JTAG-Booster for

IBM PPC405xxx

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1.   General

The programs JT405EP.EXE and JT405GPr.EXE use the JTAG port of the IBM PPC405xxx mircocontrollers in conjunction with the small JTAG-Booster:

- to program data into flash memory
- to verify and read the contents of a flash memory
- to make a memory dump
- to access an I²C Device
- to test CPU signals

All functions are done without any piece of software running in the target. No firmware or BIOS must be written. Bootstrap software may be downloaded to initially unprogrammed memories.

The JTAG-BOOSTER' s software is highly optimized to the JTAG chain of a specific target CPU. To give support for all processors of the IBM PPC405xxx family, there are two different programs on the distribution disk:

- JT405EP.EXE   : Tool for IBM PPC405EP

- JT405GPr.EXE   : Tool for IBM PPC405GPr

Please contact us, if you need support for other members of the IBM PPC405xxx family.

For latest documentation please refer to the file README.TXT on the distribution disk.

1.1.   Ordering Information

The following related products are available

- 9017   JTAG-Booster IBM PPC405xxx, 3.3V,
         PPC405EP and PPC405GPr
         DOS/Win9x/WinNT/Win2000/WinXP,
         delivered with adapter type 285

1.2.   System Requirements

To successfully run this tool the following requirements must be met:

- MSDOS, WIN3.x, WIN9x, WinNT, Win2000 or WindowsXP
  (WinNT/Win2000/WindowsXP is supported with an additional tool, see
  chapter 5 "Support for Windows NT, Windows 2000 and Windows XP")

- Intel 80386 or higher

- 205 kByte of free DOS memory

- Parallel Port

1.3.   Contents of Distribution Disk

- JT405EP.EXE   Tool for IBM PPC405EP
  JT405EP.OVL

- JT405EP.INI   Template configuration file for IBM PPC405EP. See chapter 1.9 "Initialization file JT405xxx.INI"

- JT405GPr.EXE   Tool for IBM PPC405GPr
  JT405GPr.OVL

- JT405GPr.INI   Template configuration file for IBM PPC405GPr. See chapter 1.9 "Initialization file JT405xxx.INI"

- WinNT.zip   Support for Windows NT, Windows 2000 and Windows XP. See chapter 5 "Support for Windows NT, Windows 2000 and Windows XP"

- JTAG_V4xx_FLAS HES.pdf   List of all supported Flash devices

- README.txt   Release notes, new features, known problems

1.4.   Connecting your PC to the target system

The JTAG-Booster can be plugged into standard parallel ports (LPT1-3) with a DB25-Connector.

LPT1-3
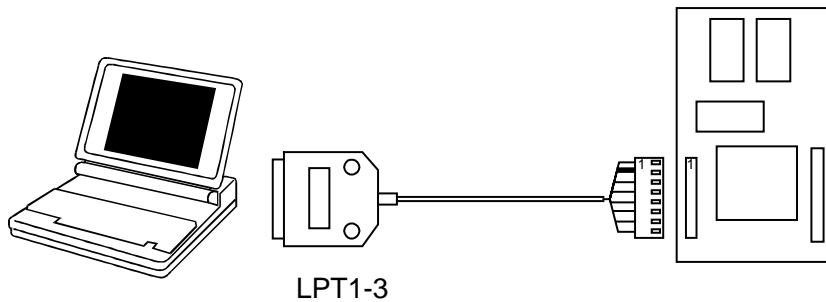
The target end of the cable has the following reference:

1	2*	3	4	5	6	7	8
TCK	GND	TMS	TRST#	NC	TDI	TDO	+3.3V

*PIN 2 can be detected by the thick cable.

To connect your design to the JTAG-BOOSTER you need a single row berg connector with a spacing of 2.54mm on your PCB. The names refer to the target: Pin 7 is the target's TDO pin and is connected to the JTAG-Booster's TDI pin.

The 3.3V version of the JTAG-Booster (FS part number 285) is delivered together with this package. Don't use the 5V version of the JTAG-Booster (FS part number 227) with a 3.3V target. **Don't apply 5V to the 3.3V version of the JTAG-Booster!**

Your target must be able to power the JTAG-Booster, it draws about 100mA.

Before you start the program, the JTAG-BOOSTER must be plugged to a parallel interface of your PC and to the 8 pin JTAG connector on the target.

The utility is started with the general command line format: JTAGxxx

JT405xxx /function [filename] [/option_1] ... [/option_n].

Note that the function must be the first argument followed (if needed) by the filename.

If you want to cancel execution of JT405xxx, press CTRL-Break-Key.

On any error the program aborts with an MSDOS error level of one.

1.5.   First Example with IBM PPC405EP

In the following simple example it is assumed that the JTAG-Booster is connected to LPT1 of your PC and target power is on.

Typing

        JT405EP /P MYAPP.BIN

at the DOS prompt results in the following output:

        JT405EP --- JTAG utility for IBM PPC405EP
        Copyright © FS FORTH-SYSTEME GmbH, Breisach
        Version 4.xx of mm/dd/yyyy

(1)   Configuration loaded from file JT405EP.INI
(2)   Target: Generic Target
(3)   Using LPT at I/O-address 0378h
(4)   JTAG Adapter detected

(5)   1 Device detected in JTAG chain
        Device 0: IDCODE=00267049 IBM PPC405EP, Revision 0
(6)   Sum of instruction register bits   : 7
(7)   CPU position   : 0
(8)   Instruction register offset   : 0
(9)   Length of boundary scan reg   : 300

        Looking for a known flash device. Please wait..
(10)   STM 29W320B, 3,3V, Boot Block Bottom detected
(11)   Bus size is 16 Bit
(12)   Erasing Flash-EPROM Block #:0 1 2 3
        Programming File MYAPP.BIN
        65536 Bytes programmed successfully

        Erase Time   :   0.8 sec
        Programming Time   :   33.8 sec

(1)   The initialization file JT405EP.INI was found in the current directory.

(2)   The target identification line of the initialization file is printed here.

(3)   The resulting I/O-address of the parallel port is printed here. With WinNT/Win2000/WinXP you must specify the option /LPT2 to access to the standard address 378h.

(4)   A JTAG-Booster is found on the parallel port

(5)   The JTAG chain is analyzed. There may be several parts in the JTAG chain. The chain is analyzed and all parts except the IBM PPC405EP are switched to bypass mode.

(6)   The length of all instruction registers in the JTAG chain are added.

(7)   The position of the IBM PPC405EP in the JTAG chain is assumed to be zero, if not specified in the command line (see option /CPUPOS=).

(8)   The position of the JTAG instruction register of the IBM PPC405EP is assumed to be zero, if not specified in the command line (see option /IROFFS=).

(9)   The real length of the boundary scan register is displayed here and compared with the boundary scan register length of a IBM PPC405EP.

(10)   A Flash STM 29W320B selected with PER_CS0# was found.

(11)   The resulting data bus size is printed here.

(12)   In this example 4 blocks must be erased.

1.6.   First Example with IBM PPC405GPr

In the following simple example it is assumed that the JTAG-Booster is connected to LPT1 of your PC and target power is on.

Typing

        JT405GPr /P MYAPP.BIN

at the DOS prompt results in the following output:

        JT405GPr --- JTAG utility for IBM PPC405GPr
        Copyright © FS FORTH-SYSTEME GmbH, Breisach
        Version 4.xx of mm/dd/yyyy

(1)   Configuration loaded from file JT405GPr.INI
(2)   Target: Generic Target
(3)   Using LPT at I/O-address 0378h
(4)   JTAG Adapter detected

(5)   1 Device detected in JTAG chain
            Device 0: IDCODE=04088049 IBM PPC405GPr, Revision 0
(6)   Sum of instruction register bits   : 7
(7)   CPU position   : 0
(8)   Instruction register offset   : 0
(9)   Length of boundary scan reg   : 360

        Looking for a known flash device. Please wait..
(10)   STM 29W320B, 3.3V, Boot Block Bottom detected
(11)   Bus size is 16 Bit
(12)   Erasing Flash-EPROM Block #:0 1 2 3
        Programming File MYAPP.BIN
        65536 Bytes programmed successfully

        Erase Time   :   0.8 sec
        Programming Time   :   xx.0 sec

(1)   The initialization file JT405GPr.INI was found in the current directory.

