

*bd*iGDB

JTAG debug interface for GNU Debugger

ARM11 / Cortex-A8 / Cortex-M3



User Manual

Manual Version 1.05 for BDI3000

abatron

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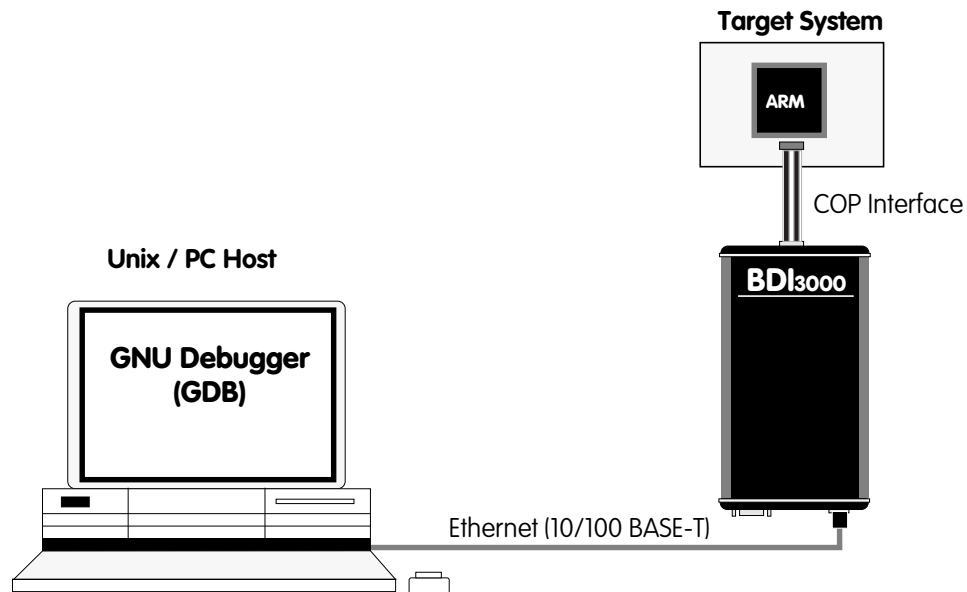
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1 Introduction

bdiGDB enhances the GNU debugger (GDB), with JTAG debugging for ARM11 and Cortex-A8/M3 based targets. With the built-in Ethernet interface you get a very fast code download speed. No target communication channel (e.g. serial line) is wasted for debugging purposes. Even better, you can use fast Ethernet debugging with target systems without network capability. The host to BDI communication uses the standard GDB remote protocol.

An additional Telnet interface is available for special debug tasks (e.g. force a hardware reset, program flash memory).

The following figure shows how the BDI3000 interface is connected between the host and the target:



1.1 BDI3000

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

1.2 BDI Configuration

As an initial setup, the IP address of the BDI3000, the IP address of the host with the configuration file and the name of the configuration file is stored within the flash of the BDI3000.

Every time the BDI3000 is powered on, it reads the configuration file via TFTP.

Following an example of a typical configuration file:

```
; bdiGDB configuration for ARM Integrator CM1136JF-S
; -----
;
[INIT]
WM32      0x1000000C  0x00000005  ;REMAP=1, MISC LED ON
;

[TARGET]
CPUTYPE    ARM1136
CLOCK      1                ;JTAG clock (0=Adaptive,1=32MHz,2=16MHz ...)
POWERUP    3000             ;start delay after power-up detected in ms
ENDIAN     LITTLE           ;memory model (LITTLE | BIG)
VECTOR     CATCH 0x1f       ;catch D_Abort, P_Abort, SWI, Undef and Reset
BREAKMODE  HARD             ;SOFT or HARD
;
SCANPRED   0 0              ;no JTAG devices before the ARM1136
SCANSUCC   1 4              ;the ETMBUF after the ARM1136 core
;

[HOST]
IP          151.120.25.119
FILE        E:\cygwin\home\demo\pid7t\fibox
FORMAT      ELF
LOAD        MANUAL          ;load file MANUAL or AUTO after reset

[FLASH]
WORKSPACE  0x00001000       ;workspace in target RAM for fast programming algorithm
CHIPTYPE    AM29BX8          ;Flash type (AM29F | AM29BX8 | AM29BX16 | I28BX8 | I28BX16)
CHIPSIZ    0x100000         ;The size of one flash chip in bytes
BUSWIDTH    32              ;The width of the flash memory bus in bits (8 | 16 | 32)
FILE        $arm1136.cfg
FORMAT      BIN 0x00010000

[REGS]
FILE        $reg1136.def
```

Based on the information in the configuration file, the target is automatically initialized after every reset.

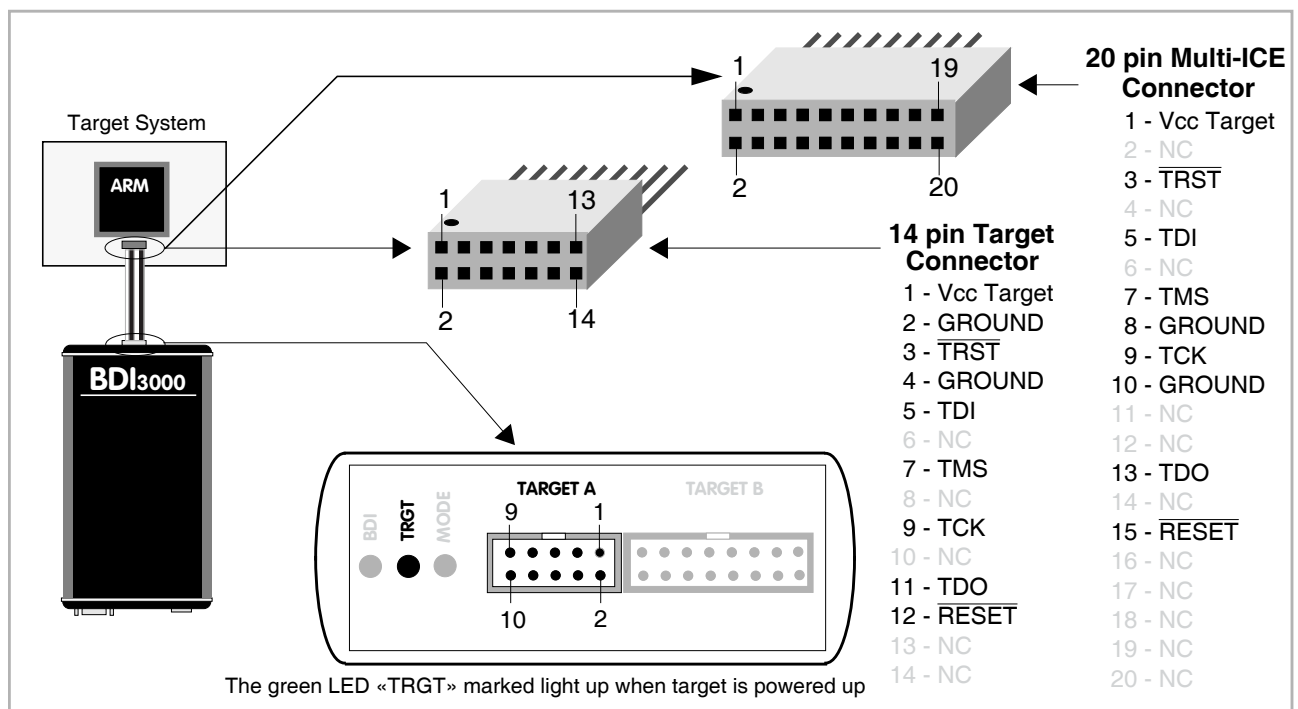
2 Installation

2.1 Connecting the BDI3000 to Target

The enclosed cables to the target system are designed for the ARM Development Boards. In case where the target system has the same connector layout, the cable (14 pin or 20 pin) can be directly connected.



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



For BDI MAIN / 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.

TARGET A Connector Signals

Pin	Name	Description
1	reserved	This pin is currently not used.
2	$\overline{\text{TRST}}$	JTAG Test Reset This open-drain / push-pull output of the BDI3000 resets the JTAG TAP controller on the target. Default driver type is open-drain.
3+5	GND	System Ground
4	TCK	JTAG Test Clock This output of the BDI3000 connects to the target TCK line.
6	TMS	JTAG Test Mode Select This output of the BDI3000 connects to the target TMS line.
7	$\overline{\text{RESET}}$	This open collector output of the BDI3000 is used to reset the target system.
8	TDI	JTAG Test Data In This output of the BDI3000 connects to the target TDI line.
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	TDO	JTAG Test Data Out This input to the BDI3000 connects to the target TDO line.

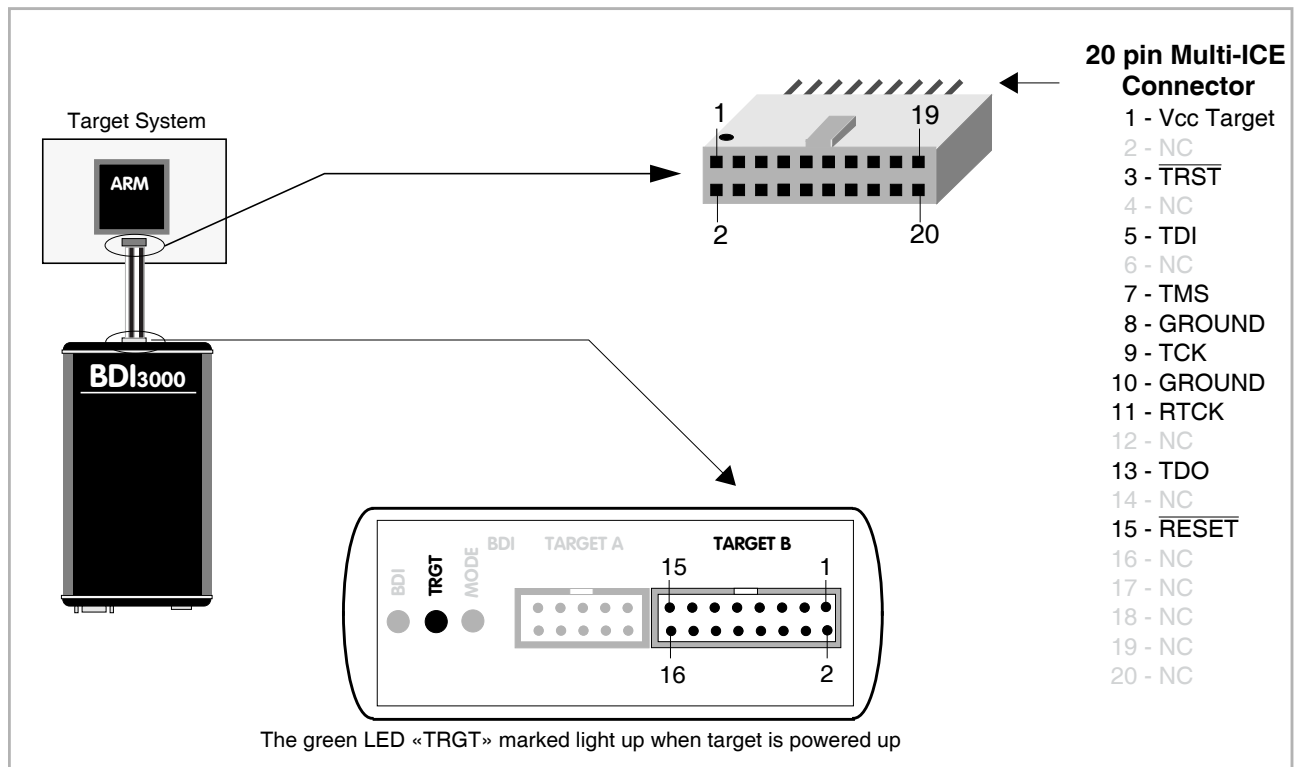
The BDI3000 works also with targets which have no dedicated $\overline{\text{TRST}}$ pin. For this kind of targets, the BDI cannot force the target to debug mode immediately after reset. The target always begins execution of application code until the BDI has finished programming the Debug Control Register.

