

bdAccess

BDM interface library

PowerPC MPC5xx/8xx



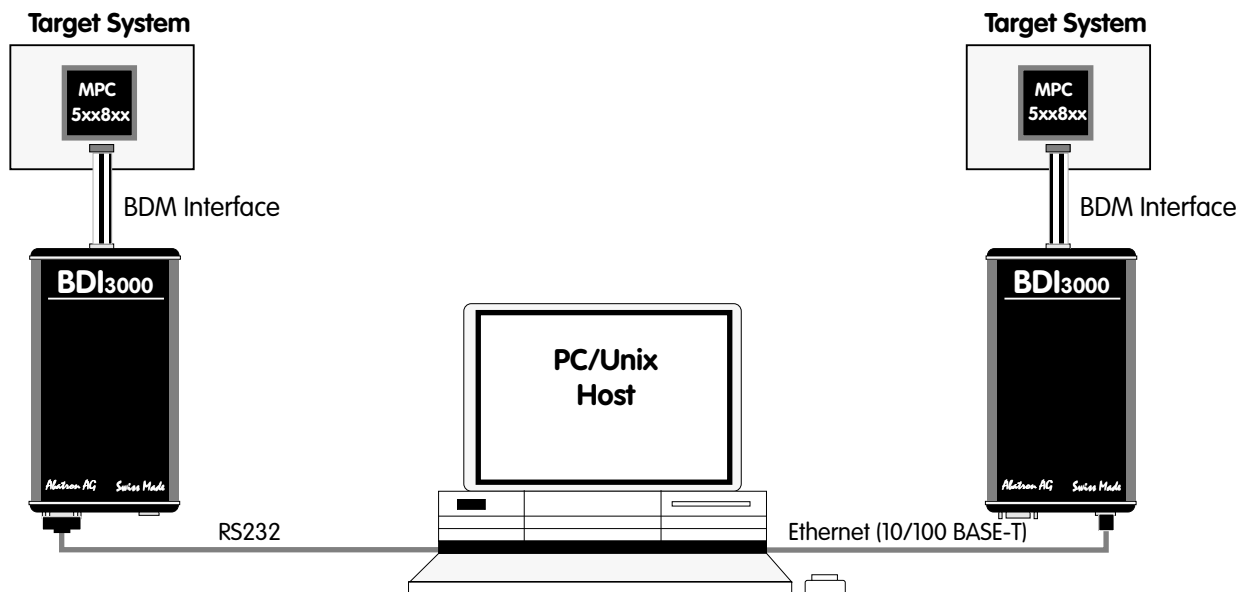
User Manual

Manual Version 1.00 for BDI3000

abatron
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1 Introduction



The bdiAccess library can be used to access BDI3000 functions. With this library, a Windows/Unix program can take advantage of the BDM/JTAG debug interface of the connected target processor and execute tasks like:

- Read/Write target registers
- Read/Write target memory
- Reset/Startup target
- Flash programming
- Start/Stop program execution

This Installation Manual shows how to connect the BDI3000 to the target and how to install the bdiAccess software. The interface to the library is specified in a different document that is target independent.

1.1 BDI3000

The BDI3000 is the main part of the bdiAccess system. This small box implements the interface between the BDM/JTAG pins of the target processor and a 10/100Base-T Ethernet or RS232 connector. The firmware of the BDI3000 can be updated by the user with a simple Linux/Windows configuration program. The BDI3000 supports 1.2 – 5.0 Volts target systems.