(2)   The target identification line of the initialization file is printed here.

(3)   The resulting I/O-address of the parallel port is printed here.

(4)   A JTAG-Booster is found on the parallel port

(5)   The JTAG chain is analyzed. There may be several parts in the JTAG chain. The chain is analyzed and all parts except the IBM PPC405GPr are switched to bypass mode.

(6)   The length of all instruction registers in the JTAG chain are added.

(7)   The position of the IBM PPC405GPrin the JTAG chain is assumed to be zero, if not specified in the command line (see option /CPUPOS=).

(8)   The position of the JTAG instruction register of the IBM PPC405GPris assumed to be zero, if not specified in the command line (see option /IROFFS=).

(9)   The real length of the boundary scan register is displayed here and compared with the boundary scan register length of a IBM PPC405GPr.

(10)   A Flash STM 29W320B selected with EX_CS0# was found.

(11)   The resulting data bus size is printed here.

(12)   In this example four blocks must be erased.

1.7. Trouble Shooting

Avoid long distances between your Host-PC and the target. If you are using standard parallel extension cable, the JTAG-BOOSTER may not work. Don't use Dongles between the parallel port and the JTAG-BOOSTER.

Switch off all special modes of your printer port (EPP, ECP, ...) in the BIOS setup. Only standard parallel port (SPP) mode is allowed.

If there are problems with autodetection of the flash devices use the /DEVICE= option. To speed up autodetection specify one of the options /8BIT /16BIT or /32BIT.

Don't use hardware protected flash memories.

The used chip selects must be defined as output and inactive in the initialization file (see chapter 1.9 "Initialization file JT405xxx.INI"). Also the address bits must be defined as output.

Use the option /NOWRSETUP to speed up flash programming.

1.8.   Error Messages

- **80386 or greater required**
  The JTAG-BOOSTER does not work on a 8088/8086 or a 80286 platform.

- **Cable not connected or target power fail**
  The JTAG-Booster (or one of the simple Parallel Port JTAG adapters selected with the options /LATTICE /WIGGLER /PLS) wasn't found. Please check connection to parallel port and connection to target. Check target power. Check the command line options. Check your BIOS-Setup. If you are using this program with WinNT, Win2000 or WinXP you must specify /LPT2 or /LPT-BASE=378 to get access to the standard printer port.

- **Can't open x:\yyy\zzz\JT405xxx.OVL**
  The overlay file JT405xxx.OVL must be in the same directory as JT405xxx.EXE.

- **Configuration file XYZ not found.**
  The file specified with the option /INI= wasn't found.

- **Device offset out of range**
  The value specified with the option /OFFSET= is greater than the size of the detected flash device.

- **Disk full**
  Writing a output file was aborted as a result of missing disk space.

- **Do not specify option /NOCS with any other chip select**
  There is a conflict in the command line.

- **Do not specify option /BYTE-MODE. *Flash device* does not have a byte mode pin.**
  The flash device specified with the option /DEVICE= does not support switching between 16 (or 32) bit mode and 8 bit mode. In practice it does not have a pin with the name BYTE#

- **Error creating file:**
  The output file could not be opened. Please check free disk space or write protection.

- **Error:** *Pin-Name* **is an output only pin**
  The specified pin cannot be sampled. Check the command line. Check the initialization file.

- **Error:** *Pin-Name* **is an input only pin**
  The specified pin cannot be activated. Check the command line. Check the initialization file.

- **Error:** *Pin-Name* **may not be read back**
  The specified pin can be switched to tristate, but cannot be read back. Check the command line.

- **illegal function:**
  The first parameter of the command line must be a valid function. See chapter 2 "JT405xxx Parameter Description" for a list of supported functions.

- **illegal number:**
  The specified number couldn't be interpret as a valid number. Check the relevant number base.

- **illegal option:**
  See chapter 2 "JT405xxx Parameter Description" for a list of supported options.

- **illegal Pin Type:**
  The name specified with the option /PIN= must be one of the list of chapter 1.9 "Initialization file JT405xxx.INI"

- **illegal Flash Type:**
  The name specified with the option /DEVICE= must be one of the list of chapter 1.10 "Supported flash devices".

- **Input file not found:**
  The specified file cannot be found

- **Input file is empty:**
  Files with zero length are not accepted

- **"   " is undefined**
  Please check the syntax in your configuration file. (See chapter 1.9 "Initialization file JT405xxx.INI").

- **LPTx not installed**
  The LPT port specified with /LPTx cannot be found. Please check the LPT port or specify a installed LPT port. Check your BIOS setup. If you are using this program with WinNT, Win2000 or WinXP you 1st must install the WinNT support package as described in chapter 5 "Support for Windows NT, Windows 2000 and Windows XP"

- **missing filename**
  Most functions need a filename as second parameter.

- **missing option /I2CCLK=**
  Some functions need the option /I2CCLK= to be defined.

- **missing option /I2CDAT=**
  Some functions need the option /I2CDAT= or the options /I2CDATO= and /I2CDATI= to be defined.

- **missing option /LENGTH=**
  Some functions need the option /LENGTH= to be defined.

- **missing option /PIN=**
  Some functions need the option /PIN= to be defined.

- **More than 9 devices in the JTAG chain or TDO pin stuck at low level**
  The JTAG chain is limited to 9 parts. Check target power. Check the target's TDO pin.

- **No devices found in JTAG chain or TDO pin stuck at high level**
  A stream of 32 high bits was detected on the pin TDO. TDO may stuck at high level. Check the connection to your target. Check the target power. Check the target's TDO pin.

- **Option /CPUPOS= out of range**
  The number specified with the option /CPUPOS= must be less or equal to the number of parts minus 1.

- **Option /IROFFS= out of range**
  Please specify a smaller value

- **Part at specified position is not a IBM PPC405xxx**
  The option /CPUPOS= points to a part not a IBM PPC405xxx

- **Pins specified with /I2CCLK= and /I2CDAT= must have different control cells**
  The pin specified with the option /I2CDAT= must be able to be switched to high impedance while the pin specified with option /I2CCLK= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Pins specified with /I2CCLK= and /I2CDATI= must have different control cells**
  The pin specified with the option /I2CDATI= must be able to be switched to high impedance while the pin specified with option /I2CCLK= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Pins specified with /I2CDATO= and /I2CDATI= must have different control cells**
  The pin specified with the option /I2CDATI= must be able to be switched to high impedance while the pin specified with option /I2CDATO= is an active output. See chapter 1.9 "Initialization file JT405xxx.INI".

- **Specify only one of these options:**
  Some options are exclusive (i.e. /8BIT and /16BIT). Don't mix them.

- **Sum of instruction register bits to low. Should be at least 7 bits for a IBM PPC405xxx**
  The sum of all instruction register bits in the JTAG chain does not fit to the IBM PPC405xxx. Check the target connection. Check the target CPU type. Check the settings for /IROFFS= and /CPUPOS= , if there are several parts in the JTAG chain.

- **Target no longer connected**
  There is a cyclic check of the JTAG chain. Check target power. Check target connection.

- **There are unknown parts in the JTAG chain. Please use the option /IROFFS= to specify the instr. reg. offset of the CPU.**
  If there are unknown parts in the JTAG chain, the program isn't able to determine the logical position of the CPU's instruction register.

- **There is no IBM PPC405xxx in the JTAG chain**
  No IBM PPC405xxx was found in the JTAG chain. Check the target power. Try with option /DRIVER=4 again.

- **Value of option /FILE-OFFSET out of range**
  The value of the option /FILE-OFFSET= points behind end of file.

- **wrong driver #**
  The value specified with the option /DRIVER= is out of range.

- **Wrong Flash Identifier (xxxx)**
  No valid identifier found. Check the specified chip select signal and the bus width. Try with the option /DEVICE= . Use the option /8BIT or /16BIT or /32BIT to specify the correct data bus size.