2.1.1 Adaptive Clocking

Adaptive clocking is a feature which ensures that the BDI3000 never loses synchronization with the target device, whatever the target clock speed is. To achieve this, BDI3000 uses two signals TCK and RTCK. When adaptive clocking is selected, BDI3000 issues a TCK signal and waits for the Returned TCK (RTCK) to come back. BDI3000 does not progress to the next TCK until RTCK is received. For more information about adaptive clocking see ARM documentation.

Note:

Adaptive clocking is only supported with a special target cable (P/N 90052). This special cable can be ordered separately from Abatron (p/n 90052).



For TARGET B 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.



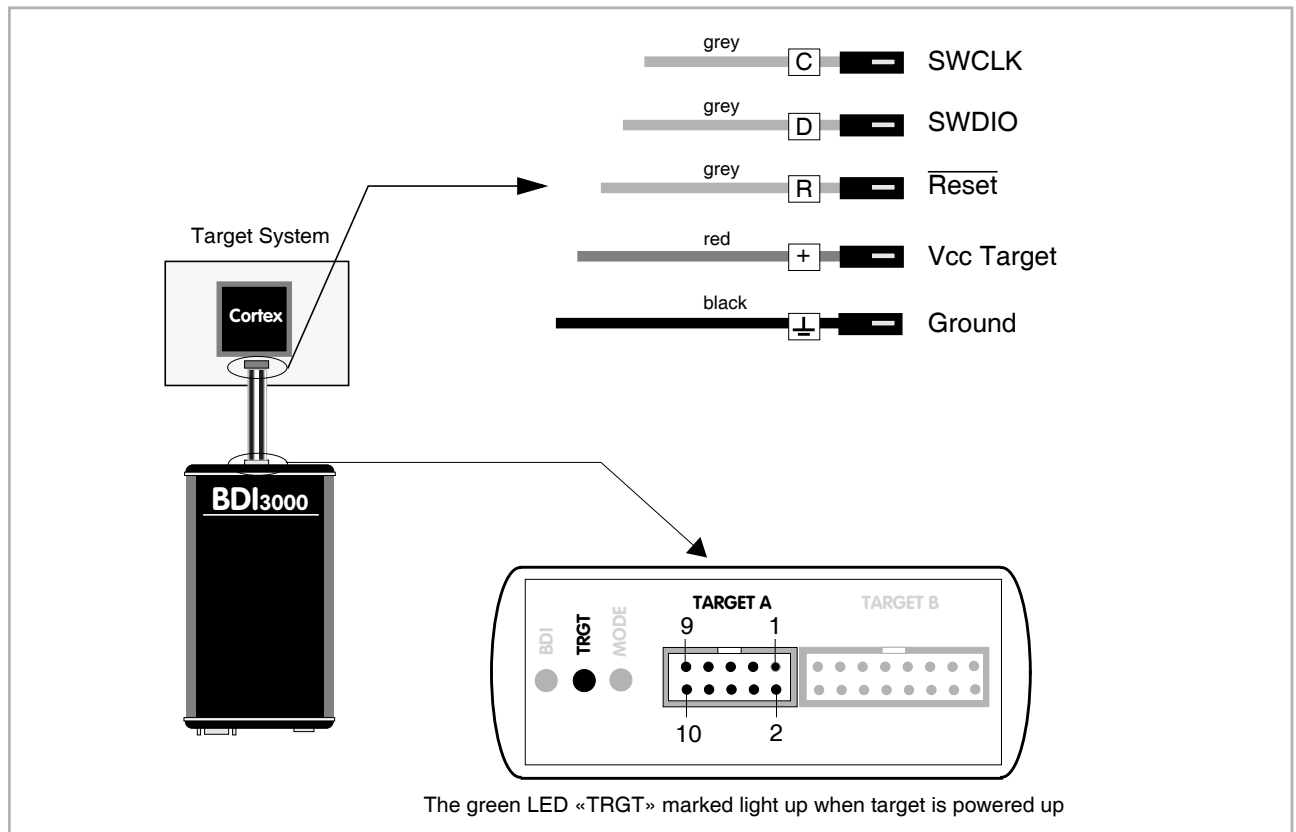
To avoid data line conflicts, the BDI3000 must be disconnected from the target system while programming a new firmware for an other target CPU.

BDI TARGET B Connector Signals:

Pin	Name	Description
1	TDO	JTAG Test Data Out This input to the BDI3000 connects to the target TDO line.
2	reserved	
3	TDI	JTAG Test Data In This output of the BDI3000 connects to the target TDI line.
4	reserved	
5	RTCK	Returned JTAG Test Clock This input to the BDI3000 connects to the target RTCK line.
6	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.
7	TCK	JTAG Test Clock This output of the BDI3000 connects to the target TCK line.
8	$\overline{\text{TRST}}$	JTAG Test Reset This open-drain / push-pull output of the BDI3000 resets the JTAG TAP controller on the target. Default driver type is open-drain.
9	TMS	JTAG Test Mode Select This output of the BDI3000 connects to the target TMS line.
10	reserved	
11	reserved	
12	GROUND	System Ground
13	$\overline{\text{RESET}}$	System Reset This open-drain output of the BDI3000 is used to reset the target system.
14	reseved	
15	reseved	
16	GROUND	System Ground

2.1.2 Serial Wire Debug

For Cortex-M3 / Cortex-A8 the BDI3000 supports also the „Serial Wire Debug Port“ (SW-DP). In order to use SW-DP a different firmware has to be loaded into the BDI3000 (included on the CD). Also a special target cable is available on request (p/n 90054).



TARGET A Connector Signals

Pin	Name	Description
3	GND	System Ground
4	SWCLK	Serial Wire Clock
6	SWDIO	Serial Wire Debug Data Input/Output
7	$\overline{\text{RESET}}$	This open collector output of the BDI2000 can be used to hard reset the target system.
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.

2.2 Connecting the BDI3000 to Power Supply

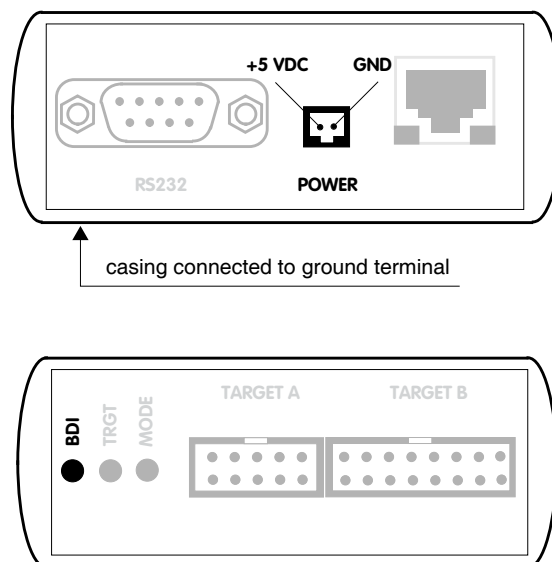
The BDI3000 needs to be supplied with the enclosed power supply from Abatron (5VDC).



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.**



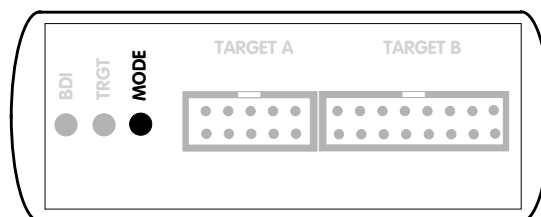
The green LED «BDI» marked light up when 5V power is connected to the BDI3000

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:



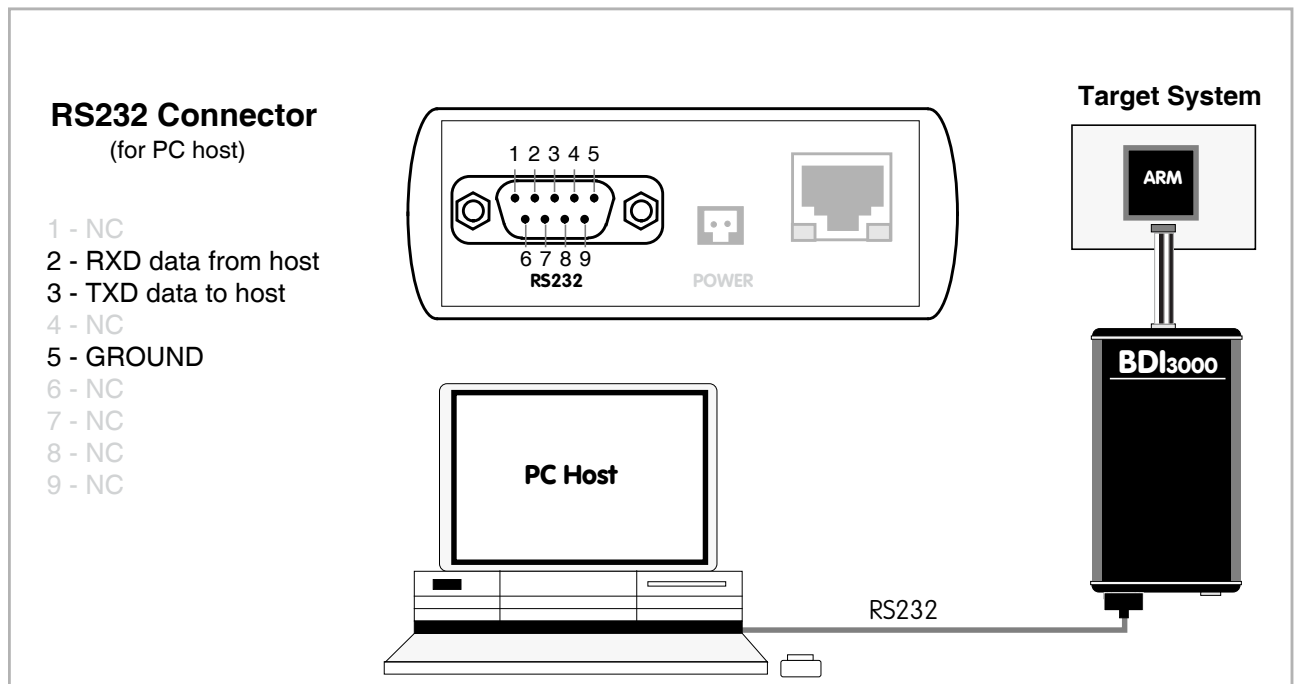
MODE LED	BDI STATES
OFF	The BDI is ready for use, the firmware is already loaded.
ON	The output voltage from the power supply is too low.
BLINK	The BDI «loader mode» is active (an invalid firmware is loaded or loading firmware is active).