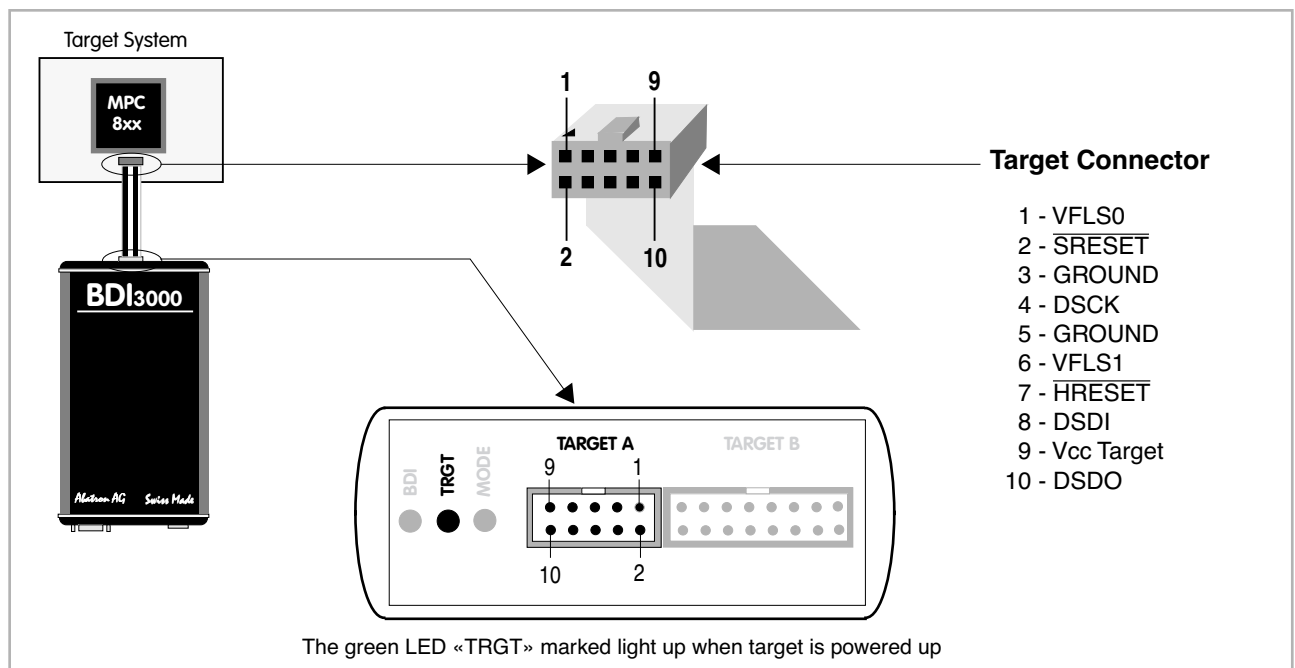
2 Installation

2.1 Connecting the BDI3000 to Target

The cable to the target system is a ten pin flat ribbon cable. In case where the target system has an appropriate connector, the cable can be directly connected. The pin assignment is in accordance with the Motorola specification.



In order to ensure reliable operation of the BDI (EMC, runtimes, etc.) the target cable length must not exceed 20 cm (8").



For BDI TARGET A connector signals see table on next page.

Warning:

Before you can use the BDI3000 with an other target processor type (e.g. PPC <--> ARM), a new setup has to be done (see chapter 2.5). During this process the target cable must be disconnected from the target system.



To avoid data line conflicts, the BDI3000 must be disconnected from the target system while programming a new firmware for an other target CPU.

BDI TARGET A Connector Signals:

Pin	Name	Description
1	VFLS0	These pin and pin 6 (VFLS1) indicate to the debug port controller whether or not the MPC is in debug mode. When both VFLS0 and VFLS1 are at "1", the MPC is in debug mode.
2	$\overline{\text{SRESET}}$	This is the Soft-Reset bidirectional signal of the MPC8xx. On the MPC5xx it is an output. The debug port configuration is sampled and determined on the rising-edge of $\overline{\text{SRESET}}$ (for both processor families). On the MPC8xx it is a bidirectional signal which may be driven externally to generate soft reset sequence. This signal is in fact redundant regarding the MPC8xx debug port controller since there is a soft-reset signal integrated within the debug port protocol. However, the local debug port controller uses this signal for compatibility with MPC5xx existing boards and s/w.
3+5	GND	System Ground
4	DSCK	Debug-port Serial Clock During asynchronous clock mode, the serial data is clocked into the MPC according to the DSCK clock. The DSCK serves also a role during soft-reset configuration.
6	VFLS1	These pin and pin 1 (VFLS0) indicate to the debug port controller whether or not the MPC is in debug mode. When both VFLS0 and VFLS1 are at "1", the MPC is in debug mode.
7	$\overline{\text{HRESET}}$	This is the Hard-Reset bidirectional signal of the MPC. When this signal is asserted (low) the MPC enters hard reset sequence which include hard reset configuration. This signal is made redundant with the MPC8xx debug port controller since there is a hard-reset command integrated within the debug port protocol.
8	DSDI	Debug-port Serial Data In Via the DSDI signal, the debug port controller sends its data to the MPC. The DSDI serves also a role during soft-reset configuration.
9	Vcc Target	1.2 – 5.0V: This is the target reference voltage. It indicates that the target has power and it is also used to create the logic-level reference for the input comparators. It also controls the output logic levels to the target. It is normally fed from Vdd I/O on the target board.
10	DSDO	Debug-port Serial Data Out DSDO is clocked out by the MPC according to the debug port clock, in parallel with the DSDI being clocked in. The DSDO serves also as "READY" signal for the debug port controller to indicate that the debug port is ready to receive controller's command (or data).

