F^{2}MC-16LX FAMILY
SUPPORT TOOL
EMULATOR SYSTEM MB2147-01

INSTALLATION GUIDE MB2147-01

APPLICATION NOTE

FUJITSU

Revision History

Date	Issue
2002-09-11	V1.0; M. Willam
2003-02-11	V2.0; M. Willam; PGA 256 description added
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2003-07-09	V2.4: H.Wech: chapter 2 corrected
2003-10-23	V2.5: M. Willam: Typos removed
2004-04-05	V2.6: M. Willam: Page reference in appendix corrected
2005-01-03	V2.7: M. Willam: Appendix A, B updated

This document contains 25 pages.

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Contents

0 Introduction

This installation guide will help you to quickly start setting up the MB2147-01 Emulation Hardware for Fujitsu 16-Bit MCUs and its usage with the Softune Workbench V30L28 or higher. For in-depth information please refer to the following manuals:

- MB2147-01 Hardware Manual (Emulator)

- MB2147-10 Hardware Manual (Adapter Board PGA256P)

- MB2147-20 Hardware Manual (Adapter Board PGA299P)

- MB2147 Getting Started Application Note

- Evaluation Board Documentation (e.g. for Flash-CAN-120-390 v1.1)

At the end of this document you will find a guide of trouble shooting items, in order to perform a quick operation check of the 16-bit emulation system.

1   Hardware Requirements

BASIC DEVICES OF MB2147 EMULATOR SYSTEM
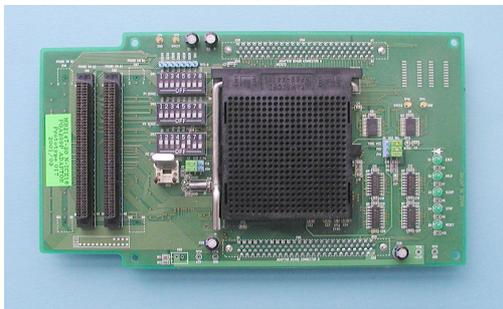
1.1   Devices

The basic devices which are required for setting up the 16-bit emulation system are for 299-Pin and 256-Pin Evaluation MCUs:
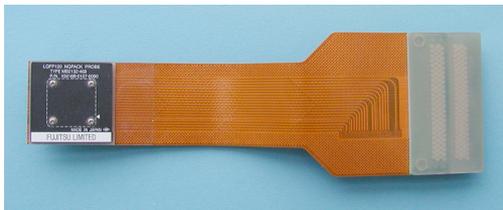
• Emulator Main Unit MB2147-01

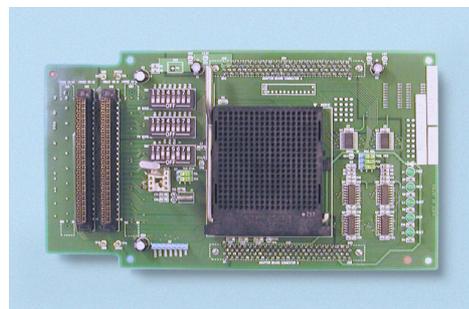| **299-Pin Evaluation MCUs**	**256-Pin Evaluation MCUs**

• Adapter Board MB2147-20 PGA299P

• Adapter Board MB2147-10 PGA256P

• Probe Cable
(here: MB2132-469 LQPF120 NQPACK)
(for MB90V390)

• Probe Cable
(here: MB2132-457 QFP-100)
(for MB90V540)
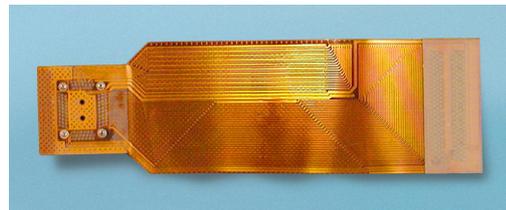
• Evaluation chip (here: MB90V390)

• Evaluation chip (here: MB90V540)
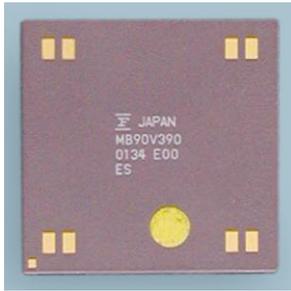
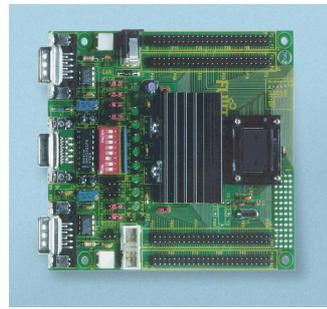• Target system
(here: Flash-Can-120-390
Starter Kit Board)
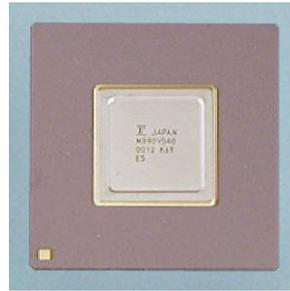
• Target system
(here: Flash-CAN-100-M06
Starter Kit Board)

• RS232-, USB- or LAN-connection cable

• Two Power supplies (12V DC)

In addition to the emulator, ordered from Fujitsu, a customer should get the 'Accessories 16'-kit that includes a set of manuals and some cables.

2 Setting up the Emulation System

HARDWARE INSTALLATION

2.1 Installing the emulator system

Attention: Be sure that the system is *not* connected to any power supply, when connecting or disconnecting components to and from it.