2.4 Connecting the BDI3000 to Host

2.4.1 Serial line communication

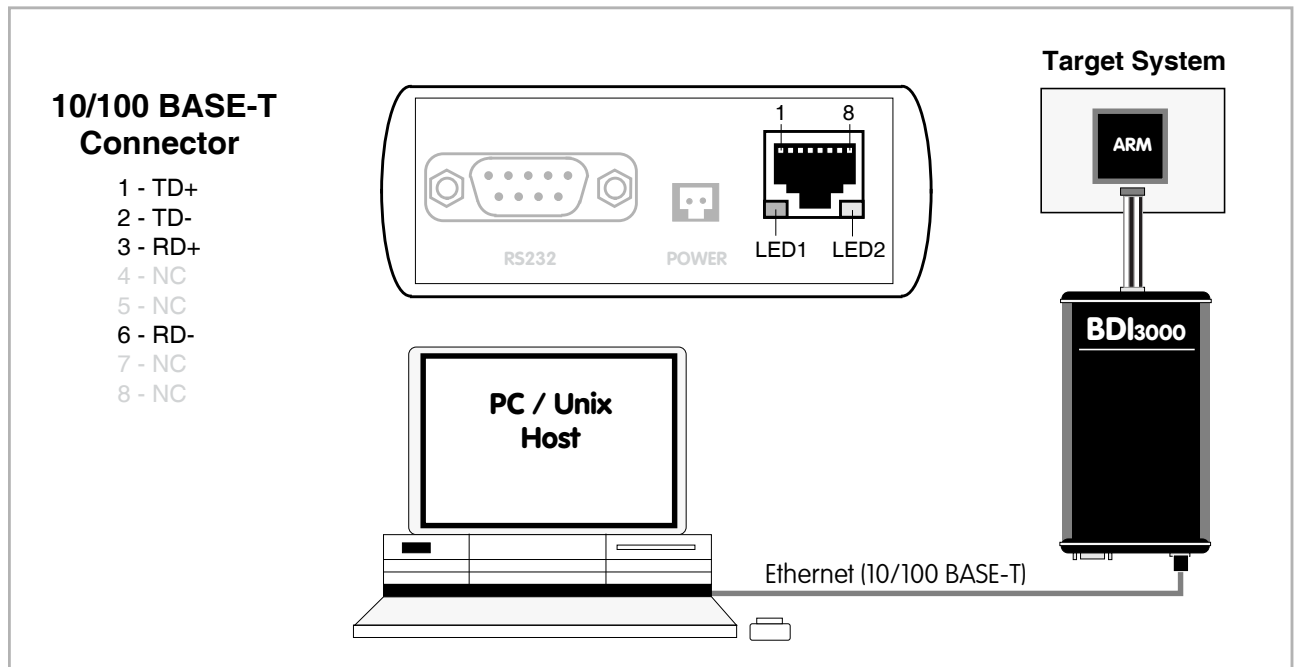
Serial line communication is only used for the initial configuration of the bdiGDB system.

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 Configuration Software

On the enclosed CD you will find the BDI configuration software and the firmware required for the BDI3000. For Windows users there is also a TFTP server included.

The following files are on the CD.

gdba1130.zip	ZIP archive with the JTAG Mode firmware
gdbswd30.zip	ZIP archive with the Serial Wire Mode firmware

The following files are in the ZIP archives.

b30a11gd.exe / b30swdgd.exe	Windows Configuration program
b30a11gd.xxx / b30swdgd.xxx	Firmware for the BDI3000
tfpsrv.exe	TFTP server for Windows (WIN32 console application)
*.cfg	Configuration files
*.def	Register definition files
bdisetup.zip	ZIP Archive with the Setup Tool sources for Linux / UNIX hosts.

Overview of an installation / configuration process:

- Create a new directory on your hard disk
- Copy the entire contents of the enclosed diskette into this directory
- Linux only: extract the setup tool sources and build the setup tool
- Use the setup tool or Telnet (default IP) to load/update the BDI firmware
Note: A new BDI has no firmware loaded.
- Use the setup tool or Telnet (default IP) to load the initial configuration parameters
 - IP address of the BDI.
 - IP address of the host with the configuration file.
 - Name of the configuration file. This file is accessed via TFTP.
 - Optional network parameters (subnet mask, default gateway).

Activating BOOTP:

The BDI can get the network configuration and the name of the configuration file also via BOOTP. For this simply enter 0.0.0.0 as the BDI's IP address (see following chapters). If present, the subnet mask and the default gateway (router) is taken from the BOOTP vendor-specific field as defined in RFC 1533.

With the Linux setup tool, simply use the default parameters for the -c option:

```
[root@LINUX_1 bdisetup]# ./bdisetup -c -p/dev/ttyS0 -b57
```

The MAC address is derived from the serial number as follows:

MAC: 00-0C-01-xx-xx-xx , replace the xx-xx-xx with the 6 left digits of the serial number

Example: SN# 33123407 ==>> 00-0C-01-33-12-34

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 (Telnet or Setup Tools). If your host is not able to connect to this default IP, then the initial configuration has to be done via the serial connection.

2.5.1 Configuration with a Linux / Unix host

The firmware update and the initial configuration of the BDI3000 is done with a command line utility. In the ZIP Archive bdisetup.zip are all sources to build this utility. More information about this utility can be found at the top in the bdisetup.c source file. There is also a make file included. Starting the tool without any parameter displays information about the syntax and parameters.



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

Following the steps to bring-up a new BDI3000:

1. Build the setup tool:

The setup tool is delivered only as source files. This allows to build the tool on any Linux / Unix host. To build the tool, simply start the make utility.

```
[root@LINUX_1 bdisetup]# make
cc -O2 -c -o bdisetup.o bdisetup.c
cc -O2 -c -o bdisetup.o bdisetup.c
cc -O2 -c -o bdisetup.o bdisetup.c
cc -s bdisetup.o bdisetup.o bdisetup.o -o bdisetup
```

2. Check the serial connection to the BDI:

With "bdisetup -v" you may check the serial connection to the BDI. The BDI will respond with information about the current loaded firmware and network configuration.

Note: Login as root, otherwise you probably have no access to the serial port.

```
$ ./bdisetup -v -p/dev/ttyS0 -b115
BDI Type : BDI3000 (SN: 30000154)
Loader : V1.00
Firmware : unknown
MAC : ff-ff-ff-ff-ff-ff
IP Addr : 255.255.255.255
Subnet : 255.255.255.255
Gateway : 255.255.255.255
Host IP : 255.255.255.255
Config : YYYYYY.....
```

3. Load/Update the BDI firmware:

With "bdisetup -u" the firmware is programmed into the BDI3000 flash memory. This configures the BDI for the target you are using. Based on the parameters -a and -t, the tool selects the correct firmware file. If the firmware file is in the same directory as the setup tool, there is no need to enter a -d parameter.

```
$ ./bdisetup -u -p/dev/ttyS0 -b115 -aGDB -tARM11 (for Serial Wire Mode use -tARMSWD)
Connecting to BDI loader
Programming firmware with ./b30a11gd.100
Erasing firmware flash ....
Erasing firmware flash passed
Programming firmware flash ....
Programming firmware flash passed
```


4. Transmit the initial configuration parameters:

With "bdisetup -c" the configuration parameters are written to the flash memory within the BDI. The following parameters are used to configure the BDI:

BDI IP Address	The IP address for the BDI3000. Ask your network administrator for assigning an IP address to this BDI3000. Every BDI3000 in your network needs a different IP address.
Subnet Mask	The subnet mask of the network where the BDI is connected to. A subnet mask of 255.255.255.255 disables the gateway feature. Ask your network administrator for the correct subnet mask. If the BDI and the host are in the same subnet, it is not necessary to enter a 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.
Config - Host IP Address	Enter the IP address of the host with the configuration file. The configuration file is automatically read by the BDI3000 after every start-up.
Configuration file	Enter the full path and name of the configuration file. This file is read via TFTP. Keep in mind that TFTP has it's own root directory (usual /tftpboot). You can simply copy the configuration file to this directory and the use the file name without any path. For more information about TFTP use "man tftpd".

```
$ ./bdisetup -c -p/dev/ttyS0 -b115 \  
> -i151.120.25.102 \  
> -h151.120.25.112 \  
> -fe:/bdi3000/mytarget.cfg  
Connecting to BDI loader  
Writing network configuration  
Configuration passed
```

5. Check configuration and exit loader mode:

The BDI is in loader mode when there is no valid firmware loaded or you connect to it with the setup tool. While in loader mode, the Mode LED is blinking. The BDI will not respond to network requests while in loader mode. To exit loader mode, the "bdisetup -v -s" can be used. You may also power-off the BDI, wait some time (1min.) and power-on it again to exit loader mode.

```
$ ./bdisetup -v -p/dev/ttyS0 -b115 -s  
BDI Type : BDI3000 (SN: 30000154)  
Loader   : V1.00  
Firmware : V1.00 bdiGDB for ARM11  
MAC      : 00-0c-01-30-00-01  
IP Addr  : 151.120.25.102  
Subnet   : 255.255.255.255  
Gateway  : 255.255.255.255  
Host IP  : 151.120.25.112  
Config   : /bdi3000/mytarget.cfg
```

The Mode LED should go off, and you can try to connect to the BDI via Telnet.

```
$ telnet 151.120.25.102
```

2.5.2 Configuration with a Windows host

First make sure that the BDI is properly connected (see Chapter 2.1 to 2.4).



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

dialog box «BDI3000 Update/Setup»

Before you can use the BDI3000 together with the GNU debugger, you must store the initial configuration parameters in the BDI3000 flash memory. The following options allow you to do this:

- | | |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port | Select the communication port where the BDI3000 is connected during this setup session. If you select Network, make sure the Loader is already active (Mode LED blinking). If there is already a firmware loaded and running, use the Telnet command "boot loader" to activate Loader Mode. |
| 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 bdiGDB 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.
Config - Host IP Address	Enter the IP address of the host with the configuration file. The configuration file is automatically read by the BDI3000 after every start-up.
Configuration file	Enter the full path and name of the configuration file. This name is transmitted to the TFTP server when reading the configuration file.
Transmit	Click on this button to store the configuration in the BDI3000 flash memory.

Note:

Using this setup tool 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).

2.5.3 Configuration via Telnet / TFTP

The firmware update and the initial configuration of the BDI3000 can also be done interactively via a Telnet connection and a running TFTP server on the host with the firmware file. In cases where it is not possible to connect to the default IP, the initial setup has to be done via a serial connection.



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

Following the steps to bring-up a new BDI3000 or updating the firmware.

Connect to the BDI Loader via Telnet.

If a firmware is already running enter "boot loader" and reconnect via Telnet.

```
$ telnet 192.168.53.72
or
$ telnet <your BDI IP address>
```

Update the network parameters so it matches your needs:

```
LDR>network
BDI MAC      : 00-0c-01-30-00-01
BDI IP       : 192.168.53.72
BDI Subnet   : 255.255.255.0
BDI Gateway  : 255.255.255.255
Config IP    : 255.255.255.255
Config File  :
```

```
LDR>netip 151.120.25.102
LDR>nethost 151.120.25.112
LDR>netfile /bdi3000/mytarget.cfg
```

```
LDR>network
BDI MAC      : 00-0c-01-30-00-01
BDI IP       : 151.120.25.102
BDI Subnet   : 255.255.255.0
BDI Gateway  : 255.255.255.255
Config IP    : 151.120.25.112
Config File  : /bdi3000/mytarget.cfg
```

```
LDR>network save
saving network configuration ... passed
BDI MAC      : 00-0c-01-30-00-01
BDI IP       : 151.120.25.102
BDI Subnet   : 255.255.255.0
BDI Gateway  : 255.255.255.255
Config IP    : 151.120.25.112
Config File  : /bdi3000/mytarget.cfg
```

In case the subnet has changed, reboot before trying to load the firmware

```
LDR>boot loader
```

Connect again via Telnet and program the firmware into the BDI flash:

```
$ telnet 151.120.25.102
```

```
LDR>info
  BDI Firmware: not loaded
  BDI CPLD ID : 01285043
  BDI CPLD UES: ffffffff
  BDI MAC      : 00-0c-01-30-00-01
  BDI IP       : 151.120.25.102
  BDI Subnet   : 255.255.255.0
  BDI Gateway  : 255.255.255.255
  Config IP    : 151.120.25.112
  Config File  : /bdi3000/mytarget.cfg
```

```
LDR>fwload e:/temp/b30a11gd.100
erasing firmware flash ... passed
programming firmware flash ... passed
```

```
LDR>info
  BDI Firmware: 41 / 1.00
  BDI CPLD ID : 01285043
  BDI CPLD UES: ffffffff
  BDI MAC      : 00-0c-01-30-00-01
  BDI IP       : 151.120.25.102
  BDI Subnet   : 255.255.255.0
  BDI Gateway  : 255.255.255.255
  Config IP    : 151.120.25.112
  Config File  : /bdi3000/mytarget.cfg
LDR>
```

To boot now into the firmware use:

```
LDR>boot
```

The Mode LED should go off, and you can try to connect to the BDI again via Telnet.

```
telnet 151.120.25.102
```

2.6 Testing the BDI3000 to host connection

After the initial setup is done, you can test the communication between the host and the BDI3000. There is no need for a target configuration file and no TFTP server is needed on the host.