- **Wrong length of boundary scan register. Should be 300 for a IBM PPC405EP. (Should be 360 for a IBM PPC405GPr.)**
  The length of the boundary scan register of the selected part (if there are more than one in the chain) does not fit to the IBM PPC405xxx. Check the target connection. Check the target CPU type. Check the settings for /IROFFS= and /CPUPOS= , if there are several parts in the JTAG chain.

1.9.   Initialization file JT405xxx.INI

This file is used to define the default direction and level of all CPU signals. This file **must be carefully adapted** to your design with the IBM PPC405xxx. The Target-Entry is used to identify your design which is displayed with most commands.

When the program JT405xxx.EXE is started it scans the current directory for an existing initialization file named JT405xxx.INI. If no entry is found the default values are used. You may also specify the initialization file with the option /INI= . If the specified file isn't found, the program aborts with an error message.

The CPU pins can also be used with the functions /BLINK (chapter 2.9), /PIN? (chapter 2.10) and /SAMPLE (chapter 2.11) to test the signals on your design.

The sample file below represents the values which are used for default initialization when no initialization file could be found in the current directory and no initialization file is specified with the option /INI=.

Changes to the structure of the file could result in errors. Remarks can be added by using //.

Sample File JT405EP.INI:

// Description file for IBM PPC405EP
Target: Generic Target, 2003/08/26
// Adapt this file carefully to your design!!
// All chip select signals are set to output and inactive.
// All signals should be defined. Undefined signals are set to their defaults.
// Pin names are defined in upper case.
// Low active signals are signed with a trailing #.

// Group 25:   All pins in this group must be set to the same direction
//   These pins are bidirectional
//   During flash programming these pins are switched between
//   input/inactive and output/active.
//   For Flash programming and other memory accesses
//   these pins should be set to Input
PER_DATA0   Inp   //
PER_DATA1   Inp   //
PER_DATA2   Inp   //
PER_DATA3   Inp   //
PER_DATA4   Inp   //
PER_DATA5   Inp   //
PER_DATA6   Inp   //
PER_DATA7   Inp   //

// Group 43:   All pins in this group must be set to the same direction
//   These pins are bidirectional
//   During flash programming these pins are switched between
//   input/inactive and output/active.
//   For Flash programming and other memory accesses
//   these pins should be set to Input
PER_DATA8   Inp   //
PER_DATA9   Inp   //
PER_DATA10   Inp   //
PER_DATA11   Inp   //
PER_DATA12   Inp   //
PER_DATA13   Inp   //
PER_DATA14   Inp   //
PER_DATA15   Inp   //

```
// The following pins are output only pins.
// Setting to input (tristate) one of these pins results in an error.
// These are used for Flash programming
PER_ADDR6      Out,Lo //
PER_ADDR7      Out,Lo //
PER_ADDR8      Out,Lo //
PER_ADDR9      Out,Lo //
PER_ADDR10     Out,Lo //
PER_ADDR11     Out,Lo //
PER_ADDR12     Out,Lo //
PER_ADDR13     Out,Lo //
PER_ADDR14     Out,Lo //
PER_ADDR15     Out,Lo //
PER_ADDR16     Out,Lo //
PER_ADDR17     Out,Lo //
PER_ADDR18     Out,Lo //
PER_ADDR19     Out,Lo //
PER_ADDR20     Out,Lo //
PER_ADDR21     Out,Lo //
PER_ADDR22     Out,Lo //
PER_ADDR23     Out,Lo //
PER_ADDR24     Out,Lo //
PER_ADDR25     Out,Lo //
PER_ADDR26     Out,Lo //
PER_ADDR27     Out,Lo //
PER_ADDR28     Out,Lo //
PER_ADDR29     Out,Lo //
PER_ADDR30     Out,Lo //
PER_ADDR31     Out,Lo //

// Group 264:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA0      Inp    //
MEM_DATA1      Inp    //
MEM_DATA2      Inp    //
MEM_DATA3      Inp    //
MEM_DATA4      Inp    //
MEM_DATA5      Inp    //
MEM_DATA6      Inp    //
MEM_DATA7      Inp    //
```

```
// Group 278:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA8      Inp    //
MEM_DATA9      Inp    //
MEM_DATA10     Inp    //
MEM_DATA11     Inp    //
MEM_DATA12     Inp    //
MEM_DATA12     Inp    //
MEM_DATA14     Inp    //
MEM_DATA15     Inp    //

// Group 290:  All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA16     Inp    //
MEM_DATA17     Inp    //
MEM_DATA18     Inp    //
MEM_DATA19     Inp    //
MEM_DATA20     Inp    //
MEM_DATA21     Inp    //
MEM_DATA22     Inp    //
MEM_DATA23     Inp    //

// Group 7:    All pins in this group must be set to the same direction
//             These pins are bidirectional
MEM_DATA24     Inp    //
MEM_DATA25     Inp    //
MEM_DATA26     Inp    //
MEM_DATA27     Inp    //
MEM_DATA28     Inp    //
MEM_DATA29     Inp    //
MEM_DATA30     Inp    //
MEM_DATA31     Inp    //

// Group 229:  All pins in this group must be set to the same direction
//             These pins are bidirectional
UART0_TX       Inp    //
UART0_RTS#     Inp    //
SYS_ERR        Inp    //
```

```
// Group 125:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD0        Inp     //
PCI_AD1        Inp     //
PCI_AD2        Inp     //
PCI_AD3        Inp     //

// Group 132:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD4        Inp     //
PCI_AD5        Inp     //
PCI_AD6        Inp     //
PCI_AD7        Inp     //

// Group 137:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD8        Inp     //
PCI_AD9        Inp     //
PCI_AD10       Inp     //
PCI_AD11       Inp     //

// Group 142:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD12       Inp     //
PCI_AD13       Inp     //
PCI_AD14       Inp     //
PCI_AD15       Inp     //

// Group 173:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD16       Inp     //
PCI_AD17       Inp     //
PCI_AD18       Inp     //
PCI_AD19       Inp     //

// Group 179:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD20       Inp     //
PCI_AD21       Inp     //
PCI_AD22       Inp     //
PCI_AD23       Inp     //
```

```
// Group 184:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD24        Inp     //
PCI_AD25        Inp     //
PCI_AD26        Inp     //
PCI_AD27        Inp     //

// Group 190:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_AD28        Inp     //
PCI_AD29        Inp     //
PCI_AD30        Inp     //
PCI_AD31        Inp     //

// Group 130:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_C/BE0#      Inp     //
PCI_C/BE1#      Inp     //
PCI_C/BE2#      Inp     //
PCI_C/BE3#      Inp     //

// Group 163:  All pins in this group must be set to the same direction
//             These pins are bidirectional
PCI_TRDY#       Inp     //
PCI_STOP#       Inp     //
PCI_DEVSEL#     Inp     //

// The following pins are complete bidirectional pins.
// The direction of each pin can be set independent of the other pins.
// Each pin can be used as an input.
// For Flash programming
PER_ADDR3       Out,Lo  // GPIO14
PER_ADDR4       Out,Lo  // GPIO15
PER_ADDR5       Out,Lo  // GPIO16

// Group 152:  All pins in this group must be set to the same direction
//             These pins are tristateable, but can not be read back
PCI_GNT0#       Out,Lo  // REQ#
PCI_GNT1#       Out,Lo  //
PCI_GNT2#       Out,Lo  //
```

```
// The following pins are complete bidirectional pins.
// The direction of each pin can be set independent of the other pins.
// Each pin can be used as an input.
IIC_SDA          Inp     //
IIC_SCL          Inp     //
UART0_DCD#       Inp     // GPIO24
UART0_DSR#       Inp     // GPIO25
UART0_RI#        Inp     // GPIO26
UART0_DTR#       Inp     // GPIO27
UART1_RX         Inp     // GPIO28
UART1_TX         Inp     // GPIO29
PER_CS1#         Out,Lo  // GPIO10
PER_CS2#         Out,Lo  // GPIO11
PER_CS3#         Out,Lo  // GPIO12
PER_CS4#         Out,Lo  // GPIO13
PER_BLAST#       Inp     // GPIO0
PCI_INT#         Inp     // PER_WE#
PCI_FRAME#       Inp     //
PCI_IRDY#        Inp     //
PCI_TRDY#        Inp     //
PCI_SERR#        Inp     //
PCI_PERR#        Inp     //
PCI_PARITY       Inp     //
IRQ6             Inp     // GPIO23
IRQ5             Inp     // GPIO22
IRQ4             Inp     // GPIO21
IRQ3             Inp     // GPIO20
IRQ2             Inp     // GPIO19
IRQ1             Inp     // GPIO18
IRQ0             Inp     // GPIO17
GPIO9            Inp     // TRC_CLK
GPIO8            Inp     // TS6
GPIO7            Inp     // TS5
GPIO6            Inp     // TS4
GPIO5            Inp     // TS3
GPIO4            Inp     // TS2O
GPIO3            Inp     // TS1O
GPIO2            Inp     // TS2E
GPIO1            Inp     // TS1E
REJECT_PKT1      Inp     // GPIO31
REJECT_PKT0      Inp     // GPIO30
SYS_RESET#       Inp     //
EMC0_MDIO        Inp     //
```

```
// The following pins are output only pins.
// Setting to input (tristate) one of these pins results in an error.
DQM0            Out,Lo  //
DQM1            Out,Lo  //
DQM2            Out,Lo  //
DQM3            Out,Lo  //
EMC0_TX0EN      Out,Lo  //
EMC0_TX0ERR     Out,Lo  //
EMC0_TX0D0      Out,Lo  //
EMC0_TX0D1      Out,Lo  //
EMC0_TX0D2      Out,Lo  //
EMC0_TX0D3      Out,Lo  //
EMC0_TX1EN      Out,Lo  //
EMC0_TX1ERR     Out,Lo  //
EMC0_TX1D0      Out,Lo  //
EMC0_TX1D1      Out,Lo  //
EMC0_TX1D2      Out,Lo  //
EMC0_TX1D3      Out,Lo  //
EMC0_MDCLK      Out,Lo  //
PER_WBE0#       Out,Lo  //
PER_WBE1#       Out,Lo  //
PER_OE#         Out,Lo  //
PER_R/W#        Out,Lo  //
PER_CS0#        Out,Lo  //
PER_CLK         Out,Lo  //
EXT_RESET#      Out,Lo  //
PCI_RESET#      Out,Lo  //
MEM_ADDR12      Out,Lo  //
MEM_ADDR11      Out,Lo  //
MEM_ADDR10      Out,Lo  //
MEM_ADDR9       Out,Lo  //
MEM_ADDR8       Out,Lo  //
MEM_ADDR7       Out,Lo  //
MEM_ADDR6       Out,Lo  //
MEM_ADDR5       Out,Lo  //
MEM_ADDR4       Out,Lo  //
MEM_ADDR3       Out,Lo  //
MEM_ADDR2       Out,Lo  //
MEM_ADDR1       Out,Lo  //
MEM_ADDR0       Out,Lo  //
MEM_BA0         Out,Lo  //
MEM_BA1         Out,Lo  //
```

```
MEM_RAS#        Out,Lo //
MEM_CAS#        Out,Lo //
MEM_WE#         Out,Lo //
MEM_CLKOUT0     Out,Lo //
MEM_CLKOUT1     Out,Lo //
MEM_CLKEN0      Out,Lo //
MEM_CLKEN1      Out,Lo //
BANKSEL0#       Out,Lo //
BANKSEL1#       Out,Lo //

// The following pins are input only.
// Setting to output of one of these pins results in an error.
// Declaration of the direction of these pins is optional.
UART0_CTS#      Inp    //
UART0_RX        Inp    //
PHY0_RX1D0      Inp    //
PHY0_RX1D1      Inp    //
PHY0_RX1D2      Inp    //
PHY0_RX1D3      Inp    //
PHY0_RX1CLK     Inp    //
PHY0_RX1ERR     Inp    //
PHY0_RX1DV      Inp    //
PHY0_TX1CLK     Inp    //
PHY0_COL1       Inp    //
PHY0_CRS1       Inp    //
PHY0_RX0D0      Inp    //
PHY0_RX0D1      Inp    //
PHY0_RX0D2      Inp    //
PHY0_RX0D3      Inp    //
PHY0_RX0CLK     Inp    //
PHY0_RX0ERR     Inp    //
PHY0_RX0DV      Inp    //
PHY0_TX0CLK     Inp    //
PHY0_COL0       Inp    //
PHY0_CRS0       Inp    //
PER_READY       Inp    //
PCI_CLK         Inp    //
PCI_IDSEL       Inp    //
HALT#           Inp    //
PCI_REQ0#       Inp    // GNT#
PCI_REQ1#       Inp    //
PCI_REQ2#       Inp    //
SYS_CLK         Inp    //
```