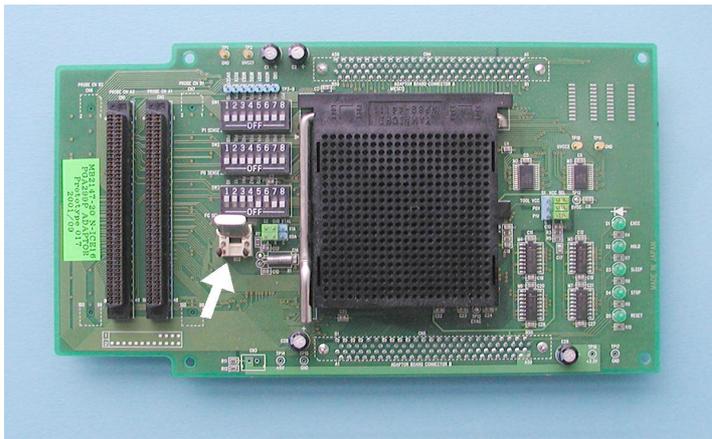### 2.1.1 Adapter Boards

There exist two different Adapter Boards:

- MB2147-10 for PGA256 MCUs

- MB2147-20 for PGA299 MCUs

Please refer to the table in the appendix, for which devices what board should be used.
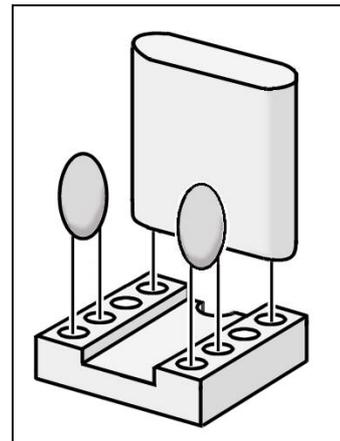
MB2147-20

MB2147-10
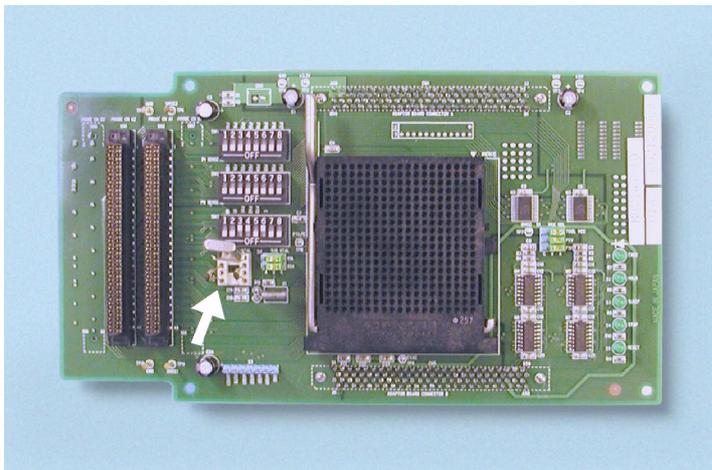
Figure 2-1: Main-Clock

The white arrow marks the crystal-area of the Main-Clock.

The DIP-switches and jumpers are identical for both Adapter Boards.

The Figure 2-2 shows the schematic of the Clock-Supply circuit. The right setting has to be done by Dip-Switch SW3 (FC SEL) and S2 (SUB XTAL).
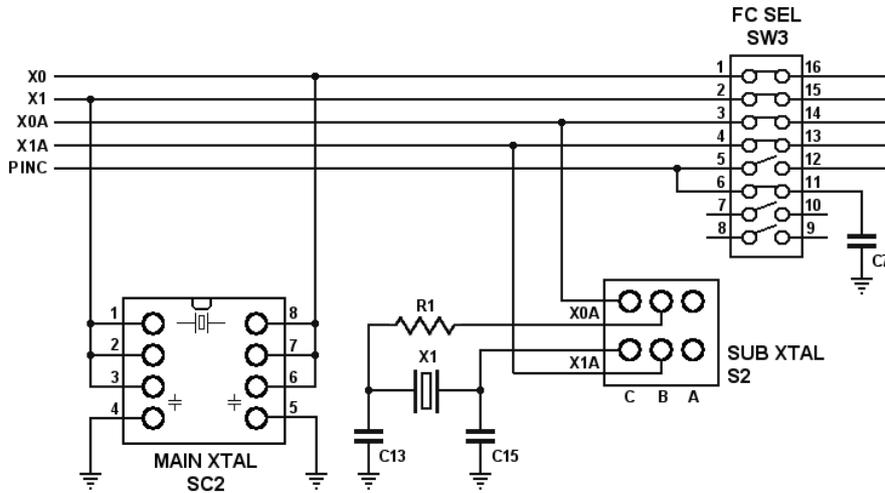
Figure 2-2: Clock supply configuration

2.1.2 Main-Clock

It is recommended to install a crystal and two capacitors (about 15 pF) directly to the Adapter Board. See Figure 2-1: Main-Clock

To supply the main clock from the user system, add an oscillator to the user system and have the main clock supplied using a CMOS buffer.

Please refer to the graphic above and to the Figure 2-1 how to enable the Main-Clock.

Clock Supply	SW3					
	S1	S2	S3	S4	S5	S6
Main-Clock on adapter-board	OFF	OFF	*S	*S	*C	*C
Main-Clock on target system	ON	ON	*S	*S	*C	*C

*S: see Sub-Clock

*C: see C-pin Switching

Table 2-1: Main-Clock Supply

2.1.3 Sub-Clock

The 32.768 kHz crystal of the Sub-Clock is already available on both Adapter Boards. It can be found in the crystal area near socket SC2.

Please refer to the graphic above and to the Table 2-2, how to enable the Sub-Clock.

Sub-Clock	SW3						S2
	S1	S2	S3	S4	S5	S6	Figure
Dual Clock PGA256: X0A=Pin176 X1A=Pin51 PGA299: X0A=Pin217 X1A=Pin267	*M	*M	OFF	OFF	*C	*C	Figure 2-3
Dual Clock PGA256: X0A=Pin51 X1A=Pin176 PGA299: X0A=Pin267 X1A=Pin217	*M	*M	OFF	OFF	*C	*C	Figure 2-4
Dual Clock not available	*M	*M	ON	ON	*C	*C	Figure 2-5

*M: see Main-Clock   *C: see C-pin Switching

Table 2-2: Sub-Clock

Sub-Clock-Setting S2:
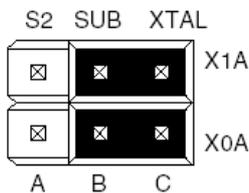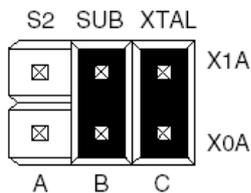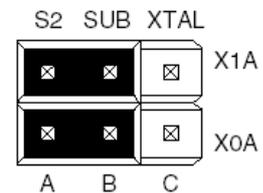
Figure 2-3   Figure 2-4   Figure 2-5

2.1.4 C-pin switching

Depending on the microcontroller series SW3-S5/S6 has to be set.