- If not already done, connect the BDI3000 system to the network.
- Power-up the BDI3000.
- Start a Telnet client on the host and connect to the BDI3000 (the IP address you entered during initial configuration).
- If everything is okay, a sign on message like «BDI Debugger for Embedded PowerPC» and a list of the available commands should be displayed in the Telnet window.

2.7 TFTP server for Windows

The bdiGDB system uses TFTP to access the configuration file and to load the application program. Because there is no TFTP server bundled with Windows, Abatron provides a TFTP server application **tftpsrv.exe**. This WIN32 console application runs as normal user application (not as a system service).

Command line syntax: `tftpsrv [p] [w] [dRootDirectory]`

Without any parameter, the server starts in read-only mode. This means, only read access request from the client are granted. This is the normal working mode. The bdiGDB system needs only read access to the configuration and program files.

The parameter [p] enables protocol output to the console window. Try it.

The parameter [w] enables write accesses to the host file system.

The parameter [d] allows to define a root directory.

<code>tftpsrv p</code>	Starts the TFTP server and enables protocol output
<code>tftpsrv p w</code>	Starts the TFTP server, enables protocol output and write accesses are allowed.
<code>tftpsrv dC:\tftp\</code>	Starts the TFTP server and allows only access to files in C:\tftp and its subdirectories. As file name, use relative names. For example "bdi\mpc750.cfg" accesses "C:\tftp\bdi\mpc750.cfg"

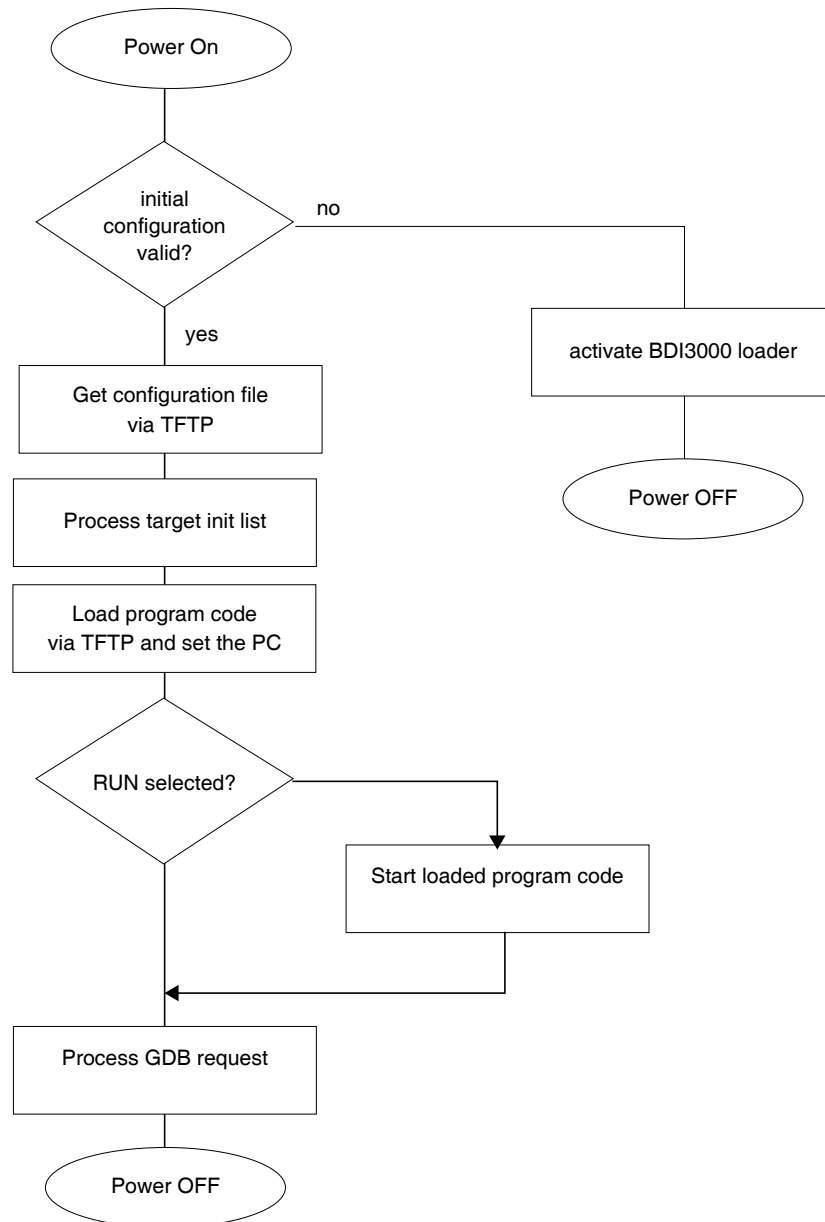
You may enter the TFTP server into the Startup group so the server is started every time you login.

3 Using bdiGDB

3.1 Principle of operation

The firmware within the BDI handles the GDB request and accesses the target memory or registers via the JTAG interface. There is no need for any debug software on the target system. After loading the code via TFTP debugging can begin at the very first assembler statement.

Whenever the BDI system is powered-up the following sequence starts:



3.2 Configuration File

The configuration file is automatically read by the BDI3000 after every power on.
The syntax of this file is as follows:

```
; comment
[part name]
core# identifier parameter1 parameter2 ..... parameterN ; comment
core# identifier parameter1 parameter2 ..... parameterN
.....
[part name]
core# identifier parameter1 parameter2 ..... parameterN
core# identifier parameter1 parameter2 ..... parameterN
.....
                etc.
```

Numeric parameters can be entered as decimal (e.g. 700) or as hexadecimal (0x80000).

The core# is optional. If not present the BDI assume core #0. See also chapter "Multi-Core Support".

3.2.1 Part [INIT]

The part [INIT] defines a list of commands which are be executed every time the target comes out of reset (except in STARTUP RUN mode). The commands are used to get the target ready for loading the program file.

WGPR register value	<p>Write value to the selected general purpose register.</p> <p>register the register number 0 .. 15</p> <p>value the value to write into the register</p> <p>Example: WGPR 0 5</p>
WREG name value	<p>Write value to the selected CPU register by name</p> <p>name the register name (CPSR)</p> <p>value the value to write into the register</p> <p>Example: WREG CPSR 0x600000D3</p>
WCPn register value	<p>Write value to the selected Coprocessor register.</p> <p>n the CP number (0 .. 15)</p> <p>register the register number (see chapter CPx registers)</p> <p>value the value to write into the register</p> <p>Example: WCP15 2 0x00004000 ; set Translation Base 0</p>
WM8 address value	<p>Write a byte (8bit) to the selected memory place.</p> <p>address the memory address</p> <p>value the value to write to the target memory</p> <p>Example: WM8 0xFFFFFA21 0x04 ; SYPCR: watchdog disable ...</p>
WM16 address value	<p>Write a half word (16bit) to the selected memory place.</p> <p>address the memory address</p> <p>value the value to write to the target memory</p> <p>Example: WM16 0x02200200 0x0002 ; TBSCR</p>
WM32 address value	<p>Write a word (32bit) to the selected memory place.</p> <p>address the memory address</p> <p>value the value to write to the target memory</p> <p>Example: WM32 0x02200000 0x01632440 ; SIUMCR</p>
WAPB address value	<p>Cortex-A8: Write a word (32bit) to the Debug APB memory.</p> <p>address the APB memory address</p> <p>value the value to write to the APB memory</p> <p>Example: WAPB 0xd4012014 0x08000014 ; RCSR</p>

WBIN address filename	<p>Write a binary image to the selected memory place. The binary image is read via TFTP from the host. Up to 4 such entries are supported.</p> <p>address the memory address</p> <p>filename the filename including the full path</p> <p>Example: WBIN 0x4000 pagetable.bin</p>
RM8 address value	<p>Read a byte (8bit) from the selected memory place.</p> <p>address the memory address</p> <p>Example: RM8 0x00000000</p>
RM16 address value	<p>Read a half word (16bit) from the selected memory place.</p> <p>address the memory address</p> <p>Example: RM16 0x00000000</p>
RM32 address value	<p>Read a word (32bit) from the selected memory place.</p> <p>address the memory address</p> <p>Example: RM32 0x00000000</p>
MMAP start end	<p>Because a memory access to an invalid memory space via JTAG leads to a deadlock, this entry can be used to define up to 32 valid memory ranges. If at least one memory range is defined, the BDI checks against this range(s) and avoids accessing of not mapped memory ranges.</p> <p>start the start address of a valid memory range</p> <p>end the end address of this memory range</p> <p>Example: MMAP 0xFFE00000 0xFFFFFFFF ;Boot ROM</p>
DELAY value	<p>Delay for the selected time.</p> <p>value the delay time in milliseconds (1...30000)</p> <p>Example: DELAY 500 ; delay for 0.5 seconds</p>
CLOCK value	<p>This entry allows to change the JTAG clock frequency during processing of the init list. But the final JTAG clock after processing the init list is taken from the CLOCK entry in the [TARGET] section. This entry maybe of interest to speed-up JTAG clock as soon as possible (after PLL setup).</p> <p>value see CLOCK parameter in [TARGET] section</p> <p>Example: CLOCK 2 ; switch to 16 MHz JTAG clock</p>

Using a startup program to initialize the target system:

For targets where initialization can not be done with a simple initialization list, there is the possibility to download and execute a special startup code. The startup code must be present in a file on the host. The last instruction in this startup code should be a BKPT. After processing the initlist, the BDI downloads this startup code to RAM, starts it and waits until it completes. If there is no BKPT instruction in the startup code, the BDI terminates it after a timeout of 5 seconds.

FILE filename The name of the file with the startup code. This name is used to access the startup code via TFTP.

filename the filename including the full path

Example: FILE F:\gdb\target\config\pid7t\startup.hex

FORMAT format The format of the startup file. Currently COFF, S-Record, a.out, Binary and ELF file formats are supported. If the startup code is already stored in ROM on the target, select ROM as the format.

format COFF, SREC, AOUT, BIN, ELF or ROM

Example: FORMAT COFF

START address The address where to start the startup code. If this value is not defined and the core is not in ROM, the address is taken from the code file. If this value is not defined and the core is already in ROM, the PC will not be set before starting the code.

address the address where to start the startup code

Example: START 0x10000

Note:

If an init list and a startup code file are present, the init list is processed first and then the startup code is loaded and executed. Therefore it is possible first to enable some RAM with the init list before the startup code is loaded and executed.

```
[INIT]
WM32      0x0B000020  0x00000000  ;Clear Reset Map

FILE      d:\gdb\bdi\startup.hex
FORMAT    SREC
START     0x100
```

3.2.2 Part [TARGET]

The part [TARGET] defines some target specific values.

CPUTYPE type [{ port | index | addr }]

This value gives the BDI information about the connected CPU.

type	The CPU type from the following list: ARM1136, ARM1156, ARM1176, MPCORE CORTEX-A8, CORTEX-A9, OMAP3400, OMAP3500 CORTEX-M3, CORTEX-R4, ARM7
port	For ARM7 the port values defines the used JTAG-AP port (0...7).
index	Defines which core debug component to select(0..7).
addr	Specifies the APB address of the core debug component. There is no ROM table search in this case. The address value has to be >= 0x80000000 (bit31 set).