Mention of sources used: MPC860ADS User's Manual, Revision A

Enhanced Debug Mode Detection:

For MPC8xx and MPC555 targets, debug mode (Freeze) detection also works when the BDM connector pins VFLS0 and VFLS1 are not connected to the target. If not connected to VFLSx, this BDM connector pins should be left open or tied to Vcc. The BDI uses the following algorithm to check if the target is in debug mode (frozen):

```

BOOL PPC_TargetFrozen(void) {
    if ((VFLS0 != 1) | (VFLS1 != 1)) return FALSE;
    read debug port status;
    if (status == frozen) return TRUE;
    else return FALSE;
}

```

2.2 Connecting the BDI3000 to Power Supply

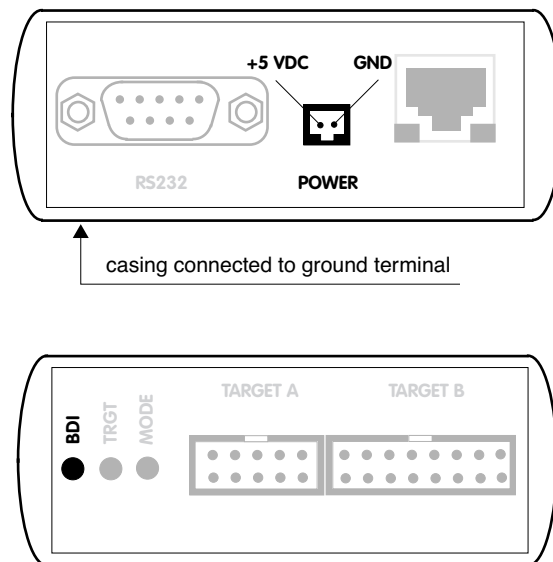
The BDI3000 needs to be supplied with the enclosed power supply from Abatron (5VDC).



Before use, check if the mains voltage is in accordance with the input voltage printed on power supply. Make sure that, while operating, the power supply is not covered up and not situated near a heater or in direct sun light. Dry location use only.



For error-free operation, the power supply to the BDI3000 must be between 4.75V and 5.25V DC. **The maximal tolerable supply voltage is 5.25 VDC. Any higher voltage or a wrong polarity might destroy the electronics.**



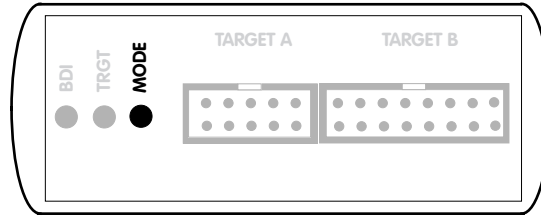
The green LED «BDI» marked light up when 5V power is connected to the BDI3000

Please switch on the system in the following sequence:

- 1 → external power supply
- 2 → target system

2.3 Status LED «MODE»

The built in LED indicates the following BDI states:

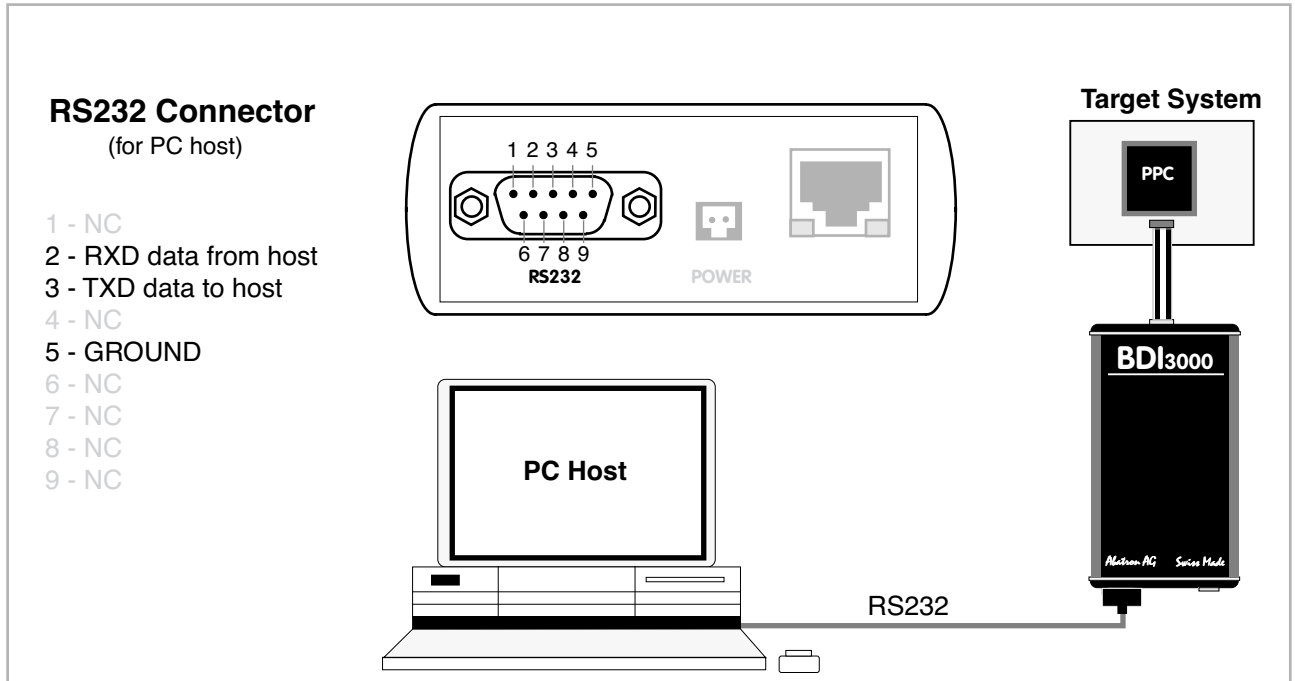


MODE LED	BDI STATES
OFF	The BDI is ready for use, the firmware is already loaded.
ON	The output voltage from the power supply is too low.
BLINK	The BDI «loader mode» is active (an invalid firmware is loaded or loading firmware is active).