Sample File JT405GPr.INI:

In preparation

1.10. Supported flash devices

Type JT405xxx /LIST [optionlist]

to get a online list of all flash types which could be used with the /DEVICE= option.

See separate file JTAG_V4xx_FLASHES.pdf to get a complete list of supported flash types.

2. JT405xxx Parameter Description

When you start JT405xxx.EXE without any parameters the following help screen with all possible functions and options is displayed:

```
JT405xxx --- JTAG utility for IBM PPC405xxx
Copyright © FS FORTH-SYSTEME GmbH, Breisach
Version 4.xx of mm/dd/yyyy


Programming of Flash-EPROMs and hardware tests on targets with the
IBM PPC405xxx.

The JTAG-Booster is needed to connect the parallel port of the PC
to the JTAG port of the IBM PPC405xxx.

Usage: JT405xxx /function [filename] [/option_1] ... [/option_n]
Supported functions:
        /P          : Program a Flash Device
        /R          : Read a Flash Device to file
        /V          : Verify a Flash Device with file
        /DUMP       : Make a target dump
        /PI2C       : Program an I2C Device with file
        /RI2C       : Read an I2C Device to file
        /VI2C       : Verify an I2C Device with file
        /DUMPI2C    : Make a dump of an I2C Device
        /BLINK      : Toggle a CPU pin
        /PIN?       : Test a CPU pin
        /SAMPLE     : Test a CPU pin while the CPU is running
        /SNAP       : Test all CPU pins while CPU is running
        /LIST       : Print a list of supported Flash devices
```

Supported Options:

/CS0	/CS1	/CS2	/CS3	/CS4
/BIG	/NOCS	/NOWRSETUP	/TOP	/BYTE-MODE
/BM	/PAUSE	/P	/NODUMP	/NOERASE
/ERASEALL	/LATTICE	/LPT1	/LPT2	/LPT3
/LPT-BASE=	/16BIT	/8BIT	/NOMAN	/LENGTH=
L=	/FILE-OFFSET=	/FO=	/OFFSET=	/O=
/DELAY=	/DEVICE-BASE=	/DB=	/DRIVER=	/IROFFS=
/CPUPOS=	/DEVICE=	/PIN=	/I2CCLK=	/I2CDAT=
/I2CDATI=	/I2CDATO=	I2CBIG	/WATCH=	/OUT=
/INI=	/REP			

The following options are valid for most functions:

/BIG
This option switches the byte ordering to big endian mode. This option must fit to the target's endianess. Normally the target is configured to the right endianess after reset. In some cases, the endianess can be changed within the configuration file.
Default: Little Endian

/DRIVER=x   with x = 1,2,3,4
A driver for the interface to the JTAG-BOOSTER on the parallel port may be specified. /DRIVER=1 selects the fastest available driver, /DRIVER=4 selects the slowest one. Use a slower driver if there are problems with JTAG-BOOSTER.
Default: /DRIVER=3

/INI=file
An initialization file may be specified. By default the current directory is searched for the file JT405xxx.INI. If this file is not found and no initialization file is specified in the command line, default initialization values are used (see also chapter 1.9 "Initialization file JT405xxx.INI").
Note: The initialization file is not loaded for the functions /SAMPLE (chapter 2.11) and /SNAP (chapter 2.12).
Default: /INI=JT405xxx.INI

/LATTICE
Besides the standard JTAG-Booster interface there may be several simple "Parallel-Port-JTAG" interfaces supported. With this interfaces the programming performance, of course, is reduced.