Please refer to the graphic above and to Table 2-4, how to set the C-Pin.

C-Pin Switching	SW3						S2
	S1	S2	S3	S4	S5	S6	Figure
C-Pin exists on V-Chip	*M	*M	*S	*S	OFF	ON	*S
P70 exist on V-Chip	*M	*M	*S	*S	ON	OFF	*S

*M: see Main-Clock   *S: see Sub-Clock

Table 2-3: C-pin Switching

2.1.5 Example settings for MCU-series:

The following table shows the settings for some microcontroller series:

| V-Chip | Adapter | SW3 | | | | | | S2 |
		S1	S2	S3	S4	S5	S6	Figure
MB90V340	MB2147-20	OFF	OFF	OFF	OFF	OFF	ON	Figure 2-4
MB90V340 S	MB2147-20	OFF	OFF	ON	ON	OFF	ON	Figure 2-5
MB90V390	MB2147-20	OFF	OFF	ON	ON	OFF	ON	Figure 2-5

* see C-pin Switching

Table 2-4: Clock Supply

Sub-Clock-Setting S2:

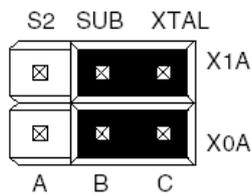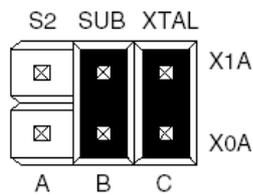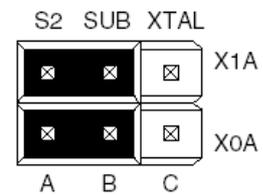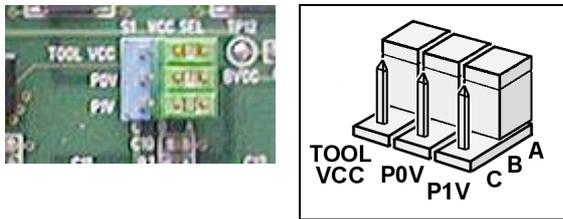Figure 2-3   Figure 2-4   Figure 2-5

2.1.6 Power connection jumper S1

The power connection jumpers S1 have all to set to A-B for TOOL VCC, P0V and P1V, as shown below:

All other DIP switches (SW1, P1 SENSE and SW2, P0 SENSE) should be switched off.

Important note: If you are using a 3V system together with an MB90V480 you have to set the *TOOL VCC* jumper to B-C (Emulator 5V).

2.1.7 Mount the Adapter Board on the Emulator

The MB2147-20 Adapter Board has two connectors (ADAPTOR BOARD CONNECTOR A and B) on the backside witch fit into the connectors of the Emulator MB2147-01.

Pay attention that the small white triangles on the side of the connectors point together.

Note: The MB2147-10 Adapter Board is placed in the same way at the Emulator.
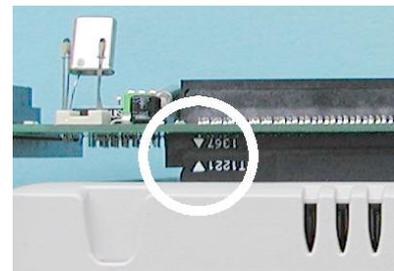
2.1.8 Insert the Evaluation Chip

2.1.8.1 Procedure for Adapter Board MB2147-20
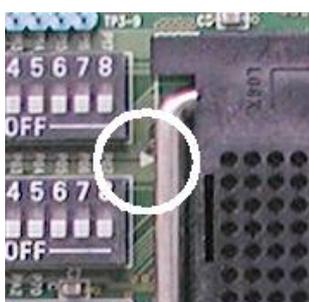
First pull the lever of the Adapter Board MCU socket. Near the axis of the lever is a small white triangle, which points to Pin 1 of the chip socket.

The Evaluation Chip has a small golden quadrate on one edge. This indicates the Pin Position 1.

Then insert the Chip as shown in the right picture and return the lever back in its home position.
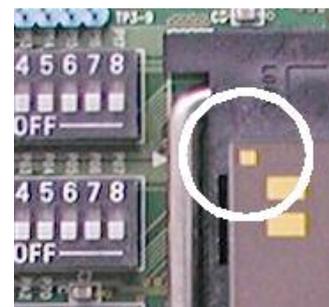
2.1.8.2 Procedure for Adapter Board MB2147-10
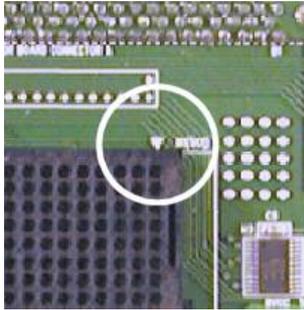
The procedure is the same like for the MB2147-20. But pay attention, that Pin 1 mark is turned by 90° clockwise to the MB2147-20 Adapter Board's mark.
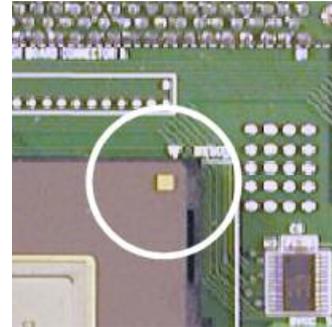
2.1.9 Connect the Probe Cable to the Adapter Board
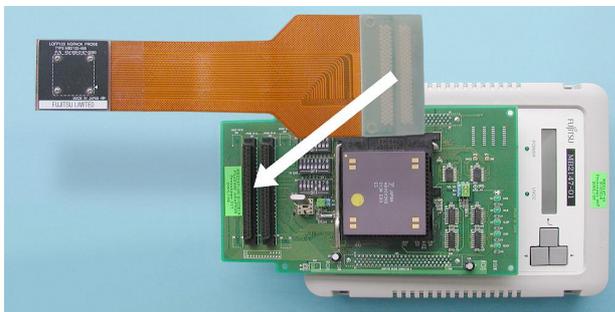
Connect a Probe Cable to the Adapter Board. For e. g. MB90V390 use the LQFP120 NQPACK PROBE cable (MB2132-469).