2.4 Connecting the BDI3000 to Host

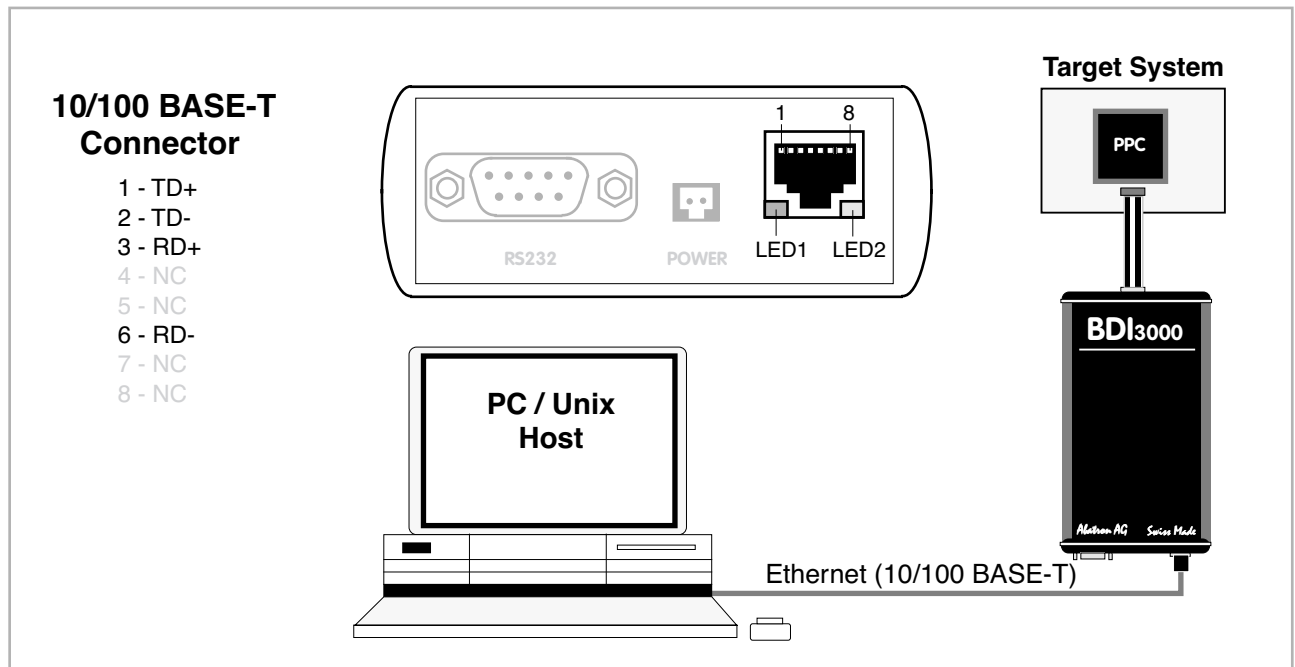
2.4.1 Serial line communication

The host is connected to the BDI through the serial interface (COM1...COM4). The communication cable (included) between BDI and Host is a serial cable. There is the same connector pinout for the BDI and for the Host side (Refer to Figure below).



2.4.2 Ethernet communication

The BDI3000 has a built-in 10/100 BASE-T Ethernet interface (see figure below). Connect an UTP (Unshielded Twisted Pair) cable to the BDI3000. Contact your network administrator if you have questions about the network.



The following explains the meanings of the built-in LED lights:

LED	Function	Description
LED 1 (green)	Link / Activity	When this LED light is ON, data link is successful between the UTP port of the BDI3000 and the hub to which it is connected. The LED blinks when the BDI3000 is receiving or transmitting data.
LED 2 (amber)	Speed	When this LED light is ON, 100Mb/s mode is selected (default). When this LED light is OFF, 10Mb/s mode is selected

2.5 Installation of the bdiAccess Software

On the enclosed CD you will find the bdiAccess library, the BDI configuration software and the firmware required for the BDI. Copy the appropriate files to a directory on your hard disk.

Windows and Linux/Unix hosts:

manual.pdf	This installation manual in pdf format
bdiacc.pdf	The bdiAccess interface specification in pdf format
b30ppcfw.xxx	Firmware for the BDI3000

Only for Windows hosts:

b30ppcfw.exe	Setup program (WIN32 application)
bdiifc32.dll	The bdiAccess library (WIN32-DLL)
bdiifc32.lib	The import library for the bdiAccess DLL (WIN32)
bdiifc.h	The C header file showing the interface to the bdiAccess DLL

Only for Linux/Unix hosts:

bdiaccux.zip	Archive with the bdiAccess sources for Linux/Unix hosts
bdisetup.zip	Archive with the BDI setup utility sources for Linux/Unix hosts

2.6 BDI3000 Setup/Update

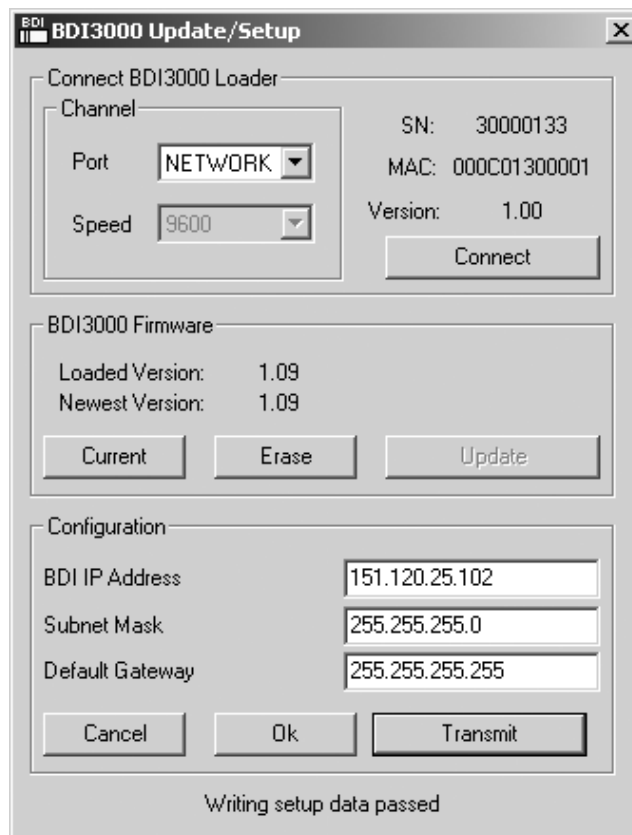
First make sure that the BDI is properly connected to the host via RS232 and/or network.