Example: CPUTYPE ARM1136
CPUTYPE CORTEX-A9 0x9F310000
CPUTYPE CORTEX-A9 0 ; use first found
CPUTYPE CORTEX-A9 1 ; use second found

CLOCK main [init] [SLOW] With this value(s) you can select the JTAG clock rate the BDI3000 uses when communication with the target CPU. The "main" entry is used after processing the initialization list. The "init" value is used after target reset until the initialization list is processed. If there is no "init" value defined, the "main" value is used all the times.

Adaptive clocking needs a special target cable. Add also SLOW if the CPU clock frequency may fall below 6 MHz during adaptive clocking.

main,init:	0 = Adaptive	
	1 = 32 MHz	9 = 200 kHz
	2 = 16 MHz	19 = 100 kHz
	3 = 11 MHz	11 = 50 kHz
	4 = 8 MHz	12 = 20 kHz
	5 = 5 MHz	13 = 10 kHz
	6 = 4 MHz	14 = 5 kHz
	7 = 1 MHz	15 = 2 kHz
	8 = 500 kHz	16 = 1 kHz

Example: CLOCK 2 ; JTAG clock is 16 MHz

TRST type

Normally the BDI uses an open drain driver for the TRST signal. This is in accordance with the ARM recommendation. For boards where TRST is simply pulled low with a weak resistor, TRST will always be asserted and JTAG debugging is impossible. In that case, the TRST driver type can be changed to push-pull. Then the BDI actively drives also high level.

type	OPENDRAIN (default) PUSHPULL
------	---------------------------------

Example: TRST PUSHPULL ; Drive TRST also high

RESET type [time] [pwr] Normally the BDI drives the reset line during a reset sequence. If reset type is NONE or SOFT, the BDI does not assert a hardware reset. If reset type SOFT is supported depends on the connected target.

type	NONE SOFT (soft reset via a debug register) HARD (default)
time	The time in milliseconds the BDI assert the reset signal.
pwr	A different reset type can be defined for the initial power-up reset (NONE, SOFT, HARD).
Example:	RESET SOFT ; reset ARM core via RCSR RESET HARD 1000 ; assert RESET for 1 second

STARTUP mode [runtime] This parameter selects the target startup mode. The following modes are supported:

HALT	This default mode tries to forces the target to debug mode immediately out of reset.
STOP	In this mode, the BDI lets the target execute code for "runtime" milliseconds after reset. This mode is useful when boot code should initialize the target system.
RUN	After reset, the target executes code until stopped by the Telnet "halt" command. The init list is not processed in this mode.
WAIT	Sets the debug request bit in the target. Once the target is released from reset it will enter debug mode.
Example:	STARTUP STOP 3000 ; let the CPU run for 3 seconds

WAKEUP time This entry in the init list allows to define a delay time (in ms) the BDI inserts between releasing the reset line and starting communicating with the target. This delay is necessary when a target needs some wake-up time after a reset.

time	the delay time in milliseconds
Example:	WAKEUP 3000 ; insert 3sec wake-up time

BDIMODE mode param This parameter selects the BDI debugging mode. The following modes are supported:

LOADONLY	Loads and starts the application code. No debugging via JTAG interface.
AGENT	The debug agent runs within the BDI. There is no need for any debug software on the target. This mode accepts a second parameter. If RUN is entered as a second parameter, the loaded application will be started immediately, otherwise only the PC is set and BDI waits for GDB requests. If QUIET is entered as a second parameter, the BDI no polls the debug status register. The target is not influenced in any way while it is running. But in this mode, the BDI cannot detect any debug mode entry.
Example:	BDIMODE AGENT RUN

ENDIAN format	<p>This entry defines the endiannes of the memory system.</p> <p>format The endiannes of the target memory: LITTLE (default) BIG</p> <p>Example: ENDIAN LITTLE</p>
VECTOR CATCH mask	<p>When this line is present, the BDI catches exceptions. The mask is used to setup the ARM Vector catch register.</p> <p>mask selects the exceptions to catch</p> <p>Example: VECTOR CATCH 0x1B ;catch Abort, Undef, Reset</p>
BREAKMODE mode	<p>This parameter defines how breakpoints are implemented.</p> <p>SOFT This is the normal mode. Breakpoints are implemented by replacing code with a BKPT instruction.</p> <p>HARD In this mode, the breakpoint hardware is used. Only 6 breakpoints at a time are supported.</p> <p>Example: BREAKMODE HARD</p>
STEPMODE mode	<p>For ARM11 and Cortex-A8 the BDI supports two different single-step modes.</p> <p>OVER This is the default mode. Single-step is implemented by setting one or two hardware breakpoint on the next instruction address(es). This way we step over exceptions.</p> <p>INTO In this mode, the BDI sets a hardware breakpoint on all addresses except the current instruction address. This way we step into exceptions.</p> <p>Example: STERPMODE INTO</p>
MEMACCES mode [wait]	<p>For Cortex-A8, this parameter defines how memory is accessed. Either via the ARM core by executing ld and st instructions or via the AHB access port. The current mode can also be changed via the Telnet interface. The optional wait parameter allows to define a time the BDI waits before it expects that a value is ready or written. This allows to optimize download performance. The wait time is (8 x wait) TCK's in Run-Test/Idle state. For Cortex-M3, only AHB access is supported.</p> <p>The following modes are supported:</p> <p>CORE The CORE (default) mode requires that the core is halted and makes use of the memory management unit (MMU) and cache.</p> <p>AHB The AHB access mode can access memory even when the core is running but bypasses MMU and cache.</p> <p>Note: Not all Cortex-A8 based SoC support an AHB access port.</p> <p>Example: MEMACCES CORE 5 ; 40 TCK's access delay MEMACCES AHB 4 ; access via AHB, 32 TCK delay</p>

SIO port [baudrate] When this line is present, a TCP/IP channel is routed to the BDI's RS232 connector. The port parameter defines the TCP port used for this BDI to host communication. You may choose any port except 0 and the default Telnet port (23). On the host, open a Telnet session using this port. Now you should see the UART output in this Telnet session. You can use the normal Telnet connection to the BDI in parallel, they work completely independent. Also input to the UART is implemented.

port	The TCP/IP port used for the host communication.
baudrate	The BDI supports 2400 ... 115200 baud
Example:	SIO 7 9600 ;TCP port for virtual IO

DCC port When this line is present, a TCP/IP channel is routed to the ARM debug communication channel (DCC). The port parameter defines the TCP port used for this BDI to host communication. You may choose any port except 0 and the default Telnet port (23). On the host, open a Telnet session using this port. Now you should see the DCC output in this Telnet session. You can use the normal Telnet connection to the BDI in parallel, they work completely independent. Also input to DCC is implemented.

port	The TCP/IP port used for the host communication.
Example:	DCC 7 ;TCP port for DCC I/O

Daisy chained JTAG devices:

For ARM targets, the BDI can also handle systems with multiple devices connected to the JTAG scan chain. In order to put the other devices into BYPASS mode and to count for the additional bypass registers, the BDI needs some information about the scan chain layout. Enter the number (count) and total instruction register (irlen) length of the devices present before the ARM chip (Predecessor). Enter the appropriate information also for the devices following the ARM chip (Successor):

SCANPRED count irlen This value gives the BDI information about JTAG devices present before the ARM chip in the JTAG scan chain.

count	The number of preceding devices
irlen	The sum of the length of all preceding instruction registers (IR).
Example:	SCANPRED 1 8 ; one device with an IR length of 8

SCANSUCC count irlen This value gives the BDI information about JTAG devices present after the ARM chip in the JTAG scan chain.

count	The number of succeeding devices
irlen	The sum of the length of all succeeding instruction registers (IR).
Example:	SCANSUCC 2 12 ; two device with an IR length of 8+4

Note:

For Serial Wire Mode, the following parameters are not relevant, have no function: TRST, SCANPRED, SCANSUCC, SCANINIT, SCANPOST

Low level JTAG scan chain configuration:

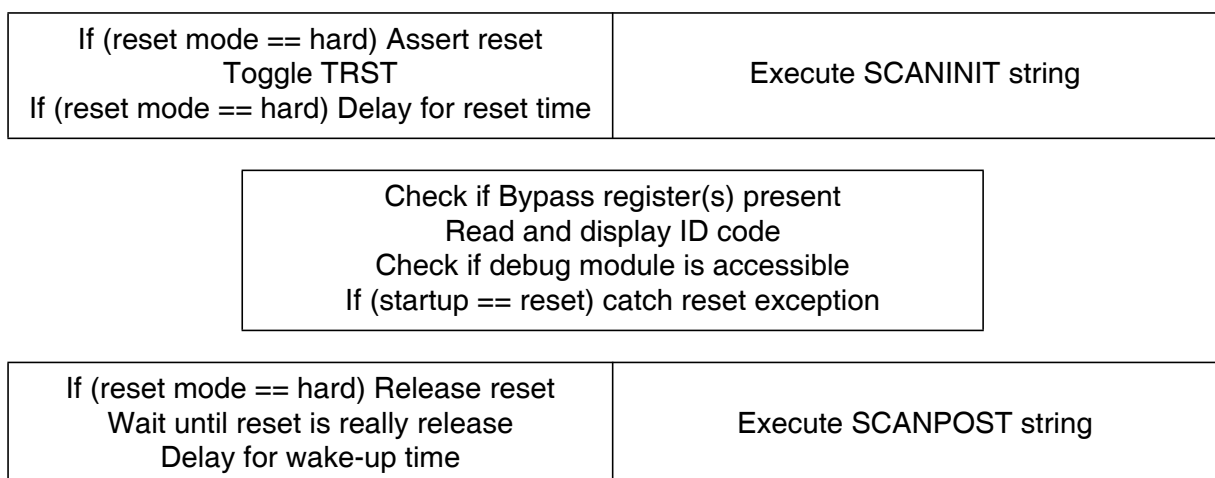
Sometimes it is necessary to configure the test access port (TAP) of the target before the ARM debug interface is visible and accessible in the usual way. The BDI supports this configuration in a very generic way via the SCANINIT and SCANPOST configuration commands. Both accept a string that defines the JTAG sequences to execute. The following example shows how to use these commands:

```
; Configure ICEPick module to make ARM926 TAP visible
SCANINIT    t1:w1000:t0:w1000:      ;toggle TRST
SCANINIT    i6=07:d8=89:i6=02:      ;connect and select router
SCANINIT    d32=81000082:            ;set IP control
SCANINIT    d32=a018206f:            ;configure TAP0
SCANINIT    d32=a018216f:c15:        ;enable TAP0, clock 5 times in RTI
SCANINIT    i10=ffff                 ;scan bypass
;
; Between SCANINIT and SCANPOST the ARM ICEBreaker is configured
; and the DBGRQ bit in the ARM debug control register is set.
;
SCANPOST     i10=002f:                ;IP(router) - ARM(bypass)
SCANPOST     d33=0102000106:         ;IP control = SysReset
SCANPOST     i10=ffff                 ;scan bypass
```

The following low level JTAG commands are supported in the string. Use ":" between commands.

```
I<n>=<...b2b1b0>  write IR, b0 is first scanned
D<n>=<...b2b1b0>  write DR, b0 is first scanned
                  n : the number of bits 1..256
                  bx : a data byte, two hex digits
W<n>              wait for n (decimal) micro seconds
T1               assert TRST
T0               release TRST
R1               assert RESET
R0               release RESET
CH<n>            clock TCK n (decimal) times with TMS high
CL<n>            clock TCK n (decimal) times with TMS low
```

The following diagram shows the parts of the standard reset sequence that are replaced with the SCAN string. Only the appropriate part of the reset sequence is replaced. If only a SCANINIT string is defined, then the standard "post" sequence is still executed.



3.2.3 Part [HOST]

The part [HOST] defines some host specific values.