The cable has to insert in the PROBE CN A2 (CN1) and PROBE CN A1 (CN2) connectors on the Adapter Board.

2.1.10 Connect the Emulator System with the Starter Kit
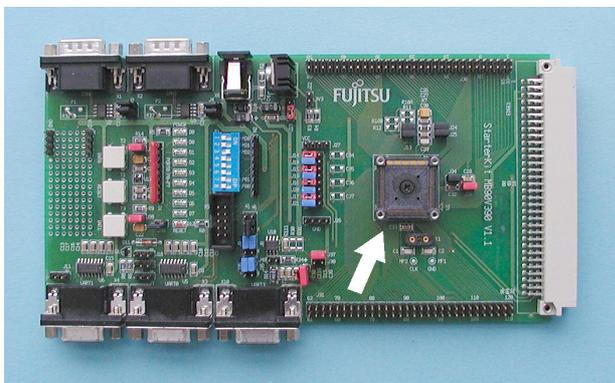
Connect the Probe Cable to a Starter Kit (e. g. Flash-Can-120-390).

Insert the cable properly into the MCU socket on the Starter Kit Board. Note, that it fits only in the correct position: Three edges of the socket are round and one is flat. In addition both the probe socket and the Board

have small triangles which point to Pin 1.
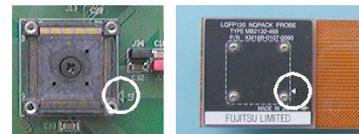
After inserting, use a small cross tip screwdriver to fix the four screws of the probe cable.

Note: The procedure is similar to a 0.5µm target system

The PGA299 MCU emulator system then looks like in the picture below:
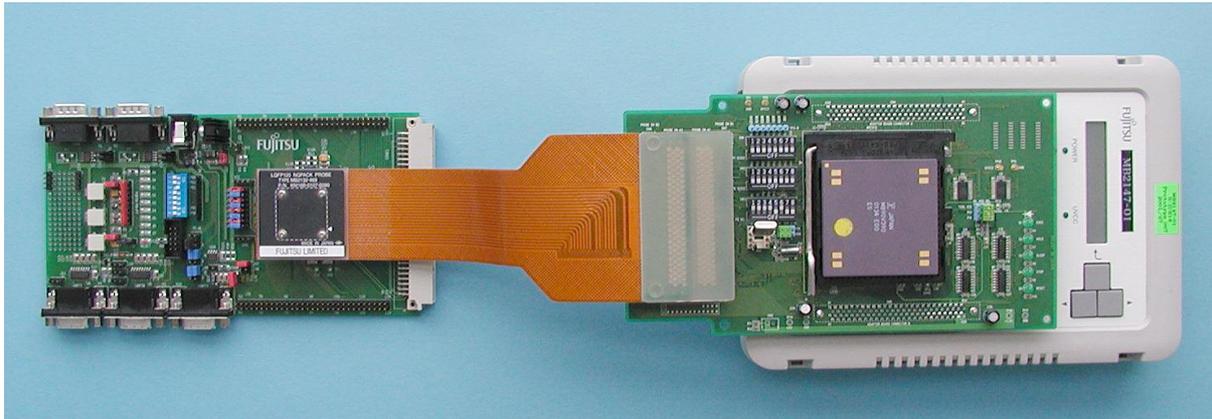
A PGA256 MCU system will look like in the picture below:
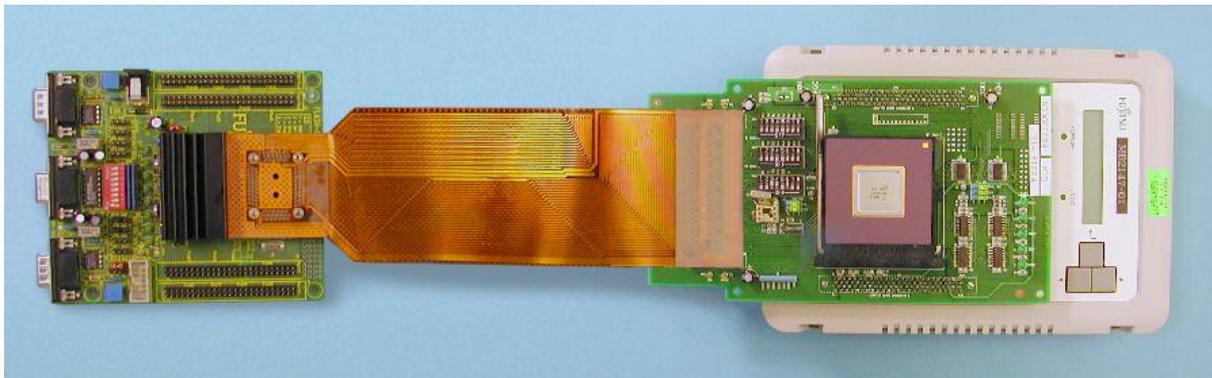
2.1.11 Check DIP switches on the Target System (e. g. MB90V390 Starter Kit)
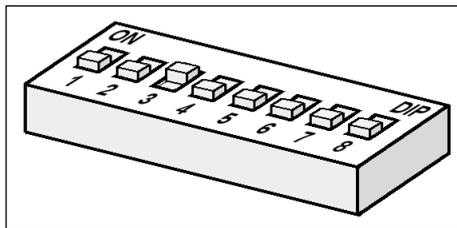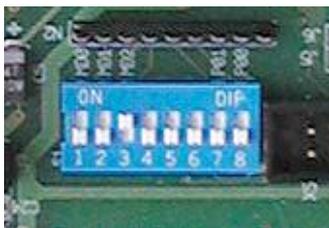
The DIP switches on the Flash-Can-120-390 Starter Kit has to be set as illustrated in the left pictures. For Single-Chip-Run Mode only switch No. 3 has to be switched ON.