/LPT1 /LPT2 /LPT3
A printer port may be specified where the JTAG-Booster resides. If you are using this program with WinNT, Win2000 or WinXP you must specify /LPT2 or /LPT-BASE=378 to get access to the standard printer port.
Default: /LPT1

/LPT-BASE
The physical I/O-Address of printer port may be specified instead of the logical printer name. Useful option, if you work with WinNT or Win2000, because the standard printer port is mapped as LPT2 here. Use the option /LPT-BASE=378 to get a command line which works independent of the operation system.

/OUT=file_or_device
All screen outputs are redirected to the specified file or device. Note that you can't redirect to the same parallel port where the JTAG-Booster resides.
Default: /OUT=CON

/PAUSE
With the option /PAUSE you can force the program to stop after each screen. Please do not use this option if you redirect the output to a file.
Abbreviation: /P

/WATCH=
With the option /WATCH= a pin can be specified, which is toggled twice per second, while the program is active. This pin may be the trigger of a watchdog. This pin must be specified as output in the initialization file.

/IROFFS=
Specifies the position of the IBM PPC405xxx instruction register within the JTAG chain. In most cases this option is not needed.
Default: /IROFFS=0

/CPUPOS=
Specifies the position of the IBM PPC405xxx within the JTAG chain.
Default: /CPUPOS=0

2.1.   Program a Flash Device

Usage: JT405xxx /P filename [optionlist]

The specified file is programmed into the flash memory. The flash status is polled after programming of each cell (cell=8, 16 or 32 bit, depending on current data bus width). In case of a programming error, the contents of the flash memory is written to a file with the extension DMP.

If you want a complete verify after programming, please use an additional command line with the verify function. See chapter 2.3 "Verify a Flash Device with file". In most cases this additional verify step is not needed.

The type of the flash device is normally detected by the software. When autodetection fails you should use the /DEVICE= option together with /8BIT or /16BIT or /32BIT to set the right flash device and configuration. The known flash devices are shown in chapter 1.10 "Supported flash devices".

Options:

/DEVICE=devicename
The flash device is detected automatically by switching to autoselect mode. In case of trouble you should select the flash device by using this parameter to avoid autodetection. Combine this option with one of the following options which specify the data bus width and the option /BYTE-MODE if applicable.

/8BIT /16BIT /32BIT
Specifies the data bus width to the target flash device. You can speed up autodetection, if you specify the correct data bus size. You need this option together with the option /DEVICE= to explicit specify a specific flash configuration.

/BYTE-MODE
If there is a flash device connected to the CPU which does have a byte mode pin (8 bit and 16/32 bit bus mode), you can force it to be used as 8 bit mode with the option /BYTE-MODE. In most cases this option will not be needed.

/NOMAN
If you use a flash device which is identical to one of the supported parts, but is from a different manufacturer, with this option you can suppress the comparison of the manufacturer identification code. We recommend to use this option together with the /DEVICE= option to avoid failures in autodetection.

/DEVICE-BASE=hhhhhh[1]
Here you can specify a flash device starting address. In most cases, where the flash device is selected with one of the CPUs chip select pins, this parameter is not needed. But if there is any decoding logic in your hardware, this option will be needed. Especially, if there are several flash banks connected to one chip select and a sub decoding logic generates chip selects for these flash banks, this option can be used to select a specific flash bank.
Default: /DEVICE-BASE=0
Abbreviation: /DB=

/OFFSET=hhhhhh
The programming starts at an offset of hhhhhh relative to the start address of the flash device. If the offset is negative, the offset specifies an address relative to the end of the flash device. See also option /TOP
Default: /OFFSET=0
Abbreviation: /O=

/TOP
If the option /TOP is used the option /OFFSET= specifies the address where the programming ends (plus one) instead of the starting address. This option is very important for Intel CPU architectures, because target execution always starts at the top of the address space.

/FILE-OFFSET=hhhhhh
If FILE-OFFSET is specified, the first hhhhhh bytes of the file are skipped and not programmed to target.
Default: /FILE-OFFSET=0
Abbreviation: /FO=

[1]hhhhhh=number base is hex

/LENGTH=hhhhhh
The number of programmed bytes may be limited to LENGTH. If no LENGTH is specified the whole file is programmed.
Default: /LENGTH=4000000   (64 MByte)
Abbreviation: /L=

/NODUMP
In case of a verify error the contents of the flash memory is written to a file with the extension .DMP. With /NODUMP you can suppress this feature.

/ERASEALL
Erase the whole flash device. If this option isn't set, only those blocks are erased where new data should be written to.

/NOERASE
This option prevents the flash device from being erased.

/CS0 /CS1 /CS2 /CS3 /CS4
This options may be used to specify one or more chip select signals to the flash memory. The used chip selects must be defined as output and inactive in the initialization file. (See chapter 1.9 "Initialization file JT405xxx.INI".)
Default: /CS0

/NOCS
Use this option to switch off all chip select signals. This may be necessary if the device's chip select is generated via a normal decoder instead of using the IBM PPC405xxx chip select unit.

/NOWRSETUP
By default write cycles to the Flash EPROM are realized with three steps: 1. set address/data 2. write strobe active 3. write strobe inactive. **In most cases** it is possible to set the write strobe coincident with setting of address and data by specifying the option /NOWRSETUP. **This increases the programming speed by 50%.**

Examples:

JT405xxx /P ROMDOS.ROM /L=20000 /TOP
This example programs up to 128 Kbytes of the file ROMDOS.ROM (with i.e. 512 Kbytes) to the top of the boot flash memory.

JT405xxx /P CE.ROM /32BIT /CS1
This example programs the file CE.ROM to the 32 Bit Flash-EPROM connected to CS1#.

2.2.   Read a Flash Device to file

Usage: JT405xxx /R filename [optionlist]

The contents of a flash device is read and written to a file.

The type of the flash device is normally detected by the software. When autodetection fails you should use the /DEVICE= option together with /8BIT or /16BIT or /32BIT to set the right flash device and configuration. The known devices are shown in chapter 1.10 "Supported flash devices".

Options:

/DEVICE=devicename
See function /P (Chapter 2.1)

/8BIT /16BIT /32BIT
See function /P (Chapter 2.1)

/BYTE-MODE
See function /P (Chapter 2.1)

/NOMAN
See function /P (Chapter 2.1)

/DEVICE-BASE=hhhhhh[2]
See function /P (Chapter 2.1)

/OFFSET=hhhhhh
Reading of the flash memory starts at an offset of hhhhhh relative to the start address of the flash device. If the offset is negative, the offset specifies a address relative to the end of the flash device.
See also option /TOP.
Default: /OFFSET=0
Abbreviation: /O=

---

[2]hhhhhh=number base is hex

/TOP
If the option /TOP is used the option /OFFSET= specifies the address where reading ends (plus one) instead of the starting address.

/LENGTH=hhhhhh
The number of read bytes may be limited to LENGTH. If no LENGTH is specified the whole flash device is read (if no offset is specified).

/CS0 /CS1 /CS2 /CS3 /CS4
See function /P (Chapter 2.1)

/NOWRSETUP
See function /P (Chapter 2.1)
Please note: In the function /R write cycles are needed to detect the type of the flash memory.

Example:

JT405xxx /R BIOS.ABS /L=10000 /TOP
This example may be used to read the upper most 64 Kbyte of the flash memory to the file BIOS.ABS.

2.3.   Verify a Flash Device with file

Usage: JT405xxx /V filename [optionlist]

The contents of a flash device is compared with the specified file. If there are differences the memory is dumped to a file with the extension DMP.

The type of flash device is normally detected by the software. When autodetect fails you should use the /DEVICE= option together with /8BIT or /16BIT or /32BIT to set the right flash device and configuration. The known devices are shown in chapter 1.10 "Supported flash devices".