IP ipaddress	<p>The IP address of the host.</p> <p>ipaddress the IP address in the form xxx.xxx.xxx.xxx</p> <p>Example: IP 151.120.25.100</p>
FILE filename	<p>The default name of the file that is loaded into RAM using the Telnet 'load' command. This name is used to access the file via TFTP. If the filename starts with a \$, this \$ is replace with the path of the configuration file name.</p> <p>filename the filename including the full path or \$ for relative path.</p> <p>Example: FILE F:\gnu\demo\arm\test.elf</p> <p> FILE \$test.elf</p>
FORMAT format [offset]	<p>The format of the image file and an optional load address offset. If the image is already stored in ROM on the target, select ROM as the format. The optional parameter "offset" is added to any load address read from the image file.</p> <p>format SREC, BIN, AOUT, ELF, COFF or ROM</p> <p>Example: FORMAT ELF</p> <p> FORMAT ELF 0x10000</p>
LOAD mode	<p>In Agent mode, this parameters defines if the code is loaded automatically after every reset.</p> <p>mode AUTO, MANUAL</p> <p>Example: LOAD MANUAL</p>
START address	<p>The address where to start the program file. If this value is not defined and the core is not in ROM, the address is taken from the code file. If this value is not defined and the core is already in ROM, the PC will not be set before starting the target. This means, the program starts at the normal reset address (0x00000000).</p> <p>address the address where to start the program file</p> <p>Example: START 0x10000</p>
DEBUGPORT port [RECONNECT]	<p>The TCP port GDB uses to access the target. If the RECONNECT parameter is present, an open TCP/IP connection (Telnet/GDB) will be closed if there is a connect request from the same host (same IP address).</p> <p>port the TCP port number (default = 2001)</p> <p>Example: DEBUGPORT 2001</p>

PROMPT string	<p>This entry defines a new Telnet prompt. The current prompt can also be changed via the Telnet interface.</p> <p>Example: PROMPT ARM11></p>
DUMP filename	<p>The default file name used for the DUMP command from a Telnet session.</p> <p>filename the filename including the full path</p> <p>Example: DUMP dump.bin</p>
TELNET mode	<p>By default the BDI sends echoes for the received characters and supports command history and line editing. If it should not send echoes and let the Telnet client in "line mode", add this entry to the configuration file.</p> <p>mode ECHO (default), NOECHO or LINE</p> <p>Example: TELNET NOECHO ; use old line mode</p>

3.2.4 Part [FLASH]

The Telnet interface supports programming and erasing of flash memories. The bdiGDB system has to know which type of flash is used, how the chip(s) are connected to the CPU and which sectors to erase in case the ERASE command is entered without any parameter.

CHIPTYPE type	<p>This parameter defines the type of flash used. It is used to select the correct programming algorithm.</p> <p>format AM29F, AM29BX8, AM29BX16, I28BX8, I28BX16, AT49, AT49X8, AT49X16, STRATAX8, STRATAX16, MIRROR, MIRRORX8, MIRRORX16, M58X32, AM29DX16, AM29DX32, STM32F10, LM3S</p> <p>Example: CHIPTYPE AM29F</p>
CHIPSIZE size	<p>The size of one flash chip in bytes (e.g. AM29F010 = 0x20000). This value is used to calculate the starting address of the current flash memory bank.</p> <p>size the size of one flash chip in bytes</p> <p>Example: CHIPSIZE 0x80000</p>
BUSWIDTH width	<p>Enter the width of the memory bus that leads to the flash chips. Do not enter the width of the flash chip itself. The parameter CHIPTYPE carries the information about the number of data lines connected to one flash chip. For example, enter 16 if you are using two AM29F010 to build a 16bit flash memory bank.</p> <p>with the width of the flash memory bus in bits (8 16 32)</p> <p>Example: BUSWIDTH 16</p>
FILE filename	<p>The default name of the file that is programmed into flash using the Telnet 'prog' command. This name is used to access the file via TFTP. If the filename starts with a \$, this \$ is replace with the path of the configuration file name. This name may be overridden interactively at the Telnet interface.</p> <p>filename the filename including the full path or \$ for relative path.</p> <p>Example: FILE F:\gnu\arm\bootrom.hex FILE \$bootrom.hex</p>
FORMAT format [offset]	<p>The format of the file and an optional address offset. The optional parameter "offset" is added to any load address read from the program file.</p> <p>format SREC, BIN, AOUT, ELF or COFF</p> <p>Example: FORMAT SREC FORMAT ELF 0x10000</p>
WORKSPACE address	<p>If a workspace is defined, the BDI uses a faster programming algorithm that runs out of RAM on the target system. Otherwise, the algorithm is processed within the BDI. The workspace is used for a 1kByte data buffer and to store the algorithm code. There must be at least 2kBytes of RAM available for this purpose.</p> <p>address the address of the RAM area</p> <p>Example: WORKSPACE 0x00000000</p>

ERASE addr [increment count] [mode [wait]]

The flash memory may be individually erased or unlocked via the Telnet interface. In order to make erasing of multiple flash sectors easier, you can enter an erase list. All entries in the erase list will be processed if you enter ERASE at the Telnet prompt without any parameter. This list is also used if you enter UNLOCK at the Telnet without any parameters. With the "increment" and "count" option you can erase multiple equal sized sectors with one entry in the erase list.

address	Address of the flash sector, block or chip to erase
increment	If present, the address offset to the next flash sector
count	If present, the number of equal sized sectors to erase
mode	BLOCK, CHIP, UNLOCK

Without this optional parameter, the BDI executes a sector erase. If supported by the chip, you can also specify a block or chip erase. If UNLOCK is defined, this entry is also part of the unlock list. This unlock list is processed if the Telnet UNLOCK command is entered without any parameters.

Note: Chip erase does not work for large chips because the BDI time-outs after 3 minutes. Use block erase.

wait	The wait time in ms is only used for the unlock mode. After starting the flash unlock, the BDI waits until it processes the next entry.
------	-----------------------------------------------------------------------------------------------------------------------------------------

Example: ERASE 0xff040000 ;erase sector 4 of flash
 ERASE 0xff060000 ;erase sector 6 of flash
 ERASE 0xff000000 CHIP ;erase whole chip(s)
 ERASE 0xff010000 UNLOCK 100 ;unlock, wait 100ms
 ERASE 0xff000000 0x10000 7 ; erase 7 sectors

Example for the ARM PID7T board (AM29F010 in U12):

```
[FLASH]
WORKSPACE 0x00000000 ;Workspace in target RAM for faster programming algorithm
CHIPTYPE AM29F ;Flash type
CHIPSIZE 0x20000 ;The size of one flash chip in bytes
BUSWIDTH 8 ;The width of the flash memory bus in bits (8 | 16 | 32)
FILE C:\gdb\pid7t\bootrom.hex ;The file to program
ERASE 0x04000000 ;erase sector 0 of flash SIMM
ERASE 0x04004000 ;erase sector 1 of flash SIMM
ERASE 0x04008000 ;erase sector 2 of flash SIMM
ERASE 0x0400C000 ;erase sector 3 of flash SIMM
ERASE 0x04010000 ;erase sector 4 of flash SIMM
ERASE 0x04014000 ;erase sector 5 of flash SIMM
ERASE 0x04018000 ;erase sector 6 of flash SIMM
ERASE 0x0401C000 ;erase sector 7 of flash SIMM
```

the above erase list maybe replaced with:

```
ERASE 0x04000000 0x4000 8 ;erase 8 sectors
```

STM32F10xx Internal Flash Memory:

The BDI3000 supports programming of the STM32F10xx internal flash memory. Mass and Sector Erase of the Main Flash memory is supported. Option byte programming is not directly supported but can be done manually via Telnet mm/md commands.

```
[FLASH]
WORKSPACE 0x20000000 ;workspace in internal SRAM
CHIPTYPE   STM32F10
CHIPSIZE   0x20000
BUSWIDTH   16
FILE        E:/temp/dumpl6k.bin
FORMAT     BIN 0x08010000
ERASE       0x08010000 0x400 16 ;erase 16 sectors
```

Mass erase via Telnet:

```
BDI> erase 0x08000000 mass
```

Stellaris LM3S Internal Flash Memory:

The BDI3000 supports programming of the Luminary Micro Stellaris LM3S internal flash memory. Mass and Sector Erase of the Flash memory is supported. Before Erasing/Programming make sure the correct value is loaded into the Flash USec Reload register (USECRL).

```
[INIT]
.....
WM32      0x400FE140 49 ;USECRL: Flash USec Reload for 50 MHz
;
```

```
[FLASH]
WORKSPACE 0x20000000 ;workspace in internal SRAM
CHIPTYPE   LM3S
CHIPSIZE   0x40000
BUSWIDTH   32
FILE        E:/temp/dumpl6k.bin
FORMAT     BIN 0x00030000
ERASE       0x00030000 0x400 16
```

Mass erase via Telnet:

```
BDI> erase 0x00000000 mass
```

Supported Flash Memories:

There are currently 3 standard flash algorithm supported. The AMD, Intel and Atmel AT49 algorithm. Almost all currently available flash memories can be programmed with one of this algorithm. The flash type selects the appropriate algorithm and gives additional information about the used flash.

- For 8bit only flash: AM29F (MIRROR), I28BX8, AT49
- For 8/16 bit flash in 8bit mode: AM29BX8 (MIRRORX8), I28BX8 (STRATAX8), AT49X8
- For 8/16 bit flash in 16bit mode: AM29BX16 (MIRRORX16), I28BX16 (STRATAX16), AT49X16
- For 16bit only flash: AM29BX16, I28BX16, AT49X16
- For 16/32 bit flash in 16bit mode: AM29DX16
- For 16/32 bit flash in 32bit mode: AM29DX32
- For 32bit only flash: M58X32

Some newer Spansion MirrorBit flashes cannot be programmed with the MIRRORX16 algorithm because of the used unlock address offset. Use S29M32X16 for these flashes.

The AMD and AT49 algorithm are almost the same. The only difference is, that the AT49 algorithm does not check for the AMD status bit 5 (Exceeded Timing Limits).

Only the AMD and AT49 algorithm support chip erase. Block erase is only supported with the AT49 algorithm. If the algorithm does not support the selected mode, sector erase is performed. If the chip does not support the selected mode, erasing will fail. The erase command sequence is different only in the 6th write cycle. Depending on the selected mode, the following data is written in this cycle (see also flash data sheets): 0x10 for chip erase, 0x30 for sector erase, 0x50 for block erase.

To speed up programming of Intel Strata Flash and AMD MirrorBit Flash, an additional algorithm is implemented that makes use of the write buffer. This algorithm needs a workspace, otherwise the standard Intel/AMD algorithm is used.

The following table shows some examples:

Flash	x 8	x 16	x 32	Chipsize
Am29F010	AM29F	-	-	0x020000
Am29F800B	AM29BX8	AM29BX16	-	0x100000
Am29DL323C	AM29BX8	AM29BX16	-	0x400000
Am29PDL128G	-	AM29DX16	AM29DX32	0x01000000
Intel 28F032B3	I28BX8	-	-	0x400000
Intel 28F640J3A	STRATAX8	STRATAX16	-	0x800000
Intel 28F320C3	-	I28BX16	-	0x400000
AT49BV040	AT49	-	-	0x080000
AT49BV1614	AT49X8	AT49X16	-	0x200000
M58BW016BT	-	-	M58X32	0x200000
SST39VF160	-	AT49X16	-	0x200000
Am29LV320M	MIRRORX8	MIRRORX16	-	0x400000

Note:

Some Intel flash chips (e.g. 28F800C3, 28F160C3, 28F320C3) power-up with all blocks in locked state. In order to erase/program those flash chips, use the init list to unlock the appropriate blocks:

```
WM16  0xFFFF0000  0x0060      unlock block 0
WM16  0xFFFF0000  0x00D0
WM16  0xFFFF1000  0x0060      unlock block 1
WM16  0xFFFF1000  0x00D0
      ....
WM16  0xFFFF0000  0xFFFF      select read mode
```

or use the Telnet "unlock" command:

```
UNLOCK [<addr> [<delay>]]
```

addr This is the address of the sector (block) to unlock

delay A delay time in milliseconds the BDI waits after sending the unlock command to the flash. For example, clearing all lock-bits of an Intel J3 Strata flash takes up to 0.7 seconds.