2.1.12 Connect the MB2147-01 Emulator to a PC or a LAN network
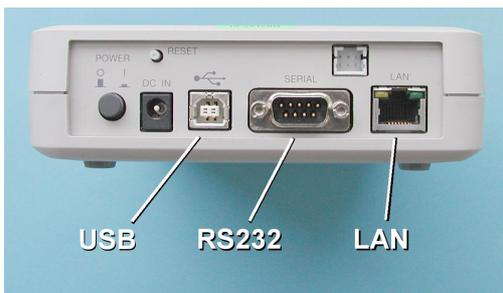
The Emulator has three different communication interfaces.

- USB

- RS232

- LAN

Choose one of these communication interfaces.

2.1.13 Power connection

Connect a power supply to the Emulator *first*, then switch on the emulator. This prevents damages in the Adapter Board, in the Evaluation Chip and in the Emulator itself.

The power LED should be lighting green and in the LC display the following text should occur: "NO CONNECT [Enter]: MENU"

After this connect a power supply to the target system, i. e. the Starter Kit Board.

2.1.14 Power down

Contrariwise to the power-on connection the power on the target system has to switched off *first* during power-down.

The emulator has to be switched off *at last*.

3 Setting up the Emulation Software

SOFTWARE INSTALLATION

3.1 Installing the emulator software on PC

To work with the 16-Bit emulation system, you have to install the Softune Workbench Software environment from the CD-ROM. After executing setup.exe you will find a menu with install options. Select all items and start the installation. The default path is C:\Softtune. After the installation you will find the Softune workbench ready to use for the new 0,35µ-16-Bit microcontroller series.

The CD-ROM includes also some demonstration projects for the MB90390 series. Install them also in a directory of your PC.

3.2 Check Emulation System with the IO-Port Sample Project

Open the Softune Workbench. Then choose the Menu *File/Open*. The following window will pop up:
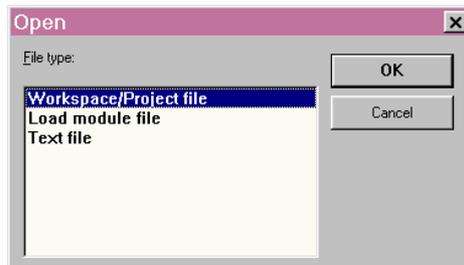
Confirm *Workspace/Project file* with the OK button.

Now choose the IO-Port-Workspace-File *IOPort.wsp* in the Open File Dialog Window.

Then the Softune Workbench window will look like this:
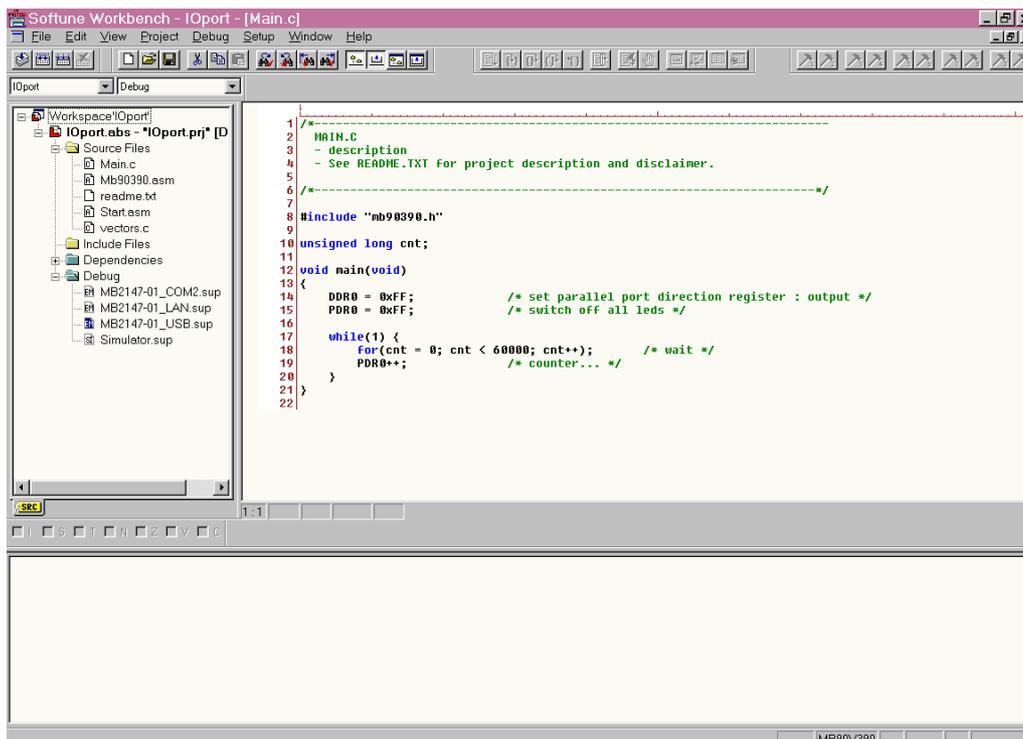
On the top of the screen you find a standard menu bar with some icons.

The left window shows the Structure of the work space including the source codes, include files, header files and debugger information.

The right upper window is used for editing and observing files.

The lower Window is the status and message window.
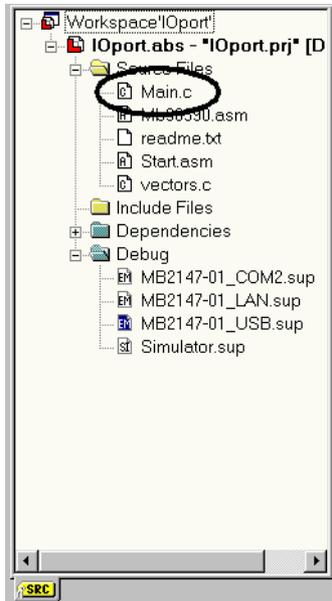
Open the file *Main.c* by double clicking it in the left upper Window.