Options:

/DEVICE=devicename
See function /P (Chapter 2.1)

/8BIT /16BIT /32BIT
See function /P (Chapter 2.1)

/BYTE-MODE
See function /P (Chapter 2.1)

/NOMAN
See function /P (Chapter 2.1)

/DEVICE-BASE=hhhhhh
See function /P (Chapter 2.1)

/OFFSET=hhhhhh
See function /P (Chapter 2.1)

/TOP
See function /P (Chapter 2.1)

/FILE-OFFSET=hhhhhh
See function /P (Chapter 2.1)

/LENGTH=hhhhh
See function /P (Chapter 2.1)

/NODUMP
See function /P (Chapter 2.1)

/CS0 /CS1 /CS2 /CS3 /CS4
See function /P (Chapter 2.1)

/NOWRSETUP
See function /P (Chapter 2.1)
Please note: In the function /V write cycles are needed to detect the type of the flash memory.

Example:

JT405xxx /V ROMDOS.ROM /L=20000 /TOP
This example may be used to verify the upper most 128 Kbytes of the flash memory with the file ROMDOS.ROM (with i.e. 512 Kbytes).

2.4.   Dump target memory

Usage: JT405xxx /DUMP [optionlist]

A Hex-Dump of the target memory is printed on the screen, if not redirected to file or device.

Options:

/8BIT /16BIT /32BIT
Default: /32BIT

/OFFSET=hhhhhh
The memory dump starts at an offset of hhhhhh plus the device start address (see option /DEVICE-BASE=).
Default: /OFFSET=0
Abbreviation: /O=

/DEVICE-BASE=hhhhhh[3]
The device start address is used as an additional offset. This gives the function /DUMP the same behavior as function /P /V and /R.
Default: /DEVICE-BASE=0
Abbreviation: /DB=

/TOP
If the option /TOP is used the option /OFFSET= specifies the address where the dump ends (plus one) instead of the starting address

/LENGTH=hhhhhh
Default: /LENGTH=100
Abbreviation: /L=

/CS0 /CS1 /CS2 /CS3 /CS4
See function /P (Chapter 2.1)
Default: /CS0

---

[3]hhhhhh=number base is hex

Example:

JT405xxx /DUMP
This example makes a memory dump of the first 256 bytes of the Boot-EPROM.

2.5.   Program an I²C-Device

Usage: JT405xxx /PI2C filename [/I2CBIG] [optionlist]

The specified file is programmed to an I²C-Device (i.e. a serial EEPROM) connected to pins of the CPU. Finally a complete verify is done. If the verify fails, the contents of the I²C-Device is written to a file with the extension DMP.

Two methods to connect the I²C-Device to the CPU are supported. The first method is to use two CPU pins, one pin for clock output (I2CCLK) and one pin for serial data input and output (I2CDAT). The second method is to use one pin for clock output (I2CCLK), one for serial data input (I2CDATI) and one for serial data output (I2CDATO).

Options:

/I2CBIG
Specify this option if there is a device which needs a three byte address instead of a two byte address.
This option must be the first option after the filename.

/DEVICE-BASE=hhhhhh
This option specifies an I²C device starting address. The default values are chosen to access an serial EEPROM.
Default: /DEVICE-BASE=5000   (if option /I2CBIG omitted)
Default: /DEVICE-BASE=500000   (if option /I2CBIG specified)

/OFFSET=hhhhhh
The programming starts at an offset of hhhhhh relative to the start address of the I²C-Device.
Default: /OFFSET=0
Abbreviation: /O=

/FILE-OFFSET=hhhhhh
If FILE-OFFSET is specified, the first hhhhhh bytes of the file are skipped and not programmed to target.
Default: /FILE-OFFSET=0
Abbreviation: /FO=

/LENGTH=hhhhhh
The number of programmed bytes may be limited to LENGTH. If no LENGTH is specified the whole file is programmed.
Abbreviation: /L=

/NODUMP
In case of a verify error the contents of the I²C-Device is written to a file with the extension .DMP. With option /NODUMP you can suppress this feature.

/I2CCLK=pin_name
Specifies the CPU pin used for serial clock output.

/I2CDAT=pin_name
Specifies the CPU pin used for serial data input and output. Pin_name must specify a bidirectional pin otherwise an error message occurs. Instead of one bidirectional pin one pin for serial data input and one for serial data output may be used. See option /I2CDATO= and /I2CDATI= .

/I2CDATO=pin_name
Specifies the CPU pin used for serial data output. Pin_name must specify a output pin otherwise an error message occurs.

/I2CDATI=pin_name
Specifies the CPU pin used for serial data input. Pin_name must specify a input pin otherwise an error message occurs.

Example:

JT405xxx /PI2C EEPROM.CFG /I2CCLK=FLAG0 /I2CDAT=FLAG1
This example loads the file EEPROM.CFG to a serial EEPROM connected to the pins FLAG0 and FLAG1 of the IBM PPC405xxx

2.6.   Read an I²C-Device to file

Usage: JT405xxx /RI2C filename [/I2CBIG] /L=hhhhhh [optionlist]

The contents of an I²C-Device (i.e. a serial EEPROM) is read and written to a file. The option /LENGTH= must be specified.

Options:

/I2CBIG
This option must be the first option after the filename.
See function /PI2C (Chapter 2.5)

/DEVICE-BASE=hhhhhh
See function /PI2C (Chapter 2.5)

/OFFSET=hhhhhh
Reading of the I²C-Device starts at an offset of hhhhhh relative to the start address of the I²C-Device.
Default: /OFFSET=0
Abbreviation: /O=

/LENGTH=hhhhhh
The number of read bytes must be specified otherwise an error message occurs.
Abbreviation: /L=

/I2CCLK=pin_name
See function /PI2C (Chapter 2.5)

/I2CDAT=pin_name
See function /PI2C (Chapter 2.5)

/I2CDATO=pin_name
See function /PI2C (Chapter 2.5)

/I2CDATI=pin_name
See function /PI2C (Chapter 2.5)

Example:

JT405xxx /RI2C EEPROM.CFG /I2CCLK=GP26 /I2CDAT=GP27 /L=100
This example reads 256 bytes from a serial EEPROM to the file EEPROM.CFG.
The serial EEPROM is connected to the pins CP26 and GP27 of the IBM
PPC405xxx.

2.7.   Verify an I²C-Device with file

Usage: JT405xxx /VI2C filename [/I2CBIG] [optionlist]

The contents of an I²C-Device (i.e. a serial EEPROM) is compared with the specified file. If there are differences the contents of the I²C -Device is written to a file with the extension DMP.

Options:

/I2CBIG
This option must be the first option after the filename.
See function /PI2C (Chapter 2.5)

/DEVICE-BASE=hhhhhh
See function /PI2C (Chapter 2.5)

/OFFSET=hhhhhh
See function /PI2C (Chapter 2.5)

/FILE-OFFSET=hhhhhh
See function /PI2C (Chapter 2.5)

/LENGTH=hhhhhh
See function /PI2C (Chapter 2.5)

/NODUMP
See function /PI2C (Chapter 2.5)

/I2CCLK=pin_name
See function /PI2C (Chapter 2.5)

/I2CDAT=pin_name
See function /PI2C (Chapter 2.5)

/I2CDATO=pin_name
See function /PI2C (Chapter 2.5)

/I2CDATI=pin_name
See function /PI2C (Chapter 2.5)

Example:

JT405xxx /VI2C EEPROM.CFG /I2CCLK=GP26 /I2CDAT=GP27
This example verifies 256 bytes from a serial EEPROM with the file
EEPROM.CFG. The serial EEPROM is connected to the pins CP26 and GP27 of
the IBM PPC405xxx.

2.8.   Dump an I²C-Device

Usage: JT405xxx /DUMPI2C [/I2CBIG] [optionlist]

A Hex-Dump of an I²C-Device is printed on the screen, if not redirected to file or device.

Options:

/I2CBIG
This option must be the first option.
See function /PI2C (Chapter 2.5)

/DEVICE-BASE=hhhhhh
See function /PI2C (Chapter 2.5)

/OFFSET=hhhhhh[4]
The memory dump starts at an offset of hhhhhh.
Default: /OFFSET=0
Abbreviation: /O=

/LENGTH=hhhhhh
Default: /LENGTH=100
Abbreviation: /L=

/I2CCLK=pin_name
Specifies the CPU pin used for serial clock output.