If "unlock" is used without any parameter, all sectors in the erase list with the UNLOCK option are processed.

To clear all lock-bits of an Intel J3 Strata flash use for example:

```
BDI> unlock 0xFF000000 1000
```

To erase or unlock multiple, continuous flash sectors (blocks) of the same size, the following Telnet commands can be used:

```
ERASE <addr> <step> <count>
UNLOCK <addr> <step> <count>
```

addr This is the address of the first sector to erase or unlock.

step This value is added to the last used address in order to get to the next sector. In other words, this is the size of one sector in bytes.

count The number of sectors to erase or unlock.

The following example unlocks all 256 sectors of an Intel Strata flash (28F256K3) that is mapped to 0x00000000. In case there are two flash chips to get a 32bit system, double the "step" parameter.

```
BDI> unlock 0x00000000 0x20000 256
```

3.2.5 Part [REGS]

In order to make it easier to access target registers via the Telnet interface, the BDI can read in a register definition file. In this file, the user defines a name for the register and how the BDI should access it (e.g. as memory mapped, memory mapped with offset, ...). The name of the register definition file and information for different registers type has to be defined in the configuration file.

The register name, type, address/offset/number and size are defined in a separate register definition file. This way, you can create one register definition file for a specific target processor that can be used for all possible positions of the internal memory map. You only have to change one entry in the configuration file.

An entry in the register definition file has the following syntax:

name type addr size

name	The name of the register (max. 12 characters)	
type	The register type	
	GPR	General purpose register
	CP15	Coprocessor 15 register
	CP14	Coprocessor 14register
	
	CP0	Coprocessor 0 register
	MM	Absolute direct memory mapped register
	DMM1...DMM4	Relative direct memory mapped register
	IMM1...IMM4	Indirect memory mapped register
	APB	APB memory mapped register
addr	The address, offset or number of the register	
size	The size (8, 16, 32) of the register, default is 32	

The following entries are supported in the [REGS] part of the configuration file:

FILE filename	The name of the register definition file. This name is used to access the file via TFTP. The file is loaded once during BDI startup.		
	filename	the filename including the full path	
	Example:	FILE C:\bdi\regs\reg40400.def	
DMMn base	This defines the base address of direct memory mapped registers. This base address is added to the individual offset of the register.		
	base	the base address	
	Example:	DMM1 0x01000	
IMMn addr data	This defines the addresses of the memory mapped address and data registers of indirect memory mapped registers. The address of a IMMn register is first written to "addr" and then the register value is access using "data" as address.		
	addr	the address of the Address register	
	data	the address of the Data register	
	Example:	IMM1 0x04700000 0x04700004	

Example for a register definition:

Entry in the configuration file:

```
[REGS]
FILE          E:\cygwin\home\bdidemo\arm\reg1136.def
```

The register definition file:

```
;
;Coprocessor Register Numbers for ARM11:
;
;      +-----+-----+-----+-----+
;      |opc_2|0|  CRm  |opc_1|0|  nbr  |
;      +-----+-----+-----+-----+
;
;The 16bit register number is used to build the appropriate MCR/MRC instruction.
;
;
;name          type          addr          size
;-----
;
id             CP15          0x0000         32      ;ID code
cache          CP15          0x2000         32      ;Cache type
tcmstatus      CP15          0x4000         32      ;TCM status
tcmtype        CP15          0x6000         32      ;TCM type
;
ctr            CP15          0x0001         32      ;Control
aux            CP15          0x2001         32      ;Auxiliary Control
cpacc          CP15          0x4001         32      ;Coprocessor Access
;
ttb0           CP15          0x0002         32      ;Translation Table Base 0
ttb1           CP15          0x2002         32      ;Translation Table Base 1
ttbc           CP15          0x4002         32      ;Translation Table Base Control
;
pid            CP15          0x000d         32      ;Process ID
context        CP15          0x200d         32      ;Context ID
;
;
; CM1136JF-S core module control registers
;
cm_id          MM            0x10000000
cm_proc        MM            0x10000004
cm_osc         MM            0x10000008
cm_ctrl        MM            0x1000000c
cm_stat        MM            0x10000010
;
;
;
; Cortex-A8 debug registers
dscr           APB           0xd4011088         ;Debug Status and Control
prcr           APB           0xd4011310         ;Device Power Down and Reset Control
prsr           APB           0xd4011314         ;Device Power Down and Reset Status
authstatus     APB           0xd4011fb8         ;Authentication Status
devid          APB           0xd4011fc8         ;Device Identifier
devtype        APB           0xd4011fcc         ;Device type
;
```

3.3 Debugging with GDB

Because the target agent runs within BDI, no debug support has to be linked to your application. There is also no need for any BDI specific changes in the application sources. Your application must be fully linked because no dynamic loading is supported.

3.3.1 Target setup

Target initialization may be done at two places. First with the BDI configuration file, second within the application. The setup in the configuration file must at least enable access to the target memory where the application will be loaded. Disable the watchdog and setting the CPU clock rate should also be done with the BDI configuration file. Application specific initializations like setting the timer rate are best located in the application startup sequence.

3.3.2 Connecting to the target

As soon as the target comes out of reset, BDI initializes it and loads your application code. If RUN is selected, the application is immediately started, otherwise only the target PC is set. BDI now waits for GDB request from the debugger running on the host.

After starting the debugger, it must be connected to the remote target. This can be done with the following command at the GDB prompt:

```
(gdb)target remote bdi3000:2001
```

bdi3000 This stands for an IP address. The HOST file must have an appropriate entry. You may also use an IP address in the form xxx.xxx.xxx.xxx

2001 This is the TCP port used to communicate with the BDI

If not already suspended, this stops the execution of application code and the target CPU changes to background debug mode.

Remember, every time the application is suspended, the target CPU is freezed. During this time no hardware interrupts will be processed.

Note: For convenience, the GDB detach command triggers a target reset sequence in the BDI.

```
(gdb)...
```

```
(gdb)detach
```

... Wait until BDI has resetet the target and reloaded the image

```
(gdb)target remote bdi3000:2001
```

Note:

GDB sometimes fails to connect to the target after a reset because it tries to read an invalid stack frame. With the following init list entries you can work around this GDB startup problem:

```
WGPR      11                0x00000020 ;set frame pointer to free RAM
WM32      0x00000020 0x00000028 ;dummy stack frame
```

3.3.3 Breakpoint Handling

There are two breakpoint modes supported. One of them (SOFT) is implemented by replacing application code with a BKPT instruction. The other (HARD) uses the built in breakpoint logic. If HARD is selected, only up to 6 breakpoints can be active at the same time.

The following example selects SOFT as the breakpoint mode:

```
BREAKMODE    SOFT          ;SOFT or HARD, HARD uses hardware breakpoints
```

The BDI supports only a GDB version that uses a Z-Packet to set breakpoints (GDB Version 5.0 or newer). GDB tells the BDI to set / clear breakpoints with this special protocol unit. The BDI will respond to this request by replacing code in memory with the BKPT instruction or by setting the appropriate hardware breakpoint.

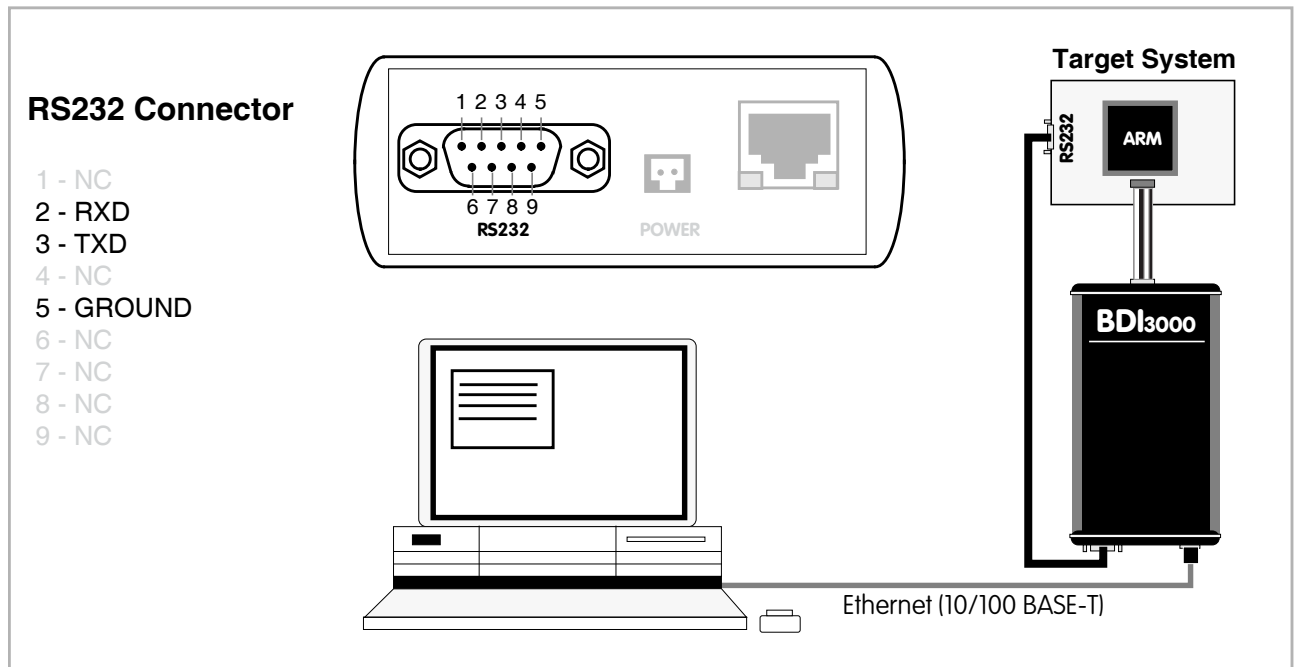
3.3.4 GDB monitor command

The BDI supports the GDB V5.x "monitor" command. Telnet commands are executed and the Telnet output is returned to GDB.

```
(gdb) target remote bdi3000:2001
Remote debugging using bdi3000:2001
0x10b2 in start ()
(gdb) monitor md 0 1
00000000 : 0xe59ff018 - 442503144 ...
```

3.3.5 Target serial I/O via BDI

A RS232 port of the target can be connected to the RS232 port of the BDI3000. This way it is possible to access the target's serial I/O via a TCP/IP channel. For example, you can connect a Telnet session to the appropriate BDI3000 port. Connecting GDB to a GDB server (stub) running on the target should also be possible.



The configuration parameter "SIO" is used to enable this serial I/O routing. The used framing parameters are 8 data, 1 stop and not parity.

```
[TARGET]
....
SIO    7      9600      ;Enable SIO via TCP port 7 at 9600 baud
```

Warning!!!

Once SIO is enabled, connecting with the setup tool to update the firmware will fail. In this case either disable SIO first or disconnect the BDI from the LAN while updating the firmware.

3.3.6 Target DCC I/O via BDI

It is possible to route a TCP/IP port to the ARM's debug communication channel (DCC). This way, the application running on the target can output messages via DCC that are displayed for example in a Telnet window. The BDI routes every byte received via DCC to the connected TCP/IP channel and vice versa. Below some simple functions you can link to your application in order to implement IO via DCC.

```
#define DSCR_WDTR_FULLL (1L<<29)
#define DSCR_RDTR_FULLL (1L<<30)

static unsigned int read_dtr(void)
{
    unsigned int c;

    __asm__ volatile(
        "mrc p14, 0, %0, c0, c5\n"
        : "=r" (c));
    return c;
}

static void write_dtr(unsigned int c)
{
    __asm__ volatile(
        "mcr p14, 0, %0, c0, c5\n"
        :
        : "r" (c));
}

static unsigned int read_dscr(void)
{
    unsigned int ret;

    __asm__ volatile(
        "mrc p14, 0, %0, c0, c1\n"
        : "=r" (ret));
    return ret;
}

void write_dcc_char(unsigned int c)
{
    while(read_dscr() & DSCR_WDTR_FULLL);
    write_dtr(c);
}

unsigned int read_dcc_char(void)
{
    while(!(read_dscr() & DSCR_RDTR_FULLL));
    return read_dtr();
}

void write_dcc_string(const char* s)
{
    while (*s) write_dcc_char(*s++);
}
```

3.4 Telnet Interface

A Telnet server is integrated within the BDI. The Telnet channel is used by the BDI to output error messages and other information. Also some basic debug tasks may be done by using this interface. Enter help at the Telnet command prompt to get a list of the available commands.