To avoid data line conflicts, the BDI3000 must be disconnected from the target system while programming the firmware for an other target CPU family.

2.6.1 Windows Hosts

After starting the Windows setup tool, the following dialog box will be displayed.



dialog box «BDI3000 Update/Setup»

The following options allow you to update the BDI3000 firmware and store the network parameters:

- Port Select the communication port where the BDI3000 is connected during this setup session.
- Speed Select the baudrate used to communicate with the BDI3000 loader during this setup session.
- Connect Click on this button to establish a connection with the BDI3000 loader. Once connected, the BDI3000 remains in loader mode until it is restarted or this dialog box is closed.

Current	Press this button to read back the current loaded BDI3000 firmware version. The current firmware version will be displayed.
Erase	Press this button to erase the current loaded firmware.
Update	This button is only active if there is a newer firmware version present in the execution directory of the setup software. Press this button to write the new firmware into the BDI3000 flash memory.
BDI IP Address	Enter the IP address for the BDI3000. Use the following format: xxx.xxx.xxx.xxx e.g.151.120.25.101 Ask your network administrator for assigning an IP address to this BDI3000. Every BDI3000 in your network needs a different IP address.
Subnet Mask	Enter the subnet mask of the network where the BDI is connected to. Use the following format: xxx.xxx.xxx.xx.e.g.255.255.255.0 A subnet mask of 255.255.255.255 disables the gateway feature. Ask your network administrator for the correct subnet mask.
Default Gateway	Enter the IP address of the default gateway. Ask your network administrator for the correct gateway IP address. If the gateway feature is disabled, you may enter 255.255.255.255 or any other value.
Transmit	Click on this button to store the configuration in the BDI3000 flash memory.

Default IP: 192.168.53.72

Before the BDI is configured the first time, it has a default IP of 192.168.53.72 that allows an initial configuration via Ethernet. If your host is not able to connect to this default IP, then the initial configuration has to be done via the serial connection.

Note:

If there is currently a bdiGDB firmware loaded, setup via the Network channel is only possible if the BDI3000 is already in Loader mode (Mode LED blinking). To force Loader mode, enter "boot loader" at the Telnet. The setup tool tries first to establish a connection to the Loader via the IP address present in the "BDI IP Address" entry field. If there is no connection established after a time-out, it tries to connect to the default IP (192.168.53.72).

2.6.2 Linux/Unix Hosts

In order to update the firmware / logic of the BDI and to set the network parameters, a setup tool is included for Linux/Unix hosts. In the ZIP Archive `bdsetup.zip` are all sources to build this utility. This command line utility can be used to update the firmware and network configuration of the BDI3000. There are 4 tasks the utility can execute:

- Reading the current loaded firmware version and network configuration
- Erasing the firmware
- Updating the firmware
- Storing the network configuration parameters into the BDI flash

Every task is started by executing the setup utility with different parameters. The first parameter always selects the task to execute:

```
bdsetup { -v | -e | -u | -c } [additional parameters]
  -v      Read version
  -e      Erase firmware
  -u      Update firmware
  -c      Store network configuration
```

There are two common additional parameters which define the serial port and the serial baudrate:

```
-pP      Port to use, replace P with the port to use e.g. /dev/ttyS0
-bB      Baudrate to use, replace B with 9, 19, 38, 57 or 115
```

Additional parameters for update (-u):

```
-aA      Application type, replace A with GDB, ADA, TOR or ACC
-tT      Target type, replace T with CPU32,PPC400,PPC600,PPC700,MPC800,
        ARM,TRICORE,MCF,HC12 or MCORE
-dD      Replace D with the directory with the firmware file
```