The following c code will be displayed in the right upper window:
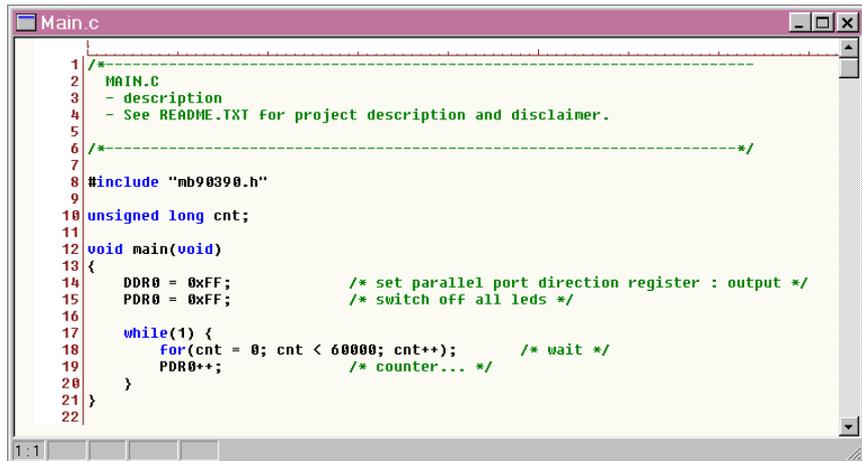
Now choose the Menu *Project/Build* or press Ctrl+F8. Now the complete project will be compiled and all object codes will be created.

The message Window will now display:

Now building...
--------------------Configuration: IOport.prj - Debug--------------------
Start.asm
Main.c
vectors.c
Mb90390.asm
Now linking...
C:\.....\mb90390\IOport\ABS\IOport.abs
Now starting load module converter...
C:\.....\mb90390\IOport\ABS\IOport.mhx

No Error.

Depending on your communication interface to the emulator, double click one of the following download methods in the upper left window:

- MB2147-01_COM1.sup

- MB2147-01_LAN.sup

- MB2147-01_USB.sup

After a short moment, the Softune Workbench will go in its debugger state. The Window will look like this:
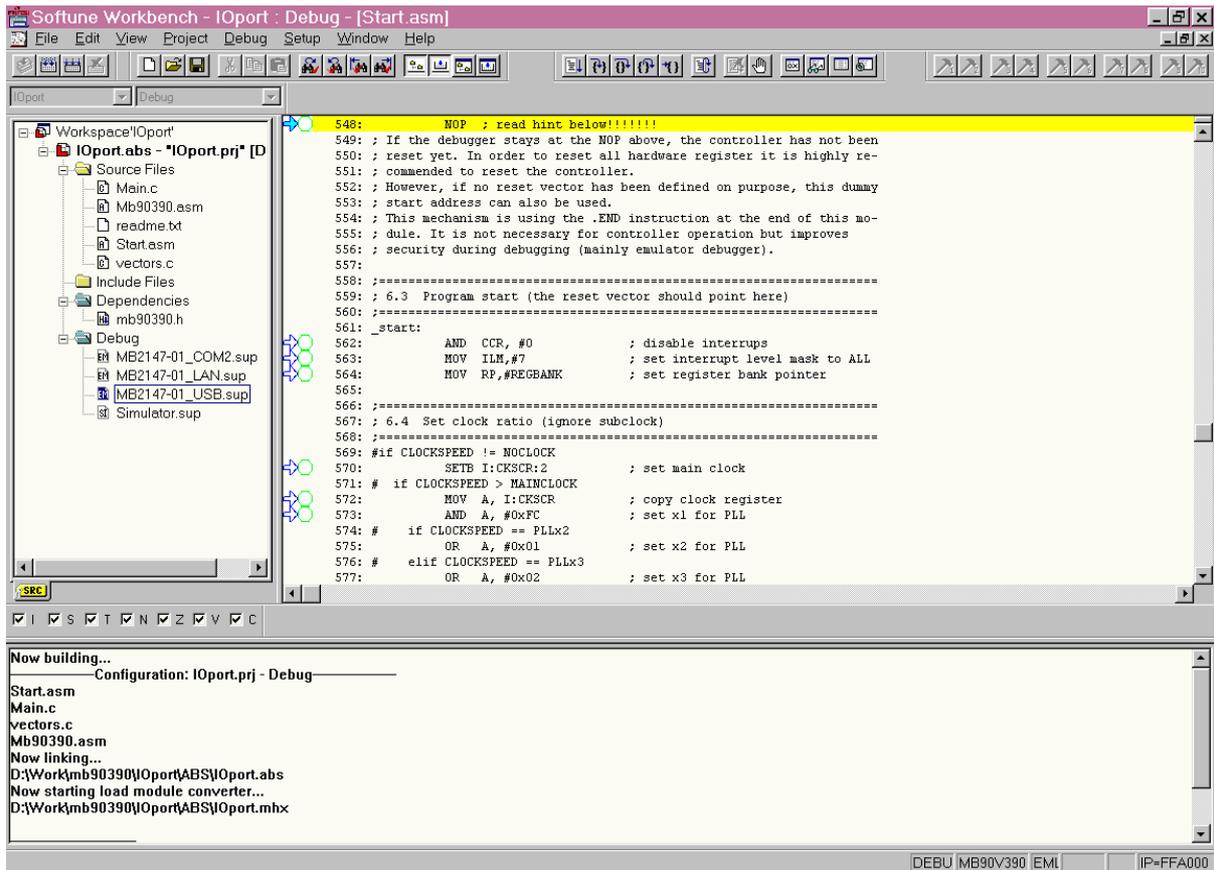
Look on the LC display of the Emulator. The following message should be displayed:

"BREAK Vol:OK [Enter]:Menu"

Now choose the menu *Debug/Run/Go* or press F5 or click the button.
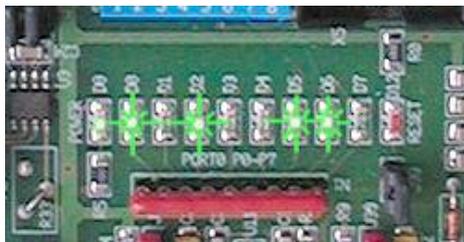
Look at the Starter Kit Board. The LEDs of Port0 have to flash alternately.

The LCD on the emulator should display:

"EXEC Vol:OK [Enter]:Menu"

To end debugging, choose *Debug/End debug* in the Softune Menu Bar. The emulator system will then halt.