Telnet Debug features:

- Display and modify memory locations
- Display and modify registers
- Single step a code sequence
- Set hardware breakpoints (for code and data accesses)
- Load a code file from any host
- Start / Stop program execution
- Programming and Erasing Flash memory

During debugging with GDB, the Telnet is mainly used to reboot the target (generate a hardware reset and reload the application code). It may be also useful during the first installation of the bdiGDB system or in case of special debug needs.

Multiple commands separated by a semicolon can be entered on one line.

Example of a Telnet session:

```
ARM1136>info
Core number      : 0
Core state       : debug mode (ARM)
Debug entry cause : Vector Catch (RESET)
Current PC       : 0x00000000
Current CPSR     : 0x000001d3 (Supervisor)
ARM1136>rd
GPR00: 000000fc f1c72a88 ff5ffdf7 3bb15ae6
GPR04: f87f47f7 3c7c6959 ba398649 ddf6fed
GPR08: fff3a7b1 ff3defdf fafb5fff fb99eb7d
GPR12: bdfedbf 7edfffd7 8ce356cf 00000000
PC : 00000000 CPSR: 000001d3
ARM1136>md 0
00000000 : 3de37365 ddaf8e8b 70a66636 52d11411 es.=...6f.p...R
00000010 : b672ee06 d6a94323 6e73fd29 a8d6e9a1 ..r.#C..).sn....
00000020 : 8f0a1aad 6c1a840f e1b1de9d 802e4839 .....l....9H..
00000030 : 9f9c2afa 9b818b86 63fdbab8 f2a63b91 .*.....c.;...
00000040 : 440f75a4 fa7b254e c5efff5b 8f4829a5 .u.DN%{.(....)H.
.....
```

Notes:

The DUMP command uses TFTP to write a binary image to a host file. Writing via TFTP on a Linux/Unix system is only possible if the file already exists and has public write access. Use "man tftpd" to get more information about the TFTP server on your host.

3.4.1 Command list

```
"MD      [<address>] [<count>]  display target memory as word (32bit)",
"MDH     [<address>] [<count>]  display target memory as half word (16bit)",
"MDB     [<address>] [<count>]  display target memory as byte (8bit)",
"DUMP    <addr> <size> [<file>] dump target memory to a file",
"MM      <addr> <value> [<cnt>] modify word(s) (32bit) in target memory",
"MMH     <addr> <value> [<cnt>] modify half word(s) (16bit) in target memory",
"MMB     <addr> <value> [<cnt>] modify byte(s) (8bit) in target memory",
"MT      <addr> <count>        memory test",
"MC      [<address>] [<count>]  calculates a checksum over a memory range",
"MV      verifies the last calculated checksum",
"RD      [<name>]               display general purpose or user defined register",
"RDUMP   [<file>]               dump all user defined register to a file",
"RDALL   display all ARM registers ",
"RDCP    [<cp>] <number>       display CP register, default is CP15",
"RDFP    display floating point register",
"RM      {<nbr>|<name>} <value> modify general purpose or user defined register",
"RMCP    [<cp>] <number><value> modify CP register, default is CP15",
"DTLB    <from> [<to>]          ARM1136: display Data TLB entries",
"ITLB    <from> [<to>]          ARM1136: display Inst TLB entries",
"LTLB    <from> [<to>]          ARM1136: display Lockable Main TLB entries",
"ATLB    <from> [<to>]          ARM1136: display Set-Associative Main TLB entries",
"DTAG    <from> [<to>]          ARM1136: display L1 Data Cache Tag(s) ",
"ITAG    <from> [<to>]          ARM1136: display L1 Inst Cache Tag(s) ",
"RESET   [HALT | RUN [time]]   reset the target system, change startup mode",
"GO      [<pc>]                set PC and start current core",
"GO      <n> <n> [<n>[<n>]]      start multiple cores in requested order",
"TI      [<pc>]                single step an instruction",
"HALT    [<n>[<n>[<n>[<n>]]]]    force core(s) to debug mode (n = core number)",
"BI      <addr>                set instruction breakpoint",
"BI      <addr> [<mask>]        Cortex-A8: set instruction breakpoint",
"CI      [<id>]                clear instruction breakpoint(s)",
"BD      [R|W] <addr>          set data watchpoint (32bit access)",
"BDH     [R|W] <addr>          set data watchpoint (16bit access)",
"BDB     [R|W] <addr>          set data watchpoint ( 8bit access)",
"BDM     [R|W] <addr> [<mask>]  Cortex-A8: set data watchpoint with address mask",
"CD      [<id>]                clear data watchpoint(s)",
"INTDIS   disable target interrupts while running",
"INTENA   enable target interrupts while running (default)",
"INFO     display information about the current state",
"LOAD     [<offset>] [<file> [<format>]] load program file to target memory",
"VERIFY   [<offset>] [<file> [<format>]] verify a program file to target memory",
"PROG     [<offset>] [<file> [<format>]] program flash memory",
"         <format> : SREC, BIN, AOUT, ELF or COFF",
"ERASE    [<address> [<mode>]]   erase a flash memory sector, chip or block",
"         <mode> : CHIP, BLOCK or SECTOR (default is sector)",
"ERASE    <addr> <step> <count> erase multiple flash sectors",
"UNLOCK   [<addr> [<delay>]]     unlock a flash sector",
"UNLOCK   <addr> <step> <count> unlock multiple flash sectors",
"FLASH    <type> <size> <bus>   change flash configuration",
"FENA     <addr> <size>         enable autoamtic programming to flash memory",
"FDIS     disable autoamtic programming to flash memory",
"DELAY    <ms>                 delay for a number of milliseconds",
"MEMACC   {CORE | AHB [<hprot>]} Cortex-A8: select memory access mode",
"SELECT   <core>               change the current core",
"HOST     <ip>                 change IP address of program file host",
"PROMPT   <string>             defines a new prompt string",
```

```
"CONFIG                                display or update BDI configuration",
"CONFIG <file> [<hostIP> [<bdiIP> [<gateway> [<mask>]]]]",
"HELP                                display command list",
"BOOT [loader]                       reboot the BDI and reload the configuration",
"QUIT                                terminate the Telnet session",

"-----",
"Low level access to CoreSight debug system:",
"-----",
"RDP <addr>                           display Debug Port (DP) register",
"RAP <addr>                           display Access Port (AP) register",
"RDBG <nbr> [<cnt>]                   display core debug register",
"WDP <addr> <value>                   modify Debug Port (DP) register",
"WAP <addr> <value>                   modify Access Port (AP) register",
"WDBG <nbr> <value>                   modify core debug register",
"MDAPB <addr> [<cnt>]                 display APB memory",
"MMAPB <addr> <value>                 modify APB memory",
"MDAHB <addr> [<cnt>]                 display AHB memory (32-bit)",
"MDAHB <addr> <value>                 modify AHB memory (32-bit)"
```


3.4.2 CPxx Registers

Via Telnet it is possible to access the Coprocessor 15,14,13 registers. Following the Telnet commands that are used to access CP registers:

```
"RDCP    <number>                display control processor 15 register",
"RDCP 15 <number>                display control processor 15 register",
"RDCP 14 <number>                display control processor 14 register",
"RDCP 13 <number>                display control processor 13 register",
    ....

"RMCP    <number> <value>        modify control processor 15 register",
"RMCP 15 <number> <value>        modify control processor 15 register",
"RMCP 14 <number> <value>        modify control processor 14 register",
"RMCP 13 <number> <value>        modify control processor 13 register",
    ....
```

The parameter number selects the CPxx register. This parameter is used to build the appropriate MCR or MRC instruction.

```
+-----+-----+-----+-----+
|opc_2|0| CRm |opc_1|0| nbr |
+-----+-----+-----+-----+
```

Some examples:

CP15 : ID register (CRn = 0, opcode_2 = 0)

```
BDI> rdcp 15 0x0000
```

CP15 : Cache Type (CRn = 0, opcode_2 = 1)

```
BDI> rdcp 15 0x2000
```

CP15 : Invalidate I cache line (CRn = 7, opcode_2 = 1, CRm = 5)

```
BDI> rmcp 15 0x2507 0xA0000000
```

3.5 Multi-Core Support

3.5.1 JTAG Daisy Chained Cores

The bdiGDB system supports concurrent debugging of up to 4 ARM cores (same family) connected to the same JTAG scan chain. For every core you can start its own GDB session. The default port numbers used to attach the remote targets are 2001 ... 2004. In the Telnet you switch between the cores with the command "select <0..3>". In the configuration file, simply begin the line with the appropriate core number. If there is no #n in front of a line, the BDI assumes core #0.

The following example defines two cores on the scan chain.

```
[TARGET]
CLOCK      1          ;JTAG clock (0=Adaptive, 1=8MHz, 2=4MHz, 3=2MHz)
WAKEUP     1000       ;wakeup time after reset

#0 CPUTYPE   ARM1136
#0 SCANPRED  0 0      ;JTAG devices connected before this core
#0 SCANSUCC  1 4      ;JTAG devices connected after this core
#0 VECTOR    CATCH    ;catch unhandled exceptions
#0 BREAKMODE SOFT     ;SOFT or HARD
#0 DCC       8        ;DCC I/O via TCP port 8

#1 CPUTYPE   ARM1136
#1 SCANPRED  1 4      ;JTAG devices connected before this core
#1 SCANSUCC  0 0      ;JTAG devices connected after this core
#1 VECTOR    CATCH    ;catch unhandled exceptions
#1 BREAKMODE SOFT     ;SOFT or HARD
#1 DCC       7        ;DCC I/O via TCP port 7
```

Note:

It is not possible to concurrent debug an ARM11 and a Cortex-A8 core even if they are located on the same scan chain.

3.5.2 ARM7 cores connected via JTAG-AP

The bdiGDB system supports concurrent debugging of 1 Cortex-A8 core and up to 3 ARM7 cores connected to the CoreSight JTAG-AP interface. For every core you can start its own GDB session. The default port numbers used to attach the remote targets are 2001 ... 2004. In the Telnet you switch between the cores with the command "select <0..3>". In the configuration file, simply begin the line with the appropriate core number. If there is no #n in front of a line, the BDI assumes core #0.

```
[TARGET]
CLOCK      7          ;BDI3000: JTAG clock 1MHz
WAKEUP     100        ;wait after reset released
;
; Core#0 Cortex-A8
#0 CPUTYPE   CORTEX-A8 ;main core is Cortex-A8
#0 STARTUP   HALT      ;halt immediatelly at the reset vector
#0 BREAKMODE HARD      ;SOFT or HARD
#0 MEMACCESS CORE 8    ;memory access via Core (64 TCK's access delay)
;
; Core#1 ARM7 at JTAG-AP port 2
#1 CPUTYPE   ARM7 2    ;ARM7 connected to JTAG-AP port 2
#1 STARTUP   RUN       ;let the core run
#1 BREAKMODE SOFT     ;SOFT or HARD
#1 MEMACCESS CORE 2    ;Additional 16 TCK DAP access delay
```

4 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

5 Environmental notice

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

6 Declaration of Conformity (CE)

7 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/repair 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.