Additional parameters for network configuration (-c):

```
-iI      Replace I with the BDI IP address (format: xxx.xxx.xxx.xxx)
-mM      Replace M with the subnet mask.
        A subnet mask of 255.255.255.255 disables the gateway function
-gG      Replace G with the default gateway IP address
```

All parameters have default values. See function `main()`. You may adjust this default values for your convenience. See also `bdsetup.c` and document `BDIACC.PDF` for additional information

To build the setup utility use: `gcc bdsetup.c bdiDll.c -o bdsetup`

3 Specifications

Operating Voltage Limiting	5 VDC \pm 0.25 V
Power Supply Current	typ. 500 mA max. 1000 mA
RS232 Interface: Baud Rates	9'600, 19'200, 38'400, 57'600, 115'200
Data Bits	8
Parity Bits	none
Stop Bits	1
Network Interface	10/100 BASE-T
BDM/JTAG clock	up to 32 MHz
Supported target voltage	1.2 – 5.0 V
Operating Temperature	+ 5 °C ... +60 °C
Storage Temperature	-20 °C ... +65 °C
Relative Humidity (noncondensing)	<90 %rF
Size	160 x 85 x 35 mm
Weight (without cables)	280 g
Host Cable length (RS232)	2.5 m
Electromagnetic Compatibility	CE compliant
Restriction of Hazardous Substances	RoHS 2002/95/EC compliant


Specifications subject to change without notice

4 Environmental notice



Disposal of the equipment must be carried out at a designated disposal site.

5 Declaration of Conformity (CE)


DECLARATION OF CONFORMITY

This declaration is valid for following product:

Type of device: BDM/JTAG Interface
Product name: BDI3000

The signing authorities state, that the above mentioned equipment meets the requirements for emission and immunity according to

EMC Directive 89/336/EEC

The evaluation procedure of conformity was assured according to the following standards:


IEC 61000-6-2: 1999, mod. EN61000-6-2: 2001
IEC 61000-6-3: 1996, mod. EN61000-6-2: 2001


This declaration of conformity is based on the test report no. E1087-05-7a of Quinel, Zug, Swiss Testing Service, accreditation no. STS 037

Manufacturer:

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CH-6343 Rotkreuz

Authority:


Max Vock
Marketing Director


Ruedi Dummermuth
Technical Director

Rotkreuz, 7/18/2007

6 Warranty

ABATRON Switzerland warrants the physical CD, cable and BDI3000 to be free of defects in materials and workmanship for a period of 3 years following the date of purchase when used under normal conditions.

In the event of notification within the warranty period of defects in material or workmanship, ABATRON will replace defective CD, cable or BDI3000. The remedy for breach of this warranty shall be limited to replacement and shall not encompass any other damages, including but not limited loss of profit, special, incidental, consequential, or other similar claims.

ABATRON Switzerland specifically disclaims all other warranties - expressed or implied, including but not limited to implied warranties of merchantability and fitness for particular purposes - with respect to defects in the CD, cable and BDI3000, and the program license granted herein, including without limitation the operation of the program with respect to any particular application, use, or purposes. In no event shall ABATRON be liable for any loss of profit or any other commercial damage, including but not limited to special, incidental, consequential, or other damages.

Failure in handling which leads to defects are not covered under this warranty. The warranty is void under any self-made repair operation.

Appendices

A Troubleshooting

Problem

The firmware can not be loaded.

Possible reasons

- The BDI is not correctly connected with the Host (see chapter 2).
- A wrong communication port is selected (Com 1...Com 4).
- The BDI is not powered up

Problem

No working with the target system (loading firmware is okay).

Possible reasons

- Wrong pin assignment (BDM/JTAG connector) of the target system (see chapter 2).
- Target system initialization is not correctly → enter an appropriate target initialization list.
- An incorrect IP address was entered (BDI3000 configuration)
- BDM/JTAG signals from the target system are not correctly (short-circuit, break, ...).
- The target system is damaged.

Problem

Network processes do not function (loading the firmware was successful)

Possible reasons

- The BDI3000 is not connected or not correctly connected to the network (LAN cable or media converter)
- An incorrect IP address was entered (BDI3000 configuration)

B Maintenance

The BDI needs no special maintenance. Clean the housing with a mild detergent only. Solvents such as gasoline may damage it.

C Trademarks

All trademarks are property of their respective holders.