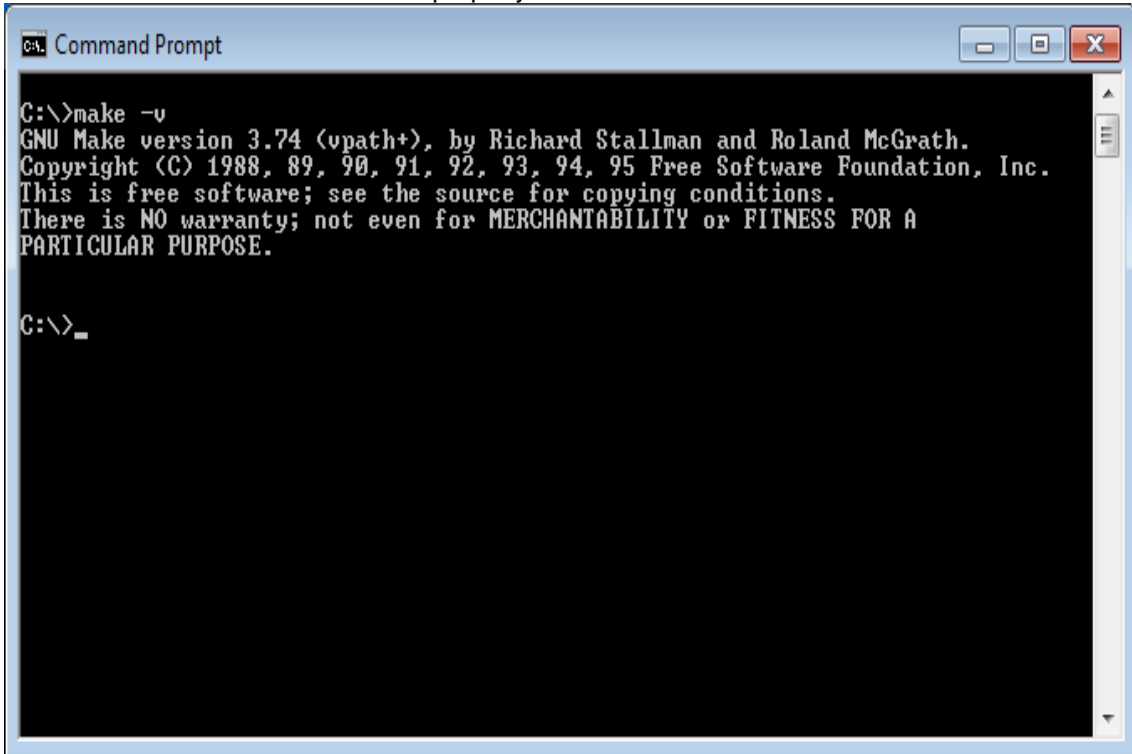


Environment variables are possible to set collectively to execute the batch file which is located directly under the installed folder.

<INSTALLDIR>\setenv.bat



When make -v is input, installed make tool will display the version information, so you can confirm environment variables were properly set.



Batch file must be executed every time Command Prompt is started. Execute build in the same Command Prompt after the execution of the batch file. When the same Command Prompt is used continuously, execution of batch file is required only the first time.

3.2. Method to set environment variable

Set environment variables which are required for NC Compiler execution to Windows environment. When other cygwin environment is not used, environment variables are set only first time.

Environment variables are able to set with the dialog displayed in environment variable located under Start button → Computer → System properties → Advanced system settings.

Variable name	Value
WIND_BASE	<INSTALLDIR>
WIND_HOST_TYPE	x86-win32
CPU	MIPS64
PATH	%WIND_BASE%\host\%WIND_HOST_TYPE%\bin;<PATH conventional variable value>

4. Execution of Build

NC Compiler is executable from Command Prompt.

Command name of compiler is "ccmips". Set up compile option as follow. Object file is generated from the source files of C and C++.

```
-EL -mips4 -mno-branch-likely -Os -fno-strict-aliasing -G 0 -fno-builtin -DCPU=MIPS64  
-DTOOL=gnule -DMIPSEL -funroll-loops -fforce-addr -std=c9x -pipe
```

An example of command line:

```
ccmips -EL -mips4 -Os -mno-branch-likely -fno-strict-aliasing -G 0 -fno-builtin \  
-DCPU=MIPS64 -DTOOL=gnule -DMIPSEL \  
-funroll-loops -fforce-addr -std=c9x -pipe -c \  
-l<Path of header file> <Source file(.c)> -o <Object file(.o)>
```

Command name of linker is "ldmips". Set up compile option as follow. Load module is generated from an object file.

```
-EL -X -r
```

An example of command line:

```
ldmips -EL -X -r -o <Load module(.o)> <Object file(.o)>
```

NC Compiler can convert C and C++ language. Refer to <INSTALLDIR>\docs\gnu\toolkit\index.html (English) for compiler related information such as details of compile option. Refer to each functions' manual for the method of writing programs. EUC or UTF-8 is usable for source code of programs.

5. Description of Makefile

Build can be simplified by specifying build procedure to Makefile. Sample program is included <INSTALLDIR>\aplc_sample in the package. This Makefile sample shows the basic descriptive method of Makefile with NC Compiler.

Refer to <INSTALLDIR>\docs\gnu\make\make.html (English) or general books etc. for the descriptive method of Makefile.

Execute “make” with Command Prompt after Makefile was completed to specify. Command to be executed can be confirmed with “make -n”. Makefile to use can be designated with make -f file name.

6. Load Module Installation procedure to NC

Refer to the following manuals for installation method of function available for each functions and load module to NC.

- APLC Open Specification Manual (BNP-C3039-130)
- NC Designer Instruction Manual (IB-1500039)
- NC Designer2 Instruction Manual (IB-1501249)

*Precaution at custom screen development

Note the following points to develop custom screen when NC Compiler is used.

1. The filenames without the extension from the names of projects which were created on NC Designer and the names used for MODULE_NAME** in Config.ini have to be set identically included both capital letters and lower-case letters. Also, set filenames for load module and the designated names in customload.txt to be identical.
2. When binary for custom screen is compiled, compile it after designating “-fno-rtti” option.

Revision History

Date of revision	Manual No.	Revision details
Jan. 2015	IB(NA)1501320-A	First edition created.
Nov. 2016	IB(NA)1501320-B	- Corresponded to Windows10. - The following chapter was revised. 1.1 Operating Environment

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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