/I2CDAT=pin_name
Specifies the CPU pin used for serial data input and output. Pin_name must specify a bidirectional pin otherwise an error message occurs. Instead of one bidirectional pin one pin for serial data input and one for serial data output may be used. See option /I2CDATO= and /I2CDATI= .

/I2CDATO=pin_name
Specifies the CPU pin used for serial data output. Pin_name must specify a output pin otherwise an error message occurs.

---

[4]hhhhhh=number base is hex

/I2CDATI=pin_name
Specifies the CPU pin used for serial data input. Pin_name must specify a input pin otherwise an error message occurs.

Example:

JT405xxx /DUMPI2C /I2CCLK=FLAG0 /I2CDAT=FLAG1
This example makes a memory dump of the first 100h bytes of a serial EEPROM connected to the CPU.

2.9.   Toggle CPU pins

Usage: JT405xxx /BLINK /PIN=pinname [optionlist]

This command allows to test the hardware by blinking with LEDs or toggling CPU signals. Faster signals can be generated by setting the delay option to zero. This can be a very helpful feature to watch signals on an oscilloscope.

The signal on the defined pin has an duty cycle of 1/2: The level is 67% high and 33% low.

Please Note: Not every pin of the IBM PPC405xxx may be specified as an output pin.

Options:

/PIN=pin_name
CPU pin to toggle. If the option /PIN= is not specified an error message occurs. Most pins of the list in chapter 1.9 "Initialization file JT405xxx.INI" can be used. If you type /PIN= without any pin declaration a list of the CPU pins is displayed.

/DELAY=dddddd[5]
Time to wait to next change of signal. This option can be adjusted to get optimum signals for measures with the oscilloscope.
Default: /DELAY=10000

Example:

JT405xxx /BLINK /PIN=FLAG3 /DELAY=0
This example toggles the FLAG3 pin very fast which can be followed by the use of an oscilloscope.

---

[5]dddddd=number base is decimal

2.10.   Polling CPU pins

Usage: JT405xxx /PIN? /PIN=pinname [optionlist]

This command allows to test the hardware by polling CPU signals.

Please Note: Not every pin of the IBM PPC405xxx may be specified as an input pin.

Options:

/PIN=pin_name
CPU pin to poll. If the option /PIN= is not specified an error message occurs. Most pins of the list in chapter 1.9 "Initialization file JT405xxx.INI" can be used. If you type /PIN= without any pin declaration a list of the CPU pins is displayed.

Example:

JT405xxx /PIN? /PIN=RESET#
This example samples the reset pin of the IBM PPC405xxx.

2.11.   Polling CPU pins while the CPU is running

Usage: JT405xxx /SAMPLE /PIN=pinname [optionlist]

This command is similar to the function /PIN?. But with this function any pin can be observed, independent of the pin direction. Furthermore the CPU remains in normal operation.

Options:

/PIN=pin_name
CPU pin to poll. If the option /PIN= is not specified an error message occurs. All pins of the list in chapter 1.9 "Initialization file JT405xxx.INI" can be used. If you type /PIN= without any pin declaration a list of the CPU pins is displayed.

Example:

JT405xxx /SAMPLE /PIN=FLAG3
This example samples the state of the port pin FLAG3 while the IBM PPC405xxx is running.

2.12. Show status of all CPU pins while the CPU is running

Usage: JT405xxx /SNAP [optionlist]

This function is similar to the function /SAMPLE, but displays the status of all CPU pins on the screen. The CPU remains in normal operation.

The behavior of the function /SNAP depends on the option /REP: With this option specified, the JTAG-Booster samples and displays the state of the CPU pins repetitive. Without this option the status of the pins is displayed only once.

Options:

/PAUSE
Use this option to stop the output after each displayed screen. Don't use this option together with the option /REP or if the output is redirected to a file.
Abbreviation   /P

/REP
If this option is specified the status of the pins is sampled and displayed repetitive. In case of many signals the display is separated into several screens. Therefor we recommend to use a video mode with 43 or 50 lines. Use the '+' and the '-' key to switch between different screens. Any other key terminates the program.

Sample output:
This is a sample output for a IBM PPC405EP

0 DQM2	1 MEM_DATA21	1 IIC_SDA	1 MEM_DATA22
1 MEM_DATA23	0 MEM_DATA24	1 EMC0_TX0EN	1 EMC0_TX0ERR
1 MEM_DATA25	1 MEM_DATA26	1 MEM_DATA27	1 EMC0_TX0D0
1 DQM3	1 UART0_CTS#	1 MEM_DATA28	0 MEM_DATA29
0 UART0_RX	1 MEM_DATA30	1 MEM_DATA31	1 UART0_TX
1 PHY0_RX1D0	1 EMC0_TX0D3	1 PER_DATA0	1 PER_DATA1
1 PER_DATA2	1 EMC0_TX0D1	1 UART0_RTS#	1 UART0_DCD#
1 PER_DATA3	0 PER_DATA4	1 EMC0_TX0D2	0 PER_DATA5
1 PER_DATA6	0 UART0_DSR#	0 UART0_RI#	0 PER_DATA7
1 PER_DATA8	1 UART0_DTR#	1 UART1_RX	1 UART1_TX
0 PER_DATA9	1 PER_DATA10	0 PHY0_RX1D1	1 PER_DATA11
0 PHY0_RX1D2	1 PER_DATA13	0 PER_DATA14	0 PHY0_RX1D3
0 PER_DATA12	0 PER_WBE0#	0 PER_WBE1#	0 PHY0_RX1CLK
0 PER_OE#	0 PER_CS2#	0 PER_DATA15	0 PER_R/W#
0 PER_CS3#	0 PER_CS0#	0 PER_CS1#	0 PHY0_RX1ERR
0 EXT_RESET#	1 PER_READY	0 PER_CS4#	0 PER_CLK
0 PER_ADDR3	1 PER_ADDR4	1 PHY0_COL1	0 PHY0_RX1DV
0 PHY0_CRS1	1 PER_ADDR5	1 PHY0_TX1CLK	0 PER_ADDR6
1 PER_ADDR7	0 PER_ADDR8	1 PER_ADDR9	0 PER_ADDR10
1 PER_ADDR11	0 PER_ADDR12	1 PER_ADDR13	0 PER_ADDR14
1 PER_ADDR15	0 PER_ADDR16	1 PER_ADDR17	1 PER_BLAST#
0 PER_ADDR18	0 PER_ADDR19	0 PER_ADDR20	0 PER_ADDR21
0 PER_ADDR22	0 PER_ADDR23	0 PER_ADDR24	0 PER_ADDR25
0 PER_ADDR26	0 PER_ADDR27	0 PER_ADDR28	0 PER_ADDR29
0 PER_ADDR30	0 PER_ADDR31	0 EMC0_TX1D1	0 EMC0_TX1D2
0 EMC0_TX1D3	0 EMC0_TX1D0	0 EMC0_TX1ERR	0 EMC0_TX1EN
0 PCI_INT#	0 PCI_AD0	0 PCI_AD1	0 PCI_AD2
0 PCI_AD3	1 PCI_C/BE0#	0 PCI_AD4	1 PCI_AD5
1 PCI_AD6	0 PCI_AD7	0 PCI_AD8	0 PCI_AD9
0 PCI_AD10	0 PCI_AD11	1 PCI_AD12	1 PCI_C/BE1#
1 PCI_CLK	1 PCI_IDSEL	1 PCI_AD13	0 HALT#
1 PCI_REQ0#	0 PCI_AD14	0 PCI_AD15	1 PCI_GNT0#
0 PCI_REQ1#	1 PCI_REQ2#	0 PCI_GNT1#	1 PCI_GNT2#
0 PCI_RESET#	1 PCI_FRAME#	1 PCI_IRDY#	1 PCI_TRDY#
1 PCI_STOP#	1 PCI_DEVSEL#	0 PCI_SERR#	0 PCI_PERR#
1 PCI_PARITY	1 PCI_AD16	1 PCI_AD17	1 PCI_AD18
1 PCI_AD19	1 PCI_C/BE2#	0 PCI_AD20	1 PCI_AD21
0 PCI_AD22	1 PCI_AD23	1 PCI_AD24	1 PCI_AD25
1 PCI_AD26	0 PCI_C/BE3#	1 PCI_AD27	1 PCI_AD28
1 PCI_AD29	1 PCI_AD30	0 PCI_AD31	1 IRQ6