4 Troubleshooting

TROUBLE DURING INSTALLATION

4.1 Emulator Software does not work in debugging mode

Note, that the Emulator Software will not work if the Emulator is not powered on, not connected to a Target Board, not connected properly to a PC or if no Evaluation MCU is in the socket.

The Target Board must provide power logic signals to all MCU pins.

4.2 Wrong COM-Port in Softune Workbench

The basic setting after installation for the RS232-PC-COM-Port is COM1. If you want to use your COM2-Port then click with the right mouse button on the entry MB2147-01_COM1.sup in the project window. Then a small popup window is displayed. Choose *change*.

Now a Setup Wizard starts. Let all entries in their default states, until the following window occurs:
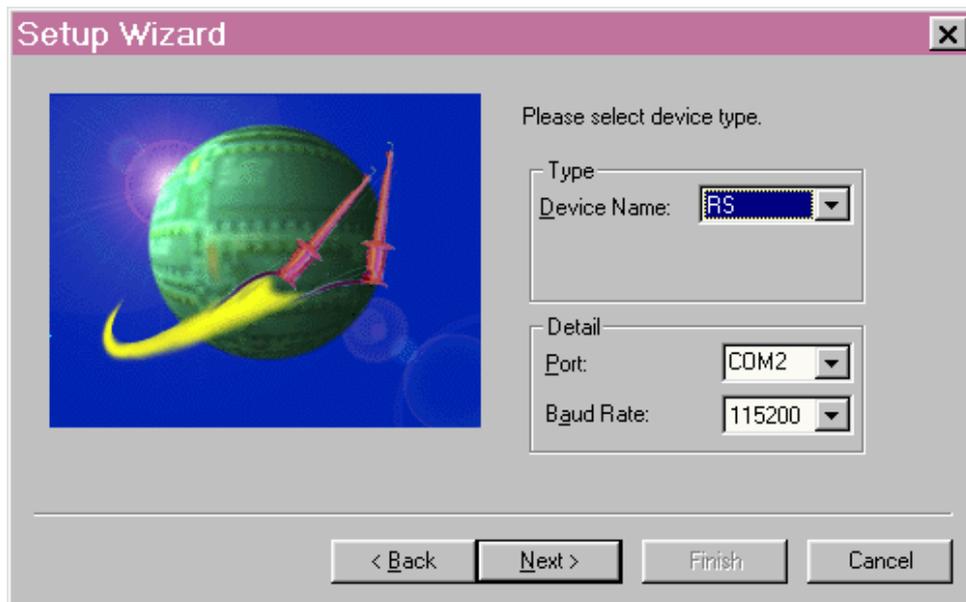
In this window, you can choose the COM2 port.

Click *Next>* and finally *Finish*.

4.3 Emulator MB2147-01 Menu Settings

Use the following settings for the Emulator 2147-01 in case of trouble:

Menu

      1.) **LAN**

           1.) **IP Address:**   *(defined by System Administrator)*

           2.) **Subnet Mask:**   *(defined by System Administrator)*

           3.) **MAC Address:**   *(defined by System Administrator)*

           4.) **Port Address:**   *(defined by System Administrator)*

2.) USB

3.) Loader Mode

4.) Information:

    1.) Version: **Loader, CMN, Depen1-3, CMNSUB**

    2.) Key Click: **ON/OFF**

4.4 Using LAN

To set up the LAN interface click on the entry "MB2147-01_LAN.sup" in the project window. Then click on the right mouse button. Choose *change* in the popup window. Then a setup wizard for the LAN interface is started. Follow the next steps.

When the following window is displayed, make sure that *Monitor program auto-loading* is selected:
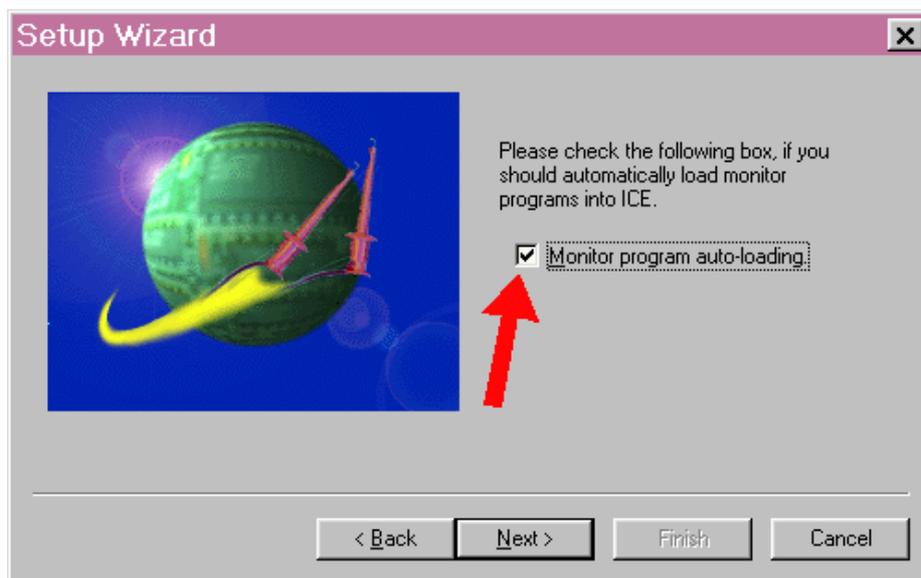
Follow the next steps and finally press *Finish*.

5 Appendix A

Adapter Board Table

5.1 Adapter Board / Evaluation MCU Table

Evaluation MCU	Adapter Board MB2147-10	Adapter Board MB2147-20
MB90V330		•
MB90V340		•
MB90V390		•
MB90V420	•	
MB90V440	•	
MB90V460	•	
MB90V470[1]	•	
MB90V480[2]		•
MB90V495	•	
MB90V520	•	
MB90V540	•	
MB90V550	•	
MB90V560[1]	•	
MB90V570	•	
MB90V580	•	
MB90V590	•	
MB90V595	•	
MB90V800		•
MB90V820		•

[1] 3V Evaluation Chip

[2] 3V Evaluation Chip, must be supplied with 5 Volts. Please see note in chapter 2.1.6.