| 0 IRQ5	| 1 IRQ4	| 1 GPIO9	| 0 GPIO8
| 1 GPIO7	| 1 GPIO6	| 0 IRQ3	| 1 GPIO5
| 1 IRQ2	| 0 IRQ1	| 1 IRQ0	| 1 GPIO4
| 0 GPIO3	| 1 GPIO2	| 1 REJECT_PKT1	| 0 REJECT_PKT0
| 1 PHY0_RX0D1	| 1 GPIO1	| 1 MEM_ADDR12	| 1 MEM_ADDR10
| 0 MEM_ADDR11	| 1 SYS_RESET#	| 1 MEM_ADDR9	| 1 MEM_ADDR8
| 1 MEM_ADDR7	| 0 MEM_ADDR6	| 1 MEM_ADDR5	| 1 SYS_ERR
| 1 SYS_CLK	| 1 MEM_ADDR4	| 1 PHY0_RX0D0	| 0 MEM_ADDR3
| 1 MEM_ADDR2	| 1 PHY0_RX0D2	| 0 MEM_ADDR1	| 1 MEM_BA0
| 1 MEM_BA1	| 0 MEM_RAS#	| 1 MEM_ADDR0	| 1 MEM_CAS#
| 0 MEM_WE#	| 1 MEM_CLKOUT0	| 1 MEM_CLKEN0	| 0 MEM_CLKOUT1
| 1 MEM_CLKEN1	| 1 PHY0_RX0D3	| 0 BANKSEL0#	| 0 BANKSEL1#
| 1 MEM_DATA0	| 1 MEM_DATA1	| 1 MEM_DATA2	| 1 PHY0_RX0ERR
| 1 MEM_DATA3	| 1 DQM0	| 0 MEM_DATA4	| 1 PHY0_RX0CLK
| 1 MEM_DATA5	| 0 MEM_DATA6	| 1 PHY0_RX0DV	| 1 MEM_DATA7
| 0 PHY0_CRS0	| 1 MEM_DATA8	| 0 MEM_DATA9	| 1 PHY0_COL0
| 1 MEM_DATA10	| 0 MEM_DATA11	| 1 DQM1	| 1 PHY0_TX0CLK
| 1 MEM_DATA12	| 1 MEM_DATA13	| 1 MEM_DATA14	| 1 MEM_DATA15
| 0 MEM_DATA16	| 1 EMC0_MDCLK	| 0 EMC0_MDIO	| 1 MEM_DATA17
| 0 IIC_SCL	| 1 MEM_DATA19	| 0 MEM_DATA18	| 1 MEM_DATA20

3.   Implementation Information

This chapter summarizes some information about the implementation of the JTAG-Booster and describes some restrictions.

- The JTAG-Booster currently uses Boundary Scan to perform Flash programming. The Debug Interface of the PPC405 is not used.

- The software assumes the following scheme for connecting the Flash-EPROM to the IBM PPC405xxx. Please contact us, if you have used a different method.

PPC405EP signal	8 Bit Flash	16 Bit Flash	32 Bit Flash
PER_CS0# PER_CS1# PER_CS2# PER_CS3# PER_CS4#	CS#	CS#	CS#
PER_OE#	OE#	OE#	OE#
PER_WBE1#	WE#	WE#	WE#
PER_ADDR0	A0	-	-
PER_ADDR1	A1	A1	-
PER_ADDR2..26	A2..26	A2..26	A2..26
PER_DATA0..7	D0..7	-	-
PER_DATA0..15	-	D0..15	-
PER_DATA0..31	-	-	D0..31

1.) PER_R/W# is set to output with high level during read cycles and is set to output with low level during write cycles.

2.) Only PER_WBE1# is switched as write strobe.

3.) All other signals are hold static during flash programming. The state of these signals is defined in the Initialization file.

4. Converter Program HEX2BIN.EXE

Since the JTAG-Booster software is not able to handle Intel-HEX or Motorola S-Record files, an separate converter tool is delivered with this product package.

Five types of HEX formats can be converted to BIN file:

- I : INTEL HEX format (BYTE oriented)

- D : Digital Research

- M : MOTOROLA S HEX format (BYTE oriented)

- T : TEKTRONICS HEX format (BYTE oriented)

- H : Intel HEX-32

Maximum conversion size is 256 kBytes. A 4th parameter for starting address can be specified to skip out the leading garbage and you will maintain a small size of output binary file.

If you start the HEX2BIN without any additional parameter all necessary parameters will be asked for in a prompt mode:

```
HEX2BIN
Input HEX file name: MYAPP.H86
Output BIN file name[MYAPP.BIN]:
HEX file format
<I>ntel /<M>otorola /<D>igital Research /<T>ektronics /[H] Intel HEX-32[I] : H
Input CODE segment start address[0000000]: 10000
Input CODE segment end address[FFFFFFF]:
Unused bytes will be <1>00 <2>FF  [1] : 2
```

Instead of using the prompt mode, you can directly specify all necessary parameters in the command line. This is essential for making batch files:

```
HEX2BIN  MYAPP.H86  MYAPP.BIN  H  0010000  FFFFFFF  2
```

It is very important to fill unused bytes with 0xFF, because this are simply skipped by the JTAG-Boosters software and so it speeds up the programming performance.

Please Note: **"CODE segment start address"** is interpreted as a Intel x86 architecture segment address: You have to specify a start address of 10000 to start the conversion at 1 MByte.

This converter is a relatively old DOS tool and therefor it has problems with non DOS compliant file and directory names. Avoid names with spaces, limit names to eight characters. Otherwise the converter does not convert the input file, without any error message!!

5. Support for Windows NT, Windows 2000 and Windows XP

A configured run time version of the "Kithara DOS Enabler, Version 6.x" is used to give support for some of our DOS based tools (like the JTAG-Booster) for Windows NT, Windows 2000 and Windows XP. After installation of the "DOS Enabler" the accesses to the LPT ports are allowed for the all programs listed in file Readme_WinNT.txt

Note: Accesses to the ports are only allowed for the programs listed in file Readme_WinNT.txt. If you rename one of our tools, the DOS Enabler does not work.

Important: You need administrator rights to install or de-install this program.

5.1. Installation on a clean system

If you have a clean system without having installed a previous version of the "Kithara Tool Center", this tool is really simple to install. Extract the ZIP file to a new folder and start KSETUP.EXE. Everything is done within a few seconds. No additional input is needed. Now reboot your PC.

5.2. Installation with already installed version 5.x/6.x of Kithara

If you have already installed an older WinNT support (Kithara Version 5.x or 6.x), you have to de-install it 1st as described in chapter 5.4.

After rebooting your PC you can install the Kithara 6.x as described above.

5.3. Installation with already installed version 4.x of Kithara

Important!! If you have already installed an older WinNT support, you have to deinstall it completely!!!

- Start kcenter

- Select Register "Einstellungen" (=Settings)
  and deactivate "VDD benutzen"
  and "speziellen seriellen Treiber benutzen".

- Stop Kernel

- exit the kcenter program

- Now you can deinstall the Kithara Package with:
  Settings - Control Panel.
  All unused parts must be removed.

- Reboot your PC

- Now you can install the Kithara 6.x as described above.

5.4.   De-Installation version 5.x/6.x:

For deinstallation of the runtime version of the "Kithara DOS-Enabler Version 5.x/6.x":

- use: Settings - Control-Panel - Add/Remove Programs
  and remove the
  "FS FORTH-SYSTEME WinNT Support"
  and/or
  "WinNT Support for JTAG-Booster and FLASH166"

- Reboot your PC

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