6 Appendix B

Emulation System Configuration and supported Starterkits

6.1 Table of Emulation System Configuration and supported Starterkits

Flash-MCU MB90Fxxx	EVA-MCU MB90Vxxx	Adapter Board	Probe Cable	Socket	Starterkit
334APFF	330ACR	MB2147-20	MB2147-491	NQPACK120SE HQPACK120SE	MB2031-10 + MB2031-20
334APMC	330ACR	MB2147-20	MB2147-492	NQPACK120SD HQPACK120SD	-
337APFM	330ACR	MB2147-20	MB2147-493	NQPACK64SB HQPACK64SB140	-
342/C/CS PF 345C/CA PF 346/C/CS PF 347/C/CS PF 349CA/CAS PF 038CASPF	340A -101/-102	MB2147-20	MB2147-582	NQPACK100RB179 HQPACK100RB179	Flash-CAN-100P-340
342/C/CS PFV 345C/CA PFV 346/C/CS PFV 347/C/CS PFV 349CA/CAS PVF 038CASPFV	340A -101/-102	MB2147-20	MB2147-581	NQPACK100SD HQPACK100SD	-
342/C/CS PF 346/C/CS PF 347/C/CS PF	340(S) + socket adapter	MB2147-20	MB2132-465 (preliminary)	NQPACK100RB179 HQPACK100RB179	Flash-CAN-100P-340
351(S)PFM 352(S)PFM	340A -101/-102	MB2147-20	MB2147-540	NQPACK64SB HQPACK64SB140	Flash-CAN-64P-350
361(S)PMT	340A -101/-102	MB2147-20		NQPACK48SD HQPACK48SD	Flash-CAN-48P-M26
387(S)PMT	495G	MB2147-10	MB2132-466	NQPACK048SD HQPACK048SD	Flash-CAN-48P-M26 Flash-CAN-48P-90F387
394HPMT 395HPMT	390CR	MB2147-20	MB2132-469	NQPACK120SD HQPACK120SD	Flash-CAN-120-390
423GA/GB/GC PF 428GA/GB/GC PF	420GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
423GA/GB/GC PFV 428GA/GB/GC PFV	420GCR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
438(L)(S)PF 439(L)(S)PF	540GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
438(L)(S)PFV 439(L)(S)PFV	540GCR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
443GPF	440GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
455(S)PMT 456(S)PMT 457(S)PMT	495G	MB2147-10	MB2132-466	NQPACK048SD HQPACK048SD	Flash-CAN-48P-M26

462PFM	460CR	MB2147-10	MB2132-461	NQPACK64SB HQPACK64SB140	Flash-CAN-64P-M09-V2
462FD 462P-SH	460CR	MB2147-10	MB2132-434 (PF: + 64SD-64QF-8L)	-	-
474L/HPF	470BCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06 (must be modified by user)
474L/HPFV	470BCR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
481PF 482PF	480CR	MB2147-20	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06 (must be modified by user)
481PFV 482PFV	480CR	MB2147-20	MB2132-496	NQPACK100SD HQPACK100SD	-
497GPFM	495GCR	MB2147-10	MB2132-461	NQPACK64SB HQPACK64SB140	Flash-CAN-64P-M09-V2
497GPF	495GCR	MB2147-10	MB2132-434 + 64SD-64QF-8L	-	-
523BPFV	520ACR	MB2147-10	MB2132-468	NQPACK120SBD220 HQPACK120SBD226	Flash-EVA2-120P-M13
523BPFF	520ACR	MB2147-10	MB2132-498	NQPACK120SE HQPACK120SE	-
543G(S)PF 546G(S)PF 548G(S)PF 548GHDSPF 548GL(S)PF 549G(S)PF	540GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06 Devkit16
543G(S)PFV 546G(S)PFV 548G(S)PFV 548GHDSPFV 548GL(S)PFV 549G(S)PFV	540GCR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
552(A)PF 553PF	550ACR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
552APFV 553APFV	550CR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
562BPFM 563PFM	560CR	MB2147-10	MB2132-461	NQPACK64SB HQPACK64SB140	Flash-CAN-64P-M09-V2
562BP(F) 568BF	560CR	MB2147-10	MB2132-434 (562BPF, 568BF: +64SD-64QF-8L)	NQPACK64SB HQPACK64SB140	-
568PFM	560CRF	MB2147-10	MB2132-461		N. A.
574APFV	570ACR	MB2147-10	MB2132-468	NQPACK120SD220 HQPACK120SD226	Flash-EVA2-120P-M13
574APFF	570ACR	MC2147-10	MB2132-461	NQPACK120SE HQPACK120SE	-
583C(A)PF	580BCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06

583C(A)PFV	580BCR	MB2147-10	MB2132-496	NQPACK100SD HQPACK100SD	-
591APF 591G(H)PF 594APF 594G(H)PF 594GZPF	590GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
598(G)(H)PF	595GCR	MB2147-10	MB2132-457	IC149-100-014-S5 IC149-100-114-S5 IC149-100-014-B5 IC149-100-114-B5	Flash-CAN-100P-M06
804-101PF/ -102PF	800 -101CR/ -102CR	MB2147-20	MB2147-582	NQPACK100RB179 HQPACK100RB179	Flash-CAN-100P-340
822PFM 823PFM	820CR	MB2147-20	MB2147-562	NQPACK080SB HQPACK080SB160	SK-90820-80PFM-562-A
822PFV 823PFV	820CR	MB2147-20	MB2147-561	NQPACK080SD HQPACK080SD	-
822PF 823PF	820CR	MB2147-20	MB2147-560	NQPACK080RA HQPACK080RA	-
867A(S)PF	340A -101/-102	MB2147-20	MB2147-582	NQPACK100RB179 HQPACK100RB179	Flash-CAN-100P-340
867(A)PFV	340A -101/-102	MB2147-20	MB2147-581	-	-
897(S)PMT	495GCR	MB2147-10	MB2132-466	NQPACK048SD HQPACK048SD	Flash-CAN-48P